Assets or Liabilities?

The Need to Apply Fair Regulatory Values to Australia's Electricity Networks

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1 Executive Summary

1.1 Background

Dramatic increases in the prices of Australia's electricity networks over the past decade has prompted numerous reviews, inquiries and studies into the extent to which deficiencies in the regulatory framework are contributing to the price rises.

Those studies have consistently concluded that excessive regulatory asset bases (RABs) are the key driver of the networks' excessive prices and that the networks' prices will continue to be retained at excessive levels unless their RABs are reduced to efficient levels.

This has led to calls from various stakeholders for the electricity networks' RABs to be written down.

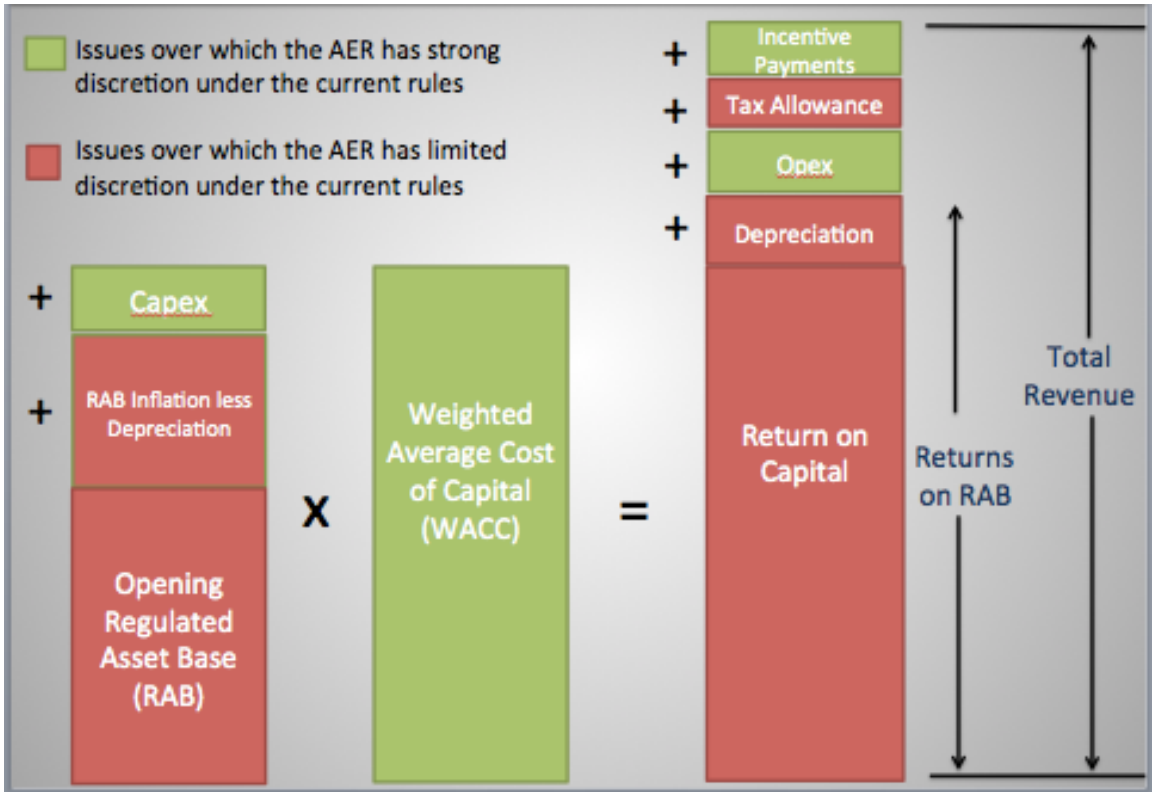
Previous reviews into the case for RAB write-downs have predominantly focused on quantifying the extent to which inefficient investments have contributed to the excessive RAB valuations.

Stakeholders' responses to those reviews identified the need for a broader and more in-depth assessment of all of the drivers of the electricity networks' excessive RABs, including a detailed assessment of the RAB valuation methodology. This study was performed in response to those calls.

The key conclusions of the study are outlined below.

1.2 Returns on RABs are the Primary Driver of The Networks' Prices

The diagram below illustrates how returns on RABs are the primary driver of the electricity networks' revenues and prices.



The networks receive guaranteed returns on their RABs in the form of 'return on capital' and 'return of capital' (depreciation) allowances. Those returns account for the majority of the networks' revenues (e.g. they accounted for 74-77% of the Queensland networks' total revenue allowances over the past 5 years).

Under the current regulatory rules, the Australian Energy Regulator (AER) has limited control over the valuation of the networks' RABs, as the RAB valuation methodology is essentially "codified" within the rules.

The AER's inability to determine prices based on efficient RABs was demonstrated by the outcomes of the AER's recent revenue decisions, which resulted in the networks' prices being retained at excessive levels.

Returns on excessive RABs are the key driver of the networks' excessive prices and will continue to drive excessive prices as the networks' RABs continue to grow.

1.3 Deficiencies with the RAB Valuation Methodology

The RAB valuation methodology is the methodology used to determine the value of the electricity networks' RABs and how the RAB values are updated over time to take account of capital additions, depreciation and asset disposals.

There are a number of deficiencies with the RAB valuation methodology that have resulted in the networks' RABs being artificially inflated and inefficiently grown. The key deficiencies are outlined below.

1.3.1 The Setting Of Artificially High Establishment Valuations

The electricity networks' initial regulatory valuations were determined when the networks were established in the mid-late 1990s upon the break up of the previously vertically integrated entities.

There are a number of valuation methodologies that the regulators could have adopted when setting the networks' initial regulatory valuations. However, the regulators chose to apply the *Depreciated Optimised Replacement Cost (DORC)* valuation methodology – the methodology that resulted in the highest possible RAB valuations (and therefore prices) for the networks.

The regulators' decision to apply the DORC valuation methodology resulted in the Australian electricity networks' establishment *'RAB Per Connection'* levels being over three times the levels of the UK networks.

This paper demonstrates that the regulators' decisions to apply the excessive DORC valuations were not justified and were not in consumers' long-term interests.

1.3.2 The Incentivisation Of Inefficient Expenditure

1.3.2.1 The Ineffective Application of Optimisation Prior to 2006

The *Depreciated Optimised Replacement Cost (DORC)* valuation methodology required the regulators to *optimise* the ongoing RAB valuations to reflect the efficient value of assets needed to provide the required services.

This meant that if the networks invested in more network capacity than required, the regulators were required to exclude the value of the excess capacity from the regulatory asset base until such time as the additional network capacity was required.

However, in practice, the regulators rarely applied optimisations.

As a result, consumers were faced with the "worst of both worlds":

- Having the initial regulatory valuations set at the highest possible levels using the DORC valuation methodology, based on the expectation that the ongoing RAB valuations would be subjected to optimisation; and
- The regulators not actually applying the required optimisations to the ongoing RAB valuations

Consequently, the extent to which the threat of optimisation acted as a disincentive to over-investment prior to 2006 is debatable. However, it is clear that the removal of the optimisation and ex-post review provisions in 2006 was a major driver of over-investment.

1.3.2.2 The 'Investment Incentive' Rule Changes Introduced in 2006 Resulted in Extraordinary Levels of Over-Investment

In 2006 the AEMC made some major changes to the National Electricity Rules (NER) to deliver stronger investment incentives for the networks.

This included changes to the RAB valuation rules that effectively removed the optimisation requirement, together with changes that ensured that all future capex was automatically rolled into the RAB without any prudency or efficiency reviews.

Those rule changes incentivised extraordinary levels of over-investment by the networks.

1.3.2.3 The Levels Of Over-Investment Were Particularly High For The Government Owned Networks

The incentives for over-investment were particularly strong for the government-owned networks due to their lower borrowing costs and the additional pecuniary benefits that they realise from over-investment.

Overall, the government owned networks expended substantially more capital than the privately owned networks, both in absolute terms and after normalisation for changes in network outputs such as peak demand and energy delivered.

For example, those different investment levels have resulted in the government owned distributors employing around three times as much capital per connection as the privately owned distributors.

1.3.2.4 Exogenous Factors Do Not Explain The Networks' Different Investment Levels

Some networks claim that exogenous factors (e.g. differences in customer density, demand growth, reliability standards or ageing assets/historic under-investment) explain their higher investment levels.

Numerous reviews and studies have been performed over recent years to ascertain the reasons for the networks' different investment rates. All of those studies have firmly concluded that exogenous factors do not explain the dramatic differences in the networks' investment levels.

For example, when normalised for changes in demand:

- The Queensland and NSW distributors invested in growth related capex at 7 times the level of the Victorian distributors
- The Queensland and NSW transmission networks invested in growth related capex at 15-20 times the rate of the Victorian transmission network

All of the studies into the networks' different investment rates have concluded that the networks' ownership structure (i.e. whether the network is controlled by public or private owners) is the most significant driver of the networks' investment levels.

1.3.3 The AER's 'Return On Capital' Determination Methodology Is Inconsistent With The RAB Valuation Methodology

The cumulative value of RAB indexation accounts for a large component of the networks' RAB valuations, accounting for over 30% of some networks' 2015 RAB values.

Having such levels of 'artificial capital' contained within the networks' regulatory valuations is not necessarily troublesome provided that it is appropriately considered in the determination of the networks' 'return on capital' allowances.

However, the AER's methodology for determining the networks' 'return on capital' allowances is inconsistent with the RAB valuation methodology, as it does not appropriately deal with the impacts of indexation of the capital base.

The AER's methodology for estimating the required percentage returns (for both equity and debt) is based on the returns that investors require on their actual investments. However, the AER calculates its 'return on capital' allowances by multiplying those percentage returns to artificially inflated capital bases, resulting in the AER providing return on capital allowances well above the required levels

For example, this paper demonstrates that the above inconsistencies are resulting in the AER providing 'return on equity' allowances of around 4 times the level that equity investors actually require to invest in the networks.

1.3.4 The Inadequacy of the 'Post 2014' Ex-Post Review Provisions

In response to widespread concerns regarding over-investment and gold plating, the 2012 rule changes introduced some new provisions that theoretically provide the AER with the potential to perform 'ex-post' reviews of the efficiency of capex incurred after 2014.

However, those new provisions are subject to numerous caveats and constraints that are highly likely to render them ineffective.

This paper demonstrates that the lack of effective ex-post capex review provisions in the National Electricity Rules (NER) contrasts sharply with the provisions contained within the regulatory rules in other regulatory jurisdictions in Australia.

1.4 Outcomes of RAB Valuation Methodology Deficiencies

The key outcomes of the RAB valuation methodology deficiencies are as follows:

1.4.1 Excessive RABs

The RABs of Australia's electricity networks have been artificially inflated and inefficiently grown to excessive levels.

Over the past 15 years, the networks' RABs have increased by up to 414 percent. These extraordinary and unprecedented RAB growth rates have resulted in the Australian electricity networks' RAB levels being much higher than their international peers.

For example, the *RAB per connection* levels of Australia's distribution networks are now up to 9 times the levels of the UK networks.

1.4.2 Excessive Prices

With returns on the networks' RABs accounting for the majority of their revenues, the excessive RABs are resulting in excessive network prices.

The Australian electricity networks' RABs drive their prices to a much greater extent than their international peers, resulting in Australia having the highest electricity network prices in the world.

On average, Australian households are paying about twice as much for network charges as UK households and around 2.5 times as much as US households.

The networks' excessive prices are presenting significant hardship for residential consumers and major competitiveness challenges for Australian businesses.

1.4.3 Excessive Profits

As the electricity networks' prices have soared, so too have their profits.

Australia's electricity networks are extraordinarily profitable, realising many multiples of the returns being realised by Australia's best performing ASX50 companies. This paper demonstrates that Australian electricity networks are realising total returns of around 23 times the returns being realised in the construction sector and around 16 times the returns being realised in the telecommunications sector.

The electricity networks' returns are extraordinary from both an income and a capital growth perspective.

For example, this report analyses the actual returns being realised by Queensland electricity networks and identifies that:

- The Queensland networks are achieving annual return on equity levels of around 5-6 times the average returns of ASX50 companies
- Over the past 15 years the Queensland networks have grown their shareholder value by a factor of around 18, whereas most ASX 50 companies have struggled to grow their shareholder value by a factor of 1.5 over the period

1.5 Business As Usual is Unsustainable

The networks' excessive prices are resulting in consumers reducing their demand.

In addition, the excessive prices are resulting in consumers disconnecting from the networks - voluntarily and involuntarily - either because they can no longer afford to stay connected or because it is more cost effective to self generate; thereby further reducing demand.

The networks are responding by further increasing their prices to recover their guaranteed revenues over reduced volumes.

The inevitable outcome of the continuation of these trends is the well documented "death spiral" - i.e. as the move towards distributed generation increases, the burden of paying for the networks' costs will be placed on a smaller consumer base until those consumers can no longer afford to stay connected to the network.

In order to address Australia's unsustainable electricity prices it is imperative that the networks' RABs are re-valued to more appropriate levels.

1.6 Required RAB Reductions

This paper provides conservative estimates of "maximum efficient" RAB values that would apply to each NEM network in the absence of the RAB valuation methodology deficiencies.

The charts overleaf highlight the differences between the electricity networks' 2015 RAB valuations and the "maximum efficient" RAB valuations.

They outline that, **based on highly conservative assumptions:**

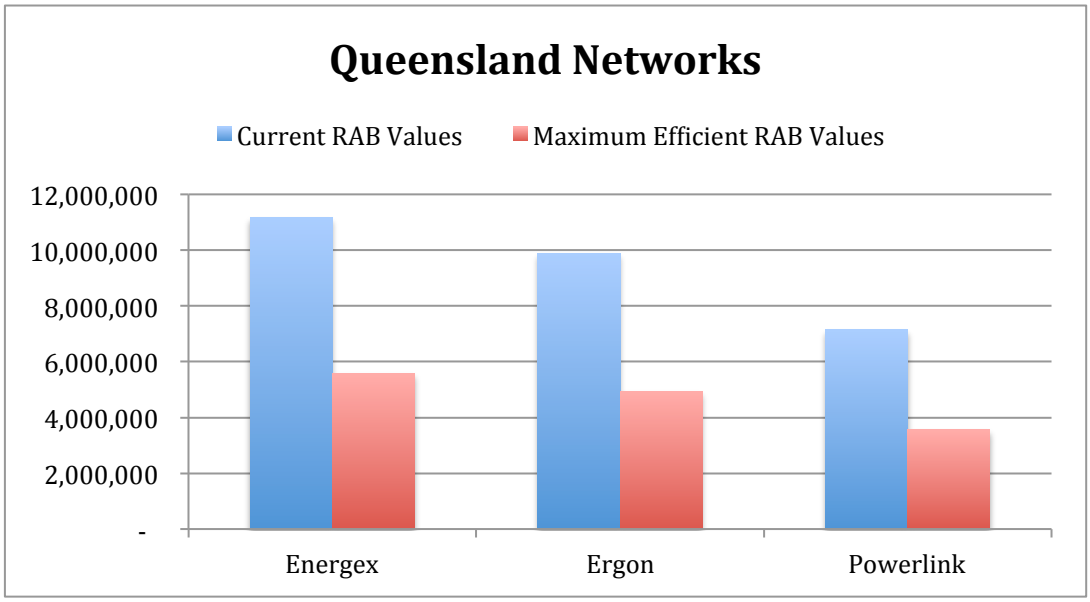
- The RAB valuations of the Queensland and NSW networks are at least twice the efficient levels
- The RAB valuations of the South Australian transmission network (ElectraNet) and the Tasmanian transmission network (Transend) are at least twice the efficient levels
- The RAB valuation of the ACT distributor (ActewAGL) is at least 64% above the efficient level
- The RAB valuation of the Tasmanian distributor is at least 59% above the efficient level
- The RAB valuation of the South Australian distributor (SAPN) is at least 41% above the efficient level
- The RAB valuations of the Victorian networks are at least 22-41% above the efficient levels

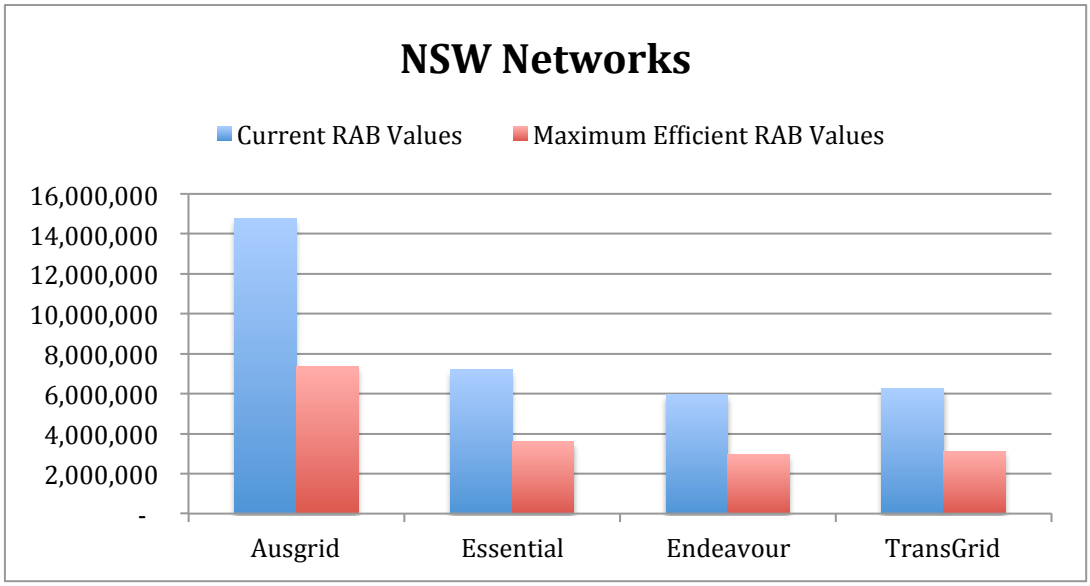
1.7 Estimated Price Reductions Of Applying Efficient RABs

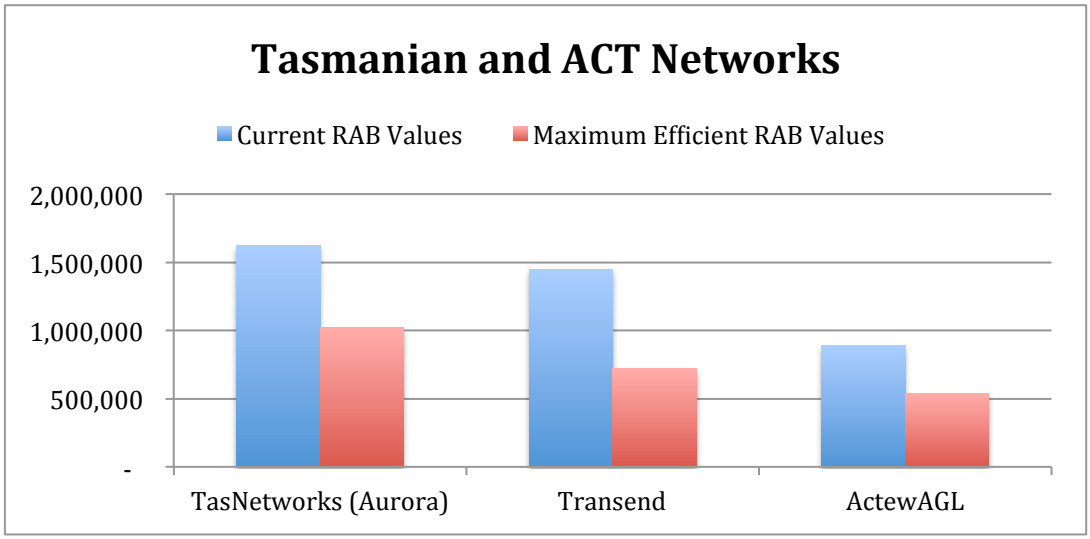
Implementing the required RAB reductions would result in the prices of those networks with the most excessive RABs (e.g. the Queensland and NSW networks) reducing by between 32-40%.

Price reductions of around 15-20% would apply to those networks that require lower RAB reductions.

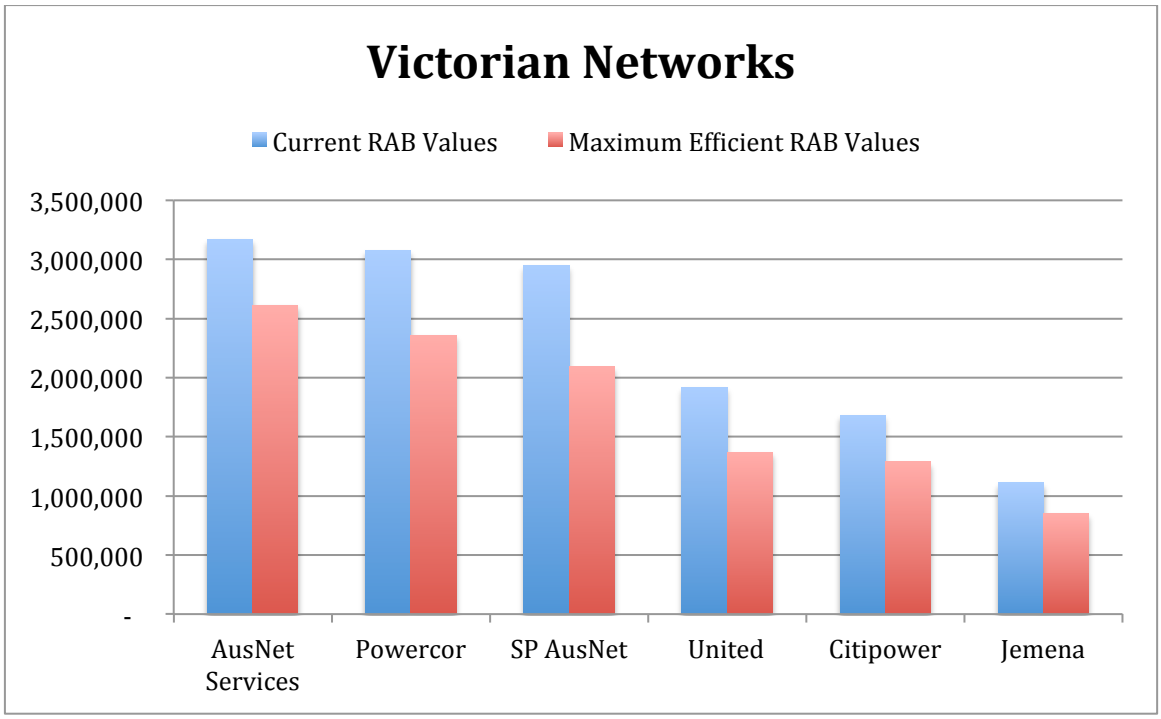
Required RAB Reductions by State – Queensland, NSW, Tasmania and ACT

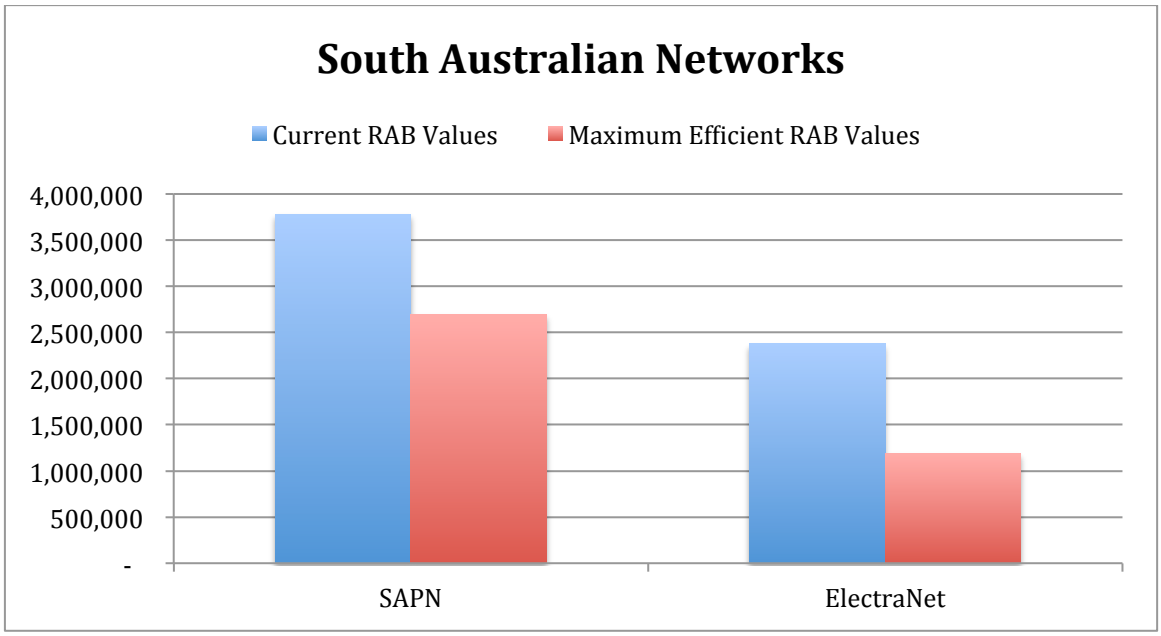






Required RAB Reductions by State – Victoria and South Australia





1.8 Determination of More Precise Calculations of Efficient RAB Valuations

This report does not purport to represent a precise calculation of the efficient RAB valuations for each electricity network.

The above "maximum efficient RAB valuations" have been calculated on the basis of highly conservative and transparent assumptions, supported with extensive evidence.

As foreshadowed by the *Senate inquiry into the Performance and Management of Electricity Network Companies),* this report proposes that an independent review is performed to determine fair regulatory valuations for Australia's electricity networks that better meet the National Electricity Objective (NEO) and better reflect consumers' long-term interests.

It is anticipated that the terms of reference of the independent review will include an assessment of the issues raised within this paper, with the overall objective of the review being to determine regulatory valuations for each NEM network that better meet the National Electricity Objective (NEO).

In light of the lack of confidence that consumers and other stakeholders have in the NEM reform process, it will be highly critical that the review body is independent of the regulatory institutions (the AEMC and the AER), and truly independent of any entities that benefit from the interests of Australia's electricity networks.

1.9 Stakeholder Impacts

This paper outlines the impacts of the proposed RAB reductions on the key affected stakeholders including the networks, consumers, energy supply chain participants, regulatory institutions and governments.

Importantly, it highlights that RAB reductions are not only in the electricity networks' long-term interests, but are also imperative for the viability of other energy supply chain participants, including the generators and retailers.

It outlines that energy generators and retailers will be amongst the most positively impacted stakeholders as they have recently been forced to write-down the values of their own investments due to the impacts of the networks' excessive prices.

1.10 Solutions

All independent analysts have concluded that the RABs of Australia's electricity networks will need to be written down, either by regulation or by choice.

The most effective and sustainable solutions will involve changes to the National Electricity Rules (NER).

However, there are solutions that can be implemented by the owners of the networks in the absence of changes to the rules, or as interim solutions prior to the implementation of the required rule changes.

This report outlines potential rule change and non-rule change solutions.

1.10.1 The Proposed Rule Change Solution

Implementing fair regulatory valuations for Australia's electricity networks that better meet the National Electricity Objective (NEO) will require changes to the National Electricity Rules (NER) that:

- Address the current excessive RAB valuations – i.e. reduce the networks' RAB valuations to efficient levels
- Ensure the prudency and efficiency of future capital additions to the networks' RABs, by incorporating more effective 'ex-post' review provisions
- Address the inconsistency between the AER's 'return on capital' determination methodology and the RAB valuation methodology

This paper outlines the specific rule change required to achieve the above objectives and provides guidance to potential rule change proponents on the development of a rule change proposal to meet the AEMC's rule change requirements.

1.10.1.1 The Challenges of the Rule Change Process

This paper outlines that over the past decade consumers' long-term interests have not been well served by the AEMC rule change process.

The information and resource imbalances, the overwhelming domination of the process by vested interests and the AEMC's systemic bias towards "investment certainty" have consistently thwarted consumers' long-term interests from being realised through the AEMC rule change process.

This paper outlines the considerable challenges that rule change proponents are likely to face when proposing the above changes and provides guidance on how rule change proponents should address those challenges.

1.10.2 Non Rule Change Solutions

Whilst the above rule change solution is the most sustainable response for addressing the deficiencies with the RAB valuation methodology, in light of the considerable challenges that rule change proponents will face in realising the required changes through the rule change process, it is anticipated that proponents of the required changes may also choose to advocate for solutions that can be implemented in the absence of rule changes.

This paper outlines two such solutions.

1.10.2.1 Voluntary Asset Write-Downs

The most rational non-rule change solution is for the networks' owners to voluntarily write down their RABs to sustainable levels.

In competitive sectors, when technologies and assets are made redundant by cheaper alternatives, or are clearly going to deliver less revenue than anticipated at the time of the investment, the value of the assets are written down. This is a rational decision that is commonly implemented in all other sectors of the Australian economy where capacity exceeds demand.

This paper explains why it is in the network owners' interests to voluntarily write down their asset valuations to protect their long-term business viability and to arrest the industry death spiral.

1.10.2.2 Reduce Prices To Sustainable Levels

As an alternative to voluntary asset write-downs, the networks could reduce the revenue they collect from consumers to levels that result in more sustainable prices.

The Australian Energy Regulator (AER) sets a limit on the maximum revenues that the networks are allowed to collect from their customers. The networks have complete autonomy regarding the actual revenue that they collect, as long as their total revenue does not exceed their maximum revenue caps.

Decisions to collect revenues below the AER's maximum revenue caps have been made by network owners in recent years – particularly by the state government owners in an attempt to provide some consumer relief from excessive prices.

Importantly, this solution can be implemented immediately and does not require any changes to the regulatory framework.

This solution is likely to be particularly attractive to state governments that own electricity networks as they attempt to better balance their conflicting roles of energy policy setter and network owner.

This paper highlights that successive state governments have consistently chosen short-term profits over sound long-term energy policy, by:

- Influencing the regulatory arrangements for electricity networks to enable their networks to achieve extraordinary profits; whilst
- Not fully considering the long-term consequences of inflicting excessive electricity prices on their communities and their state economies

This paper demonstrates that the continuation of the industry death spiral will ultimately be much more destructive to the long-term value of government owned energy companies than the short-term implications of reducing prices to sustainable levels.

2 Introduction

2.1 Background and Purpose

Dramatic increases in the prices of Australia's electricity networks over the past decade has prompted numerous reviews, inquiries and studies into the extent to which deficiencies in the regulatory framework are contributing to the price rises. [1]

Those studies have consistently concluded that excessive regulatory asset bases (RABs) are the key driver of the networks' excessive prices and that the networks' prices will continue to be retained at excessive levels unless their RABs are reduced to efficient levels.

This has led to calls from various stakeholders for the electricity networks' RABs to be written down.

Previous reviews into the case for RAB write-downs have predominantly focused on quantifying the extent to which inefficient investments have contributed to the excessive RAB valuations.

For example, reports were separately commissioned by the *Public Interest Advocacy Centre* (PIAC) [2] and the *Total Environment Centre* (TEC) [3] to assess the extent to which inefficient investments may have contributed to excessive RAB valuations for the NEM distribution networks.

Those reports concluded that the RABs of the government-owned distributors in Queensland, NSW and Tasmania had grown inefficiently compared to the RABs of the Victorian and South Australian distributors.

The PIAC report concluded that, on the basis of inefficient investment alone, a more realistic total valuation of the NSW distributors' electricity networks was $13 billion, rather than their total (June 2013) value of $22 billion.

The TEC report also indicated that, on the basis of inefficient investment alone, realistic valuations of the Queensland and Tasmanian networks are much lower than their current regulatory valuations.

The conclusions of those papers were strongly supported by various stakeholders whilst being strongly criticised by the electricity networks and their representatives.

Those responses identified the need for a broader assessment of all of the drivers of the electricity networks' excessive RABs, including a detailed assessment of the RAB valuation methodology.

This study was performed in response to those calls.

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[1] Senate Inquiry Into The Performance and Management of Electricity Network Companies, June 2015
Electricity Network Regulatory Frameworks: Productivity Commission Inquiry Report, 9 April 2013
Senate Select Committee on Electricity Prices: Reducing Energy Bills and Improving Efficiency, Independent Review Panel, Electricity Network Costs, Final Report, November 2012
Queensland Government Independent Review Panel (IRP) on Network Costs, Final Report, 2013
A comparison of outcomes delivered by electricity transmission network service providers in the NEM, EUAA, 2012
Australia's rising prices and declining productivity: the contribution of its electricity distributors, EUAA, 2011
Shock to the system: Dealing with falling electricity demand , Grattan Institute, December 2013
Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012
The Garnaut Climate Change Review Update, Paper 8: Transforming the Electricity Sector, 2011
The Energy Market Death Spiral - Rethinking Customer Hardship, Paul Simshauser and Tim Nelson, 2012

[2] PIAC: Privatisation and the regulatory valuation of electricity distribution network service providers in New South Wales: Evidence and Issues - a report for the Public Interest Advocacy Centre, CME, October 2014

[3] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

2.2 Paper Structure

This paper is structured as follows:

Chapter 3 outlines the importance of the regulatory asset base (RAB) in the determination of the networks' revenues and prices and explains how the networks' RAB valuations are determined.

Chapter 4 outlines the trends in the RAB valuations of Australia's electricity networks over the past 15 years and compares the Australian networks' networks' RAB trends with the trends of their international peers.

Chapter 5 outlines the impact of the networks' RABs on electricity prices. It demonstrates that the regulatory rules do not enable the AER to determine efficient RABs or efficient prices.

Chapter 6 provides a detailed critique of the deficiencies with the RAB valuation methodology that have resulted in the networks' RABs being artificially inflated and inefficiently grown.

Chapter 7 summarises the key outcomes of the RAB valuation methodology deficiencies and demonstrates that those outcomes are not meeting the National Electricity Objective (NEO).

Chapter 8 provides a detailed analysis of the least understood outcome of the RAB valuation methodology deficiencies – the networks' extraordinary profitability. It demonstrates that Australia's electricity networks are realising many multiples of the returns being achieved by Australia's best performing ASX 50 companies (e.g. 23 times the returns being realised in the construction sector)

Chapter 9 quantifies the magnitude of the problem. It provides conservative estimates of "maximum efficient" RAB values that would apply to each NEM network in the absence of the RAB valuation methodology deficiencies, and the price reductions that would apply from the required RAB reductions.

Chapter 10 provides an overview of solutions that would address the RAB valuation methodology deficiencies and better meet the National Electricity Objective (NEO) and the long-term interests of consumers, including:

- *Rule change solutions* – an outline of the changes that are required to the National Electricity Rules (NER) to implement fair regulatory valuations for the electricity networks
- *Non-rule change solutions* – solutions that can be implemented by the owners of the networks in the absence of changes to the National Electricity Rules (NER)

It outlines the impacts of the proposed solutions on the affected stakeholders including the networks, consumers, energy supply chain participants, regulatory institutions and governments.

Appendix 1 provides an overview of the key findings, conclusions and recommendations of various relevant studies and reviews into the drivers of the electricity networks' excessive prices.

Appendix 2 synthesises the findings and conclusions of various studies into the reasons for the electricity networks' different capital investment rates

3 The Regulatory Asset Base (RAB) and the RAB Valuation Methodology

3.1 What is the Regulatory Asset Base (RAB)?

The regulatory asset base (RAB) is intended to represent the value of the networks' unrecovered investments - i.e. the outstanding amount that the networks are required to pay back to their investors.

The RAB plays a central role in the regulatory framework for electricity networks.

It is a key driver of the networks' revenue allowances as it provides the basis for the determination of the networks' *return on capital* and the *return of capital* (depreciation) allowances, which account for the majority of the networks' revenues.

3.2 The RAB Valuation Methodology

The RAB valuation methodology is the methodology used to determine the value of the RAB and how it is updated over time to take account of capital additions, depreciation and asset disposals.

It is best understood by breaking it down to:

- The determination of the initial regulatory valuations when the electricity networks were established in the 1990's
- The determination of the ongoing valuations – to take account of capital additions, depreciation and disposals

3.2.1 The Determination of the Initial RAB Values

The electricity networks' initial regulatory valuations were determined when the electricity networks were established in the 1990's, upon the break up of the previously vertically integrated entities.

As outlined in Chapter 6 of this report, there are various asset valuation methodologies that the jurisdictional regulators could have adopted to determine the initial regulatory valuations.

The regulators chose to apply the *Depreciated Optimised Replacement Cost (DORC) valuation methodology* – a methodology that is intended to reflect the efficient depreciated replacement value of the assets needed to provide the required services.

3.2.2 The Determination of the Ongoing RAB Values

Since the establishment of the initial regulatory valuations, there have been changes to the rules regarding the determination of the ongoing RAB valuations. The resulting RAB valuation methodologies can be broadly considered as:

- The Pre-2006 RAB valuation methodology
- The 2006-2014 RAB valuation methodology
- The Post-2014 RAB valuation methodology

3.2.2.1 The Pre-2006 RAB Valuation Methodology

The adoption of the *Depreciated Optimised Replacement Cost (DORC)* valuation methodology required the regulators to periodically 'optimise' the ongoing RAB valuations to reflect the minimum value of assets required to deliver the required services.

This meant that if the networks invested in more network capacity than required, the regulators were required to exclude the value of the excess capacity from the regulatory asset base until such time as the additional network capacity was required.

Consequently, the 'Pre-2006' RAB valuation formula can be broadly summarised as:

Closing RAB = Optimised RAB + Efficient Capex - Depreciation – Disposals

3.2.2.2 The 2006-2014 RAB Valuation Methodology

In 2006 (2007 for the distribution networks), the AEMC made some major changes to the National Electricity Rules (NER) to better incentivise investment.

This included changes to the RAB valuation rules that removed the previous optimisation provisions, together with changes that ensured that all future capex was automatically rolled into the RAB without any prudency or efficiency reviews.

It also included the requirement for the application of indexation to the ongoing RAB valuations. [4]

The resulting "lock in and roll forward" approach can be broadly summarised as:

Closing RAB = (1 + indexation) x Opening RAB + All Capex Incurred - Depreciation - Disposals

3.2.2.3 The Post-2014 RAB Valuation Methodology

In response to concerns regarding over-investment by the networks, the 2012 rule changes included new rules aimed at providing the AER with the ability to perform 'ex-post' reviews of the efficiency of the networks' post-2014 capex where the networks spend above their total capex allowances.

The Post-2014 RAB valuation formula can be broadly summarised as: [5]

Closing RAB = (1 + Indexation) x Opening RAB + Capex Incurred – Inefficient (Above Allowance) Capex – Depreciation – Disposals

[4] NER Clause 6.5.1(e) (3)

[5] The actual formula includes adjustments to achieve the AER's mid year timing assumptions

4 RAB Growth Trends

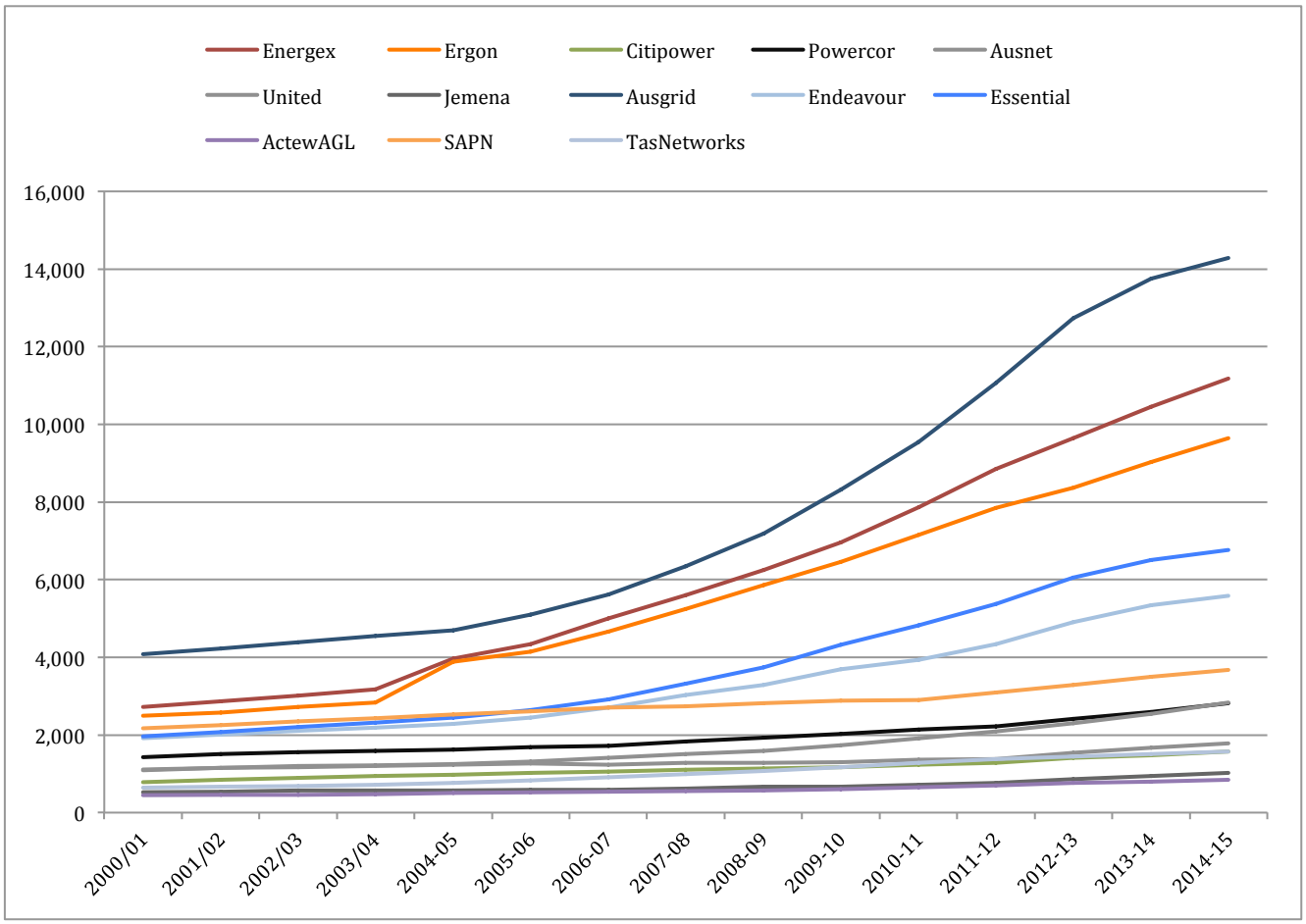
Over the past 15 years the RABs of Australia's network have grown by between 166-412%.

This chapter provides details of the Australian networks' different RAB growth trends and compares those trends with the trends in the RAB values of electricity networks in other countries.

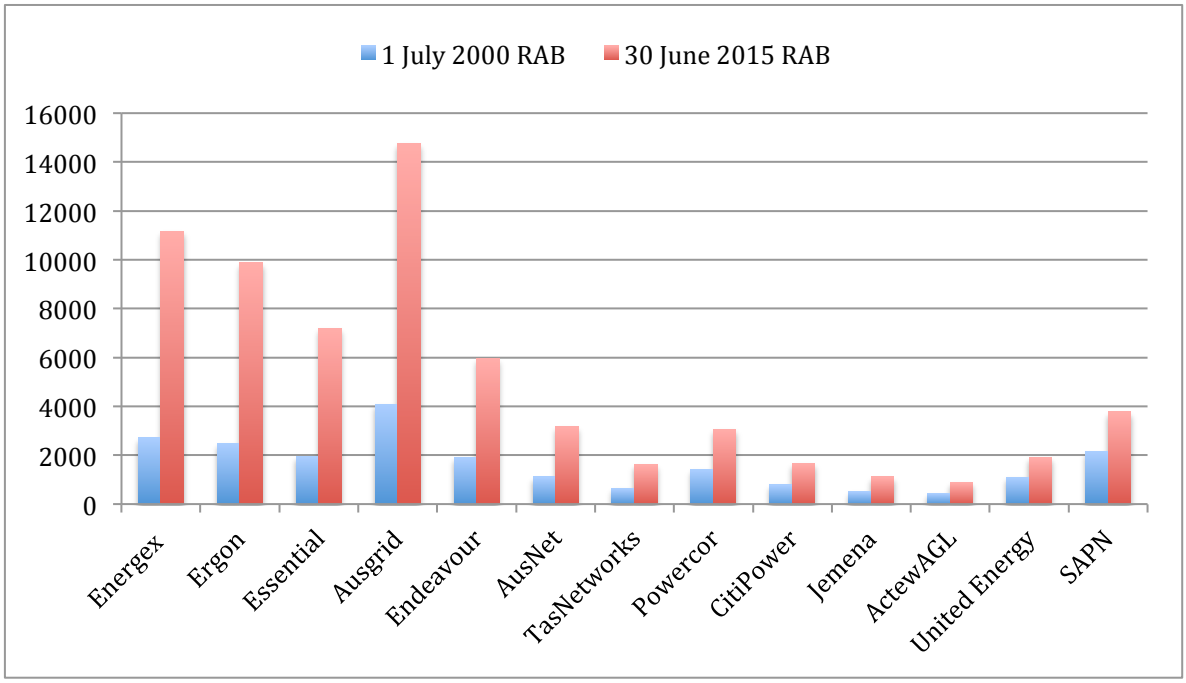
4.1 Distribution Networks

The chart below outlines the growth in the RABs of the 13 NEM distributors from 2000-2015.

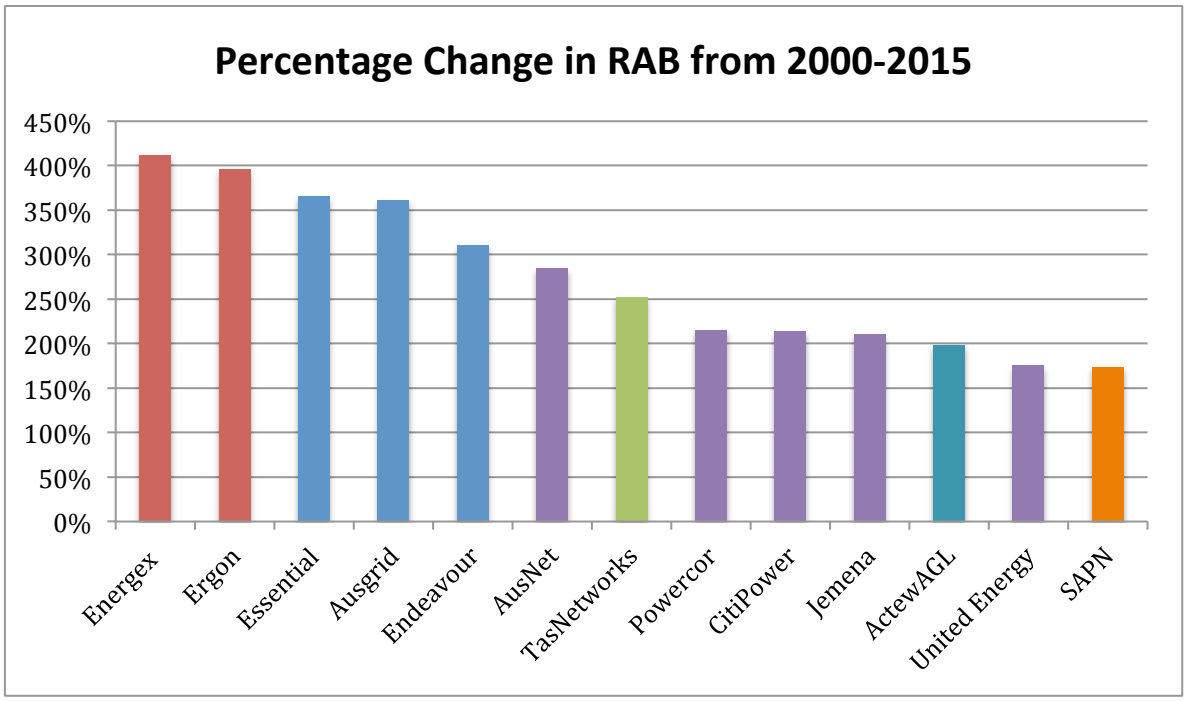
It illustrates that the majority of the distributors' RAB growth occurred after 2006, following the introduction of the 2006 investment incentives into the National Electricity Rules (NER) and the transfer of regulation of the networks to the Australian Energy Regulator (AER).



The chart below illustrates the changes in the RAB valuations for each NEM distributor from 2000 to 2015.

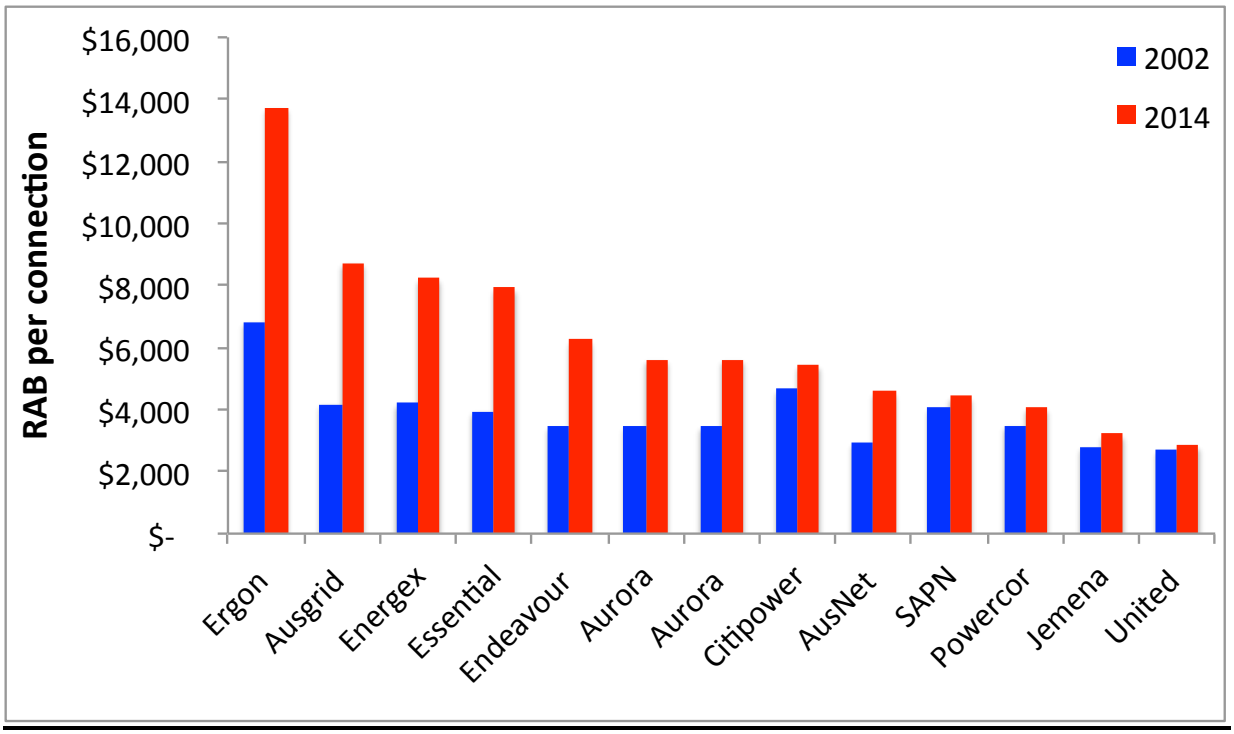


The chart below illustrates the RAB growth of each distributor in percentage terms. It illustrates that the distributors' RABs grew by between 174-412% with the RABs of the government-owned distributors in Queensland and NSW growing at much higher rates than the distributors in the other states.



The chart below illustrates the changes in the distributors' *RAB per connection* levels between 2002-2014. It illustrates that the RABs of the government owned distributors doubled over the period (in real terms), during which the RAB growth of the privately owned distributors was more modest.

Growth in The Australian Distributors' RAB Per Connection Levels From 2002 to 2014 [6]



4.1.1 The Different RAB Growth Rates of the Government and Privately Owned Distributors

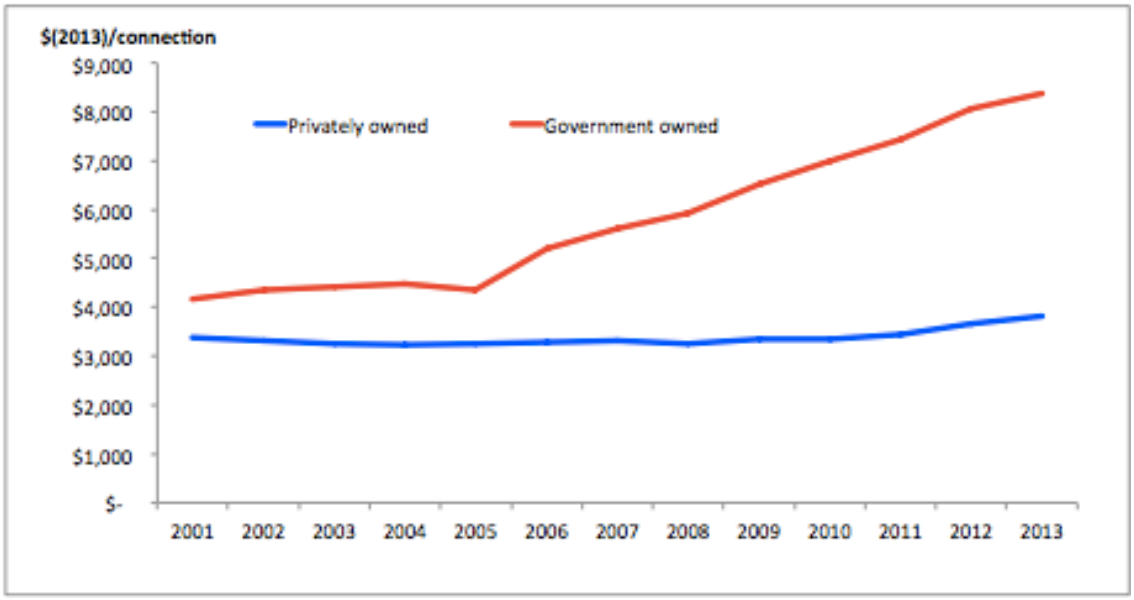
The diagram overleaf illustrates the overall growth in the distributors' RABs between 2001-2013, broken down to government and privately owned networks.

It illustrates that the total RAB per connection of the government owned distributors more than doubled (in real terms) between 2005-2013, during which the RAB levels of the privately owned distributors were relatively flat.

It illustrates that by 2013 the government owned distributors employed around three times as much capital per connection compared to their privately owned peers.

[6] CME Submission to the Senate Inquiry into the Performance and Management of Electricity Network Companies

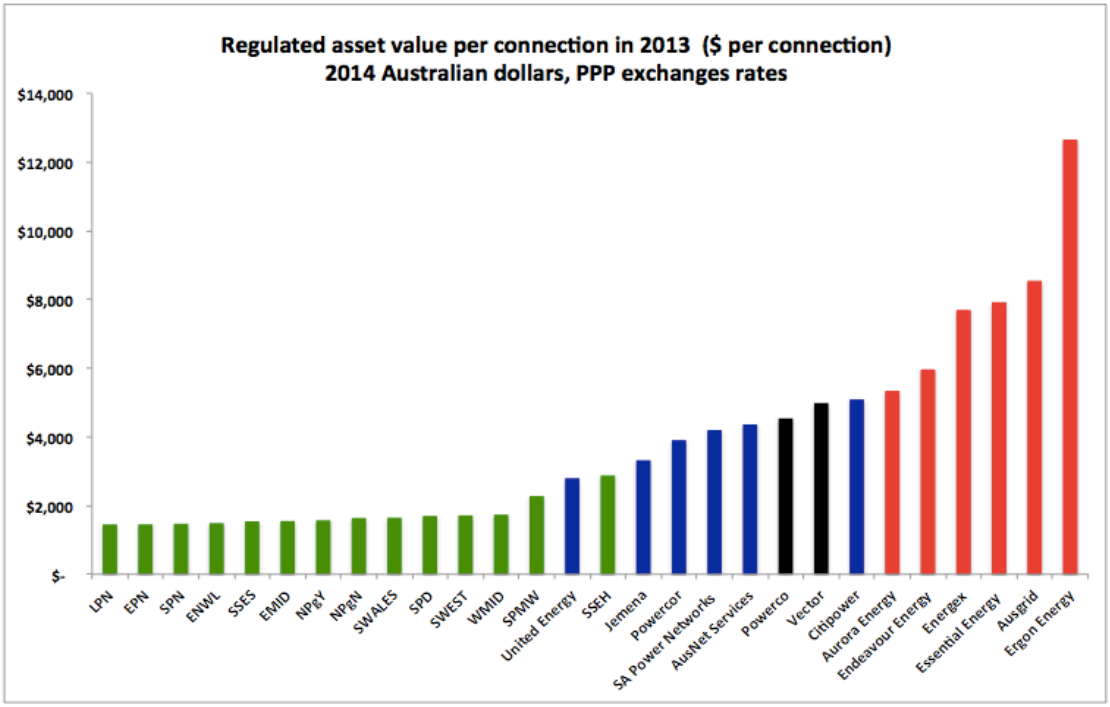
RAB Per Connection Trends of Australia's Distribution Networks [7]



4.1.2 International Comparisons

The chart below outlines the 2013 *RAB per connection* levels of 14 UK distributors, the two largest distributors in New Zealand and 12 distributors in the National Electricity Market.

Regulatory Asset Base (RAB) Comparisons – Australia, New Zealand and UK Distribution Networks [8]



[7] Australia's Rising Electricity Prices and Declining Productivity: The Contribution of its Electricity Distributors, EUAA, May 2011.

[8] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

It illustrates that:

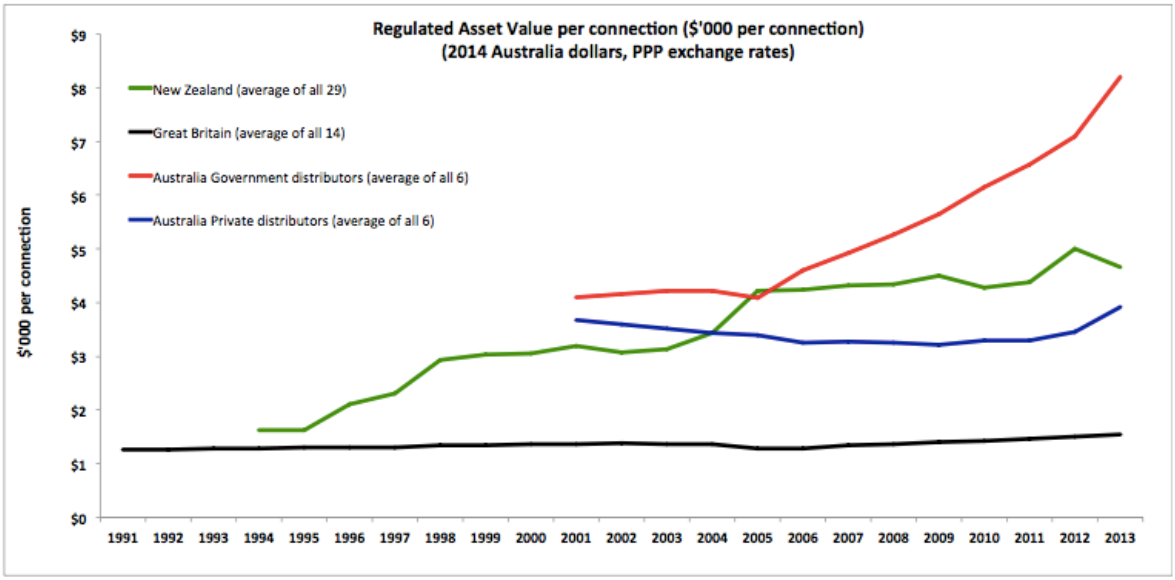
- The Australian distributors' RAB levels are much higher than their international peers
- The Australian government-owned distributors' RABs are significantly higher than the Australian privately owned distributors, and up to 9 times the levels of the UK distributors
- The lowest *RAB per connection* level in Australia is higher than the highest level in the UK
- The RAB levels of the two New Zealand distributors (Powerco and Vector) are similar to the privately owned Victorian distributors

The chart below outlines the trends in the *RAB per connection* levels of the UK, New Zealand and Australian distributors over the 22-year period to 2013. It illustrates that:

- The UK distributors' RAB levels remained stable over 30 years.
- The New Zealand distributors' RAB levels increased after the industry was corporatised but not regulated (from 1992 to 2004).
- Since the New Zealand distributors were regulated, their RABs have stabilised.
- The Australian government owned distributors' RABs increased dramatically since 2005

International *RAB Per Connection* Comparisons [9]

Figure 5. Times series of regulated asset values per connection



Source: Government statistic's agencies for inflation indices, (Bertram and Twaddle, 2005) for New Zealand from 1991 to 2002, regulatory data for all other asset values. CME analysis.

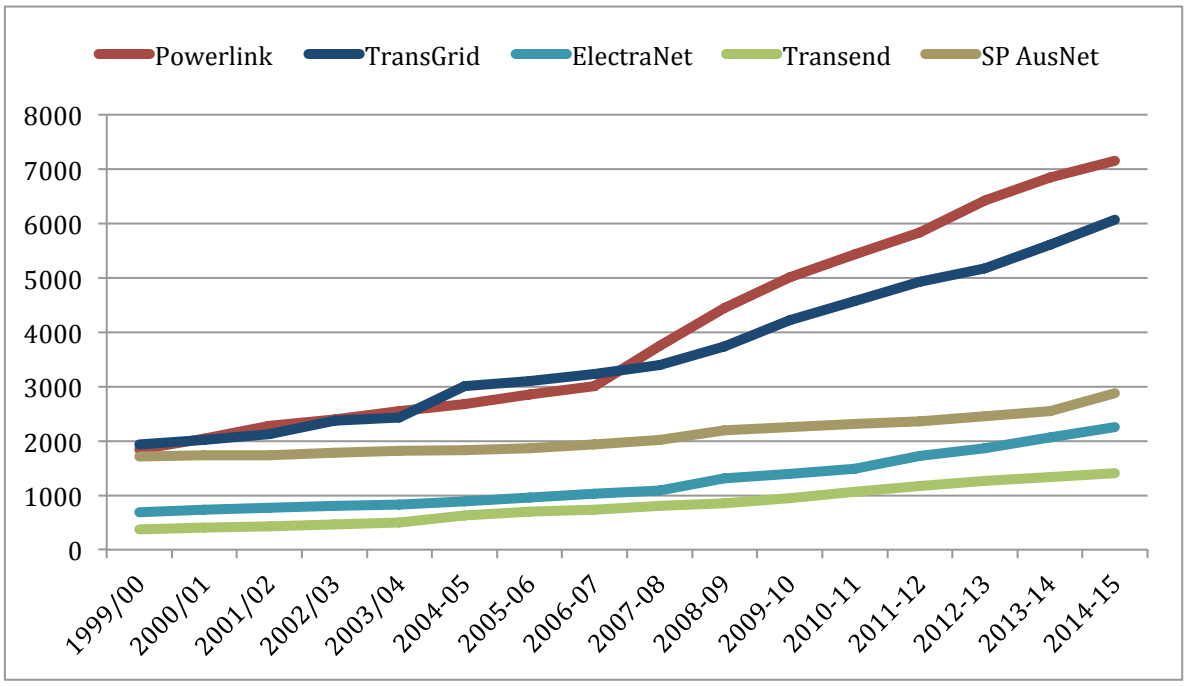
[9] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

4.2 Transmission Networks

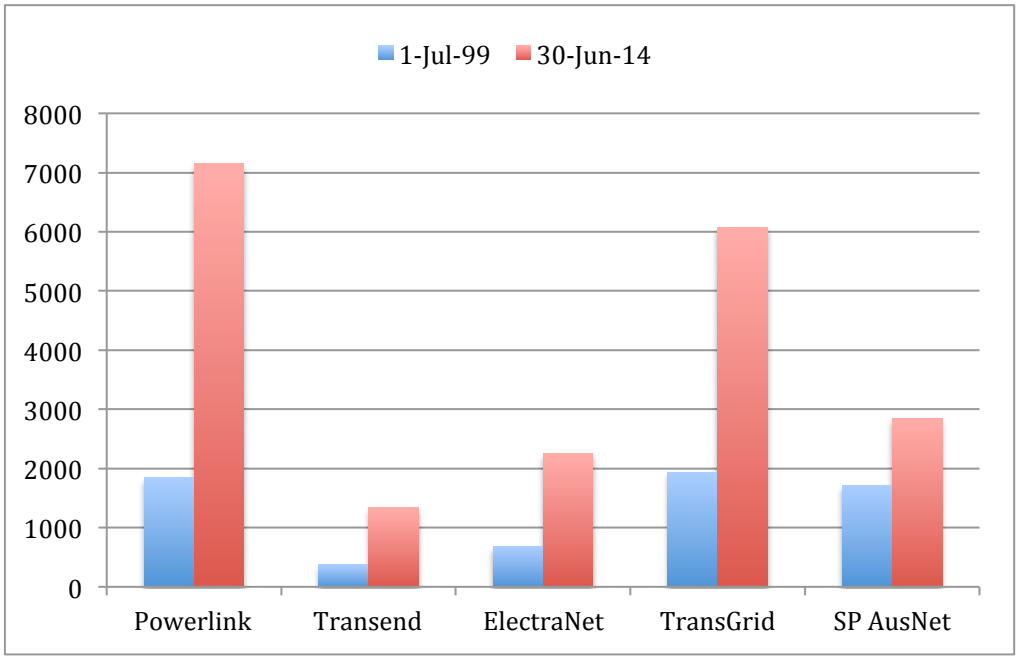
The chart below outlines the growth in the RABs of the 5 NEM transmission networks from 1999-2015.

It highlights there has been significant increases in the RABs of the transmission networks, except for the privately owned Victorian transmission network (SP AusNet).

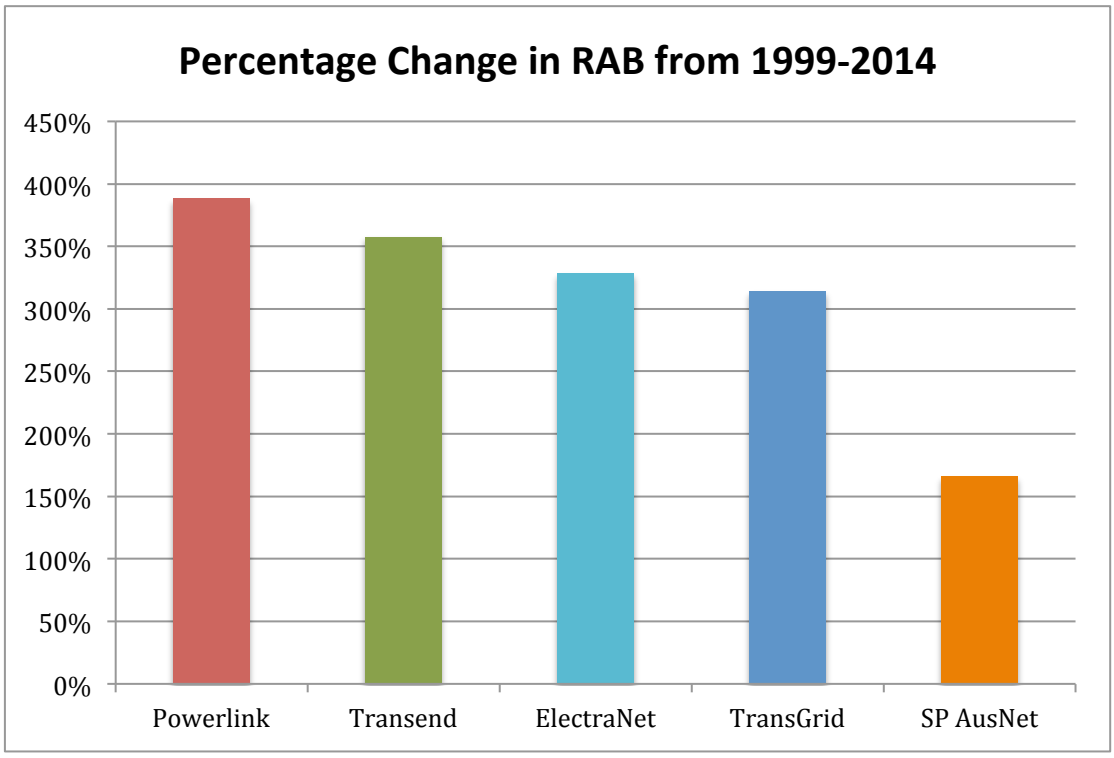
Similar to the distribution networks, the majority of the transmission networks' RAB growth occurred after 2006, following the introduction of the investment incentives into the National Electricity Rules (NER).



The chart below illustrates the overall changes in the RAB valuations for each transmission network from 1999-2014.



The chart below illustrates the RAB growth of each transmission network in percentage terms. It illustrates that the RABs of four of the five transmission networks grew at much higher rates than the Victorian transmission network (SP AusNet).



4.3 RAB Growth Components

The table overleaf provides a breakdown of the components of the RAB growth of each network over the past 15 years, broken down to:

- The opening RAB valuations
- Cumulative indexation on the opening valuations over the period
- Capital additions
- Cumulative indexation on capital additions over the period

State	Network	RAB Components	Actual Value ($bn)	Percentage of 2015 RAB
Queensland	Energex	▪ Opening (1 July 2000) Valuation	2.714	24.3 %
		▪ Indexation on opening valuation	1.175	10.5 %
		▪ Capital additions	6.019	54 %
		▪ Indexation on capital additions	1.263	11.3 %
		Total (2015) RAB	**11.172**	-
	Ergon Energy	▪ Opening (1 July 2000) Valuation	2.493	25.2 %
		▪ Indexation on opening valuation	1.079	11 %
		▪ Capital additions	5.167	52.3 %
		▪ Indexation on capital additions	1.133	11.4 %
		Total (2015) RAB	**9.873**	-
	Powerlink	▪ Opening (1 July 1999) valuation	1.842	25.8 %
		▪ Indexation on opening valuation	0.882	12.3 %
		▪ Capital additions	3.633	50.8 %
		▪ Indexation on capital additions	0.796	11.1 %
		Total (2015) RAB	**7.152**	-
New South Wales	Ausgrid	▪ Opening (1 July 2000) Valuation	4.078	27.6 %
		▪ Indexation on opening valuation	1.765	12 %
		▪ Capital additions	7.587	51.4 %
		▪ Indexation on capital additions	1.322	9 %
		Total (2015) RAB	**14.752**	-
	Essential Energy	▪ Opening (1 July 2000) Valuation	1.963	27.3 %
		▪ Indexation on opening valuation	0.851	11.8 %
		▪ Capital additions	3.687	51.3 %
		▪ Indexation on capital additions	0.687	9.5 %
		Total (2015) RAB	**7.187**	-
	Endeavour Energy	▪ Opening (1 July 2000) Valuation	1.916	32.2 %
		▪ Indexation on opening valuation	0.829	14 %
		▪ Capital additions	2.682	45.1 %
		▪ Indexation on capital additions	0.517	8.7 %
		Total (2015) RAB	**5.944**	-
	TransGrid	▪ Opening (1 July 1999) valuation	1.934	31 %
		▪ Indexation on opening valuation	0.874	14 %
		▪ Capital additions	2.792	44.6 %
		▪ Indexation on capital additions	0.642	10.2 %
		Total (2015) RAB	**6.241**	
Tasmania	TasNetworks Distribution	▪ Opening (1 July 2000) Valuation	0.643	39.6 %
		▪ Indexation on opening valuation	0.278	17.1 %
		▪ Capital additions	0.555	34.2 %
		▪ Indexation on capital additions	0.148	9.1 %
		Total (2015) RAB	**1.625**	-
	TasNetworks Transmission	▪ Opening (1 July 1999) Valuation	0.373	25.8 %
		▪ Indexation on opening valuation	0.176	12.2 %
		▪ Capital additions	0.731	50.5 %
		▪ Indexation on capital additions	0.166	11.5 %
		Total (2015) RAB	**1.447**	-

Australian Capital Territory	**ActewAGL**	▪ Opening (1 July 2000) Valuation	0.449	50.4 %
		▪ Indexation on opening valuation	0.194	21.8 %
		▪ Capital additions	0.196	22 %
		▪ Indexation on capital additions	0.052	5.8 %
		Total (2015) RAB	**0. 891**	-
Victoria	**Citipower**	▪ Opening (1 July 2000) Valuation	0.784	46.7 %
		▪ Indexation on opening valuation	0.304	18.1 %
		▪ Capital additions	0.476	28.4 %
		▪ Indexation on capital additions	0.115	9 %
		Total (2015) RAB	**1.679**	-
	Powercor	▪ Opening (1 July 2000) Valuation	1.424	46.9 %
		▪ Indexation on opening valuation	0.552	18 %
		▪ Capital additions	0.932	30.3 %
		▪ Indexation on capital additions	0.165	5.4 %
		Total (2015) RAB	**3.073**	-
	AusNet Services	▪ Opening (1 July 2000) Valuation	1.110	35 %
		▪ Indexation on opening valuation	0.430	13.6 %
		▪ Capital additions	1.452	46%
		▪ Indexation on capital additions	0.175	5.5 %
		Total (2015) RAB	**3.167**	-
	Jemena	▪ Opening (1 July 2000) Valuation	0.526	47.3 %
		▪ Indexation on opening valuation	0.204	18.4 %
		▪ Capital additions	0.334	30.6 %
		▪ Indexation on capital additions	0.047	4.3 %
		Total (2015) RAB	**1.111**	-
	United Energy	▪ Opening (1 July 2000) Valuation	1.091	57 %
		▪ Indexation on opening valuation	0.423	22.1 %
		▪ Capital additions	0.328	17.1 %
		▪ Indexation on capital additions	0.075	4 %
		Total (2015) RAB	**1.916**	-
	SP AusNet	▪ Opening (1 July 1999) Valuation	1.714	58.1 %
		▪ Indexation on opening valuation	0.751	25.5 %
		▪ Capital additions	0.347	11.8 %
		▪ Indexation on capital additions	0.138	4.7 %
		Total (2015) RAB	**2.949**	-
South Australia	**SAPN**	▪ Opening (1 July 2000) Valuation	2.169	57.4 %
		▪ Indexation on opening valuation	0.939	24.9 %
		▪ Capital additions	0.434	11.5 %
		▪ Indexation on capital additions	0.236	6.2 %
		Total (2015) RAB	**3.778**	-
	ElectraNet	▪ Opening (1 July 1999) Valuation	0.688	29 %
		▪ Indexation on opening valuation	0.317	13.3 %
		▪ Capital additions	1.173	49.3 %
		▪ Indexation on capital additions	0.199	8 %
		Total (2015) RAB	**2.377**	-

▪ The cumulative indexation values have been derived from the regulators' determinations over the period

5 The Impact of The Networks' RABs on Electricity Prices

5.1 Australia's Electricity Price Increases

Prior to 2006, Australia's electricity prices were reasonably stable with annual price increases closely tracking CPI. However, since 2006 Australia's electricity prices have increased sharply, whereas the prices in other countries have remained relatively stable.

On average, Australian electricity prices doubled from 2007 to 2012, although the increases varied by jurisdiction. [10]

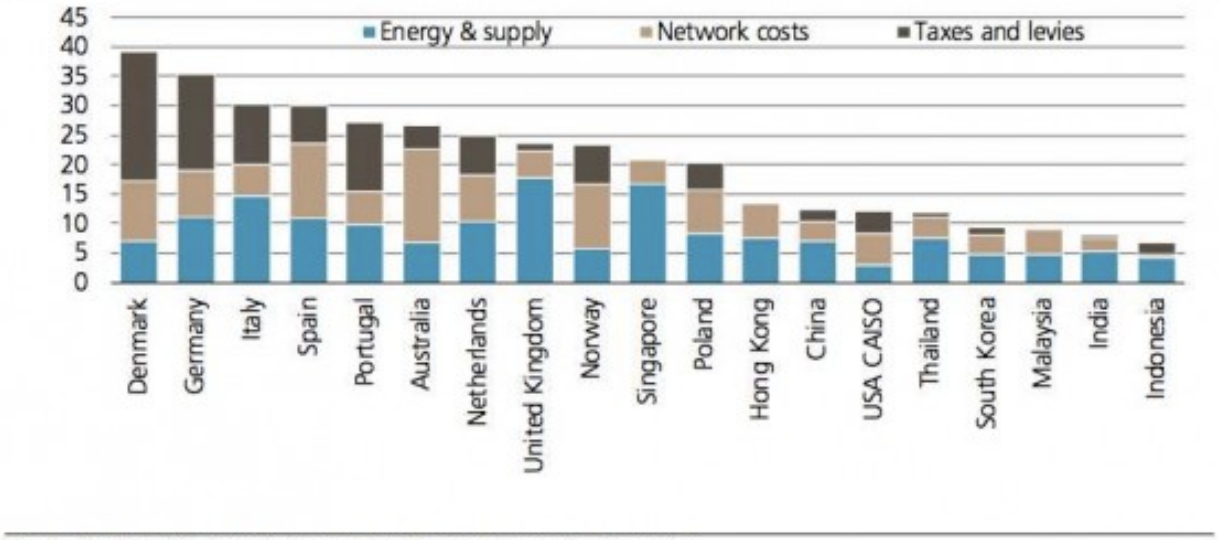
Those price increases are presenting significant hardship for residential consumers and major competitiveness challenges for Australian businesses.

5.2 The Contribution of Electricity Networks

Australia's electricity price increases over the past decade have been predominantly driven by dramatic increases in the prices of the electricity networks.

The chart below illustrates that network prices account for a much larger share of Australia's electricity prices than other countries. It illustrates that in 2013 Australia's average network charges accounted for around 60% of the total electricity price, whereas network charges accounted for between 20-25 % of electricity prices for other countries.

Figure 1: 2013 tariffs (US cents per kWh)



Note: Residential tariffs for Australia, Europe and the US; national average for Asian markets.
Source: Power utility companies, government databases, UBS estimates

That wasn't always the case.

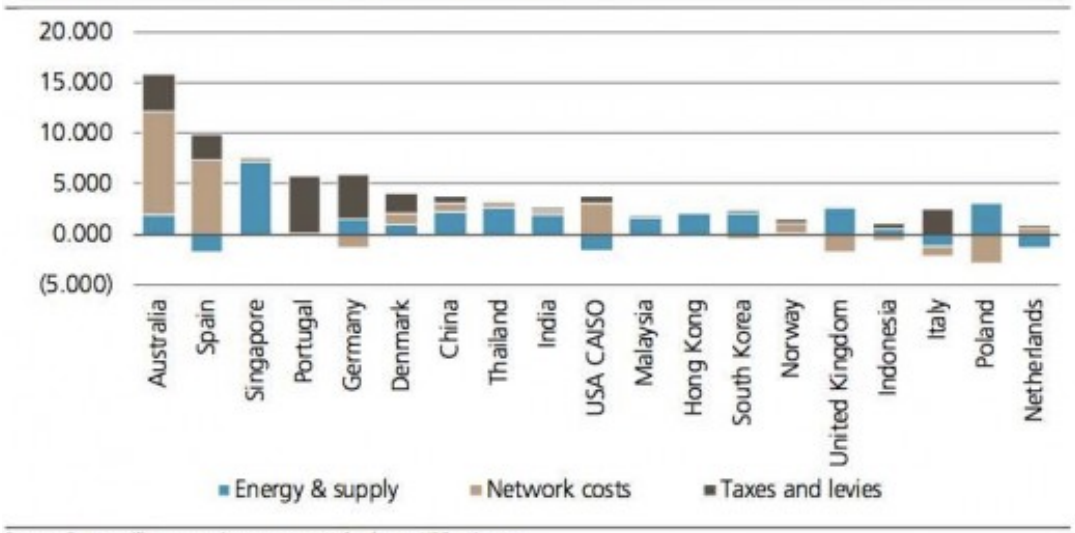
The chart overleaf illustrates the change in the key components of each country's electricity prices from 2007-13.

[10] Productivity Commission: Electricity Network Regulatory Frameworks - Inquiry Report, 26 June 2013

It illustrates that the vast majority of the growth in Australia's electricity prices was due to growth in network charges, which significantly outstripped the impact of changes in the other components.

By contrast, network charges have had a much smaller impact on the changes of electricity prices in other countries.

Figure 5: US cents per kWh change in power prices 2007-13



Source: Power utility companies, government databases, UBS estimates

5.3 The Queensland and NSW Networks Exhibited the Highest Price Increases

The Queensland and NSW networks exhibited the highest price increases.

5.3.1 Queensland Network Price Increases

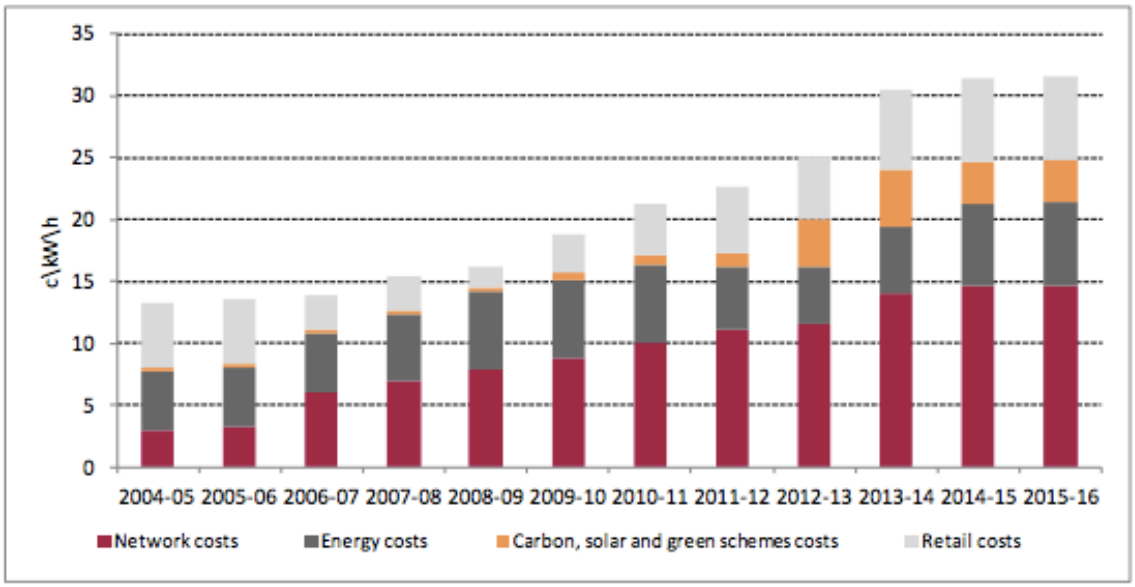
The chart overleaf illustrates the trends in Queensland's residential electricity prices (Tariff 11) over the past 11 years. [11]

It illustrates that:

- Queensland's residential electricity prices doubled from 2007/08 to 2013/14
- The price rises over the past decade have been driven by increases in network charges, which increased six-fold from 2004/05 to 2014/15, accounting for around 95% of the total electricity price increases during the period
- As a result, network charges now account for around half of Queensland's retail electricity prices, whereas in 2004/05 they accounted for around 20%
- By contrast, Queensland's generation and retail costs have remained relatively stable.

[11] Queensland Productivity Commission (QPC) Electricity Pricing Inquiry, Issues Paper, October 2015

Figure 3 Average Queensland annual Tariff 11 cost component breakdown (c/kWh, nominal)



Source: Department of Energy and Water Supply

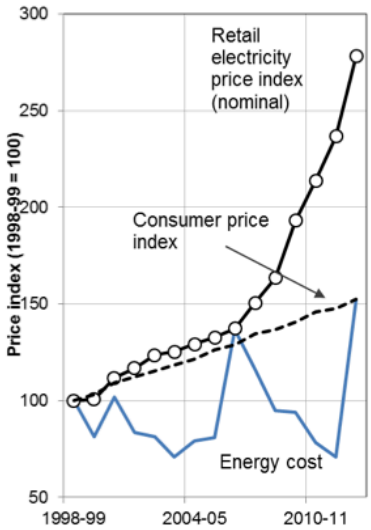
Based on all of the available information, Queensland's network charges are now the highest of any network in any region or country in the world, followed by the NSW networks.

5.3.2 NSW Network Price Increases

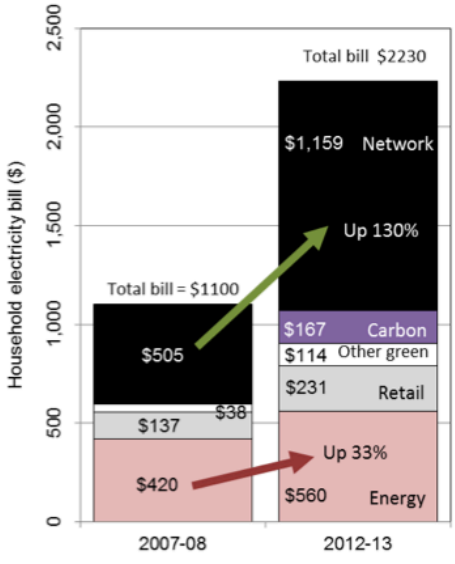
Over the 5-year period from 2007/08 to 2012/13, the average NSW residential consumer bill doubled.

The chart below [12] illustrates that the key driver of the increase was a 130% increase in network charges.

Capital city prices 1998-99 to 2012-13 (forecast)



New South Wales household electricity bill 2007-08 and 2012-13



[12] Productivity Commission: Electricity Network Regulatory Frameworks - Inquiry Report, 26th June 2013

5.4 The Extraordinary Profitability of Australia's Electricity Networks

As Australia's electricity network prices have soared, so too have their profits.

Chapter 8 of this report provides a detailed analysis of the actual profitability levels being realised by Australia's electricity networks.

It outlines that the networks are realising extraordinary profitability levels, many multiples of the returns being realised by Australia's best performing ASX50 companies (e.g. around 23 times the returns being realised in the construction sector and around 16 times the returns being realised in the telecommunications sector).

5.5 Returns on RABs are the Primary Driver of the Networks' Excessive Prices and Profits

Australia's electricity networks receive guaranteed returns on their RABs – returns that drive the majority of prices.

Numerous studies have concluded that: [13]

- The key driver of the networks' excessive prices and profits is returns on excessive RABs
- The electricity networks' RAB valuations are excessive due to deficiencies with the RAB valuation methodology that have resulted in the RABs being artificially inflated and inefficiently grown
- The networks' prices and profits will be retained at excessive levels unless their RABs are reduced to efficient levels

Chapter 6 of this report provides a detailed critique of the deficiencies with the RAB valuation methodology.

[13] Senate Inquiry Into The Performance and Management of Electricity Network Companies, June 2015
Electricity Network Regulatory Frameworks: Productivity Commission Inquiry Report, 9 April 2013
Senate Select Committee on Electricity Prices: Reducing Energy Bills and Improving Efficiency, Independent Review Panel, Electricity Network Costs, Final Report, November 2012
Queensland Government Independent Review Panel (IRP) on Network Costs, Final Report, 2013
A comparison of outcomes delivered by electricity transmission network service providers in the NEM, EUAA, 2012
Australia's rising prices and declining productivity: the contribution of its electricity distributors, EUAA, 2011
Shock to the system: Dealing with falling electricity demand , Grattan Institute, December 2013
Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012
The Garnaut Climate Change Review Update, Paper 8: Transforming the Electricity Sector, 2011
The Energy Market Death Spiral - Rethinking Customer Hardship, Paul Simshauser and Tim Nelson, 2012
Privatisation and the regulatory valuation of electricity distribution network service providers in New South Wales: Evidence and Issues - a report for the Public Interest Advocacy Centre, CME, October 2014
Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

5.5.1 The 2012 Rule Changes Did Not Address the Networks' Excessive RABs

In response to pressure from various stakeholders, in September 2011 the Australian Energy Regulator (AER) submitted a rule change proposal to the Australian Energy Market Commission (AEMC) aimed at providing the AER with additional powers and greater flexibility in the determination of the networks' revenues and prices.

Throughout the consultation process on the resulting 2012 rule changes, many stakeholders advised the AEMC that the changes being contemplated were insufficient and would not address the key driver of excessive prices – i.e. excessive regulatory valuations (RABs).

For example, in October 2011, the Major Energy Users (MEU) submitted a rule change proposal to "plug the missing gaps", proposing to reinstate the asset optimisation provisions that were contained in the pre-2006 rules. [14]

However, that proposal was denied by the AEMC.

Chapter 10 of this paper provides an overview of the MEU proposal and the AEMC's rationale for declining it.

The AEMC introduced some amendments to the National Electricity Rules in November 2012 – rule changes that the AEMC claimed would result in: [15]

*"Strengthening the capacity of the regulator to determine network prices so that **consumers don't pay any more than necessary** for the reliable supply of electricity and gas"*.

However, in reality, the 2012 rule changes ignored the most significant driver of excessive network prices – guaranteed returns on excessive regulatory asset bases (RABs) that have been artificially inflated and inefficiently grown.

As outlined by the *Senate Inquiry into the performance and Management of Electricity Companies:* [16]

- *"Despite numerous reviews, recent rule changes and positive signs from the AER as a result of its recent draft determinations, the committee considers that fundamental problems with the regulatory framework for electricity network businesses remain"*
- *"The principal flaw is that the framework protects network service providers from certain risks that businesses in competitive markets face. In particular, network businesses do not bear the risk of inefficient investments"*
- *"While there are several areas of the framework that may warrant attention, the committee considers the treatment of the regulatory asset bases (the capital expenditure investments of each network business) is the fundamental cause of high network costs and will continue to be a major driver of revenue for network businesses in the future"*
- ***"Regardless of other changes to the regulatory framework, consumers will continue to pay higher bills than necessary as long as the RABs are not reviewed"***

[14] MEU Rule Change Proposal, October 2011
[15] AEMC Final Position Paper: National Electricity Amendment (Economic Regulation of Network Service Providers)
[16] Senate Inquiry Into The Performance and Management of Electricity Network Companies, June 2015

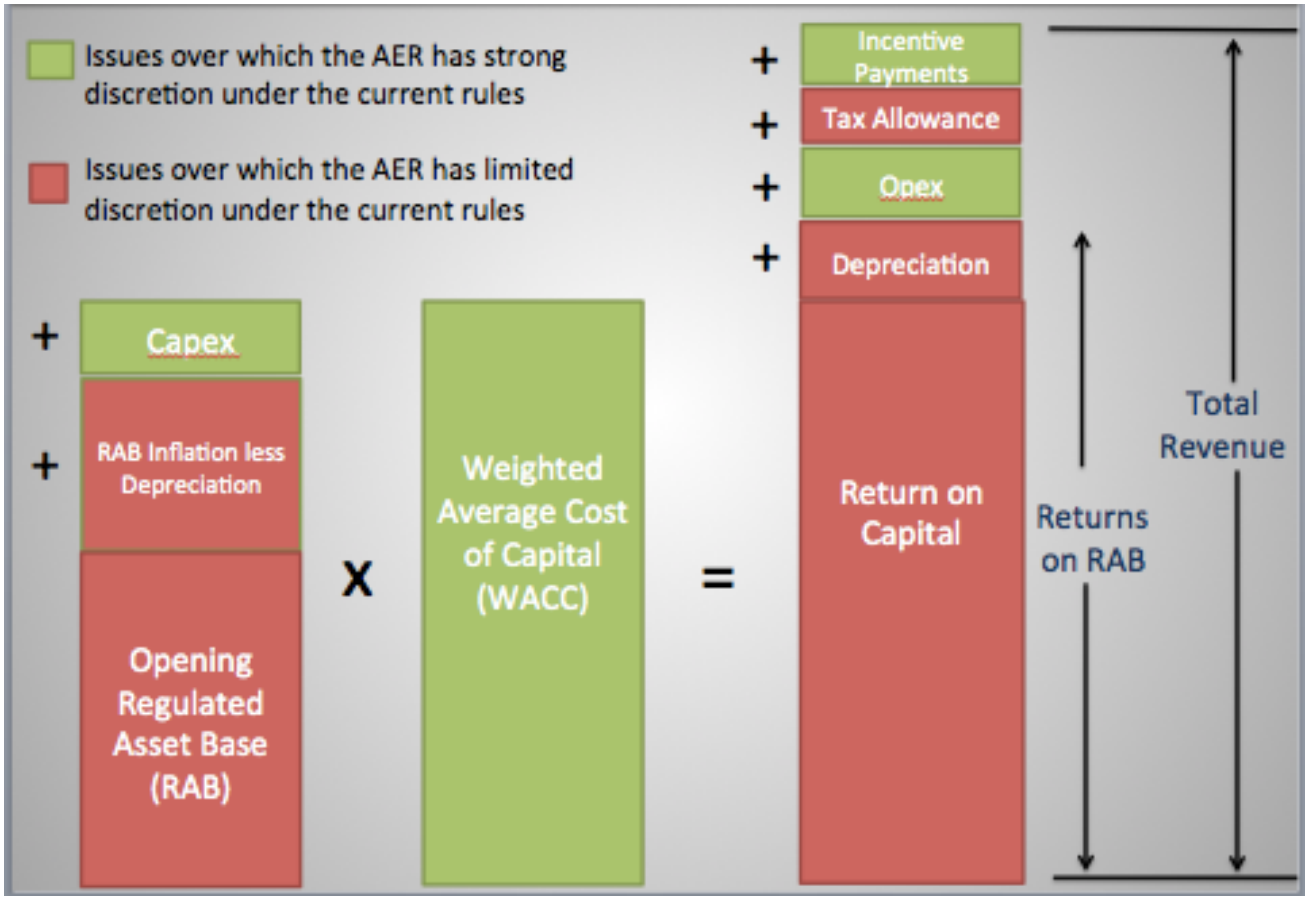
Similarly, as outlined by the Productivity Commission [17]

"The fundamental objective of the National Electricity Market (NEM) — the need for efficient investment in, and operation of, electricity networks in the long-term interests of consumers — has been frustrated by flaws in its (ever more) complex regulatory and institutional arrangements. ***Reforms made in late 2012, including improvements to the regulatory rules, better resourcing of the regulator and greater representation of consumers, have only partly addressed these flaws."***

Various political leaders and federal and state energy ministers have also highlighted that "gold-plating" has occurred and that the AER remains powerless to address the price impacts arising from excessive RABs. [18]

5.5.2 The Regulatory Rules Do Not Enable the AER to Determine Efficient Prices

The diagram below illustrates how the current regulatory rules limit the ability of the AER to determine efficient prices.



[17] Electricity Network Regulatory Frameworks: Productivity Commission Inquiry Report, 9 April 2013

[18] Prime Minister Julia Gillard address to the Policy Institute of Australia, 7 August 2012
Prime Minister Kevin Rudd address to the National Press Club, 11 July 2013
Queensland Energy Minister, Mark McArdle, 1 July 2014
NSW Minister for Resources and Energy, Chris Hartcher, 9 September 2012

The networks receive guaranteed returns on their RABs in the form of 'return on capital' and 'return of capital' (depreciation) allowances. Those returns account for the majority of the networks' revenues (e.g. they accounted for 74-77% of the Queensland networks' total revenue allowances over the past 5 years).

Under the current regulatory rules, the AER has limited control over the valuation of the networks' RABs, as the RAB valuation methodology is essentially "codified" within the rules.

The AER's inability to determine prices based on efficient RABs was demonstrated by the outcomes of the AER's recent revenue decisions, which resulted in the networks' prices being retained at excessive levels.

Importantly, the networks' excessive prices are being retained despite the major fall in interest rates compared to the previous regulatory period. If interest rates had remained at similar levels to the previous regulatory period, then the networks' prices would be significantly higher than the AER's recent determinations.

Returns on excessive RABS are still the key driver of the networks' revenues and will continue to drive excessive prices and profits as the networks' RABs continue to grow over the next regulatory period.

6 Deficiencies with the RAB Valuation Methodology

There are a number of deficiencies with the RAB valuation methodology for Australia's electricity networks that have resulted in the networks' RABs being artificially inflated and inefficiently grown.

The key deficiencies can be broadly categorised as:

- Deficiencies that have resulted in the RAB valuations being artificially inflated, i.e.:
  - The setting of artificially high establishment valuations; and
  - Deficiencies with the application of indexation to the ongoing RAB valuations
- Deficiencies that have resulted in the RABs being inefficiently grown, due to:
  - The incentivisation of inefficient investment
  - The inability to remove imprudent and inefficient expenditure
- Deficiencies arising from inconsistencies between the AER's 'return on capital' determination methodology and the RAB valuation methodology

These deficiencies are outlined below.

6.1 Deficiencies That Result In The RABs Being Artificially Inflated

6.1.1 The Setting Of Artificially High Establishment Valuations

The electricity networks' initial regulatory valuations were determined when the networks were established in the 1990's, upon the break up of the previously vertically integrated entities.

6.1.1.1 The Choice Of The RAB Valuation Methodology

The choice of the RAB valuation methodology has wide ranging consequences.

As returns on the networks' RABs account for a large proportion of the networks' revenues, RAB valuations are a key driver of the networks' prices. In addition, the RAB valuation methodology adopted has important implications for the incentives provided to the networks to appropriately invest in the network.

The National Electricity Code required the jurisdictional regulators to determine the networks' initial regulatory valuations. The code was not prescriptive regarding the valuation methodology to be adopted, other then requiring the regulators to have regard to the 1994 COAG Agreement. [19]

In effect, the 1994 COAG Agreement placed an upper limit or on the networks' regulatory valuations requiring that the valuations did not exceed the deprival value – which was generally defined as being the lesser of Depreciated Optimised Replacement Cost (DORC) or economic cost.

[19] National Electricity Code, Version 1, Clause 6.2.3

6.1.1.2 RAB Valuation Methodologies

There are a number of RAB valuation methodologies that the regulators could have adopted for the setting of the networks' initial regulatory valuations. Those methodologies can broadly be categorised as *value based* and *cost based* approaches.

6.1.1.2.1 Value Based Approaches

Value based approaches determine asset valuations on the basis of their cash generating capacity. This can be measured by the net present value of future cash flows or by the cash generated by selling the assets (the net realisable value).

Value based approaches are generally considered appropriate in competitive markets or where there is information available on how investors value the income stream from the assets.

As the UK networks were privatised prior to their first regulatory determinations, the UK regulator was able to establish the UK networks' initial regulatory valuations using a value-based approach.

As stated by the UK's Director General of Electricity Supply, Stephen Littlechild: [20]

"Replacement value is not the most appropriate basis for calculating the revenue which should be earned now in respect of existing assets if a lower revenue could yield an adequate return to shareholders investment"

"It seems to me appropriate to have regard to the money actually paid to purchase a company, not just to the value of assets in the accounts. The valuation of a company at flotation reflected what the original shareholders considered was the likely stream of future dividends, taking into account the information in a very full prospectus and the risks attached to the investment, and valuing the whole of each company. It would be wrong not to give considerable weight to this."

In the absence of market value information, value based approaches can be difficult to apply to regulated entities due to the "circularity" problem, as the asset valuations are determined by the value of the regulated revenues which, in turn, are based on the asset valuations.

6.1.1.2.2 Cost Based Approaches

The Australian regulators focused their choice of asset valuation methodology on *cost based* valuation approaches.

There are various cost based valuation methodologies that the regulators could have applied.

The two methodologies that received the most commentary in the regulators' determinations were the *Depreciated Actual Cost (DAC)* methodology and the *Depreciated Optimised Replacement Cost (DORC)* methodology.

The Depreciated Actual Cost (DAC) Methodology

Depreciated Actual Cost (DAC) represents the original cost of acquiring the asset reduced by the proportion of the asset service life that has expired.

It is Australia's most commonly used asset valuation approach, being extensively used in all sectors of the Australian economy.

[20] Distribution Price Control Proposals, Office of the Electricity Regulator, 1994

DAC has a number of advantages compared to other asset valuation approaches, including:

- The valuations can be determined with greater certainty than other methodologies
- It is inexpensive to implement and administer and can be easily audited as it relies on actual data rather than judgment
- It reflects the most accurate representation of the actual investment in the assets

The Depreciated Optimised Replacement Cost (DORC) Methodology

Depreciated Optimised Replacement Cost (DORC) is intended to reflect the efficient value of the assets needed to provide the required services.

In essence, DORC reflects the replacement cost of an 'optimised' system, less accumulated depreciation.

The key advantage of the DORC asset valuation methodology is that it requires the asset base to be *optimised* - i.e. it requires the exclusion of any unused or under utilised assets over the specified period, and allows for cost savings resulting from technological improvement.

Provided that the optimisations are performed properly, the DORC valuation methodology should ensure that over capacity and over engineered assets are not included in the capital base and are therefore not paid for by consumers.

However, the DORC valuation methodology has a number of major disadvantages, including:

- It results in the determination of the highest possible valuations (and therefore prices) of all of the asset valuation methodologies
- It is highly subjective, requiring the regulator to make a number of discretionary choices that are difficult to make due to information constraints and information asymmetries
- Its subjectivity can result in it being essentially unauditable
- It can involve excessive compliance and administration costs
- If the optimisations are not implemented properly it encourages over investment and 'gold plating'

The disadvantages of the DORC methodology were acknowledged by the Australian regulators:

For example, as outlined by the QCA: [21]

"The disadvantages of this approach include:

- *"Examination and assessment procedures are costly and more subjective judgement is required in determining the optimal network configuration and the degree of excess capacity deemed to be efficient; and*
- *The complexity of the process may be magnified by the asymmetry of information between the price setting body and the network owner"*

Despite those acknowledgements, the Australian regulators chose to apply the *Depreciated Optimised Replacement Cost (DORC)* methodology for the determination of the networks' establishment valuations.

[21] Queensland Competition Authority 2001-05 Revenue Determinations for Energex and Ergon

6.1.1.3 Application Of The DORC Methodology Resulted In The Highest Possible Valuations

In essence the regulators' choice of the DORC valuation methodology resulted in the highest possible regulatory valuations for the networks, as any valuations higher than DORC would encourage competitors to compete with the network.

This is explained by economists as the "new entrant exclusion" theory, which considers that prices based on DORC valuations represent the maximum prices that asset owners can charge, as prices above that level would incentivise "new entrants" to replicate or bypass the assets.

The choice of the DORC valuation methodology resulted in the Australian networks' establishment *'RAB Per Connection'* levels being around 3 times the levels of the UK networks. [22]

Many independent stakeholders were highly critical of the Australian regulators' decisions to apply the DORC valuation methodology and consider that the National Electricity Objective (NEO) and consumers' long-term interests would have been better served if the networks' establishment valuations had been determined on the basis of historical costs (e.g. using the Depreciated Actual Costs (DAC) valuation methodology) rather than the DORC valuation methodology.

6.1.1.4 Perspectives on Motivations for the Choice of DORC

A review of the critiques of independent industry analysts and economists, together with an assessment of the limited commentary provided by the regulators regarding their choice of DORC, indicates that the jurisdictional regulators rapidly converged on DORC as their preferred valuation methodology with scant justifications. [23]

Professor David Johnstone - Australia's most eminent independent expert on the design and application of asset valuation methodologies, has provided various scathing critiques on the application of the DORC methodology to the valuation of Australia's electricity networks. [24]

In those critiques, Professor Johnstone is highly critical of the regulators' lack of justification for the application of DORC to the determination of the electricity networks' RABs:

"From the start and with little apparent resistance there was consensus between Australian regulators, particularly the ACCC and ORG that the single most appropriate valuation basis was current replacement cost or more specifically depreciated optimised replacement cost, commonly abbreviated to DORC"

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[22] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

[23] Replacement Cost Asset Valuation and Regulation of Energy Infrastructure Tariffs, D.J.Johnstone, 2003
Asset Valuation and Access', Discussion Paper No 365, Australian National University, April 1997
Productivity Commission Review of National Access Regime: Position Paper, 2001
Determining the regulatory asset base for utility price regulation, David M Newbery, 1997
Utility Asset Valuation – A User's Perspective, R. Booth, 16 June 200

[24] See for example:
Replacement Cost Asset Valuation and Regulation of Energy Infrastructure Tariffs, D.J.Johnstone, 2003
The DORC valuation model of regulated infrastructure assets, Johnstone, D.J. and Lonergan, W, 2006
Submission to the Senate inquiry into the Performance and Management of Electricity Network Companies, D Johnstone, December 2014

"Submissions to regulators and written determinations of the regulators themselves contain repeated, albeit scantly supported claims that DORC has a derivation in economic theory. This view has been recited to the point that its validity is widely taken for granted albeit without demonstration or acknowledged authority"

"I found it offensive that this formula was put forward as if it was economic scripture. The regulators fell for that, hook, line and sinker"

Professor Johnstone was also highly critical of the pressure that the state governments and asset owners applied to the regulators to arrive at the highest possible asset valuations for the networks: [25]

- *"It is difficult to avoid the inference that the entire DORC opus owes its existence to the broad (albeit not fail-proof) political acceptability of its answers, rather than to the veracity of its theory."*
- *"You certainly knew very clearly what the objectives were for the state government, and you would angle your economic arguments to suit. The contrivance worked really well until finally the tariff stream became embarrassingly large"*
- *"The state government pressure to take this money—effectively a tax—was massive. I remember talking to people working inside IPART at the time, and they just felt they were the meat in the sandwich. There was an answer that they had to come to"*
- *"It was clearly set up in the interests of the asset owners, which were both private and public"*

6.1.1.5 The Impact on the Networks' Balance Sheets

In effect, the DORC valuations adopted by the regulators reflected theoretical values that did not bear any relation to the actual investment in the networks.

As stated by Professor Johnstone: [26]

"The existing assets were valued on paper for the purposes of plugging into the tariff at, basically, a made-up number, rather than anything necessarily related to money that had been spent building those assets, which, in many cases, were very old"

A review of the statements made by the electricity networks at the time that their DORC valuations were established identifies that they made many assertions that the majority of their assets were very old and in need of replacement.

Based on the available information, it is reasonable to conclude that the DORC valuations determined by the regulators were at least 3 times the level that would have been determined if a historical cost valuation methodology such as DAC had been applied.

This had significant distortionary implications for the networks' balance sheets as the networks' owners structured their debt and equity levels to accommodate the artificially inflated DORC valuations. In reality, the networks were essentially funded by debt and it is unlikely that any of their 'book equity' was actually invested.

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[25] Evidence provided to the Senate inquiry into the Performance and Management of Electricity Network Companies, David Johnstone, March 2015

[26] Submission to the Senate inquiry into the Performance and Management of Electricity Network Companies, D Johnstone, December 2014

6.2 Deficiencies With The Application of RAB Indexation

6.2.1 The Rationale for RAB Indexation Has Not Been Substantiated

Following the establishment of the initial regulatory valuations, the regulators artificially inflated the networks ongoing regulatory valuations by applying annual indexation to the ongoing RAB valuations.

Whilst the application of indexation could be considered consistent with the DORC valuation methodology, by retaining the asset valuations at current replacement costs, as outlined in section 6.2 of this report, the regulators' reluctance to apply optimisations to the ongoing regulatory valuations together with the subsequent removal of optimisation from the rules in 2006, effectively meant that the DORC methodology was never actually implemented, other than for the determination of the networks' establishment values.

Consequently, the rationale for applying indexation to the pre-2006 RAB valuations was not actually substantiated.

Furthermore, as outlined in Chapter 3 of this report, the requirement to index the RAB was specified in the 2006 rule changes, but again the rationale for RAB indexation was not substantiated as part of those changes. [27]

6.2.2 Indexation Accounts For A Significant Component Of The Networks' RAB Values

The cumulative value of indexation accounts for a significant component of the networks' RAB values.

For example, as outlined in Chapter 4 of this report, the cumulative value of indexation from 2000-2014 accounts for over 30% of some networks' 2015 RAB values.

Having such levels of 'artificial capital' contained within the RAB is not necessarily troublesome provided that it is appropriately considered in the determination of the networks' return on capital allowances.

However, the AER's 'return on capital' determination methodology does not appropriately consider the impacts of RAB indexation.

6.2.3 The AER's Return On Capital Determination Methodology Is Inconsistent With The RAB Valuation Methodology

A key regulatory principle that is fundamental to building block revenue regulation is that the methodology for determining the networks' return on capital allowances must be consistent with the asset valuation methodology.

However, Chapter 8 of this report provides a detailed analysis that outlines that the AER's methodology for determining the networks' return on capital allowances is inconsistent with the RAB valuation methodology, as it does not appropriately deal with the impacts of indexation of the capital base.

[27] National Electricity Rules, Clause 6.5.1 (e) (3)

In essence, the AER's methodology for estimating the required percentage returns (for both equity and debt) is based on the returns that investors require on their actual investments. However, the AER calculates its 'return on capital' allowances by multiplying those percentage returns to artificially inflated capital bases resulting in the AER providing return on capital allowances well above the required levels.

This is resulting in Australia's electricity networks achieving actual return on equity levels of many multiples of the returns being achieved by the Australia's best performing ASX 50 companies (e.g. around 23 times the returns being realised in the construction sector and around 16 times the returns being realised in the telecommunications sector).

The AER has received critiques of the above inconsistencies over recent years.[28]

Those critiques have asserted that in order to address the inconsistencies within the current rules (which require the RAB to be indexed), the AER needs to either:

- Modify its methodology for estimating the required percentage returns to reflect that they will be applied to inflated capital bases; or
- Apply its percentage returns to capital bases (i.e. debt and equity bases) that are more reflective of the networks' actual investments

However, the AER does not appear to have accepted the critiques.

When responding to the critiques, the AER has consistently responded by commenting on 'second order' issues such as the implications for the treatment of depreciation and the smoothing of the networks' total returns over the asset life. [29]

In essence, the AER appears to be of the view that the total returns it is providing to the networks (i.e. *return on capital* plus *return of capital* allowances) are appropriate and that if the RAB is not indexed then the AER would increase the % WACC to achieve the same overall returns.

Importantly, the AER's responses have repeatedly failed to acknowledge that the AER's methodology for determining the networks' return on capital allowances is inconsistent with the RAB valuation methodology and is resulting in the AER providing *return on capital* allowances well in excess of the required levels.

Based on the AER's responses it appears that, in the absence of rule changes, the AER is unlikely to alter its approach to determining the networks' 'return on capital' allowances.

Chapter 10 of this report outlines solutions that can be implemented with or without changes to the AER's 'return on capital' determination methodology.

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[28] AER Consumer Challenge Panel CCP4 (Hugh Grant) Presentation on Powerlink Queensland's 2018-22 Revenue Proposal, April 2016
AER Consumer Challenge Panel CCP2 (Hugh Grant) Submission on the AER's preliminary 2015–20 revenue determinations for Energex and Ergon Energy, September 2015
AER Consumer Challenge Panel CCP2 (Bruce Mountain) submission on the AER preliminary decisions and revised proposals from Energex, Ergon Energy and SA Power Networks, July 2015

[29] The AER frequently responds to the critiques by referring to its Draft and Final Access Arrangement decision for APA GasNet Australia, 2013

6.3 The Incentivisation Of Inefficient Expenditure

6.3.1 The Ineffective Application of Optimisation Prior to 2006

The application of the *Depreciated Optimised Replacement Cost (DORC)* valuation methodology required the regulators to *optimise* the ongoing regulatory valuations - i.e. the RABs were required to be *optimised* to reflect the efficient value of assets needed to provide the required services.

This meant that if the networks invested in more network capacity than required, the regulators were required to exclude the value of the excess capacity from the regulatory asset base until such time as the additional network capacity was required.

Importantly, the DORC valuation methodology requires the exclusion of any unused or under-utilised assets beyond the specified planning horizon and allows for RAB reductions/write-downs due to technological improvements.

As stated by IPART: [30]

"Regulators need to have procedures in place to ensure that a regulated capital base includes only 'used and required to be used' assets. Avoiding such tests could allow the regulated entity to inflate its asset base. In particular, the Tribunal does not wish to allow a full commercial return on assets that are stranded as a result of poor investment decisions or adverse circumstances.

Consequently, prior to 2006, optimisation was considered to be an integral requirement in the determination of the networks' ongoing RAB valuations. Therefore, in theory at least, the risk of asset optimisation may have provided some level of disincentive for over-investment.

However, in practice, the regulators rarely applied optimisations.

Rather, the regulators predominantly accepted the networks' capex as being efficient and applied annual indexation to the RAB to maintain the networks' RABs at current replacement value.

As a result, consumers were faced with the "worst of both worlds":

- Having the initial regulatory valuations set at the highest possible levels using the DORC valuation methodology, based on the expectation that the ongoing RAB valuations would be subjected to optimisation; and
- The regulators not actually applying the required optimisations to the ongoing RAB valuations

Therefore, the extent to which the threat of optimisation acted as a disincentive to over-investment prior to 2006 is debatable.

However, as outlined below, it is clear that the removal of optimisation and ex-post review provisions in 2006 was a major driver of over-investment.

[30] IPART Discussion Paper: Rolling forward the regulatory asset bases of the electricity and gas industries, December 1998

6.3.2 The Over-Investment Incentives Introduced in 2006

In 2006 (2007 for the distribution networks), the AEMC made some major changes to the National Electricity Rules (NER) to deliver stronger investment incentives for the networks. [31]

As stated by the AEMC: [32]

"In order to encourage efficient investment the Revenue Rule provides for the initial value of the RAB to be 'locked-in' and rolled forward on a specified basis with no provision for ex-post revenue and optimization of the RAB (except in limited circumstances). ***Clarity about the valuation of the RAB over time provides a stronger incentive for long term capital investment"***

This included two key changes to the RAB revaluation rules that effectively removed the previous optimisation provisions: [33]

- **Specification of the networks' regulatory valuations within the rules**

The networks' most recent regulatory valuations were specified in the National Electricity Rules (NER), thereby "locking in" the networks' pre-2006 RAB valuations (with effective dates between 2003-2006) and removing the AER's ability to optimise or write down the networks' previous investments [34]

- **Rules that ensured that all future capex was automatically 'rolled into" the asset base, without any prudency or efficiency reviews**

The 'RAB Roll Forward' methodology was codified to ensure that all capex incurred by the networks was automatically included in their regulatory asset bases (RABs) without any review of its prudency or efficiency, thereby removing the AER's ability to optimise or perform any ex-post efficiency reviews on the networks' future investments.

The AEMC's decision to remove the requirement to optimise the ongoing RAB valuations effectively ignored the DORC valuation methodology principles and the interdependency of the DORC establishment valuations and the subsequent optimisations.

It is important to note that the 2006 rule changes were introduced shortly after the Ministerial Council on Energy (MCE) developed the original version of the *National Electricity Rules* in 2005.

The original version of the Rules intended to provide the AER with flexibility in the methodology for determining the networks' regulatory valuations, provided that the methodology was consistent with the objectives of the new rules. [35]

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[31] The rule changes changes were formalised in November 2006 for the transmission networks and in 2007 for the distribution networks

[32] AEMC Rule change Determination, Economic Regulation of Transmission Services, Page xx, November 2006

[33] AEMC Rule Change Determination, National Electricity Amendment (Economic Regulation of Transmission Services) November 2006, Page 71

[34] The RABs for the distribution network are specified in Schedule 6.2 of the NER
The RABs for the transmission networks are specified in Schedule 6.2A of the NER

[35] See Clause 6.2.3 (d) of the Certified Initial National Electricity Rules – available at http://web.archive.org/web/20060919045937/http://www.mce.gov.au/assets/documents/mceinternet/Rulesch620050628090456.pdf

However, the AER was never given the opportunity to exercise that flexibility, as the rules were changed prior to the AER's first revenue determinations.

The removal of optimisation and ex-post capex review provisions from the National Electricity Rules (NER) contrasts sharply with the provisions contained within the regulatory rules in other jurisdictions in Australia and overseas.

For example, the Western Australian Electricity Networks Access Code and the Australian National Gas Rules have always required the regulator to apply a broad range of optimisation and 'ex-post' review tests to the determination of the networks' regulatory valuations.

During the AEMC's development of the 2006 rule changes, many stakeholders strongly criticised the AEMC's lack of justification for making such radical changes to the rules.

Many stakeholders considered that the AEMC had failed to provide any real evidence of the risk of underinvestment that it claimed the changes were intended to address.

6.3.3 The 2006 Rule Changes Incentivised Extraordinary levels of Over-Investment

As predicted by numerous stakeholders, the 2006 rule changes incentivised extraordinary levels of over-investment, particularly by the government owned networks.

This was highlighted by the report of the *Senate Select Committee on Electricity Prices* [36], which identified the overspending trends of the NSW networks:

- *"An overspend of capital expenditure in the last pricing period contributed to the increase in the value of the NSW networks' regulatory asset bases (RAB) for the start of the new regulatory period"*
- *"The overspend of each of the businesses was not subject to an examination for efficiency or prudency as part of the new determination, as had occurred under the previous state-based regulatory regime"*
- *"This meant that there was no clear incentive for the businesses to constrain expenditure in the lead up to the new pricing period [2009/10 – 2013/14]"*
- *"The businesses overspent by about $1.4 billion in the previous price period with more than half the overspend occurring in the final year (2008/09)"*
- *"EnergyAustralia (now Ausgrid) exceeded its approved capital allowance over the full period by 32% including by 72% in the final year. Its RAB increased from $4.6b to $8.5b from the start of the previous pricing period to the start of the new pricing period in 2009/10"*
- *"Country Energy overspent by 41% in the final year of the period"*

This highlights that even before the AER made its first round of determinations under the new rules, the NSW networks had taken the opportunity to overspend their capital expenditure allowances as soon as the 2006 changes became effective.

[36] Senate Select Committee on Electricity Prices: Reducing Energy Bills and Improving Efficiency, Independent Review Panel, Electricity Network Costs, Final Report, November 2012

6.3.4 The Levels of Over-Investment Were Particularly High For The Government-Owned Networks

The Garnaut Review Update Paper outlined the very strong incentives that the regulatory framework provides for overinvestment in the networks, particularly for the state-government owned networks.

As stated by Garnaut: [37]

- *"There are cascading mechanisms through which the shareholders of state-owned businesses do well out of over-investment. May be, that provides part of the explanation for why government-owned network providers invest more heavily than privately owned providers and have consistently over-spent their regulated allowance"*
- *"In addition to their lower borrowing costs, State Government owners also retain the tax allowance provided for in the cost of capital allowance.*
- *Furthermore, political concerns about the reliability of state owned networks tend to overwhelm any incentives to minimise costs"*

This issue was also highlighted by the Grattan Institute, which analysed the actual capital expenditure of Australia's distribution networks over two regulatory periods, compared to their capex allowances.

As outlined by the Grattan Institute: [38]

- *"All government-owned companies have consistently spent more than their capex allowances in the previous two regulatory period"*
- *"The net capex spent in excess of regulated allowances totalled $3.6 billion ($2010)"*
- *"Government companies spent $3.33 billion in excess and private companies $300 million ($2010)"*
- *"The AER estimates that capital expenditure spent in excess of regulated allowances has contributed to approximately 25 per cent of the rise in electricity prices"*
- *"For New South Wales companies Ausgrid, Endeavour and Essential Energy, the over expenditure in the second regulatory period exceeded the additional capex regulators allowed them in order to meet higher reliability standards"*
- *"Privately owned companies, by contrast, underspent in regulatory period one. However, several then overspent in the most recently completed regulatory period"*

[37] The Garnaut Climate Change Review Update, Paper 8: Transforming the Electricity Sector, 2011
[38] Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012

6.3.5 Analysis of the Networks' Different Investment Levels

Appendix 2 of this report provides a comprehensive synthesis of the findings and conclusions of numerous studies into the relative efficiency of the electricity networks' capital expenditure. The key conclusions of those studies are as follows: [39]

6.3.5.1 Distribution Networks

- There are major differences in the efficiency of the distribution networks' capital investments
- The privately owned distributors are much more efficient demonstrating significantly lower capital expenditure when normalised for system outputs, e.g
  - When normalised for changes in demand, the Queensland and NSW distributors invested in growth related capex at 7 times the level of the privately owned Victorian distributors
  - Despite having much younger assets, the government owned distributors' replacement capex spend levels were 4 times the level of the privately owned distributors
- As a result, Australia's government-owned distributors employ around three times as much capital per connection compared to their privately owned peers

6.3.5.2 Transmission Networks

- The RABs of four of the five Australian transmission networks (i.e. with the exception of the privately owned Victorian transmission network (SP AusNet)) have grown inefficiently.
- SP AusNet is much more efficient than the other transmission networks, spending substantially less capital both in absolute terms and after normalisation for growth in network outputs such as peak demand and energy delivered
- For example, when normalised for changes in demand:
  - Powerlink Queensland invested in load capex at over 20 times the rate of SP Ausnet
  - Transgrid invested in load capex at over 15 times the rate of the SP Ausnet
  - ElectraNet invested in load capex at 7 times the rate of SP Ausnet

[39] Senate Inquiry Into The Performance and Management of Electricity Network Companies, June 2015
Electricity Network Regulatory Frameworks: Productivity Commission Inquiry Report, 9 April 2013
Senate Select Committee on Electricity Prices: Reducing Energy Bills and Improving Efficiency, Independent Review Panel, Electricity Network Costs, Final Report, November 2012
Queensland Government Independent Review Panel (IRP) on Network Costs, Final Report, 2013
A comparison of outcomes delivered by electricity transmission network service providers in the NEM, EUAA, 2012
Australia's rising prices and declining productivity: the contribution of its electricity distributors, EUAA, 2011
Shock to the system: Dealing with falling electricity demand , Grattan Institute, December 2013
Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012
The Garnaut Climate Change Review Update, Paper 8: Transforming the Electricity Sector, 2011
Privatisation and the regulatory valuation of electricity distribution network service providers in New South Wales: Evidence and Issues - a report for the Public Interest Advocacy Centre, CME, October 2014
Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015
AER 2015 Annual Benchmarking Reports, November 2015

6.3.6 Exogenous Factors Do Not Explain The Networks' Different Investment Levels

Some networks claim that exogenous factors (e.g. differences in customer density, demand growth, reliability standards or ageing assets/historic under-investment) explain their higher investment levels.

All of the above studies have firmly concluded that exogenous factors do not explain the dramatic differences in the networks' investment levels.

Rather, they identified that the networks' ownership structure (i.e. whether the network is controlled by public or private owners) is the most significant driver of the networks' investment levels.[40]

In essence, the studies "debunked the myths" peddled by the networks for their excessive investment levels.

Other than the inevitable denials from vested interests, all independent analysts are now focused on how to address the problem, rather than denying that the problem exists.

The key conclusions of the various studies into the impact of exogenous factors on the networks' different investment levels are summarised below.

In relation to customer density:

- The proportion of underground cables compared to overhead lines is a much more significant determinant of expenditure levels than the length of the network (underground cables are much more expensive than overhead lines)
- Whilst some networks have lower customer densities than others, a large proportion of the their networks are constructed of relatively inexpensive overhead lines rather than underground cables
- Some government owned dense networks (e.g. AusGrid and Energex) charge much more than less dense privately owned networks
- Likewise, some sparse privately owned networks (e.g. Powercor) charge much less than government owned sparse networks (e.g. Essential Energy and Ergon Energy)
- In all countries, networks have been getting more dense, yet the increase in the asset values of Australia's distributors does not correlate with density
- Expenditure has increased significantly for government owned networks while their customer density has remained largely unchanged
- Customer density does not explain the major differences in the networks' RAB growth levels

In relation to demand growth:

- Various studies illustrated that demand grew more strongly in Victoria than in Queensland and New South Wales
- There are very large differences in the amount of load growth capex expended by the electricity networks to meet changes in demand
- The Queensland and NSW distributors spent around 7 times the level of load-growth capex per MW of additional demand as the Victorian distributors

[40] As outlined in section 11.3 of this paper, the issue of "control" is important. For example, the EUAA 2012 study considered that Powerlink Queensland's "control" over ElectraNet resulted in ElectraNet not being subjected to the incentives and disciplines associated with a privately owned utility

- There were even larger differences in the load growth spend levels of the transmission networks (e.g. the Queensland and NSW transmission networks spent 15-20 times the level of capex per MW of additional demand as the Victorian transmission network (SP AusNet))
- A significant part of the explanation for the differences in load-driven capex per MW of load growth is that the demand forecasting errors have been much higher in Queensland and NSW, e.g.:
  - The Queensland transmission network's level of over-forecasting was four times higher than Victoria
  - The NSW transmission network's level of over-forecasting was twice the level of Victoria
  - The Victorian demand projections performed by the independent planning body (AEMO), were more accurate and resulted in significantly lower asset growth costs for Victorian consumers
- Again, the main issue is inefficient responses to demand growth by the government owned networks

In relation to reliability standards:

- The case for changing the Queensland and NSW reliability standards in 2005 was not demonstrated and was not subjected to a cost/benefit analysis
- There was a real lack of evidence of any systemic reliability problems that may have justified the higher reliability standards
- When setting the more stringent standards there was no meaningful attempt to assess consumer preferences, or whether consumers were willing to pay more
- The reliability standards were based on highly conservative, crude and deterministic engineering approaches rather than a probabilistic cost-benefit approach, resulting in higher standards than necessary
- The increased standards have not delivered demonstrable improvements in reliability performance
- However, the government owned networks have received very generous bonuses under the reliability incentive schemes
- The efficiency of the networks' capex spend to meet the standards is highly questionable
- The Victorian networks' reliability performance has consistently been higher than the other networks in the NEM
- Differences in reliability standards do <u>not</u> explain the networks' dramatically different investment levels

In relation to ageing assets/historic underinvestment:

- The government owned networks are significantly younger than the privately owned networks
- If replacing ageing assets was an explanatory factor then it would be expected that privately owned distributors would be spending more to replace assets that are nearer the end of their lives
- Yet the government owned distributors spent four times more per connection to replace ageing assets than the privately owned networks
- The evidence concludes that the government owned networks are prematurely replacing their assets and inefficiently responding to asset ageing

Again, the issue is differences in the relative efficiency with which the networks have replaced and maintained their assets.

6.4 The Inadequacy of the 'Post 2014' Ex-Post Review Provisions

In response to widespread concerns regarding over-investment and gold plating, the 2012 rule changes introduced some new provisions that theoretically provide the AER with the potential to perform 'ex-post' reviews of the efficiency of capex incurred after 2014.

Under the revised rules, there are three specific circumstances under which the AER may be able to exclude inefficiently incurred capex from being rolled into the RAB: [41]

- Inefficient overspend above the AER's total capex allowance
- Where a NSP's capex includes expenditure that should have been classified as opex
- Inflated margins paid to "related parties"

However, the AER's powers to perform those reviews are subject to numerous caveats and constraints that are likely to render them ineffective.

This section outlines the key deficiencies with each of the three ex-post review provisions.

It also highlights the key concerns that stakeholders raised with the AEMC and the AER during the development of the revised rules and during the AER's development of its guideline that outlines how the AER intends to apply the reviews.

6.4.1 Review of Inefficient Overspend Above the AER's Total Capex Allowance

When reviewing the potential effectiveness of this new review provision, it is important to consider that:

- The AER's allowances are not necessarily efficient
- The key purpose of this review is to address the "lack of supervision" of the capex spend

6.4.1.1 The AER's Allowances Are Not Necessarily Efficient

The AEMC's 2012 rule change determination acknowledged the fact that the AER's allowances are not necessarily efficient.

As outlined by the AEMC: [42]

- *"Just because a NSP has spent less than its allowance it does not necessarily mean that the expenditure is efficient"*
- *"This recognises the principle that capex below the allowance can still be inefficient"*
- *"Ex ante incentives may not always provide adequate assurance that capex is efficient. A further check that what is rolled into the RAB is efficient would therefore be in the long term interests of consumers"*

These statements acknowledge that the AER's allowances often include capex based on inflated forecasts (e.g. due to the networks' demand forecasts being higher than the actual demand, which has consistently occurred over previous regulatory periods).

[41] National Electricity Rules, Clauses S6.2.2A and S6A.2.2A

[42] AEMC: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012

This is also reflected in the new requirement for the AER to develop a statement on the efficiency of the capex it is required to roll into the RAB. The requirement for such a statement acknowledges that inefficient capex will continue to be automatically rolled into the RAB.

6.4.1.2 The Key Purpose Of This Review Is To Address The "Lack Of Supervision" Of The Capex Spend

The lack of supervision of the networks' capex spend was highlighted by the AEMC's consultant (Parsons Brickenhoff) to be a major factor driving over-investment. [43]

This was acknowledged by the AEMC: [44]

"Reviews of efficiency of past capex are the most direct way of addressing the lack of supervision problem since they give the regulator the chance to check that the capex to be recovered is efficient"

6.4.1.3 The Key Deficiencies of the Capex Overspend Efficiency Review

The key deficiencies with the capex overspend efficiency review include:

- It can only be applied to capex overspend above the AER's total capex allowance
- It only applies to 'post 2014' capex
- It has been designed on the basis of a misplaced belief in the effectiveness of ex-ante capex provisions
- It introduces further asymmetrical incentives in favour of the networks
- The AER and the AEMC expect that it will be very rarely applied
- It is unsuitable for the NEM's light handed regulatory regime
- The AER's proposed process for performing the review has placed significant hurdles to its application.

Each of those deficiencies is discussed separately below.

6.4.1.3.1 It Can Only Be Applied To Capex Overspend Above The AER's Total Capex Allowance

Despite the AEMC's acknowledgement of the lack of supervision of the networks' capex spend and that the AER's capex allowances are not necessarily efficient, the rules only allow the AER to perform this review if: [45]

- The NSP overspends its <u>total</u> capex allowance for the regulatory period; and
- The AER considers that the overspend "does not reasonably reflect the capex criteria and the capex incentive objective"

Consequently, this review is restricted to a review of the networks' <u>incremental</u> spend above the AER's <u>total</u> capex allowance over the previous 5 years – i.e. the networks are guaranteed to recover their total capex allowances – **irrespective of whether the allowances are efficient**.

[43] Report on capital expenditure overspends by electricity network service providers, Parsons Brinkerhoff, 16 August 2012
[44] AEMC: National Electricity Amendment (Economic Regulation of Network Service Providers) Rule 2012
[45] National Electricity Rules, Clauses S6.2.2A (c) and (g)

Many stakeholders, including the Western Australian regulator (the ERA) [46], are strongly of the view that the AER should be required to prevent all inefficient capex from being rolled into the RAB, irrespective of whether the NSP has spent above or below its total capex allowance.

The restriction of this review to 'above allowance' expenditure overruns will effectively render the review ineffective.

Infact, it is likely to be counter productive as it will encourage the networks to continue to propose inflated capex forecasts (e.g. based on inflated demand growth projections) as the rules still require the AER to automatically roll forward inefficient capex into the RAB.

As outlined below, this will enable the networks to continue to achieve windfall profits from over-forecasting their requirements.

It will also enable the networks to continue their practice of selectively overspending components of their capex allowances.

For example, over the previous regulatory period when it became clear that the networks; augmentation capex forecasts were dramatically overblown; the networks used their 'surplus' augmentation capex allowances to significantly overspend on replacement capex.

Clearly, substituting load driven capex allowances for non-load capex spend results in imprudent and unjustified expenditure, as the drivers for these investments are very different.

However, the rules do not allow the AER to review the networks' component capex spend. As long as the networks' total capex spend is within the AER's total capex allowances, the AER has no power to review the prudency or efficiency of any spend.

Restricting this review to "above allowance' over-runs was strongly opposed by the *Senate Inquiry into the Performance and Management of Electricity Network Companies,* which stated that: [47]

"Following a recent rule change, the AER may preclude inefficiently incurred capital expenditure from being included in the regulatory asset base, but only in circumstances where the actual capital expenditure exceeds the capital expenditure allowance"

"The committee considers the AER requires the discretion to review the efficiency of all future investments and the need for their inclusion in the RAB"

Clearly it is not in consumers' long-term interests to require the "pass through" of inefficient expenditure.

The Senate Inquiry's views were also shared by various submissions that the AEMC received during its consultation process on the 2012 rule changes. [48]

[46] AER, Capital expenditure Incentive guideline, November 2013, pp. 12–20

[47] Senate Inquiry into the Performance and Management of Electricity Network Companies, Final Report, March 2015

[48] For example – the submissions from the SA Minister for Mineral Resources and Energy, the MEU and the EUAA

6.4.1.3.2 The Review Only Applies To 'Post 2014' Capex

The capex overspend efficiency review cannot be applied to capex incurred prior to 1 July 2014.

Furthermore, the earliest opportunity that the AER will have the ability to perform the review will be when it undertakes its revenue determinations for the next regulatory periods -– i.e. from 1 July 2019.

This means that the AER has been unable to apply the review to its recent revenue determinations, for which the AER has been required to automatically "roll in" the networks' actual capex from the previous regulatory period.

6.4.1.3.3 The AER/AEMC's Misplaced Belief in the Effectiveness of Ex-Ante Capex Provisions

Various stakeholders outlined their concerns that the AEMC and the AER's approaches to the ex-post reviews are based on a misplaced belief in the effectiveness of the ex-ante provisions in delivering efficient capex, despite extensive evidence that the AER has consistently provided capex allowances above the efficient level.

For example, as outlined by the AEMC:

"Reviews of efficiency of past capex should not be seen as diminishing the role of ex ante incentives. Rather, such reviews are to address a gap in the lack of supervision of capex that has occurred"

"The Commission considers that the ex ante allowance as a total represents a forecast of an efficient level of expenditure for the NSP and there should generally be little need for the NSP to spend above this amount in normal circumstances"

6.4.1.3.4 The Ex-Post Review Provisions Introduce Further Asymmetrical Incentives In Favour Of The Networks

Various stakeholders asserted that the restrictions applied to the ex-post review introduce further asymmetric incentives in favour of the networks into a regulatory framework that is already highly asymmetric.

For example, the submission by the EUAA [49] stated that:

" 1. The regulatory design allows for the pass-through of additional costs in various circumstances. While in principle NSPs can apply to pass-through cost reductions as well as cost increases, there is no record of NSP's ever proposing pass-through of cost reductions. By contrast there have been numerous pass-through applications resulting in higher charges for users. The pass-through arrangements are therefore asymmetrically to NSP's benefit.

2. The regulatory design provides for the ability to seek additional expenditure during a regulatory control period on "contingent" projects. Again this is an asymmetric provision.

3. The regulatory design provides for re-openers, which NSPs alone have the ability to apply for. Users can not apply to re-open regulatory decisions.

4. Concerns about under-investment threatening reliability encourages regulators to err on the side of caution (on the basis of the logic that the economic loss from the failure to supply can be expected to be much less than the economic loss attributable to the carrying cost of inefficient over-investment).

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[49] EUAA Submission on the AEMC Draft Decision, October 2012

5. Information and resource asymmetry (between the NSPs and the AER, and between NSPs and users) is likely to result in regulatory expenditure allowances that unavoidably err on the side of NSPs rather than users.

It is improbable that the AER (or indeed any regulator) will ever be able to predict efficient expenditure requirements accurately. Indeed it is the inability to do so, that is the reason incentives are so important in encouraging NSPs to discover efficient expenditure.

Similarly, as outlined by the MEU:

"The capex sharing scheme principles do not reflect the fact that the NSP is already being rewarded for efficient investment. The aim of the incentive scheme should be to ensure the the NSP minimises inefficiency"

"The AEMC proposals do not provide any protection for consumers from the NSP gaming the capex program"

6.4.1.3.5 The AEMC/AER's Expectation that Ex-Post Capex Reductions will be very rarely applied

It is clear that the AEMC and the AER expect that any capex reductions arising from the capex overspend review are likely to be extremely rare.

As outlined by the AEMC:

"The Commission intends that a reduction to the amount of capex to go into the RAB following a review of efficiency by the AER ***should be a last resort measure*** *and that primary reliance could be placed on an ex ante incentive to provide assurance that capex is incurred efficiently"*

"The ability to reduce the capex rolled into the RAB ***is intended for obvious cases of inefficiency****, and not as the main means of achieving efficient levels of capex"*

*"****Any reduction of capex*** *to go into the RAB following a review of efficiency* ***would be a relatively rare occurrence****".*

6.4.1.3.6 It is Unsuitable for the NEM's Light Handed Regulatory Regime

Many stakeholders considered that the proposed ex-post provisions are unsuited to Australia's light handed regulatory regime.

As outlined by the EUAA: [50]

"It is true that ex-post assessment is well entrenched in the U.S., in their utility regulation. However their model is quite different to ours. It entails regulatory controls with a very high degree of asset-specificity and controls with much shorter duration.

It is one thing to assess the efficiency of actual expenditure on a specific transformer for which a specific budget was set. It is an altogether different matter to assess the efficiency of expenditure on an aggregate capex budget – typically for several billions of dollars on many different projects over five years.

For these reasons, while we recognise that the AER has authority under the Rules to make expost assessments, in our opinion it is not convincing to suggest that this will ever be a meaningful or effective element of the AER's regulatory controls.

As such reliance on it to act as an effective constraint on expenditure is, we suggest, misplaced"

[50] EUAA response to the AER's Draft Capital Expenditure Incentives Guideline, September 2013

6.4.1.3.7 Issues with the AER's Proposed Process for Performing the Review

The AER's *Capital Expenditure Incentive Guideline* [51] outlines the process that the AER intends to apply to perform this review.

During the development of the guideline, the AER received feedback from various stakeholders expressing their concerns with the limitations of the ex-post review and with the AER's proposed approach to performing the reviews.

However, despite those concerns, the AER has introduced a number of hurdles to this review.

For example:

- **The AER will only perform the reviews for "significant" overspends**

The AER has indicated that it will only perform the review if the amount of overspend is "significant".

It does not appear that the AER has defined the term "significant", despite calls from various stakeholders to clarify this definition during the AER's guideline development process.

- **The Two Stage Review Process**

The AER is proposing to apply a 2-stage review process, involving a very high level 'Stage 1' review in the first instance.

Unless there are systemic inefficiency issues identified in Stage 1, the AER will conclude that:

- "The NSP has been broadly efficient and prudent"; and
- "No further assessment of capex efficiency and prudency would be required"

In essence, the AER's review process will only proceed to Stage 2 for 'serial offenders'.

Consequently, this review unlikely to identify anything other than the most blatant inefficient capex overspend.

6.4.2 Capitalisation Policy Changes

Where a change to a NSP's capitalisation policy during the regulatory period has led to opex being capitalised, the AER may be able to exclude the additional capex from being rolled into the RAB. [52]

This new review provision aims to address the incentive for NSPs to capitalise expenditure during a regulatory control period and thus recover the same expenditure twice, i.e.:

- Firstly in their opex allowances; and
- Secondly through depreciation and return on capital when the expenditure is rolled into the RAB

Again, in its implementation guideline, the AER has introduced a number of constraints to its application of this review.

[51] AER Capital Expenditure Incentive Guideline for Electricity Network Service Providers, Nov 2013

[52] National Electricity Rules (NER), Clause 6.2.2.A (e)

For example, it will only be applied if the AER considers that the regulations for capex and opex incentives are unbalanced; and only then if:

- The NSP has changed its capitalisation policy during the current regulatory control period; and
- Opex has been reclassified as capex due to those changes

As outlined within its factsheet on the expenditure incentives guideline, the AER believes that the regulatory incentives provide balanced incentives for capex and opex expenditure.

As stated by the AER: [53]

"Incentives for opex and capex are balanced (30 per cent) and constant. They are also balanced with the incentives under our service target performance incentive scheme (STPIS). This encourages businesses to make efficient decisions on when and what type of expenditure to incur, in order to meet service reliability targets"

In light of the AER's belief in the effectiveness of the symmetrical incentives, it is anticipated that the review will be rarely applied.

6.4.3 The Related Party Margin Review

Where a NSP incurs capex that provides an inflated margin to a "related party", the AER can potentially exclude the inflated portion of the margin from being rolled into the RAB. [54]

Related party margins are margins charged to companies that are related to a NSP through common ownership.

The new rules allow the AER to reduce the capex rolled into the RAB by an amount that reflects the difference between:

- The margin that was paid; and
- The margin that the AER considers would have been paid if the related party margin had been negotiated on "arm's length" terms

Again, the AER's proposed process for performing this review adds further constraints to the process, including:

- The AER will only perform the review "if the contractual arrangements have changed during the regulatory control period"
- The review would involve a two stage process, with the first stage involving a 'presumption threshold' test in which the AER intends to consider:
    - Whether the NSP has an incentive to agree to non-arm's length terms when it negotiated the contract (or at its most recent re-negotiation), and if so
    - Whether the NSP conducted a competitive open tender process in a competitive market

If the AER decides that the answer to the first question is no, or the answer to the second question is yes, the AER will determine that the related party margin passes the presumption threshold and that

[53] AER Better Regulation factsheet - expenditure incentives guideline, November 2013
[54] National Electricity Rules (NER), Clause 11.62 (d)

the contract price (including any associated margin above direct costs) reflects prudent and efficient costs.

The AER's tendency to introduce such unnecessary 'presumption of innocence' hurdles to its review processes was strongly criticised by various stakeholders, including the Public Interest Advocacy Centre (PIAC), which submitted that: [55]

"Networks should be required to show why this expenditure was in the long-term interests of consumers, rather than the burden being on the AER to 'disprove' the need for that expenditure"

Overall, due to the above deficiencies, the new ex-post capex review provisions will effectively be limited to the second order issues of related party transactions and changes to capitalisation policies during the regulatory period. Even those issues are subject to various hurdles introduced by the AER that will in effect render them a "tick the box" exercise.

As stated by PIAC:

"In the face of these practical difficulties, only the most egregious of any NSP's overspending would be set aside as inefficient and imprudent given the above deficiencies"

6.4.4 Optimisation and Ex-Post Review Provisions in Other Australian Regulatory Jurisdictions

The lack of effective optimisation and ex-post capex review provisions for the NEM networks contrasts sharply with the provisions contained within other Australian regulatory jurisdictions.

For example, the Western Australian Electricity Networks Access Code and the Australian National Gas Rules have always provided a range of explicit optimisation and 'ex-post' review powers to their regulators.

The *Senate Inquiry into the Performance and Management of Electricity Network Companies* was highly critical of the lack of such provisions within the National Electricity Rules (NER), and recommended the incorporation of the provisions contained within the Western Australian Electricity Networks Access Code: [56]

"The committee recommends that the Council of Australian Governments (COAG) Energy Council commission an independent expert review of options for excluding future imprudent capital expenditure and surplus network assets from a network service provider's regulatory asset base (RAB). ***This review should consider the provisions of the Western Australian Electricity Networks Access Code and its decision-making criteria****"*

[55] Having the desired effect: PIAC submission to the AER's Draft Expenditure Incentive Guideline, 20 September 2013

[56] Senate Inquiry into the Performance and Management of Electricity Network Companies, Final Report, March 2015

6.4.4.1 Optimisation and Ex-Post Review Provisions in Western Australia

The WA Electricity Networks Access Code requires the Western Australian regulator (the Economic Regulation Authority) to apply a number of optimisation and ex-post capex review powers to its determination of the value of the capital base, including: [57]

- **Flexibility in the Methodology for Determining the Valuation of the Capital Base**

The WA Access Code does not mandate a specific method for determining the capital base.

Rather, a number of options are available to the regulator for the determination of the capital base at the start of an access arrangement period, including:

- Valuation or revaluation of the capital base using an appropriate asset valuation methodology determined by the regulator
- Rolling forward the capital base from the previous regulatory period allowing for efficient capex incurred during the previous period, less depreciation, less redundant capital

- **Removal of Redundant Network Assets**

Clauses 6.61 to 6.63 of the Access Code require the regulator to subtract the value of "redundant network assets" from the capital base if the regulator considers that that any network assets have ceased to contribute in any material way to the provision of the required services.

In its submission to the *Senate Inquiry into the Performance and Management of Electricity Network Companies*, the ERA outlined that it considered this to be a particularly effective aspect of the Code.

The ERA provided an example of how it excluded over $200 million of capital expenditure already incurred by Western Power from its RAB, as the ERA determined that the investments did not meet the efficiency requirements of the Code.

- **Capex Prudency and Efficiency Tests**

The WA Access Code requires the regulator to apply detailed prudency and efficiency tests to any capex before it can be added to the capital base.

For example, Clauses 6.52 to 6.55 of the code require the regulator to apply a *"new facilities investment test"* to all capex before it can be included in the capital base. [58]

The *new facilities investment test* only allows capex to be added to the capital base if:

a) The expenditure does not exceed the amount that would be invested by a service provider efficiently minimising costs; and

b) It meets one or more of the following:

   i. The incremental revenue arising must at least recover the investment cost; and

   ii. The investment must provide a net benefit over a reasonable period of time that justifies the approval of higher tariffs; or

   iii. The investment Is necessary to maintain the networks' safety or reliability obligations

[57] Western Australia Electricity Networks Access Code 2004, Clauses 6.44 to 6.63
[58] Western Australia Electricity Networks Access Code 2004, Clauses 6.52 to 6.55

Importantly, the regulator must ensure that the above conditions are also met when approving the forecast expenditure in an access arrangement. The network's actual expenditure is then reviewed again at the next access arrangement to confirm that the test was met.

Any expenditure found not to meet the test is not added to the regulatory capital base and therefore not recovered from customers. The WA code includes provisions that enable the network to seek pre-approval from the regulator as to whether a planned capital project meets the '*new facilities investment test'* criteria. Providing the capital project proceeds as proposed, this guarantees that the expenditure will be allowed in the RAB.

In its submission to the *Senate Inquiry Into The Performance And Management Of Electricity Network Companies*, the ERA was critical of the lack of optimisation and ex-post capex review provisions within the National Electricity Rules. The ERA's submission outlined that it considered the ex-post review provisions contained within the WA Access code to be essential in ensuring the efficiency of the capital base.

As outlined by the ERA: [59]

"It ensures that the service provider is incentivised to only undertake efficient expenditure, both as a result of the forecasts being scrutinised by the ERA prior to undertaking the expenditure and then by being required to demonstrate at the next review that the expenditure actually incurred is efficient.

Importantly, the ERA also criticised the NER rules that constrain the AER's ex-post review power to 'above allowance' overruns. The ERA considers that there is a need to review all existing and proposed expenditure for efficiency, not just spending over the forecasts.

As stated by the ERA:

"*Unlike the provisions in the (WA) Code, the AER does not have the ability to review expenditure up to the level of the forecast to determine if it was efficient"*

The ERA's views were strongly reinforced by the submission by Western Power to the WA Electricity Market Review discussion paper.

As stated by Western Power: [60]

"Gold plating' is a common term used to describe investing in network assets that are of higher cost than needed. Independent observers have identified that gold plating has occurred in some East Coast networks. While this may have occurred in the East, it has not occurred on the Western Power network.

Western Australia has a different regulatory model to the East Coast; one that penalises capital expenditure deemed inefficient.

The ERA, after receiving advice from its independent experts, reviews the efficiency of Western Power's proposed capital expenditure in determining the access arrangement. However, unlike the Eastern States' regulation, there is also a post investment review conducted by the ERA.

Asset write-downs, without limitation, can occur if investment is deemed to be inefficient"

[59] ERA submission to the Senate Inquiry Into The Performance And Management Of Electricity Network Companies, 18 December 2014

[60] Western Power submission to the WA Electricity Market Review, October 2014

The Investment Adjustment Mechanism (IAM)

The National Electricity Rules provide strong incentives for the NEM networks to "game" the regulator by proposing excessive capex forecasts, as they are rewarded with windfall profits from their over-forecasting errors (e.g. overblow demand forecasts), receiving 'return on capital' allowances for capital investments that they do not incur.

For example, the Queensland distributors (Energex and Ergon Energy) achieved around $1 billion in windfall profits over the 2010-15 regulatory period as a result of their forecasting errors. [61]

This NEM rules contrast sharply with the provisions in other jurisdictions, e.g. the provisions in the WA Access Code that ensure that Western Australian networks don't profit from over-forecasting

Recognising that the drivers for some capital expenditure fall outside the control of the networks, the WA Access Code includes provision for an *"Investment Adjustment Mechanism (IAM)".*

Typically, this mechanism is applied to growth related and customer driven expenditure as the factors driving growth and customer requirements are outside the control of the network.

If actual costs in relation to such expenditure vary from the access arrangement forecast, an adjustment is made at the next access arrangement review so that the network is no better or worse off than if the original forecast had been correct.

As outlined by the ERA:

"This adjustment ensures that differences between actual and forecast expenditure in relation to drivers outside the network's control do not become windfall gains or losses to the network.

This ensures customers do not pay for services that are not required whilst ensuring that service providers are properly funded for efficient expenditure.

There is no similar mechanism in the NER"

The need for such a mechanism to be included in the National Electricity Rules was highlighted by the Grattan Institute: [62]

"Whilst five-year capital forecasts should remain in use, they should be updated annually in the light of any material changes to maximum demand forecasts provided by the Australian Energy Market Operator in its National Electricity Forecasting Report"

"The system of five-year reviews of network prices cannot respond to changing electricity demand and finance costs"

"The regulator sets the revenue a company can collect from consumers over five years in order to fund its investment and costs. But real conditions change more quickly"

"For example, only a few years ago, the regulator allowed companies to spend to meet forecasts of rising energy demand and rising peak demand"

"For the first time in 40 years, both are falling, yet companies are receiving revenue based on the five-year forecasts"

"In other words, they are being funded for investments they no longer need to make"

[61] AER Consumer Challenge Panel CCP2 (Hugh Grant) submission to the AER on the AER's 20150-20 revenue determinations for Energex and Ergon Energy

[62] Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012

The need to include provisions to prevent the networks from profiting from over-forecasting their needs was also highlighted by various submissions to the *Senate Inquiry Into The Performance and Management of Electricity Network Companies,* e.g.:

"A 'normal' business within a 'normal' industry is subject to a range of commercial disciplines that would see it financially damaged if it overestimated demand, invested more capital than necessary, over-valued its assets, or assumed its borrowing costs were higher than necessary. Furthermore, it is the subsequent reality and ever-changing circumstances that will determine the actual returns for a normal business, not the estimates prior to the investment program. ***These commercial disciplines are not only largely absent for network businesses but there is potential reward—or protection at a minimum—for differences between estimates and reality on key parameters such as future demand, capital costs and costs of borrowing.*** *Network business returns are largely dictated and locked-in by the proposed investment program and regulator's decision – they are shielded if reality differs from the prediction or if circumstances change"*

Australian Aluminium Council [63]

"In 2005, Tasmania had an asset base of approximately $0.8bn (in 2013$) with a peak demand of approximately 1700MW. In 2012, Tasmania has an asset base of $1.5bn (in 2013$) dispensing a peak demand 100MW lower and where reliability has deteriorated over the 5 years. ***Any private enterprise delivering an equivalent outcome would most likely see its Board of Directors and CEO face hostile shareholders and possible legal action"***

Big Picture Tasmania [64]

6.4.4.2 Optimisation Provisions in The National Gas Rules (NGR)

The National Gas Rules require the AER to optimise the gas networks' RABs.

The "Capital Redundancy" provision in the National Gas Rules [65] requires the AER to ensure that:

"Assets that cease to contribute in any way to the delivery of pipeline services (redundant assets) are removed from the capital base"

The AER is therefore accustomed to the need to apply optimisations to its capital base determinations for other energy networks.

[63] Australian Aluminium Council Submission to the Senate inquiry

[64] Big Picture Tasmania Submission to the Senate inquiry into the performance and management of electricity companies

[65] Clause 85, National Gas Rules (NGR), Version 28

7 The RAB Valuation Methodology Is Not Meeting The National Electricity Objective (NEO)

The previous chapter of this paper outlined the deficiencies of the RAB valuation methodology for Australia's electricity networks.

Appendices 1 and 2 of this paper also provide comprehensive syntheses of the findings and conclusions of other studies, inquiries and analyses relating to the deficiencies in the RAB valuation methodology and the outcomes of those deficiencies.

The key outcomes of the deficiencies are as follows:

7.1 Excessive RABs

The RABs of Australia's electricity networks have been artificially inflated and inefficiently grown to excessive levels.

Over the past 15 years, the Australian electricity networks' RABs have increased by up to 414 percent. These extraordinary and unprecedented RAB growth rates have resulted in the Australian electricity networks' RAB levels being much higher than their international peers.

For example, the *RAB per connection* levels of Australia's distributors are now up to 9 times the levels of the UK distributors.

The RABs are particularly excessive for the government owned networks, for which the incentives for overinvestment have proven to be particularly strong. As a result, Australia's government-owned distributors employ around three times as much capital per connection compared to Australia's privately owned distributors. [66]

7.2 Excessive Prices

With returns on the networks' RABs accounting for the majority of their revenues, the networks' excessive RABs are resulting in excessive prices.

The Australian electricity networks' RABs drive their prices to a much greater extent than their international peers, resulting in Australia having the highest electricity network prices in the world.

Average households in Australia are paying about twice as much for network charges as in the UK and about 2.5 times as much as in the U.S. [67]

The networks' excessive prices are presenting significant hardship for residential consumers and major competitiveness challenges for Australian businesses.

[66] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

[67] CME Submission to the Senate inquiry Into The Performance and Management of Electricity Network Companies

7.3 Excessive Profits

Excessive RABs, together with inconsistencies between the AER's return on capital determination methodology and the RAB valuation methodology are resulting in Australia's electricity networks realising extraordinary profitability levels.

The networks are achieving many multiples of the returns being realised by Australia's best performing ASX50 companies (e.g. around 23 times the returns achieved by the construction sector and around 16 times the returns achieved by the telecommunications sector).

The extraordinary profitability of Australia's monopoly electricity networks is not common knowledge within the Australian community.

Chapter 8 of this report provides a detailed explanation of why the networks are realising such extraordinary returns.

7.4 Business As Usual is Unsustainable

The networks' excessive prices are resulting in consumers reducing their demand for grid-supplied electricity.

In addition, consumers are increasingly moving to self-generation, as the costs of distributed generation are becoming more attractive, thereby further reducing demand for energy delivered by the networks.

The networks are responding by further increasing their prices to recover their guaranteed revenues over reduced volumes.

The inevitable outcome of the continuation of these trends is the well documented "death spiral" - i.e. as the move towards distributed generation increases, the burden of paying for the networks' costs will be placed on a smaller consumer base until those consumers can no longer afford to stay connected to the network.

In order to address Australia's unsustainable electricity prices it is imperative that the networks' RABs are re-valued to more appropriate levels.

7.5 The Above Outcomes Are Not Meeting The National Electricity Objective (NEO)

The National Electricity Objective, as stated in Section 7 of 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"** 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."

This paper provides extensive evidence that the existing RAB valuation methodology is **not** promoting efficient investment in the networks, but rather it is resulting in highly **inefficient investment in** the networks.

It outlines how the outcomes of the networks' excessive RAB valuations (i.e. excessive prices) are resulting in highly **inefficient use of** the networks, resulting in consumers making inefficient decisions to self generate and disconnect from the networks.

Different stakeholders have differing perspectives on how the "long-term interest of consumers" is to be interpreted. However, the AEMC has consistently stated that the rules that it develops ensure that "**consumers do not pay any more than necessary** for the reliable supply of electricity and gas**"** [68]

This report provides compelling evidence that the RAB valuation methodology is resulting in consumers paying much more than necessary.

For example:

- The networks' excessive RABs are resulting in the networks' prices and profits being much higher than their international peers
- The networks' prices and profits and have increased dramatically during a period of declining output
- The RAB valuation methodology has incentivised extraordinary levels of over-investment by the networks, resulting in dramatic increases in excess capacity and major declines in system utilisation
- It is resulting in the most inefficient networks being rewarded for their inefficiency by achieving return on equity levels of many multiples of the levels being achieved by Australia's best performing ASX 50 entities
- It is resulting in the networks' prices rising to levels that result in consumers disconnecting from the networks – voluntarily and involuntarily - because they can no longer afford to stay connected, or because it is more cost effective to self generate

Clearly, the outcomes of the RAB valuation methodology deficiencies are resulting in consumers paying much more than necessary, and consumers will continue to pay much more than necessary unless those deficiencies are addressed.

[68] For example - the AEMC Final Position Paper: National Electricity Amendment (Economic Regulation of Network Service Providers)

8 The Extraordinary Profitability of Australia's Electricity Networks

As highlighted in the previous chapter, a key outcome of the RAB valuation methodology deficiencies is that it is resulting in Austria's electricity networks achieving extraordinary profitability levels.

This chapter provides a detailed analysis of the actual profitability levels being realised by Australia's electricity networks, by investigating the actual returns that have been realised by two Queensland networks (Energex and Powerlink Queensland) over the past 15 years.

It outlines that the key reason that Australia's electricity networks are realising extraordinary profitability levels is that the AER's methodology for determining the networks' return on capital allowances is inconsistent with the RAB valuation methodology, as it does not appropriately deal with the impacts of indexation of the capital base.

Whilst many stakeholders have repeatedly criticised the AER for applying excessive weighted average cost of capital (WACC) percentages to the networks' return on capital allowances, excessive WACCs are only part of the problem.

As explained below, the primary reason for the networks' extraordinary profitability levels is due to the AER inappropriately applying its WACCs to artificially inflated capital bases.

8.1 The AER's Approach to Determining the Networks' Return on Capital Allowances

As outlined above, 'return on capital ' allowances account for a large proportion of the networks' total revenue allowances.

'Return on Capital' allowances are intended to reflect the efficient funds that the networks require to attract investment in the network.

Rather than setting the allowances on the basis of the networks' actual cost of capital, the National Electricity Rules (NER) require that the rate of return is *"to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the electricity networks"* [69]

The AER defines the benchmark efficient entity as *"one who only provides regulated electricity or gas network services, operating within Australia"*. [70]

The rationale for setting the rate of return on the basis of a benchmark is that it theoretically provides the networks with incentives to finance their business as efficiently as possible.

[69] NER, Clause 6.5.2 (c)

[70] AER Rate of Return Factsheet, October 2015

The AER provides return on capital allowances for two funding sources - equity and debt:

- 'Return on Equity' allowances are intended to reflect the returns that shareholders require to continue to invest in the business
- 'Return on Debt' allowances are intended to reflect the interest rates that the networks pay when they borrow money to invest in the business

The AER assumes that efficient network businesses fund their investments by borrowing 60 per cent of the required funds, whilst raising the remaining 40 per cent from equity.

8.1.1 The AER's Approach to Determining Return on Equity Allowances

The AER's approach to determining the networks' return on equity allowances is as follows:

- **Determination Of The Percentage Return On Equity (ROE)**

The AER estimates the percentage return on equity that it considers investors require to invest in businesses with similar risk profiles to the electricity networks.

- **Multiplying The Percentage Return On Equity To A Theoretical Equity Base**

The AER then calculates the network's 'return on equity' allowances by multiplying the percentage ROE to a theoretical equity base, which the AER assumes amounts to 40% of the network's RAB value.

8.1.2 The AER's Approach to Determining Return on Debt Allowances

Similarly, the AER's approach to determining the networks' return on debt allowances is as follows:

- **Determination Of The Percentage 'Return On Debt'**

The AER estimates the percentage return on debt that it considers reflects the interest rates that the networks pay when they borrow money to invest in the business – i.e. the AER aims to estimate the interest rates that debt providers will charge businesses with similar risk profiles to the electricity networks.

In doing so, the AER assumes that the debt is based on a BBB+ credit rating and a debt term of 10 years.

- **Multiplying the Percentage 'Cost of Debt' To A Theoretical Debt Base**

The AER then calculates its 'return on debt' allowances by multiplying the percentage interest rate to a theoretical debt base, which the AER assumes amounts to 60% of the network's RAB value.

8.1.3 The AER's Assumed Capital Bases Are Much Higher Than the Networks' Actual Investments

The AER's assumptions regarding the networks' debt and equity investment levels are deeply flawed and result in the AER providing return on capital allowances much higher than the required levels.

This is illustrated in the tables overleaf, which outline the differences between the AER's assumed investment levels for the Queensland networks and the networks' actual investment levels.

Powerlink Queensland Investment Levels (30 June 2014)

	The AER's Assumed Investment Bases		Powerlink Queensland's Actual Investment Bases			Difference
	Value ($bn)	% of RAB	Value ($bn)	% of Total Investment	% of RAB	
Equity	3.056	40%	0.791	16%	10.4%	**The AER's assumed equity level is 3.9 times Powerlink's actual equity investment**
Debt	4.585	60%	4.154	84%	54.4%	**The AER's assumed debt level is 10.4% higher than Powerlink's actual debt level**
Total	**$7.641 billion**		**$4.945 billion**			**The AER's assumed total investment is 1.55 times Powerlink's actual investment**

Energex Investment Levels (30 June 2014)

	The AER's Assumed Investment Bases		Energex's Actual Investment Bases			Difference
	Value ($ bn)	% of RAB	Value ($ bn)	% of Total Investment	% of RAB	
Equity	4.471	40%	1.597	20%	14.3%	**The AER's assumed equity level is 2.8 times Energex's actual equity investment**
Debt	6.707	60%	6.465	80%	58%	**The AER's assumed debt level is 4% higher than Energex's actual debt level**
Total	**$11.178 billion**		**$8.062 billion**			**The AER's assumed total investment is 1.39 times Energex's actual investment**

The above tables illustrates that:

Total Investment Levels

- Powerlink Queensland's RAB valuation is 1.55 times Powerlink's actual total investment
- Energex's RAB valuation is 1.39 times Energex's actual total investment

These differences are predominantly due to the networks' RABs being artificially inflated each year - i.e. the RAB value includes 'artificial capital' that the networks have not invested.

Equity Investment Levels

- The AER's assumed equity investment for Powerlink is 3.9 times Powerlink's actual equity investment
- The AER's assumed equity investment for Energex is 2.8 times Energex's actual equity investment

Debt Investment Levels

- The AER's assumed debt level for Powerlink Queensland is over 10% higher than Powerlink's actual debt level
- The AER's assumed debt level for Energex is 4% higher than Energex's actual debt level

Debt/Equity Ratios

As a percentage of their actual investment levels:

- Powerlink funded 16% of its investment from equity and 84% from debt
- Energex funded 20% of its investment from equity and 80% from debt

As a percentage of RAB:

- Powerlink's equity investment amounts to 10.4 % of RAB, rather than 40 % assumed by the AER
- Energex's equity investment amounts to 14.3 % of RAB, rather than 40 % assumed by the AER
- Powerlink's debt investment amounts to 54.4 % of RAB, rather than 60 % assumed by the AER
- Energex's debt investment amounts to 58 % of RAB, which is close to the 60 % assumed by the AER

Outcomes

As a result of the above differences:

- The AER is providing 'return on equity' allowances to Powerlink of at least 3.9 times the required level
- The AER is providing 'return on equity' allowances to Energex of at least 2.8 times the required level
- The AER is providing 'return on debt' allowances to Powerlink of over 10% above the required level
- The AER is providing 'return on debt allowances to Energex of over 4% above the required level

The outcomes of the above differences to the networks actual returns are outlined below.

8.2 The Networks' Actual Return On Equity

Return on Equity is the ratio (expressed in % terms) of the annual profit achieved by the business, divided by the equity investment, i.e.:

$$\text{Return on Equity} = \frac{\text{Net Profit After Tax (NPAT)}}{\text{Shareholder Equity}}$$

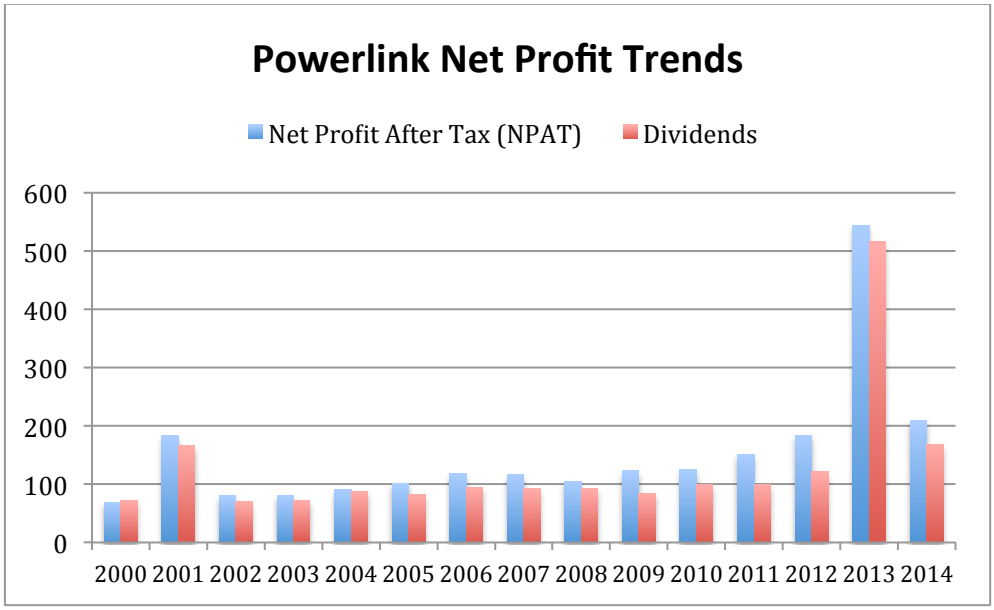
Shareholder Equity is the networks actual equity investment – i.e. the sum of the networks' share capital plus retained earnings.

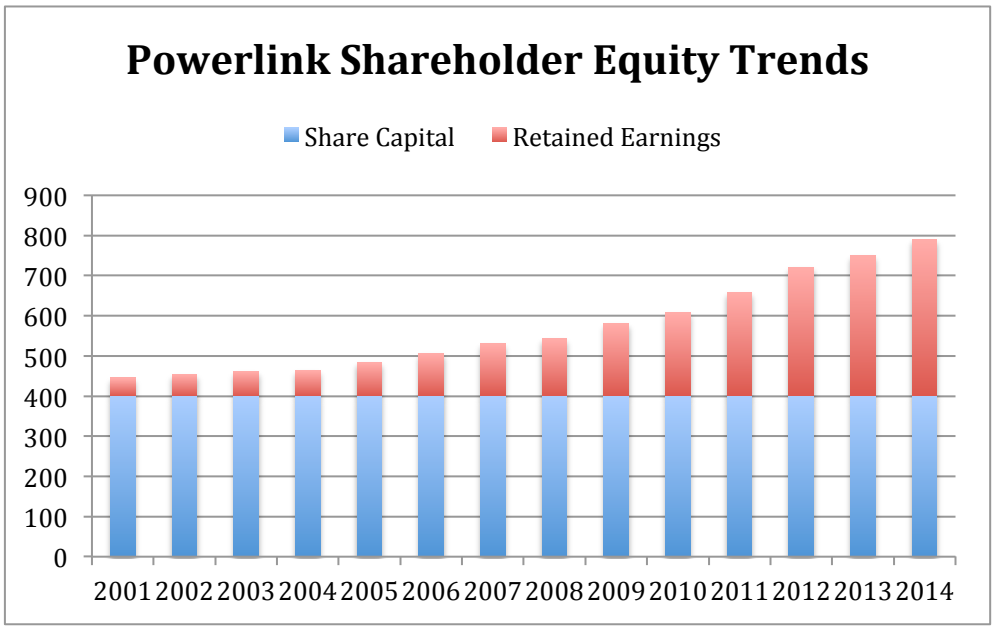
The charts overleaf illustrate the trends in the Queensland's electricity networks' profits, shareholder equity and actual 'return on equity' levels over the 2000-2014 period.

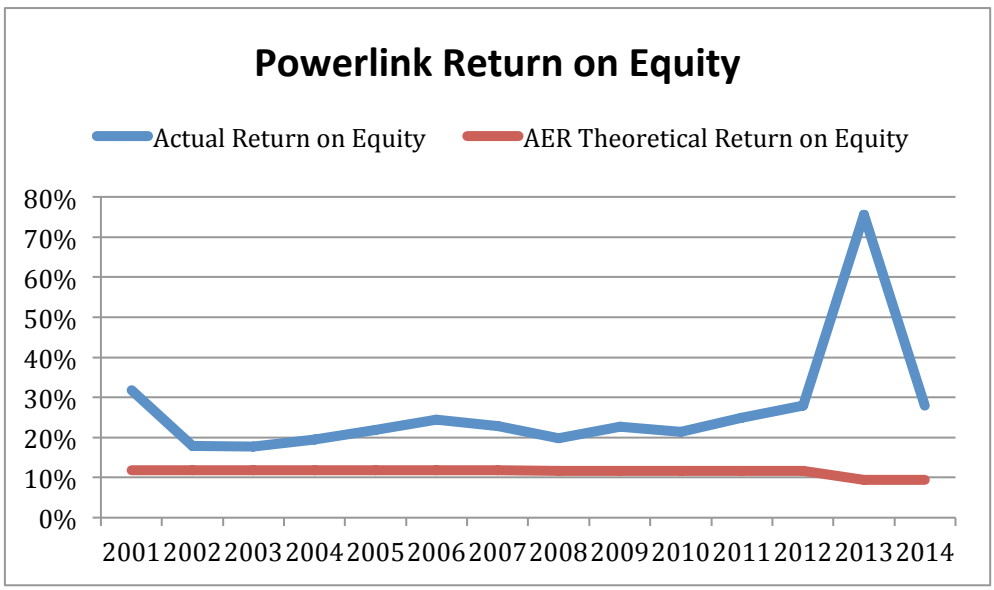
They illustrate that:

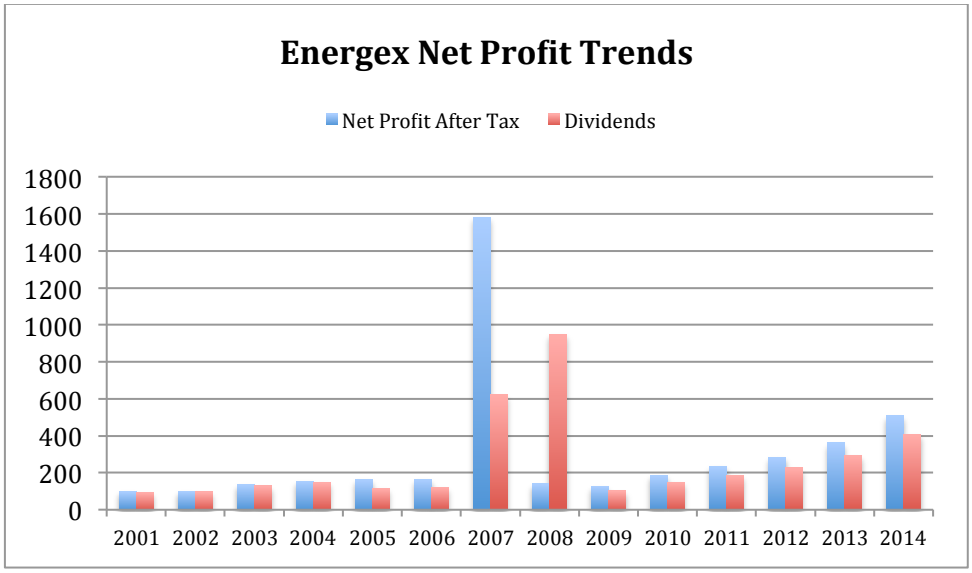
- Powerlink Queensland achieved actual return on equity levels of 18% to 75%, which amounted to 1.5 -8.1 times the AER's theoretical return on equity levels
- Energex achieved actual return on equity levels of 10.5% to 148%, which amounted to up to 13.5 times the AER's theoretical return on equity levels
- By comparison, most ASX50 companies have struggled to achieve annual return on equity levels of 5% over that period
- Over the past 15 years the Queensland networks' annual profits have grown strongly
- In some years there were significant spikes in the networks profits.
- At no time over the past 15 years have the networks experienced low profits or losses (unlike all other businesses of their size)
- The networks consistently extracted very high dividend levels, with dividend payout ratios averaging around 90% - i.e. they have reinvested minimal amounts of retained earnings into the business
- The networks' extraordinary growth levels have been predominantly funded by increased debt, e.g.:
    - Powerlink Queensland's RAB grew fourfold with no change to its share capital of $401 million
    - Energex's RAB grew fourfold whilst Energex reduced its invested equity' by $175 million (from $921million to $746 million)
- Funding such levels of growth through debt would be impossible for businesses that operate in any other sector of the Australian economy
- The commercial constraints that apply in all other sectors would require the businesses to inject significant levels of equity to fund such growth levels
- This demonstrates the uniqueness of the regulatory environment for Australia's electricity networks and how it is disconnected from the commercial realities that businesses in all other sectors of the Australian economy face

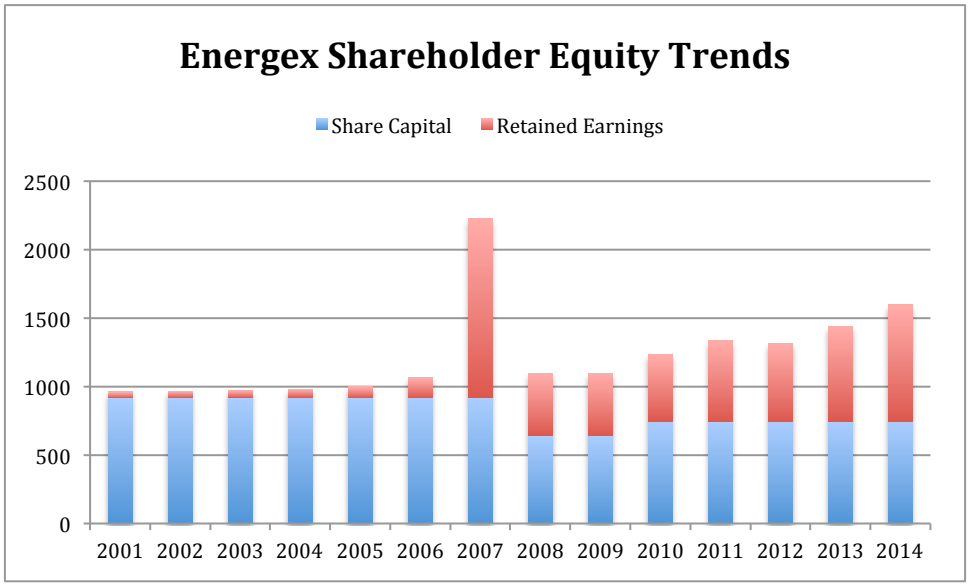
No other sector of the Australian economy provides guaranteed returns on artificial investments.

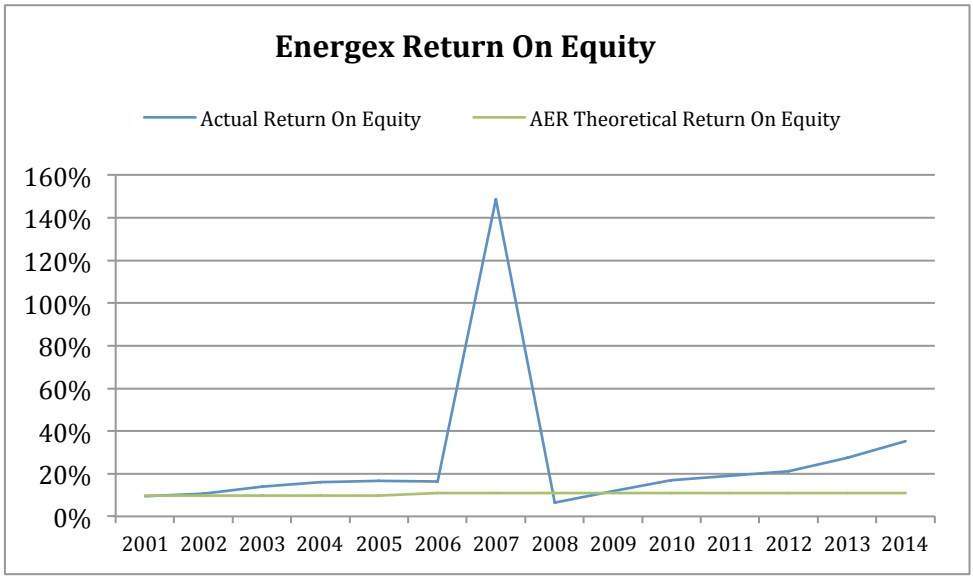

Powerlink Net Profit Trends
Net Profit After Tax (NPAT)
Dividends
600
500
400
300
200
100
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014


Powerlink Shareholder Equity Trends
Share Capital
Retained Earnings
900
800
700
600
500
400
300
200
100
0
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014


Powerlink Return on Equity
Actual Return on Equity
AER Theoretical Return on Equity
80%
70%
60%
50%
40%
30%
20%
10%
0%
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014


Energex Net Profit Trends
Net Profit After Tax
Dividends
1800
1600
1400
1200
1000
800
600
400
200
0
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014


Energex Shareholder Equity Trends
Share Capital
Retained Earnings
2500
2000
1500
1000
500
0
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014


Energex Return On Equity
Actual Return On Equity
AER Theoretical Return On Equity
160%
140%
120%
100%
80%
60%
40%
20%
0%
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

8.3 The Networks' Actual Debt Costs

Analysis of the Queensland networks' actual debt levels and debt costs highlights that:

- The networks' actual debt levels are lower than the levels that the AER assumes; and
- The interest rates that the networks pay for their debt are significantly lower than the rates assumed by the AER

These differences result in the networks' actual debt costs being around 25-30% lower than the 'cost of debt' allowances provided by the AER.

8.4 The Networks' Actual Total Returns

In light of the network's extraordinary profitability levels, it is not surprising that investors are queuing up to invest in Australia's electricity networks and are valuing them at well above their RAB valuations.

8.4.1 The Recent TransGrid Sale

In November 2015, a number of investment consortiums attempted to purchase the NSW transmission network (TransGrid), which was sold (99 year lease) for $10.3 billion – a sale price that amounted to 165% of TransGrid's regulatory asset base (RAB) value.

Throughout the recent TransGrid revenue determination process, TransGrid made many assertions that the AER's approach to determining its return on equity allowances would not enable it to recover efficient financing costs or to attract equity investors – claiming that it would result in lower investment in the network and a significant increase in TransGrid's financing risks.

The extraordinary sale price achieved by TransGrid makes a mockery of those claims.

As all informed investors and industry analysts are aware, the statements that Australia's electricity networks make to regulators, policy makers and consumers are very different to their statements to investors.

A review of the *Spark Infrastructure* equity investment prospectus outlines why investors are queuing up to pay such large premiums above the networks' regulatory values. [71]

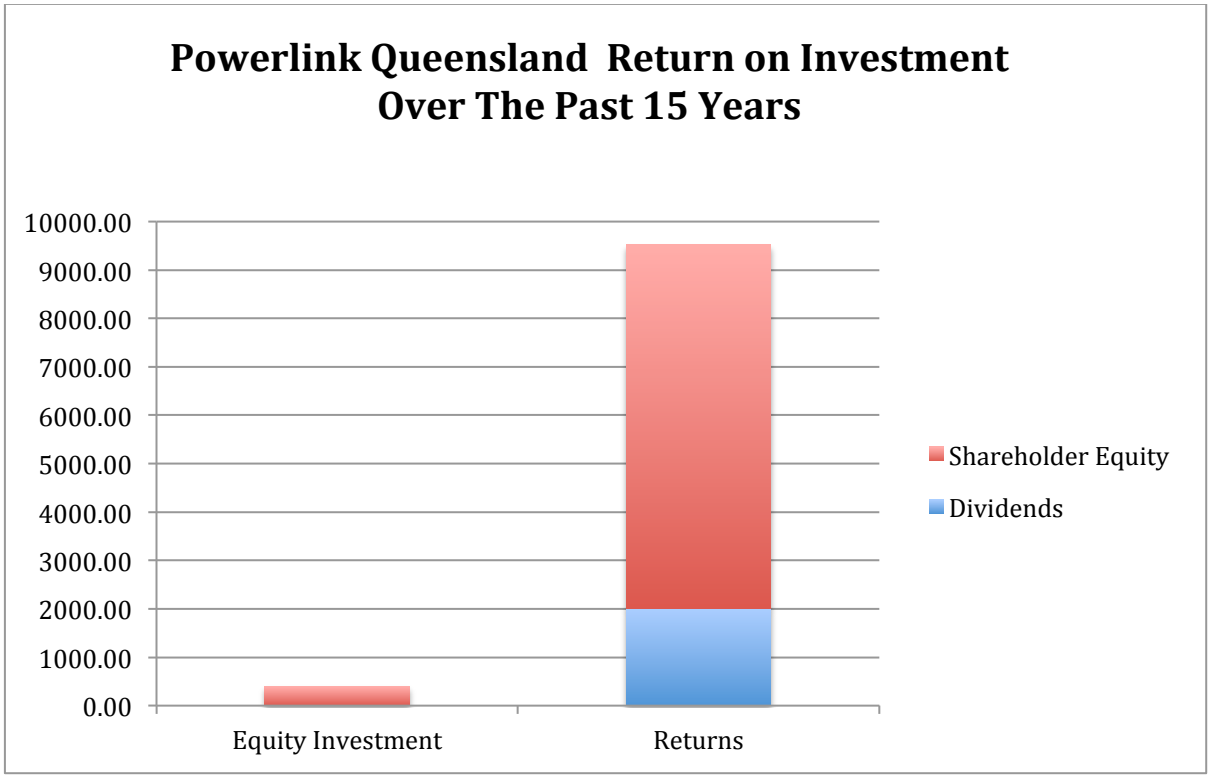
Informed investors and industry analysts were not in the least surprised that TransGrid sold for 165% of its regulatory value, as they know that the regulator is providing investors with 'return on equity' allowances at around 4 times the level that they actually require to invest in the networks.

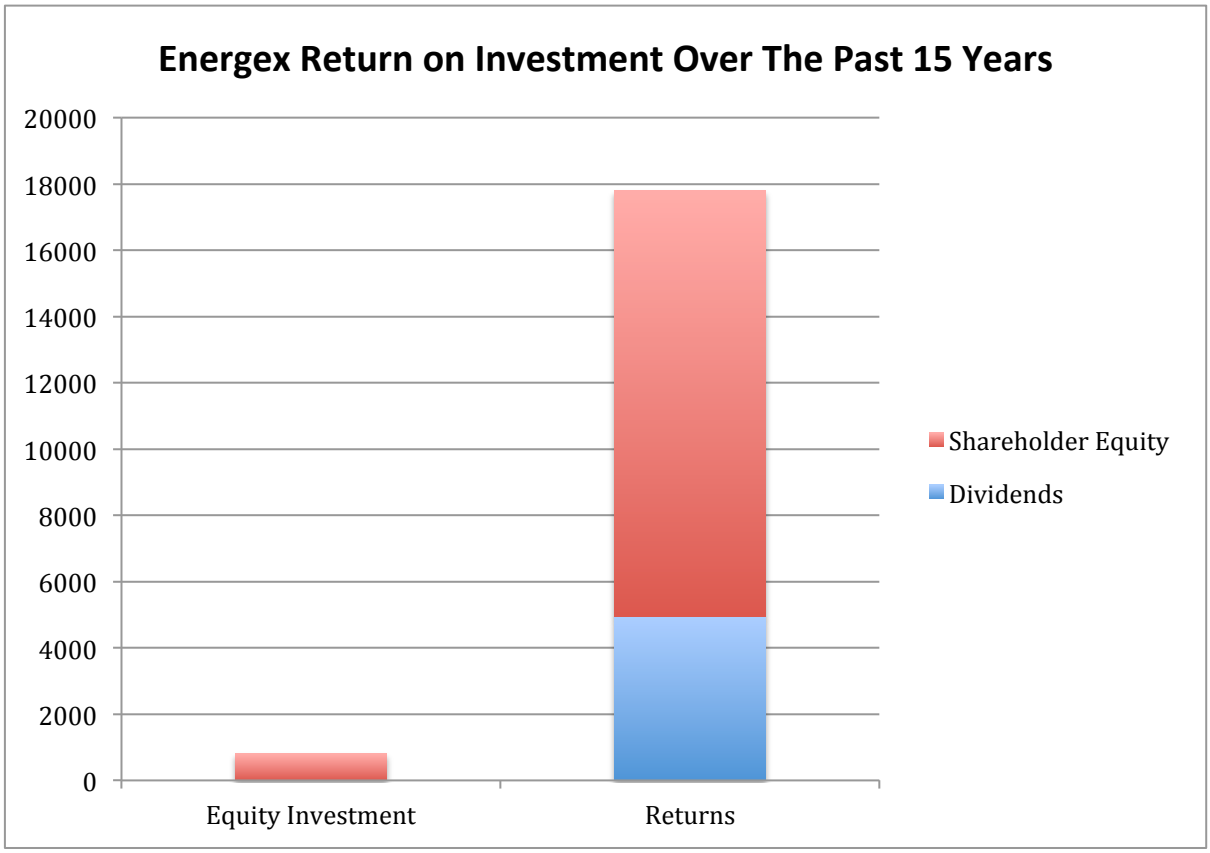
8.4.2 The Queensland Networks' Actual Total Returns

The TransGrid sale price provides a very strong indication of the current market value of the Queensland electricity networks.

The charts overleaf illustrates that the total returns (income plus growth in shareholder equity) that the Queensland government has accrued from its investments in Powerlink Queensland and Energex over the past 15 years.

[71] Spark Infrastructure - Equity Investment in TransGrid and Equity Raising, 25 November 2015





- Shareholder Equity is calculated as Current Business Value less Current Debt
- Current Business Value has been calculated as 165% of RAB, as per the recent TransGrid sale

The above charts illustrate that:

- The Queensland Government's $401 million equity investment in Powerlink Queensland has accrued total returns of around $9.4 billion – i.e. it has returned over 23 times the equity investment
- The Queensland Government's average equity investment of $814 million over the period has accrued total returns of $17.8 billion - i.e. it has realised 22 times the investment

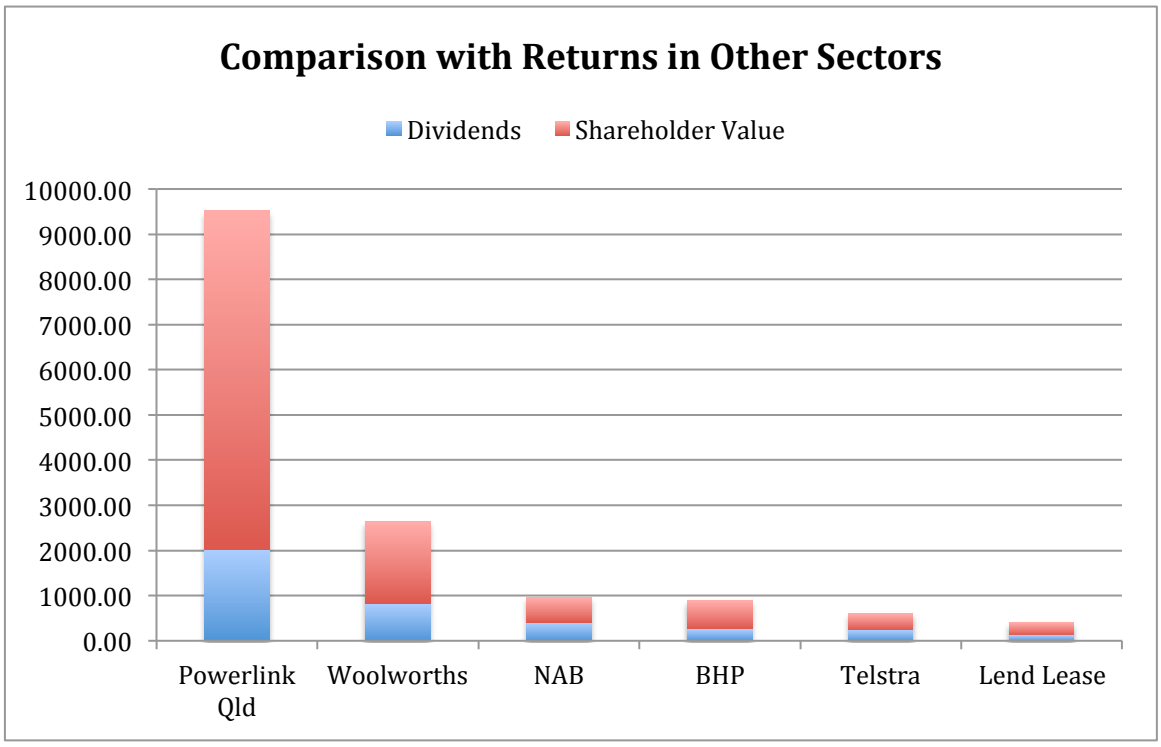
It is important to note that (as outlined in Chapter 6 of this report) the Queensland networks are unlikely to have actually invested their reported "share capital". Consequently, the networks' actual 'return on equity' ratios are likely to be higher than the above ratios.

It is also important to note that the above returns do not include the other pecuniary benefits that the Queensland government has realised from its network investments (tax receipts, debt fees, etc.). Adding those returns would also further increase the above return ratios.

8.5 Comparing the Electricity Networks' Returns With Real World Returns

These are clearly extraordinary returns and represent many multiples of the returns that have been achieved by Australia's best performing ASX50 entities over the period, despite the Queensland networks being amongst the least efficient networks in the National Electricity Market (NEM).

The chart below compares the returns that the Queensland government is realising from its ownership of Powerlink Queensland with the returns that it would have been achieved if it had invested in blue chip stocks in other sectors of the Australian economy.



It illustrates that, over the past 15 years, the Queensland government's investment in Powerlink Queensland has accrued returns of its electricity networks of:

- 23 times the returns achieved by the Australian construction sector (Lend Lease)
- 15.5 times the returns achieved by the Australian telecommunications sector (Telstra)
- 10.5 times the returns achieved by the Australian minerals and resources sector (BHP)
- 10 times the returns achieved by the Australian banking sector (NAB)
- 3.6 times the returns achieved by Australia's most profitable supermarket (Woolworths)

No other ASX 50 stock comes close to those returns.

All considerations of the impact of reductions to the networks' RAB valuations must be considered in this context.

9 How Big Is The Problem?

9.1 Estimation of Maximum Efficient RABs For Each Network

The charts overleaf provide conservative estimates of the "maximum efficient" RAB values that would apply to each NEM network in the absence of the RAB valuation methodology deficiencies.

They outline that, **based on highly conservative assumptions:**

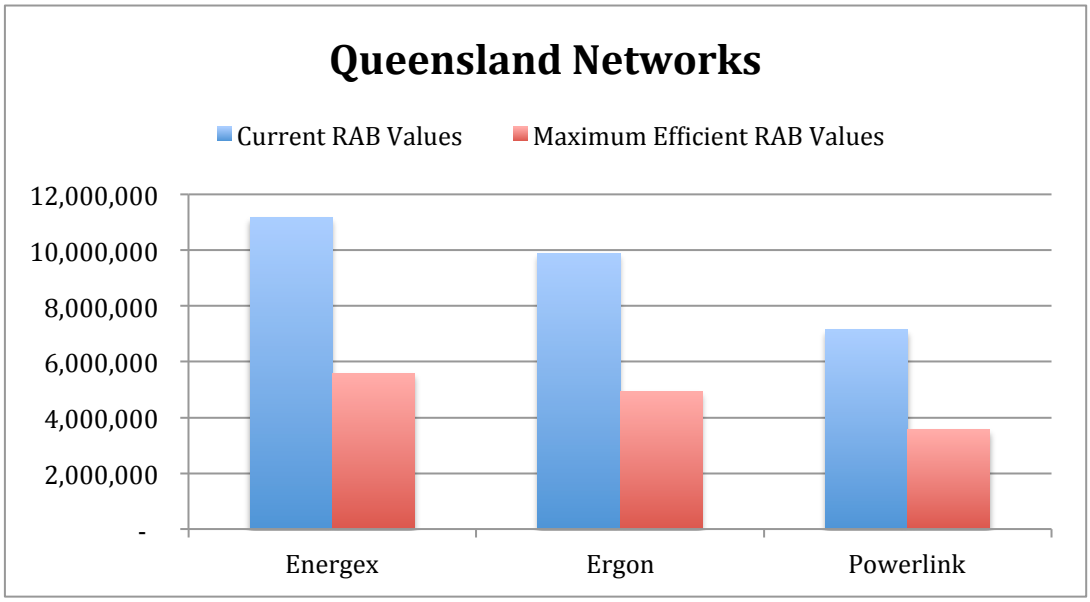
- The RAB valuations of the Queensland and NSW networks are at least twice the efficient levels
- The RAB valuations of the South Australian transmission network (ElectraNet) and the Tasmanian transmission network (Transend) are at least twice the efficient levels
- The RAB valuation of the ACT distributor (ActewAGL) is at least 64% above the efficient level
- The RAB valuation of the Tasmanian distributor is at least 59% above the efficient level
- The RAB valuation of the South Australian distributor (SAPN) is at least 41% above the efficient level
- The RAB valuations of the Victorian networks are at least 22-41% above the efficient levels

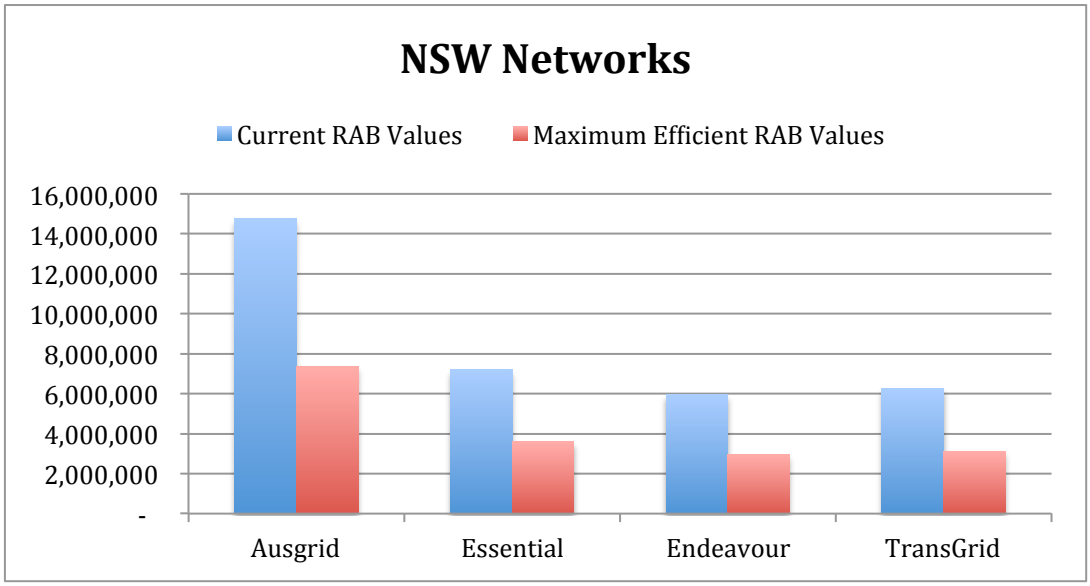
9.2 Estimated Price Reductions Of Applying Efficient RABs

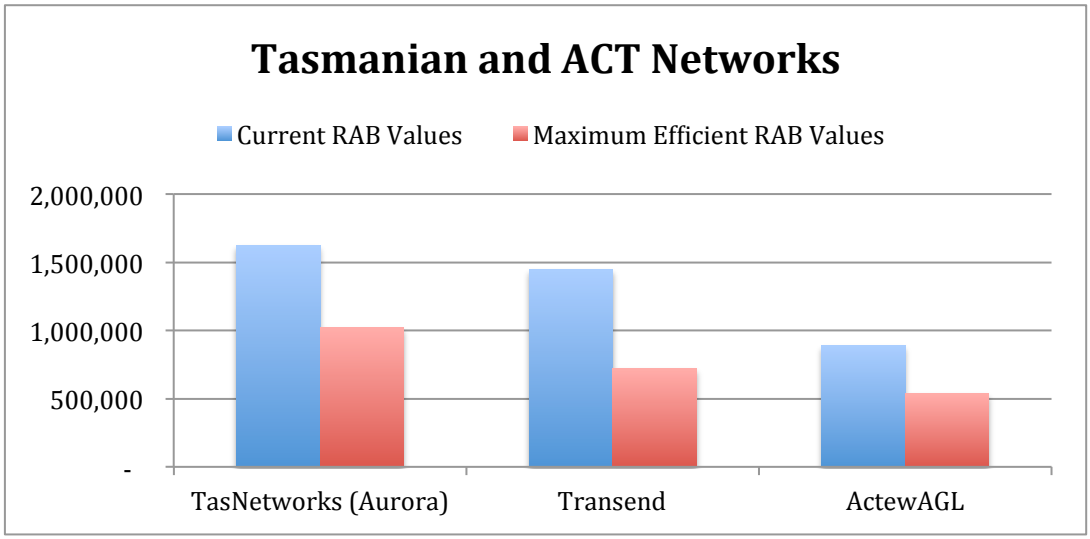
Applying the maximum efficient RAB valuations outlined overleaf would result in the prices of those networks with the most excessive RABs (e.g. the Queensland and NSW networks) reducing by up to 40%.

Price reductions of around 15-20% would apply to those networks that require lower RAB reductions.

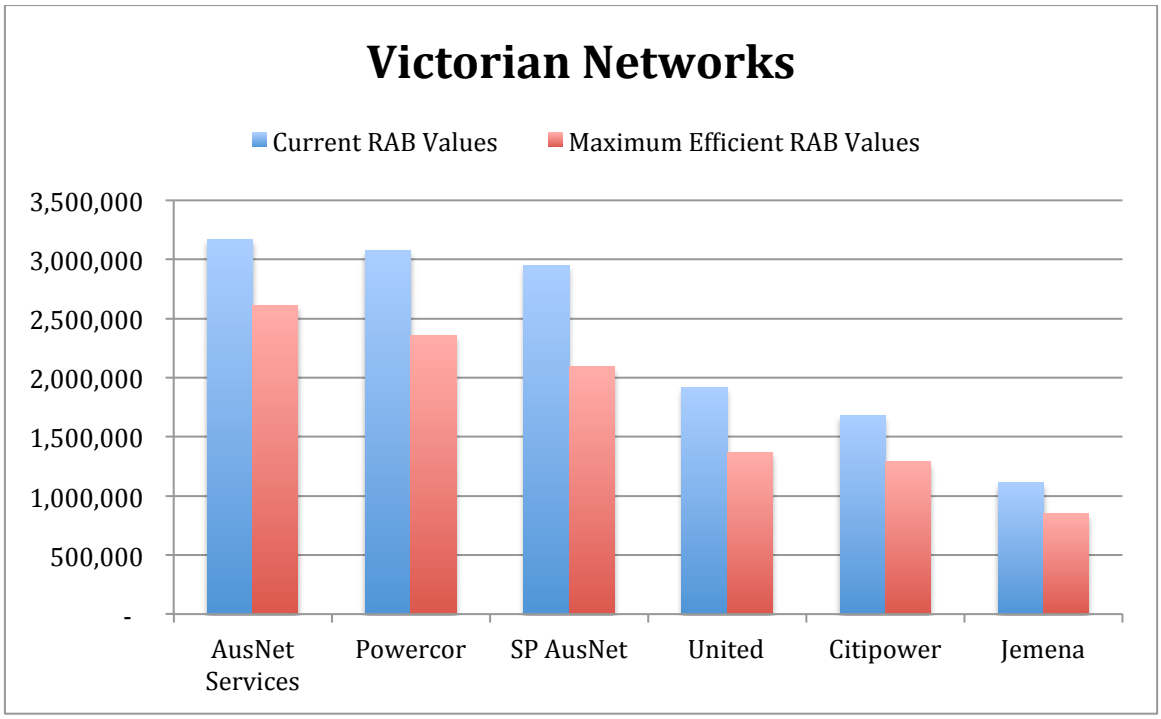
Required RAB Reductions by State – Queensland, NSW, Tasmania and ACT

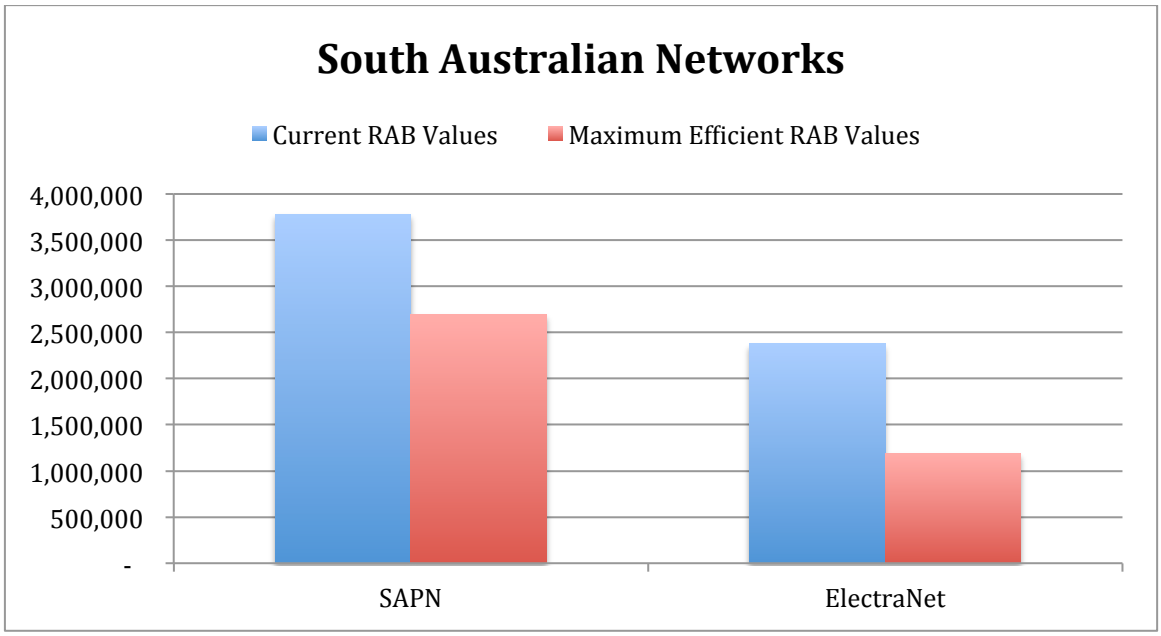






Required RAB Reductions by State – Victoria and South Australia





9.3 Assumptions

9.3.1 Estimation of Fair Establishment Valuations

Chapter 6 of this report provided evidence that consumers' interests would have been better served if the networks' establishment valuations had been determined on the basis of historical costs (e.g. using the Depreciated Actual Costs (DAC) valuation methodology) rather than applying the excessive DORC valuation methodology.

A review of the statements made by the electricity networks at the time that their DORC valuations were established identifies that the networks made many claims regarding the majority of their assets being very old and in need of replacement. The subsequent investment levels approved by the regulators were approved on the basis of those claims.

Based on this information, it is reasonable to assume that the networks' *Depreciated Actual Costs (DAC)* at that time would have been in the order of 20-30% of their DORC valuations.

A highly conservative estimate of 50% of the networks' DORC valuations has been assumed in the estimation of the efficient establishment valuations.

That would bring the networks' establishment valuations closer to the establishment valuations of the UK networks, which as outlined in Chapter 6 of this report, were less than one-third of the levels of the Australian networks.

9.3.2 Estimation of the Levels of Excessive Investment

9.3.2.1 Distribution Networks

Appendix 2 of this report summarises the findings of numerous studies into the relative capital efficiencies of Australia's distribution networks. It outlined that, when normalised for changes in network outputs:

- The Queensland distributors invested capital at up to 7.2 times the rate of the Victorian distributors
- The NSW distributors invested capital at up to 4.3 times the rate of the Victorian distributors
- The Tasmanian distributor invested capital at around 2.3 times the rate of the Victorian distributors
- ActewAGL's capital efficiency is lower than the Victorian distributors and closer to the capital efficiency level of the Tasmanian distributor

Rather than adopting the above figures, the estimates outlined in the above table have applied much more conservative adjustments to the estimation of efficient capital investment levels.

The following highly conservative assumptions have been applied:

- The Queensland and NSW distributors' capital additions at are at least twice the efficient level
- The ACT and Tasmanian distributors' capital additions are at least 1.4 times the efficient level
- No efficiency adjustments have been applied to the Victorian or South Australian distributors' capital additions. This is a conservative assumption as the evidence outlined within this report indicates that some of the privately owned distributors' capital expansion levels are significantly higher than their international peers.

9.3.2.2 Transmission Networks

Appendix 2 of this report outlines the findings and conclusions of studies into the relative capital efficiencies of Australia's transmission networks.

Those studies concluded that the privately owned Victorian transmission network (SP AusNet) is much more efficient than the other transmission networks, spending substantially less capital and operating expenditure both in absolute terms and after normalisation for growth in network outputs such as peak demand and energy delivered

For example, when normalised for changes in demand:

- Powerlink Queensland invested in load capex at over 20 times the rate of SP Ausnet
- Transgrid invested in load capex at over 15 times the rate of the SP Ausnet
- ElectraNet invested in load capex at 7 times the rate of SP Ausnet

Rather than adopting the above rates, the estimates outlined in the table overleaf are based on the highly conservative assumption that Powerlink Queensland, Transend, ElectraNet and TransGrid's capital additions are at least twice the efficient level.

No efficiency adjustments have been applied to SP AusNet's capital additions.

9.3.3 The Above Assumptions are Highly Conservative

As outlined above, the "maximum efficient RAB valuations" have been calculated on the basis of highly conservative and transparent assumptions, supported with extensive evidence.

It is clear that many stakeholders (including the authors of the various reports referenced within this paper) are of the view that the much more significant reductions to the RABs are justified.

For example:

- The assumptions regarding fair establishment valuations only apply a 50% reduction, whereas the equivalent establishment valuations in the UK were less than one-third of the Australian networks' valuations
- It has been assumed that the Queensland and NSW distributors have incurred capital additions at twice the efficient level, whereas the evidence outlined in Appendices 1 and 2 of this paper identifies that they incurred capital additions at 4-7 times the levels of the Victorian distributors when normalised for system outputs
- It has been assumed that the Queensland and NSW transmission networks have incurred capital additions at twice the efficient level, whereas the evidence outlined in Appendices 1 and 2 of this paper identifies that they incurred capital additions of up to 20 times the levels of the Victorian transmission network when normalised for system outputs
- No adjustments have been applied to the Victorian and South Australian distributors' capital additions, whereas there is evidence that their capital expansion levels are inefficient compared to their international peers

9.3.4 Determination of More Precise Calculations of Efficient RAB Valuations

The table overleaf outlines how the above estimates have been derived.

This report does not purport to represent a precise calculation of the efficient RAB valuations for each electricity network.

However, the estimates demonstrate that on the basis of highly conservative assumptions, the RABs of Australia's electricity networks are materially excessive and need to be significantly reduced to achieve the National Electricity Objective (NEO).

It has been assumed that the independent review recommended in Chapter 10 of this report will perform a detailed analysis to determine more precise calculations of the efficient RAB valuations for each network.

9.4 Data Sources

9.4.1 Opening RAB Valuations

The opening RAB valuations are the 1999 RAB valuations for the transmission networks and the 2000 RAB valuations for the distribution networks, as per the regulators' determinations.

9.4.2 2015 RAB Valuations

The 2015 RAB valuations are the 1 July 2015 valuations as per the AER's most recent revenue determinations, or the latest estimates provided within the networks' current revenue proposals.

Calculation Of The Maximum Efficient RAB Values

State	Network	RAB Components	Value ($billion)	Maximum Efficient Value	Difference
QLD	Energex	Opening (1 July 2000) Valuation	2.714	1.357	50 %
		Capital additions (including indexation)	8.458	4.229	50 %
		Total (2015) RAB	**11.172**	**5.586**	**50 %**
	Ergon Energy	Opening (1 July 2000) Valuation	2.493	1.247	50 %
		Capital additions (including indexation)	7.380	3.689	50 %
		Total (2015) RAB	**9.873**	**4.936**	**50 %**
	Powerlink	Opening (1 July 1999) Valuation	1.842	0.921	50 %
		Capital additions (including indexation)	5.311	2.655	50 %
		Total (2015) RAB	**7.152**	**3.576**	**50 %**
		QUEENSLAND TOTAL	**$28.2 billion**	**$14.1 billion**	**50 %**
NSW	Ausgrid	Opening (1 July 2000) Valuation	4.078	2.039	50 %
		Capital additions (including indexation)	10.674	5.337	50 %
		Total (2015) RAB	**14.752**	**7.376**	**50 %**
	Essential Energy	Opening (1 July 2000) Valuation	1.964	0.982	50 %
		Capital additions (including indexation)	5.224	2.611	50 %
		Total (2015) RAB	**7.187**	**3.594**	**50 %**
	Endeavour Energy	Opening (1 July 2000) Valuation	1.916	0.958	50 %
		Capital additions (including indexation)	4.028	2.014	50 %
		Total (2015) RAB	**5.944**	**2.972**	**50 %**
	TransGrid	Opening (1 July 1999) Valuation	1.935	0.967	50 %
		Capital additions (including indexation)	4.307	2.153	50 %
		Total (2015) RAB	**6.241**	**3.121**	**50 %**
		NSW TOTAL	**$34.1 billion**	**$17.1billion**	**50 %**
Tasmania	TasNetworks Distribution	Opening (1 July 2000) Valuation	0.643	0.322	50 %
		Capital additions (including indexation)	0.982	0.701	29 %
		Total (2015) RAB	**1.625**	**1.022**	**37 %**
	TasNetworks Transmission	Opening (1 July 1999) Valuation	0.373	0.187	50%
		Capital additions (including indexation)	1.074	0.537	50%
		Total (2015) RAB	**1.447**	**0.724**	**50%**
		TASMANIA TOTAL	**$3.1 billion**	**$1.75 billion**	**43 %**

ACT	**ActewAGL**	Opening (1 July 2000) Valuation Capital additions (including indexation) **Total (2015) RAB**	0.449 0.442 **0. 891**	0.224 0.316 **0.541**	50% 29% **39%**
Victoria	**Citipower**	Opening (1 July 2000) Valuation Capital additions (including indexation) **Total (2015) RAB**	0.784 0.895 **1.679**	0.392 0.895 **1.287**	50% - **23%**
	Powercor	Opening (1 July 2000) Valuation Capital additions (including indexation) **Total (2015) RAB**	1.424 1.649 **3.073**	0.712 1.649 **2.361**	50% - **23%**
	AusNet Services	Opening (1 July 2000) Valuation Capital additions (including indexation) **Total (2015) RAB**	1.110 2.057 **3.167**	0.555 2.057 **2.612**	50% - **18%**
	Jemena	Opening (1 July 2000) Valuation Capital additions (including indexation) **Total (2015) RAB**	0.526 0.585 **1.111**	0.263 0.585 **0.847**	50% - **24%**
	United Energy	Opening (1 July 2000) Valuation Capital additions (including indexation) **Total (2015) RAB**	1.091 0.825 **1.916**	0.546 0.825 **1.371**	50% - **28%**
	SP AusNet	Opening (1 July 1999) Valuation Capital additions (including indexation) **Total (2015) RAB**	1.714 1.235 **2.949**	0.857 1.235 **2.092**	50% - **29%**
		VICTORIA TOTAL	**$13.9 billion**	**$10.6 billion**	**24 %**
South Australia	**SAPN**	Opening (1 July 2000) Valuation Capital additions (including indexation) **Total (2015) RAB**	2.169 1.609 **3.778**	1.084 1.609 **2.694**	50% - **29%**
	ElectraNet	Opening (1 July 1999) Valuation Capital additions (including indexation) **Total (2015) RAB**	0.688 1.688 **2.377**	0.344 0.844 **1.188**	50% 50% **50%**
		SOUTH AUSTRALIA TOTAL	**$6.2 billion**	**$3.9 billion**	**37%**
		NEM TOTAL	**$86.3 billion**	**$47.9 billion**	**45%**

10 Solutions

Implementing fair regulatory valuations for Australia's electricity networks that better meet the National Electricity Objective (NEO) requires solutions that:

- Address the current excessive RAB valuations – i.e. reduce the networks' RAB valuations to efficient levels
- Ensure the prudency and efficiency of future capital additions to the networks' RABs
- Address the inconsistency between the AER's 'return on capital' determination methodology and the RAB valuation methodology

All independent analysts have concluded that the RABs of Australia's electricity networks will need to be written down, either by regulation or by choice.

The most effective and sustainable solutions will require changes to the National Electricity Rules.

However, there are solutions that can be implemented by the owners of the networks in the absence of changes to the rules, or as interim solutions prior to the implementation of the required rule changes.

This Chapter is separated into four parts:

- An outline of the need for an independent review to determine fair regulatory valuations for Australia's electricity networks, that better reflect the National Electricity Objective (NEO). This review is considered essential for the rule change solutions and would also be valuable to inform the non-rule change solutions
- Rule change solutions – an outline of the changes that are required to the National Electricity Rules (NER) to implement fair regulatory valuations for the electricity networks
- An outline of the key challenges of the rule change process that that rule change proponents are likely to face
- Non-rule change solutions – i.e. solutions that can be implemented by the owners of the networks in the absence of changes to the National Electricity Rules (NER)

10.1 Independent Review To Determine Fair RABs

As foreshadowed by the *Senate inquiry into the Performance and Management of Electricity Network Companies,* it is essential that that an independent review is performed to determine fair regulatory valuations for Australia's electricity networks that better reflect the National Electricity Objective (NEO).

The terms of reference of the review should include an assessment of the deficiencies with the RAB valuation methodology outlined within this paper.

In light of the lack of confidence that consumers and other stakeholders have in the NEM reform process, it will be highly critical that the review body is independent of the regulatory institutions (the AEMC and the AER), and truly independent of any entities that benefit from the interests of Australia's electricity networks.

10.2 The Proposed Rule Change Solution

Implementing fair regulatory valuations for Australia's electricity networks that better meet the National Electricity Objective (NEO) will require changes to the National Electricity Rules (NER).

It will require revisions to the Rules that:

- Revise the current RAB valuations by removing the excess valuations arising from:
  - The excessive establishment valuations
  - The inclusion of imprudent and inefficient investments
- Ensure the prudency and efficiency of future capital additions to the RAB, by incorporating more effective 'ex-post' review provisions
- Address the inconsistency between the AER's 'return on capital' determination methodology and the RAB valuation methodology

This section outlines the specific rule change required to achieve the above objectives and provides guidance to potential rule change proponents on the AEMC's rule change requirements.

10.2.1 The AEMC's Rule Change Requirements

The AEMC's key requirements for the contents of rule change proposals include: [72]

- A description of the proposed rule changes
- A "Statement of Issues" that outlines the nature and scope of the issues concerning the existing Rules and an explanation of how the proposed changes will address the issues
- An explanation of how the proposed changes would or would be likely to contribute to the achievement of the national electricity objective
- An explanation of the expected benefits and costs of the proposed change and the potential impacts of the change on those likely to be affected

The following sections provide high-level guidance and identify the key relevant sections of this report that rule change proponents may wish to draw upon in the development of the rule change proposal.

10.2.2 Description of the Proposed Rule Changes

The following sections highlight the key rule changes required.

10.2.2.1 Rule Changes to Address the Current Excessive RAB Valuations

The rule change proposal should propose that the regulatory valuations determined by the above independent review are adopted.

The RABs specified in Schedules 6 and 6A of the National Electricity Rules (NER) will need to be updated to specify the revised valuations determined by the independent review.

[72] Available at: http://www.aemc.gov.au/Energy-Rules/National-energy-rules/Rule-making-process/Guidelines-for-proponents-preparing-a-rule-change.aspx

This rule change will simply involve:

- **For the distribution networks** - updating the RAB values specified in Schedule 6.2, Clause S6.2.1 (c) (1) with the revised RAB valuations determined by the independent review
- **For the transmission networks** - updating the RAB values specified in Schedule 6A.2, Clause S6A.2.1(c)(1) with the revised RAB valuations determined by the independent review.

10.2.2.2 Rule Changes To Ensure The Prudency and Efficiency Of Future Capex

Ensuring the prudency and efficiency of future additions to the RAB will require the introduction of more effective 'ex-post' provisions for determining the prudency and efficiency of future capex before it is rolled into the RAB

This will involve rule changes that address the deficiencies with the existing ex-post review provisions outlined in Chapter 6 of this report - i.e.:

- **Removing Unnecessary Constraints To The Ex-Post Reviews**

This will include removing the *overspending requirement* clause (S6.2.2A (c) for distribution and S6A.2.2A (c) for transmission). Those clauses will need to be removed to enable the AER to review the prudency and efficiency of **all** capex to be rolled into the RAB - not just the networks' overspend above the AER's total capex allowances.

- **Incorporating The Ex-Post Capex Review Provisions Applied In Western Australia**

It is recommended that the rule change proposal should propose the incorporation of the ex-post review provisions contained within the Western Australia Access Code outlined in Chapter 6 of this report, i.e.

- The Redundant Network Assets clauses (Clauses 6.61 to 6.63 of the WA Access Code)
- The New Facilities Investment Test (Clauses 6.52 to 6.55 of the WA Access Code)
- The Investment Adjustment Mechanism (IAM) (Clauses 6.13 to 6.18 of the WA Access Code)

The description of the proposed Rule changes should be closely linked to the 'Statement of Issues', describing how the proposed changes will address the identified issues.

10.2.2.3 Rule Changes to Address The Inconsistency Between the AER's 'Return on Capital' Determination Methodology and the RAB Valuation Methodology

As outlined in Chapter 6 of this report, a key regulatory principle that is fundamental to building block revenue regulation is that the methodology for the determination of the networks' return on capital allowances must be consistent with the asset valuation methodology.

This principle was explicitly stated in previous versions of the rules.

For example, Clause 6.2.3 (v) of the National Electricity Code required that: [73]

"Benchmark returns to be established by the ACCC *are to be consistent with the method of valuation of new assets and revaluation, if any, of existing assets and consistent with achievement of a commercial economic return on efficient investment"*

Chapter 7 of this report provides a detailed analysis that outlines that the AER's methodology for determining the networks' return on capital allowances is inconsistent with the RAB valuation methodology, as it does not appropriately deal with the impacts of indexation of the capital base.

In essence, the AER's methodology for estimating the required percentage returns (for both equity and debt) is based on the returns that investors require on their actual investments. However, the AER calculates its 'return on capital' allowances by multiplying those percentage returns to artificially inflated capital bases resulting in the AER providing return on capital allowances well above the required levels.

As outlined in Chapter 6 of this report, in order to address the inconsistencies within the current rules (which require the RAB to be indexed), the AER needs to either:

- Modify its methodology for estimating the required percentage returns to reflect that they will be applied to inflated capital bases; or
- Apply its percentage returns to capital bases (i.e. debt and equity bases) that are more reflective of the networks' actual investments

The current rules do not present any impediments to the implementation of the above changes.

However, it appears that the AER is unlikely to alter its 'return on capital' determination approach in the absence of rule changes or the provision of specific guidance within the rules.

There are two alternative approaches to addressing the above inconsistencies.

10.2.2.3.1 Option 1 – Improve The Level of Prescriptivity Of The Rules

The current rule requirements regarding the calculation of the networks' 'return on capital' allowances are not particularly prescriptive.

For example, the rule requirement for the estimation of the return on equity allowances for distribution networks simply states that: [74]

6.5.2 Return on equity

(f) The return on equity for a regulatory control period must be estimated such that it contributes to the achievement of the allowed rate of return objective

(g) In estimating the return on equity under paragraph (f), regard must be had to the prevailing conditions in the market for equity funds

[73] National Electricity Code, Version 1, Clause 6.2.3 (v), Page 9

[74] National Electricity Rules, Version 79, Page 663

To avoid any further ambiguity and to address the deficiencies with the AER's return on capital determination methodology, the rule change proposal could propose changes to improve the prescriptivity of the methodology for the estimation of the networks' return on capital allowances.

That will require changes to Clause 6.52 for the distribution networks and Clause 6A.6.2 for the transmission networks.

10.2.2.3.2 Option 2 - Remove RAB Indexation from The Networks' RAB Values

An alternative approach to addressing the issues would be to remove the cumulative value of indexation from the networks' RABs and to remove the requirement for ongoing indexation of the RAB valuations.

As outlined in Chapter 4 of this paper, removing the cumulative value of indexation would involve further RAB reductions (of around 20-30%) in addition to the above RAB reductions.

The removal of the requirement to index the RAB will require:

- The removal of Clauses 6.5.1 (e) (3) and S6.2.3 (c) (4) for the distribution networks; and
- The removal of Clauses 6A.6.1 (e) (3) and S6A.2.4 (c) (4) for the transmission networks

It is anticipated that the proposed independent review will evaluate the alternative approaches to dealing with the issue.

10.2.3 The 'Statement of Issues'

The 'Statement of Issues' should:

- Identify the nature and scope of each problem or issue with the existing Rules; and
- Describe how the rule change proposal addresses each of the identified problems or issues

A detailed description of the problems with the RAB Valuation Methodology is outlined in Chapter 6 of this report.

Chapters 6-10 of this report outline how the proposed rule changes will address the problems identified.

10.2.4 How the Proposed Changes Contribute to the National Electricity Objective (NEO)

The AEMC is required to make a Rule change if it is satisfied that the Rule will or is likely to contribute to the achievement of the National Electricity Objective (NEO).

The NEO as stated in section 7 of the NEL is:

*"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."

This paper outlines how the existing RAB Valuation Methodology is **not** promoting efficient investment in the networks, but rather it is resulting in highly **inefficient investment in** the networks.

It also outlines how the outcomes of the excessive RAB valuations (i.e. excessive prices) are resulting in highly **inefficient use of** the networks, resulting in consumers making inefficient decisions to self generate and disconnect from the networks.

10.2.5 Alternatives to the "Once-Off" RAB Revaluation Solution

Whilst all independent analysts consider "once-off" asset revaluations to be the most rational and sustainable solution to address the impacts of the networks' excessive RABs, there are alternative rule change solutions that could be implemented to attempt to address the impacts.

Such alternative solutions were canvassed within the CME paper commissioned by TEC [75], including:

- **Progressive Revaluations**

Rather than "once-off" RAB revaluation, the RABs could be progressively reduced through the indexation of asset values by a constant or time-profiled negative rate.

- **Applying an Escrow Account to the Surplus RAB**

This option would transfer the proportion of the RAB that has been deemed to be surplus to requirements (or the value of specifically identified assets) to an "escrow" account i.e. segregating the surplus RAB component from the regulatory asset base (RAB). The CME Paper anticipated that the assets in the escrow account would be depreciated, but that depreciation would not form part of the networks regulated revenues and neither would a return on capital be provided on assets in the escrow account.

The CME paper suggests that if it subsequently becomes the surplus asset values in the escrow account become used and useful, then the depreciated value of the assets could then be added back to the RAB.

- **Applying A Differentiated Rate Of Return On The Surplus RAB**

This option would apply a zero or low regulated rate of return to the portion of the asset base deemed to be surplus to requirements.

- **Not Charging Consumers For The Depreciation Of Surplus Stranded Assets**

This approach would entail segregating the depreciation of the surplus stranded assets and not charging this to consumers. This approach might be applied in addition to, or as an alternative, to applying reduced or zero returns on stranded assets.

As outlined within the CME report, the "once-off" RAB reduction option is the cleanest and most rational option.

It would bring the needed immediate relief to consumers whereas some of the above alternative options would delay the consumer benefits. The above alternative solutions would also be more complex to implement and would most likely prolong the regulatory debate.

[75] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

Importantly, whilst some of these alternative solutions may reduce the short-term impacts on the networks, they would most likely still result in consumers reducing their reliance on the networks while the artificially high prices remain. Consequently, they would be unlikely to arrest the death spiral and therefore would not be in the networks' long-term interests.

In essence, the alternative solutions would only be seriously considered if the short-term impacts on network owners take precedence over the urgency that consumers obtain relief from excessive prices.

Furthermore, should rule change proponents choose to propose any of the above alternative solutions, an important principle that should be applied to the rule change proposal would be that they achieve the same outcome in net present value (NPV) terms as the asset write-down solution.

10.2.6 Expected Costs, Benefits and Impacts of the Proposed Rule Changes

The AEMC requires that proposed rule changes should explain:

- The expected benefits and costs of the proposed change; and
- The potential impacts of the changes on those likely to be affected.

The expected cost and benefits of the proposed changes are outlined in Chapter 9 of this report.

The table overleaf identifies the key stakeholders likely to be affected by the proposed changes and provides a high level indication of the likely key impacts. The rule change proposal should elaborate on those impacts.

Stakeholder	Impacts of Proposed Changes
Electricity Networks	▪ Major improvements in industry viability ▪ Avoidance of the industry death spiral whilst achieving fair financial returns ▪ Significantly improved stakeholder relationships (including relationships with consumers and community stakeholders)
Energy Generators	▪ Major improvements in industry viability ▪ Increases revenues and profits from increased sales (arising from lower retail prices) and an improved competitive position relative to demand-side alternatives
Energy Retailers	▪ Major improvements in industry viability ▪ Increases revenues and profits from increased sales (arising from lower retail prices) and an improved competitive position relative to demand-side alternatives
Consumers	▪ Price reductions of 15-40% ▪ Reduced levels of consumers in hardship ▪ Improved industry competitiveness ▪ Avoidance of inefficient investment decisions
Future Investors in Electricity Networks	▪ Lower asset stranding risks ▪ Fair and sustainable returns ▪ Major improvements in industry viability
AER	▪ Removal of systemic deficiencies with the "RAB Roll Forward Model" that it administers ▪ Improved relationships with stakeholders ▪ Improved viability of the industry it regulates
AEMC	▪ Removal of systemic deficiencies in the Rules to enable the achievement of the National Electricity Objective (NEO) ▪ Improved relationships with stakeholders ▪ Improved energy industry viability
Federal/State Governments	Progresses various current COAG Priorities , e.g.: • Ensuring the adequacy of the network regulatory framework to accommodate future market and technological changes • Improved industry competitiveness • Protecting consumers' long-term interests • Improved institutional performance

10.3 The Challenges of the Rule Change Process

As experienced consumer advocates are aware, over the past decade, consumers' long-term interests have not been well served by the AEMC rule change process.

The information and resource imbalances, the overwhelming domination of the process by the vested interests of industry incumbents and the AEMC's systemic bias towards "investment certainty" have consistently thwarted consumers' long-term interests from being realised through the AEMC rule change process.

This section identifies some of the key challenges that rule change proponents are likely to face when proposing the above rule changes.

10.3.1 The AEMC's Systemic Bias Towards "Investment Certainty"

The AEMC's interpretation of the National Electricity Objective and consumers' long-term interests has a systemic bias towards "investment certainty".

The AEMC's decisions consistently demonstrate a bias towards "investment certainty" at the expense of consumers' long-term interests.

However, the AEMC also consistently fails to provide credible justifications or evidence to support its rationale for the primacy of investment certainty over consumers' long-term interests.

As highlighted by the Public Interest Advocacy Centre (PIAC): [76]

"PIAC's belief is that a core issue has been the excessive focus on supply-side investment. Our understanding is that the underlying assumption in the rules from 2006 onwards was that investment has to be incentivised regardless of the cost to current consumers"

In sum, a set of supply-side big engineering values have dominated rule-making consistent with a 'statist development' approach to public policy"

A few examples of how these values have operated in practice are noted below:

- *The investment bias embodied in the rules requires the AER to index the RAB and does not allow for any adjustment for redundant/unused assets*
- *The automatic roll in of past capex even for assets not required meant AER cannot impose its view of an efficient outcome as required by the NEO*
- *The investment bias was also related to separating the setting of reliability standards (by government) from the costs involved (set by the regulator)*
- *Governments were allowed to set (sometimes politically influenced) reliability standards without any price signal as to what customers were willing to pay*

[76] From complex fragments to competitive consumer-focused markets: PIAC Submission to the Review of Governance Arrangements for Australian Energy Markets: Issues Paper

"PIAC's view is that there are issues with the performance of the AEMC's functions and that the AEMC's rule making process are not achieving the national energy objectives of serving the long term interests of consumers for a range of reasons, including:

- *the narrow interpretation of the NEO by AEMC (as an 'economic' objective focused on price, not 'in long term interests of consumers' as noted by the Productivity Commission and the Senate Inquiry);*
- *the dominance of Commissioners who have been incumbent 'industry players' (associated with for example, government owners of assets, major generators and/or financiers or legal firms acting for supply side entities);*
- *an organisational culture that is focused on the interests of the supply-side of the market*
- *an organisational culture that does not prioritise consumer concerns;*
- *a tendency to privilege incumbents"*

The AEMC's bias towards protecting investment certainty would be understandable if the certainty it provided did not result in inefficient investment. However, as demonstrated throughout this report, it has come at great cost to consumers, whilst delivering extraordinary profits to the networks.

Rule change proponents will need to be vigilant in holding the AEMC to account for any assertions that it makes regarding the primacy of investment certainty over other considerations, and to require the AEMC to back up any such assertions with credible evidence.

10.3.2 The AEMC's Inadequate Consideration of Consumers' Perspectives

Rule change proponents need to be aware that the AEMC has a tendency to devote inadequate consideration of consumers' perspectives.

As stated by Dr Appleby: [77]

"There have been suggestions that while there is much formal consultation required within the AEMC's processes, its responsiveness to consumer interests and issues has been poor"

As stated by the Public Interest Advocacy Centre (PIAC): [78]

"Arguments put by consumer advocates are rarely accepted, regardless of the quality of the argument or evidence offered"

Rule change proponents will need to hold the AEMC accountable for genuine consumer consultation that ensures that consumer voices are both heard and given appropriate weight during the rule change process.

[77] Accountability in the National Energy Market, Dr Gabrielle Appleby, University of New South Wales,'

[78] From complex fragments to competitive consumer-focused markets: PIAC Submission to the Review of Governance Arrangements for Australian Energy Markets: Issues Paper

10.3.3 The AEMC's Unreasonable Expectations Regarding The Provision Of Evidence

Despite the information imbalance and the extremely limited resources that consumer advocates can devote to the rule change process, the AEMC has a track record of placing an unreasonable "burden of proof" on consumers. Infact, the AEMC tends to place a higher "burden of proof' on consumers than it does to industry incumbents, and to itself.

Consumers are likely to be heavily reliant on the independent review and on the evidence provided within this report for the provision of the evidence requirements for the rule change proposal.

10.3.4 The Need To Expose Deficiencies In The Networks' Claims and Assertions

While all independent industry analysts have concluded that asset write-downs are essential for protecting the electricity networks' ongoing viability, it can be expected that the networks and their lobby groups will devote extensive resources (ultimately funded by consumers) to oppose the proposed changes.

Consumers will only ever be able to devote a small fraction of the resources that the networks can devote to the rule change process. However, it will be important that consumers endeavor to ensure that the AEMC subjects the networks' claims and assertions to a high degree of scrutiny and require their claims to be supported by an appropriate level of evidence.

10.3.5 Deficiencies in the ENA Paper - "Written-Down Value? Assessing Proposals for Electricity Network Asset Write Downs"

The paper developed by one of the energy networks' lobby groups (the ENA) entitled *"Written-Down Value? Assessing Proposals for Electricity Network Asset Write Downs"* provides example of the types of claims that can be expected from the networks in response to the proposed changes. [79]

That paper was developed by the ENA in response to calls from various stakeholders for asset write-downs. It was clearly developed in an attempt to close down any serious discussion on the issue.

It attempts to argue that the electricity networks' prices would increase rather than decrease if they are subjected to asset revaluations. The thrust of the ENA's argument is that subjecting the electricity networks to asset revaluations would represent a "new risk" that would result in the networks incurring higher financing costs that would more than offset any price reductions arising from lower RAB valuations.

[79] Written-Down Value? Assessing Proposals for Electricity Network Asset Write Downs, ENA, August 2014

The ENA paper is based on a number of seriously flawed and unsubstantiated assertions and assumptions, including:

- **Asserting That Asset Revaluations Would Represent A "New Risk" to the Networks**

The ENA's key argument is based on the deeply flawed assertion that the networks' return on capital allowances do not already compensate them for the risk of asset revaluations.

As outlined in Chapter 8 of this report, the rules require the AER to determine the networks' 'return on capital' allowances on the basis of a "benchmark efficient entity".

The benchmarks used by the AER in determining the networks' cost of capital allowances (for both equity and debt) are based on the returns that investors expect when investing in competitive sectors of the economy - i.e. the networks' return on capital allowances are based on the returns that investors that bear asset stranding risks require from their investments. This includes energy sector entities such as Origin Energy, AGL and Energy Australia, all of whom have voluntarily implemented asset write-downs in recent months.

As stated by Ross Garnaut: [80]

"There seems to be little recognition that investment in the network is recouped with near certainty, being passed on to creditworthy retailers who recoup it from customers. It is the kind of investment that, effectively packaged, would be attractive to superannuation funds and other investors seeking to place a proportion of their assets into low-risk activities earning low returns. And yet the discussion of returns proceeds as if this were a mixture of ordinary business equity and debt investment, earning normal commercial returns for debt and equity"

Garnaut highlighted that:

"In the United Kingdom, the cost of debt is derived from the price of bonds actually sold by low-risk network businesses, which has an interest rate around 2.5 percentage points lower than the general corporate debt rate.

By contrast, in Australia the cost of general corporate debt is used - i.e. the Australian regulator applies cost of capital rates that assume that regulated networks are as risky as the average investment in the Australian stock market.

Australian networks borrow significantly more cheaply than their 'cost of debt' allowances thereby enabling them to profit substantially from over-investment.

State Owned entities get an even better deal as they obtain finance at an even lower rate, thereby profiting to an even greater extent"

- **It Ignores the Networks' Extraordinary Profitability**

As outlined in Chapter 8 of this report, Australia's monopoly electricity networks are extraordinarily profitable achieving many multiples of the returns being realised by all other sectors of the Australian economy (e.g. 23 times the returns being achieved by the construction sector and 16 times the returns being achieved by the telecommunications sector).

[80] Garnaut Climate Change Review Update Paper: Transforming the electricity sector, 2011

The ENA paper conveniently ignores this fact and attempts to create the impression that the networks' returns are commensurate with their low risks and that introducing the "new risk" of asset revaluations would dramatically increases in their cost of capital.

Rule change proponents will need to hold the AEMC to account for putting the networks' actual profitability levels under the spotlight and require the AEMC to explain how the National Electricity Objective (NEO) and consumers' long-term interests can possible be being achieved when monopoly electricity networks are achieving such extraordinary profits.

- **Deeply Flawed Assumptions Regarding the Magnitude of the Required Write-downs**

As outlined within this report, there are significant variations in the required levels of write-down for Australia's electricity networks. This paper has quantified minimum required levels of write-downs for each network of between 18-50 % (with an average write-down of 45%), based on highly conservative assumptions.

Other studies referenced within this report have estimated similar or higher levels of write-downs are required, purely on the basis of inefficient investment.

However, the ENA paper attempts to create the impression that much lower levels of write-down are required, basing its unjustified scenarios on write-downs of 5-20% and describing a 20% write-down as "extremely large" and "massive".

- **Unsubstantiated Claims Regarding A "Regulatory Compact"**

In its communications on the ENA paper, [81] the ENA makes some unsubstantiated assertions regarding an unwritten "regulatory compact" that the electricity networks claim to have struck with the regulatory institutions, claiming that somehow that "regulatory bargain" should protect the networks from the risk of asset revaluations.

In essence, the ENA is asserting that because the rules don't include a specific clause that spells out that asset valuations can be reviewed then it means that they are protected from such reviews.

A reasonable alternative view is that no such clause exists because no such guarantee has been provided.

- **Assuming that the Past Protectionism Will Continue**

The ENA's assertions regarding such implied guarantees are symptomatic of the 'sense of entitlement' that permeates the monopoly electricity network sector.

As stated by Alan Pears, senior industry fellow at RMIT: [82]

*"Network operators have been given a **false sense of entitlement** to a 'right to make a profit', regardless of their past poor judgement regarding investment in infrastructure"*

"Policy makers and regulators in the energy sector are failing consumers because they have a history of being 'gatekeepers' to the industry and defining their role as protecting the incumbent industry from

[81] ENA,Network Newsletter, Issue 53, December 2014

[82] Alan Pears submission to the Essential Services Commission inquiry into the true value of distributed generation, Feb 2016

*risks associated with change". "This **"sense of entitlement"** has effectively led to discrimination against emerging energy solutions, such as rooftop solar PV and now battery storage.*

"It could be that the people running these regulators fancy themselves as some sort of Horatio Nelson – turning the telescope to their blind eye in the hope of being able to ignore undesirable information (such as the benefits of solar and battery storage) on the presumption of winning some heroic battles (defending the incumbents). If that's the case, they are deluding themselves and doing consumers, and the economy, a massive disservice"

Rule change proponents should emphasise that just because the regulatory institutions have a track record of being overly protective of the networks, that does not mean that the networks have an entitlement to the continuation of such protectionism.

10.3.6 The Need For A Unified Advocacy Effort With Aligned Stakeholders

As outlined above, rule change proponents should be prepared for the rule change process being dominated by the networks and their lobby groups. For example, throughout the rule change process for the 2011 MEU proposed rule change, the MEU was the only consumer representative that provided submissions to the process, whereas the energy networks and their lobby groups provided numerous submissions to the process.

That imbalance in stakeholder representation made it very easy for the AEMC to deny the proposed changes, as the submissions it received were overwhelmingly opposed to the proposed changes.

However, as outlined throughout this paper, there are other stakeholder groups that will benefit from the proposed changes, including energy supply chain participants (generators and retailers) and other stakeholders that are dependent upon the efficient provision of electricity network services.

It will be essential that rule change proponent work proactively with those stakeholders throughout the rule change process to provide unified positions to the AEMC and to counter the domination of the process by the electricity networks.

The proposed independent review outlined above should be used as a platform for galvanising support from aligned stakeholders for the proposed changes.

10.3.7 Balance Sheet Adjustments

Implementation of the required write-downs may require equity injections and/or the paying down of debt for those networks that have the most excessive RABs.

It will be important for the AEMC to consider that the networks with the most excessive RABs are also those networks that have realised the most extraordinary returns and that they have predominantly funded their RAB growth by debt rather than equity.

For example, as outlined in Chapter 8 of this report, over the past 15 years the Queensland networks' RABs have grown by a factor of around 4, during which there were no equity injections – infact they extracted equity over the period.

Furthermore, as outlined in Chapter 6 of this report, the "shareholder capital" that the networks assigned to their balance sheets to accommodate the artificially inflated DORC valuations was not actually invested, and in reality most networks have been fully debt funded.

Funding such levels of growth through debt would not be possible for businesses that operate in any other sector of the Australian economy. The funding constraints that apply to commercial businesses would require them to inject significant levels of equity to fund such growth levels.

Any deliberations on the balance sheet impacts of the asset revaluations need to be considered in that context.

10.3.8 How the Proposed Rule Changes Differ From the 2011 MEU Rule Change Proposal

The AEMC is likely to expect rule change proponents to clarify how the proposed rule changes differ from the 2011 MEU rule change proposal.

10.3.8.1 The 2011 MEU Rule Change Proposal

In November 2011, the Major Energy Users' (MEU) submitted a rule change proposal to the AEMC proposing two key changes to the rules: [83]

- The reinstatement of the RAB optimisation provisions that applied prior to 2006
- Changes to the regulatory treatment of fully depreciated assets

The AEMC denied both of those proposals.

10.3.8.2 The AEMC's Reasons For Denying The MEU's Proposed Changes

Regarding the reinstatement of RAB optimisation, the AEMC's reasons for denying the proposed changes were as follows:

- **The Issues Were Being Considered As Part of The 2012 Network Regulation Rule Changes**

The AEMC claimed that the MEU's proposed changes were already being considered as part of the 2012 network regulation rule change proposal, stating that: [84]

"The MEU's concerns can be viewed as part of a broader set of capital expenditure incentive issues relating to concerns about overinvestment in networks being considered as part of the network regulation rule change request submitted by the Australian Energy Regulator (AER)".

On that basis, the AEMC claimed that the 2012 rule changes *"would substantially address the issues raised by the MEU's rule change"*

However, as outlined in Chapter 5 of this report, the 2012 network regulation rule change proposal did not contemplate RAB optimisation or the introduction of any provisions relating to the prudency or efficiency of past capex. Rather, it only ever considered rule changes relating to future capex.

[83] MEU Rule Change Proposal October 2011

[84] National Electricity Amendment (Optimisation of Regulatory Asset Base and the Continued Use of Fully Depreciated Assets) Rule 2012

- **Inadequate Establishment of The Problem**

The AEMC concluded that the MEU *"had not adequately established that the specific problems raised or that these problems warrant the solutions it has proposed"*

That should not present a problem for the changes proposed within this report, as this report provides a comprehensive description of the deficiencies with the RAB Valuation Methodology and provides extensive evidence of how the outcomes of those deficiencies are not meeting the National Electricity Objective (NEO).

- **Increased Regulatory Complexity**

The AEMC concluded that the potential benefits of reinstating RAB optimisation were outweighed by the likely increased regulatory complexity, asserting that reinstating RAB optimisation would:

- *"likely increase the complexity, costs and resourcing of the regulatory process, reducing its efficiency;* and
- *"require the regulator to take a too detailed role in approving a service provider's projects and plans"*
- *"fundamentally change the nature of the AER's role and impose significant additional administrative costs"*

Whilst this report does not propose the reinstatement of RAB optimisation, it is important to note that the AEMC did not actually justify any of the above assertions and did not attempt to quantify the costs or benefits associated with reinstating RAB optimisation.

Such an analysis would most likely have confirmed that the costs of reinstating RAB optimisation would be very modest compared to the costs of the extraordinary levels of overinvestment that occurred since the optimisation provisions were removed.

Furthermore, the AEMC did not explain why the "regulatory complexity" of optimisation was considered acceptable when the regulators chose to adopt the DORC valuation methodology.

As stated by the MEU: [85]

"Carrying out optimisation does impose increased regulatory costs, but as has been seen under the NEC, optimisation was a requirement that a regulator had to implement. The Draft Decision comments that imposing optimisation will incur increased complexity and regulatory costs. This is true, but the complexity and cost was readily absorbed in regulatory decisions under the NEC"

"This implication of such concern with a rule which reintroduces a control that was eliminated because it might impact on investment, appears to be quite self serving. There was no consideration of concern for complexity or cost when the new Rules were implemented so for the AEMC to consider that this to be an issue when implementing a more rigorous approach in the interests of consumers does not appear to be justified"

Rule change proponents will need to hold the AEMC to account for the provision of evidence to substantiate any such assertions in relation to the proposed rule changes.

[85] MEU Submission on the AEMC's Draft Decision on the MEU Rule Change Proposal

- **Disincentives for Future Investment**

The AEMC asserted that the reinstatement of RAB optimisation would *"increase risk to service providers and thus provide disincentives for future efficient investment"*

Again, the AEMC did not provide any evidence to support this assertion.

As stated by the MEU:

Covec (the AEMC's consultant) comments that a higher WACC would be needed to compensate for the increased risk. What Covec does not comment on is that the WACC was not reduced when the risk of optimisation was removed. Nor does Covec assess whether the current WACC allowed provides sufficient reward for taking the risk of optimisation. To assess the WACC in isolation of the realities of the risks involved can be misleading and lead to conclusions that are not warranted when the facts are examined"

The above examples illustrate the low "burden of proof" that the AEMC applies to its own decisions.

10.3.8.3 Key Differences From the MEU Rule Change Proposal

The rule changes proposed within this report differ significantly from changes proposed by the MEU.

- **It Does Not Propose The Reinstatement Of RAB Optimisation Or Changes To The Treatment Of Fully Depreciated Assets**

Unlike the MEU proposal, the rule changes proposed within this report do not propose the reinstatement of RAB optimisation or changes to the treatment of fully depreciated assets.

Also, they do not place any new regulatory obligations on the AER.

- **The Proposed Rule Changes Would Apply to the National Electricity Rules, Not to the National Gas Rules**

The MEU rule change proposals were proposed to apply to both the National Electricity Rules (NER) and the National Gas Rules (NGR). The above rule changes would only apply to the National Electricity Rules (NER).

10.4 Non Rule Change Solutions

Whilst implementing the above rule change solution is the most rational response for addressing the deficiencies with the RAB valuation methodology, in light of the considerable challenge that rule change proponents will face in realising the required changes through the rule change process, proponents of the required changes may also choose to advocate for alternative non rule change solutions.

This section outlines two such solutions.

10.4.1 Voluntary Asset Write-Downs

The most rational non-rule change solution is for the network owners to voluntarily write down their RABs to more sustainable levels.

There are a number of reasons why network owners should voluntarily write down their asset valuations.

- **Avoidance of the Industry Death Spiral**

The revenue cap form of regulation provides the electricity networks with guaranteed revenues irrespective of the level of demand.

Over the past five years it has become apparent that electricity demand has declined and has significantly decoupled from economic growth. This has been driven in large part by consumers reducing their consumption in response to the dramatic increases in network prices. In addition, consumers are increasingly moving to self-generation as the relative costs of distributed generation and storage are becoming more attractive, thereby further reducing the energy being delivered by the networks. The networks have responded by further increasing their prices to recover their guaranteed revenues over a reduced volume.

As a consequence, network assets are becoming increasingly under-utilised and the productivity of the electricity network sector is in serious decline.

The inevitable outcome of the continuation of these trends is the well documented "death spiral" [86] - i.e. as demand continues to decline and the move towards distributed generation increases, the burden of paying for the networks' costs will be placed on a smaller consumer base until those consumers can no longer afford to stay connected to the network.

As outlined by Energy Australia: [87]

"Governments, like businesses, do not like to write down the value of assets. Nevertheless, the fall in electricity demand and low growth forecasted by the AEMO compels the government to take such action. The alternative option would be a continuation of 'the "death spiral" which will only increase hardship cases for those that remain connected to the network'

[86] The Energy Market Death Spiral - Rethinking Customer Hardship, Paul Simshauser and Tim Nelson

[87] Energy Australia submission to the Senate Inquiry into the Performance and Management of Electricity Network Companies, April 2015

The Rapid Growth Of Distributed Generation and Non-Network Alternatives

Investment analysts consider that Australia is the most attractive market for distributed generation.

Australia has excellent solar resources, a high penetration of solar PV, and most importantly - exceptionally high electricity network prices.

As stated by Greg Hunt: [88]

"The recent regulatory determinations demonstrate that the regulatory system is not keeping apace with the rapid uptake of non-network alternatives. Australia's high rate of household solar in the world makes Australia an ideal place to develop storage and battery technology"

It is therefore not surprising that Australia was the first country in the world to receive the Tesla battery. Investment banks are making staggering predictions regarding the growth of the distributed generation market. For example, Morgan Stanley is predicting that solar plus storage will be mainstream within just a few years. [89]

Applying Write-Downs Is A Rational Solution For Protecting Business Viability

In the commercial world, when technologies and assets are made redundant by cheaper alternatives, or are clearly going to deliver less revenue than anticipated at the time of the investment, the value of the assets are written down. This is a common decision that occurs in all other sectors of the Australian economy where there has been investment in supply capacity beyond demand. It is a rational decision that businesses implement to protect their long-term viability.

In recent months, Australian companies in the energy and resources sectors have written off billions of dollars from their asset valuations in response to declining demand and the plunging costs of alternatives such as distributed generation.

Importantly, asset write-downs have been commonplace in the competitive elements of the energy sector (i.e. generation and retail), with significant asset write-downs having been implemented by Energy Australia, Origin Energy, and AGL. The key rationale for those write-downs is that demand is expected to be lower than they anticipated when they made the investment decisions and because the costs of competing solutions (i.e. distributed generation) are rapidly falling.

It is likely that the generators and retailers will become the most vocal stakeholders in calling for write-downs to the networks' assets as they are being forced to write-down their own investments due to the impacts of the networks' excessive prices on their businesses.

For example, the key reason for Energy Australia's recent write-downs was overcapacity – demand dropped by 6% since 2007 (against all expectations of an increase) while generation capacity increased by 13%.

On the basis of those metrics, the case for asset write-downs for Australia's electricity networks is much more compelling, as the RAB valuations and excess capacity of all Australian electricity networks have increased by much higher levels during that period.

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[88] Greg Hunt Interview on ABC TV Lateline program, 6 October 2015

[89] See article - "Morgan Stanley Sees 2.4m Australia Homes With Battery Storage" – available at: *http://reneweconomy.com.au/2015/morgan-stanley-sees-2-4m-australia-homes-with-battery-storage-20668*

To date, no Australian electricity networks have voluntarily written down their assets. However, there are many international precedents. For example, the New Zealand transmission network (Transpower) wrote-down its assets to protect its long-term viability, acknowledging that it prices needed to be reduced to enable the grid to compete with distributed generation.

If the regulatory framework for Australia's electricity networks was providing the right incentives then implementing asset write-downs is a rational decision that would have been taken voluntarily by the networks' owners well before now.

Most independent analysts have concluded that asset write-downs will be essential to protect the networks' long-term viability and to arrest the industry death spiral.

Continuing to force excessive prices on consumers in the face of declining demand and reducing costs of alternatives is clearly a recipe for failure.

10.4.2 Reduce Prices To Sustainable Levels

As an alternative to voluntary asset write-downs, the networks could reduce the revenue they collect from consumers to the level that results in more sustainable prices.

The Australian Energy Regulator (AER) sets a limit on the maximum revenues that the networks are allowed to collect from their customers. The networks have complete autonomy regarding the actual revenue that they collect from consumers, as long as their total revenue does not exceed their maximum revenue caps.

Decisions to collect revenues below the maximum revenue caps have been made by various networks in recent years – particularly by the state government owned networks in an attempt to provide some consumer relief from excessive prices.

Importantly, this solution can be implemented immediately and does not require any changes to the regulatory framework.

This option is likely to be particularly attractive to state governments that own electricity networks.

10.4.3 Specific Considerations for Governments As Network Owners

The above voluntary options are likely to be particularly compelling for state governments that own electricity networks as they attempt to balance their conflicting roles of energy policy setter and network owner.

This section highlights those considerations in the context of the decisions currently being faced by the Queensland government, which has committed to retaining ownership of its electricity networks.

As outlined within this report:

- The Queensland networks' prices are well in excess of efficient levels
- The majority of the Queensland networks' revenues are driven by returns on excessive regulatory asset bases (RABs)
- Those returns are many multiples of the returns being realised by blue-chip companies in all other sectors of the Australian economy (e.g. 23 times the returns being achieved in the Australian construction sector)

- Based on all of the available information, the profitability levels being realised by Queensland's electricity networks are the highest of any region or country in the world
- These returns are being realised despite the Queensland electricity networks being amongst the most inefficient networks in Australia, i.e.:
  - Powerlink Queensland is the most inefficient transmission network in Australia
  - Ergon Energy is one of the most inefficient distribution networks in Australia

Having Queensland's electricity prices driven by such extraordinary profits contradicts the espoused positions of successive Queensland governments regarding the importance of ensuring efficient and fair electricity prices for Queensland consumers.

The addiction of successive Queensland governments to the electricity networks' extraordinary returns has severely compromised the Queensland Government's positions on energy policy reform for many years.

Successive Queensland Governments have consistently chosen short-term profits over sound long-term energy policy, i.e.:

- Influencing the regulatory arrangements for electricity networks to enable the Queensland networks to achieve extraordinary profits; whilst
- Not fully considering the long-term consequences of inflicting excessive electricity prices on Queensland consumers and the state economy

Predictably, the chickens have now come home to roost and Queensland's excessive electricity prices are now inflicting major damage to the Queensland community and the Queensland economy.

In response to the excessive electricity prices, Queensland consumers are exhausting all opportunities open to them to reduce their electricity costs. In addition to reducing consumption, consumers are increasingly investing in self-generation to avoid excessive network costs.

For example, residential consumers are increasingly investing in solar PV and battery storage systems to reduce or remove their reliance on the Queensland networks.

Similarly, industrial consumers are increasingly moving to self generation (from coal and gas) and Queensland's irrigators are pursuing inefficient technology substitutions such as moving to the use of diesel pumps rather than electrical pumps.

Whilst those decisions are justified on the basis of current electricity prices, from a macro-economic perspective, many of the decisions are actually inefficient as they are based on pursuing alternatives to artificially inflated electricity prices.

As a result, Queensland's inflated electricity prices are driving ongoing demand reductions and accelerating the industry death spiral, which if allowed to continue will ultimately be much more destructive to the future viability of the Queensland government-owned energy companies than the short-term implications of implementing more sustainable prices.

The Queensland community is unaware of the electricity networks' extraordinary returns and the extent to which the Queensland state budget is dependent upon them.

It is clearly irresponsible and foolhardy to continue to allow Queensland's future budgets to be so heavily dependent upon the collection of what is, in effect, a hidden *"super profits tax"*.

11 Appendix 1: Relevant Studies, Reviews and Inquiries

This appendix provides a synthesis of the relevant findings, conclusions and recommendations of various reviews into the drivers of the electricity networks' excessive prices.

11.1 Senate Inquiry Into The Performance and Management of Electricity Network Companies

The unsustainability of the excessive regulatory valuations of Australia's electricity networks was a strong focus of the *Senate Inquiry Into The Performance and Management of Electricity Network Companies.* [90]

The Senate Inquiry's key relevant conclusions and recommendations included:

- *"The asset bases used in the calculation of the return on capital are inflated by unnecessary and underutilised investments"*
- *"Past decisions have led to a high RAB value being locked in, guaranteeing high prices in the future regardless of other rule changes or efforts to expose network businesses to the risk of their spending decisions"*
- *"Despite numerous reviews, recent rule changes and positive signs from the AER as a result of its recent draft determinations, the committee considers that fundamental problems with the regulatory framework for electricity network businesses remain"*
- *"The principal flaw is that the framework protects network service providers from certain risks that businesses in competitive markets face. In particular, network businesses do not bear the risk of inefficient investments"*
- *"While there are several areas of the framework that may warrant attention, the committee considers the treatment of the regulatory asset bases (the capital expenditure investments of each network business) is the fundamental cause of high network costs and will continue to be a major driver of revenue for network businesses in the future"*
- ***"Regardless of other changes to the regulatory framework, consumers will continue to pay higher bills than necessary as long as the RABs are not reviewed"***
- *"The committee notes that certain state governments have, or are currently considering, proposals for privatising some of their network assets". The committee considers those governments have a duty to their citizens, and an obligation to potential investors, to demonstrate that the value of the RABs for these businesses are reasonable"*
- *"The committee recommends that state governments seeking to privatise their electricity network assets examine whether those assets are overvalued and if the regulatory asset base should be written down prior to privatisation"*
- ***"Action taken now to ensure the RABs are accurate may prevent more difficult decisions from being needed in the future"***

[90] Senate Inquiry Into The Performance and Management of Electricity Network Companies, Final Report, June 2015

- *"Although a recent rule change now enables the AER to review capital expenditure that exceeds the forecast it approves as part of a determination, the AER is unable to challenge past expenditure or expenditure where the forecast is not exceeded. Network businesses are allowed to earn a return on all of these investments"*
- *"The committee considers that the AER requires the discretion to review the efficiency of all future investments and the need for their inclusion in the RAB.*
- *"The committee recommends that the Council of Australian Governments (COAG) Energy Council commission an independent expert review of options for excluding future imprudent capital expenditure and surplus network assets from a network service provider's regulatory asset base (RAB)"*
- *"This review should consider the provisions of the Western Australian Electricity Networks Access Code and its decision-making criteria"*

11.2 Research Papers on the Electricity Networks' Regulatory Valuations

Recent research separately commissioned by TEC [91] and PIAC [92] into the value of the regulatory asset bases of the NEM distribution networks concluded that the RABs of the government-owned distributors in Queensland, NSW and Tasmania are excessive.

Those reports concluded that, on the basis of inefficient investment, a more realistic total valuation of the NSW distributors' electricity networks was $13 billion, rather than their total (June 2013) value of $22 billion, and that applying the realistic valuations would cut average NSW household electricity bills by $325 per year.

The paper commissioned by TEC also indicated that, on the basis of inefficient investment, realistic valuations of the Queensland and Tasmanian networks are much lower than their current regulatory valuations.

11.3 EUAA Studies into the Australian Networks' Different Price and Productivity Levels

The EUAA produced two key research studies into the different price and productivity levels of Australia's electricity networks, with separate studies being performed for the distribution networks and the transmission networks.

Those reports built upon previous research performed by Professor Stephen Littlechild and Bruce Mountain that pointed to government ownership as a key cause of the networks' rising prices and declining productivity.[93]

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[91] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

[92] Privatisation and the regulatory valuation of electricity distribution network service providers in New South Wales: Evidence and issues, a report for the Public Interest Advocacy Centre, October 2014, CME

[93] Comparing electricity distribution network costs and revenues in New South Wales and Great Britain, Bruce Mountain and Stephen Littlechild, December 2009

Australia's Rising Electricity Prices and Declining Productivity: The Contribution of its Electricity Distributors, EUAA, May 2011 [94]

The key relevant findings and conclusions of this study included:

RAB, Revenue and Price Increases

- In 2007 the regulated assets of government owned distributors were around 30% higher per customer than privately owned distributors
- By 2014, just seven years later, the regulated assets of government owned distributors will be around 200% greater per connection than for privately owned distributors
- The regulatory asset bases were growing more rapidly for government owned distributors because their capex spend levels were around four times higher per connection than their privately owned peers
- Those ballooning investment levels resulted in the revenues and prices of the government-owned distributors more than doubling over 10 years with significant further increases to come over the next four years
- Australia's network revenues per connection were much higher than the revenues of the UK distributors:
    - The Victorian distributors' levels were twice the UK levels
    - The South Australian distributors' levels were three times twice the UK levels
    - The Queensland and NSW distributors' levels were four times the UK levels
- The state governments that own distributors are realising extraordinary profitability increases from their higher investment levels

Exogenous Factors do not Explain the Different Investment Levels

The higher investment levels of the government owned networks cannot be explained by exogenous factors (e.g. differences in customer density, demand growth, reliability standards or ageing assets/historic under-investment), as claimed by the networks

In relation to customer density:

- The proportion of underground cables compared to overhead lines is a much more significant determinant of expenditure levels than the length of the network (underground cables are much more expensive than overhead lines)
- Whilst some networks have lower customer densities than others, a large proportion of the their networks are constructed of relatively inexpensive overhead lines rather than underground cables
- Some government owned dense networks (e.g AusGrid and Energex) charge much more than less dense privately owned networks
- Likewise, some sparse privately owned networks (e.g. Powercor) charge much less than government owned sparse networks (e.g. Essential Energy and Ergon Energy)

[94] Australia's Rising Electricity Prices and Declining Productivity: The Contribution of its Electricity Distributors, EUAA, May 2011

- In all countries, networks have been getting more dense, yet the increase in asset value of Australian distributors does not correlate with density
- Expenditure has increased significantly for government owned networks while their customer density has remained largely unchanged
- Customer density does not explain the major differences in the networks' RAB growth levels

In relation to demand growth:

- Demand grew more strongly in Victoria than in Queensland and New South Wales
- There are very large differences in the amount of load growth capex expended by the electricity networks to meet changes in demand
- The Queensland and NSW distributors spent around 7 times the level of load-growth capex per MW of additional demand as the Victorian distributors
- The main issue is inefficient responses to demand growth by the government owned distributors

In relation to reliability standards:

- The case for changing the Queensland and NSW reliability standards in 2005 was not demonstrated
- There was a real lack of evidence of any systemic reliability problems that may have justified the higher reliability standards
- There is no evidence that in setting the more stringent standards, there was any meaningful attempt to assess consumer preferences, or whether consumers were willing to pay more
- The increased standards have not delivered demonstrable improvements in reliability performance
- The efficiency of the networks' capex spend to meet the standards is highly questionable
- The Victorian networks' reliability performance has consistently been higher than the other networks in the NEM
- Differences in reliability standards do not explain the distributors' dramatically different investment levels

In relation to ageing assets/historic underinvestment:

- The government-owned networks are much younger than the privately owned networks
- If replacing ageing assets was an explanatory factor then it would be expected that privately owned distributors would be spending more to replace assets that are nearer the end of their lives
- However, the government owned distributors were spending four times more per connection to replace ageing assets than the privately owned distributors
- The evidence concludes that the government owned distributors are prematurely replacing their assets and inefficiently responding to asset ageing

Again, the main issue is inefficient responses to asset ageing by government owned distributors

Ownership is the Key Determinator of the Distributors' Efficiency

- Rather than exogenous factors, the study concluded that the major differences in the distributors' efficiency levels is explained by ownership
- The government owned distributors are, on average, half as efficient as the privately owned distributors – i.e. their total expenditure would need to halve to reach the efficiency levels of the privately owned distributors
- Larger improvements would be needed for the least efficient distributors
- The productivity of the Australian distributors is much lower than the UK distributors
- Raising the government-owned distributors' efficiency levels would result in major price reductions
- If the Queensland and NSW distributors were to achieve the investment and operational efficiency, per unit asset valuations and rates of return of the UK distributors, their prices would be around one quarter of their existing levels
- The report also noted that the UK distributors were less efficient than the USA distributors, therefore further efficiency improvements would be required to achieve the USA efficiency levels

The report made a number of recommendations aimed at addressing the above deficiencies, including:

- Privatisation of the government owned networks in New South Wales and Queensland
- Improvements to the regulatory framework - particularly in relation to the arrangements for determining the rate of return for government-owned networks
- Revaluing the networks' regulatory valuations to internationally comparable levels

A comparison of outcomes delivered by electricity transmission network service providers in the National Electricity Market, EUAA 2012 [95]

The key relevant findings and conclusions of this study included:

Capital Efficiency

- The capital productivity of four of the five electricity transmission networks has declined over the past several years
- The privately owned Victorian transmission network (SP AusNet) is much more efficient than the others, spending substantially less capital and operating expenditure both in absolute terms and after normalisation for growth in network outputs such as peak demand and energy delivered
- For example, when normalised for changes in demand:
  - Powerlink Queensland invested in load capex at over 20 times the rate of SP AusNet
  - Transgrid invested in load capex at over 15 times the rate of the SP AusNet
  - ElectraNet invested in load capex at 7 times the rate of SP AusNet

[95] A comparison of outcomes delivered by electricity transmission network service providers in the National Electricity Market, EUAA 2012

Over Forecasting of Demand

A significant part of the explanation for the differences in load-driven capex per MW of load growth is that the demand forecasting errors have been much higher in Queensland and NSW, e.g.:

- The Queensland transmission network's level of over-forecasting was four times higher than Victoria
- The NSW transmission network's level of over-forecasting was twice the level of Victoria
- The Victorian demand projections performed by the independent planning body (AEMO), were more accurate and resulted in significantly lower asset growth costs for Victorian consumers

The Impact of Ownership

The differentiation of outcomes by ownership of the transmission networks was more nuanced than for the distribution networks.

Whilst the capital efficiency levels of the privately owned distributors in Victoria and South Australia were similar, the same conclusion could not be reached for the privately owned transmission networks, as the privately owned South Australian transmission network (ElectraNet) incurred capital additions at similar rates to the government owned transmission networks.

Bruce Mountain concluded that the reasons for this could be explained by ElectraNet's 'hybrid' share ownership. As outlined by Bruce Mountain:

"The discussion to this point seems to suggest that endogenous factors (those factors within the control of TNSP management or their owners) play a larger part in explaining the relative differences amongst the TNSPs, than exogenous factors.

In our report "Australia's rising electricity prices and declining productivity: the contribution of its electricity distributors" we concluded that differences in ownership, and consequential impacts for investments incentives and regulation explained a significant part of the difference in the performance of the Distribution Network Service Providers (DNSPs).

To what extent does this conclusion also apply here?

SP Ausnet is privately owned while the other TNSPs (except Electranet) are owned by their respective jurisdictional governments. In this sense, the differences in performance of the government-owned Powerlink, TransGrid and Transend compared to the privately owned SP Ausnet agrees with the government/private performance differences that are observed in distribution networks.

However, in many respects the performance of Electranet, which is nominally privately owned, is comparable to the government-owned NSPs, rather than to SP Ausnet. This seems to undermine the conclusion that ownership is an explanatory factor for performance differences across the sector.

However, closer inspection suggests that Electranet may not be appropriately classified as a privately owned TNSP. Electranet's ownership is split between Powerlink (41% shareholding), YTL (a Malaysian infrastructure investment company (33% shareholding)) and two Australian superannuation funds (sharing the remaining 26%).

Powerlink, which is wholly owned by the Queensland Government, acquired its share in Electranet in around 2001. It is the largest single shareholder in Electranet. Electranet's nine person Board is chaired by the previous Chief Executive of Powerlink. Three of the remaining eight Electranet Board members are employees of Powerlink including Powerlink's current Chief Executive Officer, its Chief Operating Officer and its Chief Financial Officer.

Although Electranet is nominally a private company, Powerlink's part ownership role, and the presence of Powerlink's most senior past and present executives on its Board of Directors, calls into question whether Electranet is actually subject to the same incentives and disciplines that might be associated with a conventional, privately owned utility".

11.4 Grattan Institute Papers

The Grattan Institute performed two key studies into the reasons for the price increases of Australia's electricity networks: [96]

- *Putting the customer back in front: How to make electricity cheaper (December 2012)*
- *Shock to the system – dealing with falling electricity demand (December 2013)*

The key relevant findings and conclusions of those studies included:

The Government Owned Distributors are Investing Inefficiently

- *"Government-owned companies are inefficiently investing in capital infrastructure"*
- *"On average, they spend more on their assets, growing their asset base at a faster rate than that of private companies"*
- *"This remains the case when both the distributor's number of customers and the size of the network (measured by kilometres of line) are taken into account"*
- *"The government owned networks have a larger regulatory asset base per customer, and spend more on capital and operations, than do privately owned companies"*
- *"Government-owned companies also tend to spend more per kilometre of line compared to privately owned companies when customer density is taken into account"*
- *"If government-owned companies invested in their infrastructure at the same rate as privately owned companies, customers of government-owned companies could save up to $640 million per year (in 2010 dollars)"*
- *"If government-owned firms spent as much on operational expenses as the average of privately owned firms with equivalent customer density, they would spend about half a billion dollars less each year"*

[96] Putting the customer back in front: How to make electricity cheaper (December 2012)
Shock to the system – dealing with falling electricity demand (December 2013)

There is Insufficient Scrutiny of the Networks' Expenditure

- *"The regulator is only able to scrutinise company expenditure before it is made"*
- *"Regulators do not have adequate resources to scrutinise expenditure, or powers to penalise over-expenditure"*
- *Beyond these issues, flaws in the regulatory process have almost certainly led companies to over-invest in the network"*
- *"The more they invest, the greater their potential return, yet the regulator has neither the resources to scrutinize these investments before they are made, nor the power to penalize companies that over-invest"*

The Regulatory Rules are Too Inflexible

- *"The process of five-yearly reviews of company price setting locks in outcomes in a way that is no longer able to reflect the changing dynamics of the industry or the external financial environment"*
- *"They are too inflexible to address changing circumstances, such as recent falls in demand"*
- *"For example, expenditure was approved to meet forecasts of rising energy demand and peak demand. Both have fallen during the current five year term, so this expenditure is unlikely to be necessary, yet businesses continue to receive revenue on the basis of the original forecasts"*

The Networks Are Achieving Excessive Profits

- *"These monopoly businesses are allowed to make unduly high profits, given the relatively low risks they face"*
- *"The ultimate test is the actual returns generated by the businesses. Over time, these should be within reasonable limits of the returns generated by businesses with similar risk exposures"*

The Reliability Standards Set by State governments that own electricity networks were not justified

- *"Intervention by several governments to increase reliability standards has pushed up prices even more and led to calls for privatisation"*
- *"Government-owned businesses spend much more than privatised businesses, in part through state government intervention to keep reliability standards unduly high, in part out of inefficiency"*
- *"Costs have been incurred, and will continue to be incurred, to achieve levels of reliability that a robust cost-benefit analysis is unlikely to justify"*

There is an Urgent Need for Regulatory Reform

- *"The regulatory structure and processes are broken"*
- *"The flaws in the regulatory process that force consumers to pay too much for electricity can and should be fixed"*
- *"These flaws have unduly shifted the balance away from consumers and towards investors"*
- *"They have led to avoidable costs to consumers of around $2.2 billion a year"*

11.5 Ross Garnaut Papers

The *Garnaut Climate Change Review Update Paper 8: Transforming the Electricity Sector* [97] increased the visibility of the flaws in the regulatory framework for electricity networks and the unsustainability of the excessive revenues, prices and profits arising from the networks' excessive investments.

The key relevant findings and conclusions of that paper included:

Exogenous Factors Do Not Explain The Networks' Different Investment Levels

Garnaut analysed the reasons provided by the networks and the AER regarding the networks' high investment levels (the need to replace ageing assets, load growth and changes in reliability standards).

He concluded that they did not adequately explain the networks different investment levels and that other factors were clearly at play.

In relation to demand growth, Garnaut challenged the networks' projections of continuing load growth, pointing out that the networks forecasts were inconsistent with recent demand trends

He highlighted the likely impact of rising prices, improved energy efficiency measures and the increasing penetration of solar PV on future demand

Note – Garnaut's assertions were subsequently proven to be correct, despite major protestations from the networks at that time

In relation to reliability standards, Garnaut highlighted that:

- The setting of reliability standards and service requirements has not been subject to institutional or regulatory reform
- The state based reliability standards are based on highly conservative, crude and deterministic engineering approaches rather than a probabilistic cost-benefit approach, resulting in higher standards than necessary
- This increased reliability standards have increased prices with no opportunity for consumers to make their own choices on what they are prepared to pay for greater reliability, when standards were already too high
- The state based standards are developed from a parochial, state-centric, viewpoint - resulting in excessive investment in shoring up local reliability – i.e. "local over-building has undermined the benefits of building nationally"

Garnaut outlined that the networks have received very generous bonuses under the state-based reliability incentive schemes. He asked policy makers to *"investigate whether the networks are undertaking excessive investment in infrastructure ("gold plating") under the guise of reliability?"*

[97] The Garnaut Review Update Paper 8: Transforming the Electricity Sector. Garnaut R. (2011)

He recommended that:

- "Reliability and other standards should be subject to close analysis and desirably to consumer choice"
- "Replacing the existing conservative' state-based transmission reliability standards with national transmission reliability standards"
- "The reliability incentive schemes need to be transformed to incentivise good performance in an environment in which companies are trying to reduce, rather than increase, their network expenditure"

In relation to the need to replace ageing assets, Garnaut raised a number of questions regarding the networks' underlying assumptions regarding the need and timing of asset replacements, including whether the networks are adopting the most appropriate balance between maintenance and replacement expenditure

Incentives for Over-Investment and "Gold Plating"

Garnaut outlined the very strong incentives that the regulatory framework provides for overinvestment in the networks, particularly for the state-government owned networks.

As stated by Garnaut:

"So there are cascading mechanisms through which the shareholders of state-owned businesses do well out of over-investment. May be, that provides part of the explanation for why government-owned network providers invest more heavily than privately owned providers and have consistently over-spent their regulated allowance"

"In addition to their lower borrowing costs, State Government owners also retain the tax allowance provided for in the cost of capital allowance.

Furthermore, political concerns about the reliability of state owned networks tend to overwhelm any incentives to minimise costs"

The Return on Capital Allowances Are Excessive

Garnaut assessed the return on capital allowances being provided by the AER and concluded that they were too high and do not reflect the low risk of the investments.

As stated by Garnaut:

"There seems to be little recognition that investment in the network is recouped with near certainty, being passed on to creditworthy retailers who recoup it from customers. It is the kind of investment that, effectively packaged, would be attractive to superannuation funds and other investors seeking to place a proportion of their assets into low-risk activities earning low returns.

And yet the discussion of returns proceeds as if this were a mixture of ordinary business equity and debt investment, earning normal commercial returns for debt and equity"

Garnaut highlighted that:

- In the United Kingdom, the cost of debt is derived from the price of bonds actually sold by low-risk network businesses, which has an interest rate around 2.5 percentage points lower than the general corporate debt rate
- By contrast, in Australia the cost of general corporate debt is used - i.e. the Australian regulator applies cost of capital rates that assume that regulated networks are as risky as the average investment in the Australian stock market
- Australian networks borrow significantly more cheaply than their 'cost of debt' allowances thereby enabling them to profit from over investment
- State Owned entities get an even better deal as they obtain finance at an even lower rate, thereby profiting to an even greater extent

He recommended that:

- The rules should be changed to relate the cost of equity and debt capital to the riskiness of the investments
- If government ownership continues, then the rules should allow the regulator to take a different approach in regulating government-owned firms to account for their unique borrowing and taxation arrangements

Transmission Planning

- Garnaut was highly critical of the lack of power provided to the National Transmission Planner
- He highlighted that the National Transmission Planner has no power to actually develop projects, but rather its plan is presented purely as a guide to the state based planners who are free to ignore it
- He outlined that *"the crucial next step in transmission reform is the rationalisation of National Electricity Market transmission planning"*
- He recommended that each state separates its transmission ownership from its planning (as is the case in Victoria) and that all transmission planning responsibilities be transferred to the National Transmission Planner.

There is an Urgent Need for Regulatory Reform

In summary, Garnaut concluded that significant weaknesses in the NEM regulatory framework have led to excessive over-investment in electricity networks resulting in unnecessarily high prices for consumers

He recommended that a close examination of the regulatory framework was urgently needed with a view to correcting its weaknesses as soon as possible

Ross Garnaut has also delivered various speeches and papers that outline the urgent need to revalue Australia's electricity networks to more sustainable levels. [98]

[98] See for example Ross Garnaut's Speach to the Young Energy Professionals Institute, 21 January 2016

11.6 Productivity Commission Report into Electricity Network Regulation

The issue of excessive regulatory asset bases (RABs) was identified by the Productivity Commission (PC) in its 2013 report on electricity network regulation, which outlined that: [99]

- *"Spiralling network costs in most states are the main contributor to these increases, partly driven by inefficiencies in the industry and flaws in the regulatory environment"*
- *"Network businesses have benefited from being able to exceed regulatory allowances for capital expenditure in the previous regulatory period"*
- *"Not only has this expenditure been rolled into the subsequent regulatory asset base, but it has also influenced the regulator's decisions about what is reasonable expenditure in future periods"*
- *"Some of this overspend could have reasonably been reduced or deferred"*
- *Indeed, at times, policy developments have been inimical to consumers' interests, resulting in price rises that cannot be justified"*

The Productivity Commission proposed a fundamental package of reforms to the regulatory framework, to "*remove the interlinked regulatory barriers to the efficiency of electricity networks"*, including:

- Changes to the arrangements for the setting of reliability standards to replicate the Victorian arrangements (noting that the reliability performance of the Victorian networks was consistently higher than the performance of other states over the period from 2001 to 2010
- Recommending that state and territory governments privatise their government-owned network businesses, as:

"*There are compelling grounds for privatisation of all electricity network businesses in the NEM"*; as *"State-owned network businesses are less efficient than their private sector peers"*

11.7 Senate Select Committee on Electricity Prices

The key relevant conclusions of the *Senate Select Committee on Electricity Prices* included: [100]

- *"The most significant driver of Australia's electricity price increases is inefficient over-investment in network infrastructure—the poles and wires"*
- *"Current regulation of the National Electricity Market (NEM) creates a perverse incentive for network businesses to engage in inefficient over-investment"*

The Committee made a number of recommendations aimed at ensuring greater scrutiny by the Australian Energy Regulator (AER) of the networks' investment proposals, including:

- Changing the National Electricity Rules to ensure more efficient forecasting of capital returns, return on debt, and capital and operational expenditure, as well as decoupling network revenues from energy volumes; and
- Empowering the ability of the AER to conduct ex-post reviews of network business capital expenditure after the fact

[99] Electricity Network Regulatory Frameworks: Productivity Commission Inquiry Report, 9 April 2013
[100] Senate Select Committee on Electricity Prices: Reducing Energy Bills and Improving Efficiency

11.8 The AER's Capital Efficiency Benchmarking Results

Appendix 2 of this report provides an overview of the AER's benchmarking results regarding the relative capital efficiency levels of Australia's electricity networks.

The AER's capital efficiency benchmarking results identify that:

- The productivity of most of the Australian distribution networks declined over the past several years
- The Victorian distributors (CitiPower, United Energy and Jemena) and the South Australian distributor (SA Power Networks) are the best performers over the entire period
- The productivity of the transmission networks, except the Victorian transmission network (SP AusNet) has declined over the past several years

The AER's benchmarking results reinforce the conclusions from all of the studies into the electricity networks' different investment rates – i.e. that exogenous factors such as customer density or reliability standards do not explain the dramatic differences in the networks' investment levels.

11.9 The AMP Capital Efficiency Benchmarking Study

The above findings were reinforced by the study by AMP Capital into the capital efficiency of Australia's electricity distributors, which identified that: [101]

"The capital efficiency of Australia's state-owned distributors is far poorer than their privately owned peers, with several exhibiting RABs more than double what would be expected"

11.10 Queensland Government Independent Review Panel on Network Costs

The *Queensland Government Independent Review Panel (IRP) on Network Costs* [102] outlined major issues with the very poor capital and operational productivity of the Queensland electricity networks (Powerlink Queeensland, Energex and Ergon Energy).

The IRP's key findings in relation to the networks' capital productivity included:

- *"An industry engineering* ***culture biased toward expanding the network infrastructure and enlarging the capital base*** *of the NSPs -* ***driving inefficient expenditure****"*
- *"A* ***deficient commercial model*** *in that there was* ***no rigorous capital rationing*** *by the Government, as shareholder and provider of capital, to guide investment decisions"*
- *"A* ***regulatory model that does not allow*** *the Australian Energy Regulator (AER) to drive* ***the networks to deliver efficient capital*** *and operating programs"*

[101] AMP Submission to the Productivity Commission - The Capital Efficiency of Australian Electricity Distributors, Results of a Benchmarking Study, November 2012

[102] Queensland Government Independent Review Panel (IRP) on Network Costs, Final Report

12 Appendix 2: Evidence of Inefficient Investment

This appendix synthesises the findings and conclusions of various studies into the reasons for the different capital investment rates of the NEM electricity networks.

It is important to recognise the authors of the reports referenced within this appendix for their important contributions to the understanding of the relative capital efficiency levels of Australia's electricity networks.

In particular, it is important to acknowledge that a number of the studies were performed by Bruce Mountain (CME), who should be recognised for his extensive analyses into the different efficiency levels of Australia's electricity networks.

All credit for the value that those reports have brought to the understanding of the network's relative efficiency levels should be attributed to the report authors. Conversely, should there be any unintended errors or misrepresentations in this appendix, they should be attributed to the author of this report.

12.1 Analyses of the Reasons for the Networks' Different Investment Levels

When questioned about the reasons for their significantly higher investment rates, some networks attempt to attribute the differences to exogenous factors such as:

- Customer density
- Demand growth
- Higher reliability standards
- Ageing assets and historical underinvestment

These claims have been put to the test by various studies and inquiries referenced within this report. [103]

The following sections of this appendix attempt to summarise the key findings and conclusions of those studies.

[103] For example:
Senate Inquiry Into The Performance and Management of Electricity Network Companies, June 2015
Electricity Network Regulatory Frameworks: Productivity Commission Inquiry Report, 9 April 2013
Senate Select Committee on Electricity Prices: Reducing Energy Bills and Improving Efficiency, Independent Review Panel, Electricity Network Costs, Final Report, November 2012
Queensland Government Independent Review Panel (IRP) on Network Costs, Final Report, 2013
A comparison of outcomes delivered by electricity transmission network service providers in the NEM, EUAA, 2012
Australia's rising prices and declining productivity: the contribution of its electricity distributors, EUAA, 2011
Shock to the system: Dealing with falling electricity demand , Grattan Institute, December 2013
Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012
The Garnaut Climate Change Review Update, Paper 8: Transforming the Electricity Sector, 2011
PIAC: Privatisation and the regulatory valuation of electricity distribution network service providers in New South Wales: Evidence and Issues - a report for the Public Interest Advocacy Centre, CME, October 2014
Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and issues, CME, April 2015

12.1.1 Customer Density

Customer density is frequently suggested as a justification for higher capital expenditure levels.

However, the findings of the various studies into this issue (including the AER's benchmarking results) do not support those assertions.

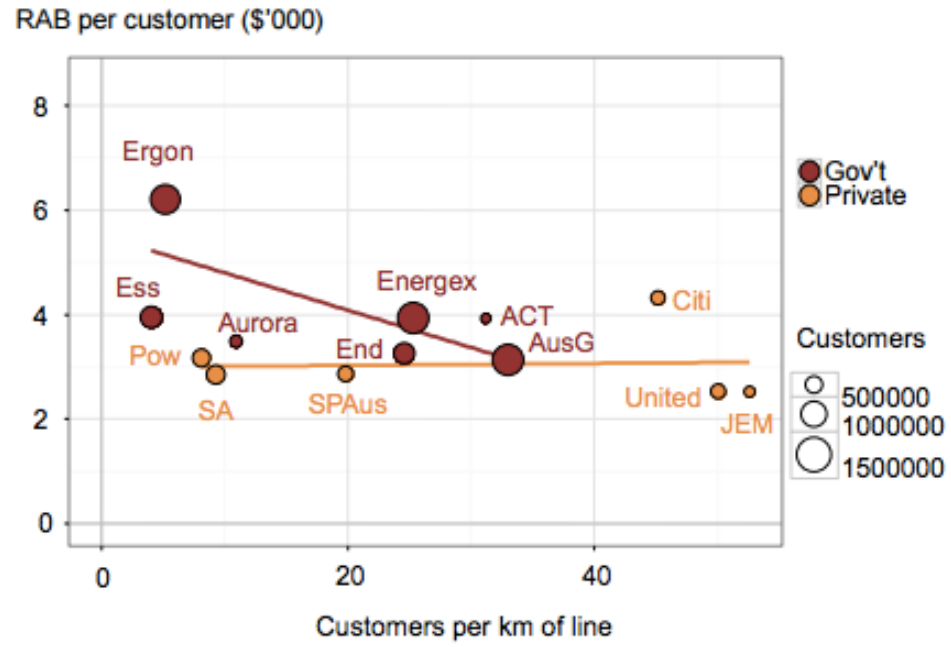
The key findings and conclusions of the Bruce Mountain studies into this issue include:

- Australia is one of the most urbanised countries in the world
- Customer density in Australia's metropolitan areas is comparable to that in other countries with the exception of very dense international capitals such as London, Tokyo or New York
- The proportion of underground cables compared to overhead lines is a more significant determinant of expenditure levels than the length of the network (underground cables are much more expensive than overhead lines) [104]
- While some Australian distributors have lower customer density levels, much more of their network is overhead rather than underground
- A large proportion of the some rural networks such as Ergon Energy, Powercor and Essential Energy is constructed from inexpensive single wire earth return or 11 kV overhead distribution lines
- Around 14% of the NEM network is underground (rather than overhead) compared to around 60% in the UK
- The networks often make claims using the measure of customer density per square kilometre of surface area.
- That metric makes little sense as a basis for comparison, as a large part of the surface area of each state is uninhabited and is not covered by electricity infrastructure
- In all countries, networks have been getting more dense, yet the increase in asset value of Australian distributors does not correlate with density
- Changes in customer density have occurred for metropolitan and country distributors alike. In all cases, networks have become more dense at the same time as expenditure has risen
- Some government owned dense networks (e.g AusGrid and Energex) charge much more than less dense privately owned networks
- Some privately owned sparse networks (e.g. Powercor) charge much less than the government owned sparse networks (e.g. Essential Energy and Ergon Energy)
- The evidence that costs have increased significantly for government owned networks while their customer density has remained largely unchanged suggests that customer density does not explain the major differences in their RAB growth levels

The above conclusions were reinforced by the Grattan Institute's analysis [105], which identified the following:

- *"Figure 4.3 shows that in 2005-06, most government-owned companies already had a higher RAB per customer compared to privately owned companies, once customer density is taken into account"*
- *"However, the gap has grown. Figure 4.4 shows that by 2008-09, government-owned companies had a significantly higher RAB per customer than did privately owned companies"*
- *"This includes government-owned companies that previously had a similar RAB per customer to privately owned companies such as Endeavour and Ausgrid"*
- *"For government-owned companies, the RAB per customer decreases as customer density increases"*
- *"By contrast, the RAB per customer of privately owned companies – already lower in most cases – remains steady regardless of customer density"*

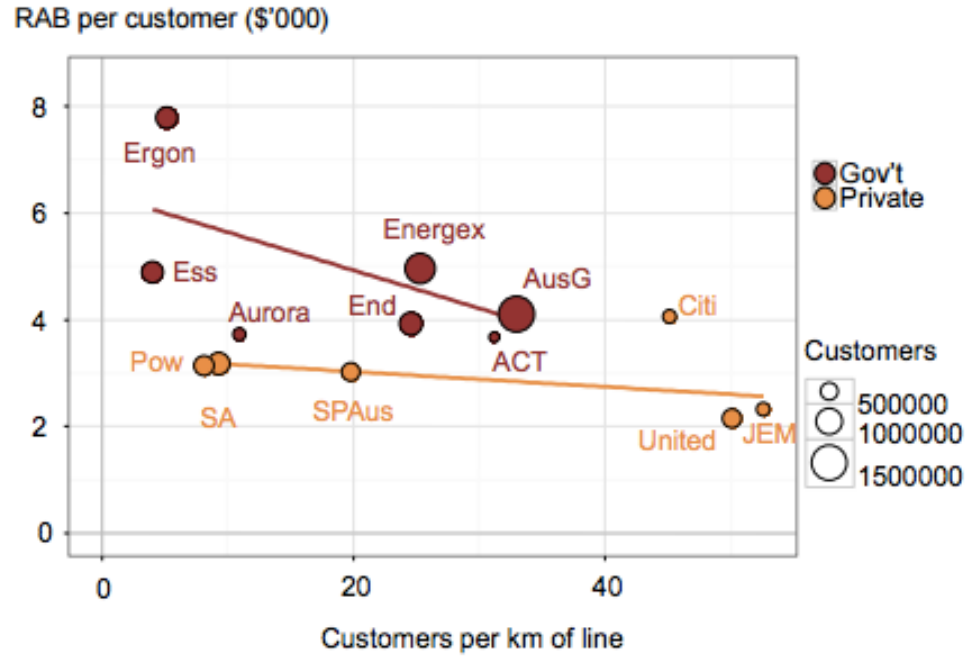
Figure 4.3: RAB per customer by customer density 2005-06 ($June 2010)



Sources: Analysis of data obtained from distribution determinations by Australian Energy Regulator (2012a), state-based regulators[89] and regulatory audit reports.[90]

[105] Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012

Figure 4.4: RAB per customer by customer density in 2008-09 ($June 2010)



Sources: Analysis of data obtained from distribution determinations by Australian Energy Regulator (2012a), state-based regulators[91] and regulatory audit reports.[92]

12.1.2 Demand Growth

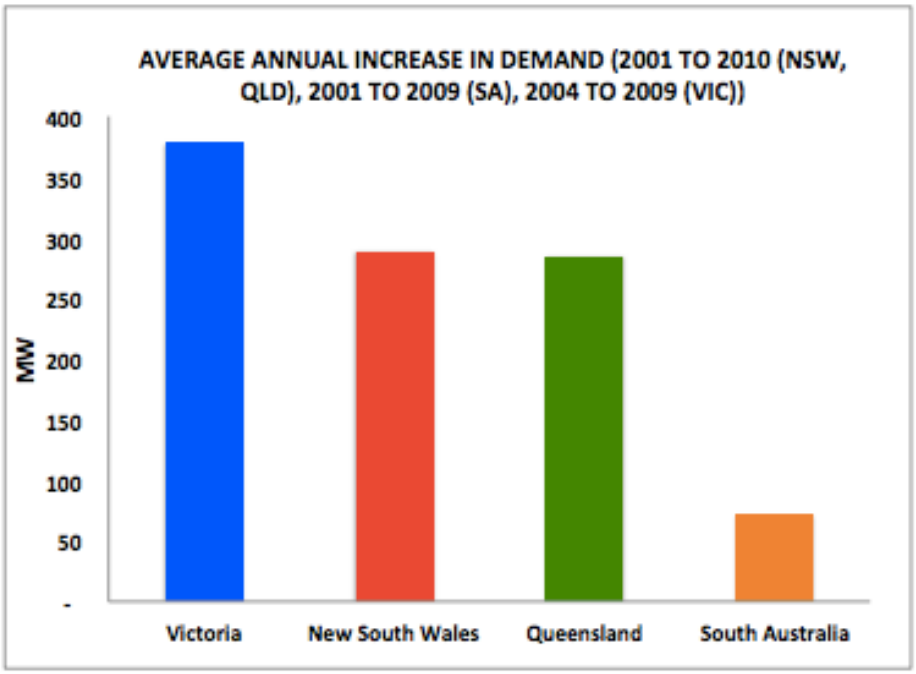
Growth in peak demand is one of the most common reasons that the networks provide to explain their RAB growth levels.

The chart overleaf outlines the average annual increase in demand for four Australian states over the 2001-2010 period. [106]

It illustrates that demand growth was highest in Victoria, followed by NSW, Queensland and South Australia.

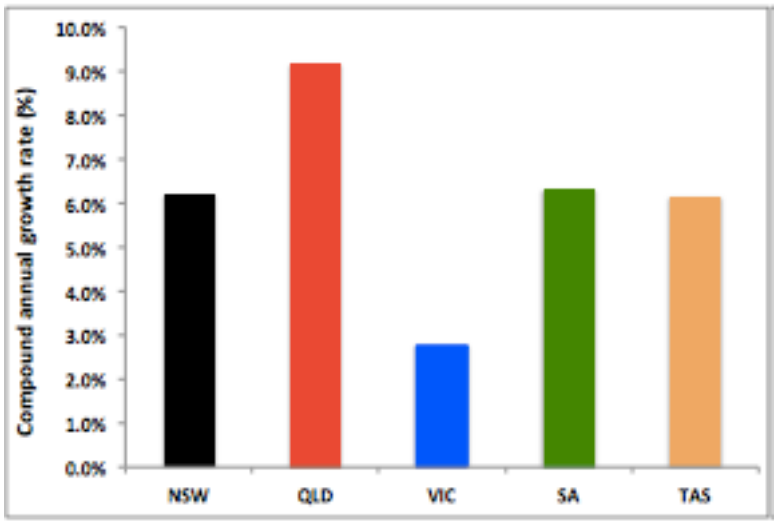
[106] A comparison of outcomes delivered by electricity transmission network service providers in the NEM, EUAA, 2012

Figure 15. Demand growth MW per annum average over the measured periods



12.1.2.1 RAB/Peak Demand Trends

The chart below illustrates the compound annual growth rate of the Australian transmission networks' regulatory asset bases (RABs) over the 2005 to 2013 period. [107]

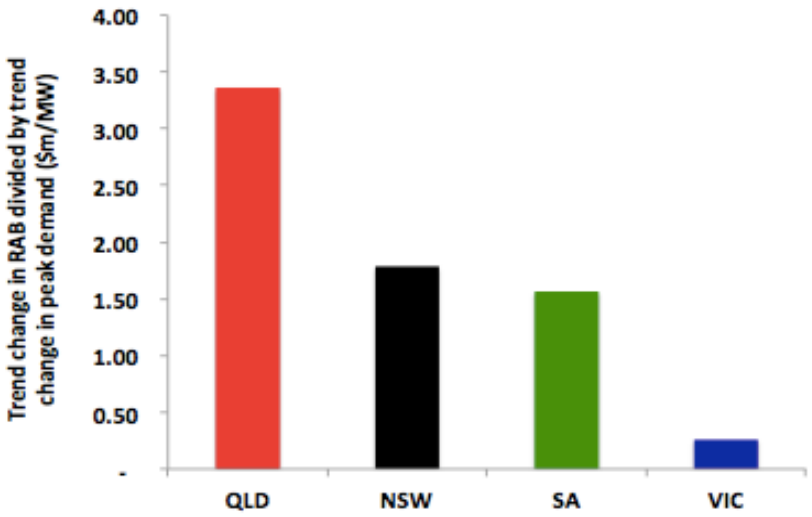


[107] A comparison of outcomes delivered by electricity transmission network service providers in the NEM, EUAA, 2012

The chart below illustrates the differences in the trend change in RAB normalised for the change in peak demand for Australia's transmission networks over the 2005-12 period. [108]

It highlights that:

- The trend rate for the Queensland transmission network (Powerlink Queensland) grew at around 14 times the rate of the Victorian transmission network (SP Ausnet)
- The trend rate for the NSW transmission network (Transgrid) grew at around 7 times the rate of the Victorian transmission network (SP Ausnet)
- The trend rate for the South Australian transmission network (Electranet) grew at around 6 times the rate of the Victorian transmission network (SP Ausnet)



The chart overleaf illustrates the compound annual growth rates of the transmission networks' RABs normalised for growth in peak demand and energy delivered for the period from 2005 to 2013.

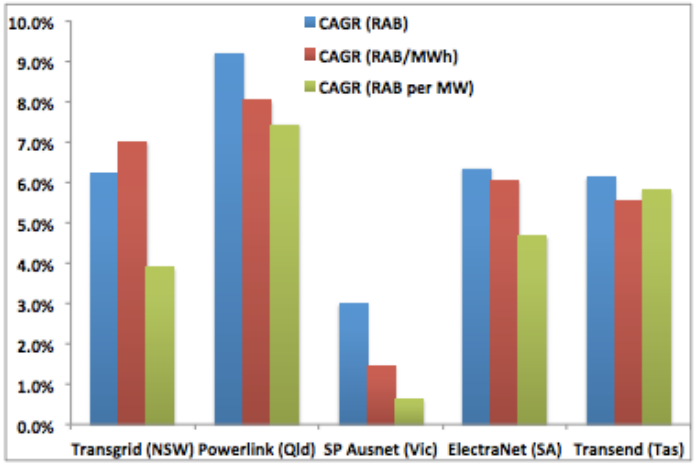
As outlined by Bruce Mountain:

"It is clear from this that the RAB for Powerlink has grown more strongly than for any of the other TNSPs in absolute terms, and after normalisation for energy delivered or annual peak demands"

"At the other end of the spectrum, the growth in the RAB for SP Ausnet has been the lowest in absolute terms and particularly after normalisation for growth in demand"

[108] A comparison of outcomes delivered by electricity transmission network service providers in the National Electricity Market, EUAA 2012

Figure 10. Compound Annual Growth Rate of the RAB, and normalised for growth in energy delivered and peak demand, from 2005 to 2013[xiii]



The relative efficiency of the networks' RAB growth in terms of the capacity outcomes delivered was analysed by the Grattan Institute. The chart overleaf outlines the Grattan Institute's assessment of the changes in the networks' RABs compared with the corresponding change in network capacity. [109]

It highlights that:

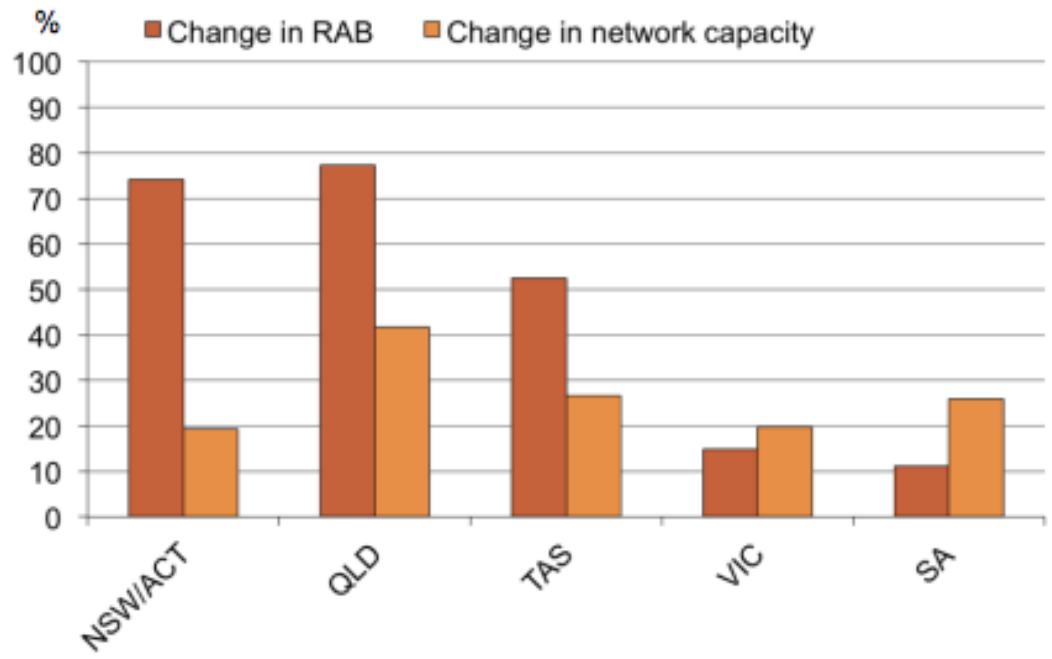
- The Queensland distributors increased their RABs by almost 80%, whilst only increasing their network capacity by around 40%
- The NSW/ACT distributors increased their RABs by around 75%, whilst only increasing their network capacity by around 20%
- The Tasmanian distributor increased its RABs by over 50%, whilst only increasing its network capacity by around 26%

By contrast:

- The privately owned Victorian distributors increased their RABs by around 10%, resulting in their network capacity increasing by 20%
- The privately owned South Australian distributor increased its RAB by around 15%, resulting in its network capacity increasing by around 27%

[109] Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012

Figure 4.2 Percentage change in RAB and network capacity for distribution networks



12.1.2.2 Load Capex/Load Growth

As not all RAB growth is directly related to demand, comparing the ratio of the networks' demand-related capex to their growth in peak demand represents a more accurate analysis of the efficiency of the networks' load driven capex.

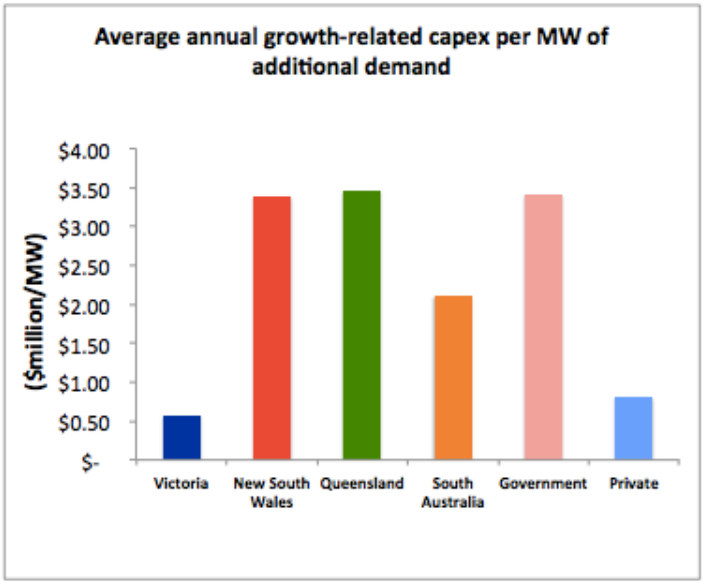
12.1.2.3 Distribution Networks

The chart overleaf illustrates the ratio of the average annual growth-related capex of Australia's distribution networks per MW of additional demand. [110]

It illustrates that the Queensland and NSW distributors spent around 7 times the level of capex per MW of additional demand as the Victorian distributors.

[110] Australia's rising prices and declining productivity: the contribution of its electricity distributors, EUAA, 2011

Figure 17. Growth related expenditure per Megawatt (MW) of additional demand



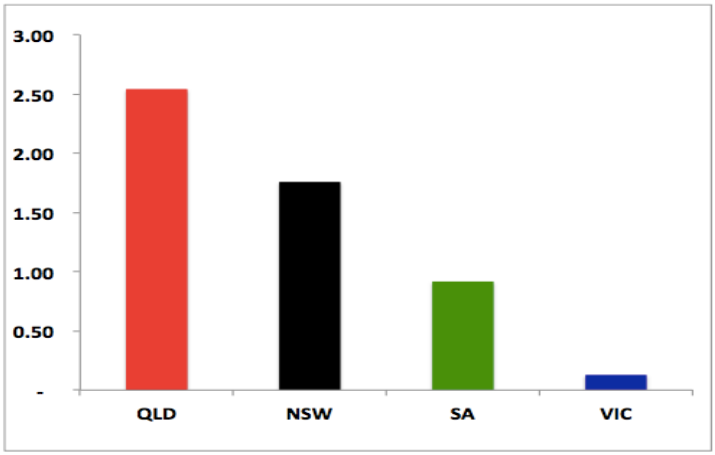
12.1.2.4 Transmission Networks

The diagram overleaf illustrates the average annual growth-related capex of Australia's transmission networks divided by the average demand growth over the 2005 – 2011 period.

It illustrates that the government-owned transmission networks in Queensland and NSW (Powerlink Queensland and TransGrid) incurred significantly higher capex to meet demand growth than the Victorian transmission network (SP AusNet), i.e.:

- The trend rate for the Queensland transmission network (Powerlink Queensland) grew at around 20 times the rate of the Victorian transmission network (SP Ausnet)
- The trend rate for the NSW transmission network (Transgrid) grew at around 15 times the rate of the Victorian transmission network (SP Ausnet)
- The trend rate for the South Australian transmission network (Electranet) grew at around 7 times the rate of the Victorian transmission network (SP Ausnet)

Average Annual Load-Driven Capex Divided by Average Annual Demand Growth for Australia's Transmission Networks[111]



12.1.2.5 The Government-Owned Networks' Systemic Over-Estimation of Load Growth

The regulatory proposals from the networks provide forecasts of their estimated demand over the regulatory period. Overall, the AER has predominantly accepted the networks' demand forecasts with minimal variations. Consequently, the AER's capex allowances are heavily driven by the networks' load forecasts.

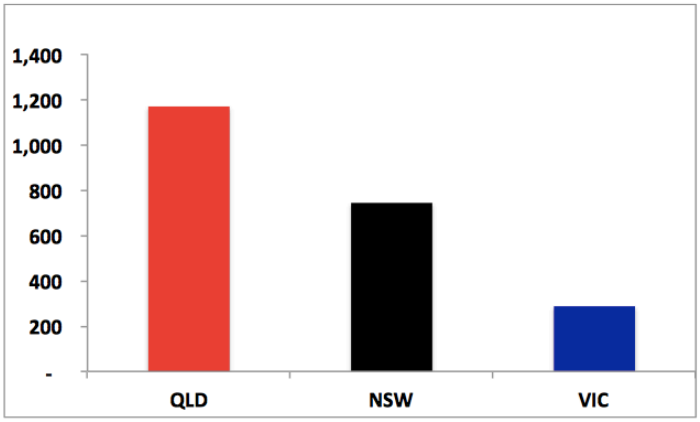
However, over the past 2 regulatory periods the networks' demand forecasts have been demonstrated to have been significantly overblown – particularly the forecasts of the government owned networks.

For example, Bruce Mountain's analysis of the demand forecasting records of Australia's transmission networks identified that, over the 2006-2012 period:

- The Queensland transmission network (Powerlink Queensland) projected peak demand to be, on average, around 1,200 MW higher than the actual peak demand
- The NSW transmission network (TransGrid) projected peak demand to be, on average, around 1,200 740 MW higher than the actual peak demand
- The Victorian forecasts projected actual peak demand to be, on average, around 287 MW higher than the actual peak demand

[111] A comparison of outcomes delivered by electricity transmission network service providers in the National Electricity Market, EUAA 2012

Figure 17. Average annual difference between projected and actual peak demand (MW) over the period from 2006/2007 to 2011/2012



Analysis of the demand forecasting record for the government owned distribution networks demonstrates similar results.

For example, as outlined in the table below, the demand forecasts used by the Queensland distributors to justify their record-high capex allowances for the 2015-20 regulatory period were dramatically overblown.

Rather than increasing significantly, as predicted by the distributors, peak demand and energy delivered both reduced during the previous period.

The Queensland distributors over-estimated their peak demand forecasts by 33.2-41.4%, and over-estimated their energy delivered forecasts by 14.2-25.2%. [112]

	2015 Forecasts	2015 Actuals	Difference
Energex			
- Peak Demand	5,940 MW	4,200 MW	**41.4 % over-estimation**
- Energy Delivered	24,042 GWhrs	21,055 GWhrs	**14.2% over-estimation**
Ergon			
- Peak Demand	3,330 MW	2,500 MW	**33.2% over-estimation**
- Energy Delivered	16,874 GWhrs	13,496 GWhrs	**25.2 % over-estimation**

[112] CCP2 Submission on Energex and Ergon 2015-20 Revenue Proposals

It is important to note that when the AER set the capex allowances for Energex and Ergon in 2009, many stakeholders strongly challenged these forecasts.

Rob Murray-Leach says he and several other experts tried to warn the networks and the regulator that their demand projections were way too high.

As outlined by Rob Murray-Leach. [113]

"When we started to see some changes and we started talking to people about these changes, really nobody would believe us. They said, "You're not getting it. Maybe we're in a short downturn right now. It's probably a little bit due to the global financial crisis."

But it wasn't the global financial crisis. In 2010, for the first time in Australia's history, energy demand went down. It went down again the next year, and the next, and it's been going down ever since. As demand fell through the floor, the networks did rein in some of their spending, but not enough to stop electricity prices going through the roof"

It is also very important to note that the Queensland DNSPs were rewarded with 'windfall profits' of around $1 billion for those forecasting errors, as their revenue allowances included returns and depreciation on capex that they did not incur: [114]

The Queensland networks' track records of consistently over-estimating their demand forecasts were highlighted by the Queensland Government Independent Review Panel on Network Costs [115]:

*"Another factor contributing to the escalation in capital programs has been the **consistent over-estimation of demand by the NSPs.** The Panel also notes that the current revenue cap control mechanism places volume risk on customers. Where demand is over-estimated, capital programs will be excess to requirements and network tariffs to customers will increase during the regulatory control period to ensure the NSPs are able to recover the allowable revenue"*

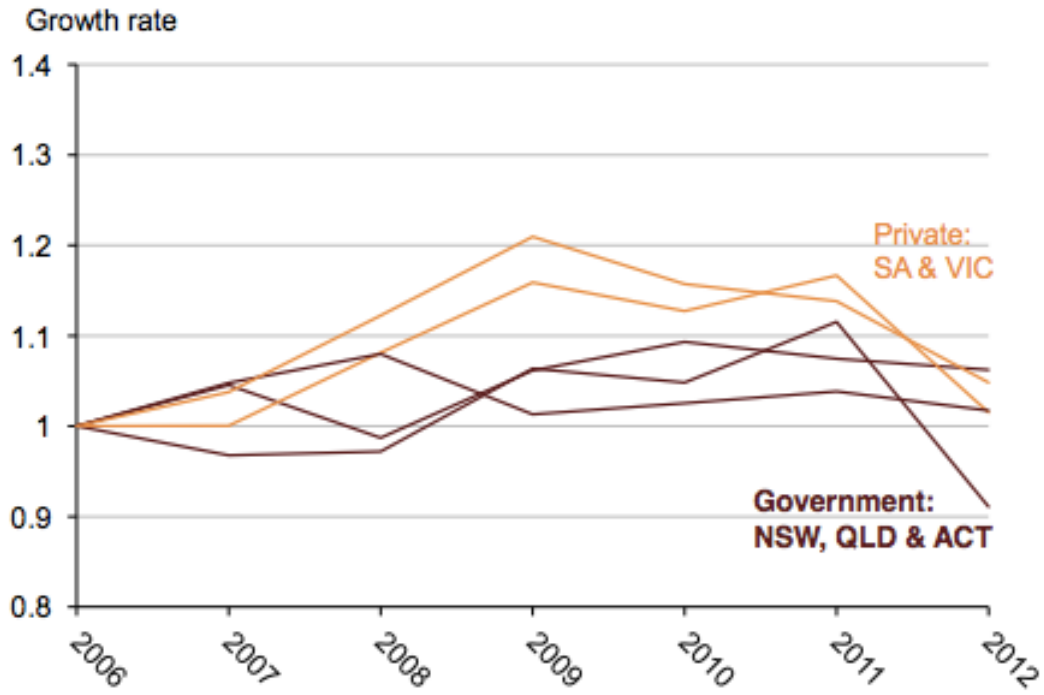
The above conclusions were reinforced by the Grattan Institute, which compared the growth rates of actual peak demand for each state (illustrated in the chart overleaf).

[113] Available at http://www.abc.net.au/news/2015-11-10/hill-the-great-energy-con-that-is-costing-us-billions/6924272

[114] AER Consumer Challenge Panel CCP2 (Hugh Grant) Submission to the AER on Energex and Ergon Energy's 2015-20 Revenue Proposals

[115] Queensland Government Independent Review Panel (IRP) on Network Costs, Final Report

Figure 4.9: States' peak demand growth rates by ownership status (2006 – 2012)



Source: Analysis of data obtained from AEMO (2012d)

As outlined by the Grattan Institute:

- *"Peak demand increased slightly faster in states where distribution companies are privately owned compared to those where companies remain government-owned"*
- *"This suggests that the difference between peak demand growth rates is unlikely to explain the magnitude of difference between the increased capex of government-owned companies and that of privately owned companies"*
- *"There is also some qualitative evidence that government-owned companies in Queensland have received higher regulated capex allowances than are necessary to cope with peak demand."*
- *"While peak demand is difficult to forecast, an independent review found that Energex and Ergon Energy have consistently over-estimated peak demand"*

The Grattan Institute also challenged the efficiency of the government owned networks' load-driven capex spend:

- *"Across Australia, it is difficult to establish whether capex spent to cope with peak demand has been efficient. Different companies have taken different approaches"*
- *"AEMO notes that privately owned companies in Victoria have augmented their network at a lower level compared to companies in New South Wales and Queensland"*
- *"Victoria has used other strategies such as loadshedding control schemes, line-uprating opportunities and the release of additional capacity"*
- *"Over time, how companies adjust their capex spending in response to reduced peak demand forecasts may cast light on the respective efficiency levels of government- and privately owned companies"*

12.1.3 Reliability Performance

Some networks claim that their requirements to deliver higher reliability performance has been a major driver of their higher capital investment growth.

However, various studies have demonstrated that those claims are not substantiated.

As outlined below, those claims are also disputed by the Victorian networks.

The key conclusions from the Bruce Mountain studies into this issue include:

The Case for Changing the Queensland and NSW Reliability Standards Was Not Demonstrated

- Reliability standards were changed in New South Wales and Queensland in 2005
- The case for changing the reliability standards was not clear
- For example, the Queensland standards were changed In response to concerns following tropical storms in 2003, following which the 2004 "Sommerville Review" recommended higher reliability standards
- However, there is a real lack of evidence of any systemic reliability problems that may have justified the higher reliability standards
- The 2003 storms mainly affected reliability in the north of Queensland
- The quality of supply for customers served by Energex (which serves most customers in Queensland) was above the average in the National Electricity Market at the time the reliability standards were raised
- Importantly, there is no evidence that in setting the more stringent standards, there was any meaningful attempt to assess consumer preferences, or whether consumers were willing to pay more
- A subsequent review by the same review team in 2011 back-tracked on several of the earlier recommendations
- A third review (in 2014) recommended substantial changes, effectively reverting back to the standards that applied prior to 2004

The Increased Expenditure Has Not Delivered Demonstrable Improvements In Reliability Performance

- Over the past decade, the reliability of supply (as measured by the duration and frequency of outages) has been largely unchanged
- The average reliability performance for all distributors in the NEM has been comparable to that in other developed economies, despite much greater capital and operating expenditure allowances
- Australia's metropolitan and most regional electricity users have long had a high quality of supply both before and after the reliability standards were changed
- Remote rural customers served by single wire earth return or radial 11kV lines have long experienced relatively lower quality of supply than their metropolitan peers, and this continues
- For example, the average minutes of outages per customer in Queensland was 1150 min in the year ending June 2011 – around three times the level in the year ending June 2004 – the year during which the level of outages resulted in changes to the reliability standards

The Efficiency of the Networks' Reliability Capex Spend is Highly Questionable

- The efficiency of the networks' spend levels to meet the revised standards is highly questionable
- It is difficult to assess how much of the networks higher expenditure levels are is attributable to reliability capex
- Even apparently clearly stated standards can be interpreted and applied differently, and networks can be expected to achieve those standards with varying levels of expenditure.

The above findings were reinforced by the research by the Grattan institute which also raised serious concerns regarding the efficiency of the networks' reliability capex spend

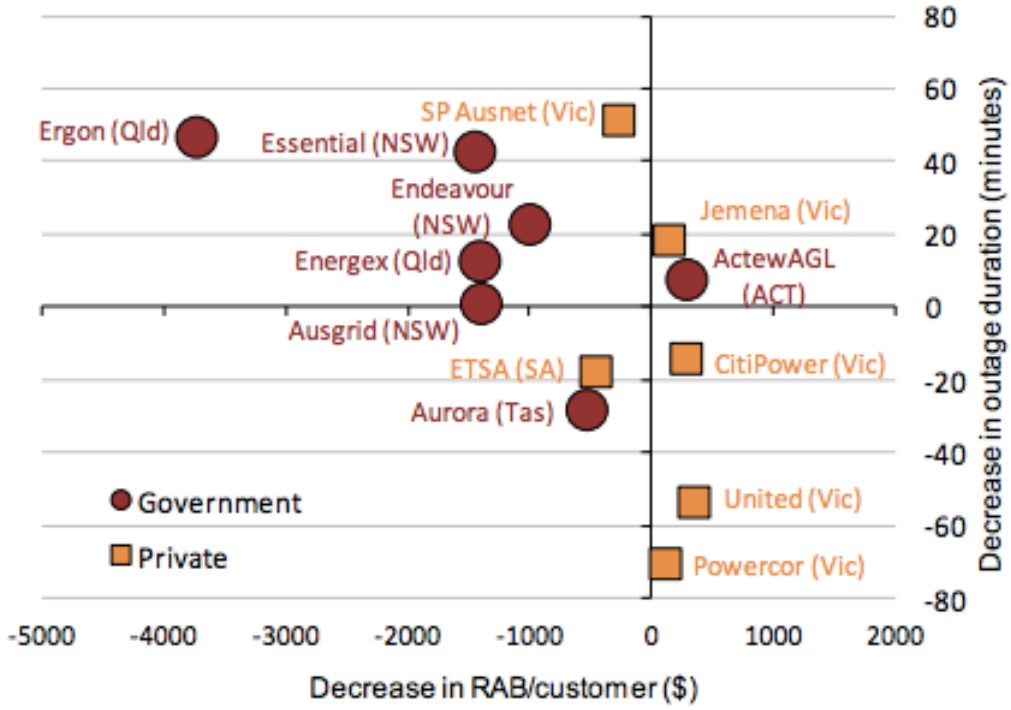
As outlined by the Grattan Institute: [116]

- *"Governments have also intervened to ensure they deliver power at levels of reliability that no serious cost-benefit analysis can justify"*
- *The New South Wales, Queensland and Tasmanian governments have imposed extra costs on companies to address perceived reliability problems*
- *"Importantly, these changes were only made in states where electricity distribution companies are government-owned"*
- *"There is limited evidence that recent investments in reliability have achieved efficient improvements"*

The chart below from the Grattan Institute study compares the total change in each networks' RAB per customer to the change in the total average outage duration over 2005-2010.

[116] Putting the customer back in front: How to make electricity cheaper. Grattan Institute, December 2012

Figure 5.1: Improvements in distributors' reliability performance relative to change in asset value: 2005-06 to 2010-11



Sources: Analysis of distribution determinations by Australian Energy Regulator (2012a), state-based regulators[134] and regulatory audit reports.[135]

As outlined by the Grattan Institute:

- *"Despite this large expenditure, there is no compelling evidence that reliability standards in these states have dramatically improved, relative to networks that have spent less"*
- *"Whether or not these investments provide a net benefit to consumers, in New South Wales and Queensland they have not delivered reliability improvements efficiently, relative to other states"*
- *"It is difficult to determine how much capital the companies spent in order to meet new reliability standards, or to separate out capital spent on each of these three objectives. Often they are intertwined"*
- *"New South Wales consumers spent $339 million to avoid outages valued at $54 million – that means they spent $285 million that might have been saved"*

To address the above issues, the Grattan Institute recommended:

- *"Developing a national, consumer-centred approach to setting these standards is also vital.*
- *"Setting of reliability standards should be transferred from state governments to the AEMC and the AER, to minimise political interference"*

12.1.3.1 The Victorian Networks' Reliability Performance

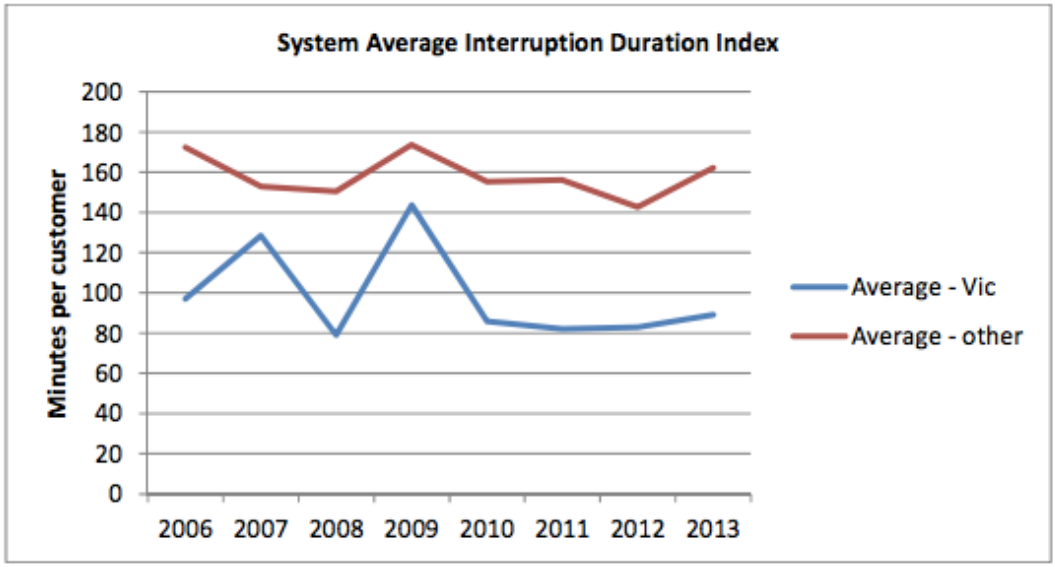
The government-owned networks' claims regarding their higher reliability capex needs are disputed by the Victorian networks.

As outlined in the submission by the Victorian networks to the Senate inquiry into the Performance and management of Electricity network Companies [117], the Victorian networks' reliability performance has consistently exceeded the performance of the other NEM networks.

The chart below shows the minutes per year that customers in Victoria and other NEM jurisdictions are without supply, presented as a per-customer average (System Average Interruption Duration Index (SAIDI).

The results show that, on average, Victorians have substantially lower number of minutes off supply than customers in other NEM jurisdictions in the period from 2006 to 2013.

Figure 5 SAIDI performance Average Victorian and rest of NEM



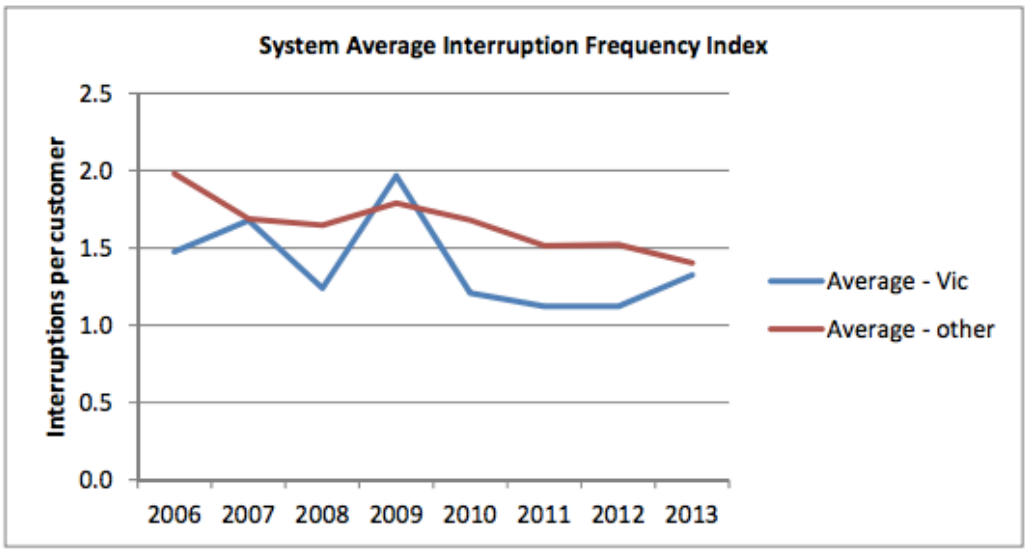
Source: Economic benchmarking Regulatory Information Notice submissions to the AER

Similarly, customers in Victoria face less frequent outages.

Figure 6 overleaf shows the frequency of interruptions for the average customer per annum in Victoria and other NEM jurisdictions (System Average Interruption Frequency Index (SAIFI)). The results show that the Victorian distributors have outperformed other states over the same period.

[117] Submission to the Senate Select Committee Inquiry into the performance and management of electricity network companies: Victorian Electricity Distribution Businesses, 18th December 2014

Figure 6: SAIFI performance average Victorian and rest of NEM



Source: Economic benchmarking Regulatory Information Notice submissions to the AER

12.1.4 Ageing Assets and Historic Under-Investment?

Some networks claim that historical underinvestment has been a major driver of their higher capex expenditure needs.

The evidence and findings from the studies that have analysed this issue do not support those assertions.

The key findings and conclusions of the Bruce Mountain studies into the issue are as follows:

- The government owned networks in NSW and Queensland have significantly younger assets than in Victoria
- The weighted average remaining service life for government owned networks was higher than the privately owned distributors in 2006, before the major capital expenditure increases
- Several government and industry studies in the early 1990s concluded that there were significant capital and labour productivity problems with the government owned networks
- Infact, rectifying those problems formed a large part of the rationale for the vertical disaggregation of the networks
- Those studies concluded that the electricity commissions had spent too much, not too little and that corporatisation should improve their governance and managerial disciplines thereby reducing expenditure and improving efficiency
- For Ergon Energy, rather than historic underinvestment, the problems appeared to be due to co-ordination and planning deficiencies following poorly executed mergers in the previous five years
- Research by the NSW Government and the Energy Supply Association concluded that there was substantial over-investment, not under-investment, in electricity networks in NSW

- As government-owned companies have newer assets, it would be expected that privately owned companies would incur higher capex for asset replacement. Yet, the replacement capex of the government-owned networks were four times the levels of the privately owned networks
- As with demand-related capex, the issue appears to be differences in the relative efficiency with which the networks have replaced and maintained their assets

12.1.5 Conclusions On The Impact Of Exogenous Factors On The Networks' Investment Levels

As outlined above, numerous studies have examined the different capital investment levels of Australia's electricity networks. All of those studies have concluded that exogenous factors do not explain the differences.

Rather, they have identified that ownership (i.e. whether the network is publicly or privately owned) is the most significant driver of the networks' investment levels.

Other than the inevitable denials from vested interests, all independent analysts are now focused on how to address the problem, rather than denying that the problem exists.

12.1.6 The Perspectives of the Victorian Privately Owned Distributors

The above conclusions were strongly supported by the submission by the Victorian networks to the *Senate inquiry Into The Performance and Management of Electricity Network Companies.* [118]

That submission was presented to the Senate Inquiry by Mr Alistair Parker - General Manager, Asset Management at AusNet Services – the Victorian privately-owned transmission and distribution business.

The key points in that evidence included:

We have controlled our costs much more effectively than the government owned networks

"When you compare us to New South Wales and Queensland, in particular, you just do not see the same increases in price that we have seen there"

"Here, our share of the electricity bill is about 23 per cent. In New South Wales and Queensland, it is between 40 and 50 per cent. It is materially different. I heard some commentary from one of your previous witnesses that there is no point just looking at network prices; you have to look at the overall retail price. But I think that dodges the key issue, which is that we have done a better job of low network prices."

"I also heard some comment that we have excluded metering in that comparison. Even when you factor metering and some other effects in back in, Victorian prices are still very much lower.

[118] Submission to the Senate Select Committee Inquiry into the performance and management of electricity network companies: Victorian Electricity Distribution Businesses, 18th December 2014

"If we then look at some work that Ernst & Young did, our average residential customer costs went down by 18 per cent between 1996 and 2013—so down by 18 per cent. In Queensland they went up by 140 per cent and in New South Wales they went up by 122 per cent, so it is materially different"

"The Victorian distributors and the South Australians remain the most efficient networks. So, even when you account for those factors, we would say that we remain the most efficient networks on average.

We invest less and later than the government owned networks

"So why can we do this? Why are we doing more with less? I think it is just fundamentally because of the ownership structure"

"We aim to spend less to get the same outcomes. We have investors, and I use that term very carefully. We do not have owners; we have investors, and we have investors like superannuation funds and so on, who demand a return from us"

"Our commercial view is that, while there is potentially an incentive to increase your RAB—to increase your asset base—we make more money by responding to the AER's efficiency incentive schemes"

"So we do better by spending less. We do better over the long run by spending less, by finding cheaper alternatives to deliver good outcomes"

"New South Wales spent 216 per cent more in capital expenditure between 2006 and 2013"

"They spent 80 per cent more on capital expenditure than Victorian DBs in Queensland, and in terms of operating expenditures New South Wales spent more than 114 per cent more than us and Queensland spent 28 per cent more"

"We only invest if there is not an alternative solution like demand management and if the economic value of the loss of supply outweighs the cost of doing something about it. This means, in practical terms, we invest later than somebody in New South Wales will"

"We are currently doing, as a transmission company, a huge redevelopment of the CBD supply in Melbourne. My guess—it is not accurate—is that we are doing that four or five years later than somebody in New South Wales would do it, and we look at that all the time to check: if we can avoid the investment, we will avoid the investment. It means we have to do some things in terms of contingency plans, but if we can avoid an investment we will"

Our efficiency has been independently verified

"I feel very awkward saying these great things about ourselves. The point here is that this is not our view: it is the Australian Competition and Consumer Commission's view, it is the AER's view, it is the Productivity Commission's view, it is the Energy Users Association of Australia's view, it is the view of Bruce Mountain, who I think you are seeing later on today, and it is EY's view.

"Person after person looks at this objectively and looks at the data that is before them and finds we are cheaper and more reliable. I put that down to our ownership structure—I am sure there are other aspects, but it is primarily driven by who we are run by and the drive they bring to this"

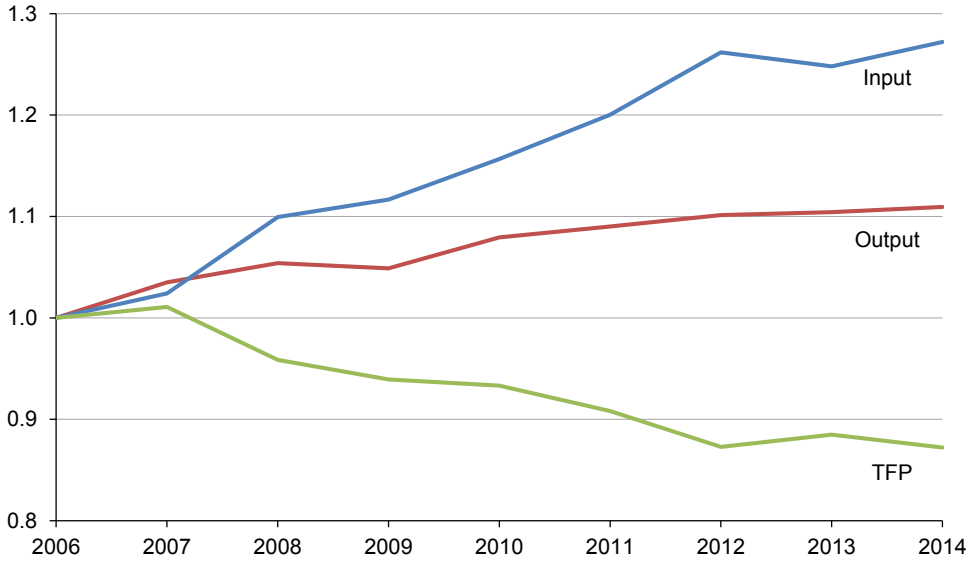
12.2 The AER's Capital Efficiency Benchmarking Results

12.2.1 Distribution Networks

12.2.1.1 Multilateral Total Factor Productivity (MTFP) Results

As outlined in the diagram below, the productivity across the electricity distribution sector has declined over the past several years, with the industry inputs increasing at a greater rate than the outputs since 2007.

Figure 1 MTFP input, output and TFP indices for all DNSPs, 2006–14



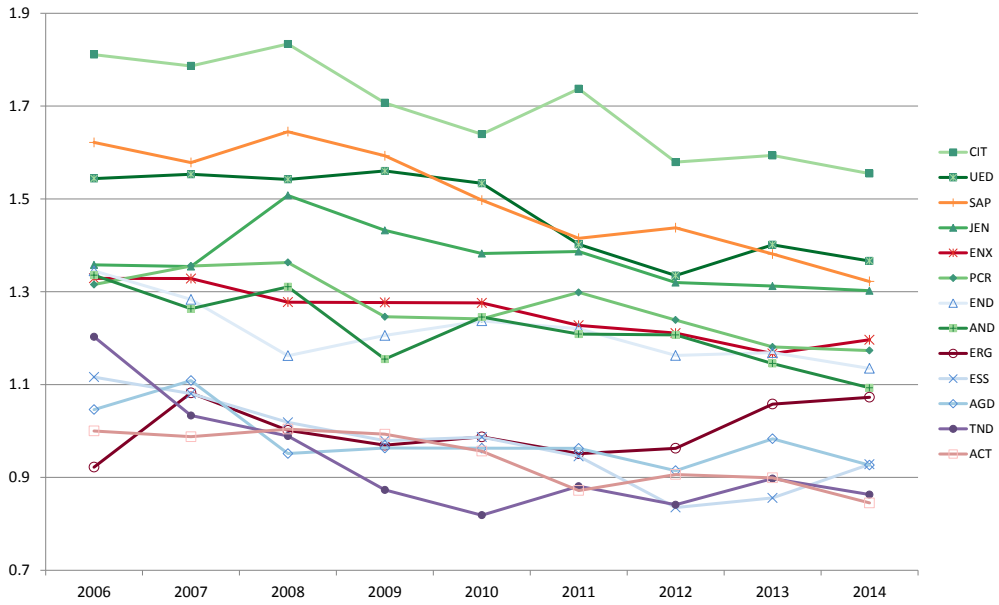
12.2.1.2 Multilateral total factor productivity for each distributor

The chart overleaf outlines the multilateral total factor productivity of each NEM distributor over the 2006–14 period.

It illustrates that:

- The productivity of most distributors trended downwards over the period
- The Victorian distributors (CitiPower, United Energy and Jemena) and the South Australian distributor (SA Power Networks) are the best performers over the entire period
- For example, in 2010 Citipower produced approximately 80% more outputs per input than Ergon Energy, Ausgrid, ActewAGL and Essential Energy, and twice the output/input level of TasNetworks

Figure 2 Multilateral total factor productivity by DNSP for 2006–14

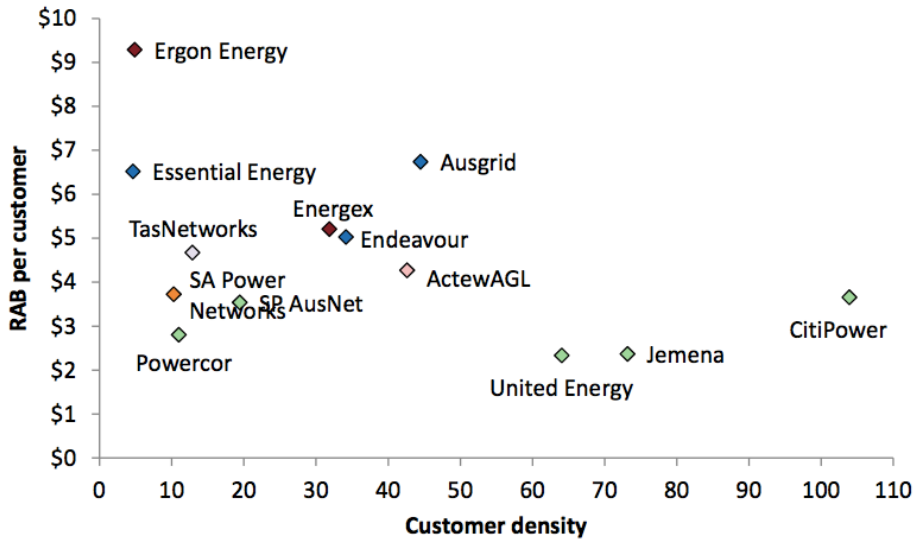


12.2.1.3 RAB Per Customer

The chart below illustrates the RAB/Customer levels for each distributor plotted against customer density. It illustrates that:

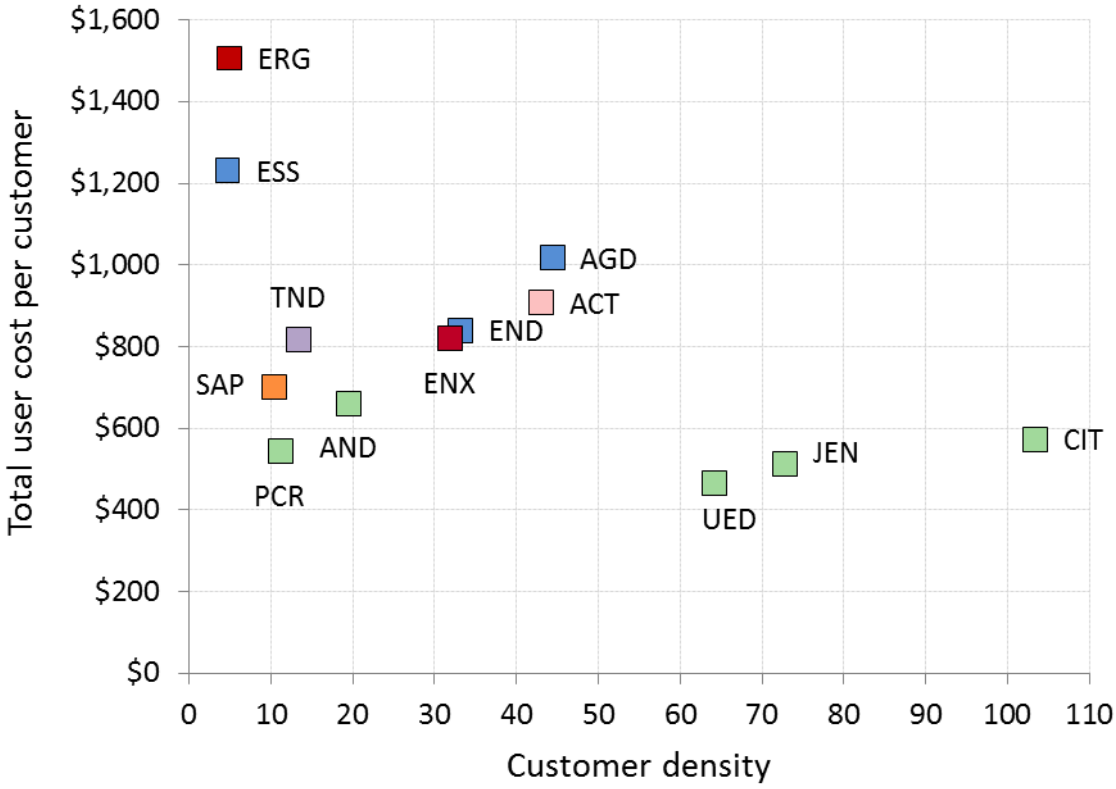
- Ergon Energy had the highest RAB/Customer level at around 4.5 times the levels of the Victorian distributors
- Essential Energy and Ausgrid had very high RAB/Customer levels of around 3.5 times the levels of the Victorian distributors
- Endeavour Energy and Energex's RAB/Customer levels are around 2.5 times the levels of the Victorian distributors

Figure 6-6 RAB per customer (000s, $2013-14), against customer density



Source: AER analysis

Total cost per customer against customer density (2010–14 average)

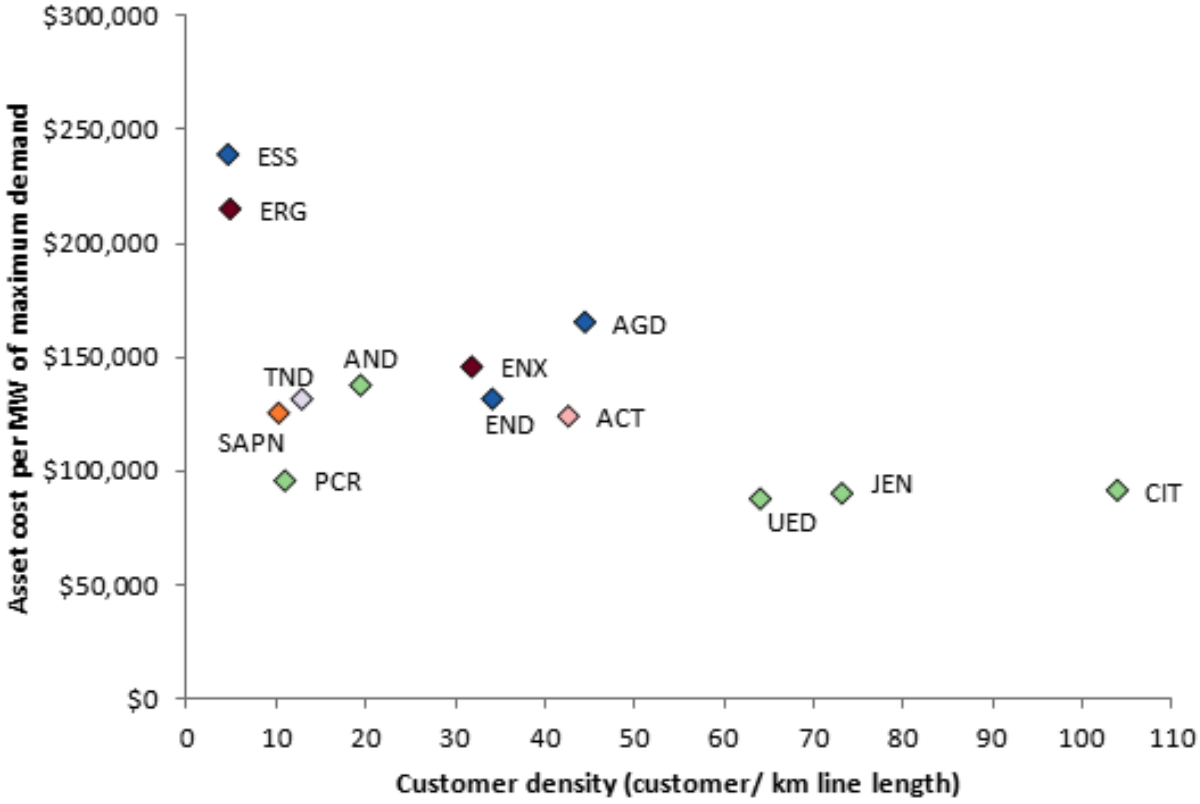


The above chart illustrates the total cost per customer plotted against customer density.

It illustrates that:

- The Victorian and South Australian DNSPs are the most productive
- They have the lowest ratio of cost to customers, despite their differing customer densities,
- Ergon Energy has the highest total cost per customer, at 3 times the level of the Victorian distributors.
- Essential Energy's total cost per customer is around 2.5 times the levels of the Victorian distributors
- These higher costs cannot be explained by customer density as they spent approximately double the cost per customer than many distributors, including SA Power Networks and Powercor, which are also sparse rural networks
- The government owned networks - Ausgrid, ActewAGL, Endeavour Energy, Energex and TasNetworks would be expected to have lower costs than SA Power Networks and Powercor due to their comparatively higher customer densities. However, they all have higher costs.

Asset cost per MW of maximum demand compared to customer density (average 2009-13)



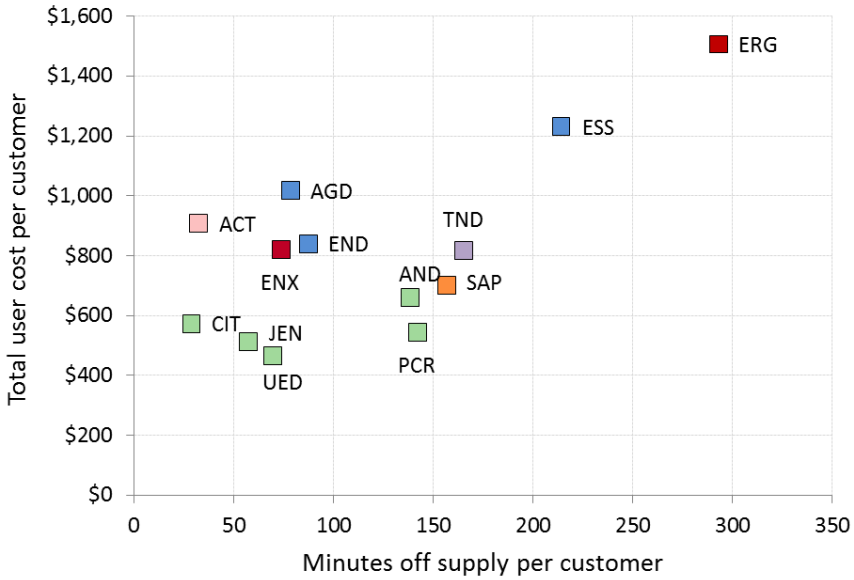
This above chart illustrates the distributors' asset cost per MW, plotted against customer density.

It illustrates that the privately owned distributors have much lower asset costs per MW of maximum demand, irrespective of their customer density.

As outlined by the AER:

"We would expect the results to favour those distributors with higher customer density, because higher density networks have fewer assets per customer, irrespective of the maximum demand of the network"

Figure 3 Total cost per customer ($2014) against unplanned minutes off supply per customer (excluding MEDs, average 2010–14)



The above chart illustrates the total cost per customer plotted against unplanned minutes off supply per customer. It illustrates that the Victorian and South Australian distributors have the lowest cost per customer.

As outlined by the AER:

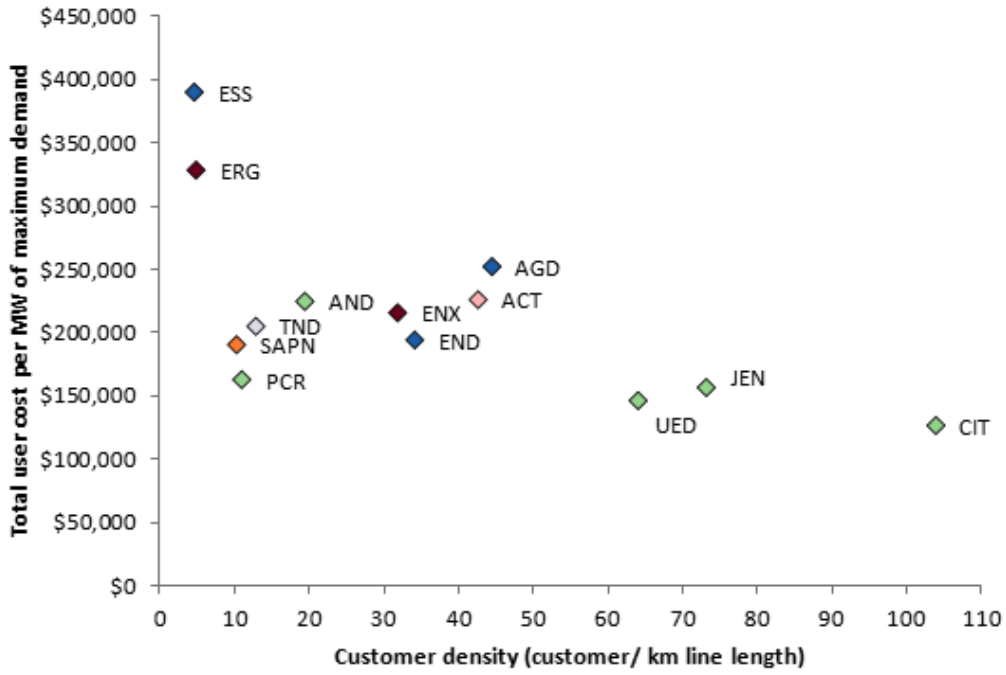
"We would expect those distributors with greater route line lengths to incur higher minutes off supply per customer, as they may need to travel further distances when responding to outages"

"Ergon Energy's minutes off supply (and its costs), however, are much greater than that of its peers, including Powercor, AusNet Services and SA Power Networks, who also operate rural networks"

"When the cost per customer is compared to the minutes off supply per customer the Victorian and South Australian distributors appear the most productive"

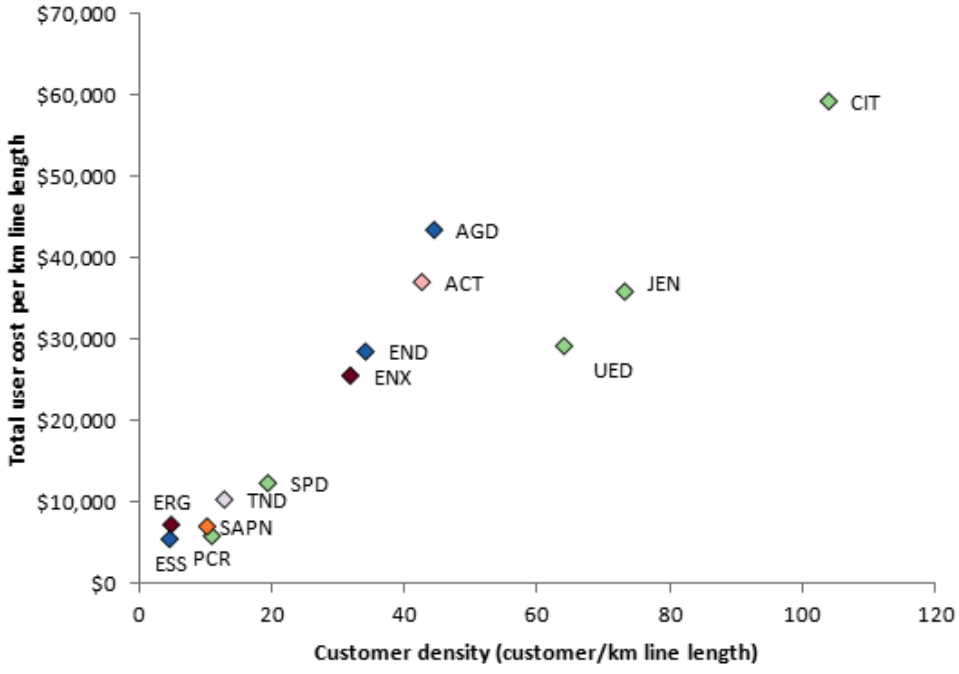
The chart below illustrates the distributors' total cost per MW of maximum demand, plotted against customer density. Again, the Victorian distributors are the most efficient on this metric.

Total cost per MW of maximum demand compared to customer density (average 2009–2013)



The chart below illustrates the distributors' total cost per km of line length plotted against customer density.

Figure 4 Total cost per km of line length compared to customer density (average 2009–2013)



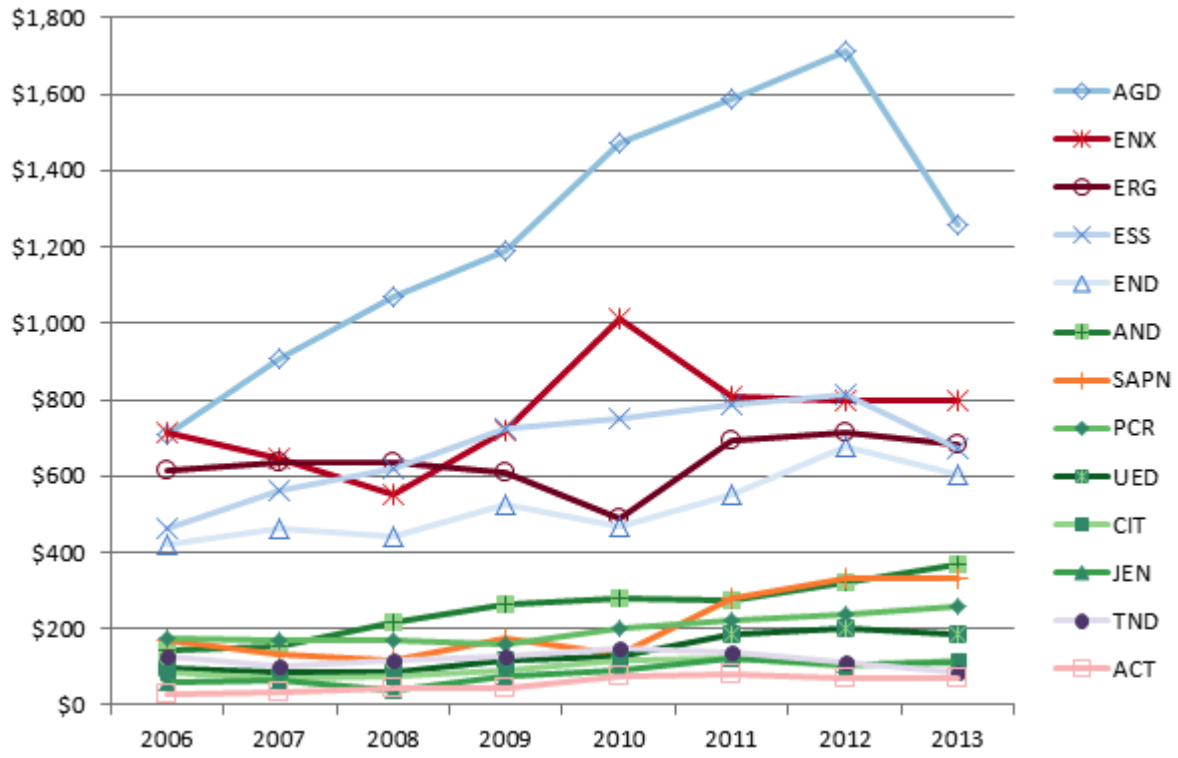
As outlined by the AER:

"We would expect a strong positive relationship between these two variables because both user cost per km and customer density are driven by line length, and indeed the results show this is the case.

However Ausgrid and ActewAGL perform poorly on this metric because they spend more per km than Jemena and United Energy, which both have a higher customer density"

The chart below illustrates the high volatility of the capex spend levels of the NSW and Queensland distributors, compared to the relatively stable levels of the Victorian and SA distributors.

Figure 5 Capex ($millions 2013)

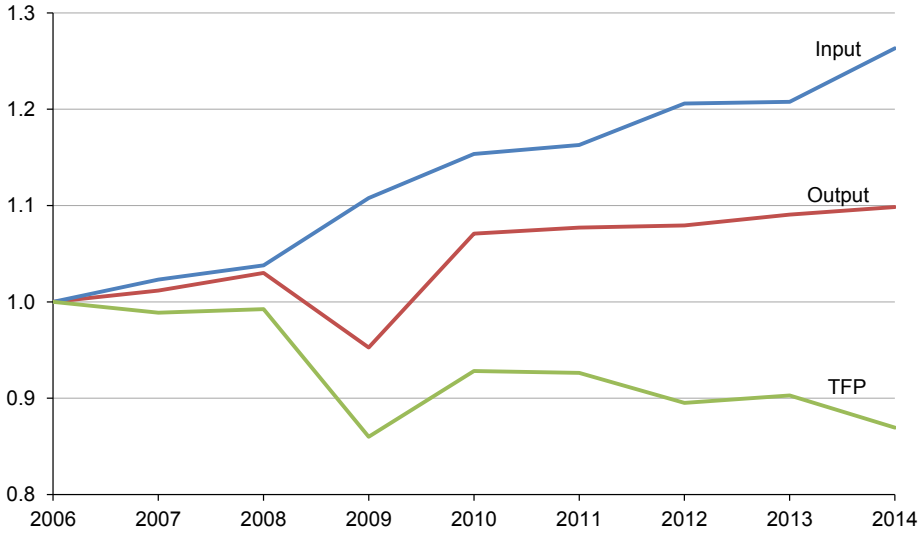


12.2.2 Transmission Networks

12.2.2.1 Multilateral Total Factor Productivity (MTFP) Results

The chart below illustrates that the productivity of the electricity transmission sector has also declined since 2006.

Figure 6 MTFP input, output and TFP indices for all TNSPs, 2006–14

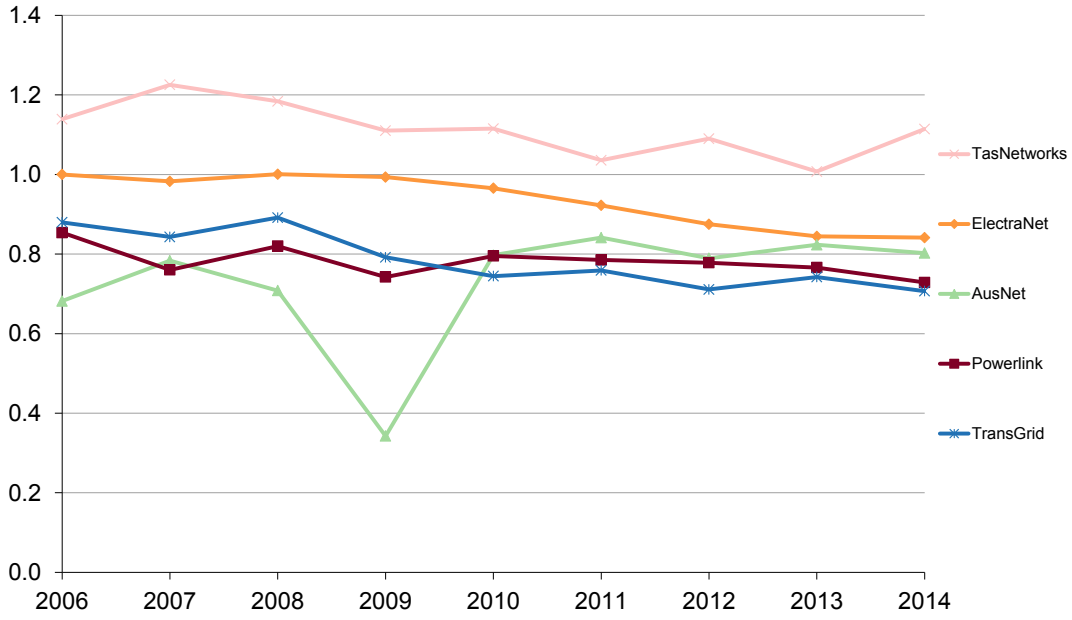


The chart overleaf outlines the MTFP score for each transmission network over the 2006-14 period.

It highlights that:

- ElectraNet's productivity declined by around 15%
- The productivity levels of Powerlink and TransGrid declined by around 10%
- TasNetworks' productivity declined slightly
- The above declines contrast with the productivity of the Victorian transmission network (SP AusNet) which improved by around 15% over the period

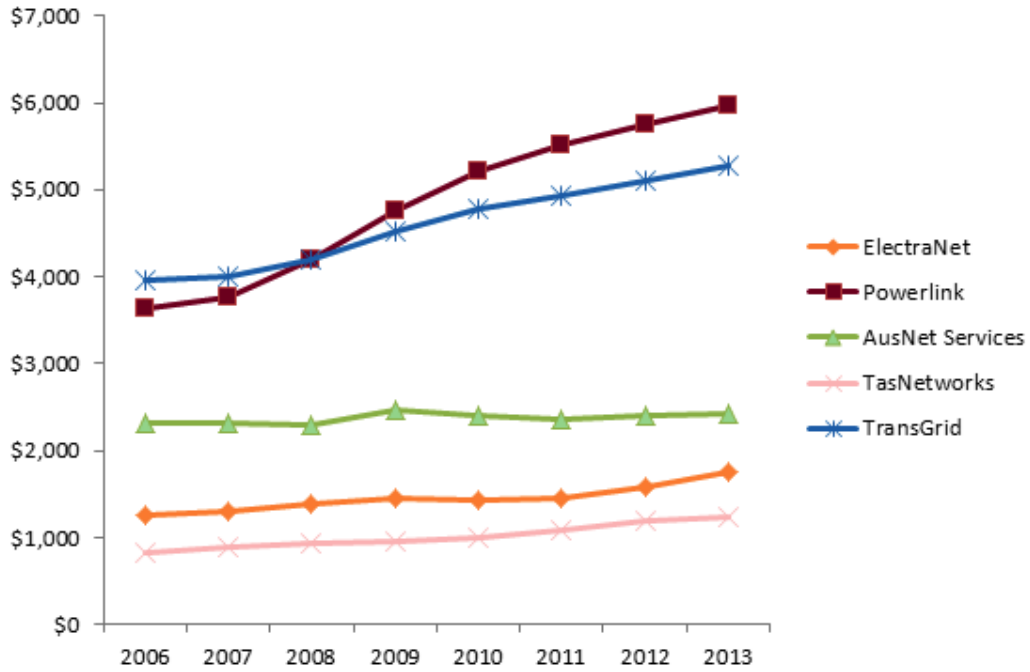
Figure 7 Multilateral total factor productivity by TNSP for 2006–14



Note: In 2009 AusNet Services had large customer interruptions

The chart below illustrates the changes in the regulatory asset bases (in real terms) of the transmission networks from 2006-2013. It illustrates that the Queensland and NSW transmission networks (Powerlink Queensland and TransGrid) expanded their RABs at much higher rates than the other networks.

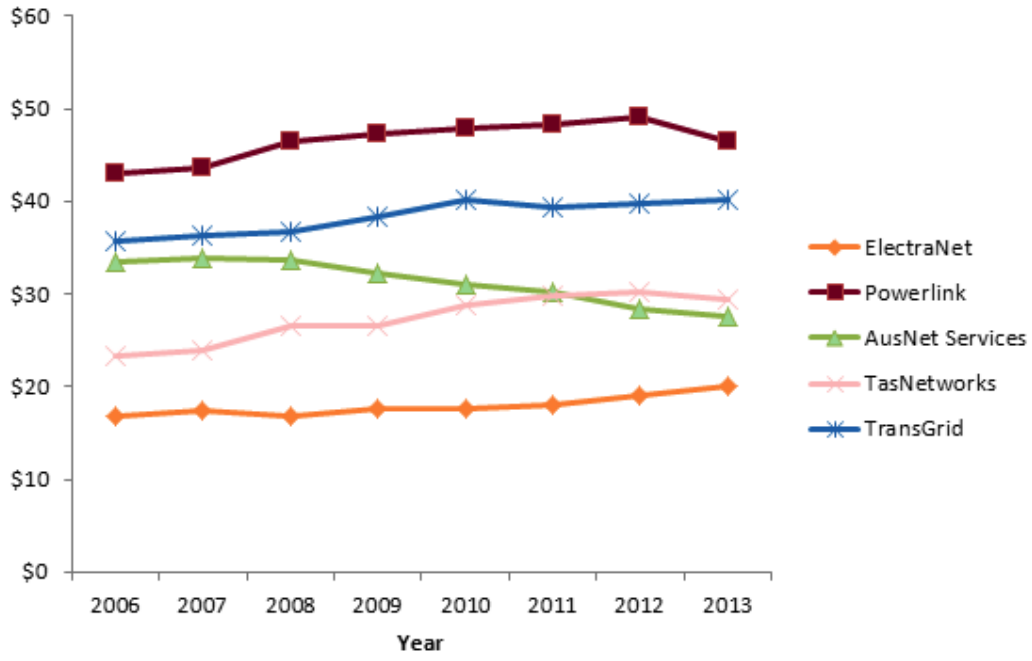
Figure 8 Regulatory asset base ($millions 2013)



The chart below illustrates the total cost per kilovolt (kV) of entry and exit points.

Under this measure, Powerlink Queensland has the highest costs per entry and exit point voltage of all the transmission networks.

Total cost per total kV of entry/exit points ($2013)

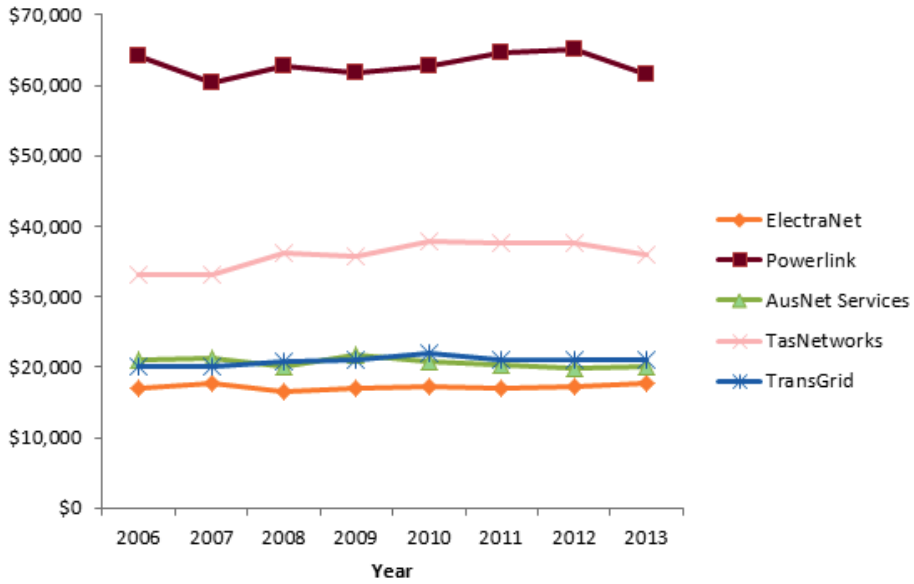


The chart below illustrates the cost per MVA of downstream connection point of transmission capacity.

As outlined by the AER:

"Powerlink performs poorly under this measure with a very high total cost per MVA of connection point capacity"

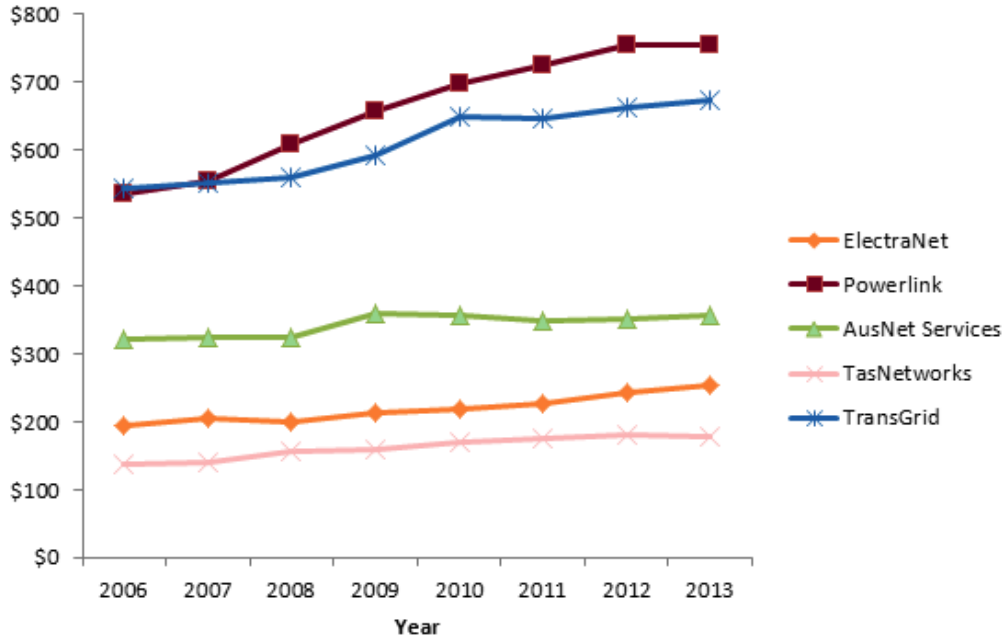
Figure 9 Total cost per MVA of connection point capacity ($2013)



The chart below illustrates how the total costs of the transmission networks changed over the 2006-13 period.

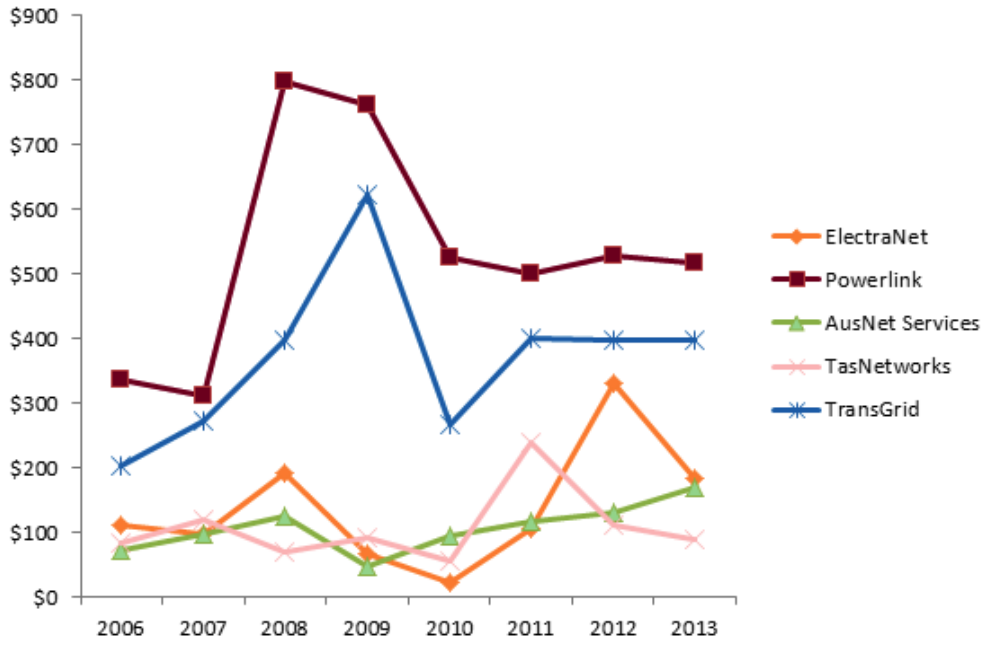
It illustrates that Powerlink and TransGrid have the highest costs and that the differences between their costs and the costs of the other transmission networks grew significantly over the period.

Figure 10 Total costs of the transmission networks ($million 2013)



The chart below illustrates the high volatility of the capex spend levels of Powerlink and TransGrid compared to the other transmission networks.

Figure 11 Capex over time ($million 2013)[119]



119 This has been converted into constant dollar terms using the ABS Weighted Average of Eight Capital Cities CPI.

12.2.3 Conclusions Regarding the Levels of Over-Investment

12.2.3.1 Distribution Networks

This appendix has outlined the findings of various studies into the relative capital efficiencies of Australia's distribution networks.

Quantification of the level of over-investment for the distribution networks was also the subject of the reports commissioned by TEC and PIAC into the regulatory valuations of Australia's electricity networks.[120]

The report commissioned by TEC identified that the net cost of the capital additions per connection (i.e. capex less depreciation less disposals) varied from:

- -$100/connection for the South Australian distributor
- $600/connection for the Victorian distributors
- $1,400/connection for the Tasmanian distributor
- $2,600/connection for the NSW distributors
- $4,300 connection for the Queensland distributors

Therefore, using the Victorian distributors' net capital additions per connection as the baseline:

- The Queensland distributors invested capital at 7.2 times the rate of the Victorian distributors
- The NSW distributors invested capital at 4.3 times the rate of the Victorian distributors
- The Tasmanian distributor invested capital at 2.3 times the rate of the Victorian distributors

Those findings were reinforced by the findings of the other studies referenced within this report.

For example, the 2011 EUAA study [121] identified that when normalised for changes in outputs, the Queensland and NSW distributors' capital investment levels were much higher than the levels of the Victorian distributors, e.g.:

- Their load capex/load growth ratios were 7 times the level of the Victorian distributors
- Despite having younger assets, they invested in replacement capex at 4 times the level of the Victorian distributors

12.2.3.1.1 ActewAGL

The above TEC and PIAC papers did not assess ActewAGL's level of inefficient/excessive investments.

However, other studies and analyses referenced within this report (e.g. the Grattan Institute studies and the AER's benchmarking results) indicate that ActewAGL's capital efficiency is lower than the Victorian distributors and closer to the capital efficiency level of the Tasmanian distributor (TasNetworks).

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[120] Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and argument, CME, April 2015
Privatisation and the regulatory valuation of electricity distribution network service providers in New South Wales: Evidence and Issues - a report for the Public Interest Advocacy Centre, CME, October 2014

[121] Australia's rising prices and declining productivity: the contribution of its electricity distributors, EUAA, 2011

12.2.3.2 Transmission Networks

The analyses of the relative capital efficiency levels of the transmission networks outlined within this report has concluded that the privately owned Victorian transmission network (SP AusNet) is much more efficient than the others, spending substantially less capital and operating expenditure both in absolute terms and after normalisation for growth in network outputs such as peak demand and energy delivered.

For example, when normalised for changes in demand:

- Powerlink Queensland invested in load capex at over 20 times the rate of SP Ausnet
- Transgrid invested in load capex at over 15 times the rate of the SP Ausnet
- ElectraNet invested in load capex at 7 times the rate of SP Ausnet

These findings are reinforced with the different increases in the transmission networks' RABs over the past 15 years, i.e.:

- The Queensland transmission network (Powerlink Queensland) and the Tasmanian transmission network (TasNetworks) expanded their RABs at around 2.3 times the level of the Victorian transmission network (SP AusNet)
- The South Australian transmission network (ElectraNet) expanded its RAB at around twice the level of the Victorian transmission network (SP AusNet)
- The NSW transmission network (TransGrid) expanded its RAB at around 1.9 times the level of the Victorian transmission network (SP AusNet)