Write-downs to address the stranded assets of electricity networks in the National Electricity Market: evidence and argument

April 2015

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Executive Summary

This paper examines the valuation of the regulated assets of twelve electricity distribution network service providers (distributors) that together distribute electricity to a little over 9 million connections in the jurisdictions that make up the National Electricity Market (hereafter for the sake of brevity referred to as Australia). The context is the significant expansion of the value of the regulated assets of some distributors at the same time that there has been declining demand for electricity provided by these distributors; and the rise of distributed generation.

The report provides information and analysis to inform a few questions:

1. How does the regulated asset value of Australia's distributors compare to each other and to distributors in other countries with comparable regulatory arrangements?
2. Are differences in regulated asset values explained by the starting valuation, differences in capital expenditure or other factors?
3. Is there evidence that distributor assets are stranded?
4. What is the basis on which regulated asset values have been established and how do these compare in Australia with those in other countries?
5. What is the possible quantification of stranded assets ?
6. If regulated assets are to be revalued how might this be done?

The rest of this executive summary sets out our response to each of these questions in turn.

Response to Question 1: Some distributors' regulated assets per connection are much higher than others in Australia and in other countries

Figure E1 shows the regulated asset value per connection in 2013 of 14 distributors in Great Britain, the two largest distributors in New Zealand and 12 distributors in the National Electricity Market. The lowest asset value per connection in Australia (United Energy in Victoria) is about the same as the highest in Great Britain. The two New Zealand distributors compare with the upper end of the privately owned distributors in

Victoria while the government owned distributors in Australia typically have much higher regulated asset values than the others.

Figure E1. Regulated asset values per connection for distributors in Britain, New Zealand and Australia (Green – Great Britain, Blue – private Australia, black – New Zealand, Red – government Australia).

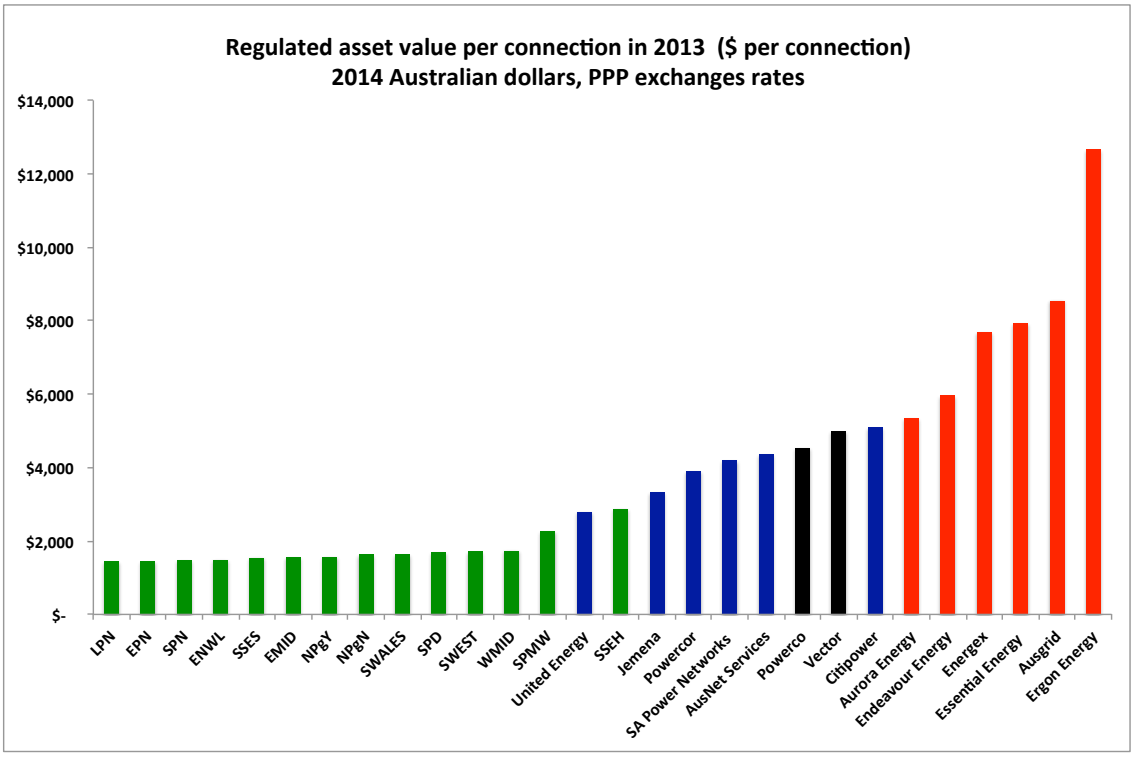
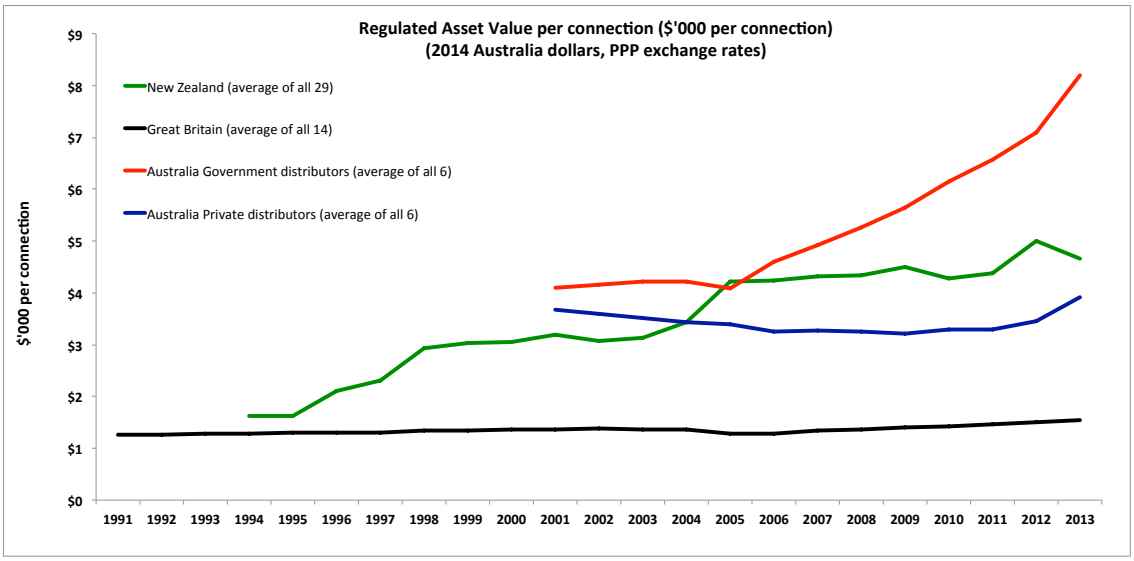


Figure E2 shows the trends of the assets values per connection in Britain, New Zealand and for private and government distributors in Australia. The British asset value has remained stable over 30 years. In New Zealand asset values per connection increased after the industry was corporatised but not regulated (from 1992 to 2004). Since then regulated asset values have stabilised. In Australia government and private distributor asset values were stable for the first five years after incorporation and, while private distributor asset values per connection have increased, the rate of growth has been much slower than for government-owned distributors.

Figure E2. Times series of regulated asset values per connection

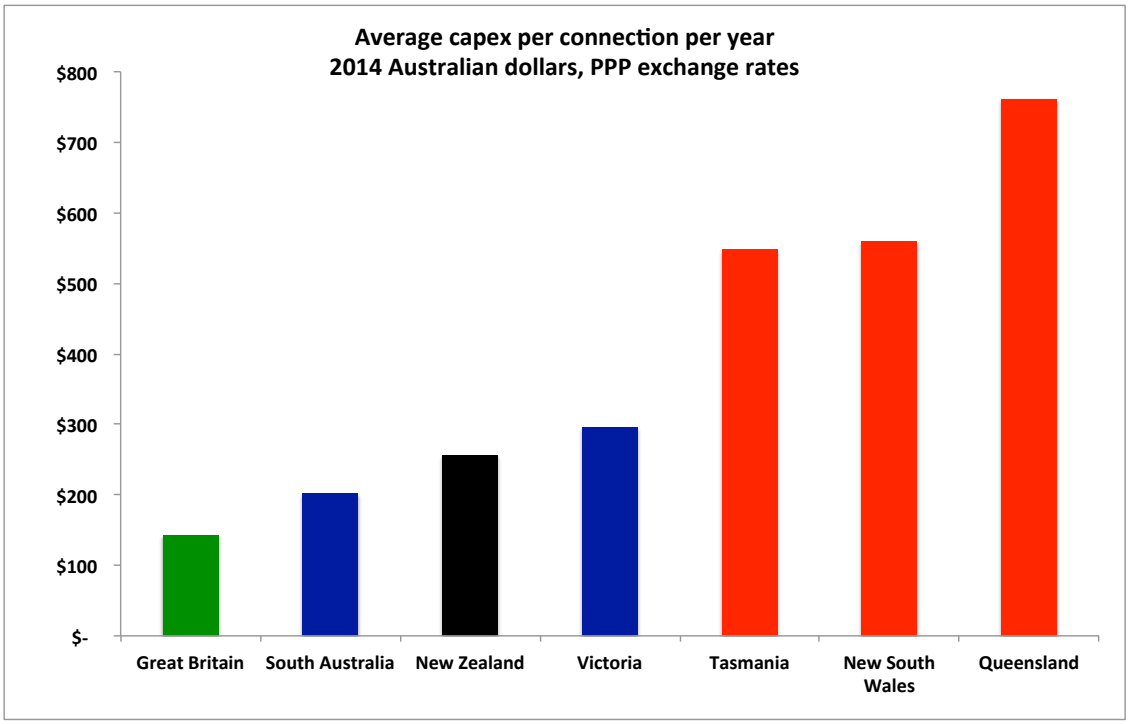


Response to Question 2: The differences in asset valuation is explained mainly by differences in capital expenditure since the distributors were corporatised

The differences in asset values are not explained by customer density. In all countries networks have been getting more dense and the increase in asset value of Australian distributors does not correlate with density. While some Australian distributors have much lower density than others, much more of their network is overhead rather than underground, a much more capital intensive approach.

Starting asset values – the values of the assets when the businesses were created - do matter. In Britain and New Zealand the starting asset values per connection were less than $2000 per connection. By comparison in Australia they were around $4000 per connection. However the main reason that the gap has opened up between government distributors in Australia is much higher capital expenditure over a long period of time. This is shown in Figure E3.

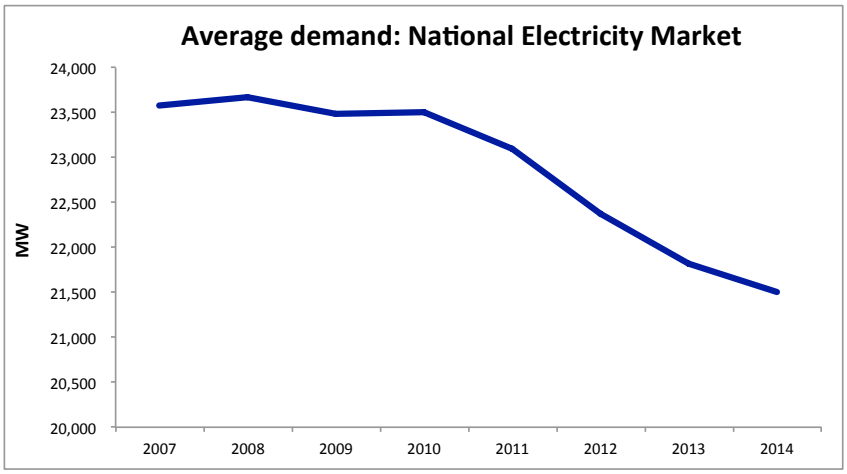
Figure E3. Comparison of average annual capex per connection for distributors in different countries/states



Response to Question 3: There is evidence to suggest some distributor assets are stranded

Average demand in the NEM has been declining for the last eight years as shown in Figure E4. This is despite robust economic expansion over this period and rapid population growth. Normalising for population growth we find that average per capita electrical demand has declined by 20% between 2007 and 2014.

Figure E4. Average demand in the NEM



The rapid expansion of regulated asset bases in the context of generally declining demand has resulted in lower network utilisation. The picture seems most severe for the government-owned distributors: the six distributors with the lowest utilisation are all government-owned and the worst two – Energex in Queensland and Essential in New South Wales - have utilisation rates of just 20-30%.

Response to Question 4: Different approaches have been applied in establishing initial asset valuations. There are good reasons to consider revaluation in Australia

In Britain the regulator established initial asset values based on the value of the assets established at privatisation. In New Zealand, initial values were based on historic costs, although they were subsequently revalued upwards for the first decade in which the distributors were not regulated. In Australia, a "depreciated optimised replacement cost" approach was used to value assets. Since the initial valuation, assets have been added to the asset bases at their actual cost and the asset bases – net of accumulated depreciation – have been revalued every year at the rate of consumer price inflation.

The Energy Networks Association has argued that the value of network service provider assets should not be revalued. Their main argument is that to do so will increase regulatory risk, which they say will raise the cost of capital that will then need to be compensated through higher prices. They contend the benefit to consumers of lower prices from written-down regulated asset values will be more than offset through higher required returns.

But protecting investors is not cost-less - insulating utility investors from stranding risk does not extinguish the risk, it simply passes it on to consumers (and upstream producers). The evidence of the profligacy particularly by Australia's government-owned distributors under a regime that set out to insulate them from stranding risk, must surely be a big part of the explanation for that profligacy. If economic regulation is to provide utilities with the disciplines provided by markets – and it is hard to imagine a regulator or policy maker arguing with this objective – then waste should not be rewarded. This argument, and also making the most of assets that have already been built, and addressing the affordability of electricity to low income households and trade exposed industries are, we think, the three main reasons why revaluation should be considered seriously.

Response to Question 5: What is the possible quantification of stranded assets ?

Appendix A describes calculations that attempt to quantify the extent of unnecessary excessive expenditure in New South Wales, Queensland and Tasmania. The calculation is based on the difference between actual expenditure and what expenditure would have been if distributors in New South Wales, Tasmania and Queensland had incurred capital expenditure at the same rate as those, on average in Victoria and South Australia. We find from this that capital expenditure in New South Wales, Queensland and Tasmania over the 13 years to 30 June 2013 (and 7 years to 2013 in Tasmania) would have been $21.2bn less than it actually was. As result, regulated revenues over this period would have been $6.5bn lower than they actually were as a result of lower depreciation charges (net of asset indexation). The regulatory asset base for distributors in these states at 30 June 2013 would therefore be $14.7bn lower than it actually was.

Response to Question 6: Revaluation can be effected in many ways including by leaving regulatory asset values unchanged

A once-off downward revaluation to exclude the recovery of stranded assets would be the cleanest and administratively most simple approach. However it might jeopardise the financial strength of the distributor and consequently require equity injections to re-establish financial capacity. This would be problematic of course. Once-off revaluations also presume that adjustment for stranding can be achieve through such single adjustment, although subsequent events might reveal that it was excessive or insufficient.

Gradualist approaches, such as through progressive negative indexation of asset values, would bring relief over time and so would avoid a financial shock. But they would be more complex and would not relieve consumers in the short to medium term from funding assets that are redundant. Effective revaluation could also occur by leaving asset values unchanged but not charging consumers for depreciation and/or returns on the portion of the asset base deemed to be stranded.

We can not recommend any single one of these approaches as better than any other in all cases: it will depend on many factors including the extent of asset stranding; the

financial capacity of the regulated businesses to absorb possibly significant reductions in value, and the urgency that consumers obtain relief from excessive prices.

Next steps

Additional research that we think will be particularly valuable, should focus on:

- A more precise picture of the actual regulated asset base of each distributor including history of asset values before restructuring and a clear and audited record of changes since then including asset indexation, depreciation, the impact of disposals, retailer ownership separation and accounting for customer contributions.
- Consideration of the options for federal-state co-operation in asset revaluation. The Commonwealth is incentivising the New South Wales Government to privatise their distributors. Such financial incentives might be considered in the context of asset write-downs.
- Quantitative assessments of the impact of regulated asset revaluations on likely privatisation proceeds.
- Clarity on accounting standards (and hence reported profits and income taxes) for the treatment of write-downs.
- Further evaluation of the mechanisms for write downs: for example homogenous write-downs versus differentiated write-downs by asset class; potential for later write-back if future circumstances change; mechanisms for accelerated depreciation; options for the application of differentiated rates of return for sunk or future assets; options for differentiated inflation indexation of sunk and new assets.

There are clearly many possibilities and it would be useful to explore these in coming to a decision on whether and if so how to best effect asset revaluations. Effort on this, considering its significance, will be valuable.

The administrative process for changing asset values is straight-forward: the National Electricity Rules in respect of the roll-forward of asset values will need to be changed to effect whatever revaluation approach is sought. However, substantial engagement with

the owners of the distributors with the highest likelihood of stranding and hence greatest justification for revaluation, would be essential in considering a rule change application.

1 Introduction

This paper examines the valuation of the regulated assets of twelve electricity distribution network service providers (distributors) that together distribute electricity to a little over 9 million connections in the jurisdictions that make up the National Electricity Market (hereafter for the sake of brevity referred to as Australia).

This report had been funded by the Consumer Advocacy Panel and sponsored by the Total Environment Centre. It follows a recent report ((Mountain, 2014c) for the Public Interest Advocacy Centre, that focussed specifically on the regulated asset values of the distributors in New South Wales in the context of their possible partial privatisation.

The main purpose of this report is to examine the valuation of Australian distributors and then, considering arguments and principles on the valuation of regulated assets, assess whether some form of revaluation should be considered.

Regulated asset values have a significant impact on the prices that consumers pay for electricity. The distributors in the NEM had a total regulatory asset value in 2014 of $63.5bn. Assuming industry average regulatory depreciation of 2.5% per year and industry average pre-tax regulated cost of capital of 10.5%, this translates into annual payments of $8.3bn. This accounts for about three quarters of the total regulated revenues of these distributors. In 2014 the depreciation and return on the distributors' assets accounted for more than the total value of the electricity transacted in the mandatory wholesale National Electricity Market.

The empirical analysis in this report compares distributors in Australia amongst themselves and then to distributors in New Zealand and Great Britain. In all three countries, distributors are structurally separated from retail and generation and are subjected to broadly similar regulation based on periodically determined caps on regulated revenues or prices.

Section 2 sets out the empirical evidence, Section 3 explains the principles underlying the valuation of regulated assets in Australia, New Zealand and Great Britain, Section 4

discusses the evidence and arguments for write-downs, Section 5 considers how revaluations might be effected and Section 6 suggests next steps.

2 Empirical evidence

The first five sub-sections of this chapter examine empirical evidence of the regulated asset valuation of Australian distributors in comparison to each other and in comparison to those in Great Britain and New Zealand. We do not suggest that pointing to Australian networks as more highly valued than others should *per se* justify downward revaluation. Rather the purpose is to understand the extent of differences and to attribute differences to initial valuations when the distributors were first corporatized, and subsequent capital expenditure, asset indexation and depreciation to the present.

The last sub-section considers evidence of the level of spare capacity in Australian networks and the trends in historic and projected future demand for electricity.

International comparisons are often criticised in Australian regulatory debates, and so we briefly respond to this criticism first. A common argument is that Australia is a large country with a sparse population and so can not be compared to small dense countries like Britain or small countries like New Zealand.

Closer inspection cast doubt on this. Table 1 compares average customer density (customers per kilometre of distribution line) and the proportion of the network that is underground rather than overhead. It shows that New Zealand and Australia have comparable customer density and although networks are on average about three times as dense in Australia as they are in Great Britain, about five times more of Britain's network is underground rather than overhead as they are in Australia. Underground networks are typically much more expensive than overhead networks. If anything, this comparison would therefore suggest that distributor assets in Australia should be less expensive than those in Britain and New Zealand.

Table 1. Customer density and proportion of underground and overhead network

	Average customer density (customers per kM of line/cable)	Proportion of network underground (%)
Australia	13	13%
New Zealand	13	27%
Great Britain	42	59%

Source: Regulatory reports, CME analysis

Looking within Australia, we see similar density/underground trade-offs in asset valuation. For example, AusGrid in New South Wales has a customer density of 40 customers per kilometre of network, comparable to the average in Great Britain and 36% of its (AusGrid's) network is underground. AusGrid's asset value per customer is higher than that of Essential Energy, that has a customer density of just 4 customers per kilometre of network, but only 4 % of whose network is underground.

There are many factors that affect the cost of distributing electricity, and the point of this comparison is to suggest that it would not be reasonable to reject comparisons with New Zealand and Britain on the basis of differing customer density.

2.1 Australia

This first sub-section examines Australian distributor valuations. All five charts are set out one page. The charts show the opening asset value at the earliest date for which data on the opening asset value and also the subsequent annual depreciation, asset indexation and capital expenditure is available. This means that the charts present 15 years of data for the South Australian distributor, 13 years for the Victorian, New South Wales and Queensland distributors and 8 years for the Tasmanian distributor.

The asset base calculation is that the closing asset value equals the sum of the opening value plus the capital additions plus the indexation of the asset base (at the Consumer Price Index) plus the net proceeds from the disposal of assets less depreciation charges. The charts present this calculation but with the net amount of indexation, disposals and depreciation shown as a single number. Effectively this single number is calculated as

the balancing entry (the opening and closing asset base and capital expenditure are all known).

The charts present asset values normalised by the number of connections and stated in 2014 dollars. The normalisation of the opening and closing asset base is based on the number of connections at the dates of the opening and closing asset values. The normalisation of "additions", and "indexation less depreciation and disposals" is based on the average number of connections between the start and end dates.

With the data presented in this way (See Figures 1a to 1e on the next page) we can see the extent to which the closing asset base has been affected by the value of the opening asset base, subsequent capital expenditure, and the net value of indexation, depreciation and disposals. A few important observations can be made from these charts:

- They all started with roughly similar asset values per connection (between $3,200 per connection in Victoria and $5,000 per connection in Queensland);
- The asset values per connection declined slightly in South Australia, rose a little under a fifth in Victoria, a third in Tasmania (TAS) and a little under twice in New South Wales (NSW) and Queensland (QLD).
- The main reason for the big difference in the closing asset bases for QLD, NSW and TAS[1] (where the state governments own the distributors) compared to VIC and SA (where the distributors are privately owned) is that the government owned distributors spent two to three times more per connection than the privately owned distributors.

These observations are consistent with those of the Productivity Commission that concluded that state-owned network businesses have conflicting objectives that undermine the effectiveness of incentive regulation.

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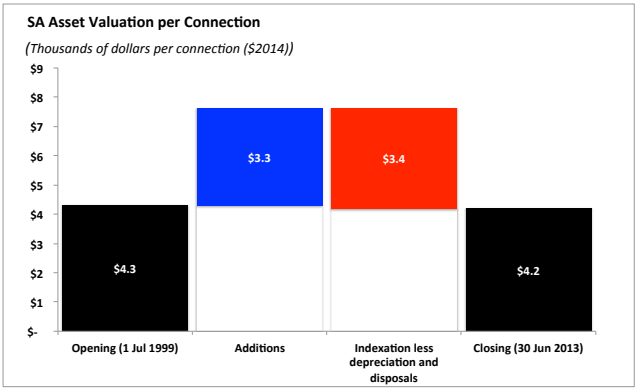
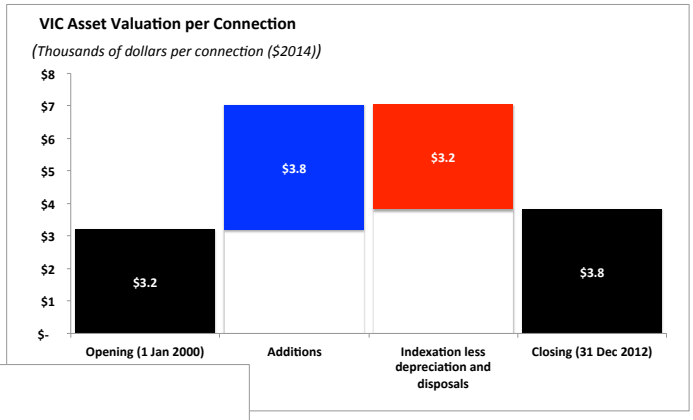
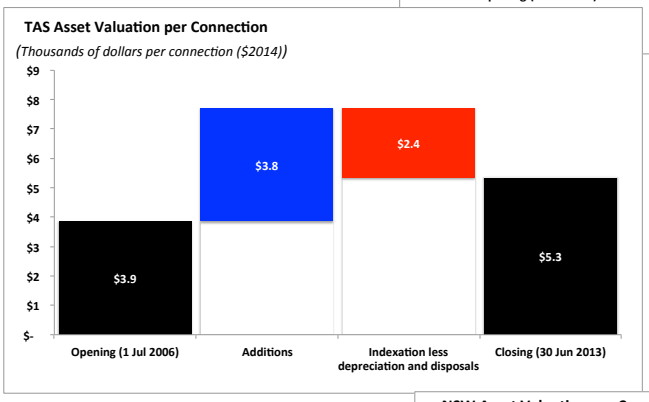
[1] As noted the TAS data is only for seven years, the others about twice that.

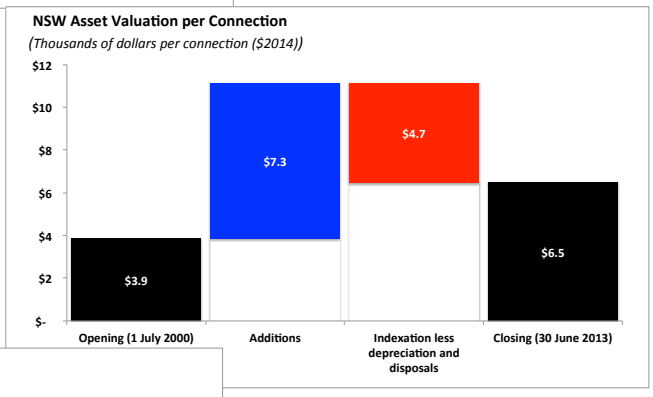
[2] A 6 kW rooftop photovoltaic system can now be installed in Queensland for $3990. Even after

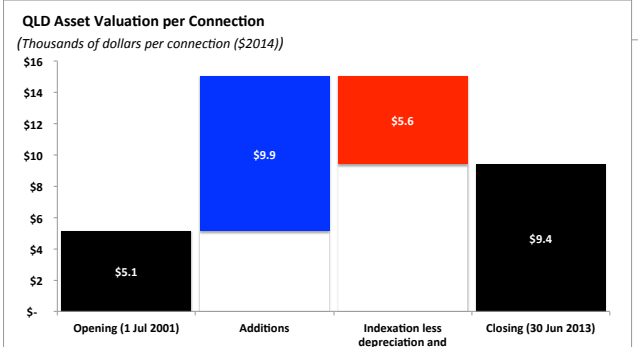
Figure 1a to 1e Valuations of Australian distributor in each region of the NEM









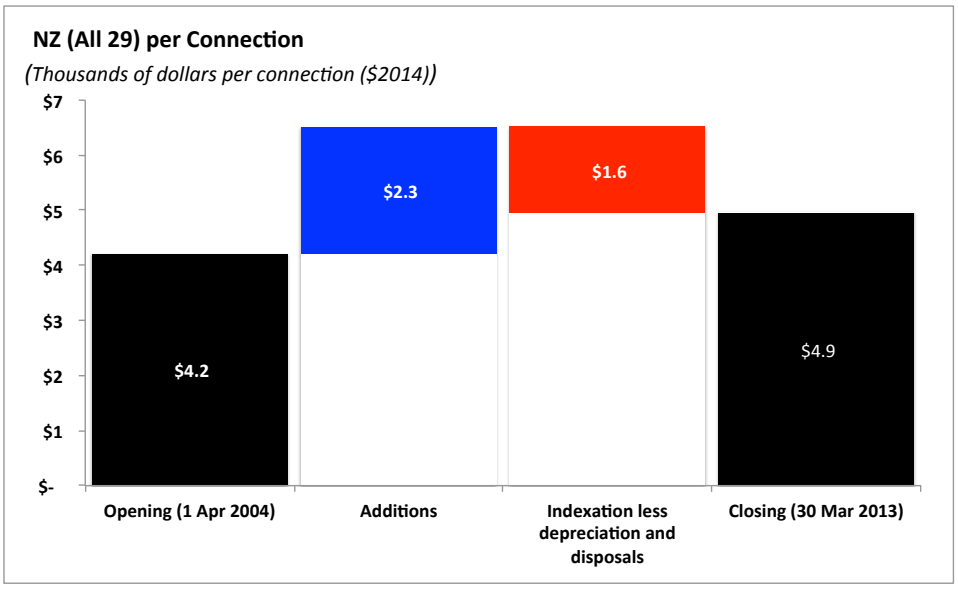


2.2 New Zealand

This sub-section presents the analysis of regulated asset values of New Zealand's distributors. The data is drawn from the New Zealand Commerce Commission's database and currencies are converted into Australian dollars using 2014 Purchasing Price Parity exchange rates published by the OECD. The same methodological comments in the previous section apply.

Figure 2 shows a country-wide calculation (covering all 29 distributors in New Zealand). It shows that asset values per connection in 2004 were about the same as those in South Australia but by 2013 had risen 17% so that they are now, comparatively, between that in Tasmania and South Australia. The results for New Zealand's two largest distributors (Vector and Powerco) are roughly consistent with the New Zealand industry average.

Figure 2. Regulated assets per connection for distributors in New Zealand

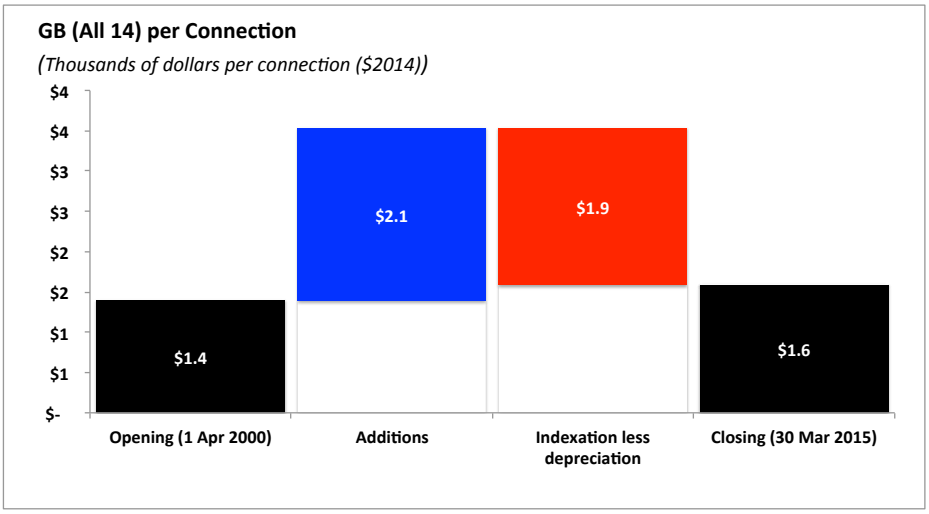


Source: regulatory databases, CME analysis

2.3 Great Britain

Figure 3 below show the situation in Great Britain. The same methodological comments in the previous section for New Zealand also apply here. It is particularly notable that the charge for indexation less depreciation in GB has matched additions fairly closely so that the closing RAB in 2015 is only slightly larger than the opening RAB in 2000.

Figure 3. Regulated assets per connection for distributors in Great Britain



Source: Regulatory documents, CME analysis

2.4 Australian, British and New Zealand distributor valuations compared

This subsection compares the Australian, British and New Zealand distributors. The first chart (Figure 4) is the regulated asset valuations in 2013. Figure 5 is a time series of regulated asset values and Figure 6 examines average capital expenditure levels. Again comparisons are in 2014 Australian dollars at 2014 PPP exchange rates and normalised by customer number. Figure 4 shows that British distributors have by far the lowest regulated asset values. The highest valued distributor in Great Britain is about the same value per connection as the lowest valued distributor in Australia. The largest and second-largest New Zealand distributors have regulatory valuations that are about the same as the higher valued privately-owned distributors in Australia.

The government-owned distributors in Australia are however in a league of their own having regulatory asset valuations uniformly higher than the Australian privately owned distributors and by comparison to the British distributors, remarkably higher.

Figure 4. Regulated asset values per connection for distributors in Britain, New Zealand and Australia (Green – Great Britain, Blue – private Australia, black – New Zealand, Red – government Australia).

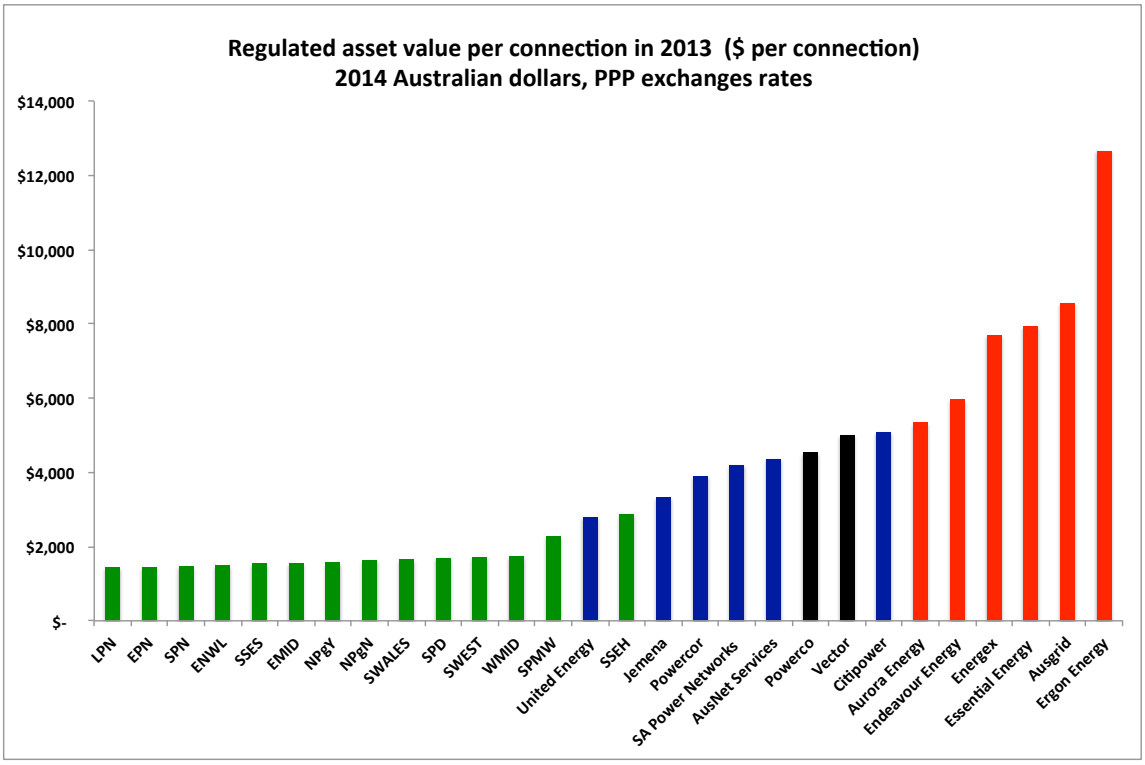
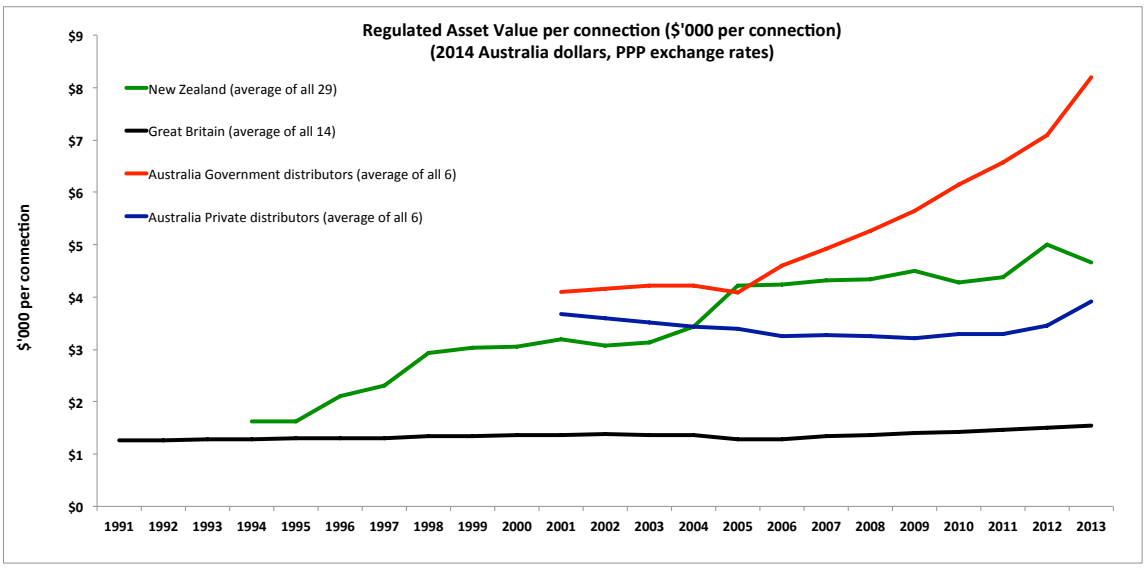


Figure 5 below extends the analysis by showing a comparison over time of regulatory asset values per connection in Britain, New Zealand and for the government and privately owned distributors in Australia. The British distributors' regulated values per connection have been very stable, increasing very gradually over the period. The New Zealand distributor values increased significantly per connection between 1994 (when the distributors were created) to 2005, but have been roughly stable since. The next chapter discusses this.

The Australian distributor time series starts at the end of 2000/beginning of 2001 – this being the earliest date that all distributors had been corporatised /privatisated and hence regulated asset bases established. The Australian private distributor data shows gradual decline in the values per customer of the privately-owned distributors, although there is a noticeable increase towards the end of the period. The Government distributor data shows stable regulatory values from 2000 to 2005 – corresponding to their first regulatory controls and then significant increases coinciding with the second (and last) state regulator controls and then first controls established by the Australian Energy Regulator (AER).

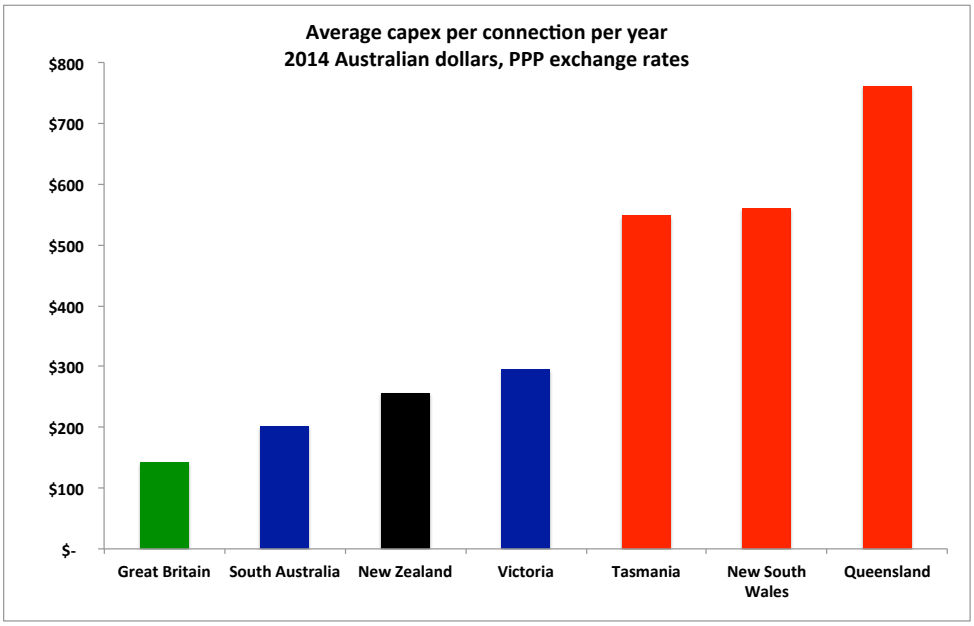
Figure 5. Times series of regulated asset values per connection



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.

In the earlier subsection on the Australian-specific comparison, we focussed on the capital expenditure in explaining the change in opening and closing asset bases. Figure 6 extends this to an international comparison of average capex per connection. The New Zealand data is for the nine years between 2005 and 2013. The British data is for 15 years between 2000 and 2014. The chart shows that average annual capital expenditure per connection for distributors in Britain has been a little over half that of the privately owned distributors in Australia and the distributors in New Zealand. The government-owned distributors in Australia have spent more than twice as much as the privately owned distributors in Australia and New Zealand and about four times as much as the British distributors.

Figure 6. Comparison of average annual capex per connection



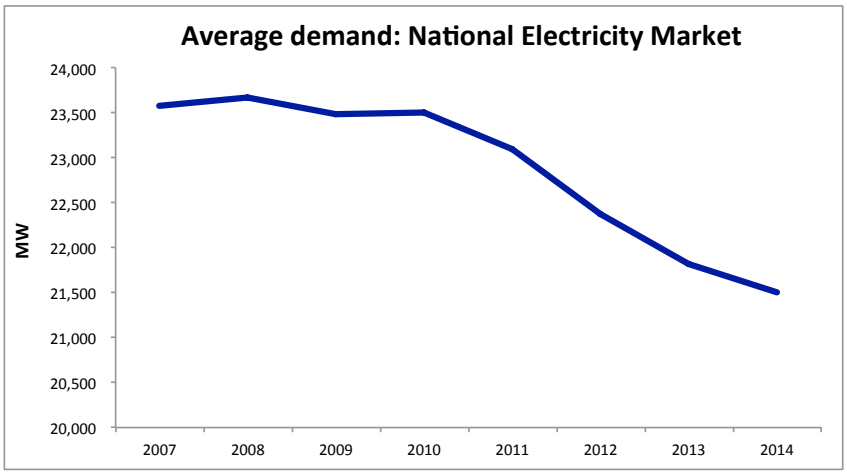
Source: Regulatory reports, CME analysis.

2.5 Evidence of excess capacity in Australian distribution networks

This subsection examines evidence to assess whether it suggests, in general, excess capacity in Australia's distribution networks. It looks at average and peak demand and then network utilisation and finally the trend towards increasingly decentralised production.

Figure 7 shows the trend of average demand in the NEM from 2007 to 2004. Having peaked at 23,700 MW in 2008, by 2014 it had declined by 10% to 21,500 MW.

Figure 7 Average demand in the NEM

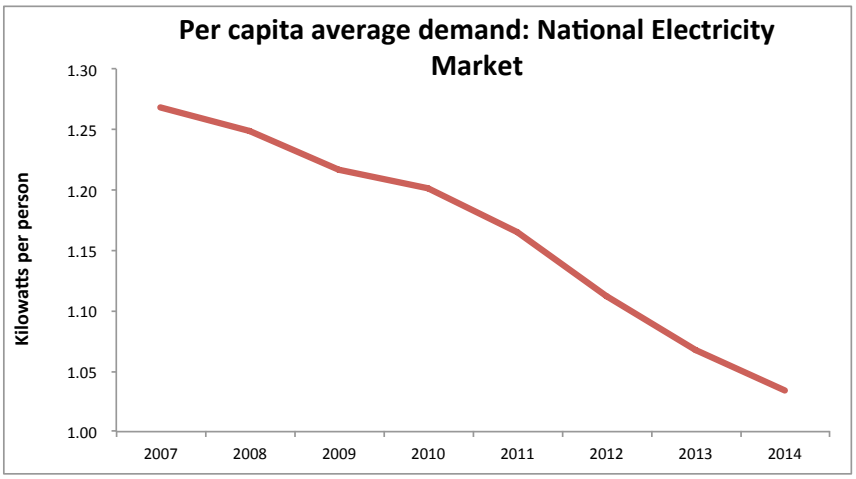


Source: AEMO data, CME analysis

Digging deeper we find that the 10% decline in average NEM demand is despite rapid increase in Australia's population: in the 7 years between 2007 and 2014 the population in the jurisdictions served by the National Electricity Market increased by 2.2 million, a trend rate of increase six times higher than the trend rate of increase from 1981 to 2014.

We normalise the demand changes in Figure 7 by changes in population to give average demand (kW) per person. This is shown in Figure 8 where we see a 19% decline in average demand per capita from 1.27 kW per person in 2007 to 1.03 kW per person in 2014.

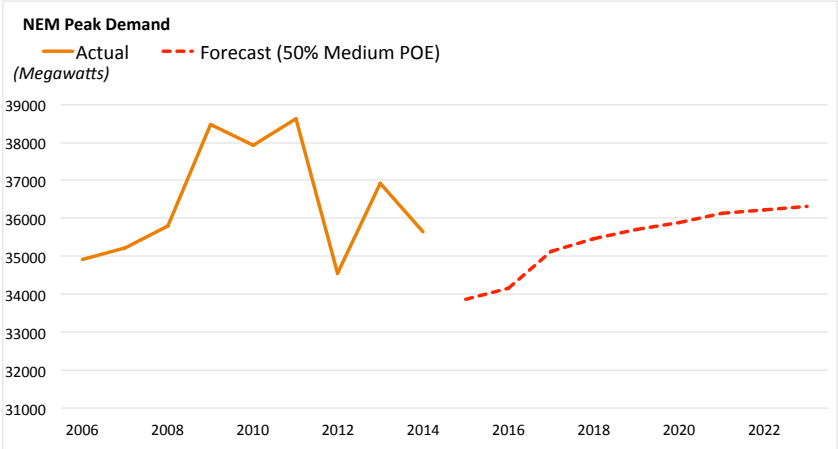
Figure 8. Per capital average demand supplied by the NEM



Source: AEMO, AER Regulatory Information Notice data, Australian Bureau of Statistics, CME analysis

Turning to NEM-wide simultaneous peak demand, as shown in Figure 9 the peak simultaneous demand in 2009, only slightly exceeded that in 2011 and has since declined significantly. AEMO projects that it will decline further and then recover although even by the last year of their projections (2023) simultaneous peak demand in the NEM will still be substantially below the 2009 level.

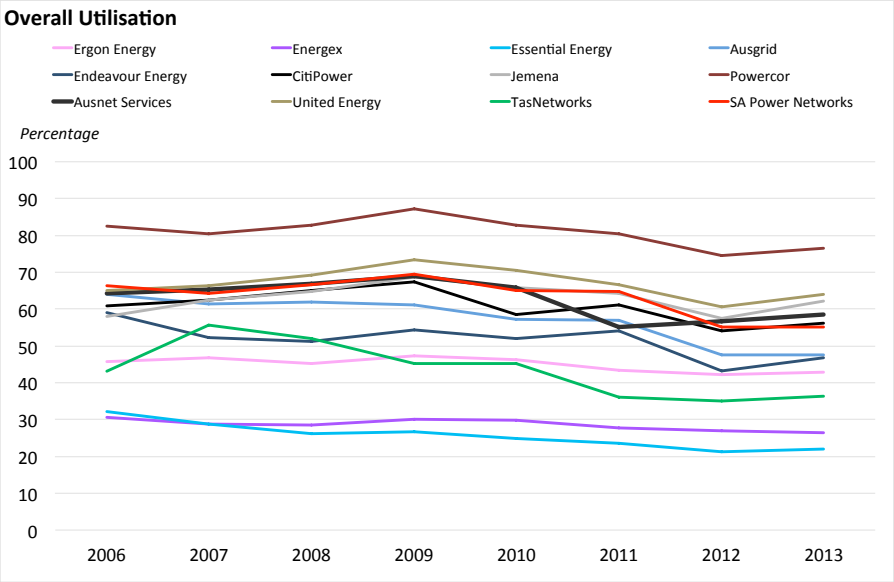
Figure 9. Actual and projected simultaneous peak demand in the NEM.



Source: (AEMO, 2014a)

Declining demand in the context of much higher network investment is resulting in lower network utilisation. Figure 10 below, based on data provided by the distributors to the AER, shows a steady decline in network utilisation for all distributors in the NEM. Considering the rate of decline in average demand and the rate of increase in capital expenditure, it is surprising that these distributor-supplied data do not show a more rapid decline in utilisation. It also notable that the government-owned distributors typically had the lowest utilisation rates at the start of the period (2006) and by 2013 the six distributors with the lowest utilisation were all government owned.

Figure 10. Average network utilisation (demand as percentage of installed capacity)

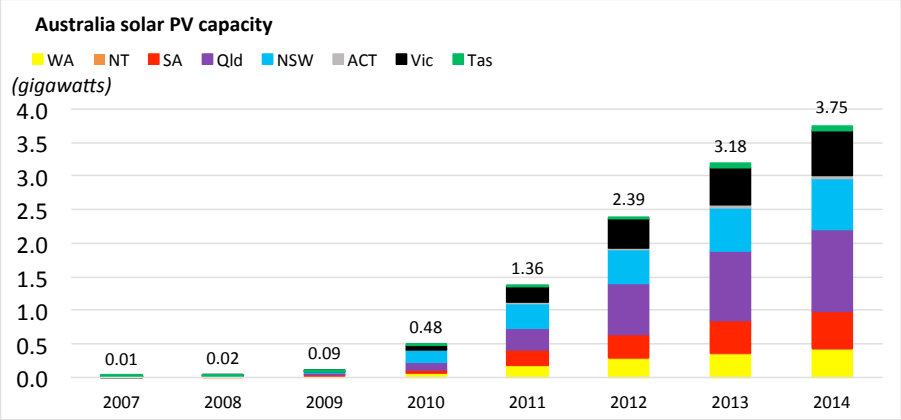


Source: Regulatory Information Notices, CME analysis

The rise of distributed generation

Figure 11 below shows cumulative total rooftop PV capacity installed in Australia.

Figure 11. Cumulative total installed PV capacity in Australia



Source: Clean Energy Regulator CER data, CME analysis

There has been a reasonably good correlation of PV production with daily regional simultaneous peak demands: AEMO (2012) suggests around a third of rooftop PV capacity is producing at the time of regional peak demands. Therefore even if rooftop PV has not reduced demand on residential feeders (because it is generally poorly correlated with household peak demand) it has had an effect on network capacity at higher levels in distribution networks. The impact is however affected by many factors and for this reason can not be determined precisely.

There are a variety of views on the rate of expansion of distributed PV and then on the impact that this will have on network capacity (and hence the level of network assets that are surplus to requirements – "stranded"). While it is difficult to imagine that PV will not continue to expand rapidly[2], one of the uncertainties is the rate of uptake of distributed batteries in combination with distributed generation and the impact this will have on demands on the existing network. In this regard we note research undertaken for AEMO and published in their 2014 National Transmission Network Development Plan that suggests that even small amounts of residential energy storage (5 kWh per household) can have a significant impact on household demand, and on network demand.[3]

However it bears noting that despite the very rapid expansion of rooftop PV in Australia so far, Saddler (2013) suggests that its impact on declining demand is overshadowed by far by structural changes in the Australian economy and greater consumption efficiency (in response to higher prices and technology change). It would be surprising if these trends did not have much further to run.

On the basis of the evidence presented here, it seems hard other than to conclude that the government-owned networks in particular have very substantial amounts of redundant ("stranded") capacity and that this is unlikely to change for the foreseeable future. If anything the likelihood is that the level of the redundancy will increase.

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[2] A 6 kW rooftop photovoltaic system can now be installed in Queensland for $3990. Even after allowing for conservative lifetime running costs and after adjusting for upfront capital subsidies, the levelised cost of electricity is much lower (about a third) of the charge households are paying for distribution network services in Queensland – see MOUNTAIN, B. R. & SZUSTER, P. 2015. Network tariffs applicable to households in Australia: empirical evidence. A report for UnitingCare Australia..

[3] According to the research undertaken for AEMO – see AEMO 2014b. National Transmission Network Development Plan. Australian Energy Market Operator. - adding a 5 kWh battery to an existing solar PV system reduces the household maximum demand by 45% in summer and 23% in winter. Households with this amount of battery storage could be self-sufficient for 60% of the time in summer and 40% in winter.

3 Principles

Different approaches have been applied in establishing initial regulatory values at the time of corporatisation/privatisation and then in subsequently continuing those valuations. This chapter examines the principles underlying the regulatory valuation of distributors. In this chapter we first examine the approach to the initial regulatory valuations at the time of corporatisation/privatisation and then the continuation of those initial valuations. Consistent with the empirical analysis in the previous section we distinguish the approaches adopted in New Zealand, Great Britain and Australia.

3.1 Initial valuations at privatisation / corporatisation

3.1.1 Australia

Regulatory valuations of distributors in Australia became a prominent issue at the time of the industry restructuring and subsequent corporatisation and privatisation from the mid to late 1990s. Prior to this time, regulatory values had not been established - there was no need to establish values for the purpose of pricing: until the restructuring, distribution charges were not separately calculated because distribution was an integral part of what were vertically-integrated suppliers.

The approach adopted in the valuation of distributor assets (by the state-based regulatory authorities) was to base them on the Depreciated Optimised Replacement Cost (DORC).

IPART (1999) cited in Johnstone (2003)) defined DORC as the "*replacement cost of an 'optimized' system, less accumulated depreciation*". IPART defined an optimised system as "*a re-configured system designed to serve the current load plus expected growth over a specified period using modern technology. This method excludes any unused or under-utilized assets beyond the specified planning horizon, and allows for potential cost savings which may have resulted from technological improvement.*"

Table 2 below compares the DORC asset values when they were established (30 June 1998 except in Queensland which was 30 June 2000), to the value of the RAB today. As discussed earlier the DORC valuations per connection in the various regions were roughly comparable (at least relative to the magnitude of the differences today).

Table 2. DORC and current distributor asset values

	DORC ($million) (in 2000, 1998 in Queensland)	Approximate RAB (in 2014)	% change
SA	$ 2,064	$ 3,754	82%
VIC	$ 4,221	$ 10,823	156%
TAS	$ 577	$ 1,566	171%
NSW	$ 6,725	$ 26,571	295%
QLD	$ 5,208	$ 21,289	309%

Source: Jurisdictional regulator decisions, CME analysis

Even after adjusting for inflation between 1998 and now, it is clear that, other than in South Australia and Victoria, the majority of the regulated asset value today is affected by assets added to the regulated asset base since the DORC values were established.

Johnstone (2003) suggests that the Australian regulators' economic justification for DORC "*as best as can be construed from their published statements*" is that valuing assets at DORC emulates rational market settings by producing the highest possible tariffs short of those at which a new entrant might be encouraged to duplicate the existing provider's infrastructure (and compete for those tariffs). According to this argument, a profit maximizing asset owner, operating opportunistically in a free market, would fix tariffs at this level for the long run.

Johnstone (2003) presents a thorough (and stinging) critique of the decision to value assets based on DORC. The main objections lie in its subjectivity; the asymmetry – to shareholders benefit - in its estimation; and the allocative inefficiencies that it delivers. He suggests DORC valuations tend to inflate asset book values (relative to either historical cost or market realizable value) and concludes "*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.*" We refer interested readers to (Johnstone, 2003) for an excellent discussion of this.

3.1.2 New Zealand

Geoff Bertram in (Bertram and Twaddle, 2005, Bertram, 2007, Bertram, 2005) describes in detail the valuation of distributor assets in New Zealand. This sub-section draws heavily on this work.

The Electricity Supply Authorities (ESAs) comprising distributors and retailers in New Zealand were corporatised between 1992 and 1994. At the time, the Minister of Energy and the Treasury planned to revalue all assets up to their Optimised Deprival Value (ODV) which at around $4.5bn was more than twice their book values. The view of the government officials overseeing the restructuring was that assets should be valued at their Optimised Depreciated Replacement Cost (Bertram and Twaddle, 2005).

However political concern about much higher prices should such revaluation be implemented (politicians had committed to lower prices as part of the industry restructuring) meant that the Government decided that these revaluations should not be implemented. Instead the value of the ESAs' assets at vesting was based on historic costs. However the Government allowed the new companies (whose prices were not subject to regulatory controls) to revalue to ODV if they so wished. Such revaluations occurred progressively over the next six years: Bertram and Twaddle (2005) estimates that the cumulative total revaluation over the following 6 years was NZD1.845bn. In the context of much lower capital expenditure over this period, the inclining asset values per connection between 1994 and 2005 (shown in Figure 5) is explained entirely by these asset revaluations.

These revaluations were not recorded in income statements but were taken directly to revaluation reserves in the distributors' balance sheets (as happens in Australia). However the information disclosure regulations required distributors to disclose an "accounting rate of profit" which included the asset revaluations, This resulted in disclosed profit rates of 30-40%, and in one case as high as 90% (Bertram and Twaddle, 2005).

During the period from 1992 to 2004 costs per kWh delivered more than halved while prices increased by about 20% (Bertram and Twaddle, 2005). However, not being

subject to regulated prices, the extent to which revaluation accounts for the large gap between the trend of costs and the trend of prices is not clear.

In August 2001 the Government amended legislation to require the New Zealand Commerce Commission to economically regulate transmission and distributors. The Commission decided to use the mid-2002 (revalued) asset prices as the opening rate base in 2004. As a result, the revaluations by the distributors between 1994 and 2004 delivered excess earnings of $2.6 billion, which can be stated as (roughly) an 8% premium over the weighted average cost of capital over the period from 1994 to 2004 (Bertram and Twaddle, 2005).

Bertram and Twaddle (2005) suggests that the essential valuation issue in New Zealand is not the choice of valuation methodology (current cost versus historic cost) but that a change was made midway through the life of assets, thereby delivering a dramatic levy on the aggregate wealth of consumers, for the benefit of electricity suppliers.

3.1.3 Great Britain

The electricity distributors in Great Britain (formally known as the Regional Electricity Companies - RECs) were privatised in 1989 as part of a package that also included the National Grid Company and a pumped hydro and telecommunications business that were both subsequently separated and sold.

The initial price cap for the RECs was set on the basis of the current cost account (CCA) net asset value (Newbery 1997). However, there was no undertaking at the time of the privatisation that this CCA value would establish the regulated asset value. The companies were purchased with no statement of the asset base that would be used to set prices in the regulatory process. The asset values were left to the discretion of each regulator, and were established in the first regulatory determination.

The first regulatory review of the distributors took place in 1994. In that review the Director General of Electricity Supply, Professor Stephen Littlechild, decided[4] that:

"*… 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*."

The application of this logic in the electricity regulator's initial decision resulted in regulatory valuations that were about 50% higher than the enterprise values based on their share prices after the first day's trade plus the cumulative value of investment since privatization. The resulting valuations varied from company to company but, on average, were equivalent to about 90 per cent of CCA asset value (Grout and Jenkins, 2001).

However not long after this decision, in early 2005, the decision was reviewed in response to new information arising from a hostile takeover of one of the distributors. The revised decision reflected this new information and also a Monopolies and Mergers Commission review of the regulated asset values of two water companies and Scottish Hydro electric (they had sought a review of Offer's earlier decision). In his revised decision, Professor Littlechild proposed regulatory asset values 15% above the market value of value of the assets based on the flotation value of the RECs at the close of the first day of trading. The market value at the end of the first day's

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[4] See OFFICE OF THE ELECTRICITY REGULATOR 1994. The Distribution Price Control: Proposals. cited in GROUT, P. A. & JENKINS, A. 2001. Regulatory oppportunism and asset valuation: evidence from the US Supreme Court and UK Regulation. *CMPO Working Paper Series*, 1.

trade was GBP7bn in comparison to the value of the assets of the distributors in the last year before privatisation of GP4.9bn and current cost value of GBP11.7bn[5].

3.2 Ongoing revaluation

The approach in Australia, New Zealand and Britain to rolling forward initial values is similar: the real value of the assets is maintained by indexing the net asset value by the same price index used in the price control formulation.

The methodology for doing this in Australia is very precisely specified in the National Electricity Rules. However Johnstone (2003) notes that the National Electricity Code – the predecessor to the National Electricity Rules and applicable initially only to transmission companies – envisaged periodic revaluation of the asset base, not just ever upward indexation for inflation (see in particular (ACCC, 1999a) and (ACCC, 1999b).)

In all three countries, the capital additions added to the regulatory asset base are, ultimately, based on the depreciated value of actual expenditure. However there are many important nuances here including the treatment of depreciation, customer connections, pass-through or risk-sharing incentives and so on. Thus, even broad consistency with the principle that the RAB should reflects actual capex additions, can result in quite different outcomes.

In Australia as in Britain and New Zealand there has not been ex-post review of the efficiency of the actual expenditure at the end of a regulatory control period, although in Australia the regulator has said it may consider this, within tight constraints, in future.

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[5] Sourced from company prospectuses and A. Carey *et al*, *Accounting for Regulation in UK Utilities*, cited in *GROUT, P. A. & JENKINS, A. 2001. Regulatory oppportunism and asset valuation: evidence from the US Supreme Court and UK Regulation. CMPO Working Paper Series, 1.*

4 Should distributor assets be re-valued ?

The Energy Networks Association has argued that the value of network service provider assets should not be revalued (see Energy Networks Association (2014)). They provide various arguments for this view, the main being that to do so will increase regulatory risk which they say will raise the cost of capital which will then need to be compensated through higher prices. They contend the benefit to consumers of lower prices from written-down regulated asset values will be more than offset through higher required returns.

The essential idea underlying their argument is that uncertainty has a cost and so the more certain the regulated revenues (of which asset values is a major determinant) the lower the cost of capital and hence prices will be. In Britain, Stern (2013) makes a similar point, suggesting that regulatory commitment not to (negatively) revalue regulated assets has provided "*a useful safety net for keeping down the cost of capital for privately financed infrastructure investment*". In Australia and New Zealand, King (1997) and Small (2000) respectively both cited in Johnstone (2003) make similar observations in suggesting that periodic revaluation of the RAB will make tariffs more volatile and this may delay investment.

These arguments are perhaps most plausible if the certainty provided by protecting investors from revaluation does not jeopardise investment efficiency. This certainly seems to have been the case in Britain as the various reviews of network regulation over the last two decades (see for example (Ofgem, 2010)) attests. The evidence of stable asset values per customer (see Figure 5) seems to support this.

But protecting investors is not cost-less - insulating utility investors from stranding risk does not extinguish the risk, it simply passes it on to consumers (and upstream producers). The evidence of the profligacy particularly by Australia's government-owned distributors under a regime that set out to insulate them from stranding risk, must surely be a big part of the explanation for that profligacy. If economic regulation is to provide utilities with the disciplines provided by markets – and it is hard to imagine a regulator or policy maker arguing with this objective – then waste should not be rewarded.

The evidence in Section 2 is that most of those distributors that had the lowest asset utilisation in 2006 are also those that have increased capacity the most since then so that now the distributors with the highest asset values per connection are also those with the lowest utilisation.

Official demand forecasts (which have a long history of optimism) provide little assurance that demand will ever recover to historic levels. And the rapid rise of distributed generation (as noted earlier more than one in nine households in Australia already meet a large part of their own electrical demand) has reduced the value of networks to these users. Continued expansion of distributed generation in the residential, commercial and agricultural sectors, combined with the expected rise of distributed storage can only exacerbate this.

The application of the current regulatory model is delivering regulated asset values at their depreciated replacement cost for assets constructed since 2000 (earlier in Victoria) and substantially above depreciated historic cost for assets constructed before then. The asset values of the government-owned distributors – now about five times higher per customer than those in Great Britain and twice those in New Zealand - is a large part of the reason why electricity has become unaffordable for many households and trade-exposed businesses that are unable to pass on those higher prices to their customers. These energy users are obviously the losers, but so also are the existing and potential future upstream producers for whom distribution networks are becoming a significant concern.

The case for the revaluation of the asset values of the government-owned distributors in particular, rests mainly on this evidence and argument.

Another argument against the downward revaluation of government-owned networks is that this will negatively affect the pecuniary benefits that the state governments derive from their ownership rights. And so, lower pecuniary benefits will jeopardise state governments' ability to provide the other services that their voters desire. This is particularly topical in view of the expressed intention of the current New South Wales government to partially privatise two of their distributors.

Inevitably there is a conflict of interest between the maximisation of pecuniary benefits through the maximisation of the RAB[6], and the pursuit of electricity consumers' interests in not passing on to them the dead-weight loss from the remuneration of redundant network capacity.

This is a difficult problem that can be stated as the maximisation of pecuniary benefits or as the appropriate allocation of risk: should the governments of NSW and QLD (and by extension the people of NSW and QLD) bear the consequence of past inefficient investment by its distributors, or should the captive electricity consumers and producers bear this risk? Electricity consumers and their associations warned repeatedly that regulation was failing to serve their needs, is it fair or efficient that they bear the consequence of failures in regulation and governance in particular of government-owned distributors?

Again, comparison to the decisions in New Zealand and Britain is instructive. In New Zealand, the distributors were not owned by the New Zealand Government but were held in beneficial ownership for consumers, predominantly through trusts (Talosaga and Howell, 2012). In the restructuring that created these businesses, the Government refused to revalue the assets (upwards) such as through the DORC approach applied in Australia, although as discussed, upward revaluations subsequently occurred in the absence of regulatory oversight.

In Britain the Government and subsequently the regulators (and the Monopolies and Mergers Commission and then Competition Commission) decided asset values. The Government rejected DORC before privatisation and the regulators (and MMC and CC) after privatisation rejected the businesses' requests for valuations that were much greater than was consistent with what investors had paid at privatisation.

There are important differences in the situation in Australia and New Zealand (state government versus consumer beneficial ownership in New Zealand). And compared to

[6] This assumes that the future buyers trust that the RAB will not be written down after they have bought the businesses.

Britain, in Australia the state governments' pecuniary interest in their electricity distributors has far greater relative value to them, than the British Government's pecuniary interest in its distributors when it owned them. It follows that the political (and fiscal) calculus of privatisation is very different in Australia than in New Zealand and Britain.

From an economic perspective however the asset valuation question seems to be the same: arguing that electricity consumers bearing a large deadweight loss will nevertheless maximise the public interest, seems to be no more convincing in Australia than it would be in New Zealand or Britain. Johnstone (2003) states the argument unambiguously: "*For a nation to build such long-lived infrastructure at great sacrifice and then not use it to anything like its available capacity for the reason that it would cost a lot to replace verges on economic absurdity*."

The concern about excessively valued assets of the government-owned distributors is surely hard to dispute and prospective privatisation makes the concerns immediate. A further argument for revaluation – perhaps not as immediate - relates to the reduced economic value of the distributors' networks in the context of large amounts of distributed generation and storage. This concern is germane to privately owned distributors as well.

Networks will still be valuable in an environment of pervasive distributed generation and storage but it is difficult to see that they will be anywhere near as valuable as they have been in the traditional model of monopoly shipper from centrally-dispatched production, to consumers who at that time had no or limited ability to substitute their electricity demand.

The "optimised replacement cost" of a network in this new world will need to reflect the opportunity many consumers have of installing their own rooftop production and storage. While rooftop photovoltaic production is now much cheaper than distribution, storage is for most still more expensive. There are very strong incentives for storage costs to decline and it would be surprising if this did not happen. Network asset values that fail to reflect this new reality will be priced out the market, precipitating significant allocative inefficiencies. Meeting this challenge, through asset revaluation and other

changes, is perhaps a little less urgent than the revaluation of government-owned distributor assets currently slated for privatisation, though it is no less important.

While there is no precedent for writing down the value of distributor assets in Australia, there is an antipodean precedent: Bertram (2007) notes that Transpower, the New Zealand transmission network service provider, paid down its debt and wrote-down its assets in recognition that the long run sustainability of the grid depended upon transmission prices low enough to compete with distributed generation connected directly to distribution networks.

5 How could revaluation be effected ?

The regulatory methodology applied to network service providers in the NEM requires the specification of the Regulatory Asset Base from which the return of capital (depreciation) and return on capital is determined. The revaluation of the regulated asset base could be effected by decreasing the value of the RAB and thus the return on and of capital. But, equivalently, it could be effected by leaving the RAB unchanged but changing the calculation of depreciation on the return on assets. This section canvasses several possibilities.

Uniform revaluation of assets

A revaluation could be effected by a uniform reduction in the value of assets, for example by reducing the network asset value in regulatory accounts by 10%. This approach would be simple to implement since it avoids the complexity of working out whether some category of assets is more deserving of reductions than others. The other advantage (to consumers) would be that an immediate reduction in the asset value has the potential to flow through immediately into lower prices. Equally this would be the disadvantage to investors. Depending on the capital structure of the business, such an approach may require equity injections in order to ensure that the business is able to sustain its financial capacity to service and redeem borrowings.

Selective asset re-valuation

Revaluation could be effected by writing down specific assets or groups of assets, perhaps differentiated by geography or type. This approach has the advantage of being better targeted and replicates the approach in asset revaluations consistent with financial accounting standards (where specified assets or investments are written down). The disadvantage is that it requires justification of why some assets are revalued and not others, and of the calculation of the amount of the revaluation. Inevitably this is problematic. A further disadvantage is that by revaluing a narrow category of assets, larger cuts will be needed in order to have a meaningful impact on the aggregate asset valuation and hence on prices.

Once-off or progressive revaluation ?

Should the revaluation be effected by a once-off reduction in asset values or progressively perhaps through the indexation of asset values by a constant or time profiled negative rate?

Progressive revaluation protects investors from valuation shocks but does mean that consumers are required to continue to fund stranded assets until the full effect of the revaluation has worked through. This can be adjusted for by determining a revaluation rate that achieves, in present value terms what might be achieved through a once-off re-valuation.

Escrow accounts ?

One approach to revaluation would be transfer the proportion of the value of the regulated asset base that is deemed to be surplus to requirements (or the value of specifically identified assets) to an "escrow" account i.e. segregating them from the regulated asset base. While in the escrow account, the assets may be depreciated, but that depreciation would not form part of the regulated revenues and neither would a return be provided on assets in the escrow account. If it subsequently becomes the case that the assets in the escrow account become used and useful, then the depreciated value of the assets could be added back to the RAB.

Differentiating the regulated rate of return on stranded assets

It would be possible to apply a zero or low regulated rate of return to the portion of the asset base deemed to be stranded. This would ensure that consumers do not compensate shareholders for a return on stranded assets. If a zero rate was applied, it would also mean that shareholders would bear the cost of financing and redeeming loans. Compared to revaluation approaches, this approach has the advantage that it does not require changes to the asset valuation, but it does require a decision of how much of the asset base will be exposed to a zero or discounted rate of return.

Not charging consumers for the depreciation of stranded assets

This approach entails segregating the depreciation of 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. Again, compared to revaluation approaches, this approach has the advantage that it does not require changes to the asset valuation, but it does require a decision on how much of the asset base is stranded and hence depreciation thereon not charged to consumers.

Summary

There are many ways to skin a cat. Approaches that involve once-off write downs are "cleaner" and more decisive and bring immediate relief to consumers, but can result in shocks to investors. Approaches that do not involve asset revaluation but rather a reduction in the rates of return or depreciation avoid broaching the difficult problem of quantifying the write down, although they do require decisions on how much of the asset base is stranded. Escrow accounts allow for assets to be added back to the RAB if they become useful but can create unhelpful incentives and can prolong regulatory debates. We can not recommend any single one of these approaches as better than any other in all cases: it will depend on many factors including the extent of asset stranding; the financial capacity of the regulated businesses to absorb possibly significant reductions in value, and the urgency that consumers obtain relief from excessive prices.

6 Next steps

The purpose of this paper is to consider the evidence and argument for writing down the value of distributor assets, not to recommend how this should be done. In considering how, it is essential to obtain evidence that there is a problem to be solved. This has been the main focus of this paper.

The willingness to embrace this challenge will be affected by knowledge of its magnitude and some confidence that recognising the problem and trying to fix it will be better than leaving things as they are. This paper, along with our previous paper - (Mountain, 2014c)) and the ENA's contribution ((Energy Networks Association, 2014) might be considered a starting point. Additional research that we think will be particularly valuable, should focus on:

- A more precise picture of the actual situation for each distributor including history of asset values before restructuring and a clear and audited record of changes since then including asset indexation, depreciation, the impact of disposals, retailer ownership separation and accounting for customer contributions.
- Consideration of the options for federal-state co-operation in asset revaluation. The Commonwealth is incentivising the states to privatise their distributors. Such financial incentives might be considered in the context of asset write-downs.
- Quantitative assessments of the impact of regulated asset revaluations on likely privatisation proceeds.
- Clarity on accounting standards (and hence reported profits and income taxes) for the treatment of write-downs.
- Further evaluation of the mechanisms for write downs: for example homogenous write-downs versus differentiated write-downs by asset class; potential for later write-back if future circumstances change; mechanisms for accelerated depreciation; options for the application of differentiated rates of

return for sunk or future assets; options for differentiated inflation indexation of sunk and new assets.

There are clearly many possibilities and it would be useful to explore these in coming to a decision on whether and if so, how, to best effect asset revaluations. Effort on this, considering its significance, will be valuable.

The administrative process for changing asset values is straight-forward: the National Electricity Rules in respect of the roll-forward of asset values will need to be changed to effect whatever revaluation approach is sought. However, substantial engagement with the owners of the distributors with the highest likelihood of stranding and hence greatest justification for revaluation, would be essential in the process of considering a rule change application.

Appendix A: Stranded asset estimation

This report has pointed to evidence of stranded assets amongst the government-owned network service providers. This Appendix explains an indicative calculation of the quantum of stranded assets, based on various assumptions.

Specifically, we have calculated how different the capital expenditure, depreciation, asset indexation and hence closing asset bases would have been, if the distribution network service providers in New South Wales, Queensland and Tasmania had, on average, incurred capital expenditure at the same rate, per connection, as the average of the distributors in Victoria and South Australia. [7]

Using this assumption we calculate that $10.3bn, $10.4bn and $0.5bn less capital would have been incurred in New South Wales, Queensland and Tasmania respectively over the 13 years to 30 June 2013 in New South Wales and Queensland and the 7 years to 30 June 2013 in Tasmania. This is a total of $21.2bn less capital expenditure.

We estimate that this will have meant that charges for asset depreciation less asset indexation and disposals over the period to 30 June 2013 would have been $6.5bn lower, and hence the regulatory asset values in New South Wales, Queensland and Tasmania would be $14.7bn lower than they actually were at this date.

These calculation are obviously dependent on the assumptions and some might criticise the assumption that spending per connection in Queensland, New South Wales and Tasmania could match that in Victoria and South Australia. Of course it would be possible to develop a far more sophisticated calculation of the extent of excessive expenditure for each distributor, individually and perhaps how this might vary from one point in time to the next. However, we defend the underlying reasonableness of our assumption: relative to SA and VIC there is no evidence of historic underspending excessive asset utilisation, systematic differences in quality of supply or systematic

[7] The average rate in Victoria and South Australia was calculated over the period 1 January 2000 to 31 December 2013, and 1 July 1999 to 30 June 2013 respectively.

differences in operating environments in NSW, QLD or TAS, that undermines the reasonableness of our approach.

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