



The contribution of monopoly network service providers to electricity price rises in the National Electricity Market

Bruce Mountain

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Bruce Mountain, Director, Carbon Market Economics (CME) examines the outcomes, reasons and possible solutions to the price rises in the National Electricity Market.

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Bruce Mountain is an energy economist. He has spent much of his career at the metaphorical “coal face” of network utility economic regulation in Australia and previously in Britain and South Africa. He also has broader interests in energy policy with specialisation in the design of energy markets. Bruce is qualified in electrical engineering and accountancy.

Executive summary

This paper examines the contribution of monopoly electricity network service providers (NSPs) to electricity price rises in the National Electricity Market (NEM). It describes the outcomes that have been delivered. It then focuses on explaining why government owned NSPs have increased their capital expenditures as much as they have. Finally it suggests ways that prices may be reduced and the efficiency of the industry improved.

Outcomes

Until recently, electricity prices in Australia ranked near the middle of electricity prices in member countries of the Organisation for Economic Development and Cooperation (OECD).¹ However, since 2007 electricity prices have risen between 70 per cent and more than 100 per cent in different parts of the NEM. Average household electricity prices in the NEM, even at Purchasing Power Parity rates of exchange, are now among the highest in the world.² Although publicly available price indices for commercial and industrial users are not available to prove it, the outcome for industrial and commercial energy users is likely to be no better.

While electricity prices (and the industry’s expenditure) have risen steeply, the industry’s output has risen only slightly. As a result there have been significant declines in the productivity of the electricity industry in absolute terms and even more so relative to productivity improvements in the wider Australian economy.^{3,4}

From the mid-1990s, the electricity industry was radically restructured from what were previously vertically integrated state government owned electricity commissions. The reform was motivated by evidence that the industry was inefficient, and that through privatisation and the introduction of competition wherever possible, costs would reduce and services improve.

Outcomes in the competitive generation market in the NEM since this reform was implemented seem broadly positive. Risks associated with the development and operation of generators now rest with competing, often privately-owned producers, rather than consumers. Services have been reliable and average production prices are lower than when the reforms were adopted.⁵

In the reform program, it was recognised that much of the natural monopoly NSP activities would still need to be regulated, and it was decided to implement regulatory designs that applied explicit efficiency incentives. The chosen approach largely copied the form of regulation that had been implemented for privatised networks in Britain, and which had already demonstrated some success in raising efficiency.

Outcomes delivered by the privatised NSPs in Victoria, while they were subject to regulation by the Essential Services Commission of Victoria, were encouraging with high levels of reliability and declining costs and prices.⁶

“Outcomes delivered by the privatised network service providers in Victoria, while they were subject to regulation by the Essential Services Commission of Victoria, were encouraging with high levels of reliability and declining costs and prices. Government owned service providers have not had the same success.”

Government owned service providers have not had the same success. Their capital expenditures have grown considerably while demand for their services has not. A large gap has grown in the size of the regulated asset base, so that by 2013 state-government owned NSPs will be employing almost three times as much capital, per connection, to provide distribution services as are their privately owned peers.⁷

By international standards, the level of capital expenditure by government owned NSPs in the NEM is remarkable. The capital expenditure (capex) allowed by the Australian Energy Regulator (AER) to government owned distributors in NSW (in the current regulatory period) is around six times higher (per connection) than the average capex per connection in Great Britain.⁸ In 2011 the total transmission and distribution capex that the AER allowed NSPs to recover through regulated charges, per MWh delivered, is more than seven times higher in the NEM than in the United States of America.⁹

The networks that distribute electricity in the NEM are reasonably long, per connection. This is often cited as a reason for higher costs (and higher expenditure) on networks in Australia than in other countries. However, a significant part of the NEM network (22 per cent by length at the end of 2010) is inexpensive single wire earth return, serving a few distant rural users. This adds to the network length but makes little difference to the total cost. By comparison this inexpensive technology is not common in countries with more compact networks.

In addition, the proportion of the network in the NEM that is more expensive (underground cables rather than overhead lines) is just 14 per cent – compared to around 60 per cent in Great Britain. In considering the expenditure on the development and maintenance of a network, the use of underground cables, rather than overhead lines, is likely to be a more significant factor than the length of the network.

Furthermore, between 2004 and 2011 (during which the aggregate regulated asset base [RAB] of NSPs in the NEM has expanded by 91 per cent), the total length of the NEM network increased by just three per cent. Most of this increase has been in reticulation voltage cables, which are likely to have been funded mostly by newly connecting customers (and hence are not recovered through regulated charges).

In regards to demand, differences in demand growth do not explain differences in capital expenditure between government and private distributors. Demand has grown more strongly in Victoria and SA (where the networks are privately owned), yet capital expenditure to meet that demand growth in those states has been significantly lower than in NSW, Queensland and Tasmania.

There is also a big disparity in the level of capital expenditure between government and private service providers on the replacement of ageing assets. This is not explained by differences in asset age – the assets of the privately-owned service providers are generally older than those of the government owned service provider.¹⁰

While government owned service providers in NSW and Queensland have been required to invest to meet higher reliability standards, there is no evidence that there was a systematic problem with network reliability to justify this expenditure, or that consumers were willing to pay the resulting higher prices, or indeed that the additional expenditure has had any measurable impact on the reliability of supply.

“In regards to demand, differences in demand growth do not explain differences in capital expenditure between government and private distributors. Demand has grown more strongly in Victoria and SA (where the networks are privately owned), yet capital expenditure to meet that demand growth in those states has been significantly lower than in NSW, Queensland and Tasmania.”

Reasons

This paper suggests that the main reasons for higher capex do not lie with external factors but rather can be attributed to state ownership, and the adoption of a form of regulation that has failed to provide incentives for government owned service providers to reduce expenditure.

State governments that own their NSPs have obtained extra-ordinary income from the provision of network services. This is attributable to their receipt of their service providers' profits as well as the income tax on those profits (where they own the NSPs) and what are euphemistically called “competitive neutrality” fees that are levied on the debt provided to the NSPs by their government owners.

In 2010 for example, the NSW Government received \$596m in income tax equivalents and competitive neutrality fees from its distribution and transmission service providers and retailers. By comparison, dividends of \$575m were paid in that year from these utilities.^{11,12}

NSPs have been able to deliver higher financial rewards to their government owners, by expanding the regulated assets from which these proceeds are funded.^{13,14} Government owned NSPs have delivered the unusual combination of higher profits through higher capital expenditures. This is the phenomenon known colloquially as “gold plating”.

The disproportionate rewards that governments have derived, as a result of the form of regulation that has been adopted, is an important reason for the increase in capital expenditure and hence prices. The problem, in other words, is the combination of flaws in regulatory design and conduct, and government ownership, not either alone.

Solutions

In designing a regulatory framework, government has to balance (among many other things) the interests of customers and investors. A government that is also an investor, as the owner of a regulated company, and as the recipient of its tax revenues, has an additional financial interest in the profitability of that company. Divestment by governments of their NSPs will resolve the distortion that arises from their financial interest.

In addition, privately owned companies can be expected to be more interested in maximising profit, and therefore more responsive to regulatory incentives that reward reductions in operating expense (opex) and capex. Divestment to private owners therefore offers the prospect of greater expenditure reductions (and concomitant price reductions) in response to regulatory incentives to improve efficiency.

Divestment has been politically problematic for many state governments. If state governments decide to continue to own their network service providers, improvements are possible by ensuring that the form of regulation takes account of government ownership.

This means that in setting the allowed rates of return for state government owned service providers, their receipt of income taxes and “competitive neutrality” fees, in addition to their claim on attributable profits, must be recognised. This will reduce electricity prices while ensuring the government owned service providers continue to deliver a reasonable, rather than extra-ordinary, return on capital.

The continued application of five year price or revenue controls to government-owned service providers should also be reconsidered. Errors in major parameters – such as demand forecasts and the cost of capital have been locked-in for five years as a result of this form of regulation. This has resulted in excessive over-investment, particularly by government owned network service providers, and consequential windfall profits for governments, at the expense of higher prices for energy users. Price/revenue controls for shorter periods will solve this.

The application of benchmarks will also help. Prices, expenditures, asset values, service outcomes and rates of return should be benchmarked. This information should be used to ensure that inefficient service providers are required to improve their efficiency in order to achieve comparable financial returns to those of their more efficient peers. The benchmarking should also include international comparisons in countries with comparable reliability standards.

Institutional arrangements also merit review. Candid consideration of the political economy of economic regulation by a federal agency, of the income and profits of state government owned service providers is needed. State (and territory) governments have constitutional rights to the provision of energy and to the profits and taxes from this. If they wish to continue to profit from the provision of network services, wouldn't it be better for the accountability for this to rest with the state (and territory) governments, rather than a federal regulatory authority?

In addition, the case for politically-independent regulation of government owned service providers, even by state authorities rather than federal authorities, merits careful re-evaluation.

Finally, there is an argument for the role of consumers in regulatory decision making to be considerably strengthened, irrespective of divestment decisions or other changes to the regulatory regime that policy makers might decide. Empowering consumers is an important part of an enduring solution. This means ensuring that consumers can effectively participate in wholesale electricity markets. Effective involvement of consumers in the regulation of networks can also promote better understanding that more accurately reflects the views of the parties and allows more creative solutions than regulatory commissions are capable of delivering.

1 Introduction

Until recently, electricity prices in Australia ranked near the middle of electricity prices in member countries of the Organisation for Economic Development and Cooperation.¹⁵ However, since 2007 electricity prices have risen between 70 per cent and more than 100 per cent in different parts of the NEM. Average household electricity prices in the NEM, even at Purchasing Power Parity rates of exchange, are now among the highest in the world.¹⁶ The outcomes for industrial and commercial energy users are likely to be no better, although data to prove this is not available.

These outcomes have now become the focus of attention by policy makers, regulators, the industry and consumers. Many reviews and inquiries are focussing on various aspects of the problem and how to resolve them.

This paper contributes information, analysis and ideas. It draws on the author's previous published research and also several research reports commissioned over the last three years by the Energy Users Association of Australia.

The second section of this submission describes the price outcomes that have been delivered in the NEM, and then the revenues and assets of its 18 regulated electricity NSPs. The third section seeks to explain those outcomes. It examines commonly cited explanations and then explores the impact that ownership arrangements and regulation has had. The last section sets out possible solutions. It suggests changes in ownership, regulation and consumer empowerment.

2 Outcomes

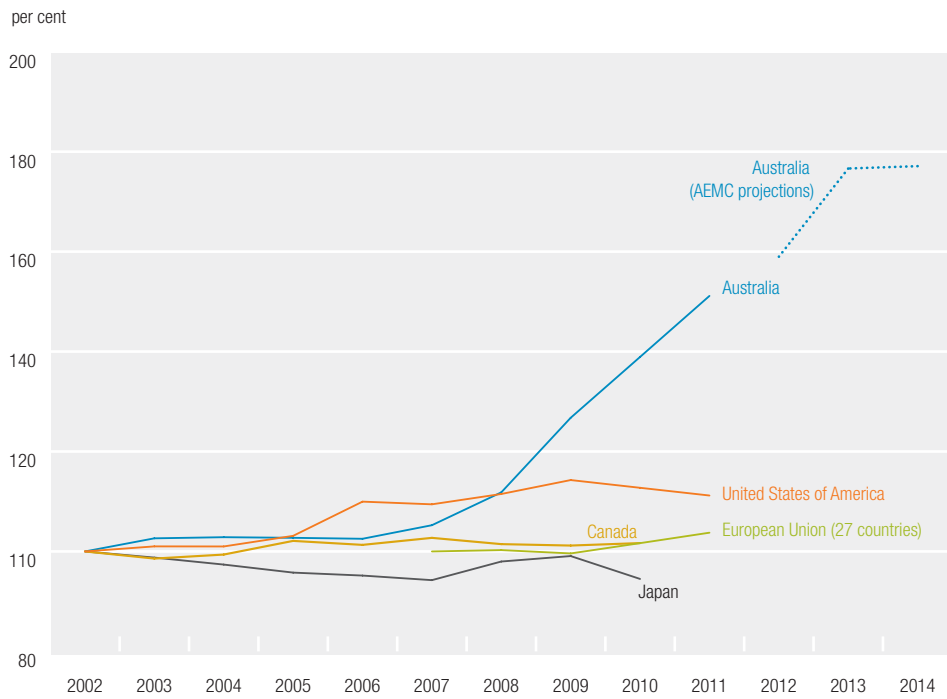
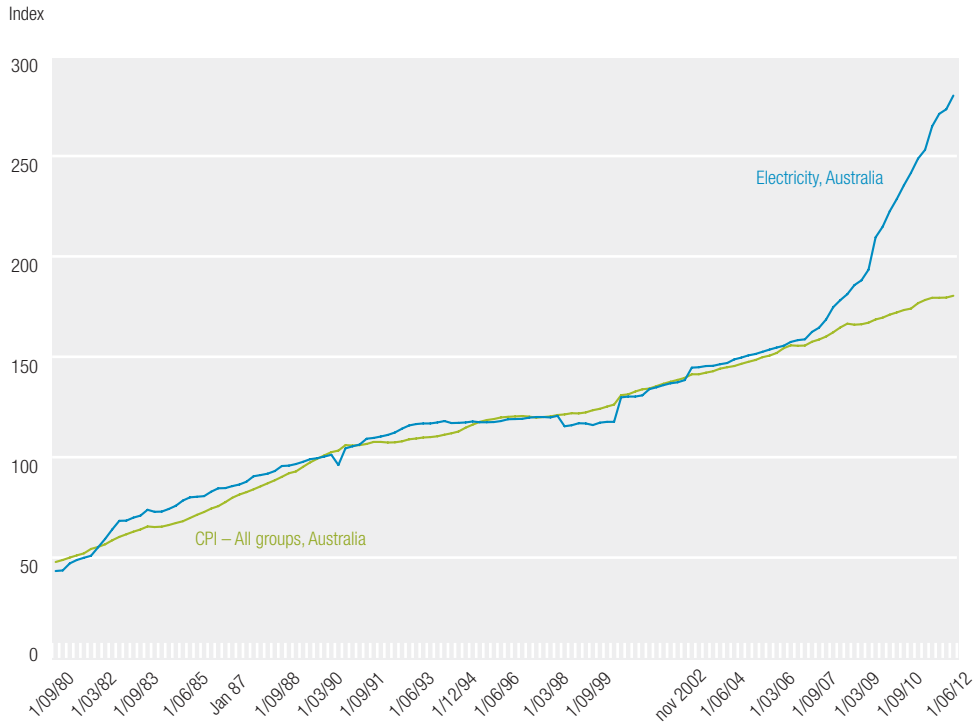
This section examines price outcomes and then the revenues and regulated assets of distribution and transmission NSPs in the NEM.

2.1 Prices

The top chart in Figure 1 shows the Australian Bureau of Statistics' (ABS) index of household electricity prices and the Consumer Price Index (CPI) from September 1980 (when the data series starts) to July 2012. It shows that on average electricity prices have increased at a rate close to CPI until 2008, at which point a clear gap emerges between household electricity prices and CPI.

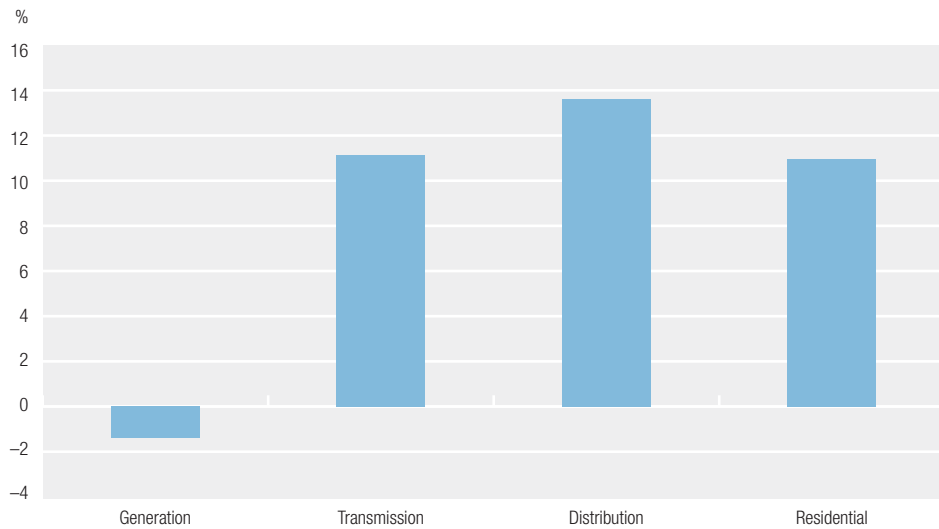
The bottom chart in Figure 1 shows that the increases in household electricity price in Australia since 2007 are not evident in the US, EU, Canada and Japan.¹⁷

FIGURE 1
ELECTRICITY AND CPI PRICE INDICES FROM SEPTEMBER 1980 TO JUNE 2012 (TOP)
AND HOUSEHOLD ELECTRICITY PRICE INDEX FROM 2002 TO 2014 (BOTTOM)¹⁸



Sources: CME analysis of ABS data (left), Mountain, B. R. (2012a). Electricity prices in Australia: An International Comparison. A report commissioned by the Energy Users Association of Australia (bottom).

FIGURE 2
AVERAGE ANNUAL PRICE TREND IN GENERATION¹⁹, TRANSMISSION, DISTRIBUTION AND RESIDENTIAL ELECTRICITY PRICES (PER CENT PER YEAR) FROM 2005 TO 2011.



Source: Author's analysis of market data from NEM ReviewTM and data contained in databases from AER regulatory decisions. ^{20,21}

Figure 2 examines the contribution of generation, transmission and distribution to the price rises that have been experienced by end users over the period from 2005 to 2011.

The chart shows the annual trend rate of change in generation, transmission and distribution prices, and also of residential electricity prices. It shows that generation prices (in the mandatory spot market) have shown a trend rate of decline of around one per cent, while transmission and distribution prices increased at annualised rates of around 11 per cent and 13 per cent respectively. The weighted average net impact on household consumers has been annualised increases of around 11 per cent since 2005. Declining generation prices have had a limited effect in off-setting rising transmission and distribution prices.

The analysis in Figure 2 shows the trend of prices in the main points in the value chain (generation, transmission and distribution). However, the prices paid by end users are determined by energy retailers, although subject to price caps (for standing contracts) in most regions in the NEM. The ABS's Consumer Price Index for capital cities in each region in the NEM seems to indicate that household electricity prices have risen by similar amounts in all regions of the NEM, despite the fact that underlying costs (particularly distribution and transmission costs) have not risen by the same rate. This seems to suggest higher retail margins in Victoria in particular (particularly for household energy users). We draw attention to this, but since this paper is focussed on NSPs we do not explore it further in this paper.

2.2 Revenues of network service providers

In 2011, Australian transmission and distribution service providers collected revenues of around \$2.4b and \$8.2b respectively, compared to spot market revenue collected by generators of \$6b.

The Australian Energy Regulator (AER) determines the revenues of NSPs. The AER (and before it the Australian Competition and Consumer Commission) has regulatory jurisdiction over transmission service providers since 1999, and over distribution service providers since 2006.

The economic regulation of NSPs takes the form of five year controls of the maximum allowed weighted average price (for most distributors) or revenues (for transmission service providers and one distributor). The prices/revenues are determined as the sum of allowances for operating expenditure, depreciation of the regulated assets and a return on the regulated assets. By fixing revenues/prices for five years, there is an incentive for NSPs to reduce expenditure since they are able to retain a proportion of the cost reduction until the end of the regulatory control period.

Figure 3 charts the regulated revenue of transmission service providers normalised by megawatt-hours (MWh) transmitted (top), and the regulated revenue of distribution service providers normalised by the number of user connections to the distribution system (bottom).

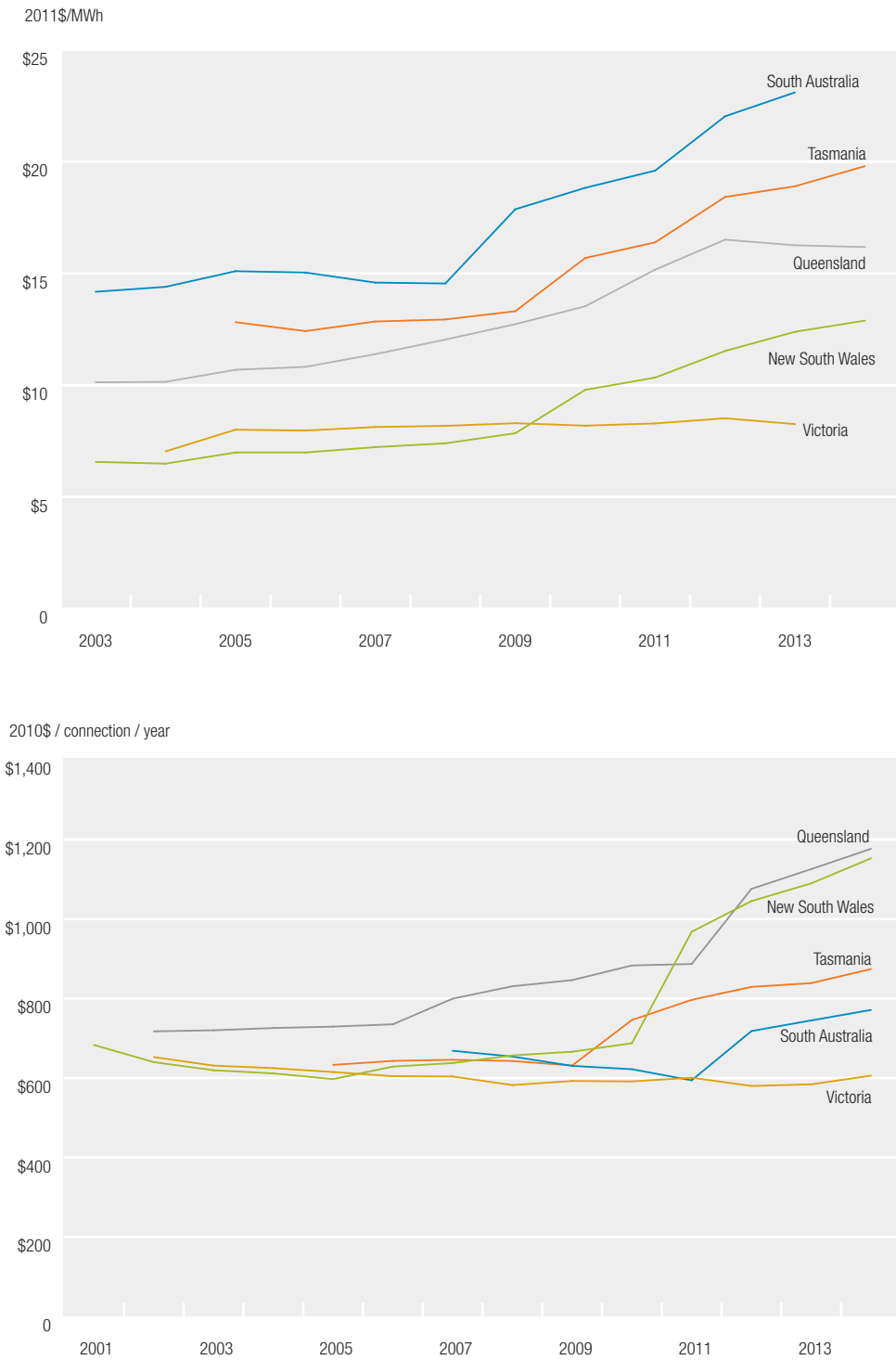
The charts show that only in Victoria, both transmission and distribution revenues have been stable. The regulated revenues of both transmission and distribution service providers have increased significantly in Queensland, New South Wales and Tasmania. In South Australia, the regulated revenues of its transmission service provider (per MWh) have increased significantly, while in distribution the increases have been less significant.

2.3 Assets of network service providers

In the six years from 2008 to 2013, NSPs will recover regulated revenues of around \$61 billion of which \$18 billion (30 per cent) remunerates operating expenditure and the remaining \$43 billion (70 per cent) cover charges for the depreciation of assets and a return on assets.

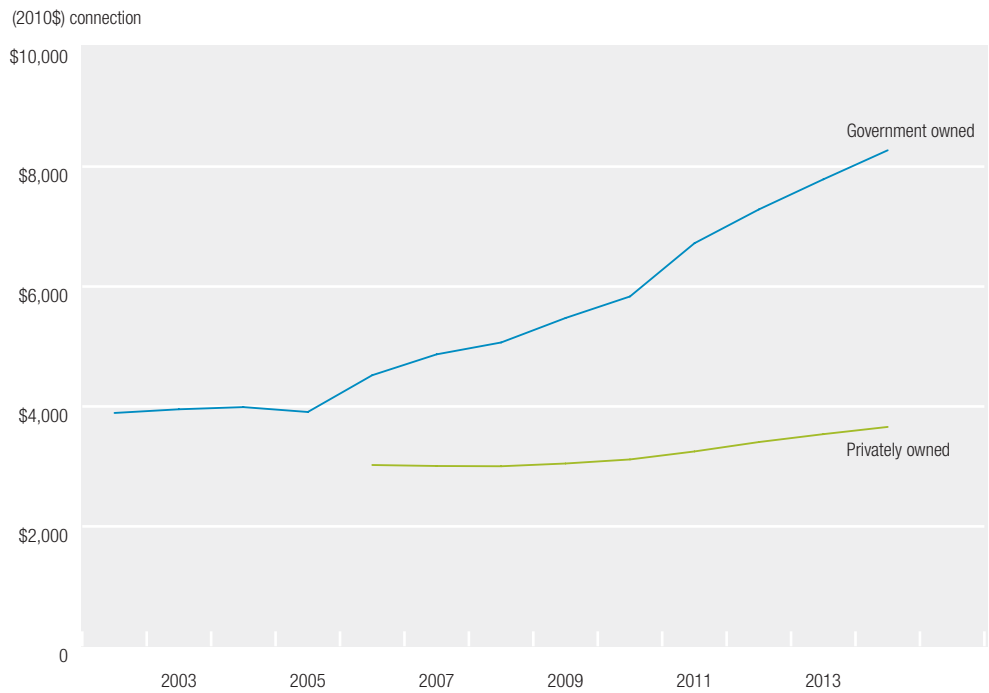
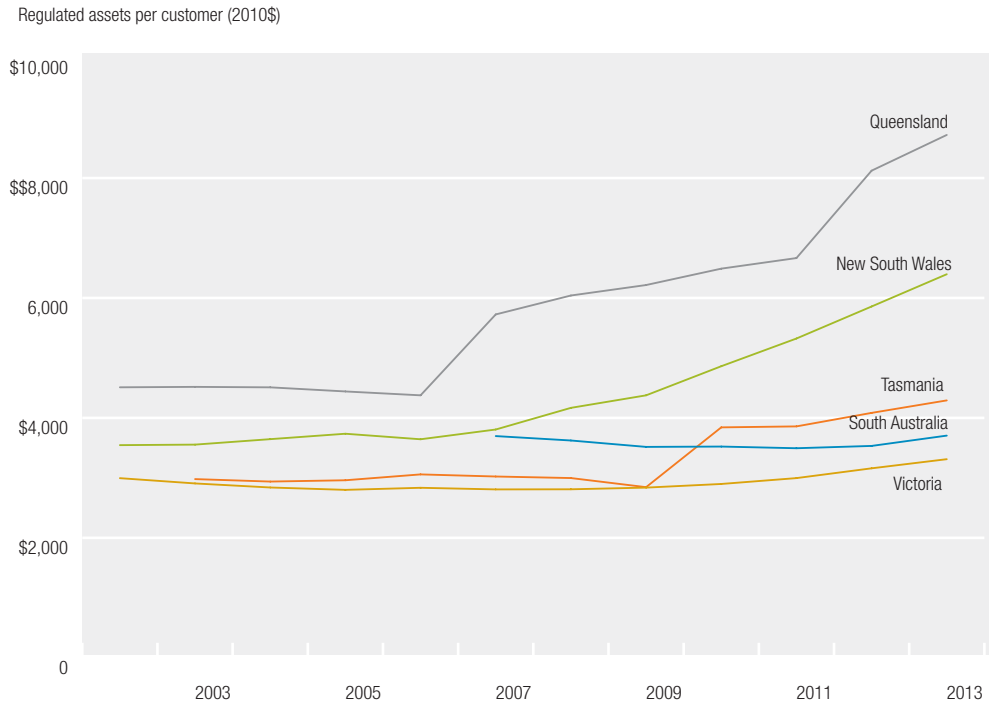
While operating expenditures of NSPs have been relatively stable, charges for depreciation and returns have risen sharply. These charges are related to the size of the regulated asset base (RAB), and so attention turns to this in this subsection.

FIGURE 3
REGULATED REVENUE OF TRANSMISSION SERVICE PROVIDERS PER MWH TRANSMITTED (2011\$/MWH) (TOP) AND DISTRIBUTION SERVICE PROVIDERS PER CONNECTION (2010\$/CONNECTION) (BOTTOM)



Sources: Source: Mountain, B. R. (2012a). Electricity prices in Australia: An International Comparison. A report commissioned by the Energy Users Association of Australia (top) and Mountain, B. R. (2011). Australia's rising electricity prices and declining productivity: the contribution of its electricity distributors. A report commissioned by the Energy Users Association of Australia (bottom).

FIGURE 4
REGULATED ASSET BASE OF DISTRIBUTION SERVICE PROVIDERS PER CONNECTION, AND BY OWNERSHIP (2010\$/CONNECTION) (TOP) AND REGULATED ASSET BASE OF DISTRIBUTION SERVICE PROVIDERS BY OWNERSHIP (2010\$/CONNECTION) (BOTTOM)



Source: Mountain, B. R. (2011). Australia's rising electricity prices and declining productivity: the contribution of its electricity distributors. A report commissioned by the Energy Users Association of Australia.

The RABs of most transmission and distribution service providers have been expanding rapidly. Over the period from 2008 to 2013, transmission and distribution service providers are expected to add around \$9 billion and \$30 billion to their RABs respectively, through new capitalised expenditure. This far exceeds the rate at which the existing assets are being depreciated and as a result the RAB in most cases is expanding rapidly. This is shown in Figure 4 for distribution service providers.

The top chart compares the increase in the RAB for distributors in the five regions of the NEM. It shows that for Victoria and SA, the size of the RAB has been stable, while in NSW and Queensland and to a lesser extent Tasmania, the RAB has expanded significantly.

The bottom chart distinguishes between government owned NSPs and their privately owned peers. It is clear from this that over the period from 2006 to 2013, a large gap has grown in the size of the RAB per connection, so that by 2013 state government owned NSPs will be employing almost three times as much capital, per connection, to provide distribution services as are their privately owned peers.

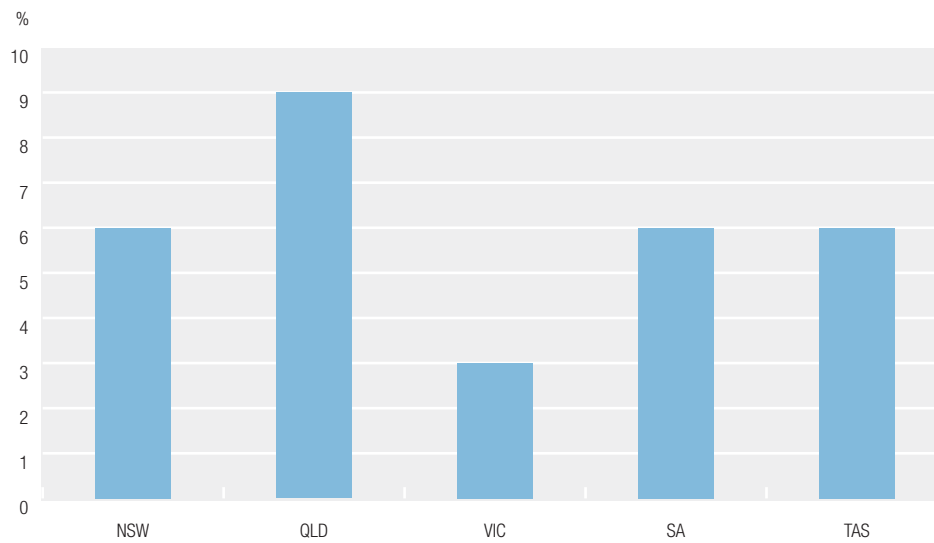
A similar picture on the expansion of the RAB emerges for transmission service providers as for distribution service providers. The top chart in Figure 5 is the compound annual growth rate (in 2011\$) from 2005 to 2013 of transmission service provider RABs.²² Over this period, the RAB grew around four times as quickly in Queensland as in Victoria, and the remaining transmission service providers had comparable rates of growth, roughly three times the rate in Victoria.

The bottom chart in Figure 5 is the trend change in the RAB from 2005 to 2011, divided by the trend change in the actual peak demand. It shows that the differences between Victoria and the other states are even greater when normalising the growth in the RAB for the growth in peak demand.²³

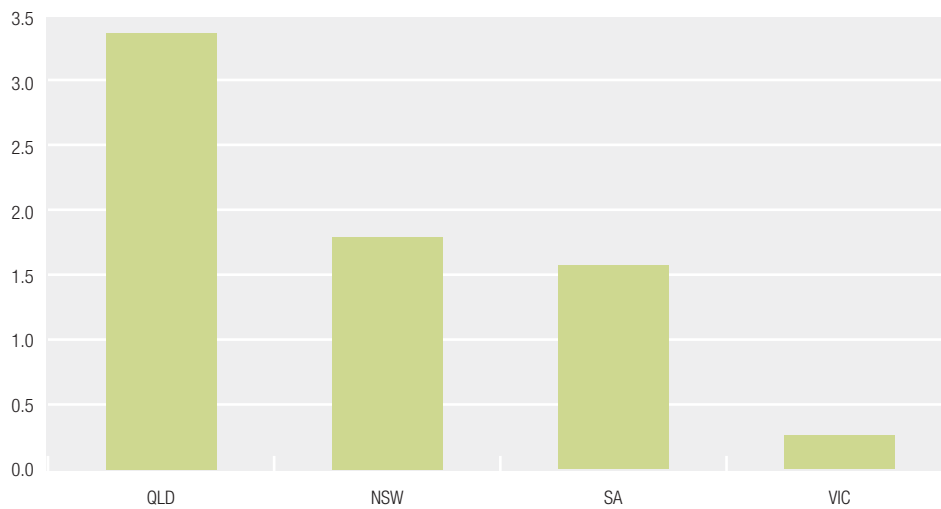
The differentiation of outcomes by ownership of transmission service provider is a little more complicated than for distribution service providers. The Victorian transmission service provider is privately owned, the SA service provider is a proprietary limited company although its largest shareholder²⁴ is the Queensland transmission service provider, and the Tasmanian, Queensland and NSW service providers are government owned.

By international standards, the level of capital expenditure by government owned NSPs in the NEM is remarkable. The allowed capex by the government owned distributors in NSW in the current regulatory period is around six times higher (per connection) than the average capex per connection in Great Britain.²⁵ In comparison to North America, in 2011 the total allowed capex on transmission and distribution per MWh produced, is more than seven times higher in the NEM.²⁶

FIGURE 5
COMPOUND ANNUAL GROWTH RATE OF THE REGULATED ASSET BASE OF TRANSMISSION SERVICE PROVIDERS FOR THE PERIOD 2005 TO 2013 (2011\$) (TOP) AND TREND GROWTH IN RAB COMPARED TO TREND GROWTH IN PEAK DEMAND FROM 2005 TO 2011 (BOTTOM)



Trend change in RAB divided by trend change in peak demand (2011\$/MW)



Source: Mountain, B. R. (2012). A comparison of outcomes delivered by electricity transmission network service providers in the National Electricity Market. A report commissioned by the Energy Users Association of Australia

3 Possible reasons

The last section showed that the growth in the regulated assets of NSPs and the consequential increase in the charges for depreciation and the regulated return on assets has been the main cause of rising electricity prices. NSPs have said that demand growth, asset ageing and higher reliability standards explain rising expenditure and hence higher prices. This section reviews these explanations and then examines the role of ownership and regulation.

3.1 Customer density, demand growth, asset ageing, reliability standards and technology change

Customer density

The networks that distribute electricity in the NEM are reasonably long, per connection. This is often cited as a reason for higher costs (and higher expenditure) on networks in Australia than in other countries. However, a significant part of the NEM network (22 per cent by length at the end of 2010) is inexpensive single wire earth return, serving a few distant rural users. This adds to the network length but makes little difference to the total cost. By comparison this inexpensive technology is not common in countries with more compact networks.

In addition the proportion of the network in the NEM that is more expensive underground cables (rather than overhead lines) is just 14 per cent – compared to around 60 per cent in Great Britain. In considering the expenditure on the development and maintenance of a network, the use of cables rather than overhead lines is likely to be a more significant factor than the length of the network.

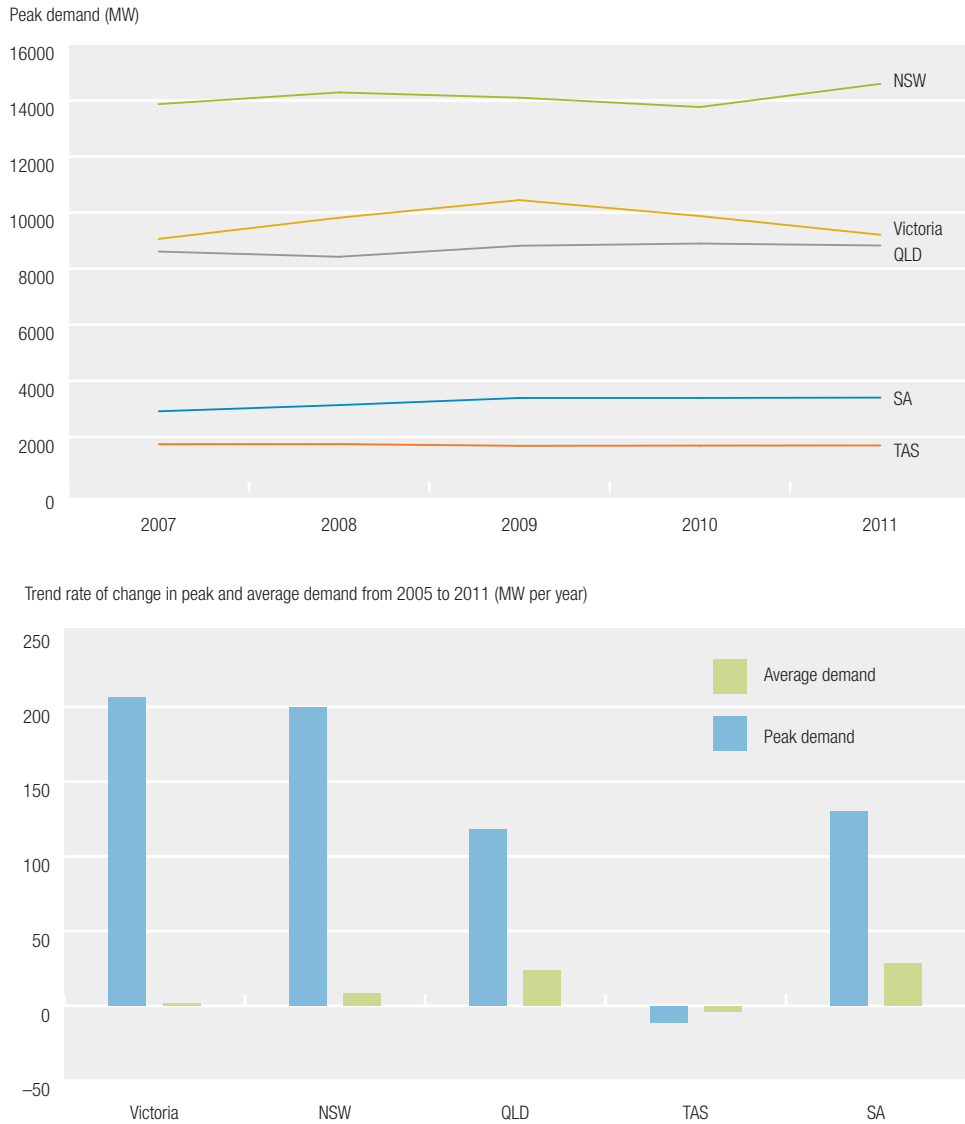
Furthermore, between 2004 and 2011 (during which the aggregate RAB of NSPs in the NEM has expanded by 91 per cent) the total length of the NEM network increased by just three per cent. Most of this increase has been in reticulation voltage cables which are likely to have been funded mostly by newly connecting customers (and hence are not recovered through regulated charges).

Demand growth

In debates on rising NSP expenditure, there is frequently allusion to rising peak demands through, for example, greater uptake of air-conditioners. However, the actual peak demand data from 2005 to 2011 suggests that rising peak demand is less significant than commonly thought.

The bottom chart in Figure 6 shows the annualised trend rate of growth in peak demand (the blue bars) and average demand (the green bars). The label above the bars is the trend rate of growth of peak demand stated as a percentage of

FIGURE 6
PEAK DEMAND MEGAWATT (MW) BY NEM REGION (TOP); TREND RATE OF GROWTH IN PEAK DEMAND AND AVERAGE DEMAND (MW) (BOTTOM)



Source: Author's analysis based on half-hourly demand data from NEM-Review™

actual 2011 peak demand. The chart shows that the trend rate of growth in peak demand has been the highest in Victoria (in absolute terms). As a percentage of 2011 peak demand, the trend rate of growth in demand has been the highest in SA.

Those states where the RAB has grown the most rapidly (Queensland, NSW and Tasmania) have also had the slowest trend rate of growth of peak demand as a percentage of their 2011 peak demands. In absolute terms the trend rate of growth in demand in NSW has been lower than in Victoria. In Tasmania, the RAB has grown significantly while peak demand (and average demand) is declining.

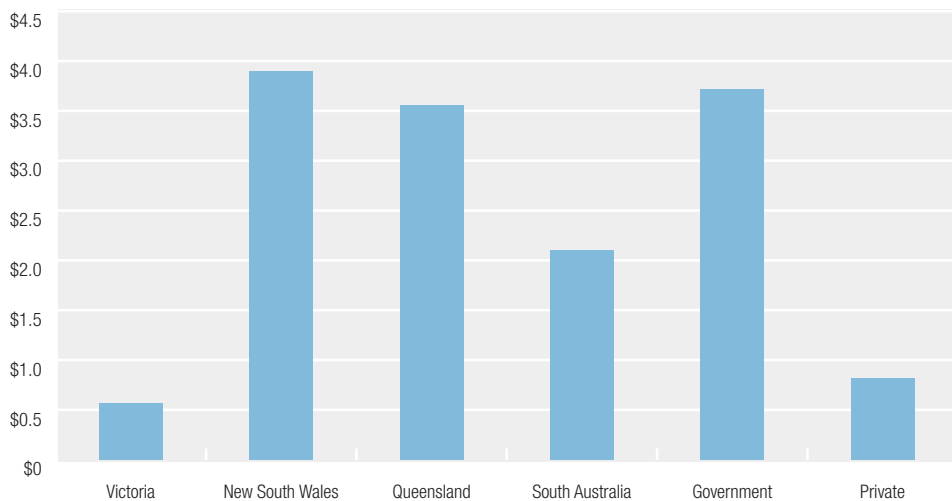
The analysis so far has focussed on the RAB compared to demand growth. However, only some of the capitalised expenditure by network services providers – typically around a third – is related to the augmentation of the network to meet

demand growth. Comparing demand-related expenditure to the growth in peak demand of the different distribution service providers, presented below, is a more precise analysis.

The top chart in Figure 7 shows the average annual growth-related capex of distribution service providers in the various NEM regions for the regulatory control period under way (based on the distributors' proposals to the AER) per MW of additional demand (assuming the trend rate growth of demand). The chart shows Victorian distributors spending substantially less per MW of additional demand than distributors in NSW and Queensland.²⁷

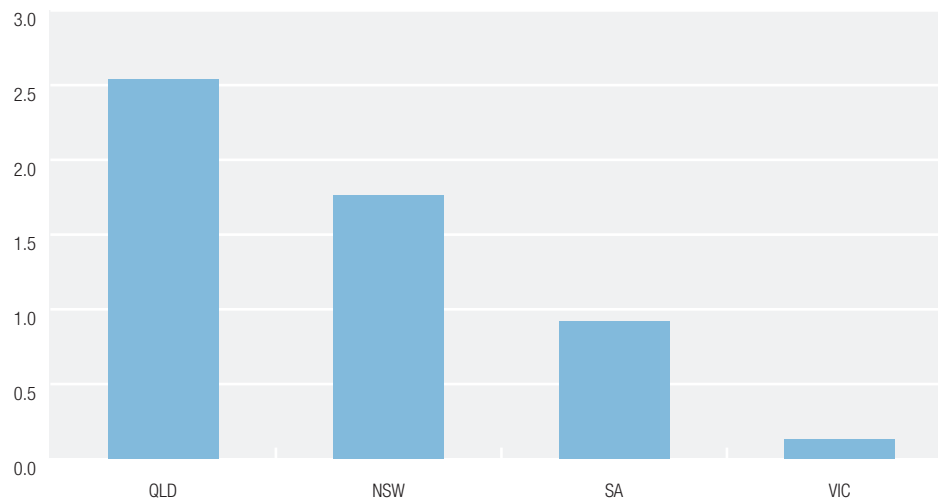
FIGURE 7
AVERAGE ANNUAL GROWTH-RELATED CAPEX PER MW OF ADDITIONAL DEMAND FOR DISTRIBUTION SERVICE PROVIDERS (TOP); AVERAGE ANNUAL GROWTH-RELATED CAPEX DIVIDED BY TREND GROWTH OF PEAK DEMAND FOR TRANSMISSION SERVICE PROVIDERS (BOTTOM).

Average annual growth capex divided by average annual demand growth (\$million/MW)



Source: Mountain, B. R. (2011). Australia's rising electricity prices and declining productivity: the contribution of its electricity distributors. A report commissioned by the Energy Users Association of Australia.

Average annual load driven capex divided by average annual demand growth (2011\$million per MW)



Mountain, B.R. (2012). A comparison of outcomes delivered by electricity transmission network service providers in the National Electricity Market. A report commissioned by the Energy Users Association of Australia.

The bottom chart in Figure 7 is the average annual growth-related capex of transmission service providers over the period from 2005 to 2011 divided by the average demand growth over this period. As for the Victorian distributors, the Victorian transmission NSP (Victorian Energy Networks Corporation and then Australian Energy Market Operator) has incurred much lower capex to meet demand growth than the transmission service providers in NSW and Queensland.

The results in these charts suggests that growth in peak demand does not adequately explain higher demand-driven capex, because more demand-driven capex has occurred in those states with the lowest growth in peak demand. Instead, the data for both transmission and distribution shows that government owned service providers in NSW, Queensland and Tasmania have incurred significantly more expenditure to meet rising demand, than the non-profit service provider in Victoria, and privately-owned service provider in SA.

Higher demand-driven expenditure by government owned service providers – in view of their lower demand growth – might be explained by some combination of relative inefficiency of expenditure (spending more to achieve the same outputs) and over-optimistic forecasting of future demand (and hence over-estimating investment requirements). There has been systematic and long-standing over-estimation of peak demand growth by network service providers.²⁸ However, the data suggests that NSPs in NSW, Queensland and Tasmania have significantly over-estimated future demand growth, while this does not appear to have been the case in Victoria.²⁹

Ageing assets

The privately owned distribution service providers in Victoria and SA had assets with a (weighted average) remaining life that was shorter than the government-owned distributors in NSW and Queensland.³⁰ Yet the distributors in NSW and Queensland appeared to be spending more than three times as much on asset replacement as distributors in Victoria and SA. Consultants for the Energy Networks Association (ENA) said that this analysis was simplistic and that asset replacement expenditure was affected not just by the age of assets.³¹

This is indeed the case, and the analysis in Mountain 2011³² showed this. However, simply observing that asset replacement expenditure is affected by factors other than age, is no explanation for why asset replacement expenditure (which the NSPs have anyway generally attributed to ageing assets) has consistently been so much higher for government owned NSPs, than privately owned ones.

As with demand-related capex, the issue seems to be differences in the relative efficiency with which NSPs have responded to the need to replace and maintain assets as they age or become redundant.

Historic underinvestment

Network service providers, and at times governments and regulators, have suggested that much of the higher expenditure currently (and in recent years) is attributed to historic investment. This contention merits more precise specification. The contention cannot be that there has been systematic (i.e. NEM-wide) under-investment in the past, because NSP expenditure in VIC and SA has been so much lower than in Queensland, Tasmania and NSW. Therefore the suggestion that historic underinvestment explains higher spending recently, must be a contention that there has been historic underinvestment in NSW, Queensland and Tasmania (and historic over-investment in SA and Victoria).

The available research does not support this contention. 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.³³ In Queensland the assessment in 2004 suggested that under-investment explained poor service outcomes by Queensland distributors.³⁴ But the service outcome for Queensland's biggest distributor (Energex) that serves three-quarters of Queensland's users was above the Australian average. For the other distributor, it is not clear that the problem was historic underinvestment rather than co-ordination and planning deficiencies following apparently poorly executed mergers in the previous five years.³⁵

Indeed, a commonly attributed justification for the reforms of the electricity industry in the 1990s that resulted in the corporatisation and privatisation of network service providers, was that the electricity commissions had spent too much, not too little and that corporatisation would introduce the governance and managerial disciplines associated with private companies, in reducing expenditure and improving efficiency.

Network planning standards

Network planning standards were made more stringent in NSW and Queensland from around 2005. This is another commonly cited explanation for rising expenditure. However, it is difficult to be certain about how much of the higher expenditure is attributable to more stringent planning standards. Even apparently clearly stated standards can be interpreted and applied differently, and NSPs can be expected to achieve those standards with varying levels of expenditure.

Most importantly, there is no evidence that in setting the more stringent standards, there was any meaningful attempt to assess end-user preferences, and whether they were willing to pay more. Neither does there seem to have been evidence of any systematic reliability problem that might have justified more stringent standards. The Independent Panel (otherwise known as the Somerville Review) in 2004 said significantly greater expenditure was needed. It revised its conclusions in 2011 suggesting that less was needed than it had first thought. However, it did persist in its belief that demand growth in Queensland would remain the strongest of any region in the NEM.³⁶ This is despite the fact that the trend growth of peak demand in Queensland from 2005 to 2011 (when the report was released) was in fact weaker than any NEM region except Tasmania (see Figure 6).

Technology change

Topp and Kulys (staff researchers at the Productivity Commission) compared changes in the multifactor productivity of the electricity industry with changes in the share of new lines that are (more expensive) underground cables compared to (less expensive) overhead lines. They note a negative correlation between multifactor productivity and the proportionate share of cables, from 1998 to 2010.³⁷ The Energy Networks Association has referred to this research to justify higher expenditure by NSPs in Queensland.³⁸

However, in the NEM in 2011 just four per cent of the transmission and distribution network at 22kV and above was underground cable, compared to 96 per cent which was overhead line. The length of underground cable at 22kV and above actually declined over the period from 2004 to 2011.³⁹ Clearly change in the length of underground cables at these voltages cannot account for higher NSP expenditure since 2004.

Data provided in Electricity Gas Australia, published by the Energy Supply Association of Australia shows that for low voltage reticulation cables at 400 volts or below, the length of underground cable between 2004 and 2011 increased by a little over 16,000 kilometres. However most of this underground cable is likely to have been funded by customers through capital contributions, or paid for by property developers in new residential estates or industrial parks. The expenditure in establishing these new cables will generally not have been incurred by NSPs and hence cannot explain their higher expenditure.

3.2 Ownership and governance

Privately owned companies can be expected to be more interested in maximising profit, and therefore more responsive to regulatory incentives that reward reductions in opex and capex. Indeed, the aim of improved efficiency has been a major reason for privatisation in the UK and elsewhere.⁴⁰

In assessing capital expenditure, companies need to consider the alternative use of their funds. Private companies typically have alternative profitable uses, their opportunity cost of capital is relatively high, and this gives them the incentive to minimise the extent of capital investment in electricity distribution (subject to maintaining adequate quality of service). In contrast, government owned companies may have fewer alternative uses. This is likely to make them more sympathetic to increasing capital expenditure.

“Private companies typically have alternative profitable uses, their opportunity cost of capital is relatively high, and this gives them the incentive to minimise the extent of capital investment in electricity distribution (subject to maintaining adequate quality of service).”

The observation that government owned NSPs have consistently spent more than their privately owned peers, lends weight to the importance of ownership as part of the explanation of rising expenditure and hence rising prices.

However, it should also be noted that government owned electricity NSPs in the NEM have delivered high and rising expenditure and profits. The combination of high and rising profits and high and rising costs is unusual and attributable to regulatory factors, examined below.

3.3 Regulation

In designing a regulatory framework, a government has to balance (among many other things) the interests of customers and investors. A government that is also an investor, as the owner of a regulated company, and as the recipient of its tax revenues, has an additional financial interest in the profitability of that company.⁴¹

In the NEM this additional financial interest is pronounced because the state governments collect income taxes on their NSP profits (but only where they own those NSPs) and also because they collect substantial fees on the debt they provide to the service providers they own.

State governments raise debt at rates that are substantially lower than those of privately owned network service providers. For example, the yield on 10 year bonds issued by the NSW Government is currently around four per cent, and yet the regulatory controls currently in place allow NSPs to charge their customers as if interest rates are more than twice as high.⁴² The state governments extract much of the surplus attributable to the difference between the allowed return on debt and the cost of debt through what are euphemistically called “competitive neutrality” or “debt guarantee” fees. The surplus not collected through these fees is then recovered through profits and dividends funded from those profits.

“State governments raise debt at rates that are substantially lower than those of privately owned network service providers...and yet the regulatory controls currently in place allow network service providers to charge their customers as if interest rates are more than twice as high.”

The combination of profit, the income tax on the profit and the debt guarantee/competitive neutrality fees have provided government owners of NSPs with extraordinary profits. In 2010 for example, the NSW Government received \$596m in income tax equivalents and competitive neutrality fees from its distribution and transmission service providers and retailers. By comparison, dividends of \$575m were paid in that year from these utilities.^{43,44}

This can be expected to have increased the sympathy that government owned NSPs have had towards higher capital expenditure. This is because higher capital expenditure has led to a larger regulated asset base which in turn has delivered higher returns to state governments since the profit, income tax on profits and debt guarantee/competitive neutrality fees on the debt provided to fund the assets has risen as the asset base has expanded. This is the “gold-plating” colloquially referred to in the popular discourse.

The incentive to “gold-plate” can be reduced if the regulatory design distinguishes between government owned NSPs and privately owned network service

providers, in particular by taking account of the fact that governments also receive income tax on the profits, and levy debt guarantee/competitive neutrality fees.

Various arguments have been advanced to suggest that it would be inappropriate to differentiate the regulated rate of return on the basis of ownership.

The first (and main) argument is the theoretical proposition that risks are defined by the investment, not the investor and therefore returns should be determined independent of ownership.⁴⁵ This proposition is widely accepted in company finance for private companies that compete in open markets.

However, the proposition that risks are defined by the investment, not the investor, for government owned regulated monopolies is less convincing. This is because the monopoly's risks are largely defined and controlled by its owner, the government and its regulatory agencies. As such, it is the investor (the state governments) that largely define the risks that such monopolies are exposed to and so the state government's cost of capital does matter in consideration of the appropriate regulated rate of return.

For example, the NSPs in NSW and Queensland have historically overspent the capex allowances in their five yearly regulatory controls. However, the NSPs' customers are bearing the resulting additional cost (as the overspend was included in the regulated asset bases), and the government's financial returns from its NSPs have not been diminished to any meaningful extent as a result of these overspends.

There are other reasons why government owned NSPs face lower risks than privately owned NSPs. For example government owned service providers are not exposed to sovereign risk (and do not require this risk to be compensated in their allowed rate of return).⁴⁶

A second argument in favour of awarding government owned monopolies the same allowed rate of return as privately owned NSPs is the Competition Principles Agreement. The Competition Principles Agreement was established to ensure that government owned companies that compete with privately owned companies do not crowd them out, as a result of preferential access to capital or markets.

But regulated monopolies do not compete with each other. Concerns about crowding out are irrelevant to monopolies. The Commonwealth Government recognises this and only applies the Competition Principles Agreement to government owned businesses that operate in competitive markets. The states that own NSPs, on the other hand, claim that the Competition Principles Agreement applies to their NSPs as well, and that electricity consumers should bear the resulting additional fees. It is their prerogative to decide this, but it is difficult to see how this can be defended as good economic policy or consistent with the intent (or the letter) of the Competition Principles Agreement.

State governments have also suggested that their receipt of income tax does not affect their incentives to expand their regulated assets on the basis that income tax equivalents flow to the government through different channels to the income from dividends, and so don't affect their NSPs' investment incentives. This argument seems difficult to sustain: Why is an income tax dollar any different to a

dividend dollar? The state government is entitled to both as the owner, and if it ceased to be the owner it would be entitled to neither.

These issues have recently been brought before the Australian Energy Market Commission – whose task it is to define rules for the regulation of electricity networks that serve the long term interest of consumers – and the AEMC has agreed with the state governments (and their NSPs) on both of these issues.

Finally, Mountain and Littlechild (2010) identified a number of other features of regulatory design and regulatory conduct that are likely to have undermined NSP efficiency including the onus of proof, inadequate use of benchmarks and the arrangements for the review of the merits of regulatory decisions. These issues are now being considered in a variety of reviews that are currently under way. The next section comments, where relevant, on progress so far.

3.4 Consumer disempowerment

The intent of the current system of regulation, when it was first adopted in Australia in the late 1990s, was to deliver what was referred to at the time as “light-handed” regulation. The idea was that the regulation would create incentives for efficiency and customer focus that arise when customers can choose their suppliers. Emulating these incentives (rather than resorting to prescriptive heavy-handed administrative controls) was intended to encourage monopoly NSPs to deliver services that its customers want, at prices they are willing to pay.

Over time, the system of regulation has moved a long way from this ideal. Economic regulatory processes in the NEM have become bureaucratic, inflexible, drawn-out, politicised, opaque, adversarial and heavily lobbied.

NSP proposals and subsequent regulatory decisions typically run to several thousand pages accompanied by many technical reports. There are then many bi-lateral discussions and information exchanges between the regulator and network service providers, behind closed doors. Regulatory decisions take several years to complete, and then are typically appealed resulting in further protracted and often esoteric debates abstracted from commercial reality. This complexity does not seem to have delivered higher quality decisions, as measured by the objective of serving the long term interest of consumers.

Part of the reason for this outcome can be attributed to the alienation of end users in the regulatory process. Users are entitled to participate in consultations during regulatory reviews, and to make submissions on proposals and draft decisions. But in practice participation in these processes seems to have been ineffective in delivering outcomes that serve the long term interest of consumers. The regulator and the industry it regulates seem to have become focussed on each other, rather than the needs of users.

“...participation in these processes seems to have been ineffective in delivering outcomes that serve the long term interest of consumers. The regulator and the industry it regulates seem to have become focussed on each other, rather than the needs of users.”

This observation of consumer disempowerment pertains not just to regulatory processes, but also to the involvement of energy users in the electricity market. The Parer Review in 2002 and the Electricity Reform Implementation Group in 2006 both suggested action be taken to secure the participation of consumers in responding to electricity markets (otherwise known as “demand-side participation” or “demand response”). Despite many regulatory reviews since then, little has been achieved.

4 Solutions

The previous section pointed to problems attributable to ownership (and consequential conflicting interests where government is the owner), flaws in the design and conduct of regulation, and consumer disempowerment as explanations for the outcomes described in the second section. It follows that the solutions lie in addressing these problems. This section suggests changes that might be considered.

4.1 Divestiture

The case for state governments to divest their ownership of their NSPs rest mainly on two arguments:

- First, divestment resolves the conflicts that arise through the interest governments have in the profits of their network service providers.
- Secondly, privately owned companies can be expected to be more interested in maximising profit, and therefore more responsive to regulatory incentives that reward reductions in opex and capex. Divestiture therefore offers the prospect of greater expenditure reductions (and concomitant price reductions) in response to regulatory incentives to improve efficiency.

“It is debatable whether enduring improvements in the efficiency of government owned NSPs are possible, until governments divest their ownership. Nevertheless improvements are possible through the application of regulations that take account of ownership.”

In view of the very significant price rises by government owned network service providers, it is understandable that there is a great deal of pressure for state governments to divest when the evidence is that privately owned NSPs have required less expenditure (and hence lower prices) to deliver reliable services.

However, it would be a mistake to attribute the significant price (and expenditure) increases only to the consequences of government ownership. As described earlier, it is the disproportionate rewards that government owners have derived as a result of the form of regulation that has been adopted, that is the main reason for the increase in capital expenditure and hence prices. The problem, in other words, is the combination of regulation and ownership, not either alone.

It is debatable whether enduring improvements in the efficiency of government owned NSPs are possible, until governments divest their ownership. Nevertheless improvements are possible through the application of regulations that take account of ownership. This is explored in the following sub-section.

4.2 Regulatory reform

There has been considerable focus on the system of regulation (its rules and its implementation) over the last year. At the time of writing, the AEMC is reviewing proposals from the AER and a group of large energy users to change the National Electricity Rules. The Productivity Commission is reviewing the role of benchmarking in economic regulation and an expert panel is reviewing the arrangements for the review of the AER's regulatory determinations.

The Limited Merits Review Panel has suggested the current review arrangements have failed to meet the central policy objective (the long term interest of consumers). The available material from the Productivity Commission suggests that they incline to the view that benchmarking could play a more prominent role in regulatory decision-making than it has so far.

The AEMC's review of proposed rule changes has focussed mainly on whether the AER has sufficient flexibility to undertake its task, or whether they are unduly constrained by the National Electricity Rules. The AER has suggested that it is unduly constrained by the Rules and that this explains why its regulatory determinations have been more generous to NSPs than they should have been.

Others (unusually both the NSPs and consumer advocates) have suggested that the AER has made too much of the restrictions on it under the Rules. The AEMC's main conclusions in its recent Draft Decision is that the AER should make more effort to benchmark service providers, and that it should be given greater freedom to set the allowed rates of return of electricity NSPs. It already has this freedom in its determination of the allowed rates of return for gas NSPs.

In addition, the National Electricity Rules already provide clear instructions to the AER to have regard to benchmarks in setting expenditure allowances; it says the AER "must" have regard to benchmarks. The AER's freedom in setting allowed rates of return for gas NSPs has not resulted in lower rates of return than for electricity NSPs, where it has had discretion over the determination of most parameters except the risk free rate and debt risk premium.

We suggest the regulatory problem is more profound than whether or not the AER has been unduly constrained in the decisions that it has made since the implementation of the Rules. For example, the ACCC (which regulated transmission NSPs before the creation of the AER) made regulatory determinations for each transmission network service provider. These determinations – which preceded the Rules – also allowed significantly higher capital expenditure.

Similarly, jurisdictional regulators in Tasmania, NSW and Queensland made price/revenue determinations for each distribution service provider in its area of

jurisdiction, before authority was ceded to the AER. The pattern of these decisions – where state governments own the service provider – is broadly consistent with the determinations that the ACCC made before the Rules, and that the AER has made since the implementation of the Rules (i.e. sharply higher capital expenditure allowances).

While expenditure allowances by the jurisdictional regulators were not as large as those determined by the AER, the jurisdictional regulators made significant intra-period adjustments to their decisions to increase capital expenditure allowances and hence regulated revenues.⁴⁷

Regulatory discretion may have been a factor that has adversely affected decisions that the AER has made since the introduction of the Rules. However, the evidence that the AER's decisions under the Rules are directionally consistent with the previous regulatory decisions by the ACCC and jurisdictional regulators (whose determinations were not subject to the Rules), suggests that the apparent restrictions on the AER's discretion under the Rules are unlikely to be the significant detriment that the AER has suggested (and AEMC seems to have agreed).

This paper has suggested that the essence of the regulatory problem is that the form of regulation that has been applied to government owned NSPs – five year fixed price revenue controls – has failed to provide incentives for efficient expenditure. The evidence of expenditure outcomes across all government owned NSPs and over long periods – at least three, five year regulatory control periods – shows a consistent pattern of sharply rising capital expenditure. As shown in Section 2, privately owned NSPs have not delivered this outcome.

The origin of the problem seems to lie in the assumptions that were made about the incentives of government owned NSPs, when the issue of regulatory form was first explicitly considered by policy makers in NSW, Queensland and Tasmania in the mid to late 1990s. Policy makers in those states that chose not to privatise their network service providers, nevertheless assumed that the application of price cap regulatory controls – by then well established in Great Britain and also in Victoria in the regulation of privately owned NSPs – would deliver comparable outcomes when applied to the service providers in their states. The evidence seems to suggest that this was a mistaken assumption.

If governments decide to continue to own their NSPs, improvements are possible by ensuring that the form of regulation takes account of government ownership.

This means that in setting the allowed rates of return for state government owned service providers, their receipt of income taxes and “competitive neutrality” fees, in addition to their claim on attributable profits, must be recognised. This will reduce electricity prices while ensuring the government owned service providers continue to deliver a reasonable, rather than extra-ordinary, return on capital.

“The origin of the problem seems to lie in the assumptions that were made about the incentives of government owned NSPs, when the issue of regulatory form was first explicitly considered by policy makers in NSW, Queensland and Tasmania in the mid to late 1990s.”

The continued application of five year price or revenue controls to government-owned service providers should also be reconsidered. Errors in major parameters – such as demand forecasts and the cost of capital have been locked-in for five years as a result of this form of regulation. This has resulted in excessive over-investment, particularly by government owned NSPs, and consequential windfall profits for governments, at the expense of higher prices for energy users. Price/revenue controls for shorter periods will solve this.

The application of benchmarks will also help. Prices, expenditures, asset values, service outcomes and rates of return should be benchmarked, and this information used to ensure that inefficient service providers are required to improve their efficiency in order to achieve financial returns comparable to those of their more efficient peers. The benchmarking should also include international comparisons with countries that have comparable reliability standards.

Institutional arrangements also merit review. Candid consideration of the political economy of economic regulation by a federal agency, of the income and profits of state government owned service providers is needed. State and territory governments have constitutional rights to the provision of energy and to the profits and taxes from this. If they wish to continue to profit from the provision of network services through the ownership of their NSPs, would it not be better for the accountability for this to rest with the state and territory governments, rather than a federal regulatory authority?

In addition, if governments continue to own their NSPs, the case for politically independent regulation of government owned service providers, even by state authorities rather than federal authorities, merits careful re-evaluation.

4.3 Consumer empowerment

In its report on stage one, the Standing Council on Energy and Resources Expert Panel, undertaking an examination of the arrangements for the review of the merits of AER decisions, concluded “an enhanced focus on customer/consumer requirements by NSPs cannot happen soon enough”.⁴⁸ Professors Littlechild and Yarrow offered similar advice to the AEMC when their views were sought in the early stages of the AEMC’s review of proposed changes to the rules for regulation of electricity and gas NSPs.

In Australia, Mr Rod Sims in his current role as ACCC Chairman and in his previous role as Chairman of the Independent Pricing and Administrative Tribunal in NSW has suggested a more significant role for consumers in the regulation of NSPs.⁴⁹ Additionally, Mr Ray Finkelstein, past President of the Australian Competition Tribunal, has suggested far reaching changes to empower consumers in regulatory processes.⁵⁰

The argument for negotiated settlements are that they:

- Are quicker, less expensive and adversarial;
- Promote better understanding, more accurately reflect the views of the parties; and
- Allow more creative solutions than regulatory commissions are capable of delivering.

In the United States and Canada, both federally and in several states/provinces, consumers and their representatives settle the prices to be charged by monopoly gas and electricity network service providers, through negotiation. In this arrangement (known as “negotiated settlements”) the regulator’s role is to facilitate negotiation and act as decision-maker of last resort, where negotiated settlement cannot be reached.

There is substantial evidence of the operation of negotiated settlements in the regulation of transmission and distribution NSPs in the United States.^{51, 52, 53, 54} For example:

- The Federal Energy Regulatory Commission (FERC) in the United States has a statutory obligation to give preference to settlement. It is required to make decisions on rates only “to the extent that the parties are unable to determine a controversy by consent”. The conduct of the settlement practice is governed by regulations promulgated by FERC itself. The majority of rate cases (for example reviews to determine prices, revenues or tariff controls) are settled. Since 1980, settlements were reached in approximately two-thirds of all electricity rate cases. In the period from 1994 to 2000, 38 out of 40 applications to change tariffs brought by large natural gas pipelines during 1994–2000 were settled in whole or in part.
- In Canada, since 1994 all tariff applications by oil pipelines have been settled by negotiation, and most applications by gas pipelines have been settled in processes arranged by the National Energy Board. The settlements generally included incentives to reduce costs, and provisions to share savings between the pipeline and its shippers, but often went further. All market participants (including shippers) support the principle of negotiated settlements, and have continued to renew them.
- Negotiated settlements have established the price and revenue controls for Florida’s five vertically-integrated electricity utilities since the mid-1990s.
- Evidence of negotiated settlements in utility regulation in California is described in the annual report of the Division of Ratepayer Advocates (DRA). DRA is an independent consumer advocate within the California Public Utilities Commission (CPUC) that advocates solely on behalf of investor owned utility ratepayers. It is the only state entity charged with this responsibility. It employs 142 staff and has an annual budget of US\$27m, and reports to the Californian legislature. Negotiated settlements occur in both revenue controls as well as other regulatory decisions. The biggest negotiated settlement in DRA’s 2011 annual report related to a settlement with Pacific Gas and Electric (PG&E), one of California’s largest vertically integrated utilities. In May 2011, the CPUC issued a decision which adopted the settlement agreement of 17 parties, including DRA, with PG&E. In 2009, PG&E had originally requested a three-year, cumulative revenue

increase of nearly US\$4.2 billion for its electric distribution, gas distribution, and electric generation operations. In 2010, after a detailed analysis of PG&E's request, DRA released a report that found that only a \$1b cumulative increase in revenues was reasonable for the three year period. Settlement was achieved (and certified by CPUC) at a US\$1.7b cumulative increase.

In summarising the evidence on the application of negotiated settlements by the FERC in the United States (one of the earliest adopters of negotiated settlements), Professor Littlechild (year) concludes:

“The proof of the pudding is in the eating. The parties involved have increasingly preferred settlement to litigation over the course of the last half-century. This is a remarkable record of survival in an activity – utility regulation – that has been characterised by no little reform and change over this period ... Traditional litigation has become essentially a method of dispute resolution limited to novel or exceptionally difficult rate case issues.”

Negotiated settlements can take many forms and can be extended into many areas of regulation, working alongside conventional regulatory processes in some cases.

In this context, the AEMC's recent Draft Decision on changes to the National Electricity Rules and National Gas Rules envisages that only comparatively superficial changes are needed to empower consumers. Their Draft Decision is that NSPs and the AER should produce various reports and papers so that consumer representatives are better informed, and focussed on the issues that the regulator wishes them to “engage and comment” on. This seems to fall short of the sort of consumer empowerment suggested by Littlechild, Yarrow, Sims and Finkelstein.

There is a strong argument for the role of consumers to be considerably strengthened irrespective of divestment decisions or other changes to the regulatory regime that policy makers might decide. Empowering consumers is no less important than these other changes, and is an essential part of an enduring solution.

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