The contribution of monopoly network service providers to electricity price rises in the National Electricity Market: outcomes, reasons and possible solutions.

Submission to the Senate Select Committee on Electricity Prices

Bruce Mountain, 14 September 2012

Executive Summary

This paper examines the contribution of monopoly electricity network service providers 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 network service providers 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 (Bureau of Resource and Energy Economics 2012). However since 2007 electricity prices have risen between 70% and more than 100% in different parts of the NEM. Average household electricity prices in the NEM, even at Purchasing Power Parity rates of exchange, are now amongst the highest in the world (Mountain 2012a). Although publicly available price indices for commercial and industrial users are not available to prove it, the outcome for industrial and commercial energy users are likely to be no better.

While electricity prices (and the industry's expenditure) has 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. (Australian Bureau of Statistics 2011) and (Productivity Commission 2012).

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 (Mountain 2012b).

In the reform program it was recognised that much of the natural monopoly network service provider 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 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 (Mountain and Littlechild 2010).

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 (Mountain 2011).

By international standards, the level of capital expenditure by government-owned network service providers in the NEM is remarkable. The capex allowed by the 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 (Mountain and Littlechild 2010). 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.[i]

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% 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% - compared to around 60% 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%, the total length of the NEM network increased by just 3% and 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).

Differences in demand growth do not explain differences in capital expenditure between government and private distributors. Demand has grown more strongly in VIC 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, QLD and TAS.

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 providers (Mountain 2011).

While government-owned service providers in NSW and QLD 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.

Reasons

This paper suggests that the main reasons for higher capex do not lie with external factors but rather that they 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 network service providers 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 (New South Wales Auditor General 2010) and (Rule Change Committee 2011).

Network service providers have been able to deliver higher financial rewards to their government owners, by expanding the regulated assets from which these proceeds are funded (Mountain 2011) and (Mountain and Littlechild 2010). Government-owned network service providers 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, 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. Divestment by governments of their network service providers 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 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, and this information 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, 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, 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 (Bureau of Resource and Energy Economics 2012). However since 2007 electricity prices have risen between 70% and more than 100% in different parts of the NEM. Average household electricity prices in the NEM, even at Purchasing Power Parity rates of exchange, are now amongst the highest in the world (Mountain 2012a). 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 is intended to contribute to the Senate Inquiry by providing 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. This is a personal submission. It has not been commissioned, and the author has not received consideration directly or indirectly from any party, for it.

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 network service providers (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

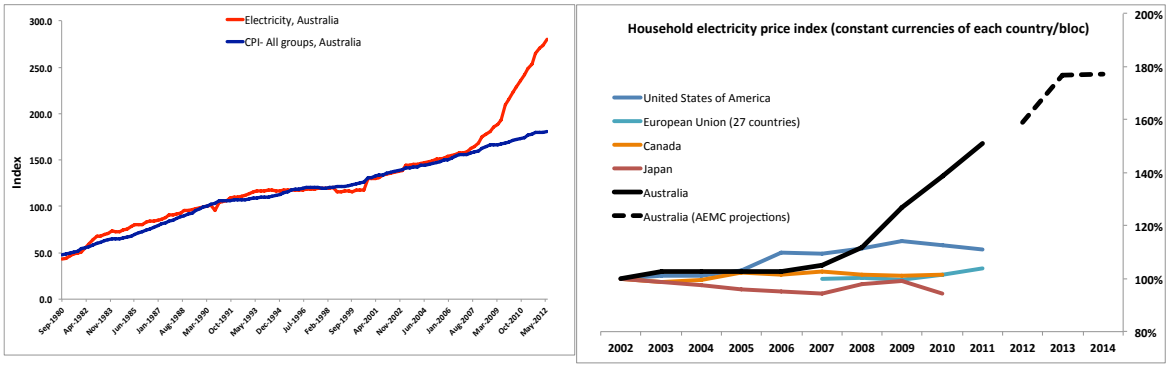
This section examines price outcomes and then the revenues and regulated assets of distribution and transmission network service providers in the NEM.

2.1 Prices

The left hand chart in Figure 1 shows the Australian Bureau of Statistics' index of household electricity prices and the Consumer Price Index 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 the CPI until 2008, at which point a clear gap emerges between household electricity prices and CPI.

The right hand chart in Figure 1 shows that the increases in household electricity price in Australia since 2007 are not evident in the U.S., EU, Canada and Japan. [ii]

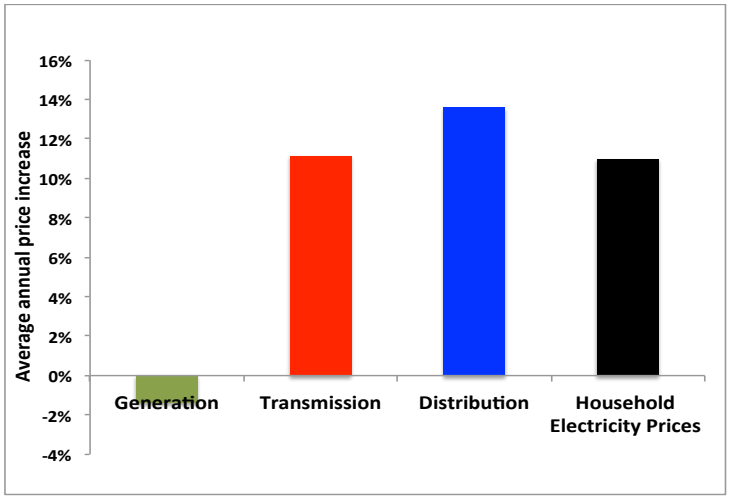
Figure 1. Electricity and CPI price indices from September 1980 to June 2012 (left) and Household electricity price index from 2002 to 2014[iii] (right)



Source: CME analysis of ABS data (left hand chart), (Mountain 2012a) right hand chart

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 1%, while transmission and distribution prices increased at annualised rates of around 11% and 13% respectively. The weighted average net impact on household consumers has been annualised increases of around 11% since 2005. Declining generation prices have had a limited effect in off-setting rising transmission and distribution prices.

Figure 2. Average annual price trend in generation[iv], transmission, distribution and residential electricity prices (per cent per year) from 2005 to 2011



Source: Author's analysis of market data from NEM Review™ and data contained in databases used in (Mountain 2011) and (Mountain 2012)

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 on the NEM. The ABS's Consumer Price Index for capital cities in each region of the NEM seems to indicate that household electricity prices seem to 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, transmission and distribution service providers collected revenues of around $2.4bn and $8.2bn respectively, compared to spot market revenue collected by generators of $6bn.

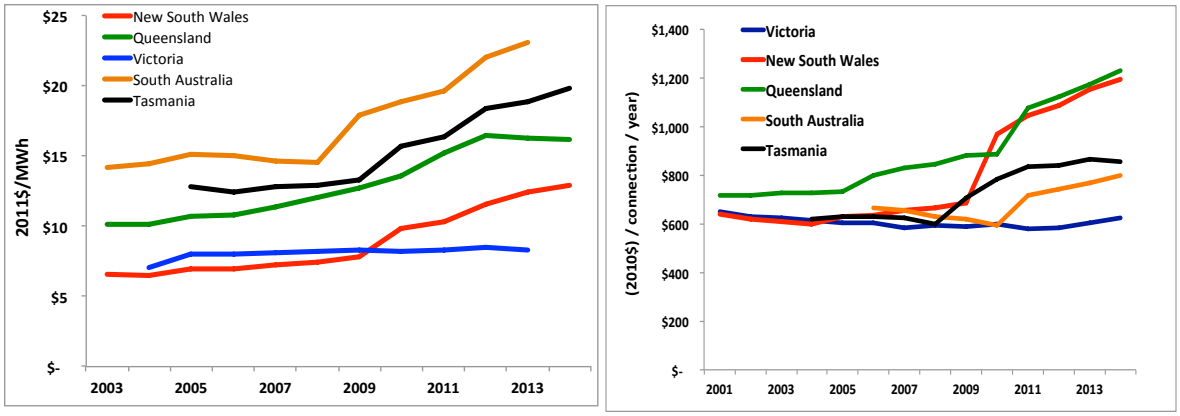
The Australian Energy Regulator (AER) determines the revenues of NSPs. The AER (and before it the Australian Competition and Consumer Commission) has had regulatory jurisdiction over transmission service providers since 1999, and over distribution service providers since 2006.

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 network service providers 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 (in the left hand chart) and the regulated revenue of distribution service providers normalised by the number of user connections to the distribution system (in the right hand chart).

The charts show that only in Victoria have both transmission and distribution revenues 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.

Figure 3. Regulated revenue of transmission service providers per MWh transmitted (2011$/MWh) (left hand) and of distribution service providers per connection (2010$/connection) (right hand)



Source: (Mountain 2012) and (Mountain 2011)

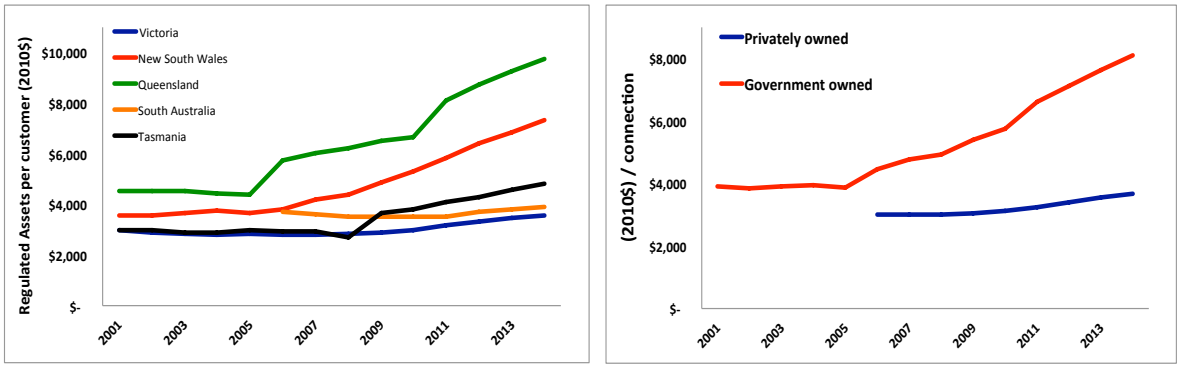
2.3 Assets of network service providers

In the six years from 2008 to 2013, network service providers will recover regulated revenues of around $61bn of which $18bn (30%) remunerates operating expenditure and the remaining $43bn (70%) 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 sub-section.

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 $9bn and $30bn 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 the two charts in Figure 4 for distribution service providers.

Figure 4. Regulated asset base of distribution service providers per connection (left hand), and by ownership (right hand) (2010$ / connection)



Source: (Mountain 2011)

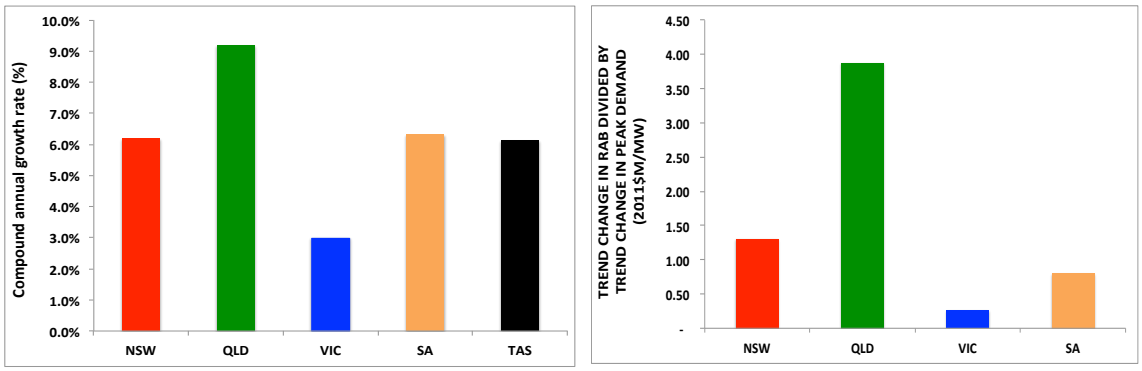
The chart on the left compares the increase in the RAB for distributors in the five regions of the NEM. It shows that for VIC and SA, the size of the RAB has been stable, while in NSW and QLD and to a lesser extent TAS, the RAB has expanded significantly.

The chart on the right 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 left hand chart in Figure 5 is the compound annual growth rate (in 2011$) from 2005 to 2013 of transmission service provider RABs[v]. Over this period, the RAB grew around four times as quickly in QLD as in VIC, and the remaining transmission service providers had comparable rates of growth, roughly three times the rate in VIC.

The right hand 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 VIC and the other states are even greater when normalising the growth in the RAB for the growth in peak demand[vi].

Figure 5. Compound annual growth rate of the regulated asset base of transmission service providers for the period 2005 to 2013 (2011$) (left chart); and trend growth in RAB compared to trend growth in peak demand from 2005 to 2011 (right chart)



Source: (Mountain 2012)

The differentiation of outcomes by ownership of transmission service provider is a little more complicated than for distribution service providers. The VIC transmission service provider is privately owned, the SA service provider is a proprietary limited company although its largest shareholder[vii] is the QLD transmission service provider, and the TAS, QLD and NSW service providers are government-owned.

By international standards, the level of capital expenditure by government-owned network service providers 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 (Mountain and Littlechild 2010). 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[viii].

3 Possible reasons

The last section showed that the growth in the regulated assets of network service providers and the consequential increase in the charges for depreciation and the regulated return on assets has been the main cause of rising electricity prices. Network service providers 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% 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% - compared to around 60% 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%, the total length of the NEM network increased by just 3% and 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

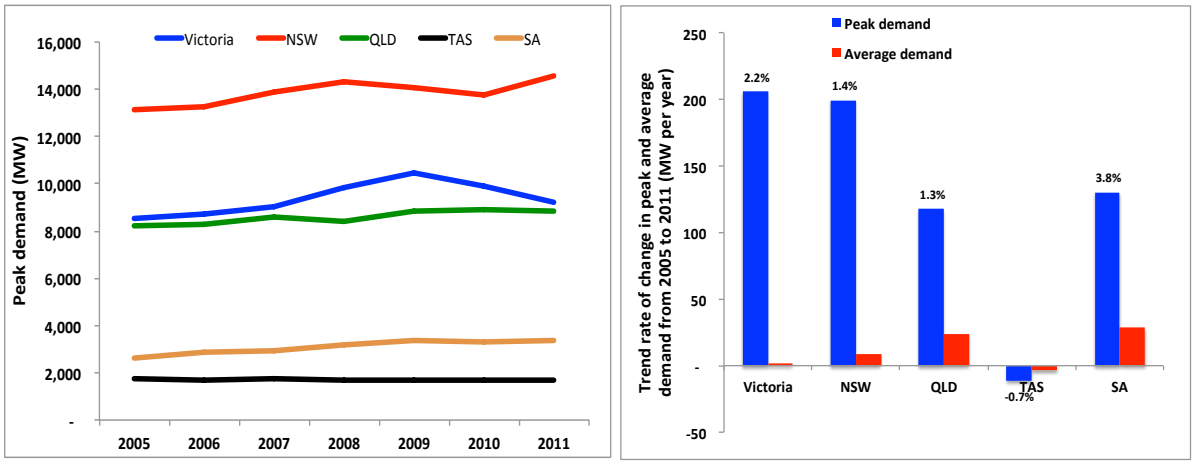
In debates on rising network service provider expenditure, there is frequently allusion to rising peak demands, through for example greater uptake of air-conditioners. The actual peak demand data from 2005 to 2011 however suggests that rising peak demand is less significant than commonly thought.

The right hand 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 actual 2011 peak demand. The chart shows that the trend rate of growth of peak demand has been the

highest in VIC (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 (QLD, NSW and TAS) 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 VIC. In TAS, the RAB has grown significantly while peak demand (and average demand) is declining.

Figure 6. Peak demand (MW) by NEM region (left hand); trend rate of growth in peak demand and average demand (MW)



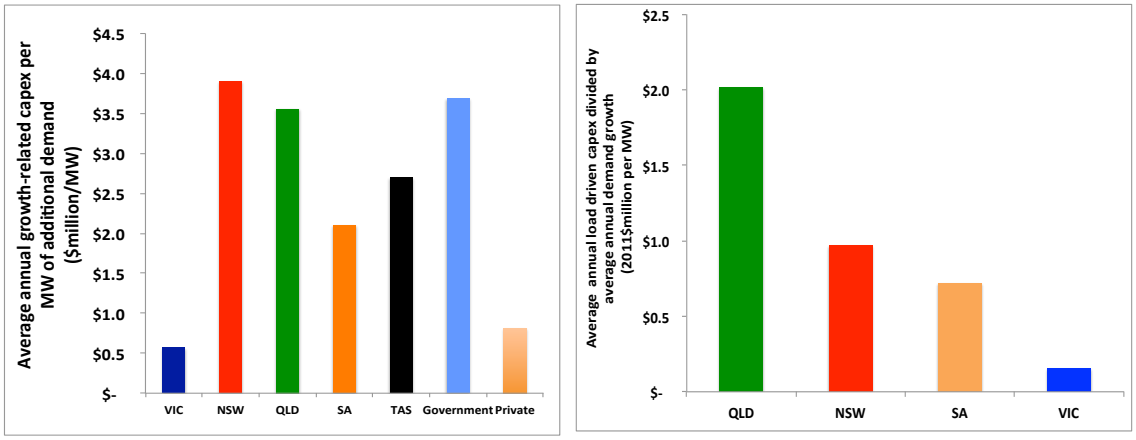
Source: Author's analysis based on half-hourly demand data from NEMReview™

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 left hand 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 VIC distributors spending substantially less per MW of additional demand than distributors in NSW and QLD.

The right hand 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 VIC distributors, the VIC transmission network service provider (VENCorp and then AEMO) has incurred much lower capital expenditure to meet demand growth than the transmission service providers in NSW and QLD[ix].

Figure 7. Average annual growth-related capex per Mega-Watt of additional demand for distribution service providers (left); average annual growth-related capex divided by trend growth of peak demand for transmission service providers (right).



Source: (Mountain 2011)

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, QLD and TAS have incurred significantly more expenditure to meet rising demand, than the non-profit service provider in VIC, 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 (Australian Energy Market Operator 2012). However, the data suggests that network service providers in NSW, QLD and TAS have significantly over-estimated future demand growth, while this does not appear to have been the case in VIC (Mountain 2012).

Ageing assets

The privately owned distribution service providers in VIC and SA had assets with a (weighted average) remaining life that was shorter than the government-owned distributors in NSW and QLD (Mountain 2011). Yet the distributors in NSW and QLD appeared to be spending more than three times as much on asset replacement as distributors in VIC 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 (NERA 2012).

This is indeed the case, and the analysis in Mountain (2011) 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 can not be that there has been systematic (i.e. NEM-wide) under-investment in the past, because network service provider expenditure in VIC and SA has been so much lower than in QLD, TAS and NSW. Therefore the suggestion that historic underinvestment explains higher spending recently, must be a contention that there has been historic underinvestment in NSW, QLD and TAS (and historic over-investment in SA and VIC).

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 (Pierce, Price et al. 1995). In Queensland the assessment in 2004 suggested that that under-investment explained poor service outcomes by Queensland distributors (Independent Panel 2004). But the service outcomes 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 (Mountain 2011).

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 QLD 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. It did however persist in its belief that demand growth in Queensland would remain the strongest of any region in NEM (Independent Panel 2011). 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 (Productivity Commission 2012). The Energy Networks Association has referred to this research to justify higher expenditure by network service providers in Queensland (Energy Networks Association Undated).

However in the NEM in 2011 just 4% of the transmission and distribution network at 22kV and above was underground cable, compared to 96% which was overhead line. The length of underground cable at 22kV and above actually declined over the period from 2004 to 2011.[x] Clearly change in the length of underground cables at these voltages can not account for higher network service provider 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 network service providers 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 (Mountain and Littlechild 2010).

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.

The observation that government-owned network service providers have consistently spent more that 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 network service providers 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 (Mountain and Littlechild 2010).

In the NEM this additional financial interest is pronounced because the state governments collect income taxes on their network service provider 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 Government of New South Wales is currently around 4%, 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[xi]. 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.

The combinations of profit, the income tax on the profit and the debt guarantee/competitive neutrality fees have provided government owners of network service providers with extra-ordinary 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. (New South Wales Auditor General 2010) and (Rule Change Committee 2011)

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 lead 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 network service providers 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 (Brealey and Myers 2000). 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 defines 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 QLD 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 assets 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) (King 2012).

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 AEMC – 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 network service provider 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.

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 network service providers 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.

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 network service providers 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 network service providers 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 network service providers than they should have been.

Others (unusually both the network service providers 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 network service providers. It already has this freedom in its determination of the allowed rates of return for gas network service providers.

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). And the AER's freedom in setting allowed rates of return for gas network service providers has not resulted in lower rates of return than for electricity network service providers, where it has anyway 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 made since the implementation of the Rules. For example, the ACCC (which regulated transmission network service providers 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 TAS, NSW and QLD 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 (Mountain and Littlechild 2010).

Regulatory discretion may have been a factor that has adversely affected decisions that the AER has made since the introduction of the Rules, but 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) they are.

This paper has suggested that the essence of the regulatory problem is that the form of regulation that has been applied to government-owned network service providers – five year fixed price / revenue controls – has failed to provide incentives for efficient expenditure. The evidence of expenditure outcomes across all government-owned network service providers 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 network service providers 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 network service providers, when the issue of regulatory form was first explicitly considered by policy makers in NSW, QLD and TAS 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 network service providers – 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 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, 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 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*" (Limited Merits Review Panel 2012). 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 network service providers.

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 New South Wales has suggested a more significant role for consumers in the regulation of network service providers (Sims 2011). Mr Ray Finkelstein, past President of the Australian Competition Tribunal has suggested far reaching changes to empower consumers in regulatory processes (Finkelstein 2012).

The argument for negotiated settlements are that they are quicker, less expensive and adversarial, that they 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 can not be reached.

There is substantial evidence of the operation of negotiated settlements in the regulation of transmission and distribution network service providers in the United States (see in particular (Littlechild 2009a) (Doucet and Littlechild 2009; Littlechild 2009b; Littlechild 2011). For example:

- The Federal Energy Regulatory Commission 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 so 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 (i.e. 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 revenues 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 revenues 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 seventeen parties, including DRA, with PG&E. In 2009, PG&E had originally requested a 3-year, cumulative revenue increase of nearly $4.2 billion for its electric distribution, gas distribution, and electric generation operations. After a detailed analysis of

PG&E's request, in 2010 DRA released a report that found that only a $1.0 billion cumulative increase in revenues was reasonable for the three year period. Settlement was achieved (and certified by CPUC) at a $1.7 billion cumulative increase.

In summarising the evidence on the application of negotiated settlements by the Federal Energy Regulatory Commission in the United States (one of the earliest adopters of negotiated settlements), Professor Littlechild 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 along-side 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 network service providers 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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End notes

[i] North American data from "Transforming America's Power Industry", The Brattle Group. Prepared for the Edison Foundation, November 2008. NEM data from AER Decisions. Conversion at 2011 PPP rates.

[ii] Many households in Australia are on "market contracts" rather than regulated standing contracts. These typically offer discounts to the price on standing contracts, although the level of these discounts vary. However ABS data on price indices (based on actual household data) however shows similar price increase the capital cities in all NEM regions, suggesting that use of standing contract prices in this international comparison is robust.

[iii] Sources: Index values for Australia from 2002 to 2011 are based on Index Numbers (A2328141J) deflated into 2002 dollars by the All Groups CPI (A2325806K), both published by ABS (2012). Index values for the other countries are based on the same data sources in Footnote 1, deflated into 2002 currency based on CPI data published in IEA (2012). It should be noted that the data on European prices is taken from Eurostat, which changed the basis of its comparative calculation in 2007. For consistency therefore the time series for Europe only begins in 2007 and so data is re-based to that year, not 2002. We cross-checked changes in European prices published by the International Energy Agency and found that their measure of OECD (Europe) showed electricity prices increasing by 8.9% in real terms between 2002 and 2007. We did consider using the OECD (Europe) household electricity price index measure but decided not to do this since it showed a 6% jump in electricity prices between 2007 and 2008. This appears to be attributable, not to underlying price changes but to a change in calculation methodology by Eurostat who present their data separately before and after 2007 for this reason.

[iv] Generation costs are likely to rise significantly following the imposition of the emission price from 1 July 2012. This analysis has also excluded costs associated with retailing electricity (which are small relative to the costs of production and distribution). It should also be noted that the actual cost that end users pay for the production of electricity will include retails margins (which can be very significant for some small users) and will also reflect the contract position of retailers relative to the spot market.

[v] AEMO's 50% probability of exceedance forecast of peak demand in 2013 is used.

[vi] Tasmania is not shown in this chart because its RAB has risen significantly while its peak demand has been declining, and the result distorts the comparison of the other NSPs.

[vii] Powerlink, the Queensland transmission service provider has a 42% shareholding.

[viii] North American data from "Transforming America's Power Industry", The Brattle Group. Prepared for the Edison Foundation, November 2008. NEM data from AER Decisions. Conversion at 2011 PPP rates.

[ix] Tasmania is not shown in this chart because its RAB has risen significantly while its peak demand has been declining, and the result displayed on the same chart as other NSPs undermines the clarity of the comparison of the other NSPs.

[x] These data are sourced from Electricity Gas Australia annual reports compiled by the Energy Supply Association of Australia.

[xi] While part of the difference is explained by the decline in the risk free rate between the time the regulator set the control, the larger part is explained by the debt risk premium which is set as if the bonds were issued by a privately owned firm.