

Carrots, sticks and tightropes: The regulator's balancing act in incentivising efficient behaviour

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Presented to session:
Progressive approaches to utility regulation that best serve the public interest
Tuesday 7 May 2013

CAMPUT Annual Conference 2013, Ontario, Canada

Introduction

Australia's energy sector is undergoing considerable change with a recent reversal of demand trends, rising retail prices, evolving consumer preferences, technological advances and the impact of climate change policies. These developments are common, to varying degrees, to a number of advanced economies.

As participants in this year's CAMPUT conference, we've been asked to consider the regulator's balancing act in serving the public interest. Energy is an essential service and a critical input to our commercial and social activities, underpinning our economy and standard of living. Regulation to promote reliable, safe, secure and competitively priced energy is fundamental in serving the public interest. The challenges an energy regulator faces in walking the proverbial tightrope depend on the subject of its regulation and the environment in which it regulates. In many circumstances, there can be a fine line between over and under regulation and, in walking that line, the regulator needs to maintain an appropriate balance in the long term interests of consumers. This paper draws on two very different examples of regulatory approaches in an Australian setting, both of which focus on the power of incentives.

The first part of this paper discusses monopoly network businesses - an area where active involvement of the regulator is required. The second part discusses enabling technologies in the retail market - an area where a more light-handed touch from the regulator can facilitate consumers exercising choice within a competitive market.

Five states, one market

The national electricity market in Australia will soon celebrate its 15th birthday – a market still in its teens and continuing to develop. Its creation involved integrating five separate state-controlled power systems with limited interchange into a single wholesale electricity market. The market is characterised by competitive wholesale and retail sectors and economic regulation of the transmission and distribution networks.

The national electricity market stretches over 5000 kilometres (3100 miles) in length from the top of Australia's east coast in north Queensland to the most southern part of Australia – Tasmania – and across to South Australia. This is just a little further than the distance between Victoria in British Columbia and Halifax in Nova Scotia. The market covers around 89 per cent of electricity consumption in Australia.¹ Like Alberta in Canada, our national wholesale market is an energy-only market. The wholesale market means of exchange between generators and retailers are half-hourly wholesale spot prices, bilateral over the counter (OTC) financial derivative contracts and standard form exchange traded contracts.

The majority of demand for electricity is concentrated in a relatively narrow band within 100 kilometres (62 miles) or so of the coast. Across this geographic spread there are markedly different climatic and environmental characteristics, driving very different energy consumption patterns across the system. Queensland has very mild winters and hot humid summers, meaning that while it has a pronounced summer peak, the difference between its summer and winter demand is relatively small, so its load factor² is quite high. By contrast, South Australia has a very high summer peak demand compared to its lowest demand periods, reflecting the extremes of its climate.

The development of the market arose during the early part of the 1990s; a period of substantive microeconomic policy development across the Australian economy and the stationary energy sector in particular. During this period, the Council of Australian Governments was formed – consisting of the Premiers of each state and the Prime Minister of the Commonwealth Government. This council provided the forum for major interstate and national economic reforms to be negotiated and developed. A central theme of the reforms was to lift the productivity of the Australian non-traded goods sector and improve the competitiveness of the external sectors. Given the all-pervasive nature of energy inputs, a logical consequence was a particular focus on energy reform.

Both the competitive and regulated sectors have supported a consistent pipeline of investment to maintain a reliable and secure energy supply. Since 1998, over 12 000 MW of new investment in generation capacity has been delivered in addition to significant investment in increased network capacity. Consumer preferences and investment requirements are changing however, partly in response to changes in relative prices, technology and governments' climate change policies.³ It has hence become important to continually improve the efficiency of energy supply *and* use in light of these developments.

¹ The remainder is consumed in Western Australia and the Northern Territory who are not connected to the national market due to the geographical isolation of their systems.

² The ratio of average demand to peak demand.

³ Climate change policies in Australia include state-based feed in tariffs for renewable energy, the Australian Government's carbon price, and the Australian Government's renewable energy target.

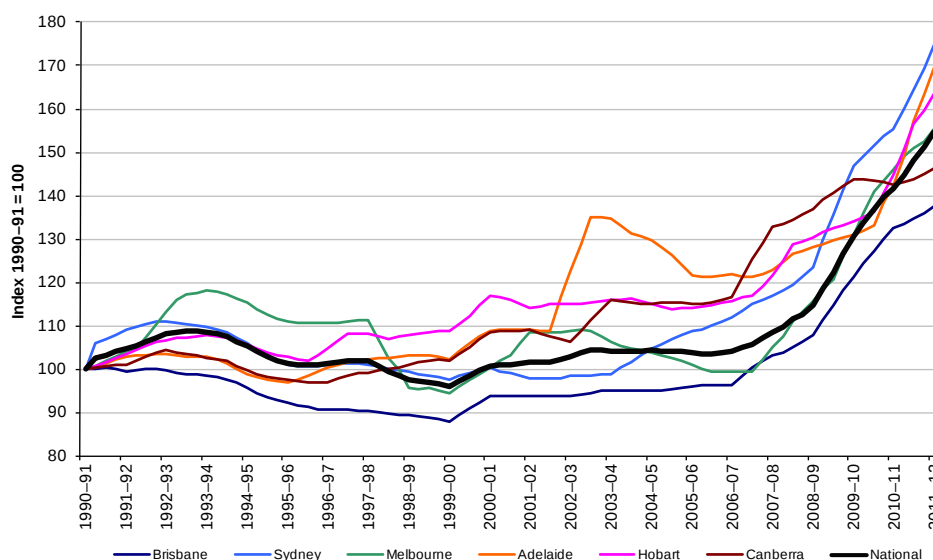
Low demand + excess supply = high prices? An electricity market paradox

Similar to Canada, electricity prices in Australia vary by state (province/territory). All states, with the exception of Tasmania,⁴ have introduced full retail contestability in electricity. This enables customers to enter a contract with the retailer of their choice to increase competition among retailers.

Two states have fully deregulated their retail prices,⁵ while in the other states and territories the jurisdictional regulatory authority sets retail price caps for standard contracts. In states with retail price regulation, small customers generally have access to two types of energy contracts – standard and market retail contracts. Standard contracts often involve a regulated tariff and there is greater prescription in the Retail Law around the contract terms and conditions.⁶ We are currently reviewing the need for continuing with a regulated retail price in the most populous state of New South Wales (NSW). In that state around 60 per cent of small customers are not on regulated tariffs, but have entered competitive supply contracts with retailers.

Interest in, and scrutiny of, the energy market in Australia is now more intense than at any time since the original reforms were introduced. Real retail electricity prices have risen considerably in most Australian states over the past few years, as shown below. Consumers and the media have rightly placed pressure on policy makers and the industry to explain and address these rises.

Retail price index (inflation adjusted)—Australian capital cities, June 1991 to June 2012



Note: CPI electricity series, deflated by the CPI for all groups.

Source: ABS, Consumer price index, cat. no 6401.0.

⁴ The Tasmanian Government announced it will introduce full retail contestability from 1 January 2014.

⁵ Victoria and South Australia.

⁶ Australian Energy Regulator, State of the Energy Market, 2012, AER, pp 124-5.

A range of factors have contributed to price rises in Australia, but the rise in regulated network costs has accounted for the largest proportion of increases in most states, followed by costs to deliver a range of environmental policy measures. The Australian Energy Market Commission's electricity price trends report, published in March 2013, shows that residential price increases will moderate nationally over the next four years.⁷ The main driver of upward pressure on retail prices in the short-term continues to be network prices, but the rate of increase of these costs is also expected to moderate considerably.

The Australian electricity sector has been significantly affected by the global financial crisis and the European sovereign debt crisis, with higher costs of capital for generation projects as a result of a re-appraisal of risk by investors and a much stronger Australian dollar. The stronger Australian dollar has also presented competitive challenges for the Australian manufacturing sector – a major source of electricity demand in the past. This, coupled with the growth of Australia's less energy-intensive service sectors, has contributed to lower energy intensity for the economy as a whole and declining demand for energy. Changes in household electricity consumption patterns are also contributing to the decline in wholesale demand, with a rapid increase in rooftop solar installations and improved energy efficiency.

We are currently faced with a paradox where wholesale prices and energy demand are declining, while retail prices are increasing. Wholesale electricity prices have been depressed with an abundance of subsidised renewable energy entering the market at a time of lower electricity demand. Retailers are facing higher costs due to the significant new network infrastructure of recent years and the costs of government environmental policies, such as state feed-in tariffs and Australia's renewable energy target.

So how do policy makers and regulatory organisations address this paradox? Due to the combination of factors at play – action will be required on a number of fronts. I will outline two key projects the Australian Energy Market Commission has recently completed that should help to address part of the issue. But first, let me explain where we fit into the institutional structure in the Australian energy sector, and the key objective that we aim to further when undertaking our rule making and advice roles.

The AEMC, AER & AEMO – wading through the acronyms

The national electricity market is governed by one set of laws and subsidiary 'rules'. The law provides the overall principles. The rules have the force of law and, broadly speaking, cover the 'who, what, when, where and how' of operating and participating in the competitive generation and retail sectors, and the way economic regulation of the transmission and distribution sectors is to be applied. There are three market institutions with distinct roles - the market operator, the regulator, and the rule maker and adviser

⁷ AEMC 2013, Possible future retail electricity price movements: 1 July 2012 to 30 June 2015, Electricity price trends report, 22 March 2013.

on market development. These are the Australian Energy Market Operator (AEMO), the Australian Energy Regulator (AER) and Australian Energy Market Commission (AEMC) respectively.

The creation of the AER and the AEMC in 2005 replaced a number of jurisdictional and Commonwealth regulators in Australia, helping to provide consistency and stability in regulating the interconnected market.⁸ Three industry figures recently likened the national consensus required to create the market as parallel to that required in 1901 to federate the states to create Australia.⁹ The market's governance structure is somewhat unique, where the roles of making, implementing and enforcing the rules have been separated. The AEMC is the rule maker and is also responsible for providing advice to governments on energy market development. We do not implement the rules – this is the responsibility of the AER, with respect to the economic regulation of the transmission and distribution network businesses and rule compliance, and AEMO with respect to the operation of the energy markets and systems and in delivering planning advice.

Separating the roles of governments, the market developer, the operator and the regulator, has resulted in independent decision-makers with clear accountabilities and objectives. Governments are appropriately responsible for high-level policy and broader social value judgements. This enables the three market bodies to focus their effort on the efficient operation of the market in the long term interest of consumers.

The regulatory recipe for serving the public

In participating in this year's CAMPUT conference, we have been asked to discuss regulatory approaches that 'best serve the public interest'. These five words can be interpreted in a multitude of ways. Let's start with the latter part – what exactly is 'the public interest'?

A relatively recent article by Paul Kerin, the CEO of an Australian regulator, focussed specifically on this question.¹⁰ In his article, Kerin notes the public interest is typically defined as 'the overall welfare of all members of the community', which depends on the overall size of the pie enjoyed by community members and how the pie is carved up. This raises both efficiency and equity issues.

Kerin also offers that the regulator's role extends beyond simply *protecting* the public interest. Instead, it is for the regulator to *maximise* the public interest over the long term. While this may seem like semantics,

⁸ Australian Government, *Securing Australia's Energy Future*, 2004, p 177.

⁹ T Baker, D Bowker, D Swift, 'Regional Markets – the Australian NEM design and lessons learnt', *CIGRE 7th Southern Africa Regional Conference*, 2013, p 3.

¹⁰ Paul Kerin is CEO of the Essential Services Commission of South Australia. His article provides an interesting discussion of regulatory objectives: P Kerin, 'In Whose Interest?', *Network*, Issue 43, March 2012.

the nuance is important in focussing regulatory decision making on promoting the long term interests of consumers.

This is consistent with the guiding objective in Australia's national electricity and gas laws that guide regulatory decision-making. The National Electricity Objective (NEO) is:

“to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of energy with respect to price, quality, safety, reliability and security of supply of energy”¹¹

The NEO provides a clear focus for the economic regulator to do what it does best - to focus on the efficiency of the market and, within the limits of its control, the productivity of the sector. Focusing on economic efficiency in regulating the energy sector helps avoid duplication and distortion of other policies designed to serve the broader public interest as defined by other Government policies.¹² For example, social and environmental issues are addressed through other legislation and specific government policies that act as a regulatory umbrella for a number of industries, including the energy sector.

This leaves it to governments to make value judgements concerning equity; using broader information about the economy as a whole and the welfare of the population. It is therefore more appropriately and efficiently addressed by governments rather than market regulators. For example, direct transfers through the taxation system to assist low income consumers with their electricity bills can be more efficient than distorting the electricity price signal in the market by suppressing prices below their efficient levels. I am aware that other bodies in the regulatory space have multiple objectives, but the benefits of the Australian approach is that it brings clarity and transparency to decision-making, and therefore to our stakeholders expectations of how we will approach issues.

There is some benefit in sharing our experiences on what has worked well (and not so well) in Australia's electricity sector due to some of the similarities between Australia, Canada and many other developed economies. For example, we are faced with similar regulatory challenges in the regulation of electricity network monopolies. We are also faced with similar opportunities for more efficient pricing structures enabled by advanced metering technologies. This paper discusses both issues through the lens of incentives. It is by no means a rose-coloured lens and I will highlight some of the associated challenges.

¹¹ A similar objective applies for gas under the National Gas Law: “to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.”

¹² An analogy can be drawn with ‘multitasking’, which is too often a euphemism for doing many things poorly.

Regulating in the public interest, part one

Network regulation

For over a century, researchers have drawn on economics, law, political sciences, history, organisational behaviour and finance to analyse the attributes and behaviour of natural monopolies. A common theme of this research is the economic and social risks of monopoly behaviour, where firms face limited performance incentives in the absence of competition.¹³ Regulation of these businesses is designed to address some of these risks. The primary goal of economic regulation is to stimulate the regulated firm to produce output efficiently, from cost and quality perspectives, and to price the associated services efficiently.¹⁴

Electricity networks are considered natural monopolies due to their declining average costs as output increases, with lower variable costs and very large fixed costs - in Australia's case, the value of the network capital assets is estimated at over AUD\$44 billion.¹⁵ A second business duplicating the infrastructure in the same location would be uneconomic. This results in a natural monopoly industry structure and is the reason so much regulatory and policy effort is dedicated to the economic regulation of network businesses.

Australia's Productivity Commission highlights a series of characteristics that contribute to the natural monopoly structure of networks, listed below.¹⁶

Some examples of the natural monopoly features of electricity networks:

- Very large fixed costs and low marginal operating costs
- Scarcity of easements and the opposition by householders and local governments to any potential duplication
- Safety concerns for consumers and workers were there to be multiple wires (overhead or underground) owned by separate businesses
- Need for the system to act as a coherent network with appropriate frequency and voltage control
- Requirement for a very reliable network built to meet peak demand
- Millions of customers, most with very limited countervailing bargaining power (unlike, airports for airlines for example)

These collectively lead to the costs for the supply of electricity being minimised by having only a single supplier in a given area – a natural monopoly.

¹³ P Joskow, Regulation of Natural Monopolies, 29 August 2006.

¹⁴ Paraphrase of P L Joskow, 'Incentive regulation and its application to electricity networks', *Review of Network Economics*, vol. 7, Issue 4, December 2008, p 550.

¹⁵ T Wood, A Hunter, M O'Toole, P Venkataraman, L Carter, 2012, Putting the customer back in front: How to make electricity cheaper, Grattan Institute, p 11.

¹⁶ Productivity Commission, *Electricity Network Regulation Frameworks*, draft report, PC, 18 October 2012, p 116.

The 'how' of network regulation

Australia's network regulation is a form of incentive regulation or 'performance based regulation', where rewards and penalties are used to encourage good performance by network service providers. Incentive regulation is commonly used for monopoly electricity, gas, telephone and water services in Australia, the United Kingdom, New Zealand, portions of Latin America, as well as in the United States for regulated parts of its telecommunications industry.¹⁷

Incentive regulation comes in different shapes and sizes. For example, we are aware of the approaches that have been developed by Ofgem to encourage businesses to reveal their efficient expenditure levels through risk reward trade-off choices – menu regulation. The Dutch have been very successful in using benchmarking to underpin their incentive based regulation, and our relatively near neighbours in New Zealand have developed a specific form of incentive based regulation to deal with the challenges they face in regulating a large number of relatively small electricity distribution networks.

Without underplaying the differences, there are some common principles. Incentive based regulation is about specifying a goal and an estimated *ex ante* budget. In the case of regulating electricity network monopolies in Australia, the *goal* primarily involves maintaining network reliability given expected demand changes and the *ex ante budget* involves the regulator approving a multi-year budget based on a forecast of the total finance needs of a business. If the regulated business can outperform the forecast budget during the regulatory period, it is able to retain a proportion of the savings, with the remainder passed through as lower prices for end users.

The AER determines the *ex ante* budget for a regulatory period that typically runs for five years. The timing of each five year period varies by state. For example, in New South Wales the next begins in 2014-15 and in Queensland in 2015-16. Before a new regulatory period begins, network businesses submit proposals to the AER that set out the business' view on the costs it will face over the next five years. The AER uses the rules developed by the AEMC to assess the proposals and forecast the revenue the business requires to cover its efficient costs and provide a commercial return. This essentially involves the regulator approving a maximum amount of revenue each business can earn over a five year period that reflects efficient behaviour and mimics competitive drivers to keep costs low. We'll discuss the details of the regulatory process later.

¹⁷ P L Joskow, 'Incentive regulation and its application to electricity networks', *Review of Network Economics*, vol. 7, Issue 4, December 2008, p 552.

This approach is grounded in the concept of information asymmetry and, more generally, the appropriate role of a regulator. As Blackmon succinctly puts it:¹⁸

Why incentives? ... [because] the regulator: (1) does not know what the firm should do and (2) cannot observe what the firm does. In this situation, the power to give orders to the firm is of little value ... an inevitable consequence of having a private firm responsible for production is that the firm will know more about its costs and opportunities than will the regulator.

It is the level, rather than the specific contents, of the approved expenditure allowances that underpins the incentive properties of the regulatory regime. The ex ante budget and the associated price path is fixed for five years and only re-examined in limited circumstances. The ability to re-open a regulatory determination is limited to specific circumstances in order to provide investment certainty and regulatory accountability. The regulated business is left to manage its actual expenditure as it sees fit, in response to the actual conditions it faces during the regulatory control period. This should motivate businesses to re-prioritise and seek efficiencies to manage obligations, such as reliability standards, within the allowed budget.

Keeping the business in the driver's seat is preferable to having the regulator make investment decisions on its behalf on a project by project basis. The regulator's strength is not in running a business. Instead, it is for the regulator to address the so called 'principal-agent' problem by implementing a framework to guide business decision making and enforce compliance with critical aspects of it (as opposed to the principle usurping the role of the agent).

Incentive regulation means that:

- The business is clearly accountable for delivering the desired service level to consumers.
- Efficient costs are revealed over time as businesses have the incentive to make efficiency gains through retaining some of the benefits.
- Most importantly, over time consumers should benefit because prices will move towards a level that reflects the efficient costs of providing the services.

An alternative to the incentive regulation is 'cost of service' regulation, which is sometimes referred to as rate of return or cost plus regulation. Cost of service regulation generally involves the regulator effectively reimbursing the business for its realised costs. Under this approach the regulated business is not rewarded for any efficiency gains it achieves, or any innovation. The approach is more common in the United States and can be effective at aligning prices and costs, however costs may be excessive due to a lack of incentives

¹⁸ G Blackmon, *Incentive regulation and the regulation of incentives*, Kluwer Academic Publishers, Massachusetts, 1994, p 6.

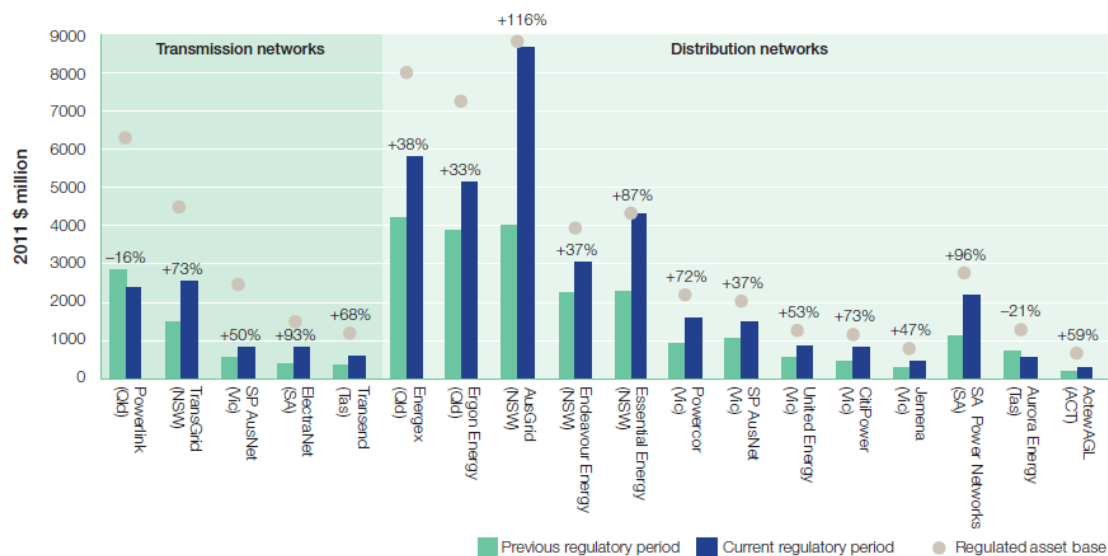
for managers to find savings.¹⁹ Consequently, the incentives for businesses under a cost of service approach to reduce costs or seek innovations can be poor.

Network regulation – a hot topic in Australia?

The regulation of electricity network businesses has received considerable public attention in Australia in recent times. This may surprise some as it is not traditionally a topic that inspires debate en masse – the mere utterance of the words ‘network regulation’ can cause eyes to glaze over instantly. So why then has it been making the front page of newspapers?

As discussed earlier, states around Australia have recently experienced double digit growth in electricity prices. Networks account for around half the residential bill paid by consumers and the majority of the recent price increases. Network investment over the current five year cycle is forecast at greater than \$7 billion for transmission networks and \$36 billion for distribution networks. This represents an increase on investment in the previous regulatory periods of around 27 per cent in transmission and 60 per cent in distribution in real terms, which is illustrated below.

Electricity network investment



Notes:

Regulated asset bases are as at the beginning of the current regulatory periods.

Investment data reflect forecast capital expenditure for the current regulatory period (typically, five years), amended for merits review decisions by the Australian Competition Tribunal. See tables 2.1 and 2.2 for the timing of current regulatory periods. The data include capital contributions and exclude adjustments for disposals.

AusGrid's distribution network includes 962 kilometres of transmission assets.

Source: AER State of the Energy Market, 2012, p 70.

¹⁹ P L Joskow, 'Incentive regulation and its application to electricity networks', *Review of Network Economics*, vol. 7, Issue 4, December 2008, p 552.

There has been much public commentary in Australia about the recent levels of network investment, with some claiming the investment has been excessive and likened to ‘gold-plating’ the network. Others counter that ‘network gold-plating’ has simply become a convenient whipping boy. So which is it? As with most complex issues, the truth often involves multiple shades of grey. There is no single cause of the rising cost of network infrastructure. The reasons for higher network investment vary across the network business and location; however there appear to be some common trends.

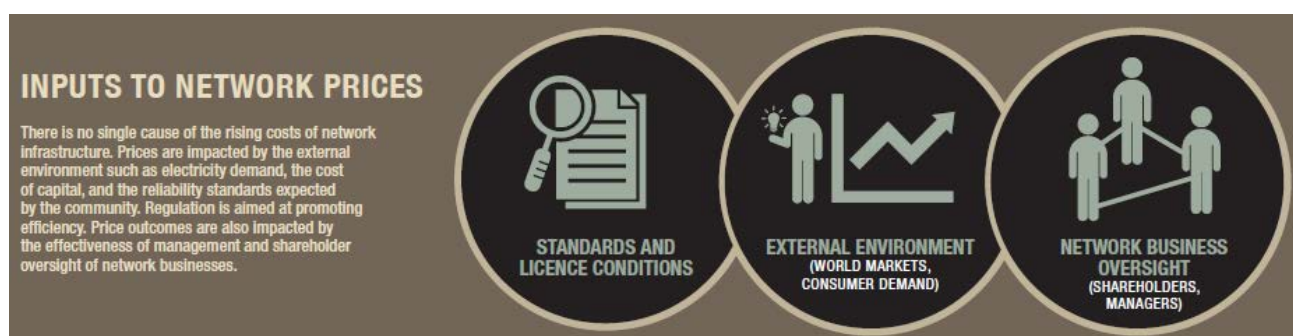
Firstly, higher reliability standards and new bushfire safety standards have been introduced by state governments. As our day to day domestic and commercial activities become more reliant on the availability of continuous supply we, as consumers, increasingly expect the safe and reliable delivery of efficiently priced electricity. In response, and in light of some sizable power failures experienced both in Australia and internationally, governments have tightened the reliability standards of the electricity network businesses within their jurisdictions, resulting in the need for additional capital investment.

Secondly, several network businesses have embarked on major capital expenditure programs to replace the infrastructure that was installed in the 1950s and 1960s. This significant investment has resulted in substantial electricity price rises for consumers over only a few years, as costs are passed through to electricity bills.

Third, the global financial crisis occurred at about the same time as these asset replacement and network expansion programs began, increasing the costs of finance faced by network businesses in funding the necessary upgrades. These costs are ultimately passed through to consumers in the final retail tariff.

Fourth, networks are built to a level that will reliability meet forecast peak demand in different locations. At the time of the regulatory decisions, peak demand was forecast to continue to grow strongly.

Fifth, the regulatory frameworks that determine the allowed revenue and prices for monopoly networks weren’t operating in the way they were originally intended. We have recently changed the rules for network regulation to help address this issue. Our deliberations and final decisions on how best to regulate monopoly networks are the focus of this section of the paper.

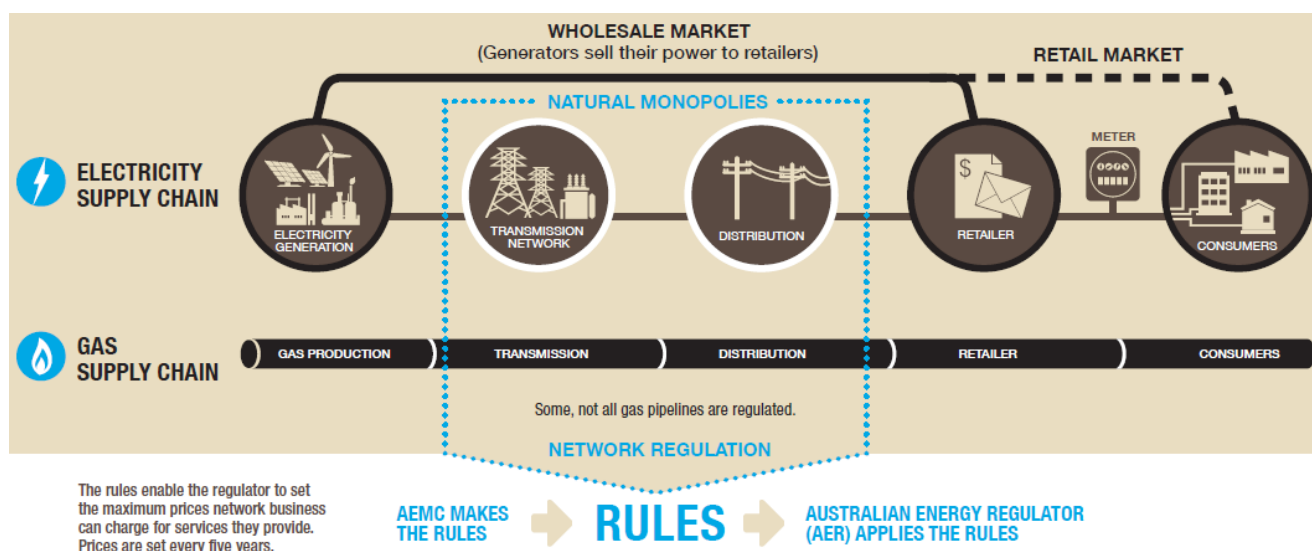


Requests to change the rules

The AEMC makes changes to the rules following assessment and consultation on proposals we receive to improve the rules. With the exception of minor rule changes, we cannot initiate changes to the rules in house – an external request needs to be made. Anyone can submit a rule change request to the AEMC and we must follow a statutory process to consider the request. This generally takes between three and twelve months from start to finish, depending on the complexity, and involves at least two rounds of consultation in defining the problem and identifying the appropriate solution. The highly consultative process is an important way in which the AEMC can take account of stakeholders' views and allow us to explain to stakeholders why we are making the decisions we are. This can help to facilitate a more effective implementation of the decisions we make.

In September 2011, the AER submitted requests to change the national electricity and gas rules for network regulation based on its recent experiences. Shortly after receiving the AER's request, the AEMC received a rule change request from a group representing major energy users, which identified an issue similar to that covered in the AER request. The AEMC decided to address the two requests together and embarked on over twelve months of analysis and extensive public consultation on the proposals.²⁰

This paper focusses on the changes to the electricity rules, which were more extensive than the changes to the gas rules.



²⁰ This consultation included formal written submissions on a consultations paper, directions paper, draft determination, draft transitional arrangements, meetings with key stakeholders, and a series of public forums and workshops on sub-issues.

The building blocks

The AER estimates the components or ‘building blocks’ that constitute the *efficient* costs and the appropriate level of financial return to its investors. This requires a degree of bottom up and top down analysis to determine the appropriate costs of a benchmark efficient business. The building blocks are the rate of return, the regulated asset base, operating expenditure, depreciation and corporate income tax.

Using these building blocks, the regulator determines a ‘maximum allowable revenue’ for the business over the five years. It is then for the business to decide how best to operate within this revenue ceiling. Broadly speaking, the Australian incentive approach is consistent with that of the United Kingdom and shares some similarities with one of the three methods the Ontario Energy Board has proposed under its renewed regulatory framework for distributors – the Board’s proposed ‘custom incentive regime’, which relies less on cost of services and involves a five year revenue forecast that includes multi-year capital investment forecasts.

To illustrate the AER’s approach we’ll focus on one of the building blocks, which is the largest – the return on capital.

Return on capital

The return on capital is the total return the business should receive on its investments, commensurate with the risks and total value of the investment. Accounting for up to 70 per cent of the revenue, the process for determining this building block attracted the most commentary in stakeholder submissions during our rule change process. It is essentially composed of two smaller building blocks - the rate of return and the asset base – both of which are determined by the AER.

Rate of return

Given the capital intensity of energy networks, the rate of return (or cost of capital) is one of the key determinants of the network prices that consumers pay. Service providers need to make significant investments in assets over time to maintain and improve their networks. The rate of return allows these businesses to attract the necessary funds from capital markets for their investments and service the debt they incur in borrowing the funds.

This involves the AER forecasting reasonable costs of debt and equity in financing the investments of each business, reflecting the risks an investor would face in providing this finance. If the rate of return is set too high, costs to consumers will ultimately be higher than the efficient level. If it is set too low, the business

will not be able to attract the finance it needs. This approach differs to that in Ontario, where there is no business-specific proceeding on the cost of capital.²¹

Asset base

The asset base of network businesses is large and long lived. Many of the poles, towers and wires in Australia were installed half a century ago and are still generating revenue for the businesses. Major network replacement and upgrade work has occurred in recent years in Australia.

The finance to build this infrastructure is repaid over the life of the asset – this is good financial practice where cash flows are matched over the life of an investment. It also helps to smooth the costs over a longer timeframe to mitigate price shocks. As such, the investment needs to be recovered through revenues over multiple regulatory periods.

The assets included in the regulator's maximum revenue calculations for a five year period include existing and future assets. This is investment that has occurred in previous regulatory periods and the future investment over the next five years to replace existing infrastructure or to expand infrastructure to meet demand forecasts.

This requires the assets that were built during previous five year periods to be 'rolled into' the asset base and revenue calculations for subsequent regulatory determinations until the asset is fully depreciated and the associated finance has been paid.

The regulator assesses the proposed investment by reviewing proposals based on information provided by the business and other external parties. This can involve (but is not limited to) assessing the proposal against historic costs and changes in the cost of labour and inputs, reviewing the age profile of assets to better understand replacement requirements, considering demand forecasts for proposed augmentations and reviewing regulatory tests for non-recurrent projects.

Other building blocks

In determining the maximum allowable revenue, the AER also needs to consider the level of corporate tax payable by the business, the required operating expenditure, and the level of asset depreciation in rolling the asset base into subsequent regulatory periods. Some of the changes we made will have impacts on the calculation of these other building blocks, but I will refrain from repeating the entire determination in this paper and focus instead on key elements of the changes.

²¹ P Bagci, T Brown, P Carpenter, P Hanser, 'Frameworks for assessing capex and opex forecasts as part of a "building blocks" approach to revenue/price determinations', The Brattle Group, June 2012, p 61.

So what was the problem and has it been fixed?

The AER considered the rules posed unnecessary restrictions on them that were causing consumers to pay more than they should for a safe and reliable supply of electricity. The rules were drafted at a time when the key objectives were promoting investment certainty and reliability, and the relevant institutional arrangements and bodies were also still very new. This led to a relatively prescriptive set of rules. The environment has since changed and it was time to reassess whether the rules remained appropriate.

In the past, prescription in the rules has caused inefficient outcomes in certain circumstances, such as at times of rapidly changing economic conditions. We have adjusted some aspects of the rules to help strengthen the capacity of the regulator. The changes to the rules primarily involve:

- a new rate of return framework;
- new tools for the regulator to incentivise network business to invest efficiently;
- clarification of the AER's existing powers; and
- changes to the regulatory process to enhance stakeholder involvement, particularly community representatives.

A new rate of return framework

The old rules involved three different frameworks – one each for electricity transmission, electricity distribution and gas – with varying degrees of flexibility in how the rate of return should be calculated. All three were essentially telling the regulator how to do a tough job, and they all had issues. We concluded that the previous approach to estimating the rate of return had not appropriately handled changes we have seen in financial markets in recent years. It has also not recognised that estimating the rate of return inevitably requires the regulator to exercise judgement having weighed up a range of evidence. No financial model can provide all the answers.

The new rules create a common approach to setting the rate of return across electricity and gas network businesses. A common framework can minimise risks of distortions in capital allocation or investment decisions between the electricity and gas sectors. Yet, the framework must allow consideration of the different characteristics of service providers in each sector when estimating a rate of return.

The common framework to be implemented requires the regulator to make an estimate of the rate of return that is consistent with an overall objective. The objective is focussed on the rate of return required by a benchmark efficient service provider, with similar risk characteristics as the service provider subject to the decision. This way the regulator has the flexibility to adopt the approach it considers appropriate to estimate the rate of return, provided it considers relevant estimation methods, financial models, market

data and other information. This is so that a best estimate of the rate of return can be obtained that reflects efficient financing costs of the service provider at the time of the regulatory determination.

While providing for flexibility, it is important for the confidence of investors, network businesses and consumers that the regulator is transparent about its approach and consults extensively when determining the allowed rate of return. To supplement the considerations at each regulatory determination, the new framework requires the regulator to develop rate of return guidelines setting out the approach it intends to take in estimating the allowed rate of return when making individual determinations. This must be undertaken no less than every three years and involve consultation with stakeholders.

While we did not model our rule changes for rate of return on the approach of any particular regulator, we were very aware of the approaches that Ofgem takes in the UK. In particular, the information it takes into account from financial market participants and its use of a rolling average to estimate the cost of debt.

New tools to incentivise efficient investment

We have provided the regulator with new tools to apply in its determination process to strengthen the incentive framework. The rule changes give the AER greater capacity to put in place ex ante incentives on businesses to manage their capital expenditure programmes efficiently. This includes enabling the regulator to decide whether to use actual or forecast depreciation and applying capital expenditure sharing schemes²² to be designed by the AER.

The changes also include removing any potential constraints on the way the AER can use benchmarking to assess the efficiency of a business in approving its capital (and operating) expenditure allowances. There is also a requirement for the AER to publish an annual benchmarking report that will provide public information on the performance of network businesses and ultimately assist the AER in assessing benchmark efficient costs for subsequent determination periods.

The new rules also provide, as a last resort, for ex post reviews to disallow inefficient overspends from being included in the regulated asset base for the next regulatory period. This would occur for obvious cases of inefficiency, rather than as the main means of achieving efficient levels of investment. The AER is required to only consider information that could have reasonably been available to the business at the time it undertook the investment.

²² Capital expenditure sharing schemes allow for the sharing of efficiency gains and losses from capital expenditure between the network business and consumers. In general regulators have approached such schemes by allowing a business to retain a set portion of any efficiency gains they make and bear a set portion of any efficiency losses it incurs against the benchmark.

Some stakeholders suggested the review of efficiency mechanisms should be broadened, where the AER should be allowed to reduce the asset base rolled into the next regulatory period when a business has spent within its allowance during the last regulatory period as well as when it spends more. The main tool to promote efficient investment however is ex ante incentives. The approach taken is intended to encourage the AER to develop and apply ex ante incentives to reveal the efficient level of investment (including timing of expenditure), so that the ex post review is a last resort option. The AER has made initial proposals for consultation to put in place strong ex ante incentives based on network businesses retaining 20-30 per cent of cost savings for investment below the amount assumed in the determination, and bearing up to 40 per cent of overspends.

Changes to the regulatory process - enhancing consumer engagement

Consideration of these rule change requests highlighted the difficulties consumers and their representatives experience in participating in the regulatory determination process. The regulatory determination process involves a high volume of information accompanying regulatory proposals and submissions, placing a burden on the resources of consumer representatives to digest this information and understand the risks, benefits and impacts of the proposals.

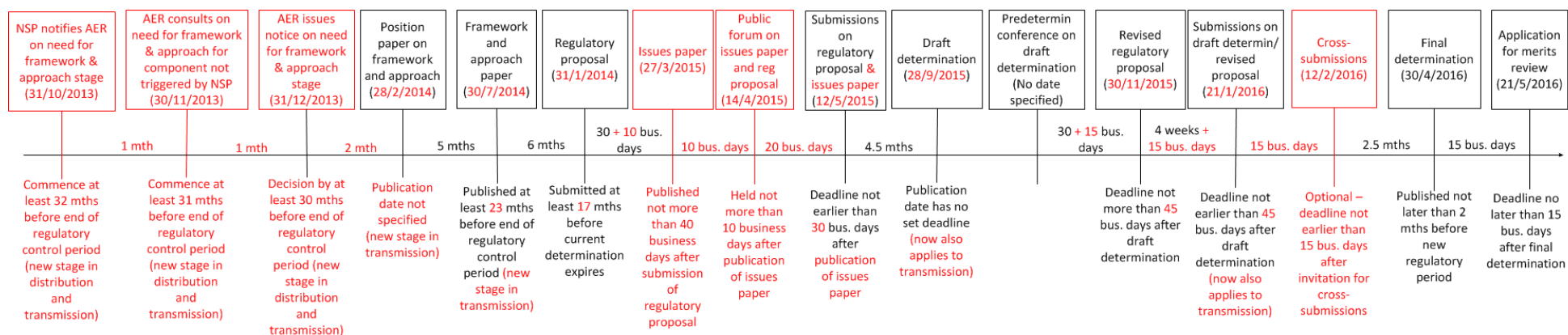
The regulatory proposal needs to be easier for consumers, including consumer representative groups, to understand. To promote this, the AEMC decided that an overview paper should be provided by the network business. The scope would be to focus on the risks and benefits of the regulatory proposal for electricity consumers. In addition, the paper would outline how the business has engaged with consumers and how it has addressed any of their concerns which have been identified as a result of that engagement. Finally, a comparison between the business' proposed and current revenue requirements would be made. This was aimed at promoting network business engagement with electricity consumers earlier in the process. As the overview paper would be consumer-focused, it would need to be presented in plain language that would be easily understood by electricity consumers.

Overall, the regulatory process needs to be transparent and timely. This is so that all parties have a clear understanding of their rights and obligations from the outset, as well as ample opportunity to participate. This is a key contributor to confidence in the overall outcomes from the perspective of both the network business and consumers. We lengthened the process to provide time for the AER to prepare and publish a mandatory issues paper and hold a public forum. The longer process will provide time for a cross submissions stage, if required. There will also be an optional framework and approach paper as part of the electricity transmission and distribution regulatory determinations processes. This document can be used, where necessary, to settle a number of issues prior to regulatory proposals being submitted.

These changes in the process are particularly intended to allow consumer representatives to participate more actively in the regulatory process. The changes are illustrated in the diagram over the page, which use hypothetical dates to demonstrate how the new process may operate.

Changes were also made to improve transparency and accountability by requiring network businesses to nominate to the AER the reasons why it classifies material as confidential. The AER will be required to publish a report of the network business making confidentiality claims as well as indicating the proportion of material that the business claims to be confidential.

Example of the new regulatory determination process applicable to electricity network businesses (hypothetical dates used)



Note: the stages in red above show the changes from the process under the previous rules.

Implementation

The new rules take effect immediately, with transitional arrangements to enable benefits to flow through to customers more quickly. To provide for certainty for the market, there are objectives and factors the AER must take into account when making decisions, as well as requirements for the AER to consult on and prepare a suite of guidelines setting out its approaches. The AER has already started this consultation process under its “Better Regulation” program, which includes consultation on guidelines for expenditure forecast assessment, rate of return, expenditure incentives, service provider consumer engagement, shared assets, confidentiality, and a consumer reference group.²³

The new rules will be applied in next revenue reset process for each jurisdiction. As noted earlier, the timing of the five-yearly regulatory periods differ across states. The effects of the new rules will first be seen in New South Wales in July 2014. This is the first state to reach the end of its existing five year determination period.

Drivers of effective regulation

The changes to the rules are expected to promote efficiency in a changing environment. However, the incentives faced by decision makers in network businesses are determined by a combination of factors – the regulated revenue is just one of these. The overall price and service outcomes experienced by consumers are dependent on two other equally important drivers:

- the effective application of the rules by the regulator; and
- the effective corporate governance of the network businesses.

Consideration of the latter is of particular importance when the network business is publically owned, given that they tend to not face the same capital market disciplines as private companies. The efficiency with which network services are provided depends on the way in which the drivers work together. Only when these aspects are operating as intended will the best outcomes for consumers be achieved.

Merits review

The application of the rules can be challenged under the limited merits review process. Once a determination has been finalised by the AER, within a specified time period, anyone²⁴ can lodge an application for a limited merits review of the determination to the Australian Competition Tribunal. If the appeal is successful, the Tribunal can make a decision itself or refer the decision to the AER with directions or recommendations as to how its approach should differ. Ultimately the final determination may be varied, in which case the post appeal outcome will be locked in for the remainder of the regulatory period.

²³ See: www.aer.gov.au

²⁴ In practice it is generally the network business that appeals decisions. A number of stakeholders have suggested that there are significant challenges for other parties to appeal decisions due to complexity, lack of information and the costs associated.

Between June 2008 and October 2011, there were 16 limited merits reviews for network determinations that collectively resulted in an estimated increase of \$2.9 billion in allowable revenues. Over a five year period, merits review decisions have had an estimated total revenue impact of around \$3.6 billion.

This limited merits review framework is soon to be changed, following an expert panel review chaired by Professor George Yarrow. Following the recommendations of the panel, Government officials have concluded that the number and nature of reviews indicates the limited merits review regime has become an extension of the regulatory determination process, which is contrary to its intended operation. These frequent appeals increase the costs for market participants and, ultimately, consumers.²⁵

Other drivers

There are other external factors that will impact the investment signals for a network business, such as global markets for finance and state planning laws. Reliability standards are also an important part of the overall incentive framework and are designed to address the 'quality' issue of monopoly businesses (the regulation discussed in detail above is focussed on the 'price' issue of monopoly businesses). Each state and territory government retains control over how transmission and distribution reliability is regulated, which has resulted in different approaches in each jurisdiction. As discussed earlier, some state governments have changed the reliability standards leading to an increase in capital expenditure.

Decisions about reliability standards need to be taken based on a good understanding of the costs of different reliability standards and the community's view on the standards they want. While it is for state governments to determine reliability standards, our review of the standards in New South Wales showed that greater application of cost benefit analysis has the potential to allow better decisions to be made about reliability standards in the future.²⁶ This involved a cost benefit analysis of four scenarios of higher or lower standards with a value of customer reliability developed through this survey of almost 1,300 customers.

During this year we will be developing proposals, at the request of Australian governments, to develop national frameworks for determining reliability standards that states can opt in to. Energy ministers have also been asked by the state premiers and the Prime Minister to consider delegating the responsibility for reliability outcomes to the AER, with the AER to apply the frameworks the AEMC develops.²⁷ Either way, there is scope to better integrate the regulation of network prices and reliability.

²⁵ Standing Council on Energy and Resources Senior Committee of Officials, *Regulation Impact Statement, Limited Merits Review of Decision-Making in Electricity and Gas Regulatory Frameworks*, Consultation Paper, 14 December 2012,

²⁶ AEMC, *Review of Distribution Reliability Outcomes and Standards*, Final Report – NSW workstream, 31 August 2012.

²⁷ COAG Energy Market Reform – Implementation Plan, 2012.

Regulating in the public interest – part two

We now turn to a very different example of regulating in the public interest involving the AEMC's second hat – the hat we wear as an adviser to governments on energy market development. We receive requests for advice from a ministerial council that brings together all energy and resources ministers from the state, territory and Commonwealth governments.²⁸

To prepare our advice, we generally undertake a 'market review' to investigate relevant issues and consult publicly on possible options to improve the market's efficiency. At the end of 2012, the AEMC completed a market review entitled 'Power of Choice', which is the focus of the second part of this paper.

Power of Choice

Power of Choice was very broad in scope, involving a comprehensive assessment of all parts of the electricity supply chain to identify opportunities for efficient demand side participation. The objective was to enable the community's demand for energy services to be met by the lowest cost combination of demand and supply side options.

A key question was how to gain greater confidence that the value consumers placed on their consumption of energy services was greater than the costs to the system of supplying them. The review sought to identify the opportunities for consumers to make more informed choices about the way they use electricity. It also sought to identify appropriate incentives for network businesses, retailers and other parties to respond to consumers' choices.

The 18-month review concluded in November 2012 with a package of recommendations provided to governments. The recommendations are designed to equip consumers with the knowledge, information and incentives to make more informed choices about when and how to use electricity. They include a substantial package of recommended changes to the wholesale, network and retail market.

Australian governments have provided in-principle agreement to the full set of recommendations.²⁹ They have recently begun work on implementing some of the recommendations and are collectively considering the implementation of the remainder.

²⁸ This council is the Standing Council on Energy and Resources (SCER). Further information: www.scer.gov.au

²⁹ All Australian governments except for Queensland provided their in-principle agreement to the recommendations, with Queensland reserving its agreement until the completion of the state's energy market reviews that are considering a number of the issues identified in the Power of Choice review.

Flexible pricing – incentivising efficient consumption

The value of electricity to a consumer is derived from the value of the services or products it is used to produce. Consumers do not purchase electricity because they want some kilowatt hours, but because they want a hot coffee or shower, or they want to cool their homes or workplace during a heatwave. The value of electricity to a consumer is a function of the value derived from its end use. Efficient consumption decisions occur when consumers derive more value from the outcomes of consuming electricity than it costs to provide that electricity.

Retail electricity prices have four key cost components:

- wholesale – the price of electricity purchased from generators. This includes the impact of Australia's carbon price as it feeds through into wholesale electricity prices;
- transmission – the costs to transport electricity across high voltage wires from generation systems and interconnected systems;
- distribution – the costs to transport electricity across low-voltage wires to where it will be used; and
- retail – the costs to manage the delivery of electricity to end-users, including billing, customer service and risk management. Retail costs also include the costs of meeting Australia's Renewable Energy Target and state based feed-in tariffs.

The wholesale spot price and network costs are time-sensitive. That is, they are higher if consumers choose to use electricity at peak demand times. However, the cost variability associated with peak demand does not flow through as variable retail prices. The retail prices paid, particularly by households and small businesses, are not generally time-sensitive. Similarly, network costs vary depending on where on the network electricity is consumed, but retail prices are not location-sensitive within any given distribution network.

Network and generation assets are built to a level that reliably provides electricity during the peak demand periods due to the inability to cost-effectively store electricity on a large enough scale. Generation that is offered into the wholesale market during peak periods needs to be available at short notice. This usually involves building generation technologies, such as peaking gas generation which is able to rapidly adjust its production levels.

For network businesses, peak demand periods are costly as the business has to build infrastructure to meet the reliability standards throughout the year, including during times of peak demand. This is usually achieved by building extra network capacity that is ready to cope with the few hours of summer each year where air-conditioners get a workout. The Australian Government estimates that 25 per cent of retail

electricity costs are derived from peak events that occur over a period of less than 40 hours per year (ie less than one per cent of the time).³⁰

Power of Choice looked at this peak demand issue from a few angles, exploring demand side options to reduce the level of demand peaks in the national electricity market and avoid or defer the need for more network and generation investment. A key part of this was looking at the current structure of electricity prices. Perfectly efficient electricity prices would mean that for each unit of electricity consumed, consumers are charged the full costs (and no more) that are incurred in supplying that unit of electricity. This means that (a) suppliers recover the costs of providing electricity; and (b) consumers spend no more than they need to on the services that electricity provides.

Currently in Australia, consumers generally face flat³¹ or inclining block tariffs,³² which bear little relationship to the actual impacts they impose on network and electricity supply costs. For example, inclining block tariffs provide some signalling by increasing the level of the charge once a particular consumption threshold has been reached, but they do not reflect that actual costs consumers are imposing on the network.

The share of network and wholesale costs for each consumer is determined on the basis of an average consumption profile applied to all consumers who do not have meters that measure time of consumption. This means that consumers wishing to reduce their energy expenditure by adjusting their consumption pattern will not realise the full benefits of doing so; rather these benefits are shared with all consumers that fall under that retailer's average consumption profile.

The averaging of residential and small business consumers results in cross-subsidisation between types of consumers. Consumers with low consumption and relatively 'flat' profiles (that is, they consume evenly across high cost (peak) and low cost (off-peak) periods) are therefore subsidising the electricity costs of consumers with large consumption and relatively 'peaky' profiles (that is, those consumers who consume much more in high cost than low cost periods). Under the current price structures, both are paying the same cost per unit, even though the average cost of supplying the peaky consumer is much higher than the average cost of supplying the flat consumer. Without cost reflective pricing, consumption decisions are disconnected from the impact of those decisions on the total costs to the system.

³⁰ National Energy Saving Initiative, Issues Paper, prepared by the National Energy Savings Initiative Working Group, Department of Climate Change and Energy Efficiency and Department of Resources Energy and Tourism, December 2011, p. 71

³¹ A flat price is a price structure which has no time element incorporated and could include a block structure.

³² Inclining block prices see the marginal price for a unit of electricity increasing as a certain consumption threshold during a particular period is crossed. They are not based on time of day or the time of year.

Power of Choice considered the improvements that can be made to market and regulatory arrangements to better facilitate cost reflective pricing for residential and small business consumers.

Efficient price signals for network use

A key aspect of implementing cost reflective pricing involves changes to network pricing. Until recently there has not been much focus on the structure of the prices charged by network businesses. Cost reflective and efficiently set network tariffs can provide important price signals for consumers to encourage more efficient consumption decisions. This will also provide better signals at more disaggregated levels about when and what type of investment is required in networks to deliver a reliable supply.

The structure of network tariffs also affects how the risks associated with utilisation of the network are shared between network businesses and consumers. Arguably more cost reflective and efficiently set network tariffs are even more important now given the changing use of the networks through developments such the rapid increase in rooftop solar photovoltaic installation in a number of Australian states. These changes mean that, for some consumers, the network is a means to sell surplus electricity and effectively a back-up source of electricity when the embedded generation is unavailable. Despite these developments the structure of network tariffs continues to reflect a situation where most consumers use the networks in a traditional way to source all of their electricity.

In the Power of Choice review we recommended to governments that regulatory changes to encourage more flexible pricing should be focused on the network component of retail bills. We proposed this for two main reasons.

First, network costs driven by peak demand are a significant component of overall resource costs required for meeting electricity demand. As discussed earlier, the network component makes up approximately 50 per cent of a typical retail bill. More efficient pricing of networks should therefore, in its own right, have significant flow on impacts to overall electricity expenditure faced by consumers. Retailers are likely to pass through network tariff structures to consumers, because doing so is the most effective way for them to manage the risk of price structure mismatch - that is, the difference in the profile of payments the retailer receives from consumers and what it has to pay the network business. Also, network costs are a straight pass through to regulated retail prices in jurisdictions other than Victoria and South Australia, thus we would expect regulated retail offers to be based on flexible network tariff structures.

Second, we consider that there are adequate market incentives to encourage retailers to offer flexible pricing options to consumers as a way of managing wholesale energy costs. Offering innovative flexible pricing products to consumers that reflect consumer profiles and/or consumer willingness to adjust

behaviour will allow retailers to compete and increase market share. Imposing greater prescription in retail prices to deliver this outcome could amount to over-regulation. Submissions from stakeholders supported our recommendation for changing the regulatory arrangements for pricing at the network rather than the retail level.

Technology to enable efficient pricing

To enable more efficient electricity pricing, consumers need technology that can provide time-sensitive consumption information. With around 88 per cent of households in Australia still having their meters read on an accumulation basis there is a limited ability to record the timing of consumption and, hence, limited ability to implement efficient pricing structures.³³

The current arrangements in Australia are inhibiting the ability of consumers and market participants to invest in metering technology that supports efficient prices and services. To address this we are recommending a framework that encourages commercial investment in smart meters and services they enable to promote consumer choice.

Power of Choice recommended establishing the regulatory framework to encourage commercial investment in smart meters. That is, rather than creating a regulated monopoly on metering services through mandating rollouts, we recommended a 'lighter touch' from the regulator to promote competitive markets. We believe this will enable competition to drive efficiency, by allowing businesses to develop their metering products and services in a way that consumers value.

We have therefore recommended amending the national electricity law to remove the option for a mandated rollout of smart meters. Under our proposed model, the onus will be on the retailer or an alternative service provider to elicit consumer consent to a smart meter through offering appropriate retail pricing offers and value added services. A framework for open access, interoperability and common communication standards is vital for this approach. Our competitive model is to be underpinned by a minimum functionality specification for the meter to be adopted nationally, which has already been endorsed by Australian energy ministers. This should enable different pieces of equipment that are installed to talk to one another.

This approach will support efficient markets as it promotes competition in the provision of metering services, product and service innovation, greater service options for consumers and efficiency in metering

³³ Smart meters have only been rolled out on a large scale in Victoria as part of a mandated deployment, where around 1.5 million smart meters have been installed. Detailed information on the outcomes of this rollout and smart meter installations in other states is available in a report by DNV KEMA commissioned by the Australian Government: Department of Resources Energy and Tourism, *National Smart Meter Infrastructure Report*, 4 February 2013.

costs. This is preferable to retaining networks as the monopoly provider of metering services to households and small businesses. There is a tradeoff, as with most policy decisions, around the speed and effectiveness of implementation. While mandates and targets may speed up implementation processes, they are less responsive to consumer choices, and do not necessarily promote efficient outcomes.

Flexible pricing (enabled by advanced metering) will be an important behavioural driver, but it will not act alone in determining consumption decisions. Other factors can also influence consumers' decisions on when and how much to consume, such as convenience, awareness and understanding. It will be important for the retailer or other service provider to ensure any changes are seamless for the consumer. There will be a critical role for them to inform the consumer of the potential opportunities and benefits that more advanced meters can provide so that consumers can make fully informed decisions. There will similarly be an important role for governments in providing information to consumers and in protecting their interests. The final report makes a series of recommendations to support the initiatives described above.

Power of Choice dedicated significant time and resources to addressing other important areas to support efficient consumer decisions. Again, in the interest of avoiding duplicating the entire final report within these pages, I've focussed on a subset of the recommendations we made. However, there may be some insights for other policy makers in other countries as a result of the extensive work we undertook and I encourage you to visit our website and read on.³⁴

Conclusion

The two case studies in this paper were selected to illustrate the regulatory spectrum in promoting efficient outcomes in competitive markets and in natural monopoly markets. Both are firmly rooted in creating incentives to motivate efficient behaviour of individuals, including network business managers, electricity retail executives or electricity customers.

In the case of promoting efficient network services in a monopoly market, we have made a series of changes to strengthen the incentive framework for network businesses in terms of cost and quality. Our rule changes will support the former and we are addressing the latter through a national framework for reliability settings that jurisdictions may choose to adopt. Network regulation through incentives involves complex decision-making by the regulator, who is at an informational disadvantage when compared to the business. However, we consider the challenges and risks are fewer overall for a regulator under incentive regulation as opposed to the cost of services approach. Under the latter, multiple decisions are required on an ongoing basis at a more detailed project level, where the disadvantages of information asymmetry can

³⁴ See: www.aemc.gov.au and search project code: EPR0022 or access via our 'completed' market reviews section.

be even further magnified. The risks of poor decision making shift from the business to the regulator and the accountability for delivering reliability standards no longer rests clearly with the managers of the network business.

Regardless of how many piles of paper or gigabytes of data a regulator receives about a business, that business will always know more about its operations and customers than the regulator. The task therefore falls to creating the right incentives for firms to operate and invest efficiently in the long term interests of consumers.

In the case of competitive markets, the right incentives are also necessary to drive efficient outcomes. Power of Choice set out a range of important changes necessary to establish the right incentives, including those required to drive a competitive market for metering services.

In regulating competitive sectors of electricity markets, policy makers, legislators and regulators need to have clear and robust objectives, establish strong decision-making frameworks, and then sometimes take a back seat to allow the market to work. We must be just as alive to the prospect of regulatory failure as we are to market failures and be suitably humble in concluding that, as regulators, we can know what's in the best interests of consumers. We have recommended to Australian governments that, in the case of advanced metering technology, a framework supporting competitive metering services will deliver the most efficient outcomes in terms of costs and service quality for consumers. This will ultimately support greater choice for consumers and provide better signals for efficient investment in the energy market as the market continues its evolution.