PART ONE
ESSAY A

Phil Carrick (Fairfax Images)

STOCKTAKE OF ENERGY REFORM

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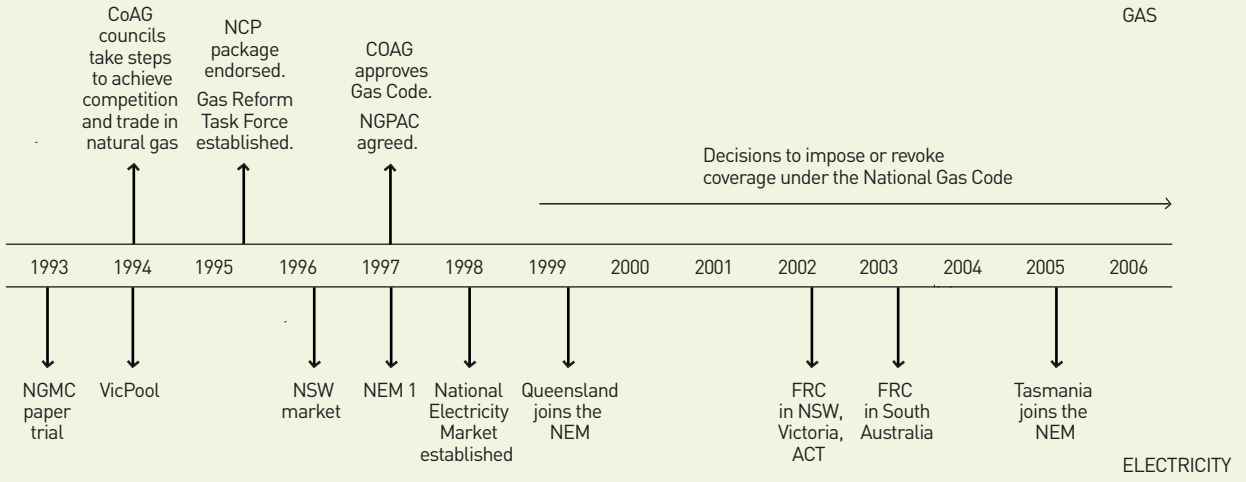
Introduction

In the early 1990s, Australian governments embarked on reforms to establish a competitive energy sector. These included:

- **structural reform**—separating potentially competitive functions from monopoly infrastructure, and establishing a competitive industry structure for commercial functions
- **competitive neutrality**—establishing corporatised governance structures for significant government businesses
- **access**—enabling access to monopoly infrastructure, with independent authorities to oversee prices
- **market design**—establishing a national electricity market, with associated institutions to oversee the rules and manage the market, and establishing gas market arrangements.

Some of the key steps in energy sector reform are illustrated in figure A.1.

Figure A.1
Key timelines in reform



This essay provides an overview of the implementation of these reforms. It considers whether the model has been implemented as originally intended and how it has worked. It looks at both gas and electricity, but concentrates on the National Electricity Market (NEM).

Structural reform and changes to the governance arrangements for government-owned businesses have been implemented across Australia. Subsequent developments have varied. In jurisdictions with continued government ownership, industry structure has changed little. In jurisdictions that have privatised their energy sector, industry structure has changed rapidly, leading to separation between network and merchant businesses, increased concentration of ownership in both, and vertical integration between retail and generation.

Access regimes have been implemented across Australia. There have been different trends in electricity and gas. Electricity has relied almost 100 per cent on regulated access, despite attempts at a deregulated model for electricity transmission. Gas transmission pipelines have increasingly become unregulated, while gas distribution has remained largely regulated. Electricity and gas networks have both seen high levels of investment.

A competitive wholesale electricity market has been established across the eastern seaboard. The market design has been stable, but has faced some difficulty in evolving the regional structure as envisaged. Full retail competition has been introduced, or a commitment made to introduce it, in all jurisdictions in the NEM. However, full deregulation of the retail market has not yet been achieved.

This framework has delivered substantial investment in generation and in networks. Overall electricity prices have reduced, although with rebalancing between business and households. The retail market is increasingly competitive, particularly in Victoria and South Australia.

Implementing the reforms

The jurisdictions entered into agreements to implement structural reform, competitive neutrality and the introduction of competitive markets. How have the reforms gone?

Structural reform

The starting point for most jurisdictions was an integrated electricity utility. Separation was required between the networks and the potentially competitive parts of the industry. Competitive wholesale and retail markets also required sufficient businesses to set prices through competition rather than regulation.

There was substantial restructuring in the mid-1990s. In jurisdictions with public ownership, industry structure has been reasonably stable since then. Jurisdictions with a high level of private ownership have seen a continued rapid pace of change. This has led to separation between merchant businesses and networks; integration between generation and retail; and concentration in the ownership of generation, retail and networks.

Victoria and South Australia privatised their electricity supply industry. In New South Wales and Queensland, the industry has remained predominantly in public ownership. Across the NEM, around two-thirds of generation, and 70 per cent of transmission, are publicly owned. There has been both private and public investment in new capacity, for both generation and network businesses.

Industry structure

All jurisdictions implemented a similar set of reforms to the structure of their electricity industry in the early to mid-1990s. These entailed breaking up generation into several businesses; establishing one or more transmission businesses; and creating several retail/distribution businesses, with ring-fencing between the distribution and retail functions.

The pace of restructuring was rapid. In New South Wales, Pacific Power was created from the former Electricity Commission in 1992 and restructured into three generation business units, a network business and a trading business. In 1995 Transgrid was separated from the network business, and 25 electricity distributors were amalgamated into six. In 1996 two government-owned generation businesses, Delta and Macquarie Generation were spun out, and the state-based competitive market started.

Similar developments took place in other states. In Queensland the Queensland Electricity Corporation was divided into a generation corporation, and a transmission and supply corporation in 1996. The generation corporation was split into three generation companies, CS Energy, Tarong Energy and Stanwell. In addition, the Queensland Power Trading Corporation (now Enertrade) owned some generation assets, and held a number of power purchase agreements. By 1998 seven distribution and retail businesses were consolidated into two, Ergon and Energex.

Victoria broke the former State Electricity Commission of Victoria into generation, transmission and distribution companies in 1993. In 1994 it consolidated 18 business units and 11 municipal undertakings into five distribution and retail businesses. These businesses were sold in 1995. Generation was broken into five generation companies and mostly sold during 1996 to 1997, with Ecogen being sold in March 1999.

These reforms were all similar, driven in part by agreements under the National Competition Policy. However, they also had distinctive features. Victoria restructured its generation sector into businesses at power station level although, as discussed below, there has been substantial reintegration. New South Wales created 'portfolio' generation companies, with several generating plants in each company.

Subsequent developments have varied. Jurisdictions with a high level of government ownership have had a stable industry structure. New South Wales completed the creation of its generating businesses through spinning off Eraring Energy from Pacific Power in 2000 and selling off Pacific Power's coal and consulting businesses. New South Wales also consolidated three regional distribution and retail businesses into one, Country Energy.

Queensland largely maintained its industry structure until recently. However, in November 2006 and February 2007 its government sold its mass market retail businesses, Powerdirect and Sun Retail. This has led to vertical separation of retail and distribution.

The industry structure in Victoria and South Australia has continued to change rapidly. Privately owned assets have changed ownership two or three times. This has resulted in some significant differences in industry structure between Victoria/South Australia and elsewhere.

One difference is the nature and extent of vertical integration. In Queensland and New South Wales, generation and retail businesses are largely separate. A number of generators have retail licences, but have a low market share. However, in Victoria and South Australia AGL, TRUenergy and Origin combine large retail businesses with ownership or part-ownership of around 55 per cent of generating capacity.

New South Wales has maintained common ownership of its distribution networks and mass retail businesses. In Victoria and South Australia a complete separation between retail and distribution businesses has emerged. This appears to reflect capital market drivers. Queensland has now largely separated the sectors.

Another difference is the approach taken to structural separation initially and subsequent developments. All jurisdictions established several generation businesses. In Victoria each generating plant was a separate business, other than Southern Hydro and Ecogen. In New South Wales, Queensland and South Australia portfolio generators were created.

Again, states that privatised have seen rapid changes to industry structure. Figure A.2 shows the trends in ownership of generation in Victoria and South Australia. In the past few years:

- AGL has acquired a part-interest in Loy Yang A, bought Southern Hydro and in 2007 acquired Torrens Island from TRUenergy
- International Power, which already owned Synergen and Pelican Point in South Australia, bought Hazelwood and then Loy Yang B
- TRUenergy, which already owned generation at Yallourn, acquired the former TXU generation capacity
- several major investors have exited from the industry.

Figure A.2
Generation ownership in South Australia and Victoria by installed capacity to 2006

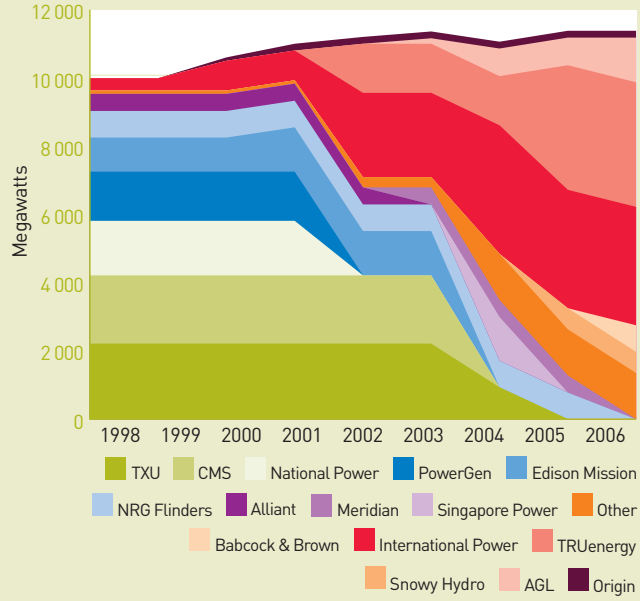


Figure A.2 illustrates the increasing degree of concentration in Victoria and South Australia in recent years. The figure is over-simplified, as ownership arrangements can be quite complex. It also excludes the recent exchange of generation capacity between AGL and TRUenergy. However, it does allow a relatively clear visual depiction of increasing concentration in the sector.

The result is less concentrated than generation ownership in New South Wales and rather more concentrated than in Queensland. Victoria and South Australian generation remains exposed to competition from the north and more recently from the south through Basslink.

There has been a similar concentration of ownership in retail. TRUenergy, Origin and AGL, the three gentailers (retailers that own generation plant), have absorbed all of the mass market electricity and gas retail businesses sold in Victoria, South Australia and Queensland. There has been no comparable change in retail ownership in New South Wales.

There has also been a concentration of network ownership in Victoria and South Australia. Cheung Kong Infrastructure/Hong Kong Electric Holdings control two distribution businesses in Victoria—CitiPower and Powercor—and the distribution business in South Australia. Also in Victoria, SP AusNet owns a distribution business and is the major transmission service provider.

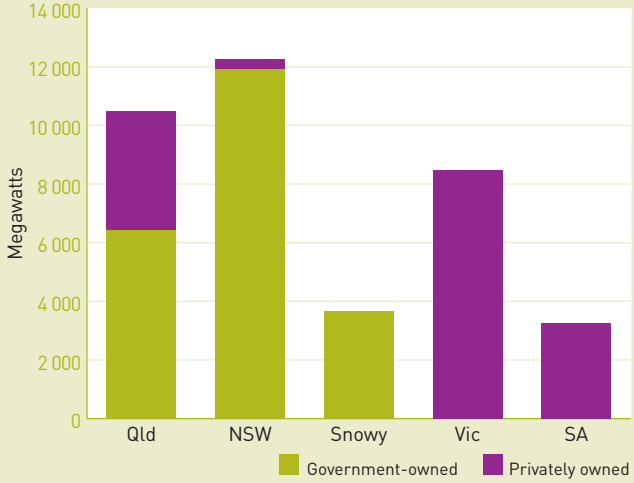
There have been some similar trends elsewhere. The New South Wales Government has consolidated its three regional distribution and retail businesses into one, Country Energy. A recent Boston Consulting report for the Queensland Government also raised the possible cost synergies from a merger of its distribution businesses.[1]

Competitive neutrality

As the role of the public sector in the electricity industry varies from state to state, so too does the need for competitive neutrality.

Overall, nearly two-thirds of generation is government-owned. The shares of government-owned and privately owned generation by jurisdiction are shown in figure A.3.

Figure A.3
Government and private generation by jurisdiction



New South Wales has kept its generation businesses in public ownership. The New South Wales Government recently announced a 400 megawatt (MW) combined cycle generation plant to be developed by TRUenergy at Tallawarra, and a 600 MW open cycle plant to be developed by Delta, a government-owned generation business, at Lake Munmorah.

Queensland has had a mix of public, private and joint ownership of generation. Callide Power and Tarong North were developed jointly by government and private investors. The most recent power plant, Kogan Creek, was initiated as a 40/60 joint venture between the government-owned CS Energy and privately owned Mirant. It is being undertaken solely by CS Energy since Mirant sold out its 60 per cent interest in May 2002. Victoria and South Australia have sold their generation interests, and rely on private investment for new capacity.

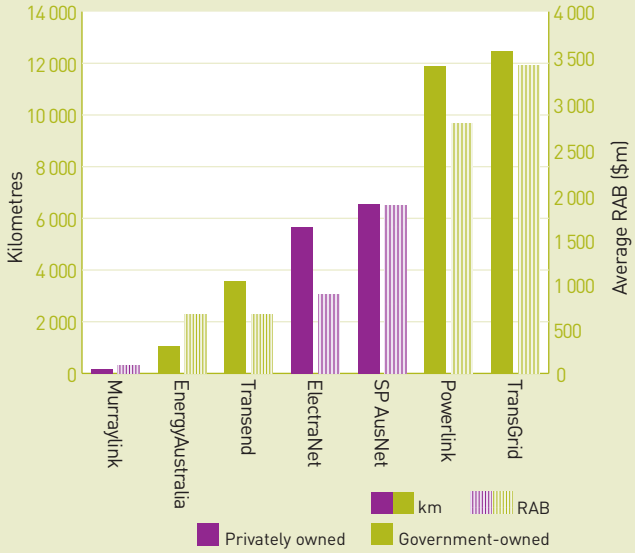
Network businesses in New South Wales, Queensland and Tasmania remain in public ownership. Victoria and South Australia have privatised their network businesses.

There has been some private investment in unregulated DC transmission links. Two mainland DC links have since converted to regulated status. The transmission link to the mainland, Basslink, remains unregulated. The link is owned and operated by a private company, with financial support being provided by the public sector.

The size of the transmission businesses, in both kilometres of transmission line and size of the regulatory asset base, is shown in figure A.4. The information is drawn from the Australian Energy Regulator (AER) report of April 2006 on transmission network service providers (TNSPs), and excludes Directlink and Basslink.[2] The government-owned transmission businesses in New South Wales, Queensland and Tasmania account for around 70 per cent of the regulatory asset base, and a rather larger share of new transmission investment.

1 The Boston Consulting Group, *Queensland energy structure review*, Final report, March 2006.
2 AER, *Transmission network service providers electricity regulatory report for 2004/05*, April 2006.

Figure A.4
Size of the transmission businesses



Retail businesses in Victoria, South Australia and Queensland are private. In Tasmania and New South Wales the mass market retail businesses remain government-owned.

Competitive neutrality has been implemented. All government businesses in generation, network and retail are corporatised, and all governments have set up competitive neutrality complaints units. No use has been made of this complaints mechanism to address concerns that have sometimes arisen about government-financed investment.

While the policy of competitive neutrality has been implemented, it is not clear that it has worked. Private investors remain unsure about the policy settings—are governments seeking private generation investment, or are they happy to finance this investment themselves? And private investors remain concerned about whether decision-making by government-owned business is fully commercial, and earning returns in line with the risks they are bearing.

An energy-only market moves in rather long waves, with average prices rising to new entrant prices—and enabling existing investors to recover their capital costs—as the supply position tightens. If governments facilitate investment in advance of the likely commercial response, this may provide high reserves but—under the current market design—will undermine reasonable commercial returns to private investment.

As a result, there is a somewhat uneasy coexistence between public and private investment in the electricity sector. This uneasiness may be reduced through changes in ownership, such as Queensland's recent sale of its retail interests. It could also be reduced if any non-commercial objectives were made explicit. These issues were strongly raised in the 2007 report to the Council of Australian Governments (COAG) by the Energy Reform Implementation Group (ERIG).

Access to monopoly infrastructure

Separation between the potentially competitive elements of the market and the monopoly networks was combined with the introduction of access regimes, with independent price regulation. The application of these reforms has differed sharply between gas and electricity. The electricity sector tested a deregulation model for transmission, but has reverted to close to complete regulatory coverage in that sector. The gas sector has seen increasing deregulation.

The National Electricity Code has always allowed for both regulated and unregulated transmission investments and code changes established the basis for unregulated investments. Subsequently three unregulated transmission investments were made: Directlink, Murraylink and Basslink.

Two of the investments have subsequently converted to regulated status, at a loss, while Basslink only started operations on 29 April 2006. The Ministerial Council on Energy (MCE) announced in December 2003 that it would remove a perceived bias in favour of unregulated investment. This change was implemented in mid-2004. In addition, the commercial appetite for unregulated transmission investment may be low, given previous experience.

The main focus has therefore been on developing a regulatory regime for transmission, which so far has been an open access regime. Generators get dispatched on the basis of their offers, within the constraints imposed by secure operation of the network. They have no rights to transmission capacity. The interaction between incumbent rights and access to the network by new investors remains a contentious topic.

The regime itself has developed through principles and practice. Regulatory principles have been developed by the AER and, more recently, rules for transmission revenue regulation and pricing have been developed by the Australian Energy Market Commission (AEMC).

Decisions have been made on revenue caps for all the TNSPs, with a second set of five-year determinations recently for Transgrid and EnergyAustralia and second determinations under way for Powerlink and SP AusNet. As a result there is a considerable body of practice.

All distribution businesses are regulated by jurisdictional regulators, through five-year resets. The resets are based on revenue or price caps that use a building block—that is, an estimation of the efficient costs of providing the distribution services allowing for return on capital, depreciation, new capital expenditure and operating costs. There has been some convergence in regulatory approach. This should be strengthened with the proposed transfer of these functions to the AER under the Australian Energy Market Agreement (AEMA).

The Gas Code has arrangements for certain pipelines to be 'covered' under the code and required to offer benchmark tariffs approved by a regulator. However, while the trend in electricity networks has been towards increased reliance on regulated networks, the trend for gas pipelines has been in the opposite direction.

There has been a high level of deregulation in gas. Recent decisions to remove or not impose coverage include:

- the decision against coverage of the Eastern Gas Pipeline, from Longford to Sydney, in 2000
- the revocation of coverage of the main trunk of the East Australia pipeline from Moomba to Sydney (but not other parts of the pipeline system)
- many smaller pipelines in Queensland, South Australia, Victoria and Western Australia.

This has led to much greater reliance on unregulated investments in the gas pipeline sector. Gas distribution networks have largely remained regulated.

Market design

The introduction of competition required the design of a wholesale market. The wholesale market has stayed reasonably close to original design, but has come under pressure from failure to evolve the regional structure.

In electricity, the wholesale market is settled on the basis of half-hourly consumption. Extending competition to mass-market consumers, who do not have half-hourly meters, required the design of a retail market. The retail market design adopted a relatively low-cost and pragmatic approach. This appears to have been successful so far, but may require change as interval meters are rolled out.

In the gas sector, Victoria has a spot market, with the market operator VENCorp carrying out functions that are managed by the pipeline operator in other states. There is no commitment to a single model for gas markets, but proposals have been put forward on steps to increase the transparency of the market. COAG has also agreed to establish a National Energy Market Operator.

The National Electricity Market

The market design was developed during the 1990s. The National Grid Management Council conducted a paper trial of a national market in 1993–94. Separate markets were established in Victoria and New South Wales in the mid-1990s, a National Electricity Code agreed to in 1996 and the NEM started operations in 1998. Tasmania joined in 2005.

The wholesale electricity market relies on competition to set half-hourly prices. The NEM is an energy-only gross pool:

- 'Energy-only' means that generators are only paid for producing energy. Some markets have capacity payments in different forms. The NEM has no payment for simply making capacity available, and no obligations on retailers to contract for reserve.
- 'Gross pool' means that all energy has to be sold through the pool. This contrasts with some other markets where the bulk of energy is managed through bilateral arrangements between generators and major consumers/retailers, with the pool only acting as a balancing market.

Changes to market design have been considered with the arguments for a capacity market having been rejected twice, in 1999 and 2002. The issue is currently being raised again by some market participants, in response to tightness in supply in some jurisdictions. The Parer report considered and rejected a shift from a gross pool to a net pool, although some commentators have continued to argue the case.

The design of the NEM is similar to the original England and Wales pool. One important difference is the use of regions. Prices within the wholesale market are established on a regional basis. Prices are reasonably uniform across the regions, but can diverge sharply when transmission lines between regions are constrained.

The NEM was initially structured around regions based on jurisdictions, with the exception of the Snowy region. The code included criteria for the evolution of regional boundaries. These were designed to ensure reasonably strong transmission interconnection within regions. Although the criteria for boundary change were met, the regional structure has not yet changed.

The failure to evolve the regional structure as originally intended has arguably been the greatest divergence from the original design of the wholesale market. This has resulted in major stresses, in particular in and across the Snowy region. It has also encouraged consideration of alternative solutions, and the trialling of approaches to improve price signals to generators. However, the MCE has recently endorsed the continued use of a regional framework for the NEM.

As a result, the market design has been stable since market start, with minor changes rather than large shifts in fundamental design. On balance, this has been a strength of the NEM. Other markets have seen major changes in design, with high direct and indirect costs. For example, the introduction of new market arrangements in England and Wales were estimated to create industry costs of up to £580 million (A$1.4 billion in 2001 prices).[3] There has been no sign in the NEM of market design problems that would justify such high costs.

Electricity retail markets

The wholesale market is settled on the basis of production and consumption every half-hour. However, mass market consumers only have meters that read consumption cumulatively, rather than half-hourly. Extending the competitive market to smaller consumers required a new market model.

The NEM adopted a model for retail competition based on the 'net system load profile'. Essentially, the time profile for all smaller consumers was assumed to be identical, and was set by the residual after netting off consumption whose time profile was known, such as major consumers with time-of-use metering and street lighting.

3 National Audit Office, *The new electricity trading arrangements in England and Wales*, 2003, p. 5.

This approach is simpler than some models elsewhere. For example, the United Kingdom adopted a profiling approach based on eight deemed profiles for smaller users that are not half-hourly metered. The costs of implementing retail competition in the United Kingdom are understood to be considerably higher than they have been in Australia. This is understood to be attributable in part to the use of a greater number of deemed profiles.

The adoption of retail competition based on net system load profile appears to have gone smoothly in Australia. It is not much discussed—often a good sign. A uniform model has been used across the NEM, although many other aspects of retail regulation continue to be decided at a jurisdictional level.

It seems possible, however, that the approach to retail competition may change in future years. In 2005 COAG committed to the roll-out of interval meters across the NEM. This will remove the need for net system load profiling, since information will be available on the actual half-hourly consumption by consumers. This may lead at some point to a change in the design of the market.

More attention has so far been devoted to how to implement an interval meter roll-out rather than to the effect it would have. However, the combination of well functioning spot and contract markets, the roll-out of interval meters and a very 'spiky' demand in some jurisdictions creates the possibility of substantial innovation over future years.

Considerable effort has gone into the creation of a competitive retail market and an industry structure to support competition. As discussed below, that has achieved high levels of customer movement in some states.

There is an unresolved debate over the continuing need for retail price caps. One argument is that caps, at a high level, simply protect against the risk to customers, without damaging competition. The counter argument is that complying with retail price regulation is an additional and unnecessary regulatory burden, and that the existence of price caps leaves a risk that these will be set at too low a level, undermining competition and the financial viability of retailers.

Gas markets

The NEM has created a uniform wholesale market in eastern Australia. This was needed to ensure instantaneous balance over a synchronous electricity grid.

There is no similar uniformity in the gas market. Victoria manages gas balancing on its transmission system through a spot market. Participants do not need to contract for gas, but must inform VENCorp of their daily supply and demand requirements. The supply offers are stacked in order of price and cleared against total demand. In other states, this scheduling is typically managed by the gas pipeline operator.

While there is no uniform market structure, the industry has put forward proposals to deliver increased transparency and ease of price discovery. These proposals led to an agreed action plan, dependent on continued support from industry participants, which was announced by the MCE in October 2006.

Market institutions

The MCE set out the new governance arrangements for energy markets in its report to COAG in December 2003. These arrangements were reflected in the AEMA in June 2004, and subsequently in the National Electricity Law and related legislation.

The MCE has been established as the single energy market governance body. Two new statutory commissions have been created. The AEMC is responsible for rule-making and market development. The AER is responsible for market regulation. The governance framework for these institutions has removed the previous strong link to state governments. However, this earlier governance framework remains in place for the National Electricity Market Management Company (NEMMCO).

The new institutions have only recently been established, and it is early to form views on their performance. However, the new structures seem to have established greater transparency in government policy, and should avoid policy entrepreneurialism by the market institutions, since the AEMC has no

power to initiate amendments. The rather cumbersome duplication with reviews by the National Electricity Code Administrator and Australian Competition and Consumer Commission under previous arrangements has also been avoided, although with a corresponding reduction in checks and balances.

The new institutions seem to have an impressive—and demanding—workload. The ability of market participants to establish the AEMC's agenda is in many ways a strength, but this may require future active management to ensure a coordinated and manageable work program. Separation between the making of regulatory rules and the conduct of regulation was an objective of the institutional design, but putting this into practice has raised issues about the appropriate level of codification, and discretion of the two institutions.

In April 2007 COAG agreed to establish a National Energy Market Operator for both electricity and gas. However, at the time of preparing this essay, the role and functions of the new body and the governance arrangements to ensure effective industry participation were yet to be developed.

Effect of the reforms

As described above, the introduction of competitive markets in the energy sector has largely followed the reforms agreed to in the early 1990s. How successful has it been in relation to investment, prices and quality of supply?

Investment

Since the market start, there has been investment in around 5000 MW of new electricity generation at a cost of around $4.7 billion. Victoria and South Australia have had a reasonably tight supply, against the conservative forecasts established by NEMMCO. Queensland has had higher reserve levels than the rest of the NEM.

There has been substantial investment—currently around $1 billion a year—in almost entirely regulated electricity transmission networks. This has contributed to an increasing convergence of prices between regions.

Around $3 billion of investment has been made in gas pipelines since 1997, most of it unregulated. This has transformed the nature of gas supply in southern and eastern Australia, meaning that most major cities are now supplied from at least two basins and producers have access to a wider customer base.

Generation investment

There has been substantial investment in new generation, estimated at $4.7 billion since market start. Figure A.5 shows the average wholesale price and the level of investment for each region (other than Snowy) in each year since market start. The investment figure is the gross megawatts of new investment and augmentations and does not include deratings or retirements. The price shows the annual average price for the region.

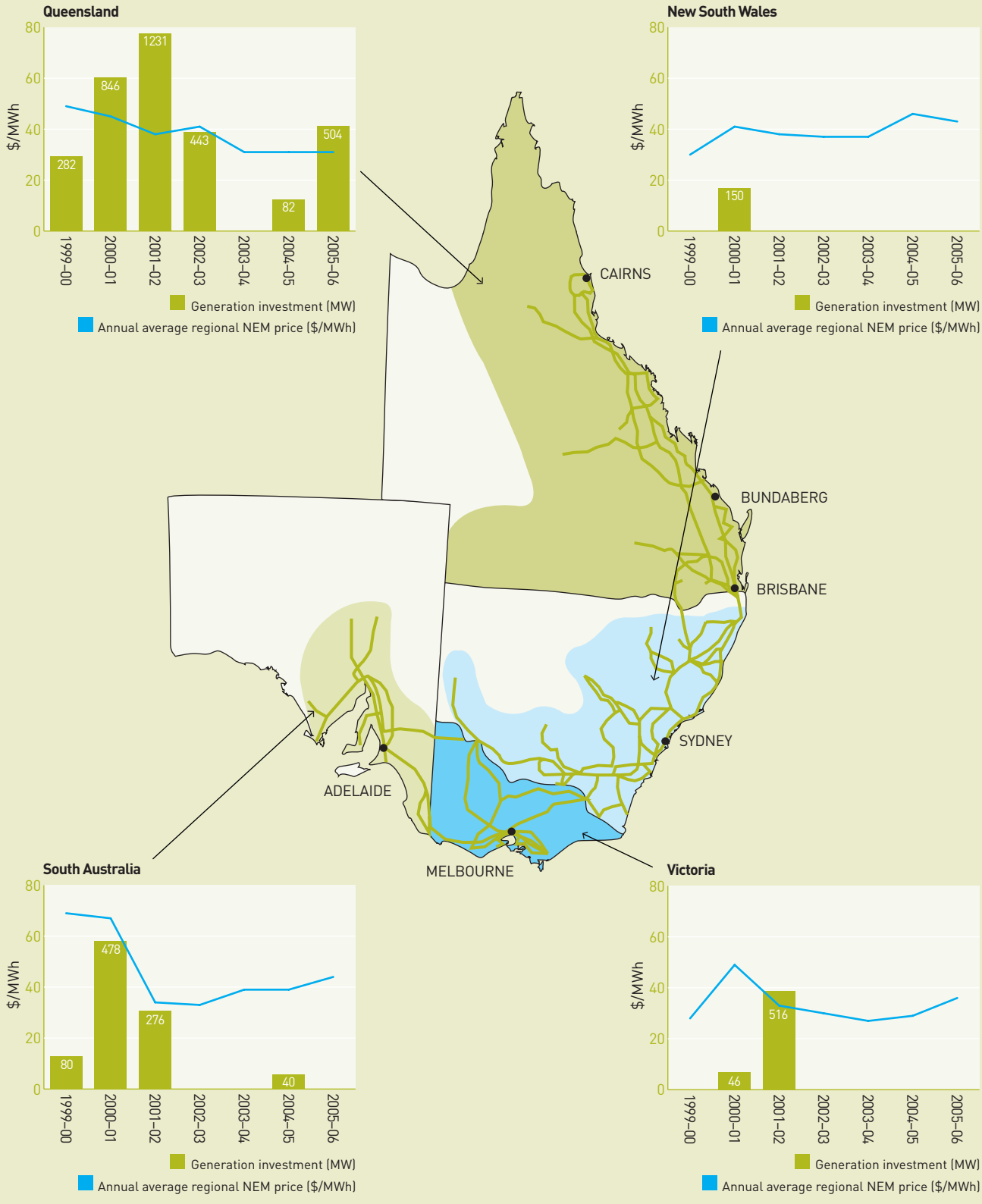
The figure suggests that, initially at least, generation has responded to price signals. South Australia initially experienced high average prices, which fell after significant investment. Queensland also had prices above new entrant levels in early years, with average prices falling after new investment.

The success of the market in ensuring timely investment appears to have varied. Victoria and South Australia have very peaky load shapes, driven by high air conditioning load on a few summer days. NEMMCO forecasts the demand/supply balance and, if necessary, takes action to manage possible shortfalls, to ensure minimum reserve margins on a one-in-ten-year peak demand.

The combination of a conservative approach with a highly peaky demand has meant periodic tight supply. In the past two years, NEMMCO has operated the reserve trader mechanism—essentially a way to seek out additional generation or demand side response in preparation for possible tight supply. Although there has been no shortfall due to generation capacity, the use of reserve trader suggests that supply has been rather tight. Future additional opportunities may emerge to manage short spikes in demand. For example, the roll-out of interval meters will create greater opportunities to develop demand as well as supply-side responses.

Figure A.5

Generation investment and electricity prices by region



There has also been substantial debate as to whether there is the right mix between generation and transmission investment. There are two ends to the spectrum in this debate:

- The NEM is characterised by large, concentrated load centres, with long distances between them. The load centres are supplied by similar generation plant, with similar variable costs. Increasingly, the marginal generation is gas-fired and gas prices have been converging. Interconnection between these regional markets is needed to avoid market power, and ensure prices are cost reflective, but the benefits of major increases in transmission are unlikely to justify the costs.
- The NEM is characterised by relatively small, regional markets, with a limited number of generators in each market. As a result, there is potential for the exercise of market power and for prices which are well above costs. Substantial increases in transmission investment can pay for themselves, by constraining this market power and keeping prices at low levels.

Although the issues are clear enough, the facts have been weaker. The AER is conducting the main quantitative analysis. This has identified that transmission constraints raised wholesale generation costs by about $36 million in 2003–04 and $45 million in 2004–05. Previous studies estimated that the impact on wholesale *prices* (as opposed to costs) may be up to $2.6 billion a year.[4] If true, this would present a somewhat frightening prospect for generation owners, since it would suggest that average wholesale prices—which have not been at high levels in recent years—could fall by a third if more investment was made in transmission. However, these headline figures appear substantially overstated.

Investment in electricity networks

There has been significant investment in transmission since market start. This is best illustrated by periodic price resets:

- TransGrid's regulatory asset base in 1999 was $2 billion. Capital expenditure for 1999–2004 exceeded $1.2 billion. For 2005–09 TransGrid anticipates capital expenditure of $1.2–1.9 billion.
- Powerlink's regulatory asset base in 2002 was $2.27 billion. Capital expenditure for 2002–06 was around $1.3 billion. For 2007–10 Powerlink anticipates expenditure of around $2.5 billion.
- Transend's regulatory asset base in 2003 was $604 million. Capital expenditure was $341 million for 2003–07.
- Electranet and SP AusNet have rather lower expenditure levels.

Care needs to be taken in interpreting these numbers: figures for the regulated asset base (RAB) and for capital expenditure are calculated differently, and the TNSPs vary a good deal in the networks they have inherited and in the demand growth that they face. However, they do illustrate that there has been significant investment in transmission networks.

In addition to private and public investments in regulated transmission, there have been private investments in unregulated transmission. These are Murraylink, a 180-kilometre DC link between New South Wales and South Australia; Directlink, a 59-kilometre DC link between Queensland and New South Wales; and Basslink, a 290-kilometre sub-sea cable and associated investments linking Tasmania to the grid.

4 Port Jackson Partners Ltd, *Reforming and restoring Australia's infrastructure*, Report prepared for the Business Council of Australia, March 2005, p. 20.

Investment in the gas sector

The nature of the eastern Australian gas sector and its level of interconnectivity has changed markedly in recent years. Historically, the major markets within south-eastern Australia have been supplied by a single gas production source through a single gas transmission pipeline. New South Wales and South Australia were supplied from Moomba. Victoria and Queensland had their own isolated supply systems and Tasmania had no supply. Up until the late 1990s there were no pipelines interconnecting supply basins.

Figure A.6
Eastern Australian gas transmission network

Pipeline	No.
Longford–Melbourne	1
South–West Pipeline	2
Victorian Transmission System	3
Moomba to Sydney	4
Eastern Pipeline	5
Moomba to Adelaide	6
SEA Gas	7
Roma to Brisbane	8
Roma to Gladstone	9
Ballera to Roma	10
Ballera to Mt Isa	11
Longford to Bell Bay	12

Figure A.7
Average wholesale electricity prices by region

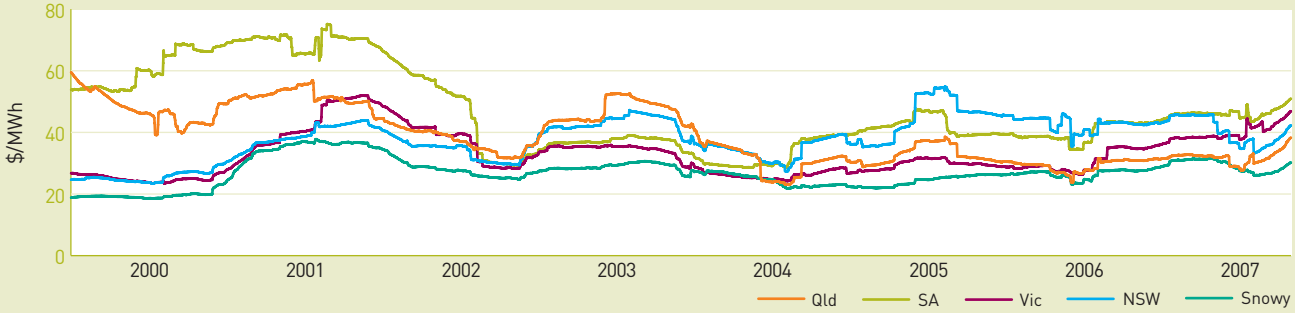
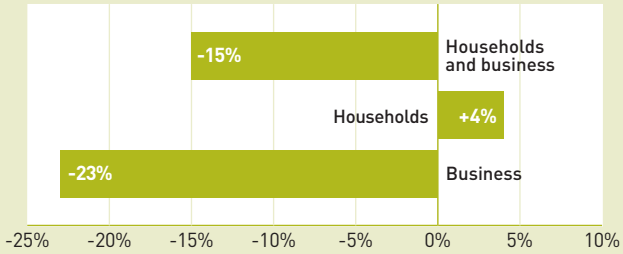


Figure A.8
Changes in the real price of electricity: 1990–91 to 2005–06



National transmission capacity has increased rapidly from 9000 kilometres in 1989 to over 17 000 kilometres in 2001 and 21 000 kilometres currently. The inter-connection between supply basins has radically changed since 1998. The Culcairn interconnect links Victoria and New South Wales; the Eastern Gas Pipeline Longford to Sydney; the SEA Gas Pipeline Port Campbell to Adelaide; and the South West Pipeline Port Campbell to the main Victorian transmission system. Tasmania is supplied through the Tasmanian gas pipeline.

The gas transmission pipeline system is now much more of a meshed network, with at least two pipelines supplying major loads at Sydney, Melbourne and Adelaide. Users have greater choice of supplier and producers have greater diversity of end market. This is shown in figure A.6.

There are also developments in the upstream sector. These include coal seam gas producers in Queensland and New South Wales and new fields in the Otway Basin. It is anticipated that this new entry into upstream gas supply will lead to a slow decline in the dominance of the major producers. The Australian Bureau of Agricultural and Resource Economics most recent projections showed the three largest market participants (BHP Billiton, ExxonMobil and Santos) accounting for 95 per cent of contracted supply to eastern Australia. This is projected to decline to 87 per cent by 2010.

Prices

In the early years of the wholesale electricity market, prices diverged sharply between regions. South Australia had high prices in 1998–99, which gradually fell as new investment came on line. Queensland also experienced high wholesale prices in early years. More recently, prices have converged between the NEM regions. This is shown in figure A.7. Wholesale pool prices can be expected to fluctuate around the entry price. Prices have been below entry level, but tightened significantly in 2007 because of drought effects and emerging requirements for new investment.

The development of the NEM has led to:

- lower electricity prices overall
- more cost reflective prices, so that prices have risen for households and fallen for business
- greater convergence of prices across the market.

Figure A.8 shows trends in the real price of electricity between 1990–91 and 2005–06, for Australia as a whole. Overall, real prices fell by 15 per cent. Households have experienced an average 4 per cent real increase, while businesses have had an average 23 per cent real reduction in price.

James Davies (Fairfax Images)

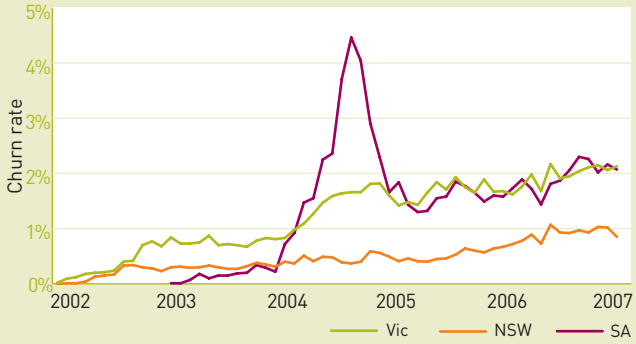
Construction of the SEA Gas Pipeline from Port Campbell to Adelaide, 2003

Retail competition

Full retail competition was introduced in Victoria and New South Wales from 1 January 2002, and a year later in South Australia. Figure A.9 shows monthly churn rates in all three jurisdictions since then. However, care should be taken in using these figures. The South Australian data includes moves to a market contract with the host retailer. Victoria and New South Wales data excludes this, and only covers movement from a host retailer to a new retailer.

Churn rates in South Australia hit a peak in the winter of 2004. This was probably due to the government's $50 transfer rebate at that time. While monthly churn rates have since reduced, the level of competition in both South Australia and Victoria is high by world standards.

Figure A.9
Churn levels in Victoria, New South Wales and South Australia—electricity



Conclusions

The establishment of the national electricity market was an ambitious vision in the early 1990s. On balance, the benefits forecast have been delivered, but not without much perseverance and hard work.

The market still faces challenges. Timely investment in new generation will be needed. The interaction between government-owned and private businesses is a continuing source of tension. The appropriate framework for ensuring optimal national transmission investment, when planning is conducted primarily at state level, has continued to receive review and attention. The new regulatory regime will require bedding down—and no doubt many other issues will arise.

However, it is less than 10 years since the first trial of an interstate market and eight years since the start of the NEM. A lot has been achieved, but there is still much to do.