NSW PARLIAMENTARY LIBRARY RESEARCH SERVICE

Energy Futures for NSW

by

Stewart Smith

Briefing Paper No 2/05

ISSN 1325-4456
ISBN 0 7313 1776 9

February 2005

Energy Futures for NSW

by

Stewart Smith

NSW PARLIAMENTARY LIBRARY RESEARCH SERVICE

David Clune (MA, PhD, Dip Lib), Manager .....(02) 9230 2484

Gareth Griffith (BSc (Econ) (Hons), LLB (Hons), PhD),
Senior Research Officer, Politics and Government / Law.....(02) 9230 2356

Talina Drabsch (BA, LLB (Hons)), Research Officer, Law.....(02) 9230 2768

Rowena Johns (BA (Hons), LLB), Research Officer, Law .....(02) 9230 2003

Lenny Roth (BCom, LLB), Research Officer, Law.....(02) 9230 3085

Stewart Smith (BSc (Hons), MELGL), Research Officer, Environment ...(02) 9230 2798

John Wilkinson (MA, PhD), Research Officer, Economics .....(02) 9230 2006

Should Members or their staff require further information about this publication please contact the author.

Information about Research Publications can be found on the Internet at:

www.parliament.nsw.gov.au/WEB_FEED/PHWebContent.nsf/PHPages/LibraryPublications

CONTENTS

EXECUTIVE SUMMARY
1.0 Introduction……1
1.1 The Operation of the National Electricity Market……..……1
1.2 Recent Reforms to the National Electricity Market……. 2
2.0 The Demand and Supply Electricity Balance…….3
2.1 Forecasts of Electricity Demand……3
2.2 Generation Capabilities……. 5
3.0 The NSW Electricity Market in Detail……...7
3.1 The TransGrid 2004 NSW Load Forecast…… 8
4.0 NSW Scheduled Generation Projects…….9
4.1 Other States Scheduled Generation Projects……10
5.0 The NSW Government's Energy Directions Green Paper……...10
6.0 Conclusion……28

EXECUTIVE SUMMARY

Up to around the 1980s, most electricity and gas markets in Australia were based at state level, and were weakly linked. However, energy market reform began to gather force internationally in the 1980s, and was given impetus in Australia in the 1990s through the implementation of competition policy. Australian governments engaged in a major reform program, culminating in the formation of the National Electricity Market (NEM) which commenced operation on 13 December 1998. Today, the NEM supplies electricity to 7.7 million Australian customers on an interconnected national grid that runs through Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. Approximately $8 billion of energy is traded through the NEM per year. From mid 2005, Tasmania will be connected to the National Electricity Market via BassLink.

This paper reviews the electricity market from a national perspective, and then focuses on the requirements of NSW. In particular, the NSW Government's Green Paper *Energy Directions for NSW* is discussed.

The National Electricity Market Management Company (NEMMCO) provides an electricity supply – demand balance assessment on a regional basis. NSW is forecast to have a reserve deficit of 157 MW by 2008/09. The NSW Government published an Energy Directions Green Paper in December 2004 with the aim of developing an Energy Directions Statement White Paper in April 2005. The Green Paper noted that up to 6,000 MW of new supply, or demand reduction, may be needed between now and 2020. In the shorter term, new electricity supply for peak demand is likely to be required within the next few years.

The Government's position is not to centrally determine the technology, location or timing of new investment in electrical generation. The establishment of the National Electricity Market was intended, in part, to provide price signals to investors to develop new generation capacity at the appropriate time. The Government's preferred position is for the private sector to take the risk to finance and build / operate new generation plant – both for shorter term peak supply and longer term base load generation.

However, there are significant obstacles in the way for the private sector to take the risk to build and operate new generation plant. These include greenhouse policy risks and monetary risks – the financial returns from the wholesale electricity market do not presently seem to encourage the construction of new generation plant. How the Government responds to these issues will have considerable impact on consumer sentiment.

1.0 INTRODUCTION

Up to around the 1980s, most electricity and gas markets in Australia were based at state level, and were weakly linked. However, energy market reform began to gather force internationally in the 1980s, and was given impetus in Australia in the 1990s through the implementation of competition policy. Australian governments engaged in a major reform program, culminating in the formation of the National Electricity Market (NEM) which commenced operation on 13 December 1998.[1] Today, the NEM supplies electricity to 7.7 million Australian customers on an interconnected national grid that runs through Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. Approximately $8 billion of energy is traded through the NEM per year. From mid 2005, Tasmania will be connected to the National Electricity Market via BassLink.

This paper reviews the electricity market from a national perspective, and then focuses on the requirements of NSW. In particular, the NSW Government's Green Paper *Energy Directions for NSW* is discussed.

1.1 The Operation of the National Electricity Market

The National Electricity Market Management Company Limited (NEMMCO) operates a wholesale market for trading electricity between generators and electricity retailers in the NEM. This means that all the electricity output from generators is pooled, and then scheduled to meet electricity demand. The pool system has been adopted to reflect two particular aspects of electricity generation and use. Firstly, electricity cannot be stored for future use, therefore supply must always be responsive to variations in demand. Secondly, it is not possible to distinguish which generator produced the electricity consumed by a particular customer. In the centrally-coordinated dispatch process, NEMMCO continually balances electricity supply and demand requirements by scheduling generators to produce sufficient electricity to meet customer demand.

NEMMCO matches the generating capacity declared available by scheduled generators against its forecast of demand to determine whether sufficient capacity is available to meet the peak demand each day, plus provide sufficient reserves to handle potential failures in either the generating units or the transmission networks.

The NEM is currently comprised of five interconnected electrical regions, the boundaries of which mostly follow State boundaries. However, the Australian Capital Territory is incorporated in New South Wales and the Snowy is also a region. Each region contains a regional reference node, which may be a major load centre such as a city, or a major generation centre, such as the power plants in the Snowy region.

The transmission lines that connect and transport power between adjacent electrical regions on the national electricity grid are called interconnectors. Power is transmitted between regions to meet energy demands that are higher than local generators can provide, or when the price of electricity in an adjoining region is low enough to displace the local supply. The scheduling of generators to meet demand across the interconnected power system will sometimes be constrained by the physical transfer capacity of the interconnectors between the regions. When

---

[1] Commonwealth of Australia, *Securing Australia's Energy Future*, 2004, at 71.

the limit of an interconnector is reached, NEMMCO schedules the most cost-efficient sources of supply from within the region to meet the remaining demand.

For example, if prices are very low in Victoria and high in South Australia, up to 500 megawatts of electricity can be exported to South Australia across the interconnector. Once this limit is reached, the system will then use the lowest priced generator/s in South Australia to meet the outstanding consumer demand

NEMMCO also monitors the future adequacy of generating capacity based on plant availability information. This is supplied by generators against forecast electricity demand. Because demand for electricity supply fluctuates, both seven-day and two-year forecast projection are made. These projections are called Projected Assessments of System Adequacy (PASA). PASA projections assist generator operators to plan maintenance and NEMMCO to schedule electricity production.[2]

1.2 Recent Reforms to the National Electricity Market

The National Electricity Market became operational in December 1998. However, whilst there has been considerable progress in electricity reform, according to the Productivity Commission it is evident that the original objective of a fully competitive national electricity market has not been achieved.[3] The Council of Australian Governments engaged Warwick Parer to Chair an Energy Markets Review, and the final report, *Towards a Truly National and Efficient Energy Market* (the Parer Review), was released in December 2002. The review noted that contributing factors detracting from reform objectives were: inefficient institutional arrangements (due to multiple regulators); a lack of grid interconnection (arising from poor incentives for transmission investment and inappropriate pricing signals); insufficient competition in generation; inflexible price signals for residential customers; and regulatory and market features limiting the use of long term contracts.

In response to the Parer Review, in December 2003 the Ministerial Council on Energy announced a program for major changes to the Australian energy market to be implemented in the period 2004 to 2006. The key elements of the reform program are:

- The establishment of the Australian Energy Regulator – responsible for market regulation and enforcement;
- The establishment of the Australian Energy Market Commission – responsible for rule making and energy market development;
- The Ministerial Council on Energy to be responsible for energy policy development.

The Commonwealth and each of the States and Territories will enact legislation that is necessary to confer on the Australian Energy Market Commission and the Australian Energy Regulator the functions as listed above. The Commission has been established as a new statutory commission under the *Australian Energy Market Commission Establishment Act 2004 (SA)*. The

---

2 The Introduction of this paper is adapted from: National Electricity Market Management Company, *An Introduction to Australia's National Electricity Market*, April 2004. See website: http://www.nemmco.com.au/publications/whitebook/introbook.htm, accessed August 2004.

3 Productivity Commission, *Review of National Competition Policy Reforms, Discussion Draft*, October 2004, at 22.

Commission is comprised of three commissioners and its head office is located in Sydney.

The Australian Energy Regulator, established as a new statutory body under the *Trade Practices Act*, will have its head office in Melbourne, with enforcement and market monitoring functions in Adelaide. The principal initial functions of the Regulator include:

- Making and amending transmission network revenue and price regulatory determinations;
- Developing and publishing service standards to be applied to transmission networks;
- Making and amending statements of regulatory practice and principles;
- Enforcing the National Electricity Law and investigating and bringing proceedings in connection with any breaches of them.

The Regulator is comprised of three members, one of whom is nominated by the Commonwealth and is also a full-time member of the Australian Competition and Consumer Commission.[4]

2.0 THE DEMAND AND SUPPLY ELECTRICITY BALANCE

2.1 Forecasts of Electricity Demand

The Australian Bureau of Agricultural and Resource Economics forecast that net electricity demand will rise from 186 Twh in 2000 to 230 Twh in 2010 and 284 Twh in 2020.[5] These estimates incorporate demand growth below economic growth, reflecting growth in less energy intensive sectors and improvements in energy efficiency. Growth will be concentrated in the eastern states, with 60 per cent in NSW and Queensland. It is evident that servicing these levels of demand will require significant investment in generation and transmission capacity. The energy industry is capital intensive, with the industry estimating that investment of at least $37 billion will be needed over the period to 2020 to ensure that Australia's energy needs are met. The energy market provides the background against which key decisions will be made on the timing, size, location and type of new investments, including supply, transmission and user equipment.[6]

Each year NEMMCO publishes a Statement of Opportunities (SOO) which predicts market trends for the following 10 years. The SOO outlines the system capability, and supply and demand forecasts for each jurisdiction in the NEM. Specifically, the SOO includes:

- forecasts of electrical energy usage;
- details about generator capabilities;
- NEMMCO's assessment of the adequacy of energy supplies to meet demand;
- inter-regional transmission capabilities for exchange of energy between NEM regions;

---

4 Ministerial Council on Energy, Standing Committee of Officials, *Energy Market Reform, Legislative and Regulatory Framework, Information Paper*, August 2004.

5 Watts (W) are the yardstick for measuring power. A one hundred watt light bulb, for example, is rated to consume one hundred watts of power when turned on. If such a light bulb were on for four hours it would consume a total of 400 watt-hours (Wh) of energy. Watts, therefore, measure instantaneous power while watt-hours measure the total amount of energy consumed over a period of time. A kilowatt (kW) is one thousand watts; a megawatt (MW) is one million watts; gigawatt (GW) is one billion watts, and a terawatt (TW) is one trillion watts.

6 Commonwealth of Australia, *Securing Australia's Energy Future*, 2004, at 69.

- forecasts of ancillary service requirements to ensure secure operation of the system;
- a summary of initiatives and proposed projects.

The 2004 Statement of Opportunites was released by NEMMCO on 30 July 2004.

Key results in the 2004 Statement of Opportunities indicate the point in time when additional capacity may be needed to maintain the established level of electricity supply reliability in each of the NEM regions. The power system is deemed reliable if, over the long-term, at least 99.998% of customer demand can be met. To provide this reliability, NEMMCO determines the necessary spare capacity within a region or via transfers on interconnectors. This is referred to as the minimum reserve level, and is fundamental to the supply-demand balance assessment. The minimum reserve level indicates the minimum spare capacity, as measured against extreme maximum demand forecasts (10 per cent probability of exceedence), required to deliver the reliability standard.

The ten year average forecast growth for energy and demand is summarised below:

Table 1: Ten Year Average Forecast Energy and Demand Growth Rates

	Energy %	**Demand %**
Queensland	3.1	2.9
NSW	2.2	2.9
Victoria	1.9	2.9
South Australia	1.5	2.8
Tasmania	1.6	1.6

Source: NEMMCO, *Australia's National Electricity Market Statement of Opportunities 2004, Executive Briefing*, July 2004, at 3.

Weather can have a significant impact on electricity demand, and different regions within the national electricity market have varying degrees of temperature sensitivity. Table 2 below shows the difference between the average maximum demand projection and the extreme weather demand projection in each region for summer 2004/05. Victoria and South Australia have the greatest weather sensitivity, followed by New South Wales. Tasmania reaches its peak demand in winter with only a small summer weather sensitivity.

Table 2: Effect of Weather on Maximum Demand Projections for Summer 2004/05 (Megawatts)

	Average Summer Weather Demand (MW)	**Extreme Summer Weather Demand (MW)**	**Difference (MW)**
Queensland	8, 187	8, 503	316
NSW	12, 660	13, 430	770
Vic. / Sth Aust.	12, 023	13, 081	1,058
Tasmania	1, 457	1, 476	19

Source: NEMMCO, *Australia's National Electricity Market Statement of Opportunities 2004, Executive Briefing*, July 2004, at 3.

2.2 Generation Capabilities

Generators produce and sell electricity to the wholesale customers of the national electricity market. The different types of generators can be characterised by their fuel source. There is a predominant amount of fossil fuel generation, namely coal and gas, a significant number of large hydro-electricity plants operating in Tasmania and the Snowy Mountains region, and increasing renewable forms of generation, such as wind and biomass. The energy generated by power stations in the National Electricity Market is shown in Table 3. It shows that in 2002 black coal was used to generate 61.5 per cent of energy in the market, compared with 29.9 per cent for brown coal, 5.7 per cent for gas and oil and 2.9 per cent for hydro. Black coal generation is prominent in both NSW and Queensland, accounting for 98.1 per cent and 97.9 per cent of generation in those states respectively, whereas in South Australia gas accounted for 63.3 per cent of energy generated.

Table 3: Energy Generated by Power Stations in the National Electricity Market in 2002.

	NSW	Vic	Snowy	Qld	SA	Total
Energy Generated in 2002 (GWh)						
Black Coal	62,624			46,819		109,443
Brown Coal		48,959			4,208	53,168
Gas and Oil	979	1,256		589	7,254	10,077
Hydro	256	989	3,543	397		5,184
Total	63,858	51,204	3,543	47,804	11,462	177,872
Proportion of Total Energy Generated in 2002 in Eastern Australia						
Black Coal	35.2%			26.3%		61.5%
Brown Coal		27.5%			2.4%	29.9%
Gas and Oil	0.6%	0.7%		0.3%	4.1%	5.7%
Hydro	0.1%	28.8%	2.0%	0.2%		2.9%
Total	35.9%	28.8%	2.0%	26.9%	6.4%	100%
Proportion of Total Energy Generated in 2002 in each State						
Black Coal	98.1%			97.9%		61.5%
Brown Coal		95.6%			36.7%	29.9%
Gas and Oil	1.5%	2.5%		1.2%	63.3%	5.7%
Hydro	0.4%	1.9%	100%	0.8%		2.9%
Total	100%	100%	100%	100%	100%	100%

Source: ACIL Tasman, *SRMC and LRMC of Generators in the NEM, A Report to the IRPC and NEMMCO*, April 2003, at 4.

The NEMMCO Statement of Opportunities provides a supply – demand balance assessment on a regional basis, as summarised in table 4. In this table, the low reserve condition point (LRC) refers to the point in time when reserves are projected to fall below the minimum power system reliability standard requirement. The LRC point does not indicate insufficient capacity to meet expected demand, or probable electricity supply interruptions. The reserve deficit refers to the amount (measured in Megawatts MW) by which the reserves may be below the minimum requirement.

Table 4: Projected Low Reserve Conditions by Region

	Low Reserve Condition Point	Reserve Deficit
Queensland	2009/10	132 MW
NSW	2008/09	157 MW
Victoria / Sth Aust combined	2004/05 2006/07	356 MW 321 MW
Tasmania	Beyond 2013/14	

Source: NEMMCO, *Australia's National Electricity Market Statement of Opportunities 2004, Executive Briefing*, July 2004, at 6.

It is projected that NSW will reach a low reserve condition point in four years time - 2008/09. Reserve capacity support from the Snowy Hydro Scheme and Queensland provide additional available capacity in 2006/07 and 2007/08. In 2008/09, NSW will experience deficits, even though Queensland has additional capacity available. This is due to interconnector transfer limits from Queensland. In addition, in 2008/09, NSW cannot source additional capacity from the Snowy, as Victoria and South Australia are already experiencing deficits.

In contrast, Victoria and South Australia were facing a low reserve condition point for the 2004/05 summer. The expected commissioning of the Basslink interconnector (connecting Tasmania to Victoria) in 2005 should provide an additional 600 MW of capacity for the 2005/06 summer peak, thereby meeting the minimum reserve requirement in Victoria / South Australia for that year. However, load growth will erode those reserves, requiring more capacity in Victoria / South Australia to maintain minimum reserve levels from the summer of 2006/07.[7]

NEMMCO Managing Director, Les Hosking, noted: "NEMMCO's 2004 Statement of Opportunities forecasts that all regions of the National Electricity Market have sufficient supply to meet peak electricity demands in the coming summer. This is the case even if extreme temperature conditions were to push electricity demand to levels expected only once in a decade. For Victoria and South Australia, the forecasts show that supply is greater than expected demand. The need for additional capacity is to ensure that more reserves of electricity are available to maintain reliability in the event of a generation break down ".[8]

In response to the Victoria/South Australia situation NEMMCO invited proposals from NEM participants and other interested parties for reserve capacity in the combined regions during the 2004/05 summer. This process is known as Reserve Trader.

According to NEMMCO the conclusions in the Statement of Opportunities are reached by taking into account a range of factors including:

- Existing and committed generation;
- The capability of electricity interconnectors to transport power between regions;

---

7 NEMMCO, *Australia's National Electricity Market Statement of Opportunities 2004, Executive Briefing*, July 2004, at 6.

8 NEMMCO, *Media Release – NEMMCO Publishes 2004 Statement of Opportunities*, Friday 30 July 2004.

- Forecasts of electricity demand; and
- The minimum levels of capacity reserves required for power system reliability.

In 2004 the minimum reserve levels have been adjusted to recognise the ability of interconnectors to share reserves and the effect of different patterns of demand in different NEM regions. Les Hosking stated: "The 2004 minimum reserve levels reflect the national make-up of the power system. They show the benefits of interconnection through sharing of generation capacity between the States and highlight that differing temperature patterns mean maximum electricity demands are unlikely to occur simultaneously across all NEM regions."[9]

The 2004 edition of the SOO incorporated for the first time an Annual National Transmission Statement (ANTS). The ANTS provides an integrated overview of the national electricity transmission flow paths in order to assess the need for network capacity over the 10-year outlook period. The 2004 ANTS offers a preliminary assessment, and on this basis NEMMCO has identified four interconnectors that warrant further investigation in regard to the benefits of increasing their capacity. These were:

- Victoria towards Snowy;
- Queensland towards NSW;
- Victoria towards South Australia;
- Snowy towards Victoria.

3.0 THE NSW ELECTRICITY MARKET IN DETAIL

National Electricity Market generating units are classified as either scheduled (where NEMMCO central dispatch coordinates the unit's output) or non-scheduled. Renewable energy units, such as landfill biomass and wind powered turbines, are generally small and therefore treated as non-scheduled generators, and consequently incorporated as a reduction to demand. Similarly, embedded generation, which is electricity generated within a distribution network – and hence avoiding transmission costs - is also generally classified as non-scheduled.

The total generation capability for NSW for both winter and summer is outlined in table 5. Snowy Hydro Limited also has capacity of 3676 MW, rising to 3,896 MW by 2010, which NSW can call upon. In addition, NSW has 710 MW of non scheduled generation capacity available.[10]

Table 5: Total Scheduled Generation Capability for NSW (MW)

	2004 (MW)	**2005 and each year to 2013 (MW)**
Winter Total	12, 349	12, 379
Summer Total	12, 002	12, 012

Source: NEMMCO, *2004 Statement of Opportunities for the National Electricity Market*, 2004, at 4-7.

The TransGrid 2004 NSW Annual Planning Report identifies emerging constraints in the NSW

9 NEMMCO, *Media Release – NEMMCO Publishes 2004 Statement of Opportunities*, Friday 30 July 2004.

10 NSW Government, Ministry of Energy and Utilities, *NSW Statement of System Opportunities, Electricity Reserves and Generation Options*, June 2002, at 46.

transmission network. TransGrid uses load forecasts to identify future transmission constraints within or adjoining its network. The load forecasts used by TransGrid for this purpose are outlined below.

3.1 The TransGrid 2004 NSW Load Forecast

Energy 'sent out' is defined as the supply to the NSW region of the national electricity market including transmission losses. Energy sent out has grown by 1 587 GWh per annum for the last ten years. Three growth scenarios for the next ten years commencing 2004/05 were developed by TransGrid – low, medium and high. The medium scenario projected that energy sent out is set to grow by an average of 1 587 GWh (or 2.2 per cent) each year. The low scenario projected an increase of 1 160 GWh (1.5 per cent) whilst the high growth scenario projected an annual increase of 2 340 GWh (2.9 per cent).[11]

TransGrid has projected peak demands for both winter and summer. Peak demand is defined as the maximum output of NSW scheduled generators plus net imports from other regions, averaged over a half-hourly trading period. Because maximum demand is highly correlated with the prevailing weather conditions, peak demands are converted to Standard Weather Peak Demands, by making an estimate of the demand that would have occurred at standard temperatures. These temperatures are chosen to represent percentiles of extreme conditions, such that probabilities can be attached to the associated demand levels. For instance, a projected '10 per cent probability of exceedance' winter standard weather peak demand describes the level of demand during winter of that year that has a 10 per cent chance of being exceeded.

Winter daily maximum demands occur in the evening around 6:00 – 6:30pm. Extreme winter demands are associated with the extent of space heating in use at the time of peak demand. In summer, the load tends to rise throughout the morning as the temperature increases and usually reaches its maximum sometime between 10am and 4 pm. Extreme summer maximums tend to be driven by air-conditioning loads. There are some differences between the winter and summer peak demands. The winter peak load is less volatile compared to summer. Volatility in temperatures during summer, particularly spikes in temperature significantly higher than the average, occur periodically and tend to be greater than 'cold spikes' during winter.

The increase in the sensitivity of summer loads to temperature and the trend rate of growth in summer peak demand is widely believed to be associated with an increase in the installation of air conditioners. Continued growth in the air conditioning market is expected for a number of years and will continue to be a driving force behind summer peak demand growth. TransGrid therefore expects that the sensitivity of summer peak demand to temperature will also continue to increase.

Prior to 2003 in NSW, summer peak demand had never exceeded the previous winter peak demand. However, in the summer of 2002-03, fuelled by extreme temperatures, peak demand of 12,456 MW exceeded the preceding winter peak for the first time. However, winter of 2003 still produced a new record demand of 12,476 MW which was not surpassed in summer 2003-04. Again, peak demand in winter 2004 reached a new record of 12,838 MW.[12] The stronger trend

---

11 TransGrid, *NSW Annual Planning Report 2004*, at 19.

12 NSW Government, *Energy Directions Green Paper*, December 2004 at 10.

growth of summer peak demand relative to winter, has led to the expectation that NSW will soon become summer peaking.

Under the medium growth economic scenario, by 2014 it is forecasted that:

- Summer 10 % probability of exceedance, demand will be around 17,500 MW;
- Winter 10 % probability of exceedance, demand will be around 16,000 MW;
- Summer 50 % probability of exceedance, demand will be around 16,500 MW;
- Winter 50 % probability of exceedance, demand will be around 15,500 MW;[13]

On a stand-alone basis (ie, ignoring imports from other States), with current generating capacity of around 12,002 MW and Snowy capacity of 3,896 MW by 2010, a 2014 NSW summer 10 % probability of exceedance event has an electrical generation shortfall of at least 1,600 MW.

Taking all the above information into account, the NSW Government has concluded that:

- The next increment of new generation capacity or demand side management capability is likely to be initially needed to meet demand at peak times only; and
- New base-load generation capacity of around 2000 MW may be required from around 2012/13. [14]

4.0 NSW SCHEDULED GENERATION PROJECTS

This section includes details of advanced and publicly announced proposals for scheduled generation projects in NSW, as outlined in the 2004 NEMMCO Statement of Opportunities. The capabilities of these have not been included in the NEMMCO supply – demand assessment.

Wambo Power Ventures: has advised that it plans to develop a 2 X 150 MW open- cycle, gas fired power station in the Wagga Wagga area. The development has been publicly announced and the company has advised that:

- a firm contract for the purchase of a 25 hectare site exists, subject to receiving the appropriate licensing and authorization;
- the first stage of the power station's development requires a lead time of 17 to 18 months from financial close to commercial load;
- work is underway to finalise the environmental impact studies.

SPI Group / Texas Utilities: has publicly announced its purchase of the Tallawarra Power Station site from the NSW Government, where it intends to develop a 400 MW gas fuelled power station.

Macquarie Generation: has publicly announced the development of a combined cycle gas turbine at Tomago. The company has advised that:

- the proposed development has received development consent; and
- it is planning a phased development on the site, comprising an initial open-cycle, gas turbine plant, for later development into a combined-cycle, gas turbine plant with a

---

13 TransGrid, *NSW Annual Planning Report 2004*, at 22.

14 NSW Government, *Energy Directions Green Paper*, December 2004 at 11.

capability up to 800 MW.

Enviromission Ltd: has advised that subject to final feasibility and design, the construction of the 200 MW Solar Tower at Buronga will commence by the end of 2005 for completion in 2008.[15]

4.1 Other States Scheduled Generation Projects

Queensland

Wambo Power Ventures: Has advised that all planning consents, development approvals and environmental licensing (based on open-cycle, gas-turbine generators) have been obtained for 3 X 150 MW gas-fired (high shoulder – for operation during intermediate to high demand periods) generators. The first two units should be available for commercial load by July and August 2005, and the third unit available before summer 2005/06. The company has also announced plans for a 50 MW gas-fired base load power station generator available for commercial load from June 2006. All plants will be on land at the intersection of the Roma to Brisbane gas pipeline and the Queensland – NSW Interconnector.

CS Energy: In May 2004 the Queensland Government approved the development by the government owned CS Energy 750 MW coal fired power station at Kogan Creek.

Victoria

Loy Yang Power: Has advised of upgrades to two generating units, adding another 70 MW in capacity from summer 2009/10.

South Australia

AGL and Origin Energy have both announced plans to increase generating capacity at existing plants. However, International Power advised that in its opinion, current wholesale market conditions and projections make new generation projects uneconomic within the SOO planning horizon. Magnesium International Ltd has developed plans to build a 400 MW gas-fired power station at Port Pirie, but is seeking expressions of interest to external parties to complete the project.[16]

5.0 THE NSW GOVERNMENT'S ENERGY DIRECTIONS GREEN PAPER

The Government published the Green Paper in December 2004 with the aim to develop an Energy Directions Statement White Paper in April 2005. The Green Paper noted that energy policies will be established in the following areas:

- Greenhouse gas emissions;
- Planning requirements;
- Price regulation; and
- Government investment in energy infrastructure.

However, the Government noted that it has two main policy roles in the electricity sector:

---

15 NEMMCO, *2004 Statement of Opportunities for the National Electricity Market*, 2004, at 4-15.

16 NEMMCO, *2004 Statement of Opportunities for the National Electricity Market*, 2004, at 4-15

- To set energy policy in a way which maximises net public benefit by ensuring: security of supply; encourage private investment; providing a simple and efficient planning and environmental assessment framework; reducing greenhouse emissions and other environmental impacts; and maintaining competitive energy prices; and
- To monitor the ongoing adequacy of the electricity system to meet the demand of NSW consumers, and to take appropriate action to ensure future electricity needs are capable of being met.

The Government acknowledged that consistent national policy in these policy areas is desirable, and gave the example that if NSW restricted greenhouse emissions from new power stations, this may lead to increased imports from higher emission power stations in other states. Important elements of the Green Paper are summarised below, with comments following each section.

The Green Paper – Addressing the Emerging Demand / Supply Imbalance

The Paper noted that up to 6,000 MW of new supply, or demand reduction, may be needed between now and 2020. In terms of demand management, the difficulty in estimating precisely how much potential exists for demand growth to be curbed over the next 15 years was noted, as was the demand management report by the Sustainable Energy Development Authority. The Independent Pricing and Regulatory Tribunal introduced new incentives for networks to invest in demand management activities in 2004.

The Government's Green Paper noted that the introduction of BASIX has required energy and water efficient measures in new homes.[17] In addition, the Government is working at a national level, through the Ministerial Council on Energy, to pursue energy efficiency outcomes via the National Framework for Energy Efficiency. The Green Paper concluded the demand management section with the comment that whilst demand management is important, "its effect will be to defer the need for new supply by a year or two, rather than eliminate it."[18]

Comment

In some cases, it may make more commercial sense to reduce peak demand than increase the supply capacity. This is termed demand management, and may take the following forms:

- Interrupting or restricting some loads during peak periods;
- Using generators or co-generators on customers' premises;
- Installing more efficient equipment, such as lights that have a lower power demand;
- Switching electricity use to outside peak periods, such as Off-Peak water heating;

---

17 Introduced as part of the NSW planning system, BASIX (the Building Sustainability Index), is a web-based planning tool that measures the potential performance of new residential dwellings against sustainability indices. BASIX ensures each dwelling design meets the NSW Government's targets of a 40% reduction in water consumption and 25% reduction in greenhouse gas emissions, compared with the average home. The greenhouse target will increase to 40% from July 2006.

18 NSW Government, *Energy Directions Green Paper*, December 2004 at 16.

- Changing some electrical loads to other fuels, such as natural gas.

It is peak demand that drives network investment in infrastructure, and the top ten % of capacity is only utilised for a few hours per year, so its capital costs must be recovered over the few hours when it is employed. The cost of providing distribution peak load can be around 400 times the cost of base load. This is why demand management measures targeted at peak loads are likely to be an increasingly important part of the energy market. For instance, in 2002, it has been shown that peaks lasting for only 3.2 per cent of the annual duration of the market accounted for 36 per cent of total spot market costs. Reducing the magnitude and costs of these peaks will reduce overall system costs, and system reliability will be enhanced.[19]

In NSW, peak demand is growing much faster than average demand. Summer peak demand in NSW has grown by around 3.8% (500 MW) per year for the past five years, whilst average demand growth has been around 2.8%. In NSW 10 % of generation and network capacity is used for only 1 % of the year (ie, 1300 MW of generating capacity is used to meet peak demand for only 87 hours per year).[20]

In recognition of the costs of supplying peak electricity demand, there has been a focus on determining how to increase the uptake of demand management. At the national level, in regards to demand management, the Parer Review found:

- The National Electricity Market systems are supply side focussed;
- The demand side cannot gain the full value of what it brings to the market;
- Residential consumers do not face price signals.

In response to these problems, the Review proposed three solutions:

- Introduce a demand reduction bidding system into the National Electricity Market – where users (including retailers and aggregators) bid price and volume to reduce load, and accepted demand reduction bids would be paid;
- Mandate the roll out of interval meters for all consumers – which means that retailers will be able to more accurately charge consumers according to their time of day usage – consumers will then potentially have the price signals available to them to engage more actively in load reduction through energy efficiency measures and load shifting to cheaper periods for discretionary power uses;

19 Commonwealth of Australia, *Securing Australia's Energy Future*, 2004, at 70.

20 NSW Government, *Energy Directions Green Paper*, December 2004 at 10.

- Within the next three years, remove retail price caps and introduce full retail contestability into all markets – enabling active competition between retailers for the energy business of all users, including those at the residential level. This was considered imperative if products are to be developed that can support an active demand side in electricity markets.[21]

In a review of demand management initiatives in NSW, the Independent Pricing and Regulatory Tribunal (IPART) had the strong view that there is significant untapped potential for efficient demand management and to a large extent one of the major obstacles to its uptake continues to be a culture which favours traditional 'build' engineering solutions and which pays little more than lip service to alternative options.[22]

IPART identified the following options to encourage environmentally driven demand management (ie, to reduce greenhouse gas emissions):

- Strengthening Retail Licence conditions, as the Government has recently done;
- Establishing a Demand Management Fund, or enhancing the current Sustainable Energy Fund and reviewing the role of SEDA;
- Allocating funds to ensure equity of demand management programs;
- Reviewing, strengthening and increasing the profile of energy efficiency programs and coordinating efforts across Government;
- Building demand management into customer choice through improved information and awareness.

IPART recommended that the Government create a Demand Management Fund to support specific programs aimed at increasing energy efficiency and reducing demand. It also recommended that a portion of the Fund goes to programs servicing consumers who are least likely to benefit from other reforms of the energy industry, especially low income groups.

In terms of building demand management into customer choice, IPART stated that key initiatives should focus on providing information to end-users, expanding building efficiency codes, increasing support for energy rating schemes for residential buildings and energy efficiency labelling programs.

The Green Paper – Supply Side Options

Future Peaking Capacity

Historically, NSW's peak electricity requirements have been met by the Snowy Mountains Hydro-electric Scheme and through older coal fired plant which can no longer be economically

---

21 Council of Australian Governments, *Energy Market Review, Towards a Truly National and Efficient Energy Market*, Chair – Warwick Parer, December 2002, at 183.

22 IPART, *Inquiry into the Role of Demand Management and Other Options in the Provision of Energy Services. Final Report*, October 2002

operated as base load. The Green Paper notes that new peaking capacity may be needed in the next few years, and identified two major options. The first – additional hydro power, was rejected due to environmental concerns and the expense of building new dams. The alternative put forward was 'open cycle' gas generation, which can be built for a relatively low capital cost in a short timeframe. However, open-cycle gas plants are expensive to run, and so these plants require sustained prices in the order of $100 per MWh of production to be price competitive, which is why they are only suited to meet high priced peak demand. The Green Paper noted that in terms of sites suitable for gas fired peaking plant, Singapore Power / TXU owns a site at Tallawarra on the South Coast which has development approval for gas fired generation, and Macquarie Generation has obtained development approval for a gas fired plant at Tomago, near Newcastle.

The Government's position is not to centrally determine the technology, location or timing of new investment, and that the establishment of the National Electricity Market was intended, in part, to provide price signals to investors to develop new generation capacity at the appropriate time. It noted that in other States, investment in new supply (eg, gas fired peaking plants) has been forthcoming on a timely basis without significant government intervention. The Green Paper argued that the lack of significant investment in new generation in NSW since the establishment of the national market reflects the over-supply of capacity from the 1980s and 1990s, rather than a failure of wholesale price signals.

Comment

The Singapore Power / TXU site is owned by the Singapore Power Group, 100 per cent owned by the Singapore Government. In June 2004 TXU announced that it will invest $3.5 million in works to develop its Tallwarra site near Lake Illawarra in preparation for a gas fired power plant. A company spokesman noted: "Whilst the timing for an energy facility completion is yet to be determined, we can be generating power by 2007, if growth in the electricity market determined that."[23] The Singapore Power Group bought out the American owned TXU Australia assets in August 2004, and now the Group is one of the largest electricity and gas utilities in Australia. The Australian assets, under the corporation name of SPI Australia Group, include: over a million retail customers, predominantly in Victoria and South Australia; a Victorian network encompassing a 45,000km electricity network and more than 8,000km of gas pipelines; and in South Australia it operates the 1,280MW Torrens Island Power Station.[24]

The NSW Government owned generator Macquarie Generation has plans to develop an open cycle gas turbine peak generating plant at Tomago. In phase one of the project, the proposed power station would comprise one open cycle gas turbine unit of up to 260MW. Construction and commissioning would take around 2 years. Phase 2 of the project is to include an additional gas turbine of up to 260MW, whilst phase 3 would convert the power station to a closed cycle gas turbine configuration with the addition of a steam turbine. Once phase 3 was complete, the power station would comprise two gas turbines up to 260MW each and a steam turbine providing a total generating capacity of up to 790MW, suitable for use as an intermediate or baseload

---

23 TXU Australia, "TXU invests $3.5M in Tallawarra energy facility site." *News Release*, 9 June 2004. See website http://www.txu.com.au, Accessed January 2005.

24 "SPI Australia Group", See Singapore Power Group website: http://www.singaporepower.com.sg. Access January 2005.

power station operating beyond peak demand periods. Under normal circumstances, Tomago phase one is expected to operate for approximately 3 hours per day on less than 130 days of the year.[25]

The Minister for Infrastructure and Planning granted approval for the Tomago plant on November 11, 2003. The Chief Executive of Macquarie Generation said that the Corporation would explore private sector participation in the development, and that a firm timetable for construction would emerge with more detailed consideration of National Electricity Market demand forecasts.[26] In terms of the economics of the Tomago gas fired power station, the Environmental Impact Statement stated:

> Notwithstanding the prevailing high electricity prices associated with peak periods, investment in stand-alone peaking plant would not be economically viable due to inadequate returns.
>
> Macquarie Generation has established however, that the development and operation of a gas fired peak generating power station is feasible from an economic viewpoint as it would assist the Corporation's total generating portfolio risk management strategy.
>
> Furthermore, as a State-owned Corporation, Macquarie Generation is charged with an obligation to exhibit a sense of social responsibility by having regard to the interests of the NSW community.
>
> Therefore, Macquarie Generation is seeking to establish the proposed power station in order to service the community's demand for peak electricity in NSW, while fulfilling its portfolio wide objective to reduce the intensity of its greenhouse gas emissions.[27]

The latest Macquarie Generation Annual Report (2003-2004) noted that wholesale electricity prices are too low to encourage new investment, with the Chief Executive commenting:

> The electricity market continued to demonstrate real price volatility in response to movements in supply and demand. July to December 2003 were characterized by relatively lower than expected weather driven demand and considerable oversupply. Prices were less than $20/MWh for three of the six months. If these levels were to be sustained there would be no incentive for new investment. The latter six months produced much greater price volatility driven by extreme heatwave conditions… Weather influences and significant changes in plant availability helped raise the average yearly pool price to $32.37/MWh – a figure also below a level likely to stimulate new investment.[28]

The National Electricity Market Management Company (NEMMCO) publishes wholesale

---

25 Macquarie Generation, "Generator welcomes Tomago approval." News Release, 19 December 2003. See website: http://www.macgen.com.au, Accessed January 2005.

26 Macquarie Generation, "Generator welcomes Tomago approval." News Release, 19 December 2003. See website: http://www.macgen.com.au, Accessed January 2005.

27 Macquarie Generation, *Environmental Impact Statement*, *Gas Fired Power Station, Tomago, Main Report,* Prepared by URS, April 2002, at Chapter 2, p 8.

28 Macquarie Generation, *Annual Report for the year ended 30 June 2004*. Chief Executive's Report, at 4.

market electricity prices. The average monthly regional reference price (ie, average price from 00:00 – 24:00 hrs) and average peak price (07:00 – 22:00 hrs eastern standard time weekdays excluding bank holidays) for NSW is provided in Table 6.

Table 6: Average Wholesale Electricity Monthly Regional Reference Price and Average Monthly Peak Regional Reference Price for NSW ($MWh).

Date	NSW Average Monthly Regional Reference Price ($MWh)	NSW Average Monthly Peak Regional Reference Price ($MWh)
31/07/2003	46.78	75.87
31/08/2003	19.61	22.04
30/09/2003	21.05	26.25
31/10/2003	17.50	19.37
30/11/2003	18.37	20.65
31/12/2003	26.76	32.39
31/01/2004	26.76	32.39
29/02/2004	58.50	48.72
31/03/2004	63.73	116.44
30/04/2004	30.27	38.88
31/05/2004	32.12	37.68
30/06/2004	31.19	34.01
31/07/2004	35.63	43.60
31/08/2004	23.61	26.12
30/09/2004	28.18	32.04
31/10/2004	69.60	125.36
30/11/2004	77.70	130.90
31/12/2004	64.89	119.27
31/01/2005	44.36	80.72

Source: NEMMCO, *Average Monthly Prices, 2003-2004, 2004-2005*. See website: http://www.nemmco.com.au/data/avg_price/averageprice_main.shtm, Accessed January 2005.

It can be seen that monthly average peak prices have, over the last 18 months, ranged from a low of $19.37 to a high of $130.90. Thirteen of the 18 months have had a monthly peak price of less than $50.00 MW/h.

The NSW Green Paper notes that an open cycle gas generation plant, such as that proposed by Macquarie Generation at Tomago, requires a sustained price in the order of $100 per MWh of production to be price competitive. Hence the dilemma for government – increasing peak demand is creating a supply shortfall, yet the wholesale electricity prices are not creating an incentive for industry to take the risk to build new peak generating capacity.

The Green Paper - Providing Future Baseload Capacity

The Green Paper noted that to provide the baseload capacity required within the next decade, four main options exist. These were:

- Distributed generation;
- Up-grading existing generation capacity;

- New coal fired plant; and
- New combined cycle gas plant.

Distributed generation refers to small scale generators that are located within the electricity network. Their major advantage is that the cost of transmission is avoided because the electricity is produced where it is consumed. The Green Paper notes that it is likely that certain types of distributed generation (eg, gas) will increasingly provide a role in meeting baseload demand.

Up-grading the capacity of generating units at power stations from 660 MW to 750 MW should add around 400 MW capacity. Further capacity gains of 300 – 600 MW could be available through additional upgrades, depending on technical and economic considerations.

The Green Paper noted that NSW has abundant and cheap coal resources, sufficient for at least 10,000 MW of new generation capacity. Potential sites for new coal development are in areas surrounding the Hunter Valley and the Gunnedah region. Coal plants tend to be more expensive and take longer to build than gas-fired plants. Their high capital costs mean they are less suiting to running as peaking plant. However, their lower fuel costs mean that coal fired stations provide the cheapest base load power – around $30 to $35 per MWh. The major problem with coal fired plants is that they are relatively greenhouse intensive compared to other generation options. The emission rates of existing coal fired plant in NSW range from 0.85 to 1.0 tonnes of CO_2 per MWh produced. New coal fired plants are more efficient, with greenhouse gas emissions 0.8 tonnes per MWh, down to 0.75 tonnes per MWh for leading edge technology.

However, if the costs of greenhouse emissions are included, the economics of coal fired generation change considerably. With a price of carbon emissions at $20 per tonne, gas may become a cheaper option than coal based on current technologies.

The Green Paper highlighted that whilst combined cycle gas generation plants are more expensive to build than open cycle plants, they are much more efficient. They are also cheaper and faster to build than coal fired plants. However, the relatively high cost of gas in NSW means that combined cycle gas plants are more expensive than coal plants. It is estimated that a price of around $40 to $50 per MWh is required to make combined cycle plants economic – up to 50 per cent higher than a coal fired plant. A combined cycle gas plant emits around 0.4 tonnes of CO_2 per MWh produced – approximately half that of best practice coal fired generation. Hence the economics of gas fired generation compared to coal fired generation is ultimately dependent on the price (if any) of greenhouse emissions.

The Green Paper also noted that whilst the Government supports the ongoing enhancement of transmission interconnections with other states, it is unlikely to be economically and technically feasible to rely solely on interconnection as a means of addressing future supply shortfalls.

For renewable and low emission technologies, the Green Paper noted that their role will be dependent on the policy settings for greenhouse emissions and technological developments. The current focus is on ensuring that these technologies continue to be developed and applied so that their technological and cost barriers are overcome, and they can make a more substantial contribution in the longer term.

In summary, the Green Paper noted that the Government will not establish policies to support particular demand and supply options. Instead, a clear planning and environmental assessment

framework will be established and clear policies on greenhouse gas emissions and regulated prices will be set to provide sufficient certainty for private sector investors.

Comment

The cost of producing electricity is clearly an issue for the State and potential power station investors. As the Green Paper noted, and highlighted in table 7 below, coal remains the cheapest electricity generation option.

Table 7: Cost of Producing Electricity, by source.

	Technology Cost ($MWh)
Coal	15 – 60
Natural Gas	35 – 60
Solar Hot Water	40 – 70
Large Scale Hydro	40 – 100
Biomass Electricity	50 – 75
Large Scale Wind	60 – 80
Solar Thermal Electric	120 – 180
Photovoltaics	200 - 400

Source: Commonwealth of Australia, *Renewable Opportunities, A Review of the Operation of the Renewable Energy (Electricity) Act 2000*, September 2003, at 94.

It is evident that the use of gas for electricity generation is likely to increase in the future. The delivered price of gas into future base load generators will depend on a variety of factors, including:

- Location of the new plant;
- Overall gas market growth;
- Availability of sufficient quantities of gas;
- Environmental policies; and
- Cost and availability of gas from a new source.[29]

A consultant report to NEMMCO notes that modeling of the supply and demand of gas in eastern Australia suggests that given continued strong growth in gas usage, the existing gas fields which are currently under development will be insufficient to support sustained development of gas fired base load generation. Development of further gas-fired base load generation is therefore dependent on the development of a further major low cost source of gas. Contenders at this stage appear to be:

- Coal seam methane in Queensland and NSW;
- PNG gas project;
- Timor sea gas; and
- North-west Shelf gas in Western Australia.

Apart from coal seam methane, all of the potential new sources involve development of substantial pipeline infrastructure which will make it very difficult for these projects to deliver

[29] ACIL Tasman, *SRMC and LRMC of Generators in the NEM. A Report to the IRPC and NEMMCO*. April 2003.

gas at a price which will support competitive base load gas-fired generation. They are unlikely to be economically viable until there is a substantial gas demand available. The consultants concluded that the delivered price of gas to new base load power stations will not be competitive with coal unless the competitive balance is changed by environmental policies, such as a substantial carbon tax (around $25.00 to $30.00 per tonne of carbon dioxide) or a moratorium on further coal fired developments.[30]

A coalition of 11 conservation groups has called on the NSW Government to rule out new coal fired power generating plant for the State. Instead, the coalition identified 5,984 MW of clean energy and energy efficiency programs that could be implemented.[31]

The Green Paper – Energy Policy Settings – Greenhouse

The Green Paper notes that significant global emission reductions will be needed to avoid significant interference with the climate system. The Government supports the setting of a long term national emissions reduction target – noting that potential requirements range from stabilizing emission rates to near current levels to reducing emissions by around 40 per cent by mid-century. The Government's stated approach is to set policy and allow the market to determine which technologies should be developed to meet greenhouse performance standards set by government.

The preferred approach of the State is for the Australian Government to ratify the Kyoto Protocol and establish a national emissions trading scheme that sets a national cap on emissions. The Green Paper notes that in the absence of action by the Commonwealth, the State Government has facilitated an inter-jurisdictional working group to develop a national emissions trading scheme.

The NSW Greenhouse Gas Abatement Scheme requires electricity retailers and other large users to reduce the emissions from electricity they sell or use to 95 % of 1990 per capita levels by 2007. To achieve this retailers and large users may: purchase energy with lower greenhouse intensity; reduce demand; and purchase non-energy greenhouse offsets such as forest plantation sinks. The Scheme is due to end in 2012, and it is the Government's preferred position that it would be replaced by a national emissions trading scheme.

However, failing this the Government will look to extend the Scheme to 2020. The Green Paper also canvassed the option of setting minimum emission performance standards for new generators. The preferred standard would be expressed in terms of emission outcomes – ie, tonnes of carbon dioxide per unit of electricity – and that all states adopt these standards. Due to the long lives of power stations, those built now need to contribute to long term emission reductions. The Green Paper notes that emission intensity of electricity generation should decline substantially from current levels to allow for growth in electricity demand and emission reductions required over the longer term.

The Green Paper notes that NSW Greenhouse Gas Abatement Scheme benchmark for 2012 of

---

30 ACIL Tasman, *SRMC and LRMC of Generators in the NEM. A Report to the IRPC and NEMMCO*. April 2003, at 39.

31 Australian Conservation Foundation *et al, Securing NSW's Environmental and Energy Future*, 6 December 2004.

7.27 tonnes of CO2-e per capita implies an average net emission intensity of about 0.7 tonnes CO2-e/MWh. If NSW is to require new generators to meet greenhouse performance standards, it is appropriate that the generator be no worse than the average emission intensity implied by the benchmark. The emission intensity of best practice coal is above the average emission intensity implied by the Greenhouse Gas Abatement Scheme, but power stations could be combined with offsets to achieve a net standard close to the intensity implied by the Scheme.

The Green Paper concludes with a warning that in the absence of nationally coordinated minimum emission standards, implementing standards in NSW alone may mean that more greenhouse intensive power stations in other states would have a cost advantage over those in NSW. Output from these greenhouse intensive stations could be imported into NSW, causing the perverse effect of raising greenhouse emissions.

Comment

With the commencement of the Kyoto Protocol on 16 February 2005, the reduction of greenhouse gas emissions is one of the most complex public policy decisions facing the Commonwealth and State Governments. The 2002 Parer Review found that greenhouse abatement measures across Australia are poorly targeted, uncoordinated, and compete with each other. Parer proposed the introduction of an economy wide emissions trading scheme to replace, and so abate the same level of emissions as the range of Commonwealth and State greenhouse gas abatement programs.[32] However, on 30 August 2003 the Prime Minister announced that Cabinet had decided against introducing a greenhouse gas emission trading scheme.[33] The Federal Government has been opposed to a trading scheme since.[34]

In NSW the Independent Pricing and Regulatory Tribunal regulates the NSW Greenhouse Gas Abatement Scheme. As at 15 February 2005 the Tribunal had registered 10 million tonnes of greenhouse gas abatement over the previous two year period. In a speech discussing the Scheme, IPART chairman James Cox was reported as saying: "The NSW scheme demonstrates that carbon trading is viable and businesses can benefit from participating in the scheme."[35]

In October 2004 the Productivity Commission released its draft discussion paper on national competition policy reforms. The Productivity Commission report noted the work of the Parer Review, and noted that it appears that divergent approaches by governments to dealing with greenhouse gas emissions, as well as uncertainty about future policy directions, are impeding necessary investment in many parts of the economy. The Commission concluded:

> In the Commission's view, the capacity of the current CoAG greenhouse processes to

---

32 Council of Australian Governments, *Energy Market Review, Towards a Truly National and Efficient Energy Market*, Chair – Warwick Parer, December 2002, at 242.

33 "PM can carbon trading scheme" in *The Australian*, 30 August 2003.

34 See for example, Senator the Hon Ian McDonald, Minister for the Environment and Heritage, *Media Release*, "Electricity costs to soar under Labor carbon plan - Beazley must come clean." 13 February 2005.

35 "Energy retailers cap greenhouse emissions: IPART" *AAP*, 8 February 2005.

> address this issue in a timely manner is questionable. For example, there appears to be have been very little progress in further developing the National Greenhouse Strategy. Accordingly, the Commission considers that CoAG should give priority to developing a more effective process for achieving a national approach to greenhouse gas abatement.[36]

The position of the Productivity Commission was supported by the Electricity Supply Association of Australia, which stated:

> One of the biggest sovereign risk issues facing the energy sector is future Government policy and measures on greenhouse gases. Base load power stations cost at least a billion dollars each and have a lifespan of 35-50 years, while transmission systems for both electricity and gas have lives of around 50 years. Companies making these long lived investments have to understand their policy environment beyond the next few years.
>
> At present there is no common Government policy position on dealing with carbon emissions, creating significant uncertainty for potential investors. Industry believes that greater certainty can be achieved by the Federal Government setting a single greenhouse gas emission target for 2050 that applies to the whole economy.
>
> … in our opinion comprehensive greenhouse gas abatement policies are central to delivering the level of investor confidence necessary to meet the demand growth for energy and carbon emission abatement objectives. No single measure, instrument or technology will on its own deliver the necessary results and this applies as equally to market based financial instruments as it does to specific technologies.[37]

The Victorian Government also released a Position Paper on greenhouse gas emissions and energy production in December 2004. The paper proposed a suite of measures favoured by the Victorian Government to meet greenhouse commitments. A national emissions trading scheme was strongly supported.[38] Commenting on the Position Paper, the Victorian Premier stated: "There needs to be a national approach to emissions trading and Victoria, in the absence of Commonwealth leadership, will work toward that with other states and territories."[39]

However, media reports suggest that, in the absence of Commonwealth involvement, agreement by all States on the format for a greenhouse emissions trading scheme is proving difficult. Resource intensive States Western Australia and Queensland have put forward objections. West Australian Environment Parliamentary Secretary was reported as saying: "If we had the NSW per capita scheme here, it would be an absolute nightmare and it would stop further development of energy production facilities…But we do need a system that is fair and equitable for all states

---

36 Productivity Commission, *Review of National Competition Policy Reforms, Discussion Draft*, October 2004, at 173.

37 Electricity Supply Association of Australia, *Submission to the Productivity Commission Review of National Competition Policy Arrangements,* 2 July 2004.

38 Victorian Government, *The Greenhouse Challenge for Energy. Driving investment, creating jobs and reducing emissions. Position Paper*. December 2004.

39 Premier of Victoria, *Media Release*, "New plan to drive investment and cut emissions in energy sector." 7 December 2004.

and territories, and the Commonwealth should be involved, but they are not even in the game."[40]

The Green Paper – Planning and Environment Issues

The Green Paper noted that the Department of Infrastructure, Planning and Natural Resources is currently developing an Energy Sector Planning Strategy to provide proponents of energy infrastructure with guidance on the Government's expectations for planning, assessment and approval of energy infrastructure. A key component of the Strategy will be a State Environmental Planning Policy, which would:

- Clarify the permissibility of energy generating facilities across the State;
- Clearly articulate Government policy on performance criteria for energy generation facilities in relation to water use, efficiency, air emissions and the use of waste or biomass as fuels;
- Make provision for new major power plant sites, including upfront agreed whole of government concept approvals for new infrastructure; and
- Make provisions for avoiding land use conflicts.

Major electricity investments will be classified State Significant with the Minister for Infrastructure and Planning the consent authority. In terms of wind generation, a regional landscape assessment will be undertaken to locate 'no-go' areas based on landscape constraints, and to develop assessment parameters for other areas to avoid impacts on important vistas or regional landscapes.

The Green Paper – Retail Pricing

The Government acknowledged that many of the options for energy policy reform put forward in the Green Paper may place upward pressure on retail prices. The Green Paper noted the 'trade-off' – policies aimed at correcting market failure and internalizing externalities can impose additional costs on the consumer. The final price of electricity paid by the consumer consists of a number of different elements – as shown in Table 8 below.

Table 8: Breakdown of Final Electricity Costs for a Residential Customer

Activity	Proportion of Final Electricity Bill
Generation	45 – 50%
Transmission	10 – 15%
Distribution	30 – 35%
Retail	5 – 10%

Source: NSW Government, *Energy Directions Green Paper*, December 2004 at 41.

The cost of generation, making up around 45 per cent of the final price, is determined competitively in the National Electricity Market. Transmission and distribution, which together make up around 45 per cent of the final price, are regulated, as is of course the final residential bill. On 1 January 2002 the NSW Government introduced full retail competition in electricity and gas markets. All business and residential customers in the State are free to choose their electricity and gas supplier. By September 2004, over 822,000 customers had chosen to negotiate a competitive contract with their retail supplier. Retail price regulation is supported by the *Gas Supply Act 1997* and the *Electricity Supply Act 1995* and their regulations. The

[40] "States at loggerheads over emissions." in *The Australian Financial Review*, 7 December 2004.

Independent Pricing and Regulatory Tribunal regulates electricity prices. However, regulated tariffs are due to expire from 30 June 2007.

The Green Paper noted that industry is seeking direction from Government on whether regulated tariffs will continue beyond 2007. The Paper also noted that some industry participants have argued that regulated prices are not set at levels that will provide incentives for further investment in new supply capacity and demand management. Stakeholders have also sought clarification about which regulatory body will be responsible for retail price regulation beyond 2007. As part of the Australian Energy Market Agreement, signed by Ministers in June 2004, jurisdictions have agreed to transfer responsibility for retail regulation to the Australian Energy Regulator. However, retail pricing was specifically excluded from this agreement. Each jurisdiction is free to choose whether it will transfer retail price regulation to the new Regulator – and the Green Paper requests comments on whether NSW should transfer this responsibility.

The Green Paper noted that when demand for electricity is at its highest, electricity retailers have to pay up to around 250 times more than average. In most markets, such price increases would significantly reduce demand. However, the Green Paper noted that electricity consumers do not reduce demand due to two important factors:

- The price paid by consumers is not a 'real time price' – it is the aggregate amount of electricity used over a period. To allow for cost reflective time of use pricing, retailers would need to know when each unit of electricity was consumed and the price at the time; and
- Electricity demand is likely to be reasonably inelastic. Even if time of use pricing is implemented, consumers are unlikely to turn off many 'essential service' appliances (eg heating and air conditioning) at times of high demand.

The Green Paper asked for comment on the mandating of interval meters for customers above a certain threshold – which would allow for 'time of use' pricing. An alternative put forward for comment was the use of a step price – where usage exceeding a threshold attracts a higher price.

Comment

The Green Paper made the statement that electricity demand is likely to be reasonably inelastic, even with the introduction of time of use pricing. However, many stakeholders disagree with this prognosis. As noted previously in this paper, the Parer Review - *Towards a Truly National and Efficient Energy Market*, proposed mandating the use of interval meters for all consumers. Parer argued that consumers will then potentially have the price signals available to them to engage more actively in load reduction through energy efficiency measures and load shifting to cheaper periods for discretionary power uses.

The Victorian Essential Services Commission, which is responsible for the economic regulation of Victoria's energy, water, and transport essential services, has recently mandated the rollout of interval meters for electricity customers.[41] The Commission's decision is for interval meters to be installed by:

- 2008 for all large customers, with new and replacement installation commencing in 2006;

[41] Essential Services Commission (Victoria), *Mandatory Rollout of Interval Meters for Electricity Customers. Final Decision*. July 2004.

- 2011 for all small businesses and large residential customers (those consuming less than 160 MWh per year but more than 20 MWh), with new and replacement installation commencing in 2006;
- 2013 for all small businesses and residential customers (those consuming less than 20 MWh per year) with offpeak metering or three phase metering, with new and replacement installation commencing in 2006;
- installation commencing in 2008 on a new and replacement basis for all small businesses and residential customers with single-phase, non-offpeak metering.

As part of its determination, the Commission extensively reviewed the evidence of whether customers would respond to price signals made available by an interval meter.[42] In its final decision, the Commission reported the results of a Californian pilot test which began in June 2003. The pilot was designed to monitor customer energy use in response to different types of dynamic pricing – where prices vary by time of use and market conditions. The tariffs had to satisfy three constraints: be cost neutral for the average consumer; not change the bill of low and high users by more than 5 per cent in either direction; and provide customers with an opportunity to reduce their bill by 10 per cent if they reduced or shifted peak usage by 30 per cent. Depending on the tariff type, the Californian pilot reduced peak demand by between 19.5 and 49.4 per cent.

The Essential Services Commission concluded that the introduction of interval metering will have the following demand management benefits:

- Provide the capacity and incentive for customers to manage their electricity consumption more efficienty;
- Increase retail price efficiency – traditional single rate accumulation meters cannot support efficient pricing structures that reflect the costs incurred by retailers in the wholesale market;
- Provide distributors with the capability and incentive to introduce more efficient pricing to retailers.[43]

The Productivity Commission noted that it is almost inevitable that removing or easing retail price caps would lead to higher average prices and have an adverse short term impact on some users. However, the Commission argued that ensuring low income users have adequate access to power is best handled through transparent community service payments rather than through a general suppression of prices.[44]

---

42 Prior to its final decision, the Commission published two papers on interval meters. These were: Essential Services Commission (Victoria), *Installing Interval Meters for Electricity Customers – Costs and Benefits. Position Paper*, November 2002. and Essential Services Commission (Victoria), *Mandatory Rollout of Interval Meters for Electricity Customers, Draft Decision*, March 2004.

43 Essential Services Commission (Victoria), *Mandatory Rollout of Interval Meters for Electricity Customers. Final Decision*. July 2004.

44 Productivity Commission, *Review of National Competition Policy Reforms, Discussion Draft*, October 2004, at 174.

The Green Paper – Industry Structure

In terms of industry structure the Government's position is that changes need to be made in order to:

- Preserve the value of the Government's investment – to be achieved through more effective governance structures for the management of risks and business structures that can effectively compete in the national market; and
- Promote private investment in energy infrastructure – The Green Paper stated: 'The Government does not consider it appropriate to invest further capital in high risk commercial activities like electricity generation, when this capital and risk exposure can be provided by the private sector.'

The Green Paper noted that the Government's Risk Management Proposals for NSW Electricity Businesses, released as consultation papers in 2001 and 2004, will not be implemented. In essence, these proposals involved separating the high risk task of wholesale electricity trading from the task of generating and delivering electricity. It was decided not to pursue these reforms due to their complexity and difficulty of implementation. However, in the Government's opinion the proposals highlighted the need for greater involvement of the private sector in retailing electricity – as greater private sector involvement in retailing is likely to encourage new private investment in generation plant. The Government noted the following actions to re-structure the State-owned electricity businesses:

- Investigate the possibility of merging some Government-owned generating capacity with a Government-owned electricity retailer to create a vertically integrated energy generation, trading and retailing company;
- Investigate ways for the private sector to become involved in the Government-owned retail businesses;
- Consider the role of the Electricity Tariff Equalisation Fund;
- Review the current distribution network boundaries; and
- Establish a framework for State-owned generators to enter longer term, risk-sharing trading contracts with the private sector.

The Green Paper noted that none of the above options would involve the Government selling electricity generation, transmission or distribution assets.

In terms of vertical integration, the Green Paper noted that three major private sector players (AGL, Origin, and Singapore Power Group) dominate the national market. These organizations are also integrated with holdings of both retail and generation assets. It is thought that in the future, the market is likely to comprise a few large, integrated companies, with smaller participants meeting the needs of market niches. To effectively compete in a national market, NSW retailers will need to have the opportunity to invest in generation plant, and to expand their activities interstate. However, this would result in the Government taking on additional risk. An alternative approach is vertical integration – this would provide the retail businesses with a 'natural hedge' and therefore decrease their need to enter into complex contractual hedging arrangements.

However, the Green Paper noted the Government's caution in vertically integrating its entire portfolio – as the private sector might be deterred from participating in the NSW electricity market, as almost all NSW generation capacity would be aligned to an existing retail business.

Sufficient 'unaligned' generation capacity needs to be retained to supply private retailers.

The Government aims to transfer the risk of electricity retailing from Government-owned retailers to the private sector – with a possible method through the creation of joint ventures or reselling arrangements between the Government-owned businesses and the private sector. An example of this is the Actew/AGL joint venture which began operating on October 3 2000. The ACT Government-owned utilities provider ACTEW formed a joint venture with AGL. ACTEW and AGL both hold a 50 per cent interest in two partnerships, distribution and retail. A distribution partnership has been established as a result of the combination of ACTEW's electricity-network operations with AGL's ACT and Queanbeyan natural-gas network. A retail partnership was also formed as a result of the merging of ACTEW's electricity-retail operations and its billing capabilities for electricity, water and wastewater services, with AGL's natural-gas sales business in Canberra and Queanbeyan.

The Green Paper noted that State-owned electricity businesses will be encouraged to continue to develop options for new generation capacity. However, the Government does not intend for these businesses to have the first call on investing in these options. Instead, the Government proposes that the businesses would either sell these options to other parties, who will further develop and invest in them, or would pursue them through commercial arrangements such as a joint venture or power purchase agreement. The Macquarie Generation gas plant proposal at Tomago is well advanced and could be ready for sale in 2005.

The Green Paper noted that a joint venture approach to developing generation capacity might be approved where:

- There is a strong business case for a joint venture arrangement involving a State-owned generator, compared to a private sector party investing in new capacity on its own;
- The debt and equity capital for the new investment is provided by the private sector;
- There is no material increase in the State-owned generator's exposure to the electricity market; and
- There is an appropriate allocation of risk between the State-owned generator and the private sector partner.

The Government also intends to develop a backup strategy to develop new generation capacity if private investment is not forthcoming.

Comment

The Australian Competition and Consumer Council has closely studied the ramifications of vertical integration in the electricity industry. The Council noted:

> Re-integration can be used by retailers to mitigate the risks associated with generator market power by providing the retailer with a natural hedge against spot market volatility. However, ownership of a generator by a retailer may increase barriers to entry/expansion for stand-alone electricity retailers, through reduced scope for them to secure competitively priced hedging contracts. In the event that load closely matches output for the vertically integrated market participants, there is little surplus to be traded in contract markets. The evidence from New Zealand suggests that stand alone retailers could not obtain contracts from integrated players, as these firms kept contract cover to protect their own retail positions. Re-

> integration may also create pressures for other generators and retailers to merge. [45]

The Australian Competition and Consumer Council has identified that in the UK, a market structure has developed over the past three years where there are now six major vertically integrated generator-retailers. Corresponding to this market development has been a substantial drop in electricity prices. However, the Council noted that the UK reforms have combined vertical integration with horizontal disaggregation of generation and changed trading arrangements. As such, it is difficult to separate the impacts of vertical integration. The Council concluded that the UK experience suggests that vertical integration may not have an adverse impact on electricity prices if the appropriate horizontal market structure is in place.

The Australian Competition and Consumer Council continued:

> The ACCC considers that it is not clear that generation-retail mergers are necessarily undesirable and that they need to be considered on a case by case basis. It also believes that the best way to ensure that these types of mergers are not anti-competitive is to ensure that the generation and retail markets are competitive. If the generation sector were to be further disaggregated then vertical integration would not seem to raise the same concerns as the situation where generation was not effectively disaggregated.[46]

However, there have been a considerable number of reports noting the lack of generator competition in NSW. For instance, the Parer Review found that there was insufficient competition among generators to allow the National Electricity Market's pool system to work as intended. To strengthen competition among generators, Parer recommended, amongst other things, the disaggregation of government owned generation businesses, and ultimately their divestiture.

The Australian Competition and Consumer Council agreed with Parer's findings, and considered that the most effective means of delivering a competitive and efficient energy market is through reform of the market's underlying structure. This could be achieved through increasing the number of competing generators, either through further disaggregation of generation assets or measures to encourage new entry. The Competition Council concluded that structural reform would result in significant improvements in competition resulting in lower energy prices for consumers.[47]

The Productivity Commission noted the cost to the community from excessive wholesale electricity price volatility, and stated in its draft report:

> In particular, governments should consider whether further disaggregation of their generation businesses is required to strengthen competition in the National Electricity Market. The key issue is whether the benefits from increasing competitive pressures (and

---

45 Australian Competition and Consumer Council, *Submission to the Productivity Commission Review of National Competition Policy Arrangements*, 13 July 2004, at 35.

46 Australian Competition and Consumer Council, *Submission to the Productivity Commission Review of National Competition Policy Arrangements*, 13 July 2004, at 35.

47 Australian Competition and Consumer Council, *Submission to the Productivity Commission Review of National Competition Policy Arrangements*, 13 July 2004, at 31.

> thereby reducing the elevated prices associated with the use of market power) would exceed the transaction costs and any costs associated with forgoing economies of scale and scope. Viewed in this light, further disaggregation of government owned generation businesses might well be the most cost effective means of reducing generator market power in particular regions.
>
> In the Commission's view, the question of ownership is in important respects secondary to ensuring that there are efficient market structures in place. However, once efficient structures have been established, governments should assess whether continued public ownership of generation businesses is warranted. In that regard…divestment of generation assets may have some wider benefits, including reinforcing the confidence of the private sector in the integrity of the market, thereby providing greater certainty for new investment.[48]

6.0 CONCLUSION

It has been forecast that NSW will require more electricity peaking capability by 2008/09 – some three to four years away. An open cycle gas peaking plant may take up to two years to build, so there is a small window of opportunity for construction to commence. There is also an opportunity for demand management measures to be implemented. The Government has stated that it does not wish to build a power station itself. However, there are significant obstacles in the way for the private sector to take the risk of building and operating a peaking generator. These include greenhouse policy risks and monetary risks. The financial returns from the wholesale electricity market do not presently seem to encourage the construction of new generation plant. How the Government responds to these issues will have considerable impact on consumer sentiment.

---

[48] Productivity Commission, *Review of National Competition Policy Reforms, Discussion Draft*, October 2004, at 170.

Recent Research Service Publications

To anticipate and fulfil the information needs of Members of Parliament and the Parliamentary Institution.

[Library Mission Statement]

Note: **For a complete listing of all Research Service Publications contact the Research Service on 9230 2093. The complete list is also on the Internet at:**

http://www.parliament.nsw.gov.au/prod/web/PHWebContent.nsf/PHPages/LibraryPublist

(A) BACKGROUND PAPERS

Implications of the 2001 Federal Election for the 2003 New South Wales Election by Antony Green 1/02
New South Wales State Electoral Districts Ranked by 2001 Census Characteristics by Mark D'Arney 1/03
New South Wales State Election 2003: Electorate Profiles by Mark D'Arney 2/03
Prospects for the 2003 Legislative Council Election by Antony Green 3/03
2003 New South Wales Elections – Preliminary Analysis by Antony Green 4/03
Alcohol Abuse by Talina Drabsch 5/03
2003 New South Wales Elections – Final Analysis by Antony Green 6/03
New South Wales Legislative Assembly Elections 2003: Two-Candidate preferred results by polling place by Antony Green 7/03
New South Wales Legislative Council Elections 2003 by Antony Green 8/03
The Economic and Social Implications of Gambling by Talina Drabsch 9/03
Principles, Personalities, Politics: Parliamentary Privilege Cases in NSW by Gareth Griffith 1/04
Indigenous Issues in NSW by Talina Drabsch 2/04
Privatisation of Prisons by Lenny Roth 3/04
2004 NSW Redistribution: Analysis of Draft Boundaries by Antony Green 4/04
2004 NSW Redistribution: Analysis of Final Boundaries by Antony Green 1/05

(B) BRIEFING PAPERS

Court Delays in NSW: Issues and Developments by Rachel Callinan 1/02
Sentencing Law: A Review of Developments in 1998-2001 by Rowena Johns 2/02
Outworkers by Roza Lozusic 3/02
Censorship in Australia: Regulating the Internet and other Recent Developments by Gareth Griffith 4/02
Bushfires by Stewart Smith 5/02
Information Privacy and Health Records by Gareth Griffith 6/02
Public Liability by Roza Lozusic 7/02
Dealing with Graffiti in New South Wales by Rachel Callinan 8/02
Human Cloning and Stem Cell Research by Stewart Smith 9/02
Victims of Crime: Plea Bargains, Compensation, Victim Impact Statements and Support Services by Rowena Johns 10/02
Public Liability: An Update by Roza Lozusic 11/02
Water Reforms in New South Wales by Stewart Smith 12/02
Defamation Law Reform Revisited by Gareth Griffith 13/02
Drought by Stewart Smith 14/02
Bail Law and Practice: Recent Developments by Rowena Johns 15/02
Gangs in NSW by Roza Lozusic 16/02
Native Vegetation: Recent Developments by Stewart Smith 1/03
Arson by Talina Drabsch 2/03
Rural Sector: Agriculture to Agribusiness by John Wilkinson 3/03
A Suburb Too Far? Urban Consolidation in Sydney by Jackie Ohlin 4/03
Population Growth: Implications for Australia and Sydney by Stewart Smith 5/03
Law and Order Legislation in the Australian States and Territories, 1999-2002: a Comparative Survey by Talina Drabsch 6/03
Young Offenders and Diversionary Options by Rowena Johns 7/03

Fraud and Identity Theft by Roza Lozusic 8/03
Women in Parliament: the Current Situation by Talina Drabsch 9/03
Crimes Amendment (Sexual Offences) Bill 2003 by Talina Drabsch 10/03
The Consumer, Trader and Tenancy Tribunal by Rowena Johns 11/03
Urban Regional Development by Stewart Smith 12/03
Regional Development Outside Sydney by John Wilkinson 13/03
The Control of Prostitution: An Update by Stewart Smith 14/03
"X" Rated Films and the Regulation of Sexually Explicit Material by Gareth Griffith 15/03
Double Jeopardy by Rowena Johns 16/03
Expulsion of Members of the NSW Parliament by Gareth Griffith 17/03
Cross-examination and Sexual Offence Complaints by Talina Drabsch 18/03
Genetically Modified Crops by Stewart Smith 19/03
Child Sexual Offences: An Update on Initiatives in the Criminal Justice System by Rowena Johns 20/03
Horizontal Fiscal Equalisation by John Wilkinson 21/03
Infrastructure by Stewart Smith 1/04
Medical Negligence: an update by Talina Drabsch 2/04
Firearms Restrictions: Recent Developments by Rowena Johns 3/04
The Future of Water Supply by Stewart Smith 4/04
Plastic Bags by Stewart Smith 5/04
Tourism in NSW: after September 11 by John Wilkinson 6/04
Drug Offences: An Update on Crime Trends, Diversionary Programs and Drug Prisons by Rowena Johns 7/04
Local Development Assessment in NSW by Stewart Smith 8/04
Indigenous Australians and Land In NSW by Talina Drabsch 9/04
Medical Cannabis Programs: a review of selected jurisdictions by Rowena Johns 10/04
NSW Fishing Industry: changes and challenges in the twenty-first century by John Wilkinson 11/04
Ageing in Australia by Talina Drabsch 12/04
Workplace Surveillance by Lenny Roth 13/04
Current Issues in Transport Policy by Stewart Smith 14/04
Drink Driving and Drug Driving by Rowena Johns 15/04
Tobacco Control in NSW by Talina Drabsch 1/05
Energy Futures for NSW by Stewart Smith 2/05