A1.1 Premier’s Press Release: Inquiry Announcement

Securing NSW energy needs – finding the balance

Wednesday 9 May 2007

NSW Premier Morris Iemma today announced the appointment of Professor Anthony Owen to advise the NSW Government on the potential need for a new baseload power station.

“On March 24 the people of NSW elected my Government on a platform of delivering the services that hard working families rely on,” Mr Iemma said.

“There are few services more basic than a reliable source of energy for our homes, businesses and industries, and there is no more important requirement than ensuring that our energy supply is as clean and green as we can possibly make it.

“A reliable energy supply is an essential part of a growing economy and the decisions we will take on this issue will make sure we can keep the lights on and keep our economy ticking over.

“I am determined to find the balance between powering our economy while maintaining NSW position at the forefront of climate change innovation.

“NSW already has Australia’s only emissions trading scheme, we now have a new opportunity to provide climate change leadership.

“If it decided that we need to move forward on a new baseload generator we will be at the same time searching for the cleanest, lowest emitting generating technology we can find.

“Today NSW has an opportunity to secure our economy while using the best available low emission technology to do so,” Mr Iemma said.

Recently, Professor Owen edited a book entitled “The Economics of Climate Change”, his own chapter focussed on the transition to renewable energies. He has written other articles for international journals on energy use and the environment, and the economics of renewable energy.
The Premier said addressing NSW energy needs posed complex policy questions that require careful consideration.

“The National Electricity Market Management Company (NEMMCO), which runs the electricity market, has identified a potential need for new baseload electricity generating capacity in NSW from 2012-13.

“Six years might sound like a long time, but building power stations is an extremely complex process with very long lead times and there are firmly held views in the community about how we should proceed.

“That means we need to start taking the necessary decisions in the coming months in order to secure the reliable supply our state needs in time,” Mr Iemma said.

Mr Iemma said that he had appointed Anthony Owen, a professor of Energy Economics at the Curtin Business School at the Curtin University of Technology in Perth to prepare a report for the Government on three issues.

They are:

- Review the need and timing for new baseload generation that maintains both security of supply and competitively priced electricity;
- Examine the baseload options available to efficiently meet any emerging generation needs;
- Review the timing and feasibility of technologies and or measures available both nationally and internationally that reduce greenhouse gas emissions;
- Determine the conditions needed to ensure investment in emerging generation, consistent with maintaining NSW triple A credit rating.

In establishing this inquiry the NSW Government is seeking advice on the actions required to ensure timely investment in generation capacity that addresses greenhouse gas emissions while retaining NSW fiscal position.

“On many of the key policy questions I am going into this process with an open mind,” Mr Iemma said.
“On one however there will be no shift in our position – there will be no consideration of nuclear energy whatsoever.

“However make no mistake, if difficult decisions are necessary, then I will take them,” Mr Iemma said.

Professor Owen will advertise for submissions from the public and stakeholder groups and will report back to Government by the end of August.
A1.2 Snapshot of the NSW Electricity Sector

As New South Wales is the most populous State, the NSW electricity industry is the largest in Australia. Electricity is supplied to customers through four distinct sectors of the industry - generation, transmission, distribution and retail.

Generation

The generation sector produces electricity at power plants and offers it for sale, either through the wholesale market or under contract with particular retailers or end-users. The vast majority of electricity is sold via the wholesale market and dispatched by NEMMCO. The current generation capacity in the NSW region of the NEM is about 12,600MW. In addition, Snowy Hydro Ltd has a capacity of 3,700MW. These capacities are the amount of power expressed in megawatts that can be produced at a point in time.

Coal-fired generation dominates the market, as New South Wales has good local access to black coal reserves. Figure 1.2.1 shows total energy output in New South Wales by fuel source (coal, gas, hydro and other renewable sources like biomass, wind and solar). This is the total output usually expressed in megawatt hours and simply is the megawatts of the power plants multiplied by their annual capacity factors. Power can also be expressed as a gigawatt hour (GWh) which is 1,000 times larger than a MWh.

Figure 1.2.1: Electricity Generated by Fuel Source, NSW in 2005-06 (including Snowy Hydro Ltd)

Source: Department of Water and Energy analysis of generation based on NEMMCO data.
Coal

There are eight coal-fired power stations in New South Wales, seven major State-Owned and one small privately owned:

State-Owned

- **Macquarie Generation** owns and operates two large coal-fired power stations in the Upper Hunter Valley – Bayswater (2,720 MW) and Liddell (2,060 MW)
- **Delta Electricity** owns and operates four large coal-fired power stations – Mt Piper (1,400 MW) and Wallerawang (1,000 MW) near Lithgow; and Vales Point (1,320 MW) and Munmorah (600 MW) on the Central Coast
- **Eraring Energy** owns and operates the Eraring coal-fired power station (2,640 MW) on the Central Coast.

Privately-Owned


Gas

There is one small gas-fired power plant in New South Wales:

Privately-owned

- **Marubeni Australia Power Services** owns a co-generation gas-fired plant (160MW) at Smithfield.

In addition, there are a number of gas-fired power stations being planned or currently under construction in New South Wales. These include the 440MW combined cycle plant being built by TRUenergy at Tallawarra, near Wollongong, the Colongra 660MW open cycle plant being built by Delta Electricity at Lake Munmorah on the Central Coast and the NewGen Uranquinty 640MW open cycle plant being built by Babcock & Brown Power and ERM Power.

Hydro

Snowy Hydro Limited is jointly owned by the New South Wales, Victorian and Commonwealth Governments. Snowy Hydro comprises 16 large dams and seven power stations in the Kosciusko National Park area. Its total generation capacity is about 3,700MW, and it predominantly meets the bulk of the State’s peak and intermediate generation requirements.
Eraring Energy owns and operates several hydro generators: Shoalhaven (240MW), Warragamba (50MW – currently disconnected), Hume (50MW), Burrinjuck (25MW), Keepit (7.2 MW) and Brown Mountain (4.95 MW).

**Other renewable energy sources**

Currently, renewable energy other than hydro electricity makes up about 0.4 per cent of the energy consumed in New South Wales.

The most significant solar thermal project underway in New South Wales is a solar thermal electricity plant being developed by Macquarie Generation at the Liddell power station in the Upper Hunter Valley. This plant is expected to generate the equivalent of 4.4GWh annually through displacement of coal for pre-heating boiler feed water. The Liddell power station can generate up to 13,000GWh per annum.

Currently New South Wales has one wave power generator, located in Port Kembla, which has a peak capacity of approximately 0.5MW.

Around 17MW of wind power has been installed in New South Wales. Eraring Energy owns and operates wind farms at Blayney (9.9MW) and Crookwell (4.8MW). A further ten wind energy projects, totalling around 540MW of additional wind power, have been given final development approval but are yet to commence construction. In addition, projects totalling a further 600MW are under consideration.

Biomass energy is energy that comes from organic matter. Delta Electricity and the NSW Sugar Milling Co-operative are jointly developing two 30MW co-generation plants at Condong and Broadwater on the North Coast.

**The electricity network**

The electricity network is made up of the transmission and distribution sectors.

**Transmission**

The high voltage transmission network delivers electricity from power stations to local distribution networks in major centres of demand.

In New South Wales, most of the transmission network is owned and operated by TransGrid, a NSW State-owned Corporation. TransGrid’s assets comprise 12,440 km of high-voltage transmission lines and 82 substations and switching stations. EnergyAustralia and Directlink are also registered Transmission Network Services Providers in New South Wales.
Transmission prices and revenues are regulated by the Australian Energy Regulator under the National Electricity Law and Rules.

**Distribution**

The distribution network is the lower voltage network of local ‘poles and wires’ that takes electricity from high-voltage substations and delivers it to end consumers.

In New South Wales the distribution network is divided between three State-owned Corporations:

- **EnergyAustralia** owns and operates the distribution network that delivers electricity to Newcastle, the Hunter Valley, Central Coast, and eastern Sydney areas. Its network comprises 49,000 km of power lines, 28,000 substations, 500,900 power poles and a service area of 22,275 square km.

- **Integral Energy** owns and operates the distribution network that delivers electricity to Wollongong and the Illawarra region, the Blue Mountains, Lithgow, the Southern Highlands, and western Sydney areas. Its network comprises 33,370 km of power lines, 27,800 substations, 315,000 power poles and a service area of 24,500 square km.

- **Country Energy** owns and operates the rural and regional distribution network that covers 737,000 square km or more than 90 per cent of New South Wales. Its network comprises 195,000 km of power lines, 113,000 substations and 1,400,000 power poles.

At present, the revenues and prices charged by distribution businesses are regulated by the NSW Independent Pricing and Regulatory Tribunal (IPART). However, as part of the energy market reform process being overseen by the Ministerial Council on Energy, responsibility for regulation of the distribution sector is expected to be transferred to the Australian Energy Regulator on 31 December 2007.

**Network reliability**

Network reliability in New South Wales is very high by comparison with other States and Territories in Australia and internationally. For example, in 2005-06, the average duration of supply interruptions per customer in New South Wales was only 143.10 minutes (out of 525,600 minutes a year), which is more than 99.97 per cent reliability.
Under the State Plan, the Government has committed to the target of achieving 99.98 per cent electricity reliability for New South Wales by 2016, which would further reduce the time a customer is without electricity by an average of 38 minutes a year. This reliability target relates to temporary unavailability of electricity following an outage of the electricity distribution system, and is known as the normalised reliability performance measure. It does not include ‘excluded interruptions’ as defined within the reliability licence conditions published by IPART. Excluded interruptions are those caused by major external events such as bushfires, severe storms or floods.

The Government has established strategies to identify geographical areas experiencing lower-than-average reliability, and to target resources at those areas to ensure improvements. More than $10 billion will be spent by TransGrid and the three distribution businesses over the next four years in substantially expanding and upgrading the network in New South Wales.

**Retail**

The retail sector comprises businesses that purchase wholesale electricity from generators and sell it to end consumers. Businesses supplying energy to retail customers in New South Wales must hold an electricity supplier’s licence issued by IPART. At present, there are 24 licensed electricity retailers, including the State-owned Corporations EnergyAustralia, Integral Energy and Country Energy.

New South Wales was the first State to introduce full retail competition for both electricity and gas in 2002. Consumers can therefore choose to enter into supply contracts with their preferred retailer under competitive or negotiated pricing arrangements. Alternatively, small customers may continue to receive their electricity supply from the ‘standard’ retailer in their local area, under regulated prices set by IPART.

In all States and Territories, consideration is being given to the regulation of retail prices over the longer term. The AEMC is progressively undertaking a review of the effectiveness of competition in each State and Territory. On the completion of each review, the AEMC will report to the relevant jurisdictional Minister on its findings and recommendations on the need to continue or not retail regulation.

Other aspects of electricity retailing, such as marketing, dispute resolution and customer information requirements, are currently regulated by State and Territory governments.

All jurisdictions are working towards the implementation of a comprehensive national regulatory framework for non-economic regulation of electricity retailing. All Australian Governments have committed to the removal over the longer term of retail price regulation in the electricity sector, if markets are shown to be sufficiently competitive.
The National Electricity Market (NEM)

The transmission grids of New South Wales, Queensland, Victoria, South Australia and Tasmania are physically connected, and electricity can be traded across these jurisdictions on the wholesale NEM. The NEM is essentially a common set of trading and network access arrangements which allows generators and retailers to buy and sell electricity from the most competitive sources.

If a particular NEM Region has more electricity demand than can be met from their domestic supplies and another has excess capacity at a particular time, or if retailers can purchase cheaper electricity from another Region, electricity can be transported across regional boundaries through an ‘interconnector’ up to its maximum capability. An interconnector is a transmission network that connects the electricity grids of two Regions.

New South Wales is connected to the Snowy and Queensland Regions of the NEM. The Snowy-to-New South Wales transfer capacity is up to about 3,300MW in winter and 3,000MW in summer. New South Wales can also receive up to about 1,100MW from Queensland via the Queensland-NSW Interconnector (QNI), which runs between Armidale in New South Wales and Tarong in Queensland, and via Directlink, which runs between Mullumbimby and Terranora in New South Wales. When it has excess capacity, New South Wales can supply up to about 500MW to Queensland and 1,000MW to the Snowy Region. A map showing the NSW interconnectors is included in Chapter 2.

The National Electricity Market Management Company (NEMMCO) facilitates transactions on the NEM by operating a wholesale market. Generators offer specific quantities of electricity to the market at particular prices. NEMMCO dispatches generation by meeting demand in the most cost-effective way, dispatching the lowest cost generators first. Retailers then sell the electricity to end-users and it is transported to customers by the transmission and distribution networks.
A1.3 Précis of Submissions

Overarching Comments and Scope of the Inquiry

Most stakeholders welcomed the opportunity to make a submission to the Inquiry. Many appreciated that the tightening supply-demand balance in the National Electricity Market (NEM), along with recent national policy developments in the area of climate change, make it timely to undertake a forward-looking assessment of electricity supply options for New South Wales.

Several submissions expressed an understanding that it is the prerogative of the Government to assess whether the NEM can address projected supply shortfalls within the necessary timeframe. However, many emphasised that, while there is a role for the Inquiry in providing advice to the Government, private market participants are best placed to make ultimate investment decisions.

The majority of submissions appeared to accept the scope of the Inquiry, and provided commentary directly addressing the Inquiry’s terms of reference.

However, some submissions were of the view that the terms of reference were overly restrictive, reflecting a preference for further investment in particular technologies (such as coal-fired generation) or projects of a certain scale, and suggested that the onus is on Government to demonstrate why new capital investment may be needed to meet growth in demand.

Several submissions commented that the terms of reference did not explicitly require consideration of options such as enhanced interconnection, energy efficiency measures, increased use of peaking and embedded generation, and improvements to electricity pricing structures, or of the effects of water shortages or new energy-intensive projects. Some submissions were of the view that the need for new generation should not be considered in isolation from a broader energy and climate policy framework.

In relation to the term ‘baseload’ generation, most submissions adopted the term as it is used throughout this report – that is, to refer to generation technologies that, for a mix of technical and economic reasons, optimally operate, at high capacity factors.
However, some submissions challenged the concept of baseload generation. These were of the view that baseload is an economic and engineering concept which was of greater relevance when electricity supply was centrally planned, prior to the market reforms of the 1990s. These submissions stated that, in the modern NEM, capacity and demand (as measured in megawatts) are more important considerations in ‘keeping the lights on’, and that this allowed for greater flexibility in addressing supply shortfalls.

Nonetheless, it was generally acknowledged that the concept of baseload remains relevant to the price of electricity, as the provision of too little baseload capacity would require extending the operation of more expensive peaking plant.

**Terms of Reference 1:**

**Review the Need and Timing for New Baseload Generation that Maintains both Security of Supply and Competitively Priced Electricity**

In relation to need and timing, most submissions referred to the National Electricity Market Management Company (NEMMCO) 2006 Statement of Opportunity (SOO) figures. However the submissions noted that since the 2006 SOO other committed capacity has been achieved and that rather than new capacity being required from 2010-11, their own or other modelling indicated a new capacity requirement from 2012-13.

Some submissions considered that the NEMMCO figures did not recognise the impacts of demand management and energy efficiency strategies, whilst others pointed to the risk of relying on such measures because demand reductions have not always been delivered as projected.

Given broad acceptance around the timing for new capacity being 2012-13, submissions differed more on the interpretation of the projection and the appropriate response, i.e. while the new capacity requirement is generally accepted, the NEMMCO projection is neutral as to whether the response should be baseload, peak or intermediate generation, and similarly is neutral to generation technology.

Many submissions reinforced that market investors are best placed to interpret the projections and make decisions accordingly, while noting that there would be a reluctance to invest until there is greater certainty in the regulatory framework. Regardless, most of the submissions that did address timing for additional baseload placed it in the period ranging from 2015 to 2020. This was based on the observation that peak demand is growing faster than energy growth.
Broadly it was considered that additional baseload generation was more a medium term need with additional peak and intermediate generation required from 2012-13.

Additional baseload was required to provide reliable and cost-effective electricity. Some submissions drew attention to the need for investments in distribution and transmission networks, not just additional generation, in order for there to be security in supply.

**Terms of Reference 2:**

**Examine the Baseload Options Available to Efficiently Meet Any Emerging Generation Needs**

There was recognition of the ability - and very strong support for - the market to determine the most efficient option for generation needs. There was much emphasis on the need for clarity in Government policy and regulatory settings in order to reduce uncertainties effecting technology choice and private sector funding.

There was broad recognition that the proven technologies for baseload generation are gas and coal, and that low emission technologies may not become commercially viable before the next uplift in generation capacity is required. Although the prospect of an emissions trading scheme has increased uncertainty around further coal generation, many pointed to the advantages of coal as being its low fuel cost, the substantial coal reserves, ease of transport and safe use. Consequently many pointed to the need to improve the efficiency of existing generation assets and to ensure the most efficient new coal-fired technologies were adopted. Careful consideration also needs to be given to water cooling technologies.

The desirability of renewable energy sources was acknowledged but most submissions did not consider it proven or economically viable for large scale generation within the timeframe for additional generation needs. Some submissions outlined a necessity to commence a move towards clean energy despite the continuing reliance on coal generation.

There was broad recognition of the potential for gas generation as the baseload option for the short to medium term, drawing on advantages such as smaller plant size, lower capital expenditure, less reliance on water cooling and shorter development time. In addition, having lower CO₂ emissions and being economic over a wider range of load factors weighed in its favour.
Many submissions pointed to known gas reserves that can support generation, although some noted that these reserves were predominantly located in Victoria and Queensland. Hence, should additional gas generators be located in New South Wales then additional pipeline infrastructure may be required. Others pointed to potential reserves in New South Wales. It was noted where there was deficient capacity there was willingness by the private sector to invest in the required infrastructure given the right incentives. Gas supply constraints were identified by some, referring to recent price volatility and the potential price impact of a gas only strategy.

A number of submissions noted that while demand management and energy efficiency measures play an important role in managing peak load or postponing new baseload commitments they would not be sufficient to meet emerging generation needs.

**Terms of Reference 3:**

**Review the Timing and Feasibility of Technologies and /or measures Available Both Nationally and Internationally that Reduce Greenhouse Gas Emissions**

**Greenhouse gas emission reduction technologies**

Submissions from stakeholders noted that gas-fired generation produces relatively lower levels of emissions in comparison with coal, however other submissions highlighted that all current fossil-fuel fired generation technologies produce substantial quantities of emissions and that gas should not be considered a low emission technology.

Some submissions considered the prospects for carbon capture and storage (CCS) technology but all stakeholders considered that it was unlikely that any technology would be commercially ready within the timeframe that NEMMCO has indicated new generation is required. However, a new asset could be made carbon capture ‘ready’ such that carbon capture technology could be added at a later stage.

Many submissions identified 2020 or beyond as the approximate timing for low emission technologies to start approaching commercial viability. A more diverse mix of technology options is anticipated in the future but only a few submissions believed that low emission technology is capable alone of meeting the immediate supply needs. In contrast a significant number of submissions, from a range of stakeholder viewpoints, specifically ruled out any prospect of renewable energy sources having the capability to meet the upcoming generation requirements. Stakeholders whose primary objective was to lower emissions whilst meeting new generation requirements generally supported combined cycle gas turbines.
Some submissions stated that nuclear power was not feasible within the current timeframe given the lack of a regulatory framework for nuclear power. Others noted that the costs of nuclear were uncompetitive with either gas or coal-fired generation. Another submission noted that nuclear was not supported by the community and any nuclear development might lead to civil unrest.

The absence of a known CO₂ storage site in New South Wales was noted as a major impediment to CCS and was used by some stakeholders to caution against building coal-fired generation.

Biomass co-firing is also an option for new plant to lower the greenhouse gas emissions intensity. Other forms of low emissions technology identified in submissions for consideration are wind, solar, hydro, geothermal, ocean wave and tidal and solar upgrades to existing coal-fired plant.

Submissions were strongly divided over whether NSW’s upcoming energy requirements could and should be delivered by coal-fired, gas-fired or renewable energy sources.

**Greenhouse gas emission reduction measures**

Stakeholder submissions overwhelmingly supported the introduction of a national emissions trading scheme. The Commonwealth Government was identified by almost all stakeholders as the appropriate level of government to take the lead on the national scheme to ensure universality of the scheme. The current level of uncertainty around carbon prices is identified in almost all submissions as a key impediment to the private sector investing in generation assets.

Submissions are strongly focused on the need for clear rules around the national emissions trading scheme before the private sector can invest in baseload. Stakeholders are also interested in certainty regarding the rules on transitioning from the New South Wales Greenhouse Gas Reduction Scheme to the national scheme.

A number of submissions provided views on the impact that different levels of the carbon price would have on the economic viability of gas vis-à-vis coal-fired generation, highlighting the uncertainty investors face given the lack of clear rules around a national emissions trading scheme.

A large number of submissions also stated that the Government should not pick technology winners or offer subsidies to one form of technology over another and instead should allow carbon trading to deliver the most competitive solution.
A few submissions raised concerns with the feasibility of meeting the State Plan interim emissions reduction target if a coal-fired power station was to be built in New South Wales.

Stakeholders from the gas industry have supported the introduction of minimum gas-fired generation requirements similar to the Queensland 18 per cent gas scheme. Submissions assert that this measure would encourage development of gas infrastructure in New South Wales. These stakeholders have also called for mandatory emissions performance standards at levels which would preclude coal-fired generation assets.

Submissions from the renewable energy industry supported the States and Territories renewable and low emission energy targets and schemes and some submissions raised the need for a national renewable energy scheme to ultimately come about. Stakeholders are divided on whether an emissions trading scheme would assist the development of a renewable energy industry or not.

Some submissions raised concerns with the number of State and Territory based schemes targeting greenhouse gas emission reductions and suggested that the range of schemes created further uncertainty in the industry. A number of submissions would prefer to see a moratorium on all State and Territory greenhouse gas emission reduction measures and a reliance on a single national emissions trading scheme.

**Energy efficiency and demand management**

Submissions from stakeholders made the following comments about energy efficiency and demand management and programs aimed at their enhancement. There is general consensus that enhanced energy efficiency has many economic benefits, in terms of delaying the need for new investment in generation, and in terms of lower electricity network costs. In addition, additional capacity could be delivered by reduced demand in the form of demand side participation.

Many submissions noted that market barriers are so significant that there is market failure in regard to energy efficiency and demand management. The market failure is largely due to ineffective price signals and lack of knowledge - energy consumers do not have a good understanding of how to reduce their energy bills. However, some also noted that the rules of the NEM also preclude effective demand side responses.

Some submissions have stated that the uptake of energy efficiency and demand management measures has been hampered even where it can be demonstrated that major cost savings would result. As a result, there is large untapped potential for energy efficiency in households and businesses. Submissions contained many suggestions on ways to unlock the potential.
For the industrial and commercial sectors, the following suggestions were made:

- energy performance assessment requirements for businesses should be expanded
- the greenhouse ratings for commercial buildings should be expanded and include non-office commercial buildings
- there should be mandatory public reporting of GHG emissions by website
- in commercial buildings, there should be more efficient lighting and heating, ventilation and air conditioning systems and the mass deployment of solar hot water heating.

For the residential sector, the submissions made the following suggestions:

- fast track the roll out of smart meters and require electricity retailers to offer of time of use tariffs
- expansion of Minimum Energy Performance Standards and more stringent energy labelling of appliances (to include plasma TVs, home entertainment products) and more stringent enforcement
- compulsory disclosure of energy ratings for houses at point of sale and leasing
- more stringent greenhouse and energy standards at the time of construction and renovation of houses, apartments and commercial buildings (supported by more stringent enforcement). This includes:
  - ramping up, and including higher rise buildings in Building Sustainability Index requirements
  - encouraging substitution of natural gas for electricity at the point of use, especially in space and water heating in both existing and new dwellings
- hot water systems: phase out and replace electric hot water heating by 2012 and mass deployment of solar hot water heating in residential buildings
- encourage solar photovoltaics by the use of ‘feed-in’ tariffs
- rebates to encourage households to convert from electric space heating to gas space heating, gas cooking, and to increase the installation of ceiling insulation.

Some submissions called for targeted efficiency measures to protect low income consumers, including increased education targeting low income users and improved standards for rental accommodation, particularly for water heaters and ovens.

Some submissions called for a nationwide energy efficiency target.
Terms of Reference 4:

Determine the Conditions Needed to Ensure Investment in and Emerging Generation, Consistent with Maintaining the NSW AAA Credit Rating.

There was a general consensus in the submissions that a lack of certainty of Government policy was creating an environment that was not conducive to private sector investment, particularly that of baseload investment. The clear articulation of Government energy policy is being sought by participants.

Most submissions pointed to the need for certainty over Government investment policy, with many pushing for a commitment to no further investment. There is a perceived risk that the Government will commit to new projects for non-commercial reasons in turn impacting upon the commercial viability of new and existing projects (i.e. stranding risk). The sale of existing Government owned generation sites is seen as a necessary initial measure by many submissions.

The lack of carbon pricing certainty was consistently and unanimously raised as a major issue, with most pointing to the need for clarity on this issue. Such uncertainty is a major contributing factor to the lack of appetite in the private sector to build new baseload plant because the future emissions regime and pricing remains so unclear. Most submissions supported a nationally based emissions trading scheme.

A number of submissions raised the issue of retail price caps with many calling for either more cost reflective tariffs or the abolition of retail caps altogether. The degree of price regulation was thought to be excessive and distortionary with many believing that retail prices were artificially low. Many submissions also pointed to the link between retail prices and revenue for generation investment, and highlighted the risk that inappropriate retail price regulation could stifle necessary investment. The winding down of ETEF was also considered important with some calling for this wind down to be accelerated.

The continuing public ownership by the NSW Government of generation and retail assets was thought to be problematic and the privatisation of the retail and generation assets was raised many times as a necessary condition for encouraging private sector investment. Many submissions expressed the belief that it was inappropriate for the Government to be competing in these markets and pointed to the uncertainty surrounding continued Government ownership and the problems that this was creating. The inability to gain critical retail mass exposure in the NSW market and the positive signal stemming from a sale of generation assets were often cited as reasons for privatisation.
Those submissions that supported continued Government ownership, pointed to the private sector as potentially being unreliable in delivering timely investment and being driven by profit-maximising motives to the detriment of consumers.

Some submissions pointed to the importance of timely and efficient planning assessment approval processes in aiding new investment projects, and expressed concern that these processes were unduly time consuming and uncertain.
A1.4 Submissions Received and Meetings Held

A. Submissions Received

AGL Energy Ltd
Alinta Limited
Alstom Power Ltd
ANZ Infrastructure Services
APAGroup
Australian Business Council for Sustainable Energy
Australian Nuclear Science and Technology Organisation (ANSTO)
Australian Petroleum Production & Exploration Association Limited
Australian Wind Energy Association (Auswind)
Babcock & Brown Power Limited
BHP Billiton Petroleum Pty Ltd
Bioenergy Australia
Business Council of Australia
Carey, David
Cavanaugh, Janet
Citigroup Global Markets Australia Pty Limited
Clarence Environment Centre
Climate Change Australia, Hastings Branch
Cohen, Ian MLC
Council of Social Service of New South Wales (NCOSS)
Country Energy
Delta Electricity
EnergyAustralia
Energy Response Pty Ltd
A. Submissions Received (cont)

Energy Retailers Association of Australia Incorporated
Energy Supply Association of Australia
Energy Users Association of Australia
Epuron Pty Ltd
Eraring Energy
ERM Power
Geodynamics Limited
George Wilkenfeld & Associates
Grant, Ashley
Hunter Business Chamber
Hunwick, Richard
Hydrogen Energy
Integral Energy
InterGen (Australia) Pty Ltd
International Power Australia
Infrastructure Partnerships Australia
Kaye, John MLC
Labour Environment Activist Network
Macquarie Generation
Magaldi Power Pty Ltd
Major Energy Users Inc.
Metgasco Limited
Mousallem, Roujane
National Generators Forum
National Electricity Market Management Company Ltd (NEMMCO)
New South Wales Minerals Council
Origin Energy
Pardy, Lesley
A. Submissions Received (cont)

Property Council of Australia
Public Services International Research Unit, The University of Greenwich, United Kingdom
Public Interest Advocacy Centre Ltd
Queensland Gas Company Ltd
Richardson, Michael MP
Santos Limited
Sligar & Associates Pty Ltd
Sydney Chamber of Commerce
Sydney Gas Ltd
The Australian Pipeline Industry Association Ltd
The Climate Institute
Tomago Aluminium Company Pty Ltd
Total Environment Centre Inc., Nature Conservation Council of NSW & Greenpeace
Transfield Services (Australia) Pty Limited
TransGrid
TRUenergy Australia Pty Ltd
Unions NSW
United Services Union
Uniting Care NSW.ACT
Visy Pulp & Paper
Wizard Power Pty Ltd
WWF Australia
B. Stakeholder Meetings with Professor Owen

AGL Energy Ltd
Alinta Limited
Amalgamated Manufacturing Workers’ Union
Association of Professional Engineers, Scientists and Managers
Australian Coal Association
Australian Energy Market Commission
Australian Industry Greenhouse Network
Australian Nuclear Science and Technology Organisation (ANSTO)
Australian Petroleum Production & Exploration Association Limited
Australian Pipeline Trust
Australian Wind Energy Association (Auswind)
Babcock & Brown Power Limited
BHP Billiton
Business Council of Australia
Business Council for Sustainable Energy
Construction Forestry Mining and Energy Union
Council of Social Service of New South Wales (NCOSS)
Country Energy
CSIRO Energy Technology Division
CSIRO Energy Transformed Flagship
Delta Electricity
Electrical Trades Union
EnergyAustralia
Energy Response Pty Ltd
Energy Retailers Association of Australia Incorporated
Energy Supply Association of Australia
Energy Users Association of Australia
Eraring Energy
B. Stakeholder Meetings with Professor Owen (cont)

Epuron Pty Ltd
Institute for Sustainable Futures
Integral Energy
International Power Australia
Macquarie Generation
Major Energy Users Inc.
National Generators Forum
National Electricity Market Management Company Ltd (NEMMCO)
National Emissions Trading Taskforce Secretariat
Nature Conservation Council of NSW
Origin Energy
Premier’s Greenhouse Advisory Panel
Public Interest Advocacy Centre Ltd
Public Service Association
Santos Limited
Total Environment Centre Inc
TransGrid
TRUenergy Australia Pty Ltd
Unions NSW
United Services Union
Visy Pulp & Paper
WWF Australia
A1.5  Example of a Generation Cost Curve and Load Duration Curve

Baseload, intermediate and peaking plants provide ‘scheduled’ generation to the National Electricity Market (NEM). The market operator, the National Electricity Market Management Company (NEMMCO), schedules each plant to come into production to meet the prevailing demand, starting with the plant offering to supply electricity at the lowest price. The price at which each generator ‘bids’ into the wholesale electricity market generally reflects each generator’s operating costs.

To demonstrate how costs affect the duration of supply from each type of plant¹ Figure 1.5.1 shows indicative cost curves for coal, combined cycle gas turbine and open cycle gas turbine technologies.²

Figure 1.5.1 is an indicative example that broadly reflects the generation mix in New South Wales. The availability of other technologies, and changes to the costs of coal and gas plant - for example, increasing fuel costs, the application of a carbon price, or technology-driven cost increases (such as the uptake of carbon capture and storage) – would affect where each technology sits in the spectrum of baseload to peaking plants.

The upper chart shows indicative cost curves of each type of plant, for different levels of plant utilisation (that is, the percentage of time each plant is operational). The curves take into account both capital and operating costs, and demonstrate that the longer a plant remains operational, the higher the costs of fuel, operation and maintenance. The curves rise at different rates, reflecting the different operating costs for each plant type.

The intersection of the cost curves with the cost axis is determined by the plant’s capital (fixed) costs. Typically there is a trade-off between capital costs and variable costs, such as fuel. The higher the capital costs the lower are the variable costs. Which plants should be utilized for different periods of time is determined by this trade-off.

¹ Based on NEMMCO load data for NSW in 2005-06.
² Based on ACIL Tasman draft report, Fuel resource, new entry and generation costs in the NEM, 27 March 2007, Report 2 - Data and Documentation.
The lower chart shows an indicative ‘load duration’ curve, which plots the percentage of time (over a year) at which demand reaches any given level. The area under the load curve is the total amount of energy supplied.

Assuming that the generator with the lowest operating costs for each level of utilisation is the first one deployed to meet market demand, the two charts together show that in this example, coal-fired generation is the cheapest technology for higher levels of plant utilisation, running 100 per cent of the time. It would therefore provide baseload supply. Combined cycle gas turbines (CCGTs) would run at up to 45 to 50 per cent of the time. Open cycle gas turbines (OCGTs) would come online infrequently, running up to 15 per cent of the time, thus meeting peaking supply requirements.

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3 The actual NSW load curve is set out in Figure 2.3.1.
Figure 1.5.1: Indicative Generation Cost Curves and the Load Duration Curve

Cost Curves for Different Options

- **OCGT**
- **CCGT**
- **COAL**

Load duration curve (The load duration curve shows the proportion of the year that load exceeds a particular level)

- **Peak Generation** is the most cost effective option for meeting short peaks and provides a small amount of electrical energy.
- **Intermediate Generation** is the most cost effective for mid-range periods and provides a modest amount of electrical energy.
- **Baseload Generation** is the most cost effective option when run for long periods and supplies the vast majority of electrical energy.

Energy from Peak Generation
Energy from Intermediate Generation
Energy from Baseload Generation