A2.1 Electricity Peak Demand - Trends and Forecasts

Maximum (peak) demand is the greatest instantaneous power level used at a particular time - usually occurring on a cold winter’s evening or a hot summer’s day. The maximum demand is usually measured in megawatts (MW).

NSW “scheduled” peak demand has grown relatively consistently over the last 30 years from about 6,000MW in 1976-77 to almost 14,000MW in 2007 (see Figure 2.1.1).

As shown in Figure 2.1.1, summer peak demand is growing faster than the winter peak demand. The historical growth in summer peak demand has not been linear. Historically, the summer peak demand has increased by an average of around 3.7 per cent on the previous year’s summer peak demand.

Annual peak demand is much more volatile than annual energy consumption, as the conditions on the day and at the time of peak demand are much more variable. Peak demand will fluctuate depending on factors such as the actual weather conditions, (particularly in Sydney), and which day-of-the-week adverse weather conditions occur (weekend/school holidays/public holidays).

To cover the volatile nature of the annual peak demand, TransGrid prepare three peak demand scenarios to provide an understanding of the estimates. These are based on a ‘Probability of Exceedence’ (POE) criteria of the various load forecasts:

-  10 per cent POE is the forecast load not expected to be exceeded more than once every 10 years
-  50 per cent POE is the forecast load not expected to be exceeded more than once in two years
-  90 per cent POE is the forecast load not expected to be exceeded more than nine times every 10 years.

Figure 2.1.1 depicts the actual winter and summer NSW maximum demands over the past 30 years together with the forecast (50 per cent POE) summer maximum demand over the next 10 years. This forecast is lower than an extrapolation of the 50 per cent POE trend based on historical trends, due at least in part to demand management measures.
‘Non-scheduled’ embedded and renewable energy generation has only a small impact on peak generating requirements as the output of some of these generators, such as wind turbines, is somewhat volatile.

Demand management measures, such as planned load interruption and load shifting, along with peak price signals can however be quite effective in managing peak demand and contribute significantly to the forecast peak generating requirements being lower than the historical trend.

**Figure 2.1.1: NSW Peak Summer/Winter Demand and Forecast, 1975-76 to 2016-17**

Source Data: TransGrid

There is obviously a degree of uncertainty around the exactness of the projections. Some submissions suggest that the NEMMCO/TransGrid forecasts for peak demand may be low, while others consider they may be too high. For example, Energy Response is of the view that peaks are rising at 4 per cent or more per annum. TransGrid/NEMMCO provide a ‘high’, ‘medium' and 'low' scenario forecasts for projected 10 per cent, 50 per cent and 90 per cent POE demand.

Thirty years ago, the maximum peak demand in New South Wales was experienced in winter. However, New South Wales is now in transition from a winter to a summer maximum peak load region. The highest NSW maximum demand of 13,871 MW (17 July 2007) is still a winter, peak but prior to this winter the highest maximum demand was a summer peak (1 February 2006). NSW seasonal peak demand trends are shown in Figure 2.1.2.
Figure 2.1.2: NSW Summer and Winter Peak Demand – Seasonal Trend

Peak demand does not drive the need for investment in baseload generation in itself. Rather, peak demand determines the need for new generation, such as open cycle gas turbines that can cost-effectively supply the short term peak requirements.

However, the distribution of peak demands can have an impact on the availability of baseload capacity at any particular time. The spread of high peak demands can impact the time available to baseload stations for maintenance.

Over the past five years, the length of time that seasonal peaks can occur (summer and winter) appears to be extending over a wider number of weeks. This is tending to narrow the gap between those peak periods and conversely the length of the seasonal troughs (spring and autumn) is narrowing (see Figure 2.1.2). Generator and transmission system maintenance is traditionally scheduled during spring and autumn periods. Maintenance schedules are currently, and will continue to be, affected by this reduction in ‘maintenance windows’ and ultimately some maintenance may need to be carried out in peak periods, meaning that additional capacity may be required.

In autumn and spring 2006, there were only two months in each period where demand was reliably below 12,000MW. There are twenty large coal-fired generation units in New South Wales, and each of these requires a few weeks or more maintenance every 2-4 years, with additional shorter duration outages for minor maintenance in the in-between years, depending on the unit. Fitting this total maintenance need into these windows is now challenging.
The **daily load curve** compares demand against the time of day. During normal summer days the peak demand occurs in the late afternoon whereas peak load in winter occurs in the early evening (see Figure 2.1.3). This reflects different daily patterns of commercial, industrial and residential demand. In summer, the peak occurs earlier reflecting the overlap between business and industrial operations and the use of air conditioners in the commercial and residential sectors. The growth of air-conditioning use in schools and other educational facilities also contributes to the summer afternoon peak, with the air conditioners switched off once school finishes. In winter, the peak is driven by residential use of heating, cooking and lighting.

The magnitude and shape of the expected daily load pattern is a key factor in determining the forward generator dispatch requirement. This is planned and scheduled by NEMMCO to ensure sufficient generation is available and/or connected to cover the likely range of load requirements and to cover power system security needs.

**Figure 2.1.3: Daily Load Curve**

On a 50 per cent POE basis, TransGrid projects summer scheduled maximum demand growth to average at about 2.5 per cent per annum over the next 10 years compared to the historic growth of around 3.4 per cent average over the past 10 years. On this basis, 17,200MW of scheduled capacity (see Table 2.1.1), plus a generation reserve margin, will be required to satisfy the scheduled maximum demand.

These NEMMCO forecasts include any major committed additional loads, but do not include any additional possible loads for major energy intensive users.
Table 2.1.1 details the historical and forecast NSW summer peak demands as set out by TransGrid in its 2007 Annual Planning Report.

### Table 2.1.1: NSW Summer Demand Projections (Medium Scenario)

<table>
<thead>
<tr>
<th>Summer</th>
<th>Actual</th>
<th>Scheduled (50% POE) (MW)</th>
<th>Embedded &amp; Renewable (MW)</th>
<th>Total (50% POE) (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-96</td>
<td>actual</td>
<td>8,879</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1996-97</td>
<td>actual</td>
<td>8,961</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1997-98</td>
<td>actual</td>
<td>9,966</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998-99</td>
<td>actual</td>
<td>10,220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1999-00</td>
<td>actual</td>
<td>10,662</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-01</td>
<td>actual</td>
<td>11,572</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001-02</td>
<td>actual</td>
<td>10,990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002-03</td>
<td>actual</td>
<td>12,456</td>
<td></td>
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<tr>
<td>2003-04</td>
<td>actual</td>
<td>12,216</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004-05</td>
<td>actual</td>
<td>12,840</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-06</td>
<td>actual</td>
<td>13,292</td>
<td>284</td>
<td>13,576</td>
</tr>
<tr>
<td>2006-07</td>
<td>estimated</td>
<td>12,876</td>
<td>296</td>
<td>13,172</td>
</tr>
<tr>
<td>2007-08</td>
<td>projection</td>
<td>13,820</td>
<td>320</td>
<td>14,140</td>
</tr>
<tr>
<td>2008-09</td>
<td>projection</td>
<td>14,260</td>
<td>350</td>
<td>14,610</td>
</tr>
<tr>
<td>2009-10</td>
<td>projection</td>
<td>14,620</td>
<td>360</td>
<td>14,980</td>
</tr>
<tr>
<td>2010-11</td>
<td>projection</td>
<td>14,970</td>
<td>380</td>
<td>15,350</td>
</tr>
<tr>
<td>2011-12</td>
<td>projection</td>
<td>15,320</td>
<td>410</td>
<td>15,730</td>
</tr>
<tr>
<td>2012-13</td>
<td>projection</td>
<td>15,740</td>
<td>430</td>
<td>16,170</td>
</tr>
<tr>
<td>2013-14</td>
<td>projection</td>
<td>16,140</td>
<td>440</td>
<td>16,580</td>
</tr>
<tr>
<td>2014-15</td>
<td>projection</td>
<td>16,530</td>
<td>460</td>
<td>16,990</td>
</tr>
<tr>
<td>2015-16</td>
<td>projection</td>
<td>16,800</td>
<td>480</td>
<td>17,280</td>
</tr>
<tr>
<td>2016-17</td>
<td>projection</td>
<td>17,200</td>
<td>500</td>
<td>17,700</td>
</tr>
</tbody>
</table>

- **2007-08 to 2016-17**: 430MW p.a., 20MW p.a., 450MW p.a.


The forecast 10 per cent POE (or one in ten year) peak demands are between 1,200MW (2007/08) and 1,600MW (2016/17) above the 50 per cent POE (or one in two year) peak demands.
A2.2 Meeting Peak Demand

NEMMCO determines the generation requirements for each region by setting minimum reserve margins. The reserve margins are set so as to provide 0.002 per cent average unserved energy (USE), which is the reliability criteria provided to NEMMCO by the Australian Energy Markets Commission (AEMC) reliability panel. Unserved Energy refers to energy that would have been consumed had an unplanned interruption to supply not occurred.

NEMMCO determined the minimum reserve for the NSW region is minus 1430MW in 2007-08. The negative value for minimum NSW reserve reflects the capacity available to New South Wales from other NEM regions and demand diversity across the NEM regions and, in particular for New South Wales, access to the Snowy region’s capacity. Diversity recognises that regional maximum demands may occur at different times.

In the 2006 Statement Of Opportunities (SOO), NEMMCO projected reserve shortfalls in New South Wales commencing in 2010-11 (see Table 2.2.1). Those projections include new generation and upgrades which met the NEMMCO commitment criteria by 30 June 2006 including a 440MW Combined Cycle Gas Turbine (CCGT) plant at Tallawarra. Two 30MW biomass fuelled co-generation plants under construction at the NSW Sugar Milling Co-operative sites at Condong and Broadwater will be registered as non-scheduled generating plant.

Table 2.2.1: Projected NSW Generation Shortfall in NEMMCO’s 2006 Statement of Opportunities, 2008-09 to 2015-16

<table>
<thead>
<tr>
<th>Year</th>
<th>Allocated Installed Capacity (MW)</th>
<th>Capacity for reliability (MW)</th>
<th>Additional Required Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>14,495</td>
<td>14,049</td>
<td>-</td>
</tr>
<tr>
<td>2009-10</td>
<td>14,519</td>
<td>14,519</td>
<td>-</td>
</tr>
<tr>
<td>2010-11</td>
<td>14,682</td>
<td>15,009</td>
<td>327</td>
</tr>
<tr>
<td>2011-12</td>
<td>14,776</td>
<td>15,479</td>
<td>703</td>
</tr>
<tr>
<td>2012-13</td>
<td>14,853</td>
<td>15,919</td>
<td>1,066</td>
</tr>
<tr>
<td>2013-14</td>
<td>14,880</td>
<td>16,359</td>
<td>1,479</td>
</tr>
<tr>
<td>2014-15</td>
<td>14,803</td>
<td>16,789</td>
<td>1,986</td>
</tr>
<tr>
<td>2015-16</td>
<td>14,832</td>
<td>17,249</td>
<td>2,417</td>
</tr>
</tbody>
</table>

Source: NEMMCO Statement of Opportunities, 2006, Executive Briefing (graphically) and NEMMCO Solver Output

Note: These NEMMCO figures are on a ‘sent out’ basis (i.e. after deducting power station auxiliaries and own demand), rather than on the ‘generated’ basis used elsewhere in this Appendix.
Since the NEMMCO 2006 SOO, Delta Electricity has commenced construction of the Colongra 660MW Open Cycle Gas Turbine (OCGT) plant, at Lake Munmorah, which is expected to become operational by late 2009. This project will be included in the NEMMCO 2007 SOO as it now meets the NEMMCO commitment criteria.

Additionally a 640MW OCGT development is under construction at Uranquinty near Wagga. It is understood that ‘financial close’ for the Uranquinty plant was achieved in July 2007. The full contribution of Uranquinty to meet peak loads in New South Wales will be affected by its capacity to displace some Snowy generation. At or near peak load times Snowy generation is sometimes constrained by the Snowy – NSW transmission link. Uranquinty will need to share that transmission capacity.

As detailed in section 2.5 interconnection capacity with Queensland and the Snowy/Victorian regions is an important part of supply reserve capacity for New South Wales.

NEMMCO publishes the augmentation opportunities for interconnectors annually and prioritises these opportunities on the basis of net market benefit. These findings are presented in the Annual National Transmission Statement (ANTS) included by NEMMCO in the SOO. No significant increases in interconnection capacity have presently satisfied the required regulatory approvals process.

**Minimum reserve level criteria**

An alternative method of examining the required new generation capacity required to meet peak demands at an acceptable reliability is to use a minimum reserve plant margin benchmark – that is, a minimum amount of generation capacity that is available over and above the expected maximum demand.

From the 1960s through to the early 1990s, generation in New South Wales was planned and built to provide a relatively high reserve plant margin of at least 25 per cent. Improved plant reliability and electricity market drivers have allowed this margin to be significantly reduced without markedly compromising supply security. One of the main drivers for the establishment of the NEM was the realisation that Governments had over-invested in baseload plant, which had inflated electricity supply costs, and the conclusion that prices and markets, rather than government, provided better outcomes on the need, type and timing for new generation capacity.

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A simply understood and an often internationally accepted minimum generation reserve standard is quoted as 15 per cent to 25 per cent of the maximum system load based on a 50 per cent POE load forecast. Application of that ‘standard’ to New South Wales, including interconnection capacity, results in very similar supply capacity shortfalls as the NEMMCO detailed market modelling process used in the SOO. A review of generation reserve levels was undertaken for NEMMCO in 2005 by KEMA. That report concluded:

‘The target criteria level of the NEM, now set at USE of 0.002 per cent, appears to be consistent with that used internationally, but it is at the low end (less stringent than most others). The methods and approach of NEMMCO are generally consistent with international practice; the resulting reserve margin levels (15.9 per cent) are at the low end of international criteria (15-25 per cent)’.²

Also the Australian Energy Market Commission Reliability Panel is undertaking a comprehensive reliability review. The Panel’s Interim Report in March 2007 ³ states:

‘The raw results of international comparison are that the reliability standard in the NEM is lower (that is, less reliable) than in very large and highly-meshed power systems such as in the north east of the US but that it is in line with systems in European countries, from which the Panel concludes that the NEM reliability standard is at the lower end of international practice.’

The reliability panel went on to say:

‘...On balance then, the reliability panel reached the view that, given Australia’s unique demographics (a small population spread over large distances), the standard for reliability in the NEM is not inappropriate at the present time.’

**Generation reserve** is needed to cover the risk of some generating plant or interconnection capacity not being available at or near peak load times through such factors as plant maintenance or breakdown. Also it is assumed that this reserve would cover the more abnormal weather conditions that can occur (e.g. 10 per cent POE maximum demand conditions).

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New South Wales has not had less than a 15 per cent generation reserve margin, based on 50 per cent POE load forecast, since the early 1960s. Generation reserve in New South Wales is therefore now approaching levels not seen for over 40 years.

No major power stations have been built in New South Wales since Mt Piper power station was completed in 1993 (see Figure 2.2.1). However, the commissioning of interconnection with Queensland (QNI) in 2001 increased NSW supply reserves as it allows electricity to be supplied to New South Wales from generators based in Queensland.

Power stations which are currently being constructed at Tallawarra, Colongra and the North Coast sugar mills will ensure reserve levels remain steady until after 2010-11.

**Figure 2.2.1: NSW Generation Reserves**

Source Data: TransGrid and ESAA

The anticipated new generation requirements using this 15 per cent capacity margin criteria are consistent with NEMMCO’s forecast capacity requirements.
A2.3 Mix of Existing NSW Plant Types

When considering both supply reliability and commercial efficiency, the mix of plant available for generation is important. An optimal mix of plant maximises efficiency and keeps costs at a minimum.

Like all power systems NSW supply is provided by a mix of base load, intermediate and peak load generation. Historical and projected “load duration curves” (see Figure 2.3.1) provide an indication of what part of the supply mix various generation sources provide to New South Wales. In this chart, the split between peak (OCGTs), intermediate (CCGTs) and base load (coal-fired) generation is based on technology cost data from ACIL Tasman’s March 2007 report to NEMMCO. This costing split would be expected to change with the introduction of an emissions trading scheme, as CCGTs are less carbon intensive than OCGTs or coal-fired plant, and so would enjoy a relative price advantage.

Figure 2.3.1: NSW Load Curve, Actual and Projected

Figure 2.3.1 presents a simple comparison of different types of plant. However, comparing unit costs in isolation does not identify what mix of plant is commercially efficient for a particular market. Other variables also need to be considered, including inter-State transmission effects, the effect of increasing renewables capacity in response to mandated targets and demand management activities.
Historically, energy generated by Snowy Hydro has supplied the major peak and intermediate generation needs for New South Wales. Some under-utilised older coal-fired plants, such as Munmorah, have also provided part of the reserve generation mix. Increased demand and energy consumption growth is now requiring NSW plant to achieve higher levels of energy generation than ever previously achieved. Delta Electricity advised the Inquiry that in its present condition the Munmorah power station cannot provide a normal baseload role and major expenditure will be required at Munmorah within five years for it to resume a more normal baseload role.

While the different plant types (baseload, intermediate and peaking) can all be technically suitable to meet baseload demand, how they operate in response to demand will be determined by commercial drivers and fuel availability. Different plant types are subject to different operating costs, primarily as a result of fuel requirements and, in the near future, carbon prices. Plants that have relatively lower operating costs will generally provide the bulk of energy supply, while plants that have relatively higher operating costs tend to limit their operation to periods of higher energy demand and consequently higher prices.

The operating behaviour of individual plants is also affected by the flexibility with which they can operate. Coal-fired power stations require a longer time to start up (between 12-20 hours) and to ramp up or down in response to demand fluctuations. This characteristic means they usually continue running even during periods of low demand (e.g. during the night). Various measures to shift demand to these periods in order to lower peak demand have been used, such as off-peak hot water heating.
A2.4 Interstate Transmission Augmentation Potential

The availability of supply from generators located outside New South Wales could be increased by augmentation and/or duplication of the existing interconnectors. However, the additional cost of increased interconnection capacity and transmission losses adds significantly to the cost of supplying NSW needs from interstate generation. If other factors are equal, generation is most cost-effective if sited in reasonable proximity to the load it is supplying.

In its submission to the Inquiry, TransGrid offered the following comments on increased interconnection capacity:

> ‘At times of high system demand these interconnectors are typically heavily loaded, with power normally being imported into NSW. Loading on the interconnectors during lower load periods is determined by bidding strategies of market participants’

With regard to Queensland-New South Wales Interconnector (QNI), TransGrid comments:

> ‘TransGrid and Powerlink Qld are currently assessing a potential upgrade of the import capability of QNI. This assessment is being undertaken under the “market benefits” limb of the Regulatory Test.

The current analysis in progress indicates that an upgrade of the import capability to NSW to around 1500MW may be justified, but these studies indicate this is unlikely before around 2011 at the earliest. The optimum timing of such an upgrade depends on generation developments within both NSW and South-eastern Queensland.’

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4 TransGrid submission, p3.
Further in a section on ‘Reliance on New Generation in South-East Queensland’, TransGrid comments:

‘The generating sites in South-East Queensland are some 700km from the Hunter Valley and significant transmission development would be required to access this generation. ... It would be necessary to construct an entirely new transmission line route from Queensland down to (probably) the Tamworth/Armidale area and then onto the Hunter Valley. ... The additional costs associated with these options may be as much as $1.7 billion. ... Losses as high as 10-15 per cent could be expected for base load power transfers from Queensland to the Newcastle, Sydney and Wollongong area.’

Allowing for increased levels of energy to be supplied to New South Wales from Queensland in around 10 years time, will require significant developments of new power stations in that State possibly together with major transmission expenditure to increase the capacity of QNI. Increased transmission losses from such an arrangement to deliver base load energy to New South Wales’ major load centres from Queensland could be around 10 to 15 per cent. This could make development of this nature unlikely.

With regard to additional Western / Southern Generation TransGrid comments:

‘...The cost of this work is in addition to transmission line costs outlined in section 5.5 [section 5.5 of TransGrid’s submission - Bannaby to Sydney augmentation] and are likely to be in the order of $1 billion. .... Significant transmission development would be required to access this generation.’

With regards to increased Transfer Capacity from the Snowy/Victoria regions TransGrid comments:

‘The majority of the network development required for an expansion of generation in the Western and Southern parts of the State ....would be required and significant works south of that point, including in Victoria.’ (No cost estimates were offered for those significant works).

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6 Ibid, pp7-8.
7 Ibid, p9.
At best, the benefits from potential augmentations to QNI and to the Vic-Snowy-NSW interconnectors identified in NEMMCO’s 2006 Annual National Transmission Statement (ANTS) have been classed by NEMMCO as ‘Marginal’ to ‘Insufficient’. On this basis, the Inquiry does not believe it is appropriate to include them in the consideration of required generation.
A2.5  Impact of Energy Shortages on Wholesale Electricity Price

Electricity market conditions in recent months have highlighted the potential for wholesale prices to increase as electrical energy becomes scarce. Whilst the drought has had little impact on peak generating capacity, it has led to a reduction in the amount of electrical energy that is available from baseload and intermediate plants due to constraints on the amount of water available for cooling and for hydro generation. The energy shortage created by the drought is analogous to an energy shortage that may be experienced if new baseload generation was not built in a timely enough fashion.

The severity of the drought, and the possibility that constrained water supplies could impact generation capacity factors, significantly affected the forward market contract price for 2008 and beyond (see Figure 2.5.1). Further, prices increased significantly for both peak and base contracts. Even though the availability of peak generation capacity was relatively unaffected by drought conditions, the prospect of energy shortages pushed the forward market contract prices to around double previous levels.

Figure 2.5.1: Calendar year 2008 baseload contract price graphed against the date the contract was written

![Figure 2.5.1](image)

Source: Sydney Futures Exchange
A2.6 Process for Addressing Energy Supply Shortfalls

Development paths for new baseload generation options require specific activities to be undertaken to ensure a project is delivered, which meets intended needs, budget and timing requirements. These activities include:

1. Recognition of the need for new capacity or market opportunity.
2. Identifying a suitable site or sites well located in relation to fuel supply, transmission, with sufficient land area and buffer zones to minimize impacts on local residences, and likely to be able to achieve acceptable licence and planning conditions.
3. Undertaking preliminary technical and environmental baseline studies to confirm a preferred site.
4. Undertaking detailed studies to confirm technical feasibility and ensure capability to meet known licensing requirements.
5. Undertaking the planning approvals process to secure Development Approval and obtain required licences.
6. Undertaking market analysis to confirm financial viability and timing requirements.
7. Committing to project activities required to design, specify, award contracts, construct, commission and achieve commercial operation.

For the purposes of this report it is recognized that the Activities 1 to 4 above have essentially been completed for a number of identified coal-fired and gas-fired sites.

Activity 5 is complete or in process for some gas-fired sites identified, but is not yet started for any of the coal-fired sites. Given that this activity can be protracted particularly in the case of a coal-fired plant this represents a key risk to any coal-fired development. Accordingly, consideration needs to be given to commencing the planning approval process for at least one coal-fired option as soon as possible so as not preclude that type of development by 2013-14 at this time.

Activities 6 and 7 will be undertaken by investors (Government or private) in the normal course of business.
A2.7 Environmental Planning and Assessment

A Possible New Base-Load Power Generation Facility in New South Wales

Environmental Planning Process

Application of Part 3A

On 1 August 2005, the Government’s ‘Major Project’ legislation came into force to provide a single, focused and integrated environmental planning and approval process for major infrastructure and development in New South Wales. These significant reforms, implemented through Part 3A of the Environmental Planning and Assessment Act 1979, replace and improve the assessment processes formerly applying to State significant development (Part 4) and major Government infrastructure projects (Division 4, Part 5). Significantly, Part 3A maintains the rigour of the environmental assessment and breadth of public involvement previously required, while substantially reducing the ‘procedural red tape’ of earlier assessment processes. The Minister for Planning is the approval authority for all Major Projects under Part 3A.

Part 3A of the Environmental Planning and Assessment Act 1979 provides that a development may be declared to be a Major Project through a State Environmental Planning Policy, or through a project-specific Order made by the Minister for Planning. Relevantly for major electricity generating facilities, clause 24, Schedule 1 of State Environmental Planning Policy (Major Projects) 2005 declares the following to be Major Projects:

‘Development for the purpose of an electricity generation facility that:

- has a capital investment value of more than $30 million for gas or coal-fired generation, or co-generation, or bioenergy, bio-fuels, waste gas, bio-digestion or waste to energy generation, or hydro or wave power generation, or solar power generation, or wind generation, or

- is located in an environmentally sensitive area of State significance.’

Note: ‘environmentally sensitive areas of State significance’ are defined in detail in the Policy, and include areas such as coastal wetlands, Ramsar wetlands, National Parks, heritage areas and critical habitats, inter alia.
It is therefore likely that a new baseload power station in New South Wales would constitute a Major Project, and would be assessed and determined by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979*. It is also important to note that as at June 2007, the Department of Planning was considering a number of possible amendments to *State Environmental Planning Policy (Major Projects) 2005*, including addition of ‘distillate’ as a relevant fuel under clause 24, Schedule 1 of the Policy.

**Part 3A process**

The Part 3A process generally includes:

- An inquiry and application phase, during which the Department of Planning and other relevant public authorities are briefed on the project and identify key environmental assessment requirements

- An Environmental Assessment preparation and review phase, during which the proponent prepares an Environmental Assessment to address key environmental assessment requirements, and the Environmental Assessment is reviewed by the Department of Planning and other relevant public authorities to ensure adequacy

- A public exhibition and submission, during which interested parties are invited to consider the Environmental Assessment and to make a submission on the project

- A submissions response phase, during which the proponent is required to respond to issues raised in submissions through a Submissions Report or Preferred Project Report

- A final assessment phase, during which the Department of Planning finalises its assessment of the project and makes a recommendation to the Minister for Planning, who determines the application
The basic Part 3A process is illustrated below.

1. Initial inquiry and confirmation of Part 3A process
2. Part 3A Application and Preliminary Assessment
   - Preliminary identification of key assessment issues prepared by the proponent
3. Director-General’s requirements for Environmental Assessment
   - Prepared by Department of Planning in consultation with relevant public authorities
   - Maximum 28 days
4. Preparation of Environmental Assessment
   - Prepared by Proponent to address Director-General’s requirements
5. Review of Environmental Assessment adequacy
   - Undertaken by Department of Planning in consultation with relevant public authorities
   - Maximum 21 days
6. Public exhibition of Environmental Assessment
   - Minimum 30 days, but may be extended for complex projects or projects subject to a high level of public interest
7. Preparation of Submissions Report/Preferred Project Report
   - Prepared by Proponent in response to issues raised in submissions (Submissions Report) and may include amendments to the project (Preferred Project Report)
8. Director-General’s Report and Conditions of Approval
   - Prepared by Department of Planning
   - Proponent and relevant public authorities consulted on recommended conditions of approval
9. Minister for Planning considers and determines application
There are a number of matters that have the potential to significantly affect the duration of the environmental planning and assessment process, beyond the minimum statutory timing requirements. These matters include:

- The rigour of the site selection process undertaken by the proponent. Careful and well-considered site selection can, in many cases, avoid or minimise potentially significant environmental impacts associated with a particular project. By taking environmental planning considerations into account during the site selection process, a proponent can potentially resolve a number of key environmental concerns that may arise with poorly-selected sites. In the case of a baseload power station, for example, consideration of factors such as the proximity of noise-sensitive receptors, airshed constraints and cumulative air quality impacts, the significance of any vegetation that may need to be cleared, and the nature of transport routes (road and rail) can make the difference between a well- and a poorly-selected site.

- The rigour of consultation undertaken by the proponent with affected and interested stakeholders during preparation of the Environmental Assessment. Consultation with affected and interested stakeholders during preparation of the Environmental Assessment assists a proponent in identifying key community concerns at an early stage and provides an opportunity for the proponent to proactively address these concerns as part of the project. In the absence of effective consultation, fundamental issues may be raised in public submissions that were not previously identified by the proponent, resulting in the need for additional work at the Submissions Report/Preferred Project Report to address these issues.

- The rigor of consultation undertaken by the proponent with the Department of Planning and relevant public authorities during preparation of the Environmental Assessment. Effective consultation with key regulatory agencies during the preparation of the Environmental Assessment can ensure that assessment requirements are clear and fully understood, and that established assessment guidelines, policies and practices are taken into account. In the absence of effective consultation, the Environmental Assessment may not adequately address the Director-General’s requirements and may need to be revised and updated prior to public exhibition.
Special provisions under Part 3A

In addition to the basic Part 3A process outlined above, the Minister for Planning has the discretionary power to:

- Authorise or require the submission of a Concept Plan
- Direct that an Independent Hearing and Assessment Panel be convened
- Declare a project to be a Critical Infrastructure Project.

Concept Plans

Authorisation or requirement for a Concept Plan permits a proponent to submit the basic scope and assessment of a project upfront, and for a bankable, in-principle agreement to be granted ahead of detailed design and assessment. It is important to note that a Concept Plan must still demonstrate that a proposal can be undertaken within acceptable environmental and public health and amenity standards, but provides an opportunity for a proponent to provide details of the project and its impacts through a subsequent project approval process (as distinct from the initial concept approval process). A Concept Plan is particularly useful in the case of large or complicated proposals, or where the details of a proposal may be subject to further consideration in future, for example in technology selection or tender processes where innovation may be required. In granting approval to a Concept Plan, the Minister for Planning may concurrently grant project approval for all or part of the proposal, and may specify the planning process and assessment requirements for subsequent project approval phases.

A Concept Plan does not permit a development to be undertaken without obtaining a subsequent project approval, but it does, however, provide up-front certainty ahead of expending resources on the detailed design of a project. Once a Concept Plan is approved, project approvals are bound to be granted consistent with the Concept Plan. In the case of a base load power station, a Concept Plan may include:

- A Concept Plan that includes multiple site options in the same general region
- A Concept Plan approval that could potentially be granted across those multiple sites, with the decision on a preferred site only required at the project application stage
- Consideration of a number of different generating technologies, or fuel sources, with the final decision on the preferred technology and fuel only required at the project application stage
- Consideration of various implementation/ timing options, with a project application for each stage/ phase made subject to market demands in future.
There are a number of examples of where the Concept Plan process has been successfully applied (available on the Department of Planning’s website, www.planning.nsw.gov.au) including:

The **Munmorah gas-fired power station**, involving a gas-fired power station, a gas pipeline and subdivision of land:
- The Minister for Planning approved the Concept Plan, to provide a basis for the overall proposal and its components
- Full project approval for the gas-fired power station component under Part 3A
- Stipulation that the subdivision of land would require further assessment and approval under Part 4
- Stipulation that the gas pipeline would require further assessment and approval under Part 5, and specification of the environmental assessment requirements for that process.

The **Kurnell Desalination Project**, involving a desalination plant, intake/discharge infrastructure and a pipeline for the supply of desalination water. The Minister for Planning approved the proposal as follows:
- Approval of the Concept Plan, to provide a basis for the overall proposal and its components
- Full project approval for the desalination plant and intake/discharge infrastructure under Part 3A
- Stipulation that the desalinated water distribution pipeline would require further assessment and approval under Part 3A
- Specification of the environmental assessment requirements for that process.

The **Bamarang gas-fired power station**, involving a two-stage gas-fired power station (open cycle in stage 1, and combined cycle in stage 2), and gas and electricity transmission infrastructure. The Minister for Planning approved the proposal as follows:
- Approval of the Concept Plan, to provide a basis for the overall proposal and its components
- Full project approval for stage 1 of the proposal (open cycle configuration) and associated gas and transmission infrastructure under Part 3A
- Stipulation that stage 2 of the proposal (conversion to combined cycle configuration) would require further assessment and approval under Part 3A, and specification of the environmental assessment requirements for that process.
Independent Hearing and Assessment Panels

The Minister for Planning also has the power to direct that an Independent Hearing and Assessment Panel be convened to advise the Minister on specific aspects of a proposal. In directing that a Panel be convened, the Minister may specify the terms of reference for the Panel and any particular procedural requirements for the Panel process. In most cases, the Panel process will involve consultation with key stakeholders and submitters, through a hearing process, roundtable meetings or other mechanism required by the Minister. Examples of recently completed Panel processes (available on the Department of Planning’s website, www.planning.nsw.gov.au) include the coal export terminal on Kooragang Island and the Anvil Hill coal mine.

Critical Infrastructure Projects

The Minister for Planning may also declare a project to be a Critical Infrastructure Project, where the Minister considers that the project is ‘essential to the State for economic, environmental or social reasons. It is important to note that a Critical Infrastructure declaration does not affect the timing of the statutory Part 3A process, the rigour of the environmental assessment, or the level of community consultation undertaken. It does, however, provide certainty by extinguishing appeal rights to the Land and Environment Court. The declaration also excludes the potential for Orders to be made under some other environmental legislation (for example, stop work orders and interim protection orders). To date, the Minister for Planning has declared the following proposals to be Critical Infrastructure Projects:

- The Kurnell desalination project
- The Western Sydney groundwater bore-fields projects
- The Pacific Highway upgrade projects
- The Hume Highway upgrade projects
- The Hexham to Queensland gas pipeline
- Upgrade of the North Shore Hospital
- Upgrade of the Liverpool Hospital
Environmental Impact Assessment

Any proposal to establish a new baseload power station in New South Wales will require an environmental impact assessment. Key environmental impacts and assessment requirements for such a project can be generally grouped as follows:

- those impacts associated with the nature of the project (technology- and fuel-dependent)
- those impacts associated with the nature of the site selected for the project, including proximity to surrounding receptors.

Impacts associated with the nature of the project can be generally addressed and managed through careful consideration of the appropriate fuels and a generating process consistent with best available technology. In some situations, particularly constrained air-sheds or locations near residential and sensitive receptors, site selection may also interact with fuel and technology selection.

Impacts associated with the nature of the site can often be resolved or minimised through careful and considered identification of potential project locations, and selection of a preferred site based on criteria including environmental planning issues and constraints. Effective consultation with local communities and regulatory agencies will often assist a proponent to identify the key opportunities and constraints that may apply to a site, or a region.

Impacts associated with the project

Key impacts associated with the nature of fuel and technology selected for a base-load power station are likely to include:

- greenhouse gas implications
- air quality impacts
- noise and vibration impacts
Air quality impacts

Possibly the most significant local/ regional impact with any emissive power generation proposal, and the impact of key concern to affected communities, will relate to air quality impacts. Choice of fuel will affect the nature and concentration of air emissions: the use of a natural gas fuel will produce oxides of nitrogen as the principal air quality concern, while coal or distillate fuel sources will also produce particulates and oxides of sulphur. Similarly, selection of technology, including the scale and efficiency of the technology and any associated air pollution control equipment applied to the technology would affect the air quality performance of the proposal.

It should be noted that with respect to air quality, site selection will play a significant role in the impacts of the proposal and the need for additional technology-based solutions to address these impacts. For example, urban airsheds may be constrained with respect to oxides of nitrogen and associated ozone generation. Therefore, an emissive power generation proposal in an urban airshed is likely to be confronted by more significant airshed constraints than a proposal in a more rural setting. Depending on the scale of the proposal, the nature of the technology and the chosen fuel, these constraints may or may not be economically and feasibly resolvable.

Similarly, an emissive power generation proposal near existing power generating developments or major emissive industry may be constrained through cumulative air quality impacts. Co-location of power station projects (or with industrial developments) may result in a more complicated air quality impact assessment and mitigation approach, compared with development of a ‘greenfield’ site away from established power generators and industry.

Noise and vibration impacts

Selection of technology will also influence the acoustic characteristics of the proposal, including the transport related noise implications of fuel provision. For example, haulage of distillate by road, supply of gas by pipeline and transport of coal by rail may generate significantly different acoustic characteristics. The nature of the power generation technology will also influence noise impacts, and the potential for these noise impacts to be mitigated through design solutions.
In this context, site selection will also play an important role in noise and vibration impacts. Location of a new base load power station away from noise-sensitive receptors or other noise-generating development may reduce the need for additional noise mitigation measures to be applied in order to meet acceptable environmental outcomes. Key noise-related issues associated with power stations will also include tonal or impulsive noise impacts, and the potential for exacerbated noise impacts under adverse (temperature inversion) meteorological conditions. Site selection taking into account these potential issues may act to simplify the assessment of acoustic impacts and the need for additional mitigation.

**Impacts associated with the site**

Key impacts associated with the nature of the site selected for a base-load power station may include:

- ecological impacts
- impacts on Aboriginal and European heritage
- water supply, water quality and hydrological impacts
- ancillary infrastructure impacts
- visual amenity implications.

As previously highlighted, an effective and comprehensive site selection process can, in many cases, resolve environmental assessment issues relating to the nature of a particular development site. Investigation of environmental constraints, whether ecological, heritage or hydrologically-related, prior to the selection of a preferred site, will often assist in selecting a site with fewer constraints and fewer issues to be considered and resolved through the assessment process. Given the current drought conditions over much of New South Wales, water availability will be a key issue, and a strong focus should be placed on accessing any alternative (non potable) water sources close to the project site (for example, recycled water from industry or sewage treatment, where feasible).

In selecting a site, consideration should also be given to the nature of any land that may be affected by new or upgraded ancillary infrastructure, including gas pipelines, transmission lines, water supply infrastructure or road/rail infrastructure. While a particular development site may be relatively free from environmental constraints, areas likely to be affected by infrastructure also need to be considered in the site selection process.

In addition to environmental constraints, site selection should also consider human receptors, particularly residential and sensitive land uses, which may be impacted through air quality, noise, traffic and socio-economic effects. Visual amenity issues, particularly where a new baseload power station is to be located in visually sensitive landscapes or with clear views to visually-sensitive receptors, may also be significant and require further consideration of screening options.