Major Energy Users Inc.

The Owen Inquiry

Into

Electricity Supply in New South Wales

Supplementary comments

by

Major Energy Users Inc

July 2007

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The content and conclusions reached are entirely the work of the Major Energy Users Inc

Executive summary

The Energy Markets Reform Forum (EMRF) via the Major Energy Users Inc (MEU) has previously lodged a detailed submission to the Owen Enquiry on 29 June 2007. This supplementary submission draws on the detail provided in the earlier submission to specifically address the four terms of reference provided to Professor Owen. These are:-

1. Review the need and timing for new baseload generation that maintains both security of supply and competitively priced electricity.
2. Examine the baseload options available to efficiently meet any emerging generation needs.
3. Review the timing and feasibility of technologies and/or measures available both nationally and internationally that reduce greenhouse gas emissions.
4. Determine the conditions needed to ensure investment in any emerging generation, consistent with maintaining the NSW AAA Credit Rating.

The MEU provides observations to each of these as follows

1. MEU concludes that there is a need for an immediate commitment for new base load generation in NSW, and that this should be coal fired in order to maintain a competitive electricity price in NSW, but as Snowy Hydro has the bulk of its output generated for NSW, there is little need for peaking power.
2. The MEU is of the view that the only commercially viable solutions for meeting the large amounts of power needed in NSW in the very near future, are dependent on NSW developing its own generation which must be based on using gas and/or coal. The MEU is convinced that using gas for this purpose is not commercially viable nor in the long term interests of NSW consumers, and therefore does not comply with the objective of the National Electricity Law
3. The MEU considers that there are significant constraints on all options for providing power generation technology other than wind, coal and gas. It sees there are concerns about attempting to provided the needed power from wind sources, and that by replacing power inflows from other states, NSW greenhouse emissions equivalence could be attained even by building a new 1000 MW coal fired generator in NSW.
4. The MEU considers that the best option for the provision of new generation and having no impact on the NSW government AAA credit rating, would be for the government to seek offers from private investors based on utilizing existing coal supplies, permits, land and nearby transmission assets, on the same basis as if the government were to authorize the building of a new coal fired power station itself

Supplementary submission

Major Energy Users, Inc (MEU) provided a comprehensive response and comments to the Owen Enquiry in its main response under cover of a letter dated 29 June 2007. The submission outlined the main concerns and observations of large energy consumers of the NSW electricity market.

This supplementary submission outlines the MEU views on the following specific terms of reference of the Owen Inquiry:-

1. Review the need and timing for new baseload generation that maintains both security of supply and competitively priced electricity.
2. Examine the baseload options available to efficiently meet any emerging generation needs.
3. Review the timing and feasibility of technologies and/or measures available both nationally and internationally that reduce greenhouse gas emissions.
4. Determine the conditions needed to ensure investment in any emerging generation, consistent with maintaining the NSW AAA Credit Rating.

1. Review the need and timing for new baseload generation that maintains both security of supply and competitively priced electricity.

The MEU provided detailed information as to the need for new baseload generation, and that it is needed now to offset significant inflows of power from other regions.

Because of the constraints of interconnections from Queensland and Snowy/Victoria, the growth in demand of electricity by the NSW economy will mean that new base load generation will be needed within the next five years. This assessment is supported by the latest NEMMCo statement of opportunities (SoO).

The MEU notes that the time required to build a new base load generator means that even if a project were to be commenced now, the new generator would not be available before the time implied by the NEMMCo SoO outlook for this new generation. Because of this time lag, MEU concluded in its submission that a firm commitment must be made now for the next base load generator in NSW.

Additionally the MEU provided data which demonstrates that absent any greenhouse abatement cost loading, black coal fired generation is the lowest cost option available in NSW. Cost estimates provided indicated that gas fired generation, whilst having an ability to provide more responsive generation in terms of faster start and shut down capabilities, would result in higher priced electricity due to the cost of gas.

The cost of gas delivered to NSW from Moomba or Longford, costs more than $4/GJ in real terms. This price is lower than that estimated by ACIL Tasman in its report[1] on the cost of generation options.

Table 34 **Projected delivered gas costs in the 17 zones (nominal $/GJ)**

Zone	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
NQ	$4.05	$3.15	$3.21	$3.28	$3.34	$3.41	$3.49
CQ	$3.42	$3.22	$3.29	$3.35	$3.42	$3.49	$3.56
SEQ	$3.29	$3.35	$3.48	$3.55	$3.62	$3.69	$3.76
SWQ	$3.04	$3.10	$3.16	$3.22	$3.29	$3.33	$3.39
NNS	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NCEN	$4.28	$4.38	$4.48	$4.59	$4.70	$4.80	$4.92
SWNSW	$4.01	$4.11	$4.23	$4.32	$4.38	$4.92	$5.04
CAN	$4.53	$4.64	$4.75	$4.87	$4.99	$5.12	$5.24
SNY	$4.11	$4.11	$4.21	$4.32	$4.56	$5.02	$5.17
NVIC	$4.53	$4.21	$4.28	$4.70	$4.42	$4.48	$4.57
LV	$3.30	$3.37	$3.44	$3.51	$3.58	$3.65	$3.72
MEL	$3.54	$3.61	$3.68	$4.28	$3.82	$3.87	$3.97
CVIC	$3.38	$3.39	$3.50	$3.60	$3.71	$3.82	$4.10
NSA	$4.09	$4.07	$4.15	$4.23	$4.80	$4.80	$4.92
ADE	$3.96	$4.07	$4.15	$4.23	$4.36	$4.46	$4.57
SESA	$3.68	$3.69	$3.80	$3.90	$4.01	$4.12	$4.40
TAS	$4.53	$4.64	$4.73	$4.82	$4.92	$5.02	$5.12

Data source: ACIL Tasman GasMark modelling

Assuming a price of $4/GJ (the estimated price for South West NSW), the cost of gas fired electricity will be in the range of $30-45/MWh just for the gas used, depending on the efficiency of conversion of gas to power. To this has to be added operating and maintenance costs and a return on capital invested. There is no doubt that gas fired power is significantly more expensive than coal fired power, which is capable of delivering power in the range of $30-35/MWh. This cost is also supported by ACIL Tasman in its report to NEMMCo[2].

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[1] ACIL Tasman Report on NEM generator costs (Part 2), Short run marginal cost of existing generators and the short and long run marginal cost of new gas and coal fired generators in each of 17 zones, Prepared for Inter Regional Planning Committee (IRPC) and NEMMCO, February 2005

[2] Op cit

Table 42: **LRMC of base load CCGTs and coal fired plant in the 17 zones (prices are in 2003/04 prices)**

Zone	Assumed Capacity Factor	Fuel cost	O&M	Capital cost	Tax cost	Total costs at station (sent out)	MLF Effect	Total costs at regional reference node (sent out)
Coal fired plant ($/MWH in 2003/04 prices)								
NQ	90%	$8.77	$5.49	$15.39	$2.96	$32.61	-$1.55	$31.06
CQ	90%	$8.31	$5.49	$15.39	$2.96	$32.15	$3.18	$35.33
SWQ	90%	$8.46	$5.49	$15.39	$2.96	$30.30	$1.59	$31.90
NCEN	87%	$7.38	$5.64	$15.92	$3.06	$32.01	$0.65	$32.66
SWNSW	87%	$9.23	$5.64	$15.92	$3.06	$33.85	$0.69	$34.55
LV	91%	$5.81	$4.98	$20.00	$3.85	$34.64	$0.35	$34.99

The MEU provided an indication of the potential costs for greenhouse emissions, and pointed out that coal fired power generates twice the amount of greenhouse emissions/MWh than gas fired power. Even if the domestic cost of emissions equals future European prices (cited in the MEU submission), the greenhouse premium on coal over gas firing still does not result in gas fired power being less costly than coal fired power.

The MEU concludes that there is a need for an immediate commitment for new base load generation in NSW, and that this should be coal fired in order to maintain a competitive electricity price in NSW.

2. Examine the baseload options available to efficiently meet any emerging generation needs.

Based on observations of the electricity market and other evidence, the MEU concluded that NSW needed new base load generation and that this should be coal fired in order to provide the most competitive outcomes for consumers.

In this regard, the MEU has examined a number of options for providing the power requirements to meet the needs of large industrial consumers in NSW. The MEU pointed out that the benefits of deregulation in the 1990s for industrial consumers have effectively been dissipated as the lower costs for power in the early years after deregulation have now been lost. Effectively the competitive position of industrial consumers in NSW is no better now (and probably worse) than before deregulation.

Thus there is no capacity available for NSW industrial consumers any ability to accept higher costs for electricity in order to meet expectations of greenhouse emission reductions. The costs for alternative sources of power are prohibitive, and do not provide reliable long term power to match the needs of industry.

Wind farms

The MEU has noted the proliferation of wind farms throughout the NEM. The basic cost of wind farm power is recognised to be at least twice that of coal fired power, and having an availability factor of ~30%, does not provide the reliability needed by industrial and manufacturing processes. Proponents of wind farms seldom make reference to the extensive additional transmission costs that result from providing the large oversizing needed, or to the congestion in transmission that results in either augmentations or out of merit order dispatch that wind farms cause. To overcome these difficulties, consumers are required to fund augmentations to the transmission systems to accommodate incorporation of wind farms. It must be noted that generators do not contribute to "deep connection costs" that result from decisions made by generators. Therefore the social costs for wind farms will be much higher than the headline costs quoted by wind farm supporters.

Solar

Solar power suffers from a number of the disadvantages associated with wind energy. Additionally, solar for base load needs suffers from the diurnal cycle, as well as less generation output when climatic conditions are adverse. The cost of solar power is reducing, but this is from a very high cost base.

Hydro power

Of all the options for utilizing renewable sources of power, the most viable and proven source capable of supplying large amounts of power, is that of hydro power. Unfortunately, the provision of the dams needed has become politically unacceptable, but combining this with the higher capital cost associated with this option (at about three times the cost of a coal fired generator), and the need to have access to specific and appropriate terrains, makes this option less attractive than in previous eras.

Plant and animal waste

Using plant and animal waste to provide generation suffers from the major problem of having to collect and transport supplies from a large number of small sources into a central location where economies of size might provide competitively priced power. Of these, human waste and sewage treatment is probably the most viable of the options available, but even this option does not provide the amounts of power needed to meet the forecast demand of NSW.

Distributed small generators

The MEU notes that there is a thrust to utilize large numbers of small generators (eg solar collectors at a residential level) but the economics are against this being a feasible source of power for industrial needs.

Further, the allocation of network costs to residential consumer/generators makes this approach even less viable.

Nuclear
As mentioned in our earlier submission, the nuclear option faces considerable opposition on the political front, although it does provide a viable option to large scale power generation with minimal greenhouse emissions. Combining this opposition with the capital costs involved and the time frames needed to build a nuclear option, would seem to preclude this as a solution to meet the more immediate NSW needs.

Other options
There have been a number of concepts for other options for the provision of power, but these are unlikely to be technically feasible in NSW (eg tidal) or require the need to be proven to be able to provide a commercially acceptable outcome.

The MEU assessment
There is a need for new base load generation in NSW, rather than a need for peaking power as the Snowy system can adequately cater for all of NSW needs for peak generation. It should be noted that if NSW does not use Snowy for peak generation, then this resource will be under utilized as there is insufficient transmission capacity for Snowy to supply the Victorian market, which in turn is now supplied by Tasmanian peak generation resources.

Alternatively NSW will have to greatly expand its interconnections with Queensland and Victoria, to allow for greater imports. This means that NSW will be dependent on supplies from other regions and their ability to have surplus generation for export. The NEMMCo SoO implies that Victoria will have minimum availability for export to NSW within one-two years and Queensland within four years. On this basis NSW would need to provide its own generation rather than rely on greater imports and incur the large costs associated with this option.

The MEU is of the view that the only commercially viable solutions for meeting the large amounts of power needed in NSW in the very near future are those involving NSW developing its own generation which must be based on using gas and/or coal. The MEU is convinced that using gas for this purpose is not commercially viable, nor in the long term interests of NSW consumers..

3. Review the timing and feasibility of technologies and/or measures available both nationally and internationally that reduce greenhouse gas emissions.

As discussed in the section above, the MEU does not consider that alternative technologies, which result in lower greenhouse emissions for power generation

are commercially feasible if the NSW industrial and manufacturing base is to remain internationally competitive. Although gas fired generation does result in less greenhouse emissions than coal fired generation, it is still an emitter of these gases. On this basis it is necessary to evaluate the benefit of the lower greenhouse gas emissions against the cost premium such an alternative might have. The MEU submissions have addressed this issue and also addressed the real issue that developing large amounts of gas fired generation in NSW will impact on the reserves of gas available for other jurisdictions and, for NSW's long term needs.

Additionally, the alternative technologies do not provide the reliability for the power demand needed by manufacturing activities. There is also some doubt that such alternative technologies are sufficiently reliable for commercial or residential use.

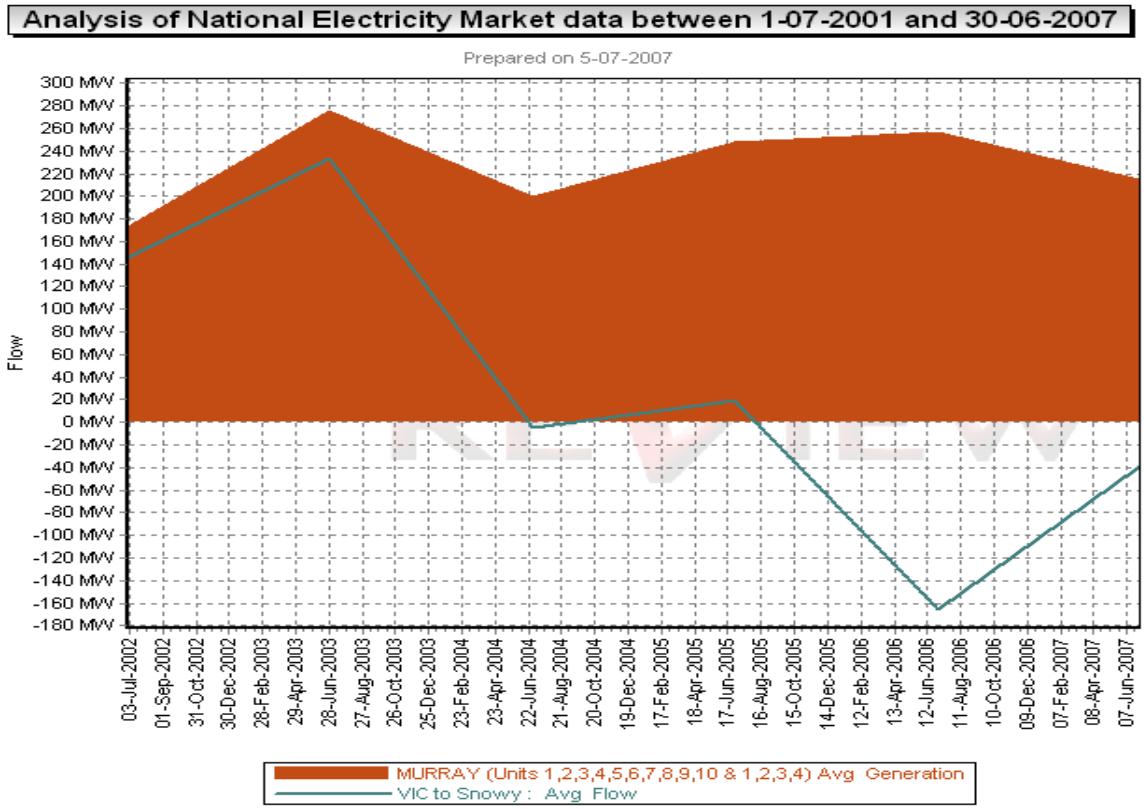
Although some of the alternative approaches to power supply are now sufficiently well developed technically to meet the time frames needed for new generation, many are not. We see that:-

- Large scale solar is still in its infancy in Australia, and even in other countries as well. There have been requests of interests issued in the US for large scale solar generation, but these have effectively foundered on costs and an unproven ability to scale up small solar applications.
- Whilst nuclear is a proven large scale generation option used in many parts of the world, an ability to introduce a nuclear option into Australia will need to negotiate through environmental issues, preventing this an option to be built within the needed NSW timeframe
- There is now sufficient evidence that large numbers of wind farms could be built to meet the time frames needed, but we have also seen that the development of many wind farms have been significantly delayed by pressure groups citing visual amenity and injury to flora and fauna as a means to prevent the development of wind farms in the most advantageous (and therefore commercially viable) locations. These appeals against planning approvals have delayed and even prevented a large number of wind farms being built in Victoria, South Australia and Tasmania.

The MEU acknowledges that there is a world wide trend which requires greenhouse gas emissions to be reduced. Currently, NSW import large amounts of power from Queensland and Victoria.

The amount of power imported from Victoria can be assessed by examining the amount of power dispatched northwards from Victoria and adjusting this to

recognise the amount of power generated by Snowy's Murray power stations. The details of this for the past six years are shown in the following chart.



Source: NEM Review

Snowy's Murray power stations are notionally located in Victoria and with the recent AEMC review on regional boundaries this is likely to be formalized. The Murray output is essentially a supply to Victoria, whereas the Tumut power stations provide for supply to NSW. The demand in the Snowy region is miniscule[3] and can be effectively excluded.

The chart shows that for the past six years, Murray power stations provided some 225 MW to Victoria and flow from Victoria to Snowy has averaged 35 MW. As Snowy demand is virtually nil, this means there is an annual average net flow from Victoria to NSW over the past six years of some 260 MW. Whilst the trend shows less northwards flow in recent years, this has been a result of less power generated in Victoria from its own hydro resources due to declining water stocks caused by the recent drought.

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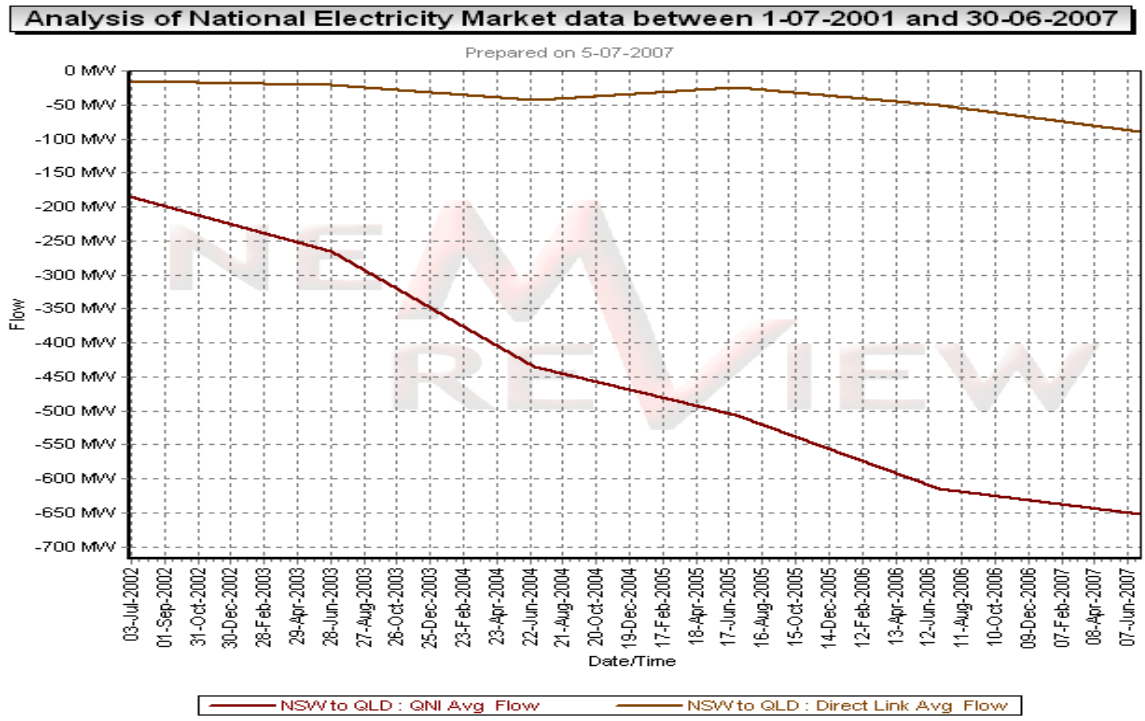
[3] The annual Snowy demand has averaged ~35 MW since NEM commencement, peaking at <60MW and is also supplied from Snowy's Tumut (NSW side) generators

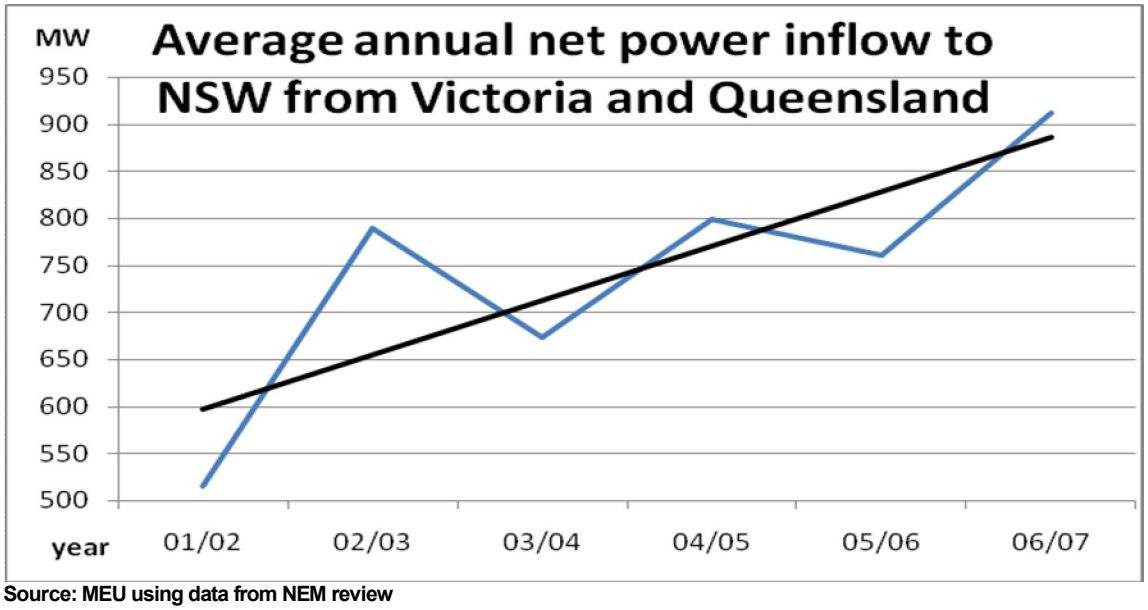
Conversely, power flows from Queensland into NSW have been burgeoning over the past six years.



Source: NEM Review

Over the same six year period, the annual average flow from Queensland to NSW has been 485 MW.

To put these two inflows to NSW into context, the average supply of power to NSW from other states has been growing, and has now reached over 900 MW annually.



Source: MEU using data from NEM review

Since 2001, there has been an annual average inflow into NSW from Queensland's black coal fired power stations and Victoria's brown coal fired power stations of 750 MW, and the amount of imports is increasing to over 900 MW in 2006/07. Of this 900 MW, about one third is supplied from brown coal fired sources. Converting this on the basis of black coal equivalence (from the view point of greenhouse emissions black coal generates ~1 t/MWh and brown coal generates ~1.3t/MWh) this has the same greenhouse impact as NSW building a 1000 MW black coal fired power station to replace imports from the other states.

At a pragmatic level this means that NSW could view the operation of an indigenous 1000 MW coal fired power station to replace imports from Queensland and Victoria and this would maintain the same greenhouse emissions as it currently does using imported power.

The MEU considers that there are significant constraints on all options for providing power generation technology other than wind, coal and gas. It sees there are concerns about attempting to provide the required power from wind sources, and that by replacing inflows from other states, NSW greenhouse emissions equivalence could be attained even by building a 1000 MW coal fired generator.

4. Determine the conditions needed to ensure investment in any emerging generation, consistent with maintaining the NSW AAA Credit Rating.

For NSW to build a government owned power station, will impact its credit rating, as there will be a need to use borrowings to fund the construction. In its calculations ACIL

Tasman[4] implies that the cost of a CCGT plant will be ~$900,000/MW and a black coal power station of ~$1,500,000/MW[5]. Thus for the expected growth in demand of some 350MW per year as estimated by NEMMCo in its SoO, this will require investment of some $315m pa for CCGT plant or $525m pa for coal fired plant.

Rather than the NSW government (or one of its corporations) incurring this cost and so impacting the NSW credit rating, encouragement for the private sector to build the new power station is required.

There are a number of privately owned power stations in the NEM, most of which have been purchased from state authorities (as in Victoria and SA) with some being built by the private sector. With the exception of Milmerran PS, all privately built power stations have been gas fired, with the larger proportion being OCGT configuration.

Analysis of the owners of new generation in the NEM shows that the predominant driver of new investment has been by electricity retailers. Anecdotal advice from discussions with retailers implies that this investment is to provide a physical hedge against high prices in the NEM. This is consistent with the actuality of this new generation built by retailers, which uses the lowest capital cost option of open cycle GT plant.

The proposed TRUenergy Tallawarra plant for NSW is planned to be combined cycle GT which has a higher efficiency than OCGT and is more suited to longer operational durations. It would appear that TRUenergy has identified that the power demand in NSW is such that its Tallawarra plant will not displace peaking supply from Snowy, but will be required to run for longer periods, replicating intermediate load conditions. This approach would not put it in direct competition with the existing base load coal fired plants of Delta, Eraring and Macquarie.

Despite the fact the NSW pool and contract markets have provided adequate “signals” that new base load investment is required in NSW, there has been no attempt to build new base load generation in the state (even after the increase in VoLL to $10,000/MWh in 2002), despite the fact that Queensland (with less of a market signal), has built Milmerran power station (870 MW) and is about to complete Kogan Creek PS (750 MW).

The MEU has observed that the market power held by Macquarie and, to a lesser extent, Delta is such that a new entrant base load power station would assess that there is too much risk in entering the NSW market, as much of the high price in NSW

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[4] Op cit

[5] This compares well with the $1,600,000/MW for the recently built Kogan Creek power station in Queensland

can be attributed to a small number of large price excursions initiated by Macquarie and Delta. As the MEU pointed out in its initial submission, there is still an underlying commercially based case for new base load generation in NSW, but the viability of this is heavily affected by the risks stemming from the easy ability to set pool prices by the dominant generators.

Because of this, the MEU is of the view that the ability to exercise market power by Macquarie and Delta needs to be constrained before a privately owned new base load entrant to the NSW market will be considered possible. This view is also supported by the reviews undertaken by Parer in 2002 and ERIG in 2007. Both of these reviews concluded that Macquarie and Delta need to be disaggregated and then privatized. Simply privatizing these, without disaggregation, would undermine what little competition currently exists in the NSW market.

The MEU strongly considers that disaggregation is totally feasible in the current NSW political climate, even if the concept of sale is not as feasible. What does concern MEU and its members is that sale of Macquarie and Delta in their current forms will result in private businesses using the same market power currently used by both, but without any offsetting impact arising from public ownership!

Disaggregation of Macquarie and Delta will provide a more stable environment in NSW for new entrant generation. It is this environment that will give new entrant generators more confidence to invest.

However, based on the history of generation in NSW, the MEU considers that there are a number of additional features available to the NSW government to encourage needed private investment in new generation.

If new generation was to be built by a government owned entity such as Macquarie or Delta, it should be noted that these entities already have long term contracts for the supply of coal from either government owned collieries or private collieries. This provides government owned generators with an advantage over a new entrant which would have to develop its own colliery or arrange purchase of coal from a nearby privately owned colliery.

In its report[6], ACIL Tasman provided the following table of future coal pricing for different generators, which overall, shows a reduction in future coal prices in real terms.

[6] Op cit

Table 6 **Projected real weighted average marginal coal prices into NSW power stations ($/GJ in 2003/04 prices)**

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Macquarie Generation	$1.08	$1.02	$1.07	$1.05	$1.03	$0.91	$0.83	$0.88	$0.88	$0.88	$0.87
Eraring Energy	$1.49	$1.44	$1.41	$1.38	$1.36	$1.30	$1.27	$1.23	$1.20	$1.19	$1.17
Delta Coastal	$1.42	$1.39	$1.40	$1.21	$1.20	$1.18	$1.17	$1.12	$1.11	$1.11	$1.10
Delta Western	$1.17	$1.06	$1.42	$1.30	$1.20	$1.13	$1.10	$1.08	$1.06	$1.03	$1.01
Redbank	$0.85	$0.85	$0.84	$0.84	$0.84	$0.83	$0.83	$0.82	$0.82	$0.82	$0.81
NSW overall average	$1.22	$1.19	$1.21	$1.15	$1.13	$1.06	$1.02	$1.03	$1.01	$1.00	$0.99

Source: ACIL Tasman discussions with coal market participants, ACIL Tasman estimates of coal price.

The variation in price for coal supplies with location indicates a need to assess the most appropriate location for the new entrant generator.

Under a traditional approach to developing new generation, the jurisdictional authority would review the amounts and price of coal available to each of its existing power stations, and the ability to develop new generation at each, addressing issues such as land available, permits already granted for future growth, and proximity of transmission assets. These provide an incumbent generator with an advantage over any new entrant if they have access to any or all of the necessary elements already in place.

Bearing this in mind, the MEU suggests that the NSW government could issue an invitation for private businesses to tender for the right to develop the next base load generator. Such an invitation could offer to provide any permits held to develop a new or adjunct power station, access to coal at a declared price comparable to prices available to the incumbent generators and, if available, land adjacent to existing generators.

Such an approach has a number of advantages. It can provide some of the necessary infrastructure needed (eg coal deliveries from an already developed supply arrangement), reduced time to develop the new power station (eg if permits already exist) and ease of development (eg if land is already acquired).

Such an approach for two generation plants owned independently but co-located has already been demonstrated as feasible. Loy Yang A power station is owned by AGL and others. It provides coal to the adjacent Loy Yang B power station, owned by International Power and others. Another example is Tarong PS owned by the Tarong Energy (a Queensland government corporation), and Tarong North PS owned by Tarong Energy with TEPCo and Mitsui.

The MEU considers that the NSW government could seek private investment in new power generation in NSW without impacting its AAA credit rating. It can seek to have one of its existing generation corporations carry out the new work, but the MEU

considers that this would be a retrograde step and would not provide the best environment for future generation investment over the long term nor produce a more competitive market outcome which is so badly needed in NSW.

The MEU considers that the best option for the provision of new generation and having no impact on the NSW government AAA credit rating, would be for the government to seek offers from private investors based on utilizing existing coal supplies, permits, land and nearby transmission assets, on the same basis as if the government were to authorize the building of a new coal fired power station itself.

A feature of such an approach could also be integrated with the government providing the ability for large industrial consumers to establish a long term supply arrangement with the new generator. Such a long term supply arrangement would provide the new entrant developer of the power station a high degree of certainty of off-take at a known price. The issue of users and generators not being able to write direct long term bilateral contracts has impacted on new generation through not being able to underpin the regional generation investment with firm contracts.