Response to AEMC Issues Paper of 11 May 2006

Comprehensive Review of Reliability Standards

10 July 2006

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1 INTRODUCTION

This Submission is the first stage in responding to the Reliability Panel's Issues paper of 11 May 2006. An answer is provided to each question as the initial basis for a response from the Energy Users Association of Australia (EUAA) to the Reliability Panel. The Submission will be further refined after the Panel's Forum which is scheduled for 27th July 2006.

The Submission is based primarily on MMA's previous work in 2001 and 2002 for NECA, as well as the more recent work where a methodology for developing an optimal reliability standard has been developed and tested. This paper "Estimation of the Economically Optimal Reliability Standard for the National Electricity Market" comprises part of this Submission. The relevant references are listed in APPENDIX A

The Submission provides an initial response to the 47 questions raised in the Issues Paper. The key conclusions issues are:

- That the current reliability in the NEM is excellent at the bulk system level. The more severe outage events that have affected significant parts of the system at the same time have been caused by lightning activity and control and protection faults that cannot be mitigated by adding more reserve generating capacity.
- Defining the reliability standard in terms of unserved energy levels is useful because it can be related to the costs of interruption experienced by customers and through market modelling to the amount of reserve capacity needed to meet a reliability standard.
- That the current reliability standard is probably not economically efficient. There is evidence that the optimal unserved energy level is about 0.001% in Queensland and about 0.004% in the southern mainland regions. The optimal reliability level in Tasmania has not been evaluated because it would require specialised models and data related to hydrological risk, which is beyond the resources of this submission.
- That the proper assessment of optimal reliability requires a quantitative approach to the priority and optimising of load shedding arrangements. This would require a confidential analysis of the load at risk during capacity shortages and an evaluation of the expected costs faced by customers for various levels of unserved energy. This would be an input to the optimal reliability analysis.
- That developing an economic reliability standard and achieving it could save up to $9 M per annum in the next five years and up to $40 M per annum thereafter compared to achieving the current standard of 0.002% throughout the NEM.
- That the basis for intervention by NEMMCO as the Reserve Trader should be minimised by making an allowance for the uncertainty in the measurement and estimation of unserved energy. This would reduce the risk of intervention if the target reliability level is being achieved. To this end, the assessed intervention level for

unserved energy should be higher by about 30% and the intervention level for capacity should be lower by about 50 to 100 MW depending on the NEM region.

- That the focus on the bulk system reliability should not be confused with distribution reliability and system security issues. These other aspects of system performance cannot be addressed by building more or less reserve capacity or demand side response, except on a local basis and therefore should be analysed separately from bulk system reliability.
- That a proper process is needed to finalise a strategy for developing efficient reliability targets and appropriate capacity levels for intervention by NEMMCO as Reserve Trader or operator. This process would examine the costs and benefits of moving toward an economic reliability standard adapted by time and NEM region. It would determine suitable risk margins to provide the basis for intervention by NEMMCO in the short to medium term; and the evaluation of the effectiveness of the new capacity development pipeline to manage the risk of higher economic growth.

2 RESPONSE TO QUESTIONS

Table 2-1 provides an initial response to the Issues Paper questions drawing principally upon the 2002 and the two 2006 MMA Papers listed in APPENDIX A . The responses are based upon the principles that:

- The reliability standard should be based upon a least cost combination of reserve capacity and cost of the risk to customer loads.
- Intervention should be based upon allowing for a risk margin to reflect the uncertainty in measuring and predicting reliability.

Table 2-2 shows how the issues can be grouped from a customer perspective and summarises the key findings in the market analysis and this submission. A recommended approach to addressing the reliability issues in relation to customer objectives is summarised in this Table. The components included in Table 2-2 are relevant to achieving the Single Market Objective:

"The national electricity market objective is to promote efficient investment in, and efficient use of, electricity services for the long term interests of consumers of electricity with respect to price, quality, reliability and security of supply of electricity and the reliability, safety and security of the national electricity system."

The key components in the context of this review relate primarily to trade-offs between price to customers and reliability of supply and the risks that outcomes deviate from efficient and acceptable service levels.

Table 2-1 Response to Issues Paper Questions

	Question	Response
	The Key Questions	
1	Is there now, or is there likely to be in the future, a problem with supply reliability in the NEM?	The current performance shows excellent reliability. In the recent past, issues with supply reliability have largely been related to network outages arising from lightning activity and control and protection faults. The loss of load situation in Queensland over the 2003/4 summer was mainly due to storm activity exacerbated by a lack of maintenance and capacity augmentation on the distribution networks. While the NEM has only been in operation since the late 1990s, comparing this period to the pre-NEM and pre-VicPool/SEM periods, would indicate that the level of reliability has improved, with fewer incidents of involuntary load shedding and higher generator availability. The reliability performance to a large part has been driven by the NEM. Some of the improvement would have happened anyway through computerisation and technological development of testing and monitoring systems. However the advent of the NEM made generators aware of the market impacts of their non performance through the spot price mechanism. Future reliability will be assured with competitive new entry on a timely and economic basis. It is important for the reliability standard to support the economic assessment of the mix of demand side and supply side resources that would deliver an efficient market. The recommendations made herein are intended to support this objective.
2	If yes, is there now, or is there likely to be in the future, a problem with the reliability settings?	MMA analysis has shown that the reliability settings are not economically optimal and that refinement would produce some modest benefits of initially about $9 M pa over the five years to 2009/10 and about $40 M pa in the long term, as compared to delivering the target reliability of 0.002% in all NEM regions simultaneously. The 2006 MMA Report details the analysis that has been conducted.

	Question	Response
3	If yes, is it serious enough to cause material dislocation to suppliers and users in the future?	Current indications are that new capacity is being constructed to meet foreseeable demand growth, especially in Queensland and NSW. The announced sale of the Queensland retailers will probably provide more incentive for the development of peaking plant as it has in the southern regions. This will translate to an economic benefit of the sale process which should benefit Target reliability in all NEM regions has been exceeded except for non-credible events, which cannot be ameliorated with additional capacity. So the immediate answer is "No". It is not serious enough to cause material dislocation. However, the basis for intervention by NEMMCO and the pre-emptive new entry strategies of the Queensland GOCs has provided a short-term disincentive for timely development of peaking plant except by retailers managing their own market risks. This could leave the market dependent on public sector entities to keep it working at a satisfactory level of reliability based upon sub-economic returns to the public sector. That would not maximise economic benefits generally.
4	If no, what improvements to the operation of the reliability settings should be made?	Reliability settings for intervention purposes could be customised to each region and reflect the current supply/demand balance and plant performance. The application of reliability settings could be adapted to the level of uncertainty in the analysis so as to reduce the probability of unnecessary intervention and thereby undermine competitive new entry.
5	Otherwise, what changes to the reliability settings should be contemplated that would be beneficial?	Economic assessment of the optimum level of reliability by balancing the value of USE against the cost of increasing capacity would allow the level of USE – and thus VoLL – to be set at a level that would minimise overall costs. This would deliver reliability settings that enable customers to achieve their desired level of supply reliability whilst encouraging those who do not need a highly reliable supply to participate on the demand side so as to guarantee the required service levels for others

	Question	Response
		and receive appropriate economic benefit commensurate with the value to the market as a whole. However, the EUAA has seen no evidence that would necessarily justify an increase in VoLL above its current level for this or any other reason. In fact, there is little evidence in our view that shows that the last increase in VoLL has had any demonstrable impact on reliability levels in the NEM, on signalling the need for new investment in peaking plant, or on active participation of the demand side. On the other hand, there is evidence that this has increased the opportunities to exploit market power. In all of the above, it should be kept in mind that VoLL is a price cap in the market and is not necessarily to be equated with the value of USE. Ensure that the application of reliability standards effectively manages the risk of market failure and does not guarantee market failure.
	The Detailed Questions	
6	Are there additional useful ways that the relationship between the reliability settings and key themes should be characterised?	The existing analysis is sufficient to conceptualise the key relationships.
7	In assessing stakeholder responses to the key Review questions, how should the Panel approach the relative importance of particular relationships?	The primary concern is the long term interests of customers, as reflected in the Single Market Objective. If the market remains competitive and competition increases, we may assume that input cost reductions would eventually be passed on to customers. Therefore the focus should be on the economics of reliability and the risks faced by the customers who are most exposed to unreliability. Because of the ubiquitous nature of electricity in the economy, even if only some customers are affected, the consequential costs of unreliability pass onto others eventually. It would flow on more quickly where business enterprises are directly affected. Therefore, it is sufficient to assess the aggregate costs of

	Question	Response
		reserve capacity and unreliability as the primary measure. It will be important not to provide confused signals to new entrant investors. The requirement for generating capacity should not be over-stated or eventually potential investors could boycott the market if they have been disappointed by low returns from investment.
8	In conducting its analysis of the reliability settings, are there particular kinds of analysis or methodologies that the Panel should undertake or follow?	The Panel should adopt more reliance on economic analysis to set reliability standards. The methods should have regard to total cost minimisation for the supply and demand side. The 2006 MMA report provides an example of how this analysis can be conducted. The uncertainty in these cost estimates should also be recognised when setting intervention levels. That the more extreme events have substantially higher costs and lead to even more costly restrictions means that some attention needs to be given to the range of outcomes and the incidence of higher costs to customers when setting reliability levels.
9	Which scenarios in Appendix 2, if any, would you like to see further developed in the Panel's analysis and why?	Mechanisms to facilitate the acquisition of long term demand side response by retailers and generators. A firm commitment to acquire DSR over an extended period would reduce the risk to suppliers and encourage investment in this part of the market. The reliability standard could be relaxed to the extent that its measure includes the price based demand side response and that the exposure to extreme price events is reduced for customers who are not interrupted.
10a	Is a measure based on unserved energy the most appropriate form of standard?	Yes, because it combines the magnitude and duration of exposure to loss of supply. However, the values of the measure used for monitoring and intervention in the NEM must be based upon economic analysis and not arbitrary numbers or simplistic economic concepts that fail to consider the complex economic relationships that determine the behaviour of players in the NEM. Loss of load hours could also be used if properly based on such an economic analysis.

	Question	Response
10b	If not, should it be an input or output based form?	Output based measures are more directly related to economic impacts on customer and are preferred. It should be able to be related to customer impacts and reserve costs.
11	If not, what would be a more appropriate form of standard for use in the NEM and why?	However, it is insufficient to look at the "expected" unserved energy alone because of the asymmetry of impacts. More extreme events should also be a focus with greater reliance on demand side withdrawal to respond to the minor and more frequent shortages. The risk of extreme events is more important to customers because of the flow-on effect on the economy generally.
12	Is it desirable, and are there ways, to broaden the form of the standard to incorporate a range of reliability-related considerations? If so, which considerations and why?	Duration of outages at the system level are not necessarily the same at the customer level, especially for shorter outages, because customer outages can be rotated if there is sufficient lower value loads that can be placed at risk. It's not the measure that is so important as long as the economics of the standard is robust in relation to the range of impacts on customers. Consideration should be given to the risk of extreme events and their costs. To illustrate, one could even come up with a measure such as a $200M daily loss of supply value no more frequent that once in 10 years in say Victoria. This would be assessed according to the level at which high marginal value customers are affected to an unacceptable extent, or upon a long-term economic basis. In most years there is no unserved energy arising from capacity shortages, so it would be better to supplement the average measure and to also focus on extreme events, 1 in 2 years, 1 in 10 years and 1 in 30 years, and the costs of managing those risks with reserve capacity.

	Question	Response
13	Should the standard be determined on a NEM-wide basis or separately for each region?	The different mix of customers in the various NEM jurisdictions and the wide range of reliability preferences are unlikely to lead to all regions having the same value of unserved energy and reliability requirement. In Victoria and NSW, where aluminium smelters are available to address short-term capacity shortages, the required reliability standard is likely to be lower (unserved energy higher) than in the regions were such facilitates are not available. Using a NEM wide standard for all regions is thus likely to be sub-optimal. MMA analysis has indicated that the economic benefits of moving away from a common standard are about $9M pa over the next 5 years and rising to $40 M pa from 2010. Regionally based standards should reflect the local economics and would not undermine the national approach. Regions already have their own constraints and supply/demand characteristics, which should determine their own supply standards within the ability to predict and measure them. This is analogous to having different capacity reserve margins in each region.
14	Is the level of the current NEM reliability standard appropriate? If not, what level would be appropriate and why?	The 2006 MMA paper shows that the current NEM standard is not economically optimal and needs to be refined to reflect different patterns of loading and load shedding in each region, and the plant mix. The MMA report suggests that, subject to review of load shedding arrangements and costs, it should be about 0.001% in Queensland and 0.004% on the southern mainland regions. Tasmania's standard requires a different kind of assessment that has yet to be undertaken.

	Question	Response
15	What level of VCR is appropriate and how, and on what basis, should it be measured? Provide reasons or analysis to support your views.	The level of VCR should relate to the costs incurred by customers who are actually exposed to load shedding. This is apparently not the same as the market as a whole because only a relatively small part of the load is normally at risk. The basis of measurement would involve including the price bid demand side response and, for the involuntary load shedding, market surveys would seek to determine customers' perception of costs and willingness to pay for reliability. The reliability standard as measured by unserved energy should be inversely proportional to VCR. The previous methods for measuring VCR are generally adequate, but may be improved for the customer groups that are affected. The reliability should be based upon the VCR weighted by customers exposed to load shedding by the reliability standard, not the market as a whole.

	Question	Response
16	Should the reliability standard be treated as a cap or as a target? If the latter, should the standard be expressed as a range for NEMMCO to target?	Treatment of the reliability measure as a target and then using the same value for intervention would not produce an efficient market if it discourages independent action by new investors. A range of acceptable outcomes should be defined that reflects the uncertainty in measurement. There should be a target level and a cap that is defined according to the risk in measuring and applying the target. Refer to the 2002 MMA report to NECA for more details on the concept. The target would take into account the potential cost and frequency of more extreme load shedding events. It would be used for market monitoring purposes to assess actual market performance based on historical information. The cap would provide the basis for intervention. It would be set to reduce the risk of intervention and to allow the market to work within the band of uncertainty of unserved energy outcomes.
17	Should the standard be defined more precisely, for instance in terms of an average or a maximum over a period of time?	The risk is continuous in time so the measurement period is not that critical. An annual basis is useful to reflect seasonal and annual capacity requirements. However, the standard should be based upon median and extreme outcomes to reflect the risk of extreme events. An annual measure is suitable because it relates to a capacity decision for a peak season. In economic terms, we seek an average over time but it does not make sense to over-invest in the future to correct a previous low level of reliability which would be the logical response to targeting an average over a number of years. Each year can be treated independently of any previous or future year because we can make a separate decision about the capacity needed for each peak season.

	Question	Response
18	Should the standard be reviewed regularly and, if so, how often? Alternatively, should there be specific triggers for initiating a review? If so, what should those triggers be and why?	Triggers would be: - large plant retirement - change in reserve capacity costs (proportional) - surplus in available reserve (increase reliability based on value according to lower marginal cost of reserve based on mothballing benefit.) If a mechanism is established to calculate the appropriate reliability cap and target for each region for each year, then the process need not be reviewed unless there is a major trigger. Prescribed methods could be used to update the values each year as demand patterns and plant performance evolves.
19	Should there be greater clarity in terms of the definition of bulk transmission? If yes, how should it be defined?	The critical question is not the definition of the bulk transmission system with a specified boundary, but rather the types of disturbances in the market that can be managed through regionally sited reserve generating capacity or upgraded interconnection capacity. There is no need to define a fixed boundary if this approach is taken. Any load shedding event that could be mitigated with regionally located generating or demand side capacity would qualify as contributing to the target measure.
20	Are there additional considerations which should be included in the standard to reflect regional concerns, for example, stricter standards for high-load areas such as CBDs?	This is a matter for load shedding priority rather than the standard itself as long as the standard adequately reflects the load at risk. This problem would be automatically addressed if the reliability standard has an economic basis, including consideration of the actual load at risk and the associated customer costs. Based on MMA's recommendations, the bulk system reliability standard would include the impact on supply reliability for high load areas only if those area loads were at significant risk. This would depend on the supply/demand structure for each region. Normally this is not the case and CBD areas are the last to be shed. They are normally exposed to the risk of a total system shut-down (called "system black"), which occurs

	Question	Response
		about once in 40 to 50 years in modern power systems. Building additional generating capacity does not mitigate system black risk. If a CBD or other critical area became a region due to unresolved transmission easement constraints, then it is almost certain that the reliability criterion on the proposed MMA basis would be very stringent (about 0.0001%) and that would require secure transmission facilities to deliver the required level. The present arrangements would make no such guarantee and it would need to be treated as a special case through the transmission planning process.
21a	Should there be a role for the NEM reliability settings in compensating for potentially lower reliability outcomes further down the supply chain?	The investment in reliability should be where it is demonstrated to maximise economic benefit through managing the supply risk to customers. Currently, DNSPs are not subjected to any NEM reliability standards. Various jurisdictional regulators have imposed differing state based efficiency factors and guaranteed service levels (GSL) with penalty payments for the breach of these GSLs. Some jurisdictions also have incentives for DNSPs to obtain DSR capabilities by including a factor into their revenue requirement or by providing a direct incentive payment. In 2005, the ESC in Victoria introduced an S-factor that was based on the Value of Customer Reliability. Other jurisdictions' schemes do not seem to be supported by any economic justification and the level of penalties involved have no sound economic rationale. Setting a NEM wide reliability standard to apply at the customer level would imply that the reliability of DNSPs would have to be included in its determination. Differing standards may have to be set to take into consideration the different distribution network configuration that supplies individual customers, i.e. whether the customer is connected into a mesh or at the end of a long radial line. However, a precedent does exist in the determination of distribution loss factors (DLF), where different loss factors are applied to different distribution line configurations within a distribution network.

	Question	Response
		To be meaningful, penalties associated with breaching reliability standards must apply to DNSPs. At present, DNSPs have no incentive to optimise the DLF as customers pay for all losses. The current penalties for breaching the GSLs are small and do not reflect the economic cost of supply interruptions experienced by customers. The answer is "No" apart from exceptional circumstances. It is not economic to compensate in one part of the grid for deficiencies in another part. Each part should be optimised for its own performance irrespective of other aspects. Distribution reliability is not normally affected by generation system reliability and vice versa. It would only be in exceptional circumstances where loads can be quickly and remotely transferred between transmission regions in response to generation or transmission contingencies that distribution and generation reliability would be affected. High costs to achieve high transmission or generation reliability would be unlikely to be economic if customers have already accepted low distribution reliability as economically acceptable relative to the costs of improving performance, unless these circumstances somehow changed. It is only through the relative economics of performance improvement in relation to the value to customers that these two aspects of supply reliability to customers might be indirectly coupled. Distribution and bulk system reliability are separate issues and there is no benefit in arbitrarily linking their reliability standards. Reliability levels should be based upon cost/benefit analysis, where the costs to provide higher reliability are matched to the value as appreciated by customers on the basis of their willingness to pay for a given level of reliability, or the demonstrated economic value of their activities as affected by the particular pattern of unreliability of supply. This approach requires a demonstrated link between the aspect of supply disruption that is of concern and the most economic means

	Question	Response
		to reduce that exposure to disruption.
21b	Should the reliability standard take into account changes in the generation plant mix and embedded generation?	The answer is "Yes". As more intermittent generation enters the system, the assessment of risk may change and the definition of firm capacity will change. The target level of the standard may need to adapt to this change over time because it relates to the forced outage rates and the volatility of electricity production relative to the temporal profiles of regional load.
22	Should the scope of the standard be extended to encompass matters currently treated as system security issues such as multiple contingency events? Should near misses be reported?	**Yes,** but only in so far as they have a direct impact on the risk to customer load due to pre-contingent load shedding to maintain system security. Rather than arbitrarily require reserves to be held to cover the largest contingency over an extreme peak load (say 20% POE or greater load), it is best to include any load shedding necessary to maintain system security in the modelling and measurement of unserved energy events. If the system load must be shed to protect the system against a credible double contingency because there is inadequate generating capacity to reschedule, then such events should be included in monitoring where feasible and significant in the modelling. An example is the occasional reduction in the capacity of the Heywood interconnection during lightning storms. Such events should be included in the reliability modelling and standard for South Australia because such risks can be managed with demand side or reserve capacity resources.
23	If yes, how should such matters be defined to ensure that supply adequacy is appropriately monitored in the context of power system security?	This can be achieved through the classification of events of unserved energy according to their cause and the most economic form of prevention or mitigation in the future. This would enable the reliability standard or standards to be matched to their associated economic measures such as reserve generation capacity, tree clearing, lightning protection, and control and protection system standards.

	Question	Response
24	Should specific 'exogenous' matters such as industrial action be included or excluded? If so, what factors and why?	As above. Causes of unserved energy events emanating from the bulk transmission system should be recorded so that useful information is available when standards are to be reviewed. It is not normally economic to fix industrial relations problems by building extra reserve capacity. That is more effectively accomplished by attending to union and company management and industrial relations law. Therefore, we would not normally include unserved energy due to industrial relations causes unless the problem was so endemic that it could not be addressed by other means. Some of the other types of exogenous events (lightning strikes, bush fires and other weather related events, animal interference with equipment), commonly used as reasons for interruptions, are credible contingency events; they can be foreseen. The interconnection between SA and Victoria is derated under certain weather conditions because of the likelihood of lightning activity in the vicinity of the equipment. Redundancies in the system, equipment protection and work practices defining how the equipment is to be operated should be able to deal with these events. To the extent that these approaches cannot address the system performance, the remaining outage events would be included as contributing to bulk system unreliability.
25	Do the current price mechanisms encourage appropriate investment? Explain why or why not.	Since the electricity industry reforms, new sources of supply can be characterised as mostly pre-emptive new entry. Most of the new capacity can be separated into three categories: base load generators which have been developed at the instigation of state government owned corporations and are politically driven (Callide C, Tarong North and Kogan Creek in Queensland); some private projects that have been financially unsuccessful due to excess capacity being committed and to the surplus created elsewhere (Pelican Point and Millmerran respectively); and peaking generators developed with the backing of retailers seeking self insurance against high pool prices (Valley Power and Somerton in Victoria, Hallett and Quarantine in South Australia).

	Question	Response
		The experiment with market network service providers to provide interconnection capacity has largely failed, with both Directlink and Murraylink converting to regulated status. There, however, is still hope that Basslink will achieve a better outcome owing to the unique nature of the Tasmanian electricity supply configuration relative to the rest of the NEM. Overall, we conclude that the current price mechanism has supported more than adequate generating capacity in the NEM in all regions since market inception. However, we have not seen an economic response from the demand side as yet, due in part to the supply side surplus and other impediments that have been identified elsewhere, including the EUAA reports on a Demand Side Response (DSR) Trial and the subsequent Report on DSR Case Studies. A more balanced market would be needed to show the value of demand side response.
26	If not, how should the mechanisms be modified to improve that effectiveness?	Prior to the formation of the AEMC/AER, the ACCC had backtracked on establishing pricing arrangements to provide for charges and rebates to be applied to all network users including generators depending on whether they add to or relieve network congestion. However, this is likely to remain an issue unless some form of nodal pricing is implemented. If the reliability standard is adjusted to reflect a closer balance of supply and demand on an economic basis, the incentives for demand side participation and embedded generation on an economic basis would be enhanced. On these grounds, it would be beneficial to progressively move to a VoLL that is consistent with the VCR, the cost of reserve capacity and the reliability target for generation. Generation capacity targets on an economic basis to meet reliability levels should be separated from the total requirement to reveal the scope for demand side response and

	Question	Response
		embedded generation.
27	What is the impact of price volatility on the reliability mechanisms?	Excessive price volatility drives peak plant investment by retailers seeking to protect their risk position (e.g. Hallett, Somerton, Quarantine). This contributes to higher reliability. However, all this comes at a cost to generators and ultimately consumers, as the generators attempt to pass on these costs at times of tight supply/demand balance. We might expect the higher volatility to also bring forth demand side participation and some is contracted by NEMMCO in its Reserve Trader role. However, the arrangements tend to be short-lived as they only cover one peak season and they don't encourage retailers to acquire the demand side resources over a longer time period. As the EUAA's work in facilitating the negotiation of reserve trader arrangements with NEMMCO last summer clearly shows, the complex legal and technical arrangements around the tender are also a hindrance. These factors don't encourage customers to make the investment in load management to achieve the longer-term benefits of demand side response.
28	Are the current price mechanisms appropriate tools for limiting the exposure of market participants to extreme price outcomes?	Yes. They represent a compromise between the average marginal cost of unserved energy, which is between $20 and $50/kWh depending on the NEM region and a market price cap of $10/kWh, which participants and jurisdictions have accepted as workable given the current tools for price and volume risk management in the NEM. The cumulative price threshold also provides protection for extreme and unforeseeable events where extreme price signals would deliver limited benefit in balancing supply and demand. Again we re-iterate our earlier comment about the distinction between the value of USE and VoLL, the market price cap, with one not to be confused with the other. In previous submissions reviewing VoLL, we have pointed out this distinction and its implications, even arguing for a separation of the two.

	Question	Response
29	If no, what are the most appropriate alternative mechanisms? What are the relevant settings and why?	As the reliability standard is adjusted and the risk of intervention is reduced, a more active demand side could reduce the risks of increasing the market cap price (or even the need to do so) and perhaps the cumulative price threshold. However, the EUAA would also want to see a NEM that is less prone to the exercise of market power before it could support any increase in VoLL.
30a	What impact will the changing generation mix, particularly the increased use of non-scheduled generation such as wind, have on reliability outcomes?	More non-scheduled generation will make it more difficult to calculate the expected reliability levels and will increase the uncertainty in the estimation process. This may increase the need for and risk of intervention in the market. Reserve capacity levels will need to be carefully defined and may need to adapt to the current operating generation mix.
30b	Should there be improvements to the price mechanisms to take that impact into account?	Providing the reliability target is assessed taking these market factors into account and the price mechanism allows the market to respond, then the current pricing structures are adequate.
31	Would the introduction of improved forward market mechanism contribute to reliability outcomes? Provide full details of your proposal and supporting data.	EUAA does not have any data to support such a proposition. If an improved forward market would assist unit commitment for peaking plant then improved reliability would follow. Because of the flexible plant at Snowy and Southern Hydro, we would not expect the benefits for reliability to be significant in terms of expected unserved energy.
32	Are there ways that NEMMCO could improve its forecasting accuracy that would enhance reliability outcomes?	Providing reserve capacity is available, then improving short-term demand forecasting ability would have a negligible effect on reliability.
33	Are consumers able to signal their reliability-related prices to the wholesale market effectively? If no, why not and how could that signalling be improved?	While the wholesale market may be able to signal energy prices, there is no reliability signal in network prices for consumers to respond to. IPART has implicitly acknowledged this by allowing a D-factor into its DNSPs' revenue determination to provide an incentive for DNSPs to obtain DSR in the absence of any market price signals for such resources.

	Question	Response
		In New Zealand, concerns over the cost of system augmentations at both the distribution and transmission levels have led to a form of congestion pricing to signal the cost of network demand constraints, where a separate congestion period charge is applied at times when demand on the network (coincident demand) is high. The intention is to expose customers to the cost of higher network capacity required to meet peak demand and so obtain some demand side resources during these periods. The larger customers could make a greater contribution to signal their reliability objectives because smart metering is less costly relative to consumption. The major cost is in designing new consumption facilities and retrofitting old plants to take advantage of a dynamic interaction with the electricity market. There can also be an education problem in large firms. They may not be aware of the potential to lower their total costs for little risk of disruption to production. The EUAA DSR Trial Report and DSR Case Studies Report (Refs 3 and 4, APPENDIX A) showed this to be the case and recommended corrective action to improve customer education and information. EUAA has undertaken some of this but with very limited resources. Some benefits have already been clear, such as in a greater take up of DSR by members, member participation in the NEMMCO Reserve Trader tender (to the extent that nearly all the 375 MW contracted came from EUAA members) and through the setting up of Energy Response as the first DSR aggregator in the NEM. A tighter reliability target which stimulates a more active demand side response would increase the top end participation in the market and thereby better signal reliability requirements on an economic basis.
34	What do stakeholders see as the role of DSR in terms of supply reliability outcomes?	DSR can improve supply/demand at the top of the market and improve the commercial viability of peaking plant by providing some head room in the market at higher marginal costs. Peaking plants not attached to a retailer would not need to induce prices near VoLL

	Question	Response
		to earn a return on their investment. It would enable customers to manage their own reliability requirements to a greater degree and lower their costs where extremely high reliability is not required. It would also deliver higher reliability to those services where it is required by making more of the load price responsive. In the absence of effective DSR, customers should be entitled to know the risk of disconnection due to the operation of load shedding facilities to cover for supply and demand side capacity shortages. The EUAA has previously argued for this exposure to be made transparent and for customers to be informed. It would be expected to improve reliability and reduce the costs to users as it would encourage greater knowledge and uptake of DSR and embedded generation and enhance risk mitigation by customers. Concerning networks, the benefits of embedded resources on a $/kWh avoided basis are greater when the market is exposed to short duration and infrequent peaks that are typical of extremely hot days. While we acknowledge that there may be some issues with how the system can ensure that such non-network alternatives will be available during times of system stress, more needs to be done to encourage a solution which will lead to an overall lower cost. The dependency of NSP revenue on network expansion, in large part because of the incentives in the current regulatory regime, is a significant impediment to the development of demand side response and embedded generation even though such development would almost certainly lead to lower overall cost. However, there are significant obstacles that non-network solutions encounter. This includes inadequate notice periods of potential opportunities to allow non-network solutions to be developed, a lack of information about opportunities, a lack of players with the ability to co-ordinate such options and a lack of end-user knowledge. Attention to all these issues is needed. However, it would be unfair and inappropriate for individual TNSPs to be left with the sole responsibility for this. Policy makers, regulators, retailers, customers,

	Question	Response
		aggregators and customer representatives all have a role to play. Measures such as the Demand Management fund in NSW aimed at providing NSPs with sharper incentives to peruse non-network options and aggregation providers may also be worth serious consideration provided they are well targeted, effective and well managed, which is by no means certain.
35	Are there operational or other changes that could be made to improve the effectiveness of the price mechanisms in terms of their impact on supply reliability outcomes?	Price spikes that are unrelated to supply/demand issues should not be reflected in market prices. The performance of ancillary services may be improved to this end to avoid 5 minute VoLL spikes that occur when overall supply/demand is adequate but perhaps unit commitment has failed to anticipate the change in demand.
36	How often should the price mechanism settings be reviewed and why?	When the reliability standard is re-optimised. The price setting mechanisms should relate to the customer load at risk, which is determined by the load shedding policies and the target reliability level. This might require a different VoLL in each region to be fully effective.
37	Are the triggers as currently specified appropriate? What additional triggers would be useful?	May need to change the price mechanism when new regions are formed to reflect reserve requirements in the new region having regard to interconnection constraints.
38	Does NEMMCO intervene in the market too often? Should intervention be seen as part of the 'normal' workings of the market, or should there be continued effort to treat intervention as exceptional and to expect the market to deliver investment sufficient to maintain reliability to the level of the reliability standard?	The Reserve Trader has been activated twice since the start of the NEM to secure additional supplies. There was another occurrence pre-NEM in Victoria, with additional capacity support sought in 1997. It is probable that at least some of the additional generation capacity made available would not have been had this mechanism not been activated in 1997. In 2006, 375MW of addition capacity was obtained in Victoria and South Australia mainly from the demand side and EUAA members. While the development of the demand side in providing reserve capacity is very positive, it is still in response to a regulatory intervention and opportunistic rather than part of the normal market. As a result of this regulatory intervention, the market is required to buy top-up capacity at a premium price ahead of time whether it is needed or not in real time. This

	Question	Response
		simply adds to the cost of energy through up-lifts in the market price (eg NEMMCO is know to have paid nearly $5 M for its contracts for reserves last summer). The ability to intervene also opens up the possibility of political intrusion if there is strong publicity of a potential electricity supply failure. Ministers could be panicked into taking action undermining the markets to the detriment of long term market stability. NEMMCO is at risk of intervening too often because the trigger level is the same at the target level. This does not reflect the uncertainty in estimating reliability levels. Intervention should only occur when projected reliability levels are beyond about the 80% percentile level having regard to uncertainty. The intervention level should have regard to the risk of adverse outcomes for customers where the VCR is greater than the VoLL. It would be preferable for capacity that would normally be considered as reserve capacity (smelter load, water pumping, cold storage loads and standby generators) to be made an integral part of the market, responding to price signals. The current NEM market, with a sub-optimal reliability standard is, however, not managed to provide a return on investment for such capacity. If the reliability standard were adjusted, it would in some ways force higher demand side participation, although some could be obtained through involuntary load shedding. It would be expected that this would soon lead to more priced based participation, as the value of that participation would then be more clearly observable in the NEM prices and volumes traded. If the reliability standard is not changed, then providing some form of longer term capacity payments may allow such resources to develop. The UK used to have a payment for reserve capacity based on the loss of load probability to compensate for capacity that was bid into the market but not dispatched. Other markets also reward capacity, including the P-J-M market and the newly formed WA market. These payments provide a return to investments that supplied reserves, which were unlikely to be dispatched but would nevertheless assist in improving system reliability. Before the NEM moved in this

	Question	Response
		direction there would need to be a detailed assessment of the impacts of such a change. However, in our view, this assessment should take place.
39	Does the reliability safety net remain an appropriate mechanism for managing against the risk of market failure? If yes, should NEMMCO's intervention powers be extended indefinitely or for a specific period of time and why? If no, what would constitute appropriate alternative measures?	The reliability safety net remains an effective mechanism, but the basis for intervention needs to be adjusted to make it exceptional rather than likely to happen even if the market is delivering target reliability. The mechanism should be extended indefinitely with a basis for intervention related to the level of uncertainty. It should be more than just one year ahead if the risk weighted criterion is not met. This would lower the cost of intervention and reduce its frequency. As mentioned elsewhere in this submission, measures to improve the operation of reliability around the market, including greater use of DSR and embedded generation would also facilitate lower reliance on the reliability safety net.
40	What considerations are relevant to determining the period of extension?	The period of extension would relate to the lead time to acquire reserve capacity resources, which could be up to four years if suitable sites and planning approvals are not sufficient to deliver the required capacity. The uncertainty in economic growth would define the required level to secure an acceptable unserved energy risk. The difference between the project pipeline and the supply gap would determine the time period over which NEMMCO might act as Reserve Trader.
41	Can the intervention mechanism or the Panel's guidelines be further improved?	Yes. Apply a risk margin depending on the time frame of application and the associated uncertainties in measurement and market assumptions.
42	Is the current approach to NEMMCO's operationalisation of the standard through the reserve margin thresholds appropriate? If no, what improvements are suggested to the framework and/or the methodologies	No. The current approach of targeting the expected unserved energy level as a basis for intervention is excessively conservative and a disincentive to demand side response for extreme conditions. If necessary, there could still be load shedding for 1-2 hours once in ten years if there is insufficient capacity and limited demand side response. This would be far more

	Question	Response
	and why?	economic than building excess capacity as has been done in Queensland, although we recognise that less than optimal reliability approaches in the NEM have contributed to the Government's response. Matters related to security should be separated from the reliability requirement but should be reflected in the resulting unserved energy analysis based on pre-contingent load shedding if necessary.
43	Should the Panel explicitly approve NEMMCO's reserve margin calculations or should the Panel undertake the calculations itself? What POE or POEs should they be expressed in relation to (for example, a 10 per cent, 50 per cent or weighted average?	It does not matter what the reference peak demand level is for defining reserves. However, for publication purposes, it would be more meaningful if it is related to the 50% POE as this is the level of peak demand usually observed. It would be more palatable in the public arena to present the reserve margin this way if the reserve above 10% POE were to be less than the largest unit.
44	Should the fuel issues and changing generation mix described above be factored into the reserve margin calculations? If yes, explain why and how?	Hydro yield at Snowy and in Tasmania will likely become a more important factor with global warming and the diversion of water away from the Snowy Scheme. Gas supply availability will become less of an issue as the gas markets become more interconnected. Sensitivity testing should form the basis of a decision as to whether modelling of uncertainties related to generation mix are material considerations.
45	Would the effectiveness of the reliability settings be improved by explicitly defining contingency, short term and/or medium term capacity reserve standards? If yes, how should they be determined?	Since the reliability target as an unserved energy is approximately uniformly distributed throughout the year, it may be useful to conduct an analysis at that level and evaluate what capacity levels are required to provide a benchmark for a "use as you go" unserved energy target. This might mean that reserves are progressively loosened if no outages occur in the first half of a year, or tightened if below target reliability has been achieved to date, as if the reliability target were a bank to draw upon or replenish. However, while this might seem intuitively sensible, it would inevitably lead to uneconomic responses to a

	Question	Response
		prior large unserved energy event in trying to force the remaining period to be outage free. The better approach is to always look forward and recognise that previous reliability levels are a sunk cost and do not affect the value of future reliability.
46	When should the Panel next review the effectiveness of the reliability settings as a whole and why? What form should that review take?	After the next round of capacity enhancements, particularly after Kogan Creek performance settles down in 2008/09, might be a useful time frame if there are no other imperatives. Reliability targets and risk margins should be re-optimised for prevailing reserve costs, VCR, supply mix and demand patterns. The current review should confirm the extent to which it will base the reliability target and its operational management on economic criteria, and permit the variation of the standard and cap according to the applicable NEM region and time.
47	Is there a clear case for implementing transitional arrangements if the current reliability settings are adjusted or changed? If yes, demonstrate why and what arrangements would be appropriate.	Transitional arrangements are unlikely to be needed because there is surplus generating capacity in the NEM that would provide for an enhanced standard in Queensland and allow the standard in the other regions to be relaxed. If there were to be a major increase in VoLL, which at this point we can see no reason for and would not support, then a stepped increase would allow parties and load to adjust their risk position and to secure demand side resources. Some extra time might be needed to secure adequate demand side response but this may not occur until the effects of any new arrangements are more visible in the market.

The following Table 2-2 provides an analysis of how the questions in the Issues paper relate to customer objectives and summarises a recommended approach to the reliability issues.

Table 2-2 The Relationship Between Customer Objectives and the Questions Raised in the Issues Paper

Customer Objectives	Related Market Objectives	Sources of Risk to Customer Objectives	Reliability Management Strategy	Relevant Questions	Suggested Approach
Minimum electricity prices with reasonable supply risk	Efficient dispatch and investment	Low prices will discourage timely investment until it is too late to respond and prices will spiral out of control (eg California 2001)	Reserve Trader contracts the necessary resources	1, 30a, 38, 39, 40, 41	Extend period of commitment to reserve trading with risk adjusted measures. Reduce the probability of intervention when the market is delivering optimal reliability. Enhance the longer-term application of intervention if risk adjusted reliability targets are not being matched with capacity in the planning pipeline.
Improved risk management of electricity supply and contracts	Demand side participation	Manages the risk of extreme peak demand not being met for high value loads.	Encourage demand side response	27, 28, 29, 33, 34, 42, 43	Encourage demand side response for infrequent reserve duty when it is much lower cost than reserve generating plant, which is usually the case.
Maximum supply reliability at reasonable cost	Reliable supply to customers	Rapid demand growth beyond development lead times.	Scenario analysis for demand forecast with allowance for uncertainty		Model the uncertainty in USE arising from changes in load growth, as well as other input uncertainties. Use the results to confirm that the development pipeline is sufficient to manage the risk of higher growth.

Customer Objectives	Related Market Objectives	Sources of Risk to Customer Objectives	Reliability Management Strategy	Relevant Questions	Suggested Approach
Maximum supply reliability at reasonable cost	Timely new capacity to ensure adequate reliability	Delayed new capacity	SOO defines the aggregate requirements with a risk adjustment (new policy)	25, 26, 46, 47	The SOO to show a composite capacity requirement covering growth and plant performance uncertainty versus time as the basis for new capacity being considered in the development pipeline. Review standards after major developments of generation or inter-regional transmission.
		Poor or variable generation plant performance	Monitor trends in forced outage rates by technology and plant age	30a	Model the uncertainty in USE arising from changes in forced outage and scheduled maintenance rates. Allow for wind regimes and forecast output.
		Poor network performance	Network performance standards		Network performance may be considered but it is not usually significant in terms of bulk system reliability. Constraints may be more important because of interactions with generation and demand.
		Unreliable fuel supply	Monitor fuel markets and possible constraints (water, gas , black coal)	44	Include a sensitivity study to fuel supply uncertainty. Incorporate variability of Tasmanian hydro and Snowy yield if significant.

Customer Objectives	Related Market Objectives	Sources of Risk to Customer Objectives	Reliability Management Strategy	Relevant Questions	Suggested Approach
Maximum supply reliability at reasonable cost	Timely new capacity to ensure adequate reliability	Inadequate VoLL discourages reserve capacity. High VoLL encourages exercise of market power	Review VoLL for consistency with reliability target and Single Market Objective	30b, 34	Highlight viable generation level for reserve requirements in the SOO and make the demand side requirement clear.
	Appropriate reliability standards	Excessive costs to meet uneconomic reliability standards are passed on to customers through an uncompetitive aggregated and vertically integrated electricity market structure	Ensure economic standards and dynamic demand side participation	1, 2, 3, 8, 10a, 10b, 12, 14, 21a, 21b, 41, 42, 43	Estimate the optimal level of bulk supply reliability based on customer load at risk and its value to each customer class. Separate the security from the reliability aspects. Model pre-contingent load shedding to meet security requirements in the unserved energy evaluation.
		Same standard across the whole NEM is inappropriate in some regions.	Adapt reliability standard to local regional conditions and prevailing supply/demand balance.	13, 14	Adapt the reliability standard to the regional conditions having regard to loading diversity with neighbouring regions.

Customer Objectives	Related Market Objectives	Sources of Risk to Customer Objectives	Reliability Management Strategy	Relevant Questions	Suggested Approach
Maximum supply reliability at reasonable cost	Appropriate reliability standards	Average unserved energy at average VCR does not adequately represent the risk to customers. It's more about extreme events.	Look at extremes of unserved energy as well as the expected value	11, 16, 17, 38	Examine not only the expected unserved energy but look at the asymmetry of risk and cap it to an acceptable probability, say 1 in 30 years commensurate with other extreme system risks.
		Customers can't secure the level of reliability they need because there is no physical delivery.	As much as possible, protect contracted customers from involuntary load shedding.	9, 20, 33, 34	Examine ways of protecting contracted loads where the counterparty is available. This would be a new market concept. High priority loads are already protected through the load shedding arrangements.
		Cost of customer interruptions not properly considered in setting standards	Periodic review of customer value of unserved energy related to those customers actually at risk during supply shortages	15	Market surveys. May be quite contentious if customers realised they were at risk! Exposure for each class of customer should be quantified so that individual customers can make alternative arrangements with back-up supply if the standard supply reliability is not adequate for their purposes.

Customer Objectives	Related Market Objectives	Sources of Risk to Customer Objectives	Reliability Management Strategy	Relevant Questions	Suggested Approach
Maximum supply reliability at reasonable cost	Appropriate reliability standards	Standard becomes out of date.	Establish triggers for review and sensitivity factors for fine adjustment over time	18	USE is proportional to cost of reserve capacity and inversely proportional to VCR.
	Definition of standard	Lack of clarity about scope of application and definition	Define the bulk transmission system and relevant generation sources.	19	Allocate the unserved energy according to the cause and the most economic mitigation strategy. Model the system accordingly.
		Lack of clarity about events covered by reliability standard	Define the cause of all unserved energy events arising from the bulk transmission system to give clarity on cause and effect.	22, 23, 24	Separate out the generation/ transmission related events arising from credible contingencies.
	Reliability safety net	Constant intervention by NEMMCO discourages independent and competitive investment	Provide margin for error before intervening (new policy)	4, 5	Estimate a margin for intervention based on the uncertainty in measurement and the risks to customers. This margin is expected to be equivalent to about 30% of the target unserved energy level and to result in a critical capacity level between 50 MW and 100 MW lower in the mainland NEM regions.

Customer Objectives	Related Market Objectives	Sources of Risk to Customer Objectives	Reliability Management Strategy	Relevant Questions	Suggested Approach
Understandable market place for energy.	Transparent regulation and pricing	Unpredictable changes in rules that affect the price of electricity and discourage investment in capacity	Thorough consultation process before making changes. Make changes infrequently or could consider simple formulae for automatic adjustments (eg VoLL with CPI, USE with reserve costs)	6, 7, 46, 47	Review the whole review process and clarify the priority of objectives. Establish trigger criteria for review related to major generation and transmission developments.

APPENDIX A REFERENCES

Table A- 1 Reference Documents

No	Document Title and Date	Source and Context	Relevant Elements
1	"Assessment of NEMMCO's 2001 Calculation of Reserve Margins", 10th September 2002	MMA report to Reliability Panel reviewing NEMMCO's methodology for reserve margin calculation and its application	Discussion of how a reserve margin should be calculated for the purpose of defining a basis for intervention.
3	"Estimation of the Economically Optimal Reliability Standard for the National Electricity Market", 16th June 2006	MMA Report to EUAA outlining a basis for an economic reliability standard	Basis for disparate standards for each NEM region. Tasmania was not considered due to lack of public information on hydrological and associated capacity risk.
3	"Trial of a Demand Side Response Facility for the National Electricity Market: Independent Consultant's Report", April 2004	Pareto Associates report for EUAA that (paper) trialled a demand side response facility for trading in the NEM.	Showed that significant demand side response would be available at about $1000/MWh bid price and that it would create market benefits.
4	"Demand Side Response in the National Electricity Market Case Studies", April 2005	Fraser Consulting Services report for EUAA.	Case studies to demonstrate to customers the value of demand side response. Up to 600 MW of demand is conservatively indicated as being available nationally.
5	"VoLL and the Cumulative Price Threshold in the National Electricity Market – the User Viewpoint', 13th February 2004	Bardak report for the EUAA.	Discussed the impact of VoLL on the exercise of market power and the effect on investment.