VoLL and the Cumulative Price Threshold in the National Electricity Market

— the User Viewpoint

Version 1 — In the form of a submission to the Reliability Panel of NECA

13th February 2004

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The Terms of Reference for Bardak, as approved by the Advocacy Panel were to provide the EUAA with the following services:

- Preparation of a submission to the Reliability Panel's current Review of VoLL and the Cumulative Price Threshold in the National Electricity Market (NEM);
- Advice, analysis and assessments on the above;
- Other related matters that arise as specified by the Executive Director and agreed with Bardak, particularly a supplement or revision/expansion of the submission in the above that can be used for broader advocacy to other relevant parties.

The views and opinions presented in the paper are those of the EUAA.

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Executive Summary

The Energy Users' Association of Australia (EUAA) has prepared this report as a contribution to the current consideration of the Value of Lost Load (VoLL) and the associated Cumulative Price Threshold (CPT) by the Reliability Panel of the National Electricity Code Administrator (NECA). It will be modified to serve also as a document which records the end-user view of these matters in the ongoing discussion of reforms to the National Electricity Market (NEM) and its institutions due to take place in the year 2004.

The EUAA is a non-profit organisation funded mainly by membership fees and focused entirely on energy issues. Members determine EUAA policy and direction. The EUAA represents a wide spectrum of end-users in all Australian States. It currently has some 70 members. The members are predominantly business users with activities across all states and many sectors of the economy. EUAA activities cover both national and state issues.

The Reliability Panel is required by the National Electricity Code to conduct an annual review and to report to NECA on the level of VoLL to apply in the year commencing on 1 July two years after the review is conducted. As part of that process, the Reliability Panel released an Issues Paper in December 2003[1], calling for comments.

This submission responds to the matters raised in that Issues Paper, but is also intended for a wider audience than the Reliability Panel, as the level of VoLL has implications extending well beyond the scope of the Reliability Panel review.

EUAA has previously expressed strong opinions on the related issues of the level of the VoLL and of the CPT.

In the year 2000, NECA proposed changes to the Code to raise the level of VOLL to $20,000/MWh from the previous level of $5,000/MWh. The EUGA (as the EUAA was then known) argued strongly against any increase in the level of VoLL and sought additional safeguards.[2] In particular, the EUGA was concerned about the scope that the Code provided for significant exercise of market abuse by incumbent generators and the influence this has on the behaviour of generator participants. EUGA also argued that raising the VoLL price cap would also massively increase the financial risks faced by contracted generators and uncontracted retailers, the price of which would, inevitably, be passed through to end-users.

Following consideration of the issues, the ACCC considered that the proposed VoLL Code changes:

> *"may involve significant public detriment, primarily due to:*
>
> - *the additional risk which a higher VoLL introduces to the market, which is not easily accommodated by market participants;*

[1] NECA Reliability Panel, "VOLL and the Cumulative Price Threshhold — Issues Paper", December 2003.

[2] EUAA, "VoLL Review — Response to Draft Determination, an end-user customer perspective", Submission to the ACCC, August 2000.

- *concerns over how generator market power may manifest itself with a higher level of VoLL; and*

- *the likelihood of higher prices across the NEM as a consequence of the proposed increase in VoLL."*

Since 2000, EUAA has not altered its fundamental objections to high levels of VoLL in the NEM and believes that the subsequent experience fully justifies the stance taken at that time. The key issues remain:

- the enhanced potential for market power abuse by generators, which increases the level of risk in the wholesale market, and

- the consequential flow on of higher prices born by end-users as both generators and retailer attempt to pass on the cost of risk mitigation measures to end use customers.

In this respect, the EUAA is both surprised and disappointed that these two issues, especially the latter one, are essentially ignored or casually dismissed in the NECA Issues Paper.[3]

This report makes the following major observations:

The need for a price cap

- EUAA supports the continuing existence of a price cap in the NEM, but argues that it should be set at a lower level than currently applies, for the reasons set out in the body of the report.

- VoLL in the present situation serves two purposes — the first of which being the true meaning of the Value of Lost Load (which should only apply when load is in fact, lost) and secondly as a price cap on generator bidding behaviour. It is time that the two functions were separated and the price cap set independent of the setting of VoLL and the term VoLL cease to be used to describe what is, in reality, a bidding price cap.

The absence of concern regarding generator market power and the cost of risk mitigation

- The EUAA is both surprised and disappointed that the three issues which provided the rationale for the ACCC's decision to adopt a value for VoLL of $10,000/MWh in 2000 (rather than the NECA recommended $20,000/MWh)— the enhanced ability for generators to exert market power, increased financial risk and inability to protect against that risk and the effect on end-user prices — are essentially ignored, or casually dismissed, in the NECA Issues Paper.

- Volatility in electricity prices is not in the interests of end-users of electricity; it is only of value to some electricity traders and certain parts of the supply side of the industry.

[3] It should be noted that the EUAA (and other user organizations) have sought to study these two effects, but have unfortunately not had the resources to do so. EUAA wishes to record that this has limited EUAA's ability to respond to the NECA Reliability Panel Issues Paper.

The effect of price caps on new investment

- Neither the NEM spot market nor the associated hedge contract market can provide reliable forward price estimates out to a time span sufficiently long for prospective generators to gain a reasonable assurance of their future levels of income.

- Price spikes unrelated to fundamental supply/demand conditions comprise a significant proportion of the annual average pool price. Investors cannot be sure that such practices will continue in the future and thus must discount the pool price expected in future years.

- EUAA is of the view that investors for new power plants would much prefer less volatile and more stable pool prices, especially ones not subject to artificial manipulation, rather than the present situation of susceptibility to episodes of extreme and unpredictable price spikes (some driven by the exercise of market power and bearing no relationship to tight capacity).

The measurement of pool price volatility

- EUAA does not agree that the new NECA measure purporting to represent pool price volatility is either correct or useful. The mere fact that it specifically excludes the highest and most volatile price excursions attests to that. EUAA does not object to NECA developing and using such a measure, but it is quite incorrect to describe as it as an indicator of pool price volatility. It is more a measure of volatility when the market is in a "normal condition" and has some limited value as that.

- A true and useful measure of price volatility up to VoLL needs to measure and record the financial effects of the extreme pricing events that have such a significant effect on pushing up average pool prices; which increases substantially the risk of operating in the NEM and causes significantly increased prices for end-users in some States.

- It follows from the above that EUAA does not agree with the use of the new NECA volatility index (as it has been used in the Issues Paper) to assess whether pool price volatility has increased or decreased since the change of VoLL in April 2002. Given the above, we strongly oppose its erroneous use for this purpose.

Price spikes unrelated to supply/demand balance

- EUAA has documented several aspects of generator bidding behaviour that show that many price spikes close to VoLL are not related to fundamental supply/demand conditions. Price spikes generated under these conditions do not signal any shortage of capacity — rather they are artificially created by generator bidding behaviour, and in particular, the practice of "economic withholding" of capacity.

- High levels of VoLL (as a price cap) increase the incentive to create price spikes (especially by generators possessing market power), make the generation of such price spikes easier to achieve and lower the number of occasions when they are needed in order to gain a given measure of average pool price increase.

The effect of the 2002 increase in VoLL

- The incidence of price spikes fell significantly following the increase in VoLL to $10,000/MWh in 2002, but the addition to the annual average pool price due to price spikes increased only slightly for the NEM as a whole — averaging over 20%, or almost $7/MWh. Separate analysis of the year 2002 shows that fully 27% of the annual average pool price was caused by price spikes above $250/MWh.

- The change of VoLL allowed the generators to achieve much the same increase in the annual average pool price with less than half the number of price spikes — with the price spikes being roughly doubled in value. This increased the financial risk of uncovered generators and retailers substantially.

- EUAA contends that the most important financial risk of operating in the NEM comes from these relatively unpredictable price spikes — especially when unrelated to tight supply/demand conditions — and that the Issues Paper has not paid anywhere near enough attention to them**.**

- The NEM trading system forces generators to bid prices higher than their SRMC — raising the problem that the same freedom to do this allows the generation of extremely high prices when conditions are favourable and when VoLL (as a price cap) is set to very high levels.

- These bidding practices, and the economic return available from them, are obviously facilitated by the adoption of a high value of VoLL (here referring to its use as a price cap).

- Some constraints exist on the ability of generators, even those possessing market power, to drive prices to high levels — including the high level of Government ownership and the ability of the Government-owned generators to achieve enviable financial returns even with average prices (contract plus pool plus ancillary services payments) as low as $34-35/MWh. To push the average pool price (and its related hedging contract prices) higher would invite criticism that the financial returns being made are excessive — especially compared to the returns being achieved by the major listed companies in Australia over the same period.

Effect of VoLL on the "effective wholesale price"

- EUAA is of the view that the levels of "effective contract price" seen in South Australia and Victoria — at times 60-80% above prevailing contract prices for a given year — are unacceptable to end-users. The (at times) excessive financial risk of operating in the NEM, due to price spikes and the high level of VoLL (as a price cap), has a major impact on this.

- Action needs to be taken urgently to lower the level of financial risk — and a reduction in the price cap is an essential part of this process.

Effect of VoLL on financial markets

- EUAA believes that a lower level of a price cap in the NEM would increase the liquidity of the financial contract market, with beneficial effects on the NEM itself and with lower prices to end-users.

Effect of VoLL on inter-regional trading of electricity

- The uncertainly in trading across inter-Regional interconnectors is a direct function of the price differential possible between regions. High levels of VoLL increase this differential possible and therefore inhibit interstate trading in electricity. This leads to higher prices for end-users.

Effect of VoLL on demand side response

- EUAA believes that, although there are still significant impediments to marshalling an effective level of demand side response in the NEM, only a relatively small amount of DSR (3-4% of load) will help to make the NEM price setting mechanism more acceptable to end-users.

- The limited amount of demand side response able to be identified by NEMMCO (just 290MW in the latest Statement of Opportunities) and the lack of any great change since VoLL was doubled in magnitude, shows evidence that other factors and impediments are more important than the level of VoLL (as a price cap) in encouraging a higher level of demand side response.

- Therefore the EUAA believes that a reduction in VoLL would not have a significant impact on the amount of DSR in the NEM. In fact, it might even stimulate some more DSR if it increased liquidity and trading options, for example, of if other changes were made to stimulate DSR (such as those identified in the EUAA's DSR Trial).

Use of capacity payments to reduce price volatility and risk levels

- EUAA favours further (independent) investigation of the introduction of straight forward and uncomplicated capacity payments — set at a level to cover the fixed costs of an efficiently constructed and operated open cycle gas turbine. This has some attractions compared to the complex and indirect proposals in the Issues Paper.

- This could involve capacity charges, properly implemented as discussed in the Report, together with a price cap set at $250-300/MWh, which would eliminate the extreme price spikes and most of the financial risk that is a characteristic of the NEM and causes participants to add high risk premiums to end-user prices. The need for $300/MWh cap contracts, which can cost in the range $8-15/MWh, would be eliminated, and generators would find less need to hold back capacity from the contract market to self-insure against unit outages.

- EUAA commends this straight forward approach to reducing the level of financial risk in the NEM to the Reliability Panel and to NECA for further consideration. The present review of VoLL should support the need for further examination of these matters as soon as possible, noting the relationship between them and the level of VoLL.

- EUAA also intends to press the Ministerial Council on Energy, NEM institutions, the ACCC and the individual Governments to address this issue and to evaluate its consequences in detail.

Overall conclusions

- There are no grounds to assert — as does the Issues Paper — that: *"a price cap of less than $10,000/MWh will put at risk the reliability of supply in the NEM, and there is some justification for a higher price cap"*.

- EUAA argues that there are no grounds on these two methodologies to justify a higher value of VoLL (correctly defined) or a price cap higher than presently applies — in fact a reduction in the price cap is warranted (at least down to its former level of $5,000/MWh, and possibly lower.

- The EUAA DSR Trial showed that end-users would bid a 'voluntary' price cap of around $1,000/MWh into the NEM and overseas experience suggests a price cap well below the old $5,000/MWh for VoLL.

- Consistent with this, EUAA wishes to see a low Cumulative Price Threshold set together with a lower level of price cap, on the basis that it reduces the level of financial risk to generators and retailers and thus prices to customers.

1. Introduction

The Energy Users' Association of Australia (EUAA) has prepared this report as a contribution to the current consideration of the Value of Lost Load (VoLL) and the associated Cumulative Price Threshold (CPT) by the Reliability Panel of the National Electricity Code Administrator (NECA) and also as a document which records the end-user view of these matters in the ongoing discussion of reforms to the National Electricity Market (NEM) and its institutions due to take place later in the year 2004.

The EUAA is a non-profit organisation funded mainly by membership fees and focused entirely on energy issues. Members determine EUAA policy and direction.

The EUAA represents a wide spectrum of end-users in all Australian States. It currently has some 70 members. The members are predominantly business users with activities across all states and many sectors of the economy. EUAA activities cover both national and state issues.

The Reliability Panel is required by the National Electricity Code to conduct an annual review and to report to NECA on the level of VoLL to apply in the year commencing on 1 July two years after the review is conducted. As part of that process, the Reliability Panel released an Issues Paper in December 2003.[4], calling for comments.

This report responds to the matters raised in that Issues Paper, but is also intended for a wider audience than the Reliability Panel, as the level of VoLL has implications extending well beyond the scope of the Reliability Panel review.

[4] NECA Reliability Panel, "VoLL and the Cumulative Price Threshold — Issues Paper", December 2003.

2. EUAA's Previous Views on the Level of VoLL

EUAA has previously expressed strong opinions on the related issues of the level of the VoLL and of the CPT.

In the year 2000, NECA proposed changes to the Code to raise the level of VoLL to $20,000/MWh from the previous level of $5,000/MWh. The ACCC initially agreed with the proposal in a Draft Determination, but faced with strong arguments raised against the increase by EUAA (then called the Energy Users Group of Australia, or EUGA), other end-user organisations, some retailers and some generators, in December 2000 the ACCC decided to set the level of VoLL to $10,000, and of the CPT to $150,000.[5]

The EUGA argued strongly against any increase in the level of VoLL and sought additional safeguards.[6] In particular, the EUGA was concerned about the scope that the market and Code provided for significant exercise of market abuse by incumbent generators and the influence this has on the behaviour of generator Participants. They stated that:

> *"Market abuse causes prices to rise to unreasonably high levels, primarily by withholding or withdrawing capacity and by re-bidding capacity in supply-constrained situations. The fact that this can occur within the rules of the Code is a major concern to end-users, as is the absence of any effective punitive measures to curb this behaviour."*

EUGA stated that:

> *"Raising the VoLL price cap and the CPT, as proposed by the ACCC in its Draft Determination, would provide an extended opportunity and increased incentive for existing generators to practice market abuse. This would impose unreasonably high costs on end-users before any new capacity could be brought on line, particularly as end-users could not implement effective demand side responses due to other Code, market, infrastructure and operational impediments".*[7]

EUGA also argued that

> *"raising the VoLL price cap would also massively increase the financial risks faced by contracted generators and uncontracted retailers that would, inevitably, be passed through to end-users* ***twice****. The increased risk means that generators will withhold some capacity to "self-insure" against plant failure (this "robs" the system of operating plant, increasing the need for higher cost reserve plant to be despatched, thus pushing up spot prices). In turn, retailers manage the risk either by hedging (at higher*

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5 ACCC, "Determination — VoLL, Capacity Mechanisms and Price Floor" December 2000.

6 EUAA, "VoLL Review — Response to Draft Determination, an end-user customer perspective", Submission to the ACCC, August 2000.

7 In the UK, OFGEM had noted that "[t]he scope for the manipulation of prices has artificially lowered demand-side elasticities and contributed to the reluctance that large customers have shown to participate actively in the market" (p 37, *Introduction of the market abuse condition into the licences of certain generators. Ofgem's second submission to the Competition Commission*, OFGEM, June 2000) … and that … "the manipulation of prices has meant that shorter-term price movements (seasonal, daily, hourly) do not always reflect the underlying variations in supply and demand" (p 38, *Op Cit*). Virtually the same point had been made by AGL in the ACCC's Pre-Decision Conference about generator behaviour in the SA Region.

cost because of higher spot prices) and these higher hedging costs are passed onto end-users, or they simply pass through higher spot prices to end-users. Thus, end-users pay for generator self-insurance through higher spot prices, plus the cost of hedging "insurance" cover that has to be taken out by retailers."

The EUGA recommended that the ACCC should:

- reject any increase in VoLL, because of its incentive to increase market abuse that would lead to economic damage to end-use customers (who are intended to be the key beneficiaries of the NEM) and other stakeholders (including retailers and potential new entrants). There are not sufficient offsetting public benefits for the ACCC to grant an authorisation to increase VoLL (or other components of the price cap mechanism).
- leave open the option of imposing a price cap at a level comparable to the current Administered Price Cap (i.e. less than $300/MWh) should market abuse or generator bidding behaviour impose unreasonably high costs on end-users.
- require that a "market abuse" condition is imposed on all generator Participants similar in intent and force to that recently imposed by OFGEM on UK generators;[8]
- require that every incident where generating plant "fit for service" is withheld or withdrawn be subject to prompt, independent, rigorous and fully effective monitoring and investigation;
- require that every incident where generator Participant bids are unreasonably high be subject to prompt, independent, rigorous and fully effective monitoring and investigation (any bid price above a reasonable short run marginal cost for any generator should be suspect and any bid price above a reasonable long run marginal cost for any generator should be a *prima facie* trigger for investigation); [9] and
- that a mechanism be developed for imposition of severe financial penalties on any Market Participant found to have breached the proposed market abuse conditions.

Following consideration of the issues, the ACCC considered that the proposed VoLL Code changes:

"may involve significant public detriment, primarily due to:

- the additional risk which a higher VoLL introduces to the market, which is not easily accommodated by market participants;
- concerns over how generator market power may manifest itself with a higher level of VoLL; and
- the likelihood of higher prices across the NEM as a consequence of the proposed increase in VoLL."

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[8] In its submissions to the UK Competition Commission, OFGEM made the point that market abuse of the type observed in the UK electricity market is not a feature of the market. Rather, market abuse is a feature of the commodity traded in the market (i.e. electricity) that will occur whatever market design is adopted. OFGEM also makes the point that penalty provisions of general competition law cannot contain these types of market abuse.

[9] Particularly since generators (including rarely used peak load plants) have an option of recovering fixed and variable costs through forward contracts with retailers. This means they should not "need" to bid unreasonably high prices unless exceptional market conditions prevail (i.e. extremely high levels of demand).

The Commission also proposed further conditions of authorisation requiring more stringent market monitoring measures in the NEM to address concerns that a higher level of VoLL could translate to higher energy prices across the NEM given the current concerns about generator market power.

Thus the ACCC Final Determination on the matter acknowledged the EUGA concerns — but went only part of the way towards addressing them.

Since 2000, EUAA has not altered its fundamental objections to high levels of VoLL in the NEM and believes that the subsequent experience fully justifies the stance taken at that time. The key issues remain:

- the enhanced potential for market power abuse by generators, which increases the level of risk in the wholesale market, and

- the consequential flow on of higher prices born by end-users as both generators and retailers attempt to pass on the cost of risk mitigation measures to end use customers.

Indeed, what the EUAA (and most of the Market Monitoring Units of overseas competitive markets) would regard as abuse of market power – driving prices to high levels unrelated to demand or cost factors – is dismissed and defended in the Issues Paper as "legitimate profit-maximising strategy" of generators — a phrase used several times.[10]

The EUAA understands the need for any commercial operation to make a profit and pursue a "legitimate profit-maximising strategy". However, when this is done through market power abuse, there is a need for a strong policy or regulatory response that disciplines market power. It is our view that this was not done effectively at the last VoLL review and that end users bear the costs of this.

[10] This attitude to these two issues is strongly reminiscent of the problems in North America caused by the stance taken by Enron Corporation. After vigorously advocating deregulation of the electricity industry in the USA, Enron (and others) proceeded to use their newfound freedom to exploit the new markets in an unprincipled and illegal manner, bringing the whole concept of deregulation and energy trading into disrepute, and inflicting great harm on end-users in several American States.

Swartz and Watkins (M Swartz, S Watkins, "Power Failure — The Rise and Fall of Enron", Aurum Press, 2003), in their excellent description of the rise and fall of Enron, make several pertinent points regarding the Enron strategy. Importantly,

> "Whatever Enron and its competitors promised about deregulation — lower prices, freedom of choice, et cetera — ***they found that they needed volatility, not stability,*** to make money. In a stable market, no one worried about their power supply, because the lights always came on and the air conditioner always worked. ***(Our emphasis)***
>
> But if the supply was questionable, customers get anxious, and if the supply dwindled, they became willing to pay any price to keep their homes and businesses running smoothly." (p. 239)

3. When VoLL is not VoLL

What is called VoLL in the NEM (Value of Lost Load) is a form of doublespeak, in that the term is incorrectly used to refer to the bid price cap applying in that market. Generators are allowed to lodge and change bids up to the price cap, even though continuity of electricity supply is not in danger.

In theory, the real Value of Lost Load, if able to be determined, should only apply when load shedding is imminent or actually taking place.[11] EUAA argues that it is not inconsistent to have a Value of Lost Load (precisely defined) operating in the relevant parts of the Code, while having a quite separate price cap applying to generator bid prices. The aim of the latter would be to provide a "safety net" limit on price spikes, a limit on the abuse of market power by generators and a means of reducing the level of price volatility to more reasonable levels.

Unless there is significant demand-side response (indicated by short term elasticity of demand versus price), theory also tells us that the pool price in an energy-only compulsory market, as applies in the NEM, can reach extreme levels — in fact, infinity if elasticity is zero.

EUAA supports the continuing existence of a price cap in the NEM, for these fundamental reasons, but argues that it should be set at a lower level than currently applies, as is set out in the remainder of the report.

The setting of a "safety net" price cap is a common feature of overseas competitive markets, a fact only partly made clear in the Appendix to the Reliability Panel Issues Paper. In North America, the price cap is most often set at $US1,000/MWh (approx $A1,500/MWh at current exchange rates). In these and other markets, which are not compulsory, and rely on bilateral contracts with optional power exchanges and a balancing market, price caps in the balancing market (the only market not subject to direct or indirect supplier/customer agreed prices) are optional. Such a balancing market will normally only cover 2-3% of traded energy. Occasional price spikes in such a small portion of the market do not have a significant effect on the overall price being paid for electricity.

In New Zealand, which is not well covered in the Appendix to the Reliability Panel Issues Paper, the newly formed Electricity Commission has greater powers than are described in the Appendix and their ability to require actions of both generators and retailers to enter into longer term contracts, and especially the ability to construct peaking plant to be offered to the market in times of shortage, effectively places a price cap on the pool price. The option of requiring generators and retailers to have a minimum contract position has also been raised in relation to the NEM by some commentators.

[11] The process used to estimate VoLL (or Value of Unserved Energy in Vic) does not estimate a true value when load is lost. It might be able to realistically estimate the perception of representative groups of consumers to loss of supply. But even then the methodology only "proves" that different consumers have different perceptions on this issue. The "value" of output by this methodology purports to be a volume-weighted dollar value of loss of supply, but the robustness of this value is entirely dependent on the quality of consumer responses to a "social research" questionnaire that has never been subject to independent review or detailed comment by end-users. In fact the previous EUGA submission on VoLL referred to earlier obtained comments from an expert market researcher who found a number of fundamental flaws in the survey.

In the case of Western Australia, also not well covered in the Appendix, one of the stated aims of their wholesale market design is to: [12]

- ensure that adequate new capacity enters the market, and
- to maintain capacity ***without requiring energy price volatility (our emphasis)***

EUAA is understandably pleased that Western Australia proposes to address the problems associated with excessive scope for market power abuse and the associated deleterious price spikes and volatility, concerns expressed by end-users of electricity in that State, even if the proposed structure of generation in Western Australia is fatally flawed.

We wish that the same understanding of these problems existed in the NEM institutions.

Having separated the issue of a price cap from the correct use of the term Value of Lost Load, EUAA wishes to repeat is grave concerns over the accuracy of the estimates of VoLL, which appear to be willingly accepted by NECA and the Reliability Panel.

The requested $20,000/MWh figure put forward by NECA to the ACCC in the year 2000, rested heavily on a study conducted by Monash University for VPX (the former Victorian Power Exchange). In the submission made by EUGA to the ACCC, we stated:

> *"The EUGA is also concerned that the higher VoLL figures originating in the fatally flawed study conducted by Monash University for VPX appear to have gained currency and have influenced arguments that higher price caps are acceptable to end-users. This submission demonstrates that this study is fatally flawed by extremely poor quality data (that produces non-sensible and erroneous results). Even if the data obtained by Monash was relevant and a reliable indication of actual costs incurred by customers due to interruption in electricity supply, the methodology used in the analysis is not likely to assist in establishing a NEM price cap or a surrogate demand side bid. These comments are made in the full knowledge that NECA has apparently accepted arguments put by Ergon Energy that the methodology is flawed[13] and has also rejected the use of a single aggregate value [for VoLL] as an economic concept. However, the comments are still relevant to the ACCC's deliberations because, despite the fundamental and fatal flaws in the Monash study, NECA has still:*
>
> - *retained use of the concept that VoLL, for at least some classes of customer[14], is much higher than the figure of $20,000/MWh it proposed for use as a price cap**;** and*
> - *has used only the Monash study as a reference for such a high figure."*

In a recent study for the Queensland Competition Authority, Meyrick and Associates, in association with the Pacific Economics Group, summarised both the various Australian studies and overseas

[12] Taken from the "Aims and Objectives" slide of a recent presentation on the Detailed Market Design Rules in Western Australia.

[13] p 10, Reliability Panel Final Report, *Review of VoLL in the national electricity market, Report and recommendations*, NECA, July 1999.

[14] The Monash report used the term "customer sector" in reference to the Victorian or Australian "population" of customers in classes of Residential, Agricultural, Commercial, Industrial and Major (customers employing more than 200 people).

studies of VoLL.[15] The summary illustrates once again how widely estimates of VoLL for various classes of consumer can vary, no doubt in part due to the flaws in survey techniques like those identified by EUAA in the Monash study. Meyick/PEG comment, rather conservatively, that:

'Broadly speaking, the Vencorp and Monash studies fall at the high end of the overseas estimates"

which would seem to be a considerable understatement after examination of the data provided in Appendix 2 of their report.

EUAA notes that the NECA Reliability Panel Issues Paper records a range of $6,000/MWh to $30,200/MWh in the 6 Australia studies it reviewed. There is thus no magic, and very little science in selecting a value for VoLL.

The other argument used to support high levels of VoLL (now referring to its use as a price cap) is the need for open-cycle gas turbines to be able to recover their fixed costs over a very small number of operating hours (just 5 hours a year is used in the example on page 30 of the NECA Reliability Panel Issues Paper). The Reliability Panel used this approach in 1999 to calculate a price cap of $8,694-12,946/MWh. The latest Issues Paper implies that these costs have probably gone up.

This approach is critically dependent on the assumed number of operating hours per year for such a gas turbine. The following graph illustrates the sensitivity of this calculation to the number of operating hours of a modern open-cycle gas turbine (OCGT).[16] Increasing the number of operating hours dramatically reduces the price needed to recover fixed costs (capital charges plus operations and maintenance). Remember also that even 90 hours per year of operation corresponds to only a 1% capacity factor, which is very low indeed — 5 hours seems an unreasonably low assumption.

EUAA therefore argues that there are no grounds based on these two methodologies, to justify a higher value of VoLL (correctly defined) or a price cap higher than presently applies — in fact a reduction in VoLL is indicated. We examine other reasons put forward for a high value of VoLL in later parts of this report.

There are certainly no grounds to assert, as does the Issues Paper, that:

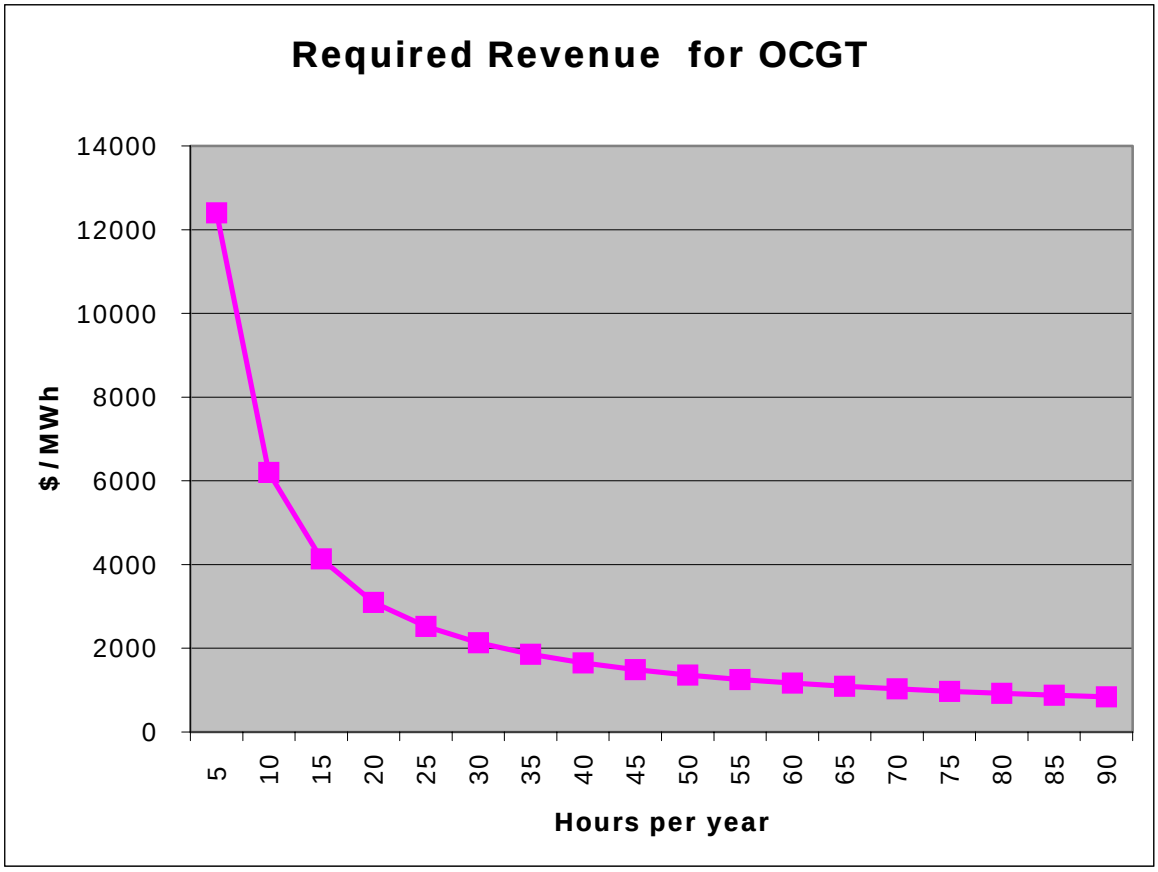
" a price cap of less than $10,000/MWh will put at risk the reliability of supply in the NEM, and there is some justification for a higher price cap".[17]

The EUAA emphatically rejects this unjustified assertion.

[15] Meyrick and Associates/Pacific Economics Group, "Development of an Electricity Distribution Service Quality Regime", A report to the Queensland Competition Authority, August 2003.

[16] Based on a Specific Capital Cost of $500/kW, a 30 year life and a 9% real pre-tax rate of return, with reasonable assumptions for operations and maintenance costs, losses and other parameters.

[17] Issues Paper, page 30.


Required Revenue for OCGT
14000
12000
10000
8000
6000
4000
2000
0
$ / MWh
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
Hours per year

4. High Levels of Price Caps and Investment in New Generation

NECA and the Reliability Panel assert that:

> *"spot market prices are vital for signalling the need for new investment, which in turn ensures reliability"*[18]

This assertion justifies some discussion.

The statement may have some validity were it related to future spot market prices, rather than current spot prices. High current spot prices will have the effect of encouraging the operation and/or return to service of plant which presently exists. These may be mothballed units, which are difficult to operate because of fuel problems etc, — essentially capacity which can be made available in the short term by being enticed to re-enter service to take advantage of the high spot prices.

But high spot prices come far too late to indicate the need for new generation at a future time — generation investment should have been committed several years prior to the period of high spot prices. And indeed, if the high spot prices are caused by a fundamental shortage of supply (rather than artificially caused), then end-users will be faced with several years of high prices while new plants are rushed into service. The recent experience with new gas turbine plant shows that two to three years or more of high prices may be expected before significant quantities of new generation can be brought into reliable service.

Moreover, investors might consider past price trends in their assessment of the need for new peaking plant but they will be influenced by a combination of a sustained period of capacity shortages (high peak prices), underlying conditions in the market and the prospect of high prices in future.

On the other hand, if the high spot prices are caused by artificially induced price spikes — as has been the case in the NEM from time-to-time — a new investor has to make a judgement as to whether the conditions leading to such artificial price spikes will continue to exist into the future. Such artificial price spikes — which contain a high proportion of the annual average spot price (as we shall discuss later) — can be just as easily taken away if incumbent generators with market power wish to deter new competitors.

For new investment, therefore, present high spot prices are not much help in indicating whether they will continue to apply several years out into the future. An owner contemplating a new investment in a power plant is faced with a lead time before the new plant enters operation (typically 18 months to two years for a simple open-cycle gas turbine and 5 years or more for a large coal fired station) and is keenly interested in the revenue that can be captured in the first five years or so of operation, when debt burdens need to be reduced.

Thus it is the expectation of spot price (and associated contract prices) up to 5-10 years out which will be the major factor determining whether a large investment is made or not.

[18] Issues Paper, page 1.

The situation is somewhat different for a retailer suffering from high short term spot prices. A retailer willing to do so may well seek to rush in open-cycle gas turbines to seek to capture some of the high prices and/or use the capacity to moderate the spot prices that would otherwise occur. This has been evident in the case of the Somerton, Hallett and Quarantine power stations rushed into service as a result of the very high spot prices seen in the hot summer of 2001.[19]

But when a large investment in base or intermediate load factor plant is required, with its more difficult siting requirements and much longer lead times, even a retailer is placed in the situation of wanting good estimates of forward prices 7-10 years out.

Neither the NEM spot market nor the associated hedge contract market can provide reliable forward price estimates that far out in time. The financial hedge market in Australia remains quite thin and illiquid and is essentially short term in nature — 3 years or so is all that can be reasonably relied upon.[20] EUAA has observed that prices in future years are usually little more than projections of current averaged spot prices, for example, rather than robust forward projections of the actual prices which will apply.[21]

EUAA is of the view that investors for new power plants would much prefer less volatile and more stable pool prices, particularly ones not subject to artificial manipulation, rather than the present situation. This view has been reinforced by discussions with members who regularly contract for electricity and who may be potential investors in new power plants.

[19] We note that only Quarantine managed to begin service before the following summer and the other plants took a full additional year to be fully commissioned.

[20] See the Parer Panel Report to COAG and in particular, the survey conducted b y KPMG referenced in the report.

[21] This observations is confirmed by discussions with EUAA members who regularly contract for electricity.

5. Measuring Volatility

A comment is also necessary on the issue of measuring pool price volatility.

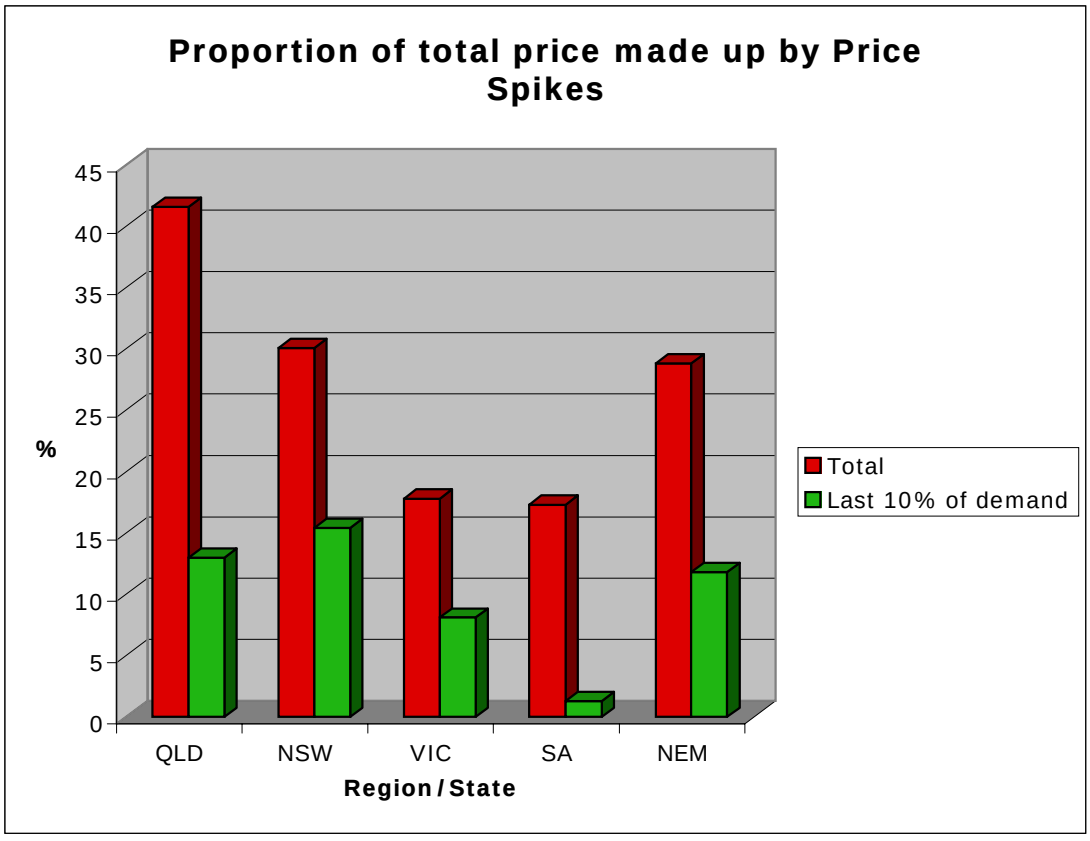
The NEM is characterised by a small number of very high price spikes. If we assume an average pool price of $30/MWh, the current price cap is set at 333 times the average pool price. This is an extraordinary range compared to that allowed in any other overseas competitive markets. It would not matter so much if the price cap (or prices near that cap) rarely occurred, but this is not the case with the price spikes in the NEM.

Price spikes greater than $250/MWh — a figure selected as the highest marginal fuel cost experienced in the NEM, on the basis that in a workably competitive market the spot price should not rise above this level — occur very infrequently, but when they do occur, they have a very great impact on the annual average pool price.

As a rule of thumb, a one hour price spike to $10,000/MWh raises the annual average pool price by $10000/8760= $1.14/MWh. Just ten such spikes raise the annual average price by $10.40/MWh. And yet only 0.11% of the hours in the year are involved!

This sort of outcome will eventually find its way into retail contracts and increase the retail prices paid by end-users, either directly or through higher risk premiums being sought by retailers.

EUAA has had access to a full analysis of the effect of price spikes on average pool prices for the 2002 year. It is shown below.



In that year, for the NEM as a whole, fully 27% of the annual average pool price was composed of price spikes above $250/MWh. But only some 250 trading intervals were involved, meaning 125 hours or 1.4% of the total hours in the year. Only 10% of the annual pool price was caused by price spikes when demand was within 10% of the system peak for the year.

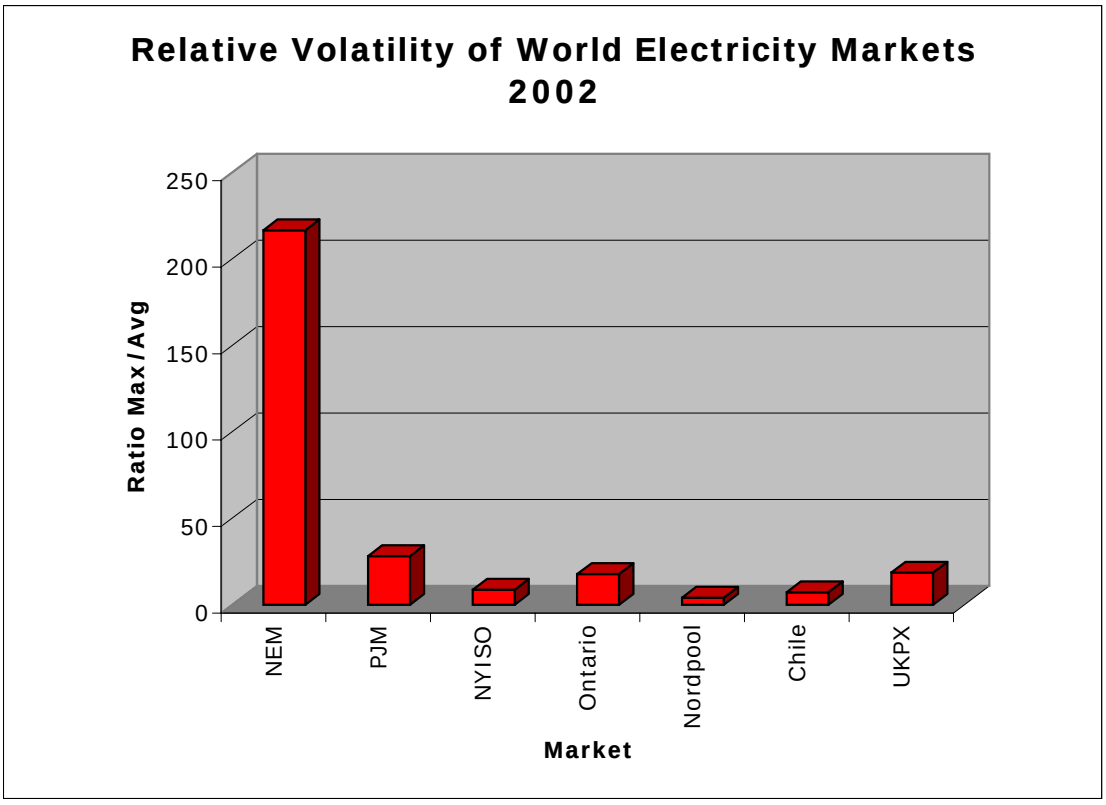
NECA has recently adopted a measure of pool price volatility. This fails to recognise the major impact that such a small number of price spikes has on the annual average pool price. It takes only the central 75% range of pool prices and divides by the mean price. Extremes of price are excluded.

This means that the price spikes such as those that caused 27% of the annual pool price in 2002, are excluded, by definition.

EUAA does not object to NECA developing and using such a measure, but it is quite incorrect to describe as it as a general indicator of pool price volatility. It is more a measure on volatility when the market is in a "normal condition" and has limited value as that. A more important test of the market for end users is how it performs under stressed conditions, for example, when prices reach very high levels, when VoLL is reached or is about to be.

NECA's index of volatility therefore needs to be supplemented by a measure which records the financial effects of the extreme pricing events that have so much effect on average pool prices, which create so much of the risk of operating in the NEM and which cause so much of the increased prices being seen by end-users in some of the states.

The graph below compares the ratio of the highest pool price experienced with the average pool price for the major competitive markets in the world. This is a simple measure of volatility under the extreme conditions across different markets.



The Australian NEM has by far the highest ratio of highest/average pool price of any of the major competitive markets.

And yet, markets such as PJM or Nordpool or even the English market, are not suffering from a lack of investment in new generation, nor do they have to include in their prices, risk premiums of the order of those required in Australia.[22]

These facts raise some issues that need to be taken into account by the Reliability Panel:

- How much volatility (as measured by the highest price to the average price) is needed to encourage new investment and demand side response and to signal shortages of supply? Overseas experience shows that it is much lower than that applying in Australia and supported by NECA reliability Panel in the Issues Paper.

- NECA should make clear that its measure of volatility is a partial not a full measure. Its use needs to be strongly qualified to make it clear that extreme pricing events, which can have a significant effect on average pool prices and flow through into customers' contracts, have been excluded.

- A new volatility measure is required which reflects the level of financial risk associated with trading in the NEM, and this measure must include the infrequent but important, price spikes.

It follows from this discussion that EUAA does not agree with the use of the NECA volatility index (as it has been used in the Issues Paper) to assess whether pool price volatility has increased or decreased since the change of VoLL in April 2002.

This matter is examined further in the next section.

[22] In fact, in a presentation to the EUAA's Annual Conference, 2003, Ken Laughlin, Vice President, PJM remarked that new capacity in PJM was abundant.

6. Effect of the Increase in VoLL in 2002

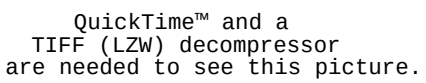
The increase in VoLL implemented on the 1st April 2002 led to an immediate change in the bidding patterns of the generators.

Prior to March 2002, generators had developed the technique of "parking" capacity that they did not expect to be dispatched, in price bands close to the then-allowed price cap of $5,000/MWh. This is illustrated by the following graph, extracted from the NECA Weekly Report for the week 17th to 23rd March. NSW is shown below, but the actual weekly reports show the bidding behaviour for all of the States. Similar practices are followed in all of the States.

At times, capacity equivalent to over 30% of the peak load was being "parked" near to the highest allowable price.

With this strategy, if load forecasts are low, or if a large unit trips, it is very likely that NEMMCo will be forced to dispatch capacity being bid at prices near VoLL — despite the fact that the supply system is not under stress and reserve margins are adequate.[23] In this week, NSW would have had over 3,000MW of spare capacity available (including capacity able to be drawn from Snowy).

This practice is called "economic withholding" of capacity and is banned in most overseas markets. It is akin to cocking a gun and just waiting for circumstances where it can be fired to generate a price spike.



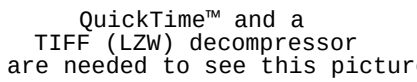
[23] Unless significant last minute rebidding of capacity into lower price bands takes place.

Following the increase in the price cap to $10,000/MWh, the generators followed a similar strategy, but this time the capacity unlikely to be dispatched was "parked" at prices close to the new price cap — typically in the band greater than $9,000/MWh.

This behaviour began almost immediately, but is illustrated well by showing the bidding pattern for the same week in 2003. This is shown below, again for NSW.

At times 20% or more of capacity was being "parked" at prices in excess of $9,000/MWh, waiting to be called up in the event of trouble.

Obviously, given this consistent pattern of bidding behaviour by all generators, it becomes easy to generate price spikes near the price cap level by withdrawing capacity. Using NSW as the example, such events occurred during the May/June winter peak period over the last two years, when a sequence of large price spikes were created by the NSW generators withdrawing capacity being bid at lower prices and replacing at the higher price level.[24]



[24] It should be noted that the existence to the Electricity Tariff Equalisation Fund (ETEF) provides a further significant incentive for generators to do this, especially when there is a large surplus siting in the fund. In May-June 2002, NSW generators entered into a regular daily practice of using a combination or economic withholding type practices and higher VoLL to draw down the ETEF by over $300 million in the period before dividends were due to be paid to the NSW Government. This is documented in the Parer Report. The practice effectively uses funds accumulated in the fund and paid for by NSW consumers to increase the revenue of the NSW Government. The following year they attempted the same tactic with only slightly less success.

An example of this is shown for three days towards the end of June in 2002. Price spikes were generated each day, with the maximum price exceeding $8,000/MWh on the last of these days. The withdrawal of capacity at the time of the system peak is obvious.[25]

Compared to the level of output that would normally be expected over this period, almost 2000MW of capacity, or almost 20% of the capacity being operated on that day, was subject to economic withdrawal.

This pattern of bidding behaviour was apparent during the May-June period of 2002, and over a six week period, raised the average pool price for that year from $27/MWh to over $41/MWh — an increase of over $14/MWh.[26]

But the peak loads being experienced over this period were well below the expected peak load for the year, and with some 16,000MW of capacity available to NSW in that year, supply reliability was not an issue.

In this case, as with many others, price spikes were not signalling any shortage of capacity — rather they were being artificially created by generator bidding behaviour, and in particular, the practice of "economic withholding" of capacity.

There is an example of "economic withholding" of capacity in the Issues Paper.

On page 43, the situation in Queensland in the week including December 4th 2002 is described and illustrated. The Issues Paper states "supply was stretched to the limit" on many occasions during that week, and the pool price reached $10,000/MWh on the 4th December.

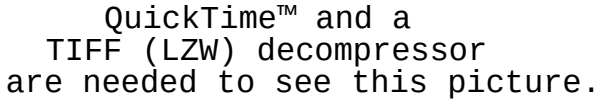
But the graph and the text illustrate the fact that "there was, in fact, sufficient reserve capacity at all times".

One cannot have "supply stretched to the limit" when reserve capacity exceeded 14% of demand (of the order of 1000MW was in reserve) at all times during the day!

While the Issues Paper used this week to illustrate the workings of the CPM, the example chosen shows another price spike artificially created by generator bidding behaviour, and again, due to the practice of "economic withholding" of capacity.

[25] By "withdrawal" here we mean "economic withdrawal" of capacity. This was achieved by rebidding the capacity "withdrawn" to the $9,000/MWh and above capacity bands.

[26] There has been an example of the same behaviour in the past week. *Electricity Week* described the incident: "In an example, five NSW State-owned generators collectively reduced output at peak by a continued deficit of approximately 1,250MW at the 12:20-14:30 period of peak demand on 7 February. NSW was the only region demonstrating the behavior last week. The five were Bayswater, Eraring, Mt Piper, Vales Point and Wallerawang. Liddell did not reduce capacity at peak and maintained a steady output. … Data at www.erisk.net for the past week compared to the same week at the start of the NEM appears to show that large NSW generators have learned to artificially set high prices at times of shortage. The behavior does not appear in 1999 bid patterns.

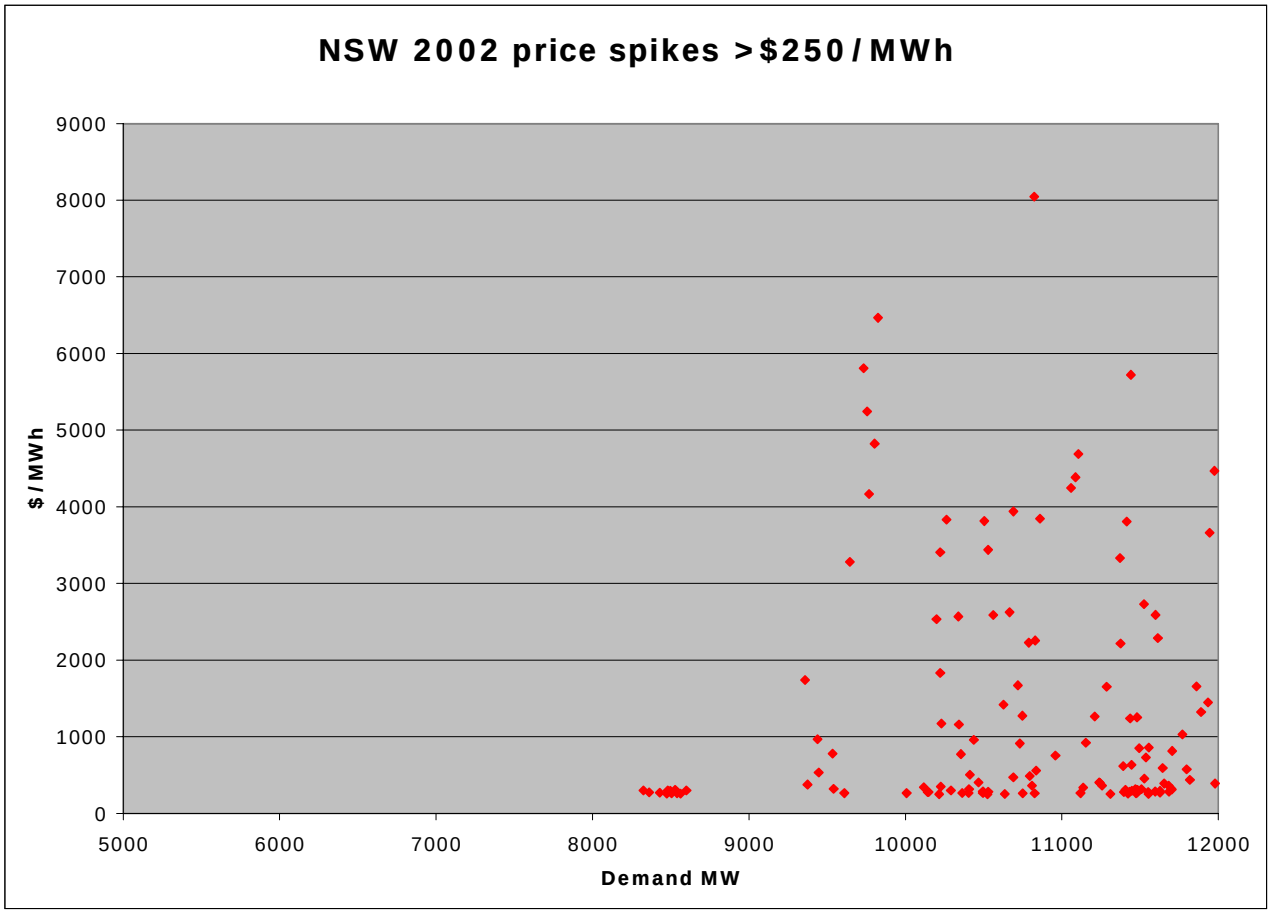


This concern of the EUAA can be illustrated by plotting the price spikes in a year against the peak load. Remaining with NSW as our example, the following graph shows the incidence of price spikes in the calendar year 2002, scaled so that the demand scale runs from the minimum demand to the maximum demand for that year.

While there is some weak correlation with demand, the majority of the price spikes occurred in the range down to 80% of the peak demand, with the highest pool price experienced at 91% of the peak demand. It must also be remembered that NSW normally has available some 16,000MW of capacity (own capacity plus interconnections), and at no time during this year can supply have been "stretched to the limit". The price spikes were artificially created by generator bidding behaviour, using the practice of "economic withholding" of capacity.

The following two graphs show a comparison between the years 2001 (when VoLL was set at $5,000/MWh) and 2003 ((when VoLL was set at $10,000/MWh). The individual State circumstances are shown on the graphs as well and the NEM totals.

The first graph shows the number of price spikes above $250/MWh in the two years, and the second shows the addition to the annual average pool price caused by these price spikes.



The incidence of price spikes fell significantly, but the addition to the annual average pool price increased slightly for the NEM as a whole — averaging over 20%, or almost $7/MWh. Separate analysis of the year 2002, available to the EUAA, shows that 27% of the annual average pool price was comprised of price spikes above $250/MWh. This was the year when the level of VoLL changed from $5,000 to $10,000/MWh.

Thus the change of VoLL has allowed the generators to achieve much the same increase in the annual average pool price with less than half the number of price spikes — with the price spikes being able to be doubled in value.

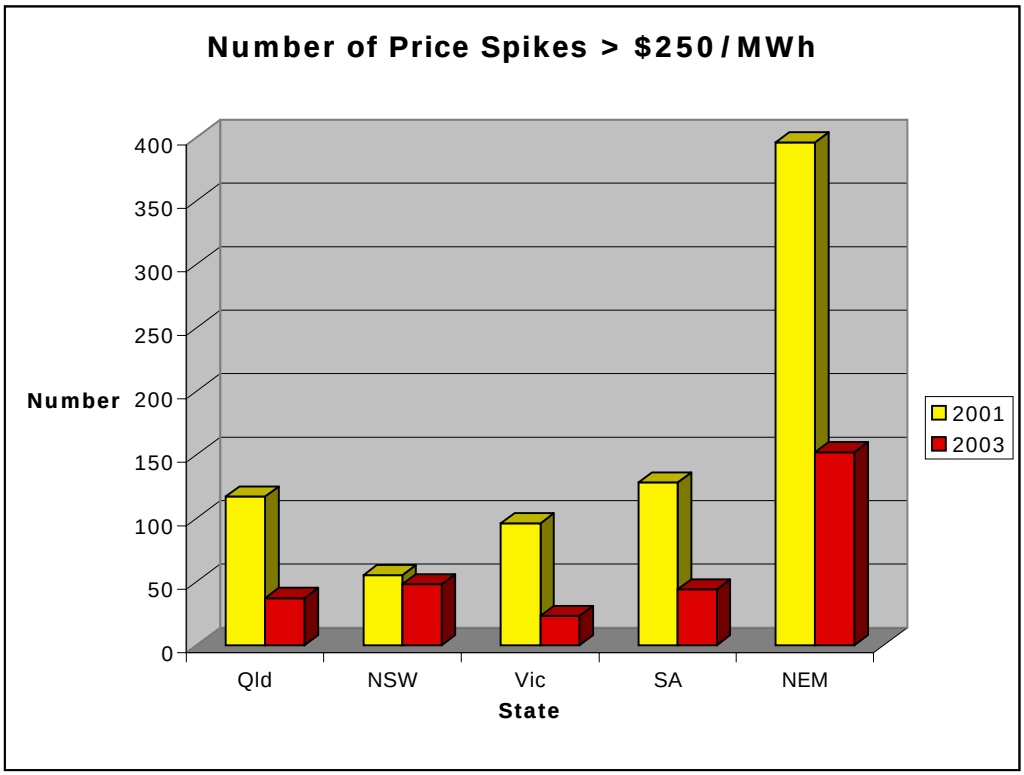
While adding significantly to the annual average pool prices, the price spikes in 2003 occurred during only 150 trading intervals, or just 0.86% of the time.

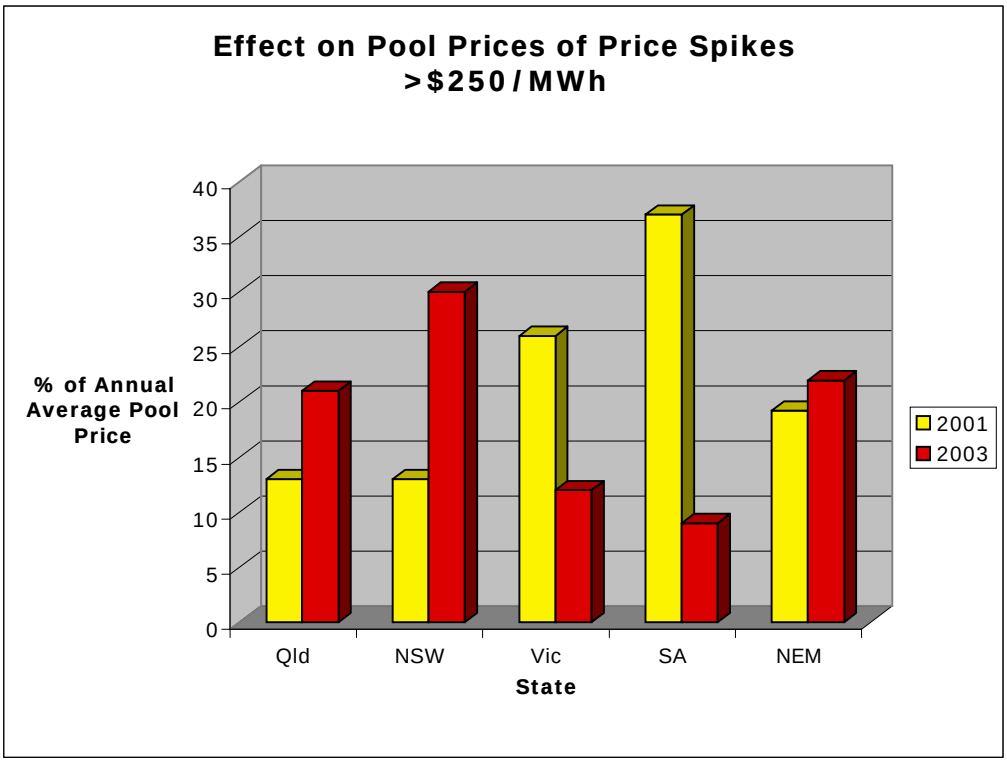
EUAA warned that a significantly higher VoLL would give generators with market power far more incentive to use it. It also means that they can use it less frequently for the same impact as this analysis shows.

EUAA contends that the most important financial risk of operating in the NEM comes from these relatively unpredictable price spikes — quite unrelated to tight supply/demand conditions — and that NECA and the Reliability Panel need to examine this situation more carefully, including in this present review of VoLL.

Certainly NECA's new measure of pool price volatility fails to capture the effect of these events – having defined them out of the calculations. Any reasonable measure of pool price volatility of use

to the market and end-users must capture the large economic cost of the price spikes occurring for less than 1% of the time. We repeat again that these episodes, although making up only a small proportion of the trading times in the NEM, have a significant impact of spot prices and market risk, eventually flowing through to end-users.





7. Generator Behaviour, Volatility and Risk

In the submission made to the ACCC in 2000, the EUGA was concerned about the scope that the market and Code provided for significant exercise of market abuse by incumbent generators and the influence this has on the behaviour of generator participants. EUAA remains concerned about this matter.

It is therefore useful to analyse the incentives that are placed before a generator in a NEM-style trading system, and how they tend to respond to these incentives, before looking at the effect of high levels of VoLL (as a price cap).

EUAA does not imply here that the generators act in any way illegally, but we assume that they always remain within the authorised rules of the NEC. However, we also assume that they will seek to maximise profits (as is their commercial right) and respond to whatever legal incentives they have to assist them to do so.

Given the absence of any specific payment for capacity in the NEM trading system (a matter dealt with later in this report), generators must bid at levels above their SRMC to be able to gain contributions towards covering their fixed costs.

The issue is — given that they have this freedom under the rules — what prevents them from continuing to raise pool prices well above the levels needed to cover their fixed costs?

Vigorously competitive conditions would require generators to bid at levels that were close to their Short Run Marginal Cost (SRMC), since this can readily be shown to maximise their profit under these conditions. This behaviour is seen for much of the time in the NEM. Both observation of resulting pool prices and modelling shows that bidding at SRMC with the current plant mix in Australia will not produce enough revenue to cover the cost of a new entrant in any of the Regions. SRMC bidding results in average pool price of the order of $25/MWh, when the Long Run Marginal Cost (LRMC) is of the order of $33-35/MWh,[27]

The fact that the actual pool prices resulting from the competitive bidding pattern are so far below LRMC estimates is primarily due to the fact that the mix of plants is generally far from optimum in all of the Regions. The disparity is least in Queensland, where there is a better mix of plant types than in the other Regions.

In the current NEM trading system design — a single priced, compulsory, energy-only pool — generators must bid prices at levels higher than their SRMC's in order to recover some or all of their fixed costs. EUAA acknowledges this.

[27] There are a number of references arriving at these figures. One significant and recent one is ACIL-Tasman, "SRMC and LRMC Estimates of Generators in the NEM", a report for NEMMCo dated April 2003.

This means that the current design of the NEM trading system forces generators to bid prices higher than SRMC — raising the problem that the same freedom allows extremely high prices to occur when conditions are favourable and when the price cap is set to very high levels.

As has been discussed, in the absence of capacity payments, the need to bid higher than SRMC is apparent when one considers the position of a peaking generator. As an example, SRMC for an open cycle gas turbine operating on gas in the NEM would typically be of the order of $40/MWh. At a typical capital cost of $500/kW, a 9% real rate of return before tax, and annual operating and maintenance costs of $10/kW/year, its annual fixed expenses would be around $63/kW/year or $7/MW/hour. If the gas turbine was expecting to operate for only 1% of the time (87.6 hours) and obtained no other revenue from other services, it would have to receive $760/MWh generated on average over the year in order to produce sufficient revenue to cover its total costs. Lower levels of utilisation produce higher costs than this, as has already been discussed.

A base load plant is, however, in a very different situation. SRMC costs for a black coal fired power station in the NEM, typically would be of the order of $12/MWh. At a capital cost of $1100/kW, a 9% real rate of return before tax and annual operating and maintenance costs of $30/kW/year, its annual fixed expenses would be $153/kW/year or $17/MW/hour. If this plant expected to operate for 90% of the time (7884 hours) and obtained no other revenue from other services, it would have to receive $33/MWh on average in order to produce sufficient revenue to cover its total costs.

The essential difficulty is that the same freedom which allows the generators to bid above their SRMC's in order to cover their fixed costs can also be used to "game" the trading system and generate very high prices — in favourable circumstances.

In the NEM, bids have no limits until they reach the $10,000/MWh price cap, and thus a legitimate freedom is capable of abuse when the generators possess market power and decide to use it.

The above example shows that if the base load generator can force the peaking generator to be the marginal plant and thus to set the pool price in a given period, it stands to gain greatly. For example, if the base load generator rebids (say) 25% of its capacity at prices above $9,000/MWh — effectively removing it from the price setting process — and as a result, makes the peaking generator the marginal plant, then its revenue will be $760/MWh applied to 75% of its output compared to (say) $40/MWh applied to 100% of its output. The revenue for the half hour will be 19 times normal.

This is a practice observed many times in EUAA's examination of the operation of the NEM.

The generators seek to maximise their revenue in terms of the product of output and price, while remaining within the rules set out in the Code. A reduction of output by withholding capacity can be extremely profitable if the pool price can be manipulated up by a factor greater than the ratio of the full capacity to the reduced capacity. In the case of withholding one unit out of four, any pool price increase above 4/3 times what would otherwise apply will be profitable.

Of course a generator would prefer that it is not the only generator cutting back capacity and losing production to gain a higher pool price — otherwise its competitors continue to produce at full output but gain the benefit of the higher price in any event.

This situation is easier to produce if competition from the other NEM Regions is eliminated — such as when interconnections are forced to be constrained as a result of withholding of capacity. Repeated experience operating in the NEM will readily disclose the normal bidding patterns of the other generators, indicating those who can be relied upon to be bidding at suitably high levels to make capacity withholding profitable.

The circumstances favourable to raising pool prices are also easy to produce for those generators holding a portfolio of plants, since one can be bid at the high level, making it easier to force it to be the marginal plant in favourable circumstances. Alternatively, any rebid partial capacity may be positioned to become the marginal plant in favourable circumstances.

Finally, the ability given to generators in the NEC to bid using up to ten bands of capacity and price — a feature originally designed to allow a generator to sculpt its bids to match the variation in SRMC with level of output — greatly facilitates the playing of the game described above.

Withholding of capacity can be achieved in two ways:

- *physical withholding* — by shutting down serviceable plants and not starting them up. This can be done in both the short term (i.e. within a day) and in the longer term (seasonally or longer);

- *economic withholding* — where the plant is operated and capacity is offered to the market, but all or part of that capacity is bid or rebid into price bands so high that the capacity is effectively withdrawn from the market in all reasonable circumstances.

The circumstances are also easier to produce if several generators participate in the 'game' of filling up the interconnections to limit/eliminate interstate competition and force a high bid price plant to set the pool price. This does not need to involve active collusion or any discussion between them, since the circumstances favourable to the creation of a high priced event are readily detected in advance from the pre-despatch for the day, and the generators can act independently — but all in the similar direction.

However, it is possible for one generator to signal to others that the game is about to be played — for example, by bidding a significant block of capacity at a very high price for several trading periods in the bids lodged on the previous day, forcing the loading of the interconnections to be increased towards their constrained levels, and forcing plants making higher bids to be setting the pool price in the pre-despatch. The other generators will soon see what is being attempted and, if so motivated, may elect to join in and help the initiating generator.

But no generator wants to see "free riding" taking place, i.e. where it withholds capacity to cause a price spike, but sees the other generators maintaining output and also receiving the high price. Thus one should not be surprised to see that the rebidding process allowed under the NEC is frequently used to make minor adjustments to the capacity being withheld, in order to achieve the desired effect, but to maintain output at as high a level as can be achieved. Some of this rebidding will move smaller amounts of capacity back down to a lower price, not to assist the system for altruistic reasons, but rather to optimise the capacity/price combination for that generator. Rebidding for this reason is sometimes erroneously described as a generator seeking to reduce the pool price. This is rarely the case.

Also, there is little reason to play the game described above if the generator in question has not first organised its portfolio of hedging contracts to allow it to retain the major portion of the increased revenue without having to give it up to a retailer under a hedging arrangement. Thus when generators believe that they can achieve higher prices by the mechanism described, they will be inclined to cut back on the capacity offered to retailers in the hedging market, or offer hedges at much increased prices.

This has been the experience in the NEM in the last few years, where retailers have complained that they are having difficulty in obtaining hedge cover from some generators either at all, or at least at reasonable prices.

Of course, high pool prices can hurt generators as well. If they suffer a unit outage and their available capacity falls below their contracted level, then they must purchase from the spot market to cover the shortfall. There are examples in the history of the NEM where generators have lost millions of dollars in a day due to this set of circumstances.

Unfortunately, a typical action taken by the generators to protect themselves against this eventuality is to withhold the capacity of at least one of their units from the hedge contract market to effectively act as a "spare" unit — available to allow them to meet contractual commitments while covering the loss of one of their other units. This has the inevitable effect of limiting the availability of hedge contracts and reducing liquidity in the hedging market. It also takes away from the despatch process units that have a low incremental cost and should be able to operate at high load factors.

Thus the average fuel cost of the system must increase above desirable and least cost levels.

It must also be remembered that bidding into the NEM systems is a continuous learning experience. As each day passes more information is gathered on system conditions, likely demand levels and in particular, the normal bidding patterns of other generators — especially those operating in the same Region. With a small number of generators in each Region, it is relatively easy to deduce the bidding strategies of the other players and to plan your own strategy accordingly.

All of these practices and the economic return available from them are obviously facilitated by the adoption of a high value of VoLL (here referring to its use as a price cap).

Furthermore, as we have seen, the generators only have to engage in these obviously non-competitive practices very infrequently — well less than 1% of the time — to achieve significant increases in annual average pool prices.

8. Effect of High VoLL Levels on End-Customers

In the submissions made to the ACCC on the matter of the setting of VoLL in 2000, EUGA argued that raising the VoLL price cap would massively increase the financial risks faced by contracted generators and uncontracted retailers, the price of which would, inevitably, be passed through to end-users.

This has in fact occurred, and evidence is now available of the significant cost impact to end-users of the higher level of VoLL (as a price cap).

It is necessary to examine the situation in the individual States to extract the effect. Both NSW and Queensland, with their high levels of State Government ownership, have schemes in place thatforce government owned generators and retailers to 'contract' together around a mandated 'benchmark' price.[28] It should be noted that this price, at least in NSW, is much higher than the $34/MWh quoted in a previous section of this report as the price at which generator revenues become profitable. These schemes insulate non-contracted customers (mainly domestic consumers) from high prices, albeit at the cost of potentially lower prices. They also force customers on contracts to pay higher prices and limit the interest in competition from retailers not included in the schemes (eg interstate retailers) who are not insulted from the market risks that the schemes avoid.

In Victoria and South Australia, where private ownership is the norm, the financial risk caused by price spikes and exacerbated by the high level of VoLL, causes retailers to have to enter into risk management schemes in order to cover themselves against financial consequences. The high level of VoLL is a factor making these arrangements more expensive, which cost flows through to customers. Contract customers see this as higher risk premiums, while non-contracted ones will bear the costs in so far as price control mechanisms permit it (otherwise retailers must initially absorb the cost not passed through but will eventually try to find ways to pass it through).[29]

The South Australian State Regulator (ESCOSA) has published several reports dealing with the Standing Contract Prices to apply in that State, which quantify their assessment of the additional costs born by retailers in supplying the small customer section of the market. It is important to note that industrial/commercial retail prices in South Australia increased by an average exceeding 40% in mid-2001 and those for small customers increased by an annual average of 24% in January 2003. The overall average South Australian retail tariff has increased by over one third due to these two increases.

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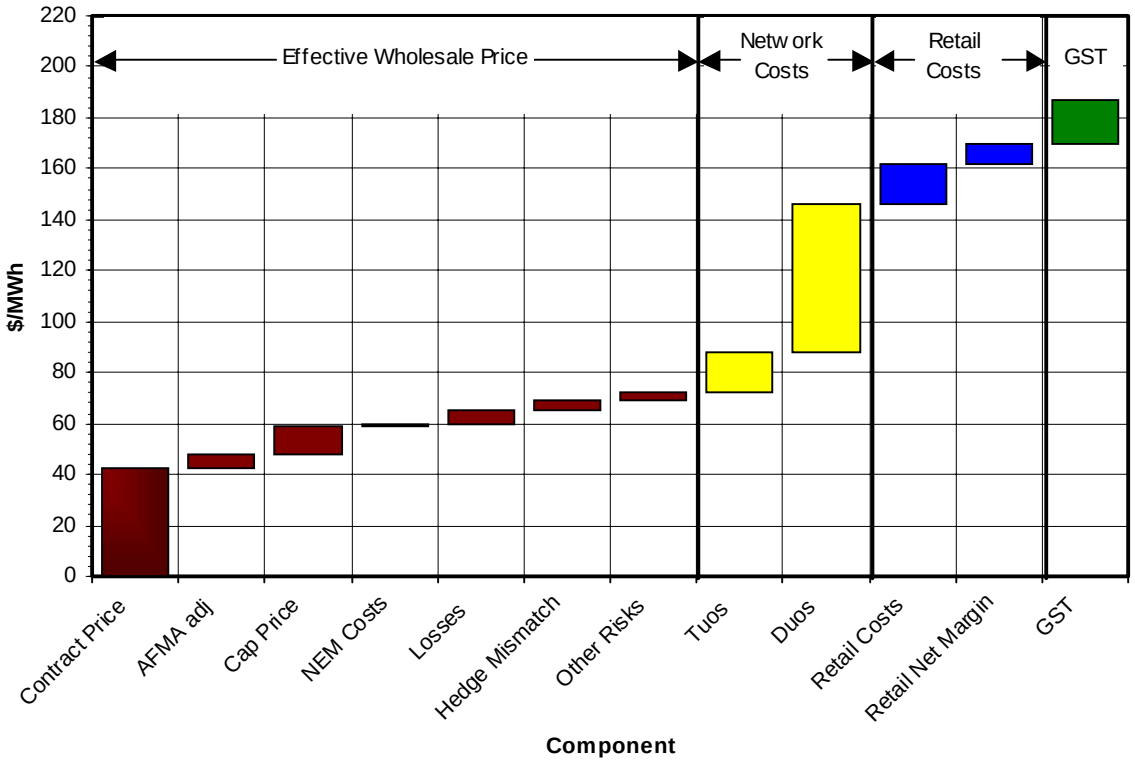
[28] ETEF in New South Wales and the Benchmark Pricing Agreement (BPA) in Queensland. Both have the effect of siphoning off excess generator profits into a central fund and guaranteeing the retail tariffs of franchise customers or those opting for a "safety net" tariff.

[29] This could be through a cross-subsidy paid by contracted customers or by forcing up their underlying cost structure, which will eventually be paid by all customers. The EUAA believes that the decisions of some retailers to build peaking plant following a period of tight supply-demand conditions in Victorian and SA, was partly due to imperfections in existing hedging markets in the NEM and an absence of demand management opportunities. A higher level of VoLL would contribute to this and customers would be paying higher prices as a result.

One of the major reasons for the increased prices is the very high "effective wholesale price" which ESCOSA believes that the retailers in South Australian have to pay.[30]

The following graph was compiled by the Energy Consumers Council of South Australia to show the build-up of the Standing Contract price for 2003 in that State.[31]



Beginning with a basic contract price for 2003 of around $40/MWh, the addition of a range of allowances results in a total "effective wholesale price" of $71/MWh — an increase of $31/MWh or a staggering 78% increase. Most of the factors are directly related to the level of financial risk associated with operating in the NEM — a risk as we have seen which is directly affected by the number and magnitude of price spikes and the level of VoLL.

The situation is similar, but less onerous in Victoria. ESCV in 2001 derived an "effective wholesale contract price" of around $70/MWh, but more recently, have reflected the falling prices in the contract market and indicated that they would use a value of some $58/MWh — still representing an increase of some $16/MWh or 58% above contract prices being quoted for Victorian supply in 2004.

EUAA is of the view that these levels of "effective contract price" demonstrate the impact that excessive price volatility and high levels of VoLL have on end-users.

[30] Including all of the components associated with the wholesale market — including basic energy purchases, cap contracts and various allowances.

[31] Included in their 2003 Annual Report to the Minister for Energy.

Action needs to be taken urgently to lower the level of financial risk — and a reduction in the price cap is an essential part of this process.

The level of financial risk experienced in the NEM (including the high level of VoLL) also has a direct influence on the level of liquidity in the "contract market" for financial hedge products. If participants see the market as "too risky", it will suffer in liquidity terms. The EUAA believes that this is the case with the NEM and cites the following as evidence of this.[32]

It is well accepted that the financial contracts market operating in the NEM is both illiquid and short term in nature.[33]

NECA has previously stated the need for a vibrant and liquid market in financial instruments for the present NEM market design to work satisfactorily.

But the excessive level of financial risk present in the NEM deters non-asset owning participants from participating in the financial contract market — leaving it primarily as a market between generators and retailers, with the generators usually holding the whip hand in negotiations.

AFMA publishes an estimate of the annual turnover in the electricity financial markets and their data has been reproduced in the following graph — expressed as a ratio of the physical volume of electricity traded in the NEM for the same period.[34]

The value of this ratio actually fell by almost 18% in 2001/02, but has recovered in 2003 to reach 1.25 times the physical volume of sales through the NEM.[35]

But these volumes are very small compared to those that would be expected in a properly functioning, liquid market in financial products. To illustrate this, the following graph shows the ratio of the volume of financial products divided by the total volume of sales through the competitive market for other well know competitive electricity markets.[36]

Interestingly, the previous England/Wales pool did not achieve a ratio much above 0.6 times physical volume in its 8 years of existence. The change to NETA, even though only 15-20% of electricity is traded through the spot markets (power exchanges and OTC trading) is remarkable, given that NETA has been operating for just 2.5 years. In discussing this effect with UK contacts, EUAA understands that they ascribe it to the fact that they "can now trust the market" and develop sensible and reliable statistical measures on which to base financial derivative products.

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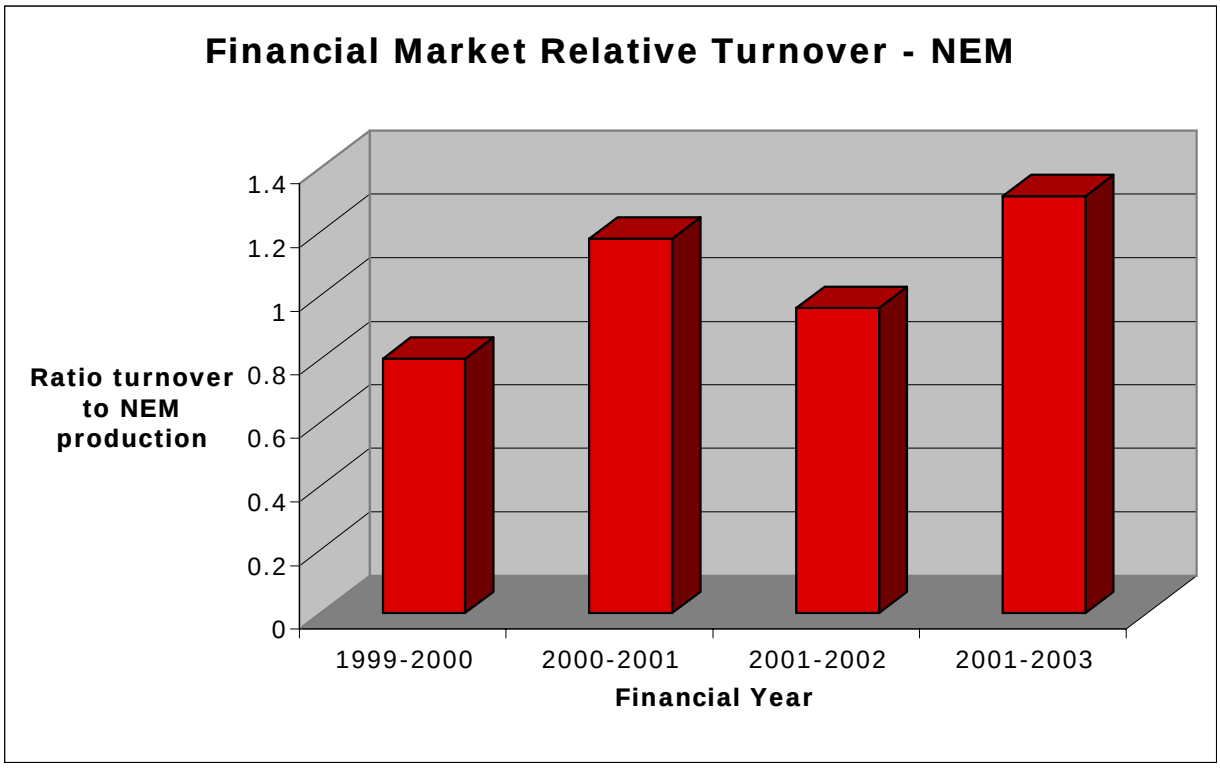
[32] It is acknowledged that an element of risk and volatility is needed to drive interest in a financial market and that the 'energy only' design of the NEM requires higher levels of risk than other markets. Equally, excessive risk will drive interest and liquidity out of the market. Hence, there is a careful balance needed here and, in our view, the NEM has not achieved this yet.

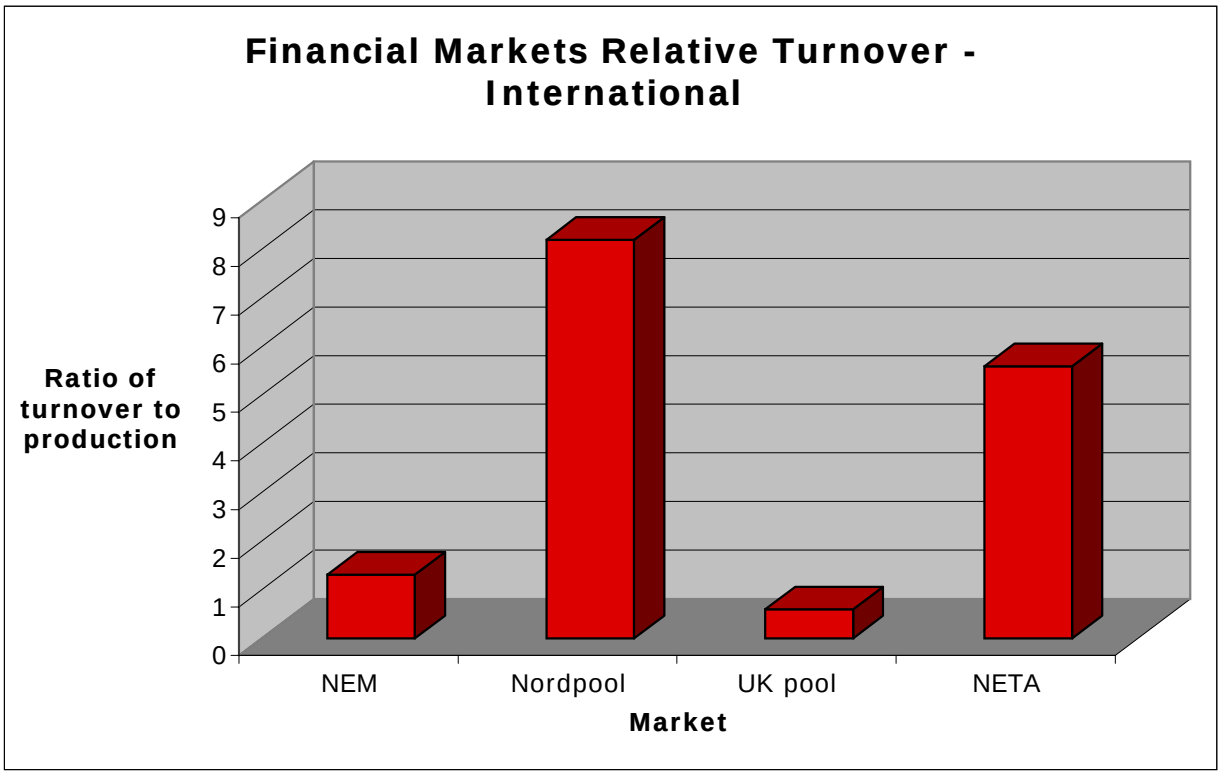
[33] This has been well documented in the Parer Panel report to COAG, dated December 2002, and especially in the associated report prepared for the Panel by KPM and referenced in the Parer report.

[34] Annual summaries are published on the AFMA web site.

[35] The value of financial hedges and other secondary products seen in liquid markets is many times this, eg the stock market.

[36] Obtained from NordPool Annual reports and the various progress reports on the performance of NETA published by OFGEM and available from their web site.





Compared to Nordpool (with a ratio exceeding 8 times physical volumes) or the NETA system in the UK (ratio now exceeding 5 times physical volumes), the NEM ratio is extremely low and, in the EUAA's view, unhealthy.

It is a truism that derivative markets cannot be divorced from the performance of the physical market on which they depend. A more predictable and less volatile market than the NEM would enable a wider range and greater volume of financial instruments to be developed and marketed, which would greatly improve the operation of the NEM and would be likely to result in lower prices to end-users. The high level of VoLL is a contributor to this set of circumstances.

Thus EUAA believes that the present high level of VoLL is contributing to a lack of interest and liquidity in the financial contracts market around the NEM. It follows that a lower price cap in the NEM would increase the liquidity, with beneficial effects on the NEM itself and with lower prices to end-users.

High values of VoLL also impact adversely upon the transmission system and in particular, the risk of trading across interconnections. This latter risk is essentially one associated with being forced to pay a high price due to an unexpected price spike in the receiving system, while purchasing electricity in the sending system at a lower price.

With price differentials as high as ($10,000-$25) $9975/MWh, even a small transfer between the Regions can give an exposure of many million of dollars. An exchange of 100MW between two Regions when VoLL applies in one would cost $1 million per hour if it were uncovered.

Limited protection can be gained by participating in the Settlement Residue auctions, but this is well-known to provide an imperfect hedge, and physical outages of the transmission lines or reductions in transfer capabilities cannot be protected against.

These impediments to cross border trading help to keep the NEM as five regional markets rather than a national market. They also enhance the ability of generators possessing market power to utilise that market power to drive prices in a region to higher levels than if inter-regional trade was unfettered. As mentioned earlier, the high level of VoLL provides them with an even greater incentive to use their market power.

The extent of the disadvantage is a direct function of the price differential possible between regions and thus the level of VoLL (as a price cap). It follows that high levels of VoLL inhibit interstate trading in electricity and this has lead to higher prices for end-users.

This is a further argument for lower levels of VoLL than presently apply.

9. Effect of High VoLL Levels on Demand-Side Response

There is no doubt that the operation of the NEM would be greatly improved if the demand-side of the market could be encouraged to respond when supply is placed under stress and/or when pool prices threaten to be driven to very high values. In theory, if there is no price elasticity in demand (a vertical price/demand line on the supply/demand graph), the pool price can be driven to infinity. Conversely, the higher the price elasticity (the greater the demand-side response) the more the demand side can play a role in limiting pool prices to more reasonable levels.

EUAA believes that, although there are significant difficulties in marshalling an effective level of demand side response in the NEM, only a relatively small proposition of load (say3-4%) is needed to make the NEM price setting mechanism more acceptable to end-users.

The EUAA has recently completed and documented a trial of a Demand Side Facility, aimed at aggregating available demand-side controllable or sheddable capacity.[37].

The Trial was based on the proposition that a commercial DSR facility could provide a means for encouraging and stimulating end-user response to price volatility and extreme network loading. This would help overcome what is widely recognised to be one of the fundamental weaknesses of the NEM – the effective absence of demand side response. Participating end-users would earn revenue for providing Demand Side Response (DSR) that could reduce the overall cost of delivered energy and network services. If such a facility stimulated sufficient DSR, it would also benefit the great majority of end-users not providing DSR.

End-users participating in the Trial offered 93 items of plant with a total despatch capacity of 119.4MW, substantially more than anticipated during planning for the Trial (see Table below for more details). The plant was located in three NEM Regions (NSW, SA and Victoria) and each plant item was offered for scheduling and despatch on the basis of individual bids with different prices and despatch conditions. The end-users were providers and sellers of DSR and electricity retailers and distributors were buyers of aggregated DSR.

Despite the wide range in type and capacity of individual plant items, and the wide range of differing bid prices, the capacity-weighted bid price in the three NEM regions with registered sellers during the test varied from just $1,000/MWh to $1,129/MWh, with the overall capacity-weighted sellers' bid price being $1,046/MWh, or just over 10% of the value of the NEM price cap (VoLL).

This outcome suggests that effective DSR could help create a 'voluntary' price cap in the energy market at a value well below VoLL – providing sufficient DSR capacity was available for despatch to impact on the spot price.

Material made available to participants in the Trial suggested that up to 500MW of DSR capacity in any single NEM region and 1,000MW across the NEM may be required to ensure DSR will reliably affect extreme energy market spot prices. This is about 3.5% of the maximum demand in the NEM.

[37] EUAA, "A Demand Side Response Facility for the National Electricity Market", Reporting Consultant's Independent Assessment, forthcoming 2004.

The final report on the trial comments that:

> *"Current National Electricity Code rules create some perverse incentives for DSR. The spot price mechanism provides incentives for generators to offer capacity by paying all generators at the (higher) bid price of the last increment of capacity required to satisfy demand. But DSR capacity delivering the same outcome (through reducing demand) reduces spot price and 'destroys' value for actual or potential DSR providers. This acts as a powerful disincentive for end-users to provide DSR and prevents 'capture' of a 'fair' share of the value that could be released by global DSR.*
>
> *A mechanism to optimise incentives for DSR should be considered. For example:*
>
> - *imposing a (relatively) small surcharge on energy market transactions and using this to compensate DSR providers whenever global DSR is achieved; or*
> - *investigating how a DSR capacity payment scheme could be used to 'compensate' DSR providers for the value they could create.*
>
> *It is recommended that the EUAA ensure this issue is considered during examination of the feasibility of a commercial DSR facility."*

To this comment must be added those made earlier in this report regarding generator behaviour. When we can see instances where NSW generators can withdraw up to 2000MW of capacity at short notice to produce a price spike, under the present rules and the prevailing level of VoLL, it is easier for generators to combat the accumulation of even the 1000MW of NEM-wide demand side response suggested as needed by the EUAA trial. It is not until something is done to limit that practice (while still allowing generators to recover reasonable fixed costs) that significant demand side response is likely to occur.

A factor in the decision of the ACCC to increase VoLL to $10,000/MWh was that it would provide greater incentives for demand side response. The EUAA queried this at the time.

The limited amount of demand side response able to be identified by NEMMCO (just 290MW in the latest Statement of Opportunities) and the lack of any great change since VoLL was doubled in magnitude, shows evidence that other factors and impediments are more important than the level of VoLL (as a price cap) in encouraging a higher level of demand side response.

This is essentially one of the conclusions arising from the recent EUAA trial.

Therefore the EUAA believes that a reduction in VoLL would not have a significant impact on the amount of DSR in the NEM. In fact, it might even stimulate some more DSR if it increased liquidity and trading options, for example, of if other changes were made to stimulate DSR (such as those identified in the EUAA Trial).

10.A Place for Capacity Payments in the NEM?

Capacity payments are used in numerous overseas markets to help ensure that investment in new capacity is available when required. These provide a high level of certainty to investors about the profitability of their new investments. They also permit the use of a much lower price cap than applies in the NEM at present. The matter of capacity payments it therefore closely related to the concept of VoLL and its level, being an alternative option to explore. The EUAA's terms of reference to it consultant on this assignment therefore requested that the consultant "*Compare, contrast and comment on the approach to the price cap in the NEM compared to overseas, including the effect on end-users.*"

Similarly, the Issues Paper considers the use of capacity payments in several overseas markets, as an alternative to a very high price cap in an energy only market, but does not deal with the advantages of a properly constructed use of capacity payments in the NEM, preferring to suggest indirect means of approaching a similar effect. EUAA believes that there is merit in further detailed and independent consideration of the addition of a system of capacity payments to the current design of the NEM trading system, stopping well short of a fundamental change in the structure of the trading system.[38]

There is a considerable body of economic theory that explains the economic effect of the operation of electricity trading systems and the need for "marginal capacity payments", if the sum of short term actions is to lead to an acceptable long term pricing outcome.

In the 1960s and 70s, economists in England and France examined the theoretical relationship between short run (SRMC, essentially fuel costs and losses) and long run marginal costs (LRMC, all costs including an adequate return on investment).[39] Arising from their work, it emerged that for the particular case of a perfectly balanced electricity system (not too much nor too little reserve plant), with an optimum mix of plant (such that the lowest cost of electricity could be obtained over a year), and if:-

- electricity was sold at every hour of the year at the short run marginal cost, plus
- electricity sold at peak times was charged, in addition to the short run marginal cost, a marginal capacity cost corresponding to the cost of providing peaking capacity on the system,

then and only then, the revenue obtained would exactly cover both fixed and variable costs and be equal to the LRMC — a highly desirable outcome.

[38] NECA has undertaken several examinations of this matter but has always concluded against such a system. We have reason to suspect that NECA was influenced heavily by some participants in its conclusions and that it had a pre-determined position.

[39] Turvey in the UK and Boiteaux in France in particular.

In more recent times, this has been described by Hugh Rudnick in South America that, under economically optimum conditions:-[40]

> *"Income obtained from selling all energy at the short term marginal cost, plus income obtained from selling capacity at the development cost of peaking units, is equal to the cost of capital plus total generation operation costs"* .

Rudnick explains that this principle is applied in all competitive markets in South America, with a capacity payment generally equal to the fixed costs of an open cycle gas turbine — the lowest cost of providing marginal capacity.

This is an 'ideal' situation which competitive electricity markets should seek to achieve. The price of electricity would then be sufficient to provide developers of new, efficiently constructed and operated power plants with a full return on their investment, thus maintaining adequate incentives to invest, but should also provide electricity tariffs to customers related to LRMC and a degree of stability in electricity prices — although fluctuations in prices would still be present they would be less volatile.

In the 1970s this theory led to the introduction of electricity tariffs based on marginal costs wherever practical, augmented by an additional charge to cope with the fact that the ideal situation can never be achieved in a practical system. This theory also found application in some of the Australian States, especially NSW.[41]

From the above discussion, it can be seen that certain prerequisites must be achieved for the ideal outcome to be reached. These are:-

- the system must not have over or under capacity, which implies that capacity can be added/subtracted in small increments and with no time delay;
- the system must have the correct balance between high capital cost/low fuel cost and low capital cost/high fuel cost plants, such that their operation over the year results in the lowest possible electricity cost;
- electricity must be charged at marginal cost in all hours of the year;
- a surcharge must be added to peak usage to match the marginal capacity cost.

It is rather obvious that such theoretical conditions cannot apply in practice, especially in Australia, where:-

- the number of power stations is limited (less than 6-7 in the larger States and 3-4 in the smaller States);

[40] Of the Catholic University in Santiago, Chile, but a prolific author of articles published in both North and South America. The phrase is used often in his papers.

[41] The Bulk Supply Tariff in NSW was based on these principles. The supplementary charge could be as high as 25% of the total tariff.

- a strongly meshed transmission system does not exist, but rather a series of regional grids are connected by relatively weak transmission links;

- ownership of the power plants in two major States is controlled by the State Governments, and independent action by generators cannot be expected as a matter of course;

- unit sizes are generally large as a proportion of the total system capacity compared to overseas systems;

- lead times for the construction of new plants can be very long (three to six years or more);

- the plant mix may vary quite considerably from the optimum due to all of the above, and these conditions can exist for long periods of time.

These imperfections were recognised in the past by the need to have a supplementary charge in centrally established tariffs to make up for the imperfections, which at times could be quite large.

The original English trading system developed in 1989, and based on a compulsory pool, sought to approach the theoretically ideal outcome by encouraging bidding between generators to be loaded (and thus gain revenue), assuming that this would result in them bidding at their marginal fuel cost, plus adding an additional component related to the probability of the system failing to meet the load at any half hour (the LOLP, or Loss of Load Probability, component of the marginal price). This LOLP component was a proxy for the addition of the marginal capacity cost of peaking plant required in the theoretical formulation, but would equal it only by chance in the English formulation, and was itself capable of being manipulated. The concept was good but the implementation was poor.

> In practice, this system resulted in "half a market", where generators compete amongst themselves and against the rules, with the retailers/customers unable to directly influence the pool price, since they have little opportunity to vary their demand in the short term.

Generators in the NEM are placed exactly in this position.

Unfortunately for retailers, the primary source of hedging contracts is the generators themselves, who may not be particularly interested in offering reasonable contract terms when the customers/retailers really need them.

Economic theory can thus be used to support the payment of a marginal capacity payment as well as a marginal energy payment in compulsory pools.

In 2004, such a payment in the NEM might reasonably be set at a level of around $7/MW/hour.

We acknowledge, however, that experience with capacity payments has been somewhat mixed. Even recent examples, although offering improvements on earlier schemes, still exhibit some 'rough edges'. It seems that in PJM, for example, the use of such payments is still subject to some 'gaming' type activity by beneficiaries. For instance, it has been suggested that the particular variant of capacity payments used in PJM has resulted in excessive new capacity entering the

market and that it has also discouraged the exit of old capacity. Hence the mix is not optimal.[42]

Nevertheless, this is not t suggest that the experience with capacity payments is any worse than that of the NEM with high VoLL, which has had a direct detrimental impact on end-users in terms of market power, higher energy prices than necessary and higher risk premiums in contracts.

As mentioned above, where the experience and facts lie needs to be subject to further (independent) investigation.

If a capacity payments scheme was to be introduced into the NEM, EUAA suggests that it should be paid to all generators presenting themselves for loading to NEMMCo, whether actually running or not, on the basis that NEMMCo could instruct them to run if needed. Generators with unserviceable plant or who may be deliberately withholding capacity (by physical or economic means) would not receive the payment.

A limit could be placed on the payments — based on the most attractive bid prices — if excessive capacity is being offered to the market.

This procedure would eliminate the need for peaking plants or plants operating for a small number of hours in a year, to bid extremely high prices. Bidding at or around their marginal costs will allow them to readily cover their total annual costs — providing that they control capital and operating costs to best-practice levels.

Base load generators willing to run when required, would also gain a boost to their annual revenue (depending on their availability and bidding practices) and thus be less motivated to generate artificial price spikes to increase average annual revenue.

Economic theory also tells us that, with workably competitive conditions, the pool price cannot rise above the marginal cost of the least efficient, highest cost generator regularly operating in the NEM — unless customer load is actually being shed, when the VoLL should apply. Thus it might be appropriate that a cap be placed on the prices able to be bid by all generators at around this level — probably $250-300/MWh in the NEM at the moment (although requiring further investigation to determine precisely and consider impacts).

With a price cap of some 10-12 times the efficient pool price (using LRMC bidding), and a capacity payment of the order of $7/MWh, there remains ample opportunity for base-load generators to recover their fixed costs. It would also appear to be sufficient for price signalling of impending shortages and thus of the need for new investment in capacity (to the extent that short term prices are effective in this role).

A reduction on VoLL (as a price cap) and the measures described above would help in reducing the incentives to exploit market power in the NEM, but would not be sufficient in itself, in our view.

Further consideration should also be given to stronger rules to deal with market power abuse, such as the banning of “economic withholding” of capacity, such that prices near the bid cap would only be allowed for peaking plants and for plants which had a genuine reason why they should be loaded

[42] See presentation by Ken Laughlin, Vice-President, PJM to EUAA Annual Conference, 2004

as a last resort.[43]

These changes would eliminate the extreme price spikes and most of the financial risk that exists in the NEM and causes participants to add high risk premiums to end-user prices. The need for $300/MWh cap contracts, which can cost in the range $8-15/MWh, would be eliminated, and generators would find less need to hold back capacity from the contract market to self-insure against unit outages.

EUAA commends this straight forward approach to reducing the level of financial risk in the NEM to the Reliability Panel and to NECA for further consideration. The present review of VoLL should support the need for further examination of these matters as soon as possible, noting the relationship between them and the level of VoLL.

It is a relatively minor change to the current market design (compared to a NETA like reform) and one that offers considerable advantages to end-users. It is preferable to the indirect approaches proposed in the Issues Paper.

EUAA also intends to press the Ministerial Council on Energy, NEM institutions, the ACCC and the individual Governments to address this issue and to evaluate its consequences in detail.

[43] NECA came close to supporting this during its last rebidding review in 2002. However, the ACCC rejected the proposal on the basis that it was 'second best' intervention, preferring to support some lessor tightening of the rules for rebidding and support structural solutions to reduce market power in the NEM. The EUAA believed at the time (and still does) that this was a naïve view by the ACCC and that 'second best' options were needed to alleviate market power until the structural problems are fixed. The alternative is that customers must bear the costs in the meantime.

11. Conclusions and Recommendations

EUAA has previously expressed strong opinions on the related issues of the level of the VoLL and of the CPT.

In the year 2000, the EUGA argued strongly against any increase in the level of VoLL and sought additional safeguards.[44] In particular, the EUGA was concerned about the scope that the market and Code provided for significant exercise of market abuse by incumbent generators and the influence this has on the behaviour of generator Participants. EUGA also argued that raising the VoLL price cap would also massively increase the financial risks faced by contracted generators and uncontracted retailers, the price of which would, inevitably, be passed through to end users.

Following consideration of the issues, the ACCC considered that the proposed VoLL Code changes:

"*may involve significant public detriment, primarily due to:*

- *the additional risk which a higher VoLL introduces to the market, which is not easily accommodated by market participants;*
- *concerns over how generator market power may manifest itself with a higher level of VoLL; and*
- *the likelihood of higher prices across the NEM as a consequence of the proposed increase in VoLL."*

Since 2000, EUAA has not altered its fundamental objections to high levels of VoLL in the NEM and believes that the subsequent experience fully justifies the stance taken at that time. The key issues for end-users remain:

- the enhanced potential for market power abuse by generators, which increases the level of risk in the wholesale market, and
- the consequential flow on of higher prices born by end-users as both generators and retailer attempt to pass on the cost of risk mitigation measures to end use customers.

This report makes the following major observations:

The need for a price cap

- EUAA supports the continuing existence of a price cap in the NEM, but argues that it should be set at a substantially lower level than currently applies, for the reasons set out in the body of the report.
- VoLL in the present situation serves two purposes — one the true meaning of the *Value of Lost Load* (which should only apply when load is, in fact, lost) and as a *price cap* on generator bidding behaviour. It is time that the two functions are separated and the price cap set independent of the setting of VoLL.

[44] EUAA, "VoLL Review — Response to Draft Determination, an end-user customer perspective", Submission to the ACCC, August 2000.

The absence of concern regarding generator market power and the cost of risk mitigation

- The EUAA is both surprised and disappointed that the two issues which provided the rationale for the ACCC's decision to adopt a value for VoLL of $10,000/MWh rather than the NECA recommended $20,000/MWh in 2000 — the enhanced ability for generators to exert market power and the increased financial risk and inability to protect against that risk — are essentially ignored or casually dismissed in the NECA Issues Paper.

- Excessive volatility in electricity prices, particularly when related mainly to the exploitation of market power, is not in the interests of end-users of electricity, it is only of value to some sections of the supply side and some electricity traders.

The effect of price caps on new investment

- Neither the NEM spot market, nor the associated hedge contract market, can provide reliable forward price estimates out to a time span sufficiently long for prospective generators to gain a reasonable assurance of their future levels of income.

- EUAA is of the view that investors for new power plants would much prefer less volatile and more stable pool prices, not subject to artificial manipulation, rather than the present situation of a combination of high VoLL, structural problems in the NEM and lax rules disciplining the abuse of market power.

The measurement of pool price volatility

- EUAA does not agree that the new NECA measure purporting to represent pool price volatility is either correct or useful. The mere fact that it specifically excludes the highest and most volatile price excursions attests to that. EUAA does not object to NECA developing and using such a measure, but it is quite incorrect to describe as it as an indicator of pool price volatility. It is more a measure of volatility when the market is in a "normal condition" and has some limited value as that.

- A true and useful measure of price volatility up to VoLL needs to measure and record the financial effects of the extreme pricing events that have such a significant effect on pushing up average pool prices; which increases substantially the risk of operating in the NEM and causes significantly increased prices for end-users in some States.

- It follows from the above that EUAA does not agree with the use of the new NECA volatility index (as it has been used in the Issues Paper) to assess whether pool price volatility has increased or decreased since the change of VoLL in April 2002. Given the above, we strongly oppose its erroneous use for this purpose.

Price spikes unrelated to supply/demand balance

- EUAA has documented several aspects of generator bidding behaviour that show that many price spikes close to VoLL are not related to fundamental supply/demand conditions. Price spikes generated under these conditions do not signal any shortage of capacity — rather they are artificially created by generator bidding behaviour, and in particular, the practice of "economic withholding" of capacity.

- High levels of VoLL (as a price cap) increase the incentive to create price spikes (especially by generators possessing market power), make the generation of such price spikes easier to achieve and lower the number of occasions when they are needed in order to gain a given measure of average pool price increase.

The effect of the 2002 increase in VoLL

- The incidence of price spikes fell significantly following the increase in VoLL to $10,000/MWh in 2002, but the addition to the annual average pool price due to price spikes increased only slightly for the NEM as a whole — averaging over 20%, or almost $7/MWh. Separate analysis of the year 2002 shows that 27% of the annual average pool price was caused by price spikes above $250/MWh

- Thus the change of VoLL allowed the generators to achieve much the same increase in the annual average pool price with less than half the number of price spikes — with the price spikes being roughly doubled in value.

- EUAA contends that the most important financial risk of operating in the NEM comes from these relatively unpredictable price spikes — especially when unrelated to tight supply/demand conditions — and that the Issues Paper has not paid anywhere near enough attention to them**.**

- The NEM trading system forces generators to bid prices higher than their SRMC — raising the problem that the same freedom to do this allows the generation of extremely high prices when conditions are favourable and when VoLL (as a price cap) is set to very high levels.

- These bidding practices, and the economic return available from them, are obviously facilitated by the adoption of a high value of VoLL (here referring to its use as a price cap).

- Some constraints exist on the ability of generators, even those possessing market power, to drive prices to high levels — including the high level of Government ownership and the ability of the Government-owned generators to achieve enviable financial returns even with average prices (contract plus pool plus ancillary services payments) as low as $34-35/MWh. To push the average pool price (and its related hedging contract prices) higher would invite criticism that the financial returns being made are excessive — especially compared to the returns being achieved by the major listed companies in Australia over the same period.

Effect of VoLL on the "Effective Contract Price"

- EUAA is of the view that the levels of "effective contract price" seen in South Australia and Victoria — at times 60-80% above prevailing contract prices for a given year — are unacceptable to end-users. The (at times) excessive financial risk of operating in the NEM, due to price spikes and the high level of VoLL (as a price cap), has a major impact on this.

- Action needs to be taken urgently to lower the level of financial risk — and a reduction in the price cap is an essential part of this process.

Effect of VoLL on financial markets

- Thus EUAA believes that a lower level of a price cap in the NEM would increase the liquidity of the financial contract market, with beneficial effects on the NEM itself and with lower prices to end-users.

Effect of VoLL on inter-regional trading of electricity

- The uncertainly in trading across inter-Regional interconnectors is a direct function of the price differential possible between regions. High levels of VoLL increase this differential possible and therefore inhibit interstate trading in electricity. This leads to higher prices for end-users.

Effect of VoLL on Demand Side Response

- EUAA believes that, although there are still significant impediments to marshalling an effective level of demand side response in the NEM, only a relatively small amount of DSR (3-4% of load) will help to make the NEM price setting mechanism more acceptable to end-users.

The limited amount of demand side response able to be identified by NEMMCO (just 290MW in the latest Statement of Opportunities) and the lack of any great change since VoLL was doubled in magnitude, shows evidence that other factors and impediments are more important than the level of VoLL (as a price cap) in encouraging a higher level of demand side response.

- Therefore the EUAA believes that a reduction in VoLL would not have a significant impact on the amount of DSR in the NEM. In fact, it might even stimulate some more DSR if it increased liquidity and trading options, for example, of if other changes were made to stimulate DSR (such as those identified in the EUAA's DSR Trial).

Use of Capacity Payments to reduce price volatility and risk levels

- EUAA favours further (independent) investigation of the introduction of straight forward and uncomplicated capacity payments — set at a level to cover the fixed costs of an efficiently constructed and operated open cycle gas turbine. This has some attractions compared to the complex and indirect proposals in the Issues Paper.

- This could involve capacity charges, properly implemented as discussed in the Report, together with a price cap set at $250-300/MWh, which would eliminate the extreme price spikes and most of the financial risk that is a characteristic of the NEM and causes participants to add high risk premiums to end-user prices. The need for $300/MWh cap contracts, which can cost in the range $8-15/MWh, would be eliminated, and generators would find less need to hold back capacity from the contract market to self-insure against unit outages.

- EUAA commends this straight forward approach to reducing the level of financial risk in the NEM to the Reliability Panel and to NECA for further consideration. The present review of VoLL should support the need for further examination of these matters as soon as possible, noting the relationship between them and the level of VoLL.

- EUAA also intends to press the Ministerial Council on Energy, NEM institutions, the ACCC and the individual Governments to address this issue and to evaluate its consequences in detail.

Overall conclusions

- There are no grounds to assert — as does the Issues Paper — that: *"a price cap of less than $10,000/MWh will put at risk the reliability of supply in the NEM, and there is some justification for a higher price cap"*.

- EUAA argues that there are no grounds on these two methodologies to justify a higher value of VoLL (correctly defined) or a price cap higher than presently applies — in fact a reduction in the price cap is warranted (at least down to its former level of $5,000/MWh, and possibly lower.

- The EUAA DSR Trial showed that end-users would bid a 'voluntary' price cap of around $1,000/MWh into the NEM and overseas experience suggests a price cap well below the old $5,000/MWh for VoLL.

- Consistent with this, EUAA wishes to see a low Cumulative Price Threshhold set together with a lower level of price cap, on the basis that it reduces the level of financial risk to generators and retailers and thus prices to customers.

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Appendix 1

Terms of Reference for EUAA's Consultant and Compliance Statement

1. Terms of Reference set by the Reliability Panel for their consultant (Tavis Consulting)

The Reliability Panel set the following Terms of Reference for their consultant.

- appropriate measures, including to the extent practicable objective quantifiable measures, of the impact of changes in VOLL on:
  - spot prices, including spot price volatility;
  - provision of financial instruments related to spot price risk;
  - investment in the National Electricity Market; and
  - the reliability of the power system.

  This part of the work should also identify any additional information that would be necessary or helpful in order to construct such measures and make recommendations about how that information might be sourced including, where appropriate, recommendations about how commercially sensitive information can be protected as part of that process;

- using the measures identified in the first stage of the work, and for which the necessary information is already available or can readily be obtained, to assess the effects of the increase in VOLL from $5,000 to $10,000/MWh in April 2002 and the likely impact of the level of VOLL determined as part of the Panel's 2004 review, particularly for the period that the Panel's 2004 review will apply;

- the extent to which the actions of TNSP's contribute to VOLL, or near VOLL, events;

- the potential for refinements to the cumulative price threshold, including the changes proposed to the Panel as part of its 2003 review, as an alternative or adjunct to changes to VOLL; and

- to the extent that VOLL is not providing appropriate signals for new investment across the range of generation, to identify and assess options for alternative or complementary mechanisms to provide refined investment signals, including a review of international experience with VOLL or, where used, other mechanisms.

NECA's consultant (Travis Consulting) subsequently obtained the agreement of NECA and the Reliability Panel to implement these terms of reference in the form covered by the Issues Paper, including some related matters (such as the place of capacity payments in the NEM).

2 Terms of Reference set by EUAA

The EUAA set the following Terms of Reference for their selected consultant (Bardak Ventures).

The review of the Issues Paper was to cover the following specific matters:

- Review of the impact of the increase in VoLL to $10,000/MWh on end users, including electricity prices, reliability and risk premiums.
- Compare this to a situation where VoLL had remained at $5,000/MWh or been reduced.
- Assess the impact of a further increase in VoLL to $30,000/MWh on end users, including electricity prices, reliability and risk premiums.
- Assess the impact and performance of the Cumulative Price Threshold (CPT) on end users and market risk.
- Assess the need for a price cap in the NEM in terms of its impacts on end-users, prices and reliability.
- Compare, contrast and comment on the approach to the price cap in the NEM compared to overseas, including the effect on end-users.
- Assess the impact of VoLL on the incentives for demand management in the NEM
- Impact on transmission reliability and investment.

3 Compliance with Terms of Reference

It should be noted that approval for funding for the preparation of this report was not obtained from the Advocacy Panel until February 3rd. With an extension of time granted by the Reliability Panel to February 13th, this left only eight working days for the production of this report. In the limited time available for preparation of a submission to the Reliability Panel it was not possible to cover all matters to a complete level of detail. This was recognised in the revised application for funding made to the Advocacy Panel and allowance for it was made in the reduced amount and scope of work for which funding was received by the EUAA. However, it has been agreed separately between the EUAA and Bardak that this will be covered in the proposed revision/expansion of the report that will be used for broader advocacy to other relevant parties. It should be emphasised that all funding received from the Advocacy Panel has been used to prepare this submission.

The EUAA Terms of Reference have been covered in this report in the manner set out below.

- *Review of the impact of the increase in VoLL to $10,000/MWh on end users, including electricity prices, reliability and risk premiums.*

  These matters are covered in Sections 4, 6, 7, 8 and 9. These Sections document the harmful effect of high levels of VoLL and the EUAA's previous opposition to the lifting of VoLL from $5,000/MWh to $10,000/MWh. The concerns of the EUAA (and of the ACCC) expressed in 2000 have been shown to be valid.

- *Compare this to a situation where VoLL had remained at $5,000/MWh or been reduced.*

  This matter is covered in Sections 7, 8 and 9. EUAA would like to see the level of the price price cap (which may be different from setting a Value of Lost Load for application where load is in fact, lost) lowered to reduce the level of volatility and financial risk of operating in the NEM. The options of either a straight lowering of the price cap back to $5,000/MWh or lower, or the introduction of capacity payments (described in Section 10) with a much lower price cap, are canvassed.

- *Assess the impact of a further increase in VoLL to $30,000/MWh on end users, including electricity prices, reliability and risk premiums.*

  This matter is not covered explicitly, but rather covered by documenting the problems being caused by the present level of VoLL (as a price cap). Given the magnitude of these problems, EUAA is obviously opposed to any further increase in VoLL, — let alone to a level as high as $30,000/MWh. In any case, the $30,000 figure was related to the Tavis report and should be seen as indicative of a "high" level of VoLL, rather than being a set figure. However, EUAA concern over some of the studies purporting to support a level as high as $30,000/MWh is covered in Section 3.

- *Assess the impact and performance of the Cumulative Price Threshold (CPT) on end users and market risk.*

  This matter is covered in Section 8. EUAA would like to see the value of VoLL decreased and the CPT set at as low a level as possible to limit the level of financial risk experienced in the NEM. Clearly there is a relationship between the level of VoLL and the CPT.

- *Assess the need for a price cap in the NEM in terms of its impacts on end-users, prices and reliability.*

  This matter is covered in Sections 2, 3, 8 and 10. The need for a price cap is acknowledged, but EUAA would like to see a lower value than $10,000/MWh currently in effect in the NEM.

- *Compare, contrast and comment on the approach to the price cap in the NEM compared to overseas, including the effect on end-users.*

  This matter is covered in Section 3 and again in Section 8. Overseas markets use much lower levels for price caps than used in the NEM ($US1,000/MWh is common) and as shown in Section 5, experience much lower peak prices.

- *Assess the impact of VoLL on the incentives for demand management in the NEM*

  This matter is covered specifically in Section 9

- *Impact on transmission reliability and investment.*

  This matter is covered in Section 31.

It should be noted that the terms of reference for the EUAA's consultant also specifically required Bardak to "have regard" to the Tavis Report in preparing this submission. This meant that certain matters raised by Tavis required comment, including overseas experience with VoLL, price caps and alternative options, including the use of lower price caps and capacity payments in several overseas electricity markets.

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