Major Energy Users Inc.

Australian Energy Markets Commission

# RELIABILITY PANEL

# 2010 REVIEW OF RELIABILITY and EMERGENCY RESERVE TRADER (RERT)

## Comments on RP Issues Paper August 2010

**Submission by**

**The Major Energy Users Inc**

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**The views expressed in this document do not necessarily reflect the views of the Consumer Advocacy Panel or the Australian Energy Market Commission. The content and conclusions reached in this submission are entirely the work of the MEU and its consultants.**

**A condition by the Consumer Advocacy Panel for making funding available to the EUCV to provide this submission is a requirement imposed on it by the Ministerial Council on Energy.**

**This requirement is that the submission must be considered to be a draft until the MCE has the opportunity to review it for accuracies of fact. The MCE has reviewed the document and has not required any changes.**

**This submission is no longer a draft, may be made public, and may be placed on the AER website**

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The Major Energy Users Inc (MEU) considers that the RERT provisions should be retained for another 4 years after the most recent change in the MPC, which is scheduled for July 2012.

Modifications to the RERT have made it more effective.

Consumers also consider RERT to be a low cost approach to providing the certainty that involuntary load shedding is unlikely to be needed.

The Reliability Panel is urged to assess whether all available options for demand side response are permitted by RERT.

# 1. Introduction

## 1.1 About the MEU

The Major Energy Users Inc (MEU) represents over 20 large energy using companies across the NEM and in Western Australia and the Northern Territory. Member companies are drawn from the following industries:

- Iron and steel
- Cement
- Paper, pulp and cardboard
- Aluminium
- Processed minerals
- Fertilizers and mining explosives
- Tourism accommodation
- Mining

MEU members have a major presence in regional centres throughout Australia, e.g. Western Sydney, Newcastle, Gladstone, Port Kembla, Mount Gambier, Whyalla, Westernport, Geelong, Launceston, Port Pirie, Kwinana and Darwin.

The articles of the MEU require it to focus on the cost, quality, reliability and sustainability of energy supplies essential for the continuing operations of the members who have invested $ billions to establish and maintain their facilities.

The MEU has seen considerable volatility in the NEM. Appendix 1 provides a brief summary of the extent of this volatility and the impact this volatility has on the spot prices in the NEM. MEU members have seen the impact of this volatility flow into retail contract offerings and seen the exit of many second tier retailers from regional markets with excessive volatility

## 1.2 The MEU view of the electricity market as a whole

Consumers are already seeing electricity costs rising very quickly (with further rises in prospect), from a range of causes, stemming from:

- The exercise of generator market power (the AER has identified that Torrens Island Power Station in SA has market power when regional demand exceeds 2500 MW)
- Steeply rising transmission and distribution network prices – on average these will rise in real terms by ~50% over the next five years
- The proposed implementation of the carbon emission reduction program (CPRS)
- The progressive implementation of the 20% renewable electricity target (eRET)
- The indirect costs for network augmentation to meet the CPRS and eRET
- Prospective increases in coal prices as contracts with power stations are renewed

Overall, there is a general expectation that electricity supply costs will rise in real terms by 100% or more over the next few years as a cumulative result of these changes.

This raises the question as to whether against an expectation of a doubling of electricity supply and delivery costs, consumers will remain content to pay for the same reliability at an even higher cost level or would prefer a reduction in price but with less reliability.

The answer to this question is tied to the issue of how much will this reliability cost?

### 1.3 The MEU view on reliability

The MEU and its members recognise that the reliability settings used in relation to electricity supply (such as the amount of unserved energy to the NEM) are only a small part of the overall reliability of the supply of electricity at its point of use. Consumers of electricity see the impact of the reliability of the electricity system as comprising reliability of the generation supply, the transmission system and the distribution networks. The MEU considers that decisions on reliability must be assessed in relation to the overall reliability of the supply chain, and in particular, take into account the cost and benefit to consumers, including any reliability measures involving generation supply reliability.

The costs consumers incur as result of their loss of supply of electricity have been assessed by many jurisdictional entities since the establishment of the NEM. Many consultants have provided their views as well. Consistently, the response is that the costs vary depending on the time of the loss of supply, the frequency of its occurrence and the duration of each supply loss. For many years, the market price cap (MPC) that was applied to the NEM was called the Value of Lost Load (VoLL) as this reflected the maximum price consumers would pay for power before electing to “switch off”, implying this to be a surrogate for the value consumers place on the value of power. Values for VoLL and MPC varied from $5,000/MWh to the more recent $12,500/MWh, although the value assessed as being the maximum price consumers place on power have been estimated as high as 4-5 times these amounts.

Most manufacturing entities that look at the cost impact of the loss of supply would be likely to consider that it cannot be set at a single value. The loss of power supply for a few seconds can cost a business as much as losing supply for as many minutes depending on many circumstances e.g. production runs, capacity utilisation, contractual obligations, seasonal factors, etc. To arrive at a single figure based on a myriad of variables makes the concept of a single value almost meaningless.

Basically consumers do not consider that the costs they incur from the loss of supply can be quantified in terms of a value of the power that has been not supplied. The supply of power is merely an adjunct to the overall processes consumers carry out on a daily basis and to set a single value for the loss of power in terms of the amount of power used, is an economic construct and bears little relation to reality. To assume

that assessing a cost a consumer incurs can be related to the amount of power that was not supplied, implies the power industry has more significance than those industries it is structured to serve. Electricity supply is a service and not an end in itself.

## 1.4 Tools for achieving reliability

The NEM provides reliability of supply by use of a single "lever" – that of setting the market price cap (MPC). In the Reliability Panel (RP) review of the market price cap earlier this year, the RP accepted that once the MPC exceeds a certain value, the costs that result from increasing it further would be more than offset by not increasing it, and decided that it should not be increased at this time.

As a backup, the NEM has continuously since the start of the NEM, recognised that there needs to be a Reserve Trader activity by the Market Operator.

The main problem with using the MPC as the driver to ensure reliability of supply is that it is an extremely indirect method of achieving such an important outcome. To ensure reliability by using the MPC alone, assumes that investors in generation will be sufficiently incentivised to do so. Implicitly the use of MPC to ensure adequate investment occurs is based only on the hope that someone might do something because there might be a reward (unquantified) if they do so.

From a consumer viewpoint, facing significant loss if there is a loss of supply, such hope hardly provides the certainty of supply that the consumer's investment is predicated on. Equally, if a consumer was to pay for the certainty of electricity supply, it could result in its own investment never occurring. Therefore, there is a need for a balance between the cost of providing the certainty a consumer requires for its electricity supply and the likelihood that such loss of supply will occur.

With this in mind, if a greater certainty of supply can be provided for a relatively small cost, then this is likely in the long term interests of consumers.

Consumers see the Reserve Trader activities provided by AEMO from the following perspectives:

1. As distinct from the RP approach of increasing MPC as a tool to increase reliability (as stated above, this is a very indirect method of ensuring there is adequate generation in the market) the AEMO use of Reserve Trader is a very direct and focused tool to provide reliability.

2. AEMO only activates Reserve Trader when there is an identifiable period of time when there is a likelihood of a shortage of power. As all NEM regions (other than Tasmania) are summer peaking demands, then Reserve Trader is only activated for a few months in summer, and not for the entire year.

3. As distinct to the use of MPC, which is and should be a NEM wide setting, Reserve Trader is only activated for the region(s) considered to be at risk of facing a shortfall of supply.

4. Reserve Trader is only activated for the expected shortfall in power, and not for the entire regional power demand.

Thus Reserve Trader is an extremely focused tool for ensuring reliability when and where a shortage might occur, and only for the period of time when it might be needed.

### 1.5 Summary

There is only one "lever" available to the RP to attempt to ensure the market reliability meets its setting – that is the MPC. This raises three basic questions:

1 How influential is MPC in incentivising new generation investment?
2 How long should the MPC be held static in order to give sufficient time to see if the settings are achieving their expected outcome?
3 At what point does increasing MPC no longer improve reliability but creates (perverse) incentives to exit the market?

Significant new generation has occurred under an MPC of $10,000/MWh. This implies that on a NEM wide basis, the activities by the RP in setting the MPC, does have an impact on providing an incentive for investing in generation. Whist the MEU considers that the current level of MPC (ie $12,500/MWh indexed to CPI) is unnecessarily high based on the amount of new generation delivered under an MPC of $10,000/MWh, it does not consider that MPC should no longer be considered when assessing reliability in the NEM.

Equally, the MEU considers that the retention of Reserve Trader (as refined in recent years by the RP) also plays an essential, albeit occasional, part in ensuring reliability in the NEM.

## 2. An overview of the Issues Paper and other observations

The Issues Paper seeks stakeholder views as to whether the Reserve Trader (RERT) should be extended beyond its currently set sunset timing of 30 June 2012. If the RP considers the Reserve Trader should be extended, then the PR is to provide the AEMC with its view as to the period the Reserve Trader should be extended by.

The Terms of Reference set for this review by the RP, also requires the RP to:

- "consider if the RERT mechanism is required to ensure that the reliability of supply in a region or regions meets the relevant power system security and reliability standards and where practicable, to maintain power system security;
- examine the potential and/or actual effectiveness of the RERT arrangements as specified in the Rules;
- consider the national electricity objective (NEO) contained in section 7 of the National Electricity Law (NEL) when it considers issues that arise in the review and when making associated recommendations."

The Issues Paper makes some useful observations about the RERT and the outcomes of it. The Paper notes that:

1. The design of the Reserve Trader has been modified a number of times, with the major change allowing AEMO to contract ahead for long (up to 9 months ahead), medium and short (a few hours ahead) term regional shortfalls
2. The current design of the RERT has not been used by AEMO
3. The RERT Panel established by AEMO has only one member, which seems to be contrary to the advice of AEMO which implies there are a number of potential providers on the RERT panel (see below).


# AEMO ENTERS INTO RESERVE AGREEMENTS

As covered in the December edition of *AEMO Energy Update*, AEMO last year requested Expressions of Interest from potential electricity reserve providers to form a panel under the Reliability and Emergency Reserve Trader (RERT) process. The purpose of this panel's formation was to establish agreements with RERT members that would enable AEMO to procure reserve supply within Medium Notice and Short Notice emergency situations. This process can be called on during times of peak demand to bolster supply to customers.

AEMO received a number of submissions from various electricity market participants in response to the call for Expressions of Interest in December, and has since established a panel of RERT members with service agreements implemented.

Under the RERT panel guidelines, AEMO is also required to reach agreement with the jurisdictions on cost sharing and the upper price threshold for accepting RERT offers for Short Notice situations. Agreements with most jurisdictions are now in place and discussions are continuing to finalise this process.

4. Reserve Trader has been triggered only twice since the NEM commencement and on neither occasion was the additional power acquired actually used. The Paper notes that the costs incurred for both occasions was $1.105m for 195 MW in 2004/05 (a unit cost of $5,600/MW), and $4.4m for 375 MW in 2005/06 (a unit cost of $11,700/MW). To put these costs into perspective, ACIL Tasman (in its generator cost report for the AEMO 2009 ESoO) implies that the cost for OCGT generation is about $100,000/MW/year.

An unspoken but clear message is that as Reserve Trader has never been used and as there is a cost to continue its use, should Reserve Trader be retained?

## 2.2 Load shedding in 2008/09

In its Review of the Effectiveness of NEM Security and Reliability Arrangements in light of Extreme Weather Events, the AEMC issued its final report on 31 May 2010. In that report, it advised in table 5.1 that there had been only two instances where the Reliability Standard (USE = 0.002%) had been exceeded, and both of these (one in Victoria and one in SA) were related. The report comments that:

> "The conditions that lead to the 2008-09 load shedding event have been estimated by AEMO as a 1 in 20 year event. As the NEM is planned to meet 1 in 10 year extreme demand events, some load shedding during 1 in 20 year extreme demand events is not unexpected."

At the time of the load shedding in 2008/09 there was demand side response available in both SA and Victoria that could have been provided as there were end users and a demand side aggregator prepared to offer load shedding (such as by Energy Response) but NEMMCo was unable to avail itself of these offers because of the market design. The recent revisions to the Reserve Trader design introduced by the RERT variations, should enable these offers to be used more readily.

The clear import is the compulsory shedding of load in this instance might have been avoided if NEMMCo was allowed to access commercially available sources of supply or commercially available voluntary load shedding, rather than compulsory load shedding. If the changes to the Reserve Trader rules (to RERT) had been implemented prior to the 2008/09 load shedding, it is probable that this loss of supply would have been avoided.

## 2.3 Will increasing MPC help avoid load shedding?

The use of MPC to encourage generation investment has been discussed at length during the various reviews by the RP, and most recently in February 2010. In the 2010 review the RP consultant (ROAM Consulting) advised that an increase in MPC from $12,500/MWh to $16,000/MWh was required to ensure the reliability standard of USE = 0.002%. They also advised that the cost to the market (ie to consumers) for this increase would be significant.

In its response[1] to the RP draft report on the 2010 review the MEU commented:

> "Based on the calculated price rises for each region for the next four year, ROAM modeling indicates that the change in MPC from $12,500/MWh to $16,000/MWh will cause an average increase in spot price of $2.70/MWh.
>
> AEMO forecasts that the NEM will consume some 230,000 GWh of electricity in 13/14, and that demand at 10% PoE will need to be 44,000 MW.
>
> The outcome of these forecasts is that the increase in MPC from $12.5k to $16k (with no other changes) will cost the NEM some $620m in the year 2013/14 based on the spot market."

The import of this analysis is that use of the MPC as a tool for incentivizing generation investment is not costless to consumers. Therefore, any analysis of the costs for implementing RERT needs to be assessed in terms of the costs incurred by use of other tools in ensuring reliability of supply.

Further, as noted in section 1, using MPC to ensure reliability is a very indirect approach and does not guarantee there will be no loss of supply. In fact, prior to the load shedding in SA and Victoria, it had already been announced that MPC was to increase to $12,500/MWh on 1 July 2010.

Therefore, it cannot be assumed that using MPC exclusively (as would be the case if RERT is not extended) is both expensive and does not guarantee that load shedding can be entirely avoided.

### 2.4 The costs of Reserve Trader in perspective

The Issues Paper points out that the proposed use for Reserve Trader in 2004/05 was $1.105m for 195 MW of standby supply and in 2005/06 was $4.4m for 375 MW of standby supply. There are two comparisons that should be made.

The first is that the cost of installing new standby generation is of the order of $100,000/MW. This is massively higher than the cost of the standby provided by the Reserve Trader program for the period of time where NEMMCo had considered there was a risk of insufficient supply, indicating that the Reserve Trader program is cost effective.

The second reflects the amount of electricity traded in Victoria and South Australia[2] in the summer quarter (December, January and February) of 2004/05 totaled $0.805Bn, and in 2005/06 totalled $1.851Bn. Therefore, the cost of the Reserve Trader programs for the shortfall in SA and Victoria identified for 2004/05 was 0.14% of the trade in

[1] Reliability Panel 2010 Review of reliability standard and settings (MPC). Comments on RP Draft Report and ROAM Consulting Analysis and Recommendations by Major Energy Users Inc February 2010

[2] Spot market data provided by NEMMCo

electricity over the summer period seen as at risk, and 0.24% of the trade in electricity over the same period the following year.

The fact that Reserve Trader was not required because the demand forecast was higher than actual, is not at issue. The real issue is that the use of Reserve Trader provided greater certainty that involuntary load shedding might not occur, and at a very low cost.

In contrast if the MPC had been used to improve the certainty of no involuntary load shedding, the cost would have been much higher. Based on the ROAM Consulting figures, a 22% increase in MPC (from $12,500/MWh to $16,000/MWh) results in a $2.70/MWh increase (see section 2.3 above) in the average annual cost of power for an entire year. As the SAVic region is summer peaking this cost would have to be allocated to the summer quarter, implying that the cost incurred would be an increase of four times this as the incentive is to provide power to meet the peak period needs. On this basis, the cost of providing the additional supply just for the summer quarter might be of the order of $10-11/MWh.

In 2004/05, the volume weighted average spot price for the summer quarter in SAVic was $26.85/MWh and in 2005/06, summer quarter was $60.23/MWh. To provide an MPC incentive to these two years might have increased the cost of power in the summer quarters by nearly 40% (04/05) and some 17% (05/06).

### 2.5 Timing

Building new generation involved considerable time. From the time new investment in generation is contemplated to when it can deliver power into the NEM can take many years. Activities involve proving the commercial viability of a proposal, identifying a location and securing permits, seeking internal and external funding, and designing, construction and commissioning. Even with the simplest of power generation (eg OCGT) the total time lag is 3-4 years from contemplation to commissioning. For more complex power generation systems, even longer is required.

The setting of MPC combined with the publishing of the ESoO provides the necessary input to providing long term investment in generation. They cannot address the needs identified for a shortfall forecast in the near future due to the lead times involved.

The basic concept of the Reserve Trader program is to identify if there is a need for standby power for the coming summer in any region, and this provides only some 9 months lead time. There is little chance that a permanent generation option can be provided in such a timeframe and so alternative solutions to ensuring reliability for the coming summer.

In this way, Reserve Trader and MPC need to be considered to be complementary and not substitutes for each other.

## 2.6 Distortionary effects of RERT

It is acknowledged that a perfectly designed market should not need "patches" (such as Reserve Trader) to address shortcomings in the market. However, it must be agreed that the NEM design is not perfect and has inherently many elements which are compromises.

For example,

- The regional design itself is a compromise when a nodal design would be more cost reflective,
- Generators price on 5 minute dispatch periods but market costs are averaged over the ½ hour,
- That there are many points of regular congestion preventing free flow of electricity attests to compromise,
- Because there are some very large generators in some regions, their market power prevents competition alone from setting the market price,
- Averaging of network prices for convenience sake precludes consumers from seeing locational signals
- Most consumers do not see the ½ hour prices but pay on 3 monthly averages due to metering costs
- The electricity market assumes that the financial markets will always provide necessary finance regardless of world trends.
- The electricity market assumes there will not be external distortions introduced, yet the market now has to accommodate the renewable energy program (eRET) and the cost of carbon (CPRS).

If the market was to operate perfectly and if all participants reacted positively to market signals and if finance was always available, then perhaps Reserve Trader is not needed. But the MEU knows that the NEM design is not perfect.

The Issues Paper (rightly) points out that Reserve Trader (if it operated for more than a short "look ahead" would distort the energy only market concept and probably make it look like a capacity market. The MEU has always been of the view that certainty of supply engendered by a capacity market is a better solution than the indirect certainty of supply provided by an energy only market.

Accepting that the market design is based on an energy only market, the MEU sees there is a need for the Reserve Trader program to provide for short term (9 month look ahead) reliability as there is no other instrument in the energy only market design which will provide reliability for supply in such short time frames.

The MEU agrees with the Issues Paper that the implementation of the Reserve Trader should cause as little distortion as possible. The current RERT requirements achieve this goal when combined with the data and information AEMO is required to publish on a regular basis.

## 2.7 Effectiveness of RERT

The new Reserve Trader rules have not been used to date and so it is difficult to assess their effectiveness.

Notwithstanding this, the MEU considers that the new rules should provide greater reliability of supply to obviate potential for loss of supply in the short term outlook applying to the RERT.

What has not been made clear in the Issues Paper is whether commercial programs for aggregating a number of demand side providers (such as those managed by Energy Response) has been enabled by the RERT design. If these demand side options are not allowed to be dispatched, then the RERT design needs to be modified. The RP should provide clear advice on this issue as MEU sees this ability to aggregate and provide demand side responses as part of RERT is an essential element for the success of RERT.

## 2.8 Summary

Reserve Trader program has been a feature of the NEM since inception. That it is still part of the NEM rules and has been modified to make it more effective, clearly indicates that it serves a useful purpose. Consumers see it as a low cost way of providing the certainty that load shedding is unlikely to be needed.

The Reserve Trader program is only initiated when there is forecast a potential shortfall in generation supply in a specific region in the coming summer. As such it is very targeted to the needs in the NEM.

Building new generation has a significant time lead, so securing new generation supply for the coming summer is not really an option.

The Reserve Trader program would appear to be a quite cost effective solution to other approaches to secure reliability for a shortage identified in the near term. The negative aspects of increasing MPC are avoided.

The RP needs to assess whether all available options for demand side response are permitted by RERT.

# 3. The RP Questions

In its Issues Paper the RP has posited 3 questions:

1. The Reliability Settings have been set at levels that are expected to encourage sufficient investment in new capacity. Do stakeholders consider that the residual risk of insufficient capacity being available in the future is high enough to retain a form of reliability safety net (of similar form to the reserve trader)?
2. If a form of reliability safety net is required, do stakeholders consider that the current short, medium and long-notice forms of the RERT are effective?
3. Do stakeholders consider that the current expiry date for the RERT is appropriate and, if not, what is the most appropriate date?

The MEU responds to these as follows

## 3.1 Should RERT be retained?

Yes. The reason for this emphatic affirmative is that the MEU considers that there is a residual risk that there may be a short term shortfall.

The need for RERT will be identified by AEMO on an annual basis for each region. The decision has been made that MPC should be retained at $12,500/MWh indexed to CPI. This is an increase from the level of $10,000/MWh applying up to 30 June 2010.

The level of $10,000/MWh applied for the periods when Reserve Trader was invoked (but not used) and for the period when involuntary load shedding occurred in 2008/09 but a need for Reserve Trader had not been forecast.

The increase in MPC is intended to result in more investment in generation than occurred under a lower MPC, thereby reducing the need for Reserve Trader. But this surmise has yet to be demonstrated, and until this connection can be proven to obviate the need for RERT than RERT must be retained to maximise the ability to not exceed the Reliability Standard of USE = 0.002%.

Even if there is sufficient generation forecast for the coming summer period, there still resides a risk that one of the generation plants may fail prior to the summer period, despite the best efforts of all. Retention of RERT will allow AEMO to overcome a projected shortfall in the minimum reserve levels AEMO uses in its estimates.

In particular, RERT has the ability to access demand side options for covering shortfalls. Increasing the level of MPC is unlikely to lead to more demand side activity when there is the potential for supply side shortages. Accessing this demand side activity is feature of RERT.

As noted above, Reserve Trader is demonstrably cost effective, even when compared to the costs of increasing MPC. If RERT continues to be cost effective, then its

continued use in the NEM would meet the NEO in that retention of RERT would be "… in the long term interests of consumers" in respect of price.

The MEU considers that there is a need to demonstrate over a considerable period that there is no need for RERT after the introduction of the increased levels of MPC. Until this link between increased MPC has resulted in there being no shortages forecast by AEMO, it is premature to consider the removal of this option to ensure continued reliability.

The MEU therefore considers the RERT should be maintained until there is a clear demonstration that it is no longer needed and that the other reliability settings have achieved certainty of long term supply.

As RERT is the only mechanism that has the ability to provide commercially attractive demand side responsiveness, ant decision to remove RERT should be made with the understanding that this ability will be lost to the market.

### 3.2 Is the current structure of RERT effective?

The current structure of RERT has yet to be proven as RERT has not yet been needed since its current form was implemented.

In principle the MEU considers that the current structure of RERT has the potential to be more effective than the previous forms of Reserve Trader, as it recognizes that the market might display a need for short term supply to overcome a shortage resulting from unforeseen conditions.

The RERT has not demonstrated that it can accommodate commercially available demand side aggregated offers (such as offered by Energy Response and others) and the MEU considers that unless RERT can use these, then it should be modified to make this possible.

### 3.3 Expiry date for RERT

RERT is targeted to expire 30 June 2012. This is the same date that the new level of MPC is to be implemented (ie $12,500/MWh indexed).

The current level of $12,500/MWh will have only operated for 2 years by this time and therefore there will have been little time to assess whether the new level of MPC has provided sufficient certainty of supply to overcome the need of RERT.

The changes the RP has recommended in relation to AEMO forecasting of future needs will have also only been in operation for a few years and these added features have yet to be seen to have resulted in adequate investment being made.

The MEU considers that by 2012 there will have been insufficient elapsed time to assess the benefits of the revisions to the AEMO forecasting and when this is combined with there being insufficient time for assess the outcomes of the increased

MPC, it is patently clear that allowing the RERT to expire before the benefits of the changes made are be assessed to the extent required to warrant the removal of the safety net RERT provides, will be quite detrimental to consumer interests.

Overall, the MEU considers that the RERT provisions should be retained for another 4 years after the most recent change in the MPC scheduled for July 2012.

# APPENDIX 1

**Analysis of the NEM operation**

The data shows that the impact of a very few price spikes has a massive impact on the average spot prices. In particular, 78 high price events in SA in 2008 (ie for 0.5% of the time) caused over half (57.1%) of the average volume weighted price.

The time weighted price reflects the spot price to a user with a flat load. The volume weighted price reflects the spot price to a user with a load that matches the regional average.

If the flat loads are excised from the average demand, a typical residential user would exhibit a load which has more peak demand than the average state demand shape and so would pay a higher price than the volume weighted average

| 2009 data | Qld | NSW | Vic | SA | Tas | NEM (excl Tas and Snowy) |
|---|---|---|---|---|---|---|
| % of average annual volume weighted price caused by >$300 price spikes | 24.2% | 42.5% | 34.4% | 66.5% | 31.9% | 39.9% |
| % of average annual volume weighted price caused by >$1000 price spikes | 23.5% | 41.0% | 34.1% | 65.7% | 27.9% | 38.9% |
| Av annual time weighted regional price $/MWh | 34.13 | 43.92 | 36.48 | 60.47 | 50.20 | 43.75 |
| Av annual volume weighted regional price $/MWh | 37.42 | 51.63 | 43.68 | 89.84 | 53.82 | 48.34 |
| # price spikes >$300/MWh in 2009 | 42 | 89 | 37 | 129 | 103 | 297 |
| # price spikes >$1000/MWh in 2009 | 33 | 56 | 27 | 78 | 64 | 196 |

| 2008 data | Qld | NSW | Vic | SA | Tas | NEM (excl Tas and Snowy) |
|---|---|---|---|---|---|---|
| % of average annual volume weighted price caused by >$300 price spikes | 22.9% | 14.1% | 10.3% | 57.1% | 0.7% | 24.3% |
| Av annual time weighted regional price $/MWh | 43.87 | 39.12 | 40.24 | 66.37 | 49.73 | 47.41 |
| Av annual volume weighted regional price $/MWh | 48.81 | 42.13 | 43.45 | 92.70 | 50.67 | 47.70 |
| # price spikes >$300/MWh in 2008 | 62 | 23 | 21 | 78 | 4 | 184 |

| 2007 data | Qld | NSW | Vic | SA | Tas | NEM(excl Tas and Snowy) |
|---|---|---|---|---|---|---|
| % of average annual volume weighted price caused by >$300 price spikes | 25.9% | 27.3% | 19.7% | 12.1% | 4.5% | 24.1% |
| Av annual time weighted regional price $/MWh | 66.84 | 67.07 | 63.40 | 57.49 | 56.85 | 63.70 |
| Av annual volume weighted regional price $/MWh | 72.73 | 76.01 | 69.58 | 64.89 | 58.97 | 72.68 |
| # price spikes >$300/MWh in 2007 | 160 | 213 | 132 | 78 | 36 | 583 |

| 2006 data | Qld | NSW | Vic | SA | NEM (excl Tas and Snowy) |
|---|---|---|---|---|---|
| % of average annual volume weighted price caused by >$300 price spikes | 18.2% | 20.6% | 20.9% | 19.4% | 20.1% |
| Av annual time weighted regional price $/MWh | 25.97 | 31.01 | 34.13 | 38.68 | 31.02 |
| Av annual volume weighted regional price $/MWh | 28.23 | 34.81 | 37.65 | 44.68 | 34.49 |
| # price spikes >$300/MWh in 2006 | 27 | 32 | 47 | 62 | 168 |

| 2005 data | Qld | NSW | Vic | SA | NEM(excl Tas and Snowy) |
|---|---|---|---|---|---|
| % of average annual volume weighted price caused by >$300 price spikes | 19.6% | 36.6% | 7.6% | 10.1% | 24.6% |
| Av annual time weighted regional price $/MWh | 25.17 | 35.83 | 26.29 | 33.60 | 30.22 |
| Av annual volume weighted regional price $/MWh | 27.12 | 40.84 | 27.83 | 36.76 | 33.44 |
| # price spikes >$300/MWh in 2005 | 26 | 67 | 24 | 35 | 152 |