Electricity Markets Research Institute

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Submission on the Annual Market Performance Review 2008-09 (draft) by The Reliability Panel

Preface

This submission is based on an intimate knowledge of the Victorian Electricity Industry Restructuring, the close involvement with the establishment of the National Electricity Market (NEM), over 15 years experience in electricity cost modeling and pricing development, both under a regulated environment and in the new competitive market, and a keen interest in the techno-economics of energy use in Australia.

Electricity Markets Research Institute (EMRI) undertakes research with primary focus on:

- Public benefit aspects of competitive energy markets;
- Technical and market efficiency;
- Equity issues;
- Transition issues going from integrated utility in a monopoly market to competitive marketing.

A brief write-up of the work of EMRI and a short biography of the author are given in Attachment A.

Electricity Supply Industry still evolving

Electricity industry has undergone very significant transformation and still continue to change, much more than other industries. Industry is faced with two major challenges, a) responding to climate change, and meeting the huge investment requirements over the next two decades. To compound the issue, investment requirements are multiplied by the consequences of climate change and the actions being taken to address climate change. Climate change means we now have much higher summer temperatures and for longer, as a consequence of which maximum demand has been rising at double the

rate of annual energy use. What has not been adequately assessed is the impact of the higher ambient temperatures on electrical equipment ratings. We had the case in Queensland where power stations had to be shut down due to lack of clean water for cooling. Victorian generators use very large quantities of scarce clean water. Actions being taken to address climate change include very significant increase in renewable energy sources like wind and solar, both subject to intermittent output with need to increase back-up capacity and usually located some distance from load centres. Follow-on actions include early retirement of coal power stations and the eventual decline in the proportion of base load plant as we have now.

Such changes in our operating environment will have drastic impact on the future operation of the electrical power system. Sadly the Reliability Panel has decided to take a 'backward looking' approach [*over the long-term using a moving average of the actual observed levels of annual unserved energy (USE) for the most recent ten financial years*] when the Reliability Standard is forward looking [*no more than 0.002% of the annual energy of consumers in any region is at risk of not being supplied*]. There is no proper basis for statements such as:
"*load shedding event in the Victoria and South Australia regions on 29-30 January 2009 resulted in USE that was greater than 0.002% in both regions for the 2008-09 fiscal year. However, it should be noted that the long-term (?) Reliability Standard was not breached due to this load shedding".* The above statement taken in conjunction with the statement below, is worrying – it would appear that the Reliability Standard is under real threat:
"*The latest update (report on the impact of the current drought on system reliability by AEMO) was published in September 2009, covering the study period from May 2009 to April 2011. This report advised that under the low rainfall scenario, the NEM is likely to exceed the Reliability Standard of 0.002% USE during the 2010-11 fiscal year in New South Wales and Victoria*".

No amount of 'beating the chest' to say how good we were 10 years ago is going to change the threats posed by altered conditions of today. We need to wake up to reality.

Scientific approach to risk and reliability

It is time that the electricity industry adopted a more scientific approach to risk and reliability. The airline safety record significantly improved when they went from counting the number of crashes to concentrating on 'near misses'. According to the Airspace Risk Model a critical event or 'near miss' occurs when two or more aircraft come within defined horizontal (1 Nm) and vertical (500 feet) limits without being aware of the other's presence. There are various risk assessment models and I am happy to leave it to the experts to provide more specific advise to the Reliability Panel, sufficient to say that a typical risk analysis "defines the system, sets the evaluation criteria, identifies hazards, estimates frequency, models consequences, estimates/evaluates risk, and where possible recommends risk reduction measures". An example of a hazard would be the impact of increasing ambient temperatures on the reliable operation of electrical plant and equipment. At the moment AEMO accepts safe current ratings specified by the various plant owners, so there is no process for a consistent and reliable assessment of the total system capability and no capacity to model the consequences.

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Network Performance and Distributed Generation

The Reliability Panel was right to include Section 3 on Network Performance, drawing attention to the reliability performance of the local transmission and distribution networks. With the centralizing of the Regulatory Regime that apply to these networks, maybe a more rational and consistent approach will evolve in the near future. What the Review did not mention is the **diabolical dilemma** the electricity industry has 'to deliver a level of reliability a customer is prepared to pay for'. For example the value of customer reliability (VCR) equal to $ 55,000 as used by AEMO for planning the Victorian transmission system is completely out of proportion to the value of reliability to a rural householder on a long rural feeder, where the allowed regulatory target for interruptions (planned and unplanned) is around **370 minutes** per year. Added to this diabolical dilemma is the inconsistency between the level of reliability for such a customer and the reliability target of *0.002% of the annual unserved energy* set for the wholesale bulk electricity market and transmission system. The 0.002% translates to **10.5 minutes** per customer per year. This very significant discrepancy cannot and should not be allowed to be brushed off by saying "only a few customers are connected to long rural feeders. According to ESAA data, the overall average minutes off supply (SAIDI) for 2007-08 was **231 minutes**, so a very large proportion of customers get a very poor level of electricity supply reliability (relatively) while only a small proportion of customers enjoy a level of overall reliability somewhat commensurate with the 0.002% reliability standard.

To some extent the electricity industry is a victim of it's own successes. A few decades ago when the supply reliability level was not as good as it is today, customers like hospitals, airports, high rise buildings, public utilities like water and sewerage, etc, ie customers who required a level of supply reliability higher than was being delivered b the electric utility, had their own stand-by generators to improve their own reliability level. With time their need for such extra support became less and such stand-by units were abandoned or not installed. Today only a few institutions like hospitals and airports have small stand-by sets only sufficient to operate critical parts of their businesses. If adequate returns are provided for such stand-by units to contribute to improving power system reliability, 'opportunity cost' of such units come down, more of such units will get installed and will pave the way to a more equitable costing base for supply reliability.

To properly address this **diabolical dilemma** the electricity industry need to do two things:

a) Concentrate attention on overall reliability, have a consistent and scientific approach to all facets effecting electricity supply reliability. This means networks also must go from focusing on 'backward looking' reliability assessments (eg SAIDI which is history) to 'forward looking' measures like 'near misses'. AEMO translates the 0.002% reliability standard to a minimum reserve requirement and puts out LOR notices when these requirements are under threat. There must be a common appreciation and guidelines for adopting Credible Contingencies and when to change a non-credible contingency to a credible contingency. Distribution system operators / regulator also must adopt forward looking measures like these measures and focus on maintaining reserves. A more detailed proposition is contained in

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Sections C.2.0 to C.2.3 of my submission of 5 June 2009 to the Australian Energy Market Commission - Draft Report on Review of Demand Side Participation in the National Electricity Market found at: http://www.aemc.gov.au/Media/docs/Electricity%20Markets%20Reserch%20Institute-f00b2361-4e23-423a-bd0d-ebe1d7d5cf27-0.PDF
A key message in that submission is the fact that current regulatory arrangements where demand side response is made the responsibility of the local network, is not an efficient arrangement. The electricity pool price is the dominant signal for garnering customer response to alleviate shortfalls in power supply availability. For efficient demand side response it is absolutely necessary that both pool market price signals and incentives for clearing local network congestion work in unison. The new bridging technologies mentioned in the submission provide a single platform for accomplishing both. Regulation is supposed to emulate markets and must promote market mechanisms that enable efficient market behaviour;

b) Stop the 'lip service' currently being paid to distributed generation and put forward real targets and incentives to facilitate distributed co-generation that can operate in response to market / network constraints. Such co-generation will also prove to be more cost effective in achieving GHG emission reduction targets than possible with the current emphasis on renewable energy sources. A more detailed proposition is included in my above mentioned submission of 5 June 2009 to the Australian Energy Market Commission and is contained at Sections B.5 to B.7.4

Thank you for this opportunity to provide comment. I would be happy to give the Reliability Panel a presentation on the coming "Paradigm Shift in Electricity Supply" that include potential roles for Opportunity Power ™ and Energy Arbiter ™. The Reliability Panel members will then have the opportunity to ask any questions they might have.

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Attachment A

Electricity Markets Research Institute (EMRI) undertakes research with primary focus on:

- Public benefit aspects of competitive electricity markets:
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- Equity issues,
- Transition issues going from integrated utility in a monopoly market to competitive marketing.

Other research & consultancy work cover:

- demand side response in the context of the electricity pool market;
- retail pricing and value studies;
- distributed generation;
- network and ancillary services pricing.

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Biography of Lasantha Perera, Director - National Electricity Markets Research Institute

September 2001 to January 2004, was Assistant Director at the Office of the Tasmanian Energy Regulator responsible for setting up the Performance Monitoring and Reporting section and providing technical advise to the Regulator. Also provided technical and secretarial support to the Reliability and Network Planning Panel responsible for setting standards for the Tasmanian power system and making recommendations to the Regulator on network investment proposals

Until July 1999, was Manager Pooling with Eastern Energy Ltd. Played a significant part in the deliberations of various bodies connected with the setting up of the National Electricity Market, including membership in the Dispatch and Pricing Reference Group. Was a founding member of the National Retailers Forum and have made many submissions to NEMMCO, NECA and the ACCC on different facets of the National Electricity Market.

Was inducted into Eastern Energy at its inception in 1994 and as Manager Pricing and Forecasting set up their Pricing and Forecasting section, participated actively in the trade sale process and managed the contestable customer pricing process.

As Pricing Analysis Manager with SECV spent seven years working on pricing development, cost of supply studies and the development of industry cost models, and defining price paths to reduce cross-subsidies. Was an active participant in the Victorian Electricity Supply Industry Restructuring process involving industry codes, Tariff Order and network pricing.

Has a MSc in Technological Economics from the University of Stirling in Scotland, is a Chartered Engineer from both the Electrical and Mechanical Institutes in the UK. Has over 35 years experience as an engineer / techno-economist, with work experience covering electricity generation, distribution, contracting, engineering jobbing, co-generation plant maintenance and R&D into renewable energy sources.