

# **Submission on the National Framework for Non-Economic Distribution and Retail Regulation**

**18 July 2007**

## **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.

## **Introduction**

Since the advent of electricity industry restructuring in the 1990s, very significant changes have happened within the industry and there has also been significant impact from external factors as well. Key factors include:

- Programs to contain impact of global warming has favoured renewable energies like solar photovoltaic and wind mills, while providing minimum incentives for energy efficiency, co-generation and distributed generation from less polluting energy sources. Up to now costs of such programs are recovered through a retail levy, providing no incentive for polluters to reduce their emissions;
- More severe draught conditions restricting electricity generation from hydro sources (eg Snowy) and some key coal power stations (due to shortfalls in supply of cooling water);
- Corporate re-groupings that seek to achieve economy of scale by combining retail of gas and electricity;
- Corporate activity that seek to de-risk electricity retail by direct or indirect control of electricity generation;
- Corporate activity that have de-linked distribution network ownership from retail function making it difficult to justify retailer of last resort arrangements and weakening the financial standing of some major retail entities;

Electricity Markets Research Institute, PO Box 6158 Vermont South, Victoria 3133 Australia

Telephone: +61 3 9803 7170

Email: lasantha@bigpond.com

Mobile: 0439 803 717

- Most states within the NEM now have significant supplies of natural gas and the national gas market has helped to level out natural gas prices within Australia;
- Significant technology changes have happened facilitated by the more ready availability of natural gas and the break-up of the vertically integrated monopoly structures that prevailed before (eg smart meters, automated meter reading and domestic co-generation);
- Mass production of small stand-by generator sets have seen their prices drop very significantly (around \$300 per Kw compared to around \$600 per kW for a industrial type gas turbine generator) paving the way for distributed co-generation even at the residential customer level provided the retail fuel pricing issue can be satisfactorily resolved.

This and other reviews currently happening in connection with the new governance arrangements for the national energy market have failed to assess the benefits and threats from these major changes that are happening. Neither have they properly reassessed the major drawbacks faced by customers under the old arrangements. Some of the key disadvantages that impact the more vulnerable customers are:

- Pool market is one sided in that only generator bids are taken into account to find market clearing price. This constitutes an inbuilt incentive for the generators to game the market, ie an increase in price by the marginal generator, provides greater profit for that generator and to all other generators supplying the market in that period. As the retailers have no say in setting aggregate demand, they are unable to influence market price determination. This is different from a wholesale market for any other commodity, where buyers can and do determine quantity depending on price;
- NEM market design is based on marshalling supply to meet variable load keeping redundant generating and line capacity as back-up. Redundant generating and line capacity is very expensive, adding approximately 20% to the customers' bill. Given that retailers hedge their exposure to pool price volatility, there is an additional 10% added to the cost of the energy component. Retail prices based on average costs including hedge costs, provide very little opportunity for demand side to respond to price excursions in the electricity pool market (energy traded in the pool market is consumed at the same instant by the retail customer, so affective control of pool price needs instantaneous customer response);
- Network pricing does not adequately reflect cost of providing reliability consistent with the level of reliability that is delivered to specific locations;
- Up to now it has not been possible to provide different customer classes the different levels of reliability appropriate to what they are prepared to pay. Customer Value studies (& outage cost studies) have clearly demonstrated that residential customers value lost load significantly less than business customers. NEM reserve margins are based on a single level of reliability (0.002%). This level of reliability in the energy component is meaningless to a rural customer served by a radial line that may be capable of delivering only 1% reliability on average;
- Current treatment of network losses is the customer purchases extra energy equivalent to the losses derived as the product of metered energy over the settlement period and

Electricity Markets Research Institute, PO Box 6158 Vermont South, Victoria 3133 Australia

Telephone: +61 3 9803 7170

Email: lasantha@bigpond.com

Mobile: 0439 803 717

the loss factor at the transmission / distribution connection node. The loss factor is the marginal loss factor at that node, in other words the extra energy that must be sent out at the generators to enable extra delivery of one unit of energy from the said node. The problem with this methodology is that while the marginal loss factor gives a correct derivation of the losses, the apportionment of losses to customers does not take account of the laws of physics that say losses are proportional to the square of the current (or load when the voltage remains constant);

- In the past state governments provided mechanisms (grants or reduced dividends) for subsidising network investment in rural areas. As these subsidies were not asset specific, they have now been smeared across the total asset base, transferring the benefits to all customers. This has happened also to customer contributions paid by some rural customers, requiring them to pay increased network charges under NEM rules;

### **Outline of new technologies currently available**

As mentioned previously technology development in various fields have been converging, opening up new opportunities to resolve some of the outstanding issues faced specially by vulnerable small energy customers. Always on communication facilities to the home are now available via different mediums, such as broadband (hybrid fibre optic cable, ADSL, wireless, Powerline, etc). Computers and control systems have combined to provide new low cost options for home automation. More efficient heat pumps are being increasingly deployed so much so it is becoming a big headache for many electricity distributing companies.

Two Australian patents briefly described below are now able to combine some of the above mentioned technology developments so as to deliver electricity from mass market distributed co-generation systems at a price less than for electricity from base load coal fired power stations. The excellent and timely demand side response to price excursions in pool type electricity markets from this application will be significant boon to all customers and for more efficient market outcomes. They also incorporate provisions for network operators and the electricity market operator to influence timely demand response with very little effort.

First Australian patent involves a retail energy forward contract that provides Time-of-Use prices (periods corresponding to time periods in the pool market) for energy requirements over the contract period and an energy entitlement that can be traded at the underlying pool price. Is supported by a computer based energy management system that can connect and disconnect loads according to pool price variations, customer specified load priority settings and application specific threshold values. (Australian Patent 748800)

The second Australian patent involves a triple mode load-drive-generator system that improves reliability by:

Electricity Markets Research Institute, PO Box 6158 Vermont South, Victoria 3133 Australia

Telephone: +61 3 9803 7170

Email: lasantha@bigpond.com

Mobile: 0439 803 717

- having two modes of driving the load;
- having the capacity to generate electricity to substitute for the mains power supply or to supplement the mains power supply;

and reduces cost, by:

- arbitraging between cost of electricity from the mains supply or cost of alternate fuel used by the engine when meeting load requirements;
- optimizing on heat recovery from the engine;
- possible export of power to support network or energy market requirements.

(Australian Patent 2005316188)

Stakeholder benefits include:

- small residential and business (commercial) customers, specially customers who place less value on lost load than is implied by the system reliability target for that location;
- Medium and large customers, especially customers requiring a level of reliability higher than the system average for that location;
- Network service providers, network investment and network performance incentives;
- Improves operation of retail market, energy price hedge market and retail activity;
- Expanded generation and reserve capacities
- Market operations facilitated, reduced need for market price cap or involuntary load shedding and reduced potential for abuse of market power
- Less regulatory intervention required from both state based and national regulatory authorities;
- Public at large benefit from reduced greenhouse gas emission, less demand for water, enhanced economic activity in general, eg jobs creation, overall price levels

Main indirect benefits include:

- helps resolve the problem of mismatch between the value customers place on reliability (varies by customer class) and the cost share of target level (same average for all customer classes) of system reliability;
- provides a market alternative to network related load shedding, that can be linked to regulatory capital expenditures and network performance incentives;
- improves the operation of pool markets and reduces the need for pool price caps;
- reserve capacity more equitably spread between demand and supply sides;
- reserve capacity requirements satisfied at lower cost;
- reduces market impact of supplier dominance and extreme pool price volatility;
- reduces network energy losses;
- reduces investment in network augmentation;
- significant improvement in energy conversion efficiencies;
- reduces carbon dioxide emissions;
- reduces use of water by large electricity generators;

Electricity Markets Research Institute, PO Box 6158 Vermont South, Victoria 3133 Australia

Telephone: +61 3 9803 7170

Email: lasantha@bigpond.com

Mobile: 0439 803 717

- reduces overall cost of electricity;
- more jobs created due to use of smaller units / systems involving larger proportion of local content.

**I would be happy to give a confidential presentation to the MCE Standing Committee of Officials on the workings of these two technological developments.**

Thanking you for the opportunity to present this submission.

Lasantha Perera  
Director, Electricity Markets Research Institute  
4, Baranbali Drive, Vermont South VIC 3133

Electricity Markets Research Institute, PO Box 6158 Vermont South, Victoria 3133 Australia

Telephone: +61 3 9803 7170

Mobile: 0439 803 717

Email: lasantha@bigpond.com

## Attachment A

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

- Public benefit aspects of competitive electricity markets:
- Technical and market efficiency,
- 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.

### Contact Details:

**Lasantha Perera, Director**  
**Electricity Markets Research Institute**  
**P. O. Box 6158,**  
**Vermont South VIC 3133, AUSTRALIA**

**Telephone : +61 3 9803 7170**  
**E-mail : [lasantha@bigpond.com](mailto:lasantha@bigpond.com)**

### 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.

Electricity Markets Research Institute, PO Box 6158 Vermont South, Victoria 3133 Australia

Telephone: +61 3 9803 7170

Mobile: 0439 803 717

Email: [lasantha@bigpond.com](mailto:lasantha@bigpond.com)