COMMENTS

INVESTMENT SIGNALS IN THE NATIONAL ELECTRICITY MARKET: A COMMENT

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INTRODUCTION

One of the key issues facing the National Electricity Market (NEM) is whether or not it is providing sufficient and timely signals for efficient market investment in new generation capacity to meet Australia's medium- to long-term energy needs.

The 'energy-only' design of the NEM assumes that the market price will provide the necessary signals (and incentives) for investment in such new capacity. However, if the required new investment does not occur, it may be necessary to consider the introduction of some sort of capacity procurement mechanism.

The final report of the COAG Energy Market Review Panel (the Parer Committee), *Towards a Truly National and Efficient Energy Market,*[1] considered these issues, and concluded that the energy-only design of the NEM should be retained. This comment discusses the investment or price signals theoretically produced by the NEM's energy-only design, the differing views as to whether the NEM is working in this regard and the alternative capacity mechanisms that have been proposed.

IS THE NEM WORKING?

Price Signals and the Energy-only Design

There is an inherent tension between a volatile (and thus risky) wholesale energy market and the capital intensive (and thus risk-averse) nature of energy-related investment: the cost and difficulty of financing major energy-generating (and also major energy-using) projects is increased to the extent that long-term energy contracts with predictable prices are not available.

Demand for electricity falls and rises on a daily, monthly and seasonal basis and the spot price moves accordingly as supply (being a function of available generation and transmission capacity) and demand are balanced. Moreover, power stations are dispatched to generate in response to five-minute demand fluctuations, which may cause brief jumps in the spot price (although these fluctuations may be off-set by the behaviour of the spot price over the remainder of the 30-minute trading interval, generators being paid on the average spot price over that 30-minute period).

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1 This report was released on 20 December 2002.

Such short-term spot price 'volatility' is seen by many commentators as a critical indicator of a healthy and correctly functioning wholesale electricity market responding to short-term rises and falls in demand. If the market is functioning properly, then it is only on rare occasions (such as emergencies) that the electricity spot price should reach the administered price cap of VoLL (the 'value of lost load'), currently set at $10,000/MWh.

The critical issue is whether there are adequate signals coming from the NEM to elicit timely investment in generation, of an appropriate kind and capacity, so as to meet forecast demand.

Periodic high spot prices (eg in times of unusually high electricity usage) means that there is a potential quantity of demand that is not being supplied by generators, perhaps because of a lack of generation capacity or because of the emergence of local transmission constraints in periods of high demand. In these circumstances, and if these high prices are confined to relatively short periods, this sends a signal that there is scope for investment in new, peaking generation. (Equally, this is a signal that demand-side management may be warranted).

Conversely, if there is a sustained and substantial increase in the median spot price (ie the most frequently occurring spot price), this sends a signal that investment in additional baseload capacity is required and is likely to be economically viable (an alternative might be to increase the transmission capacity to the affected region).

The Electricity Supply Association of Australia has estimated that, in the medium- to long-term, demand for electricity will grow at around 2.8 per cent per annum, and it is likely that most of this increase will need to be met by baseload generation.

More starkly, the Commonwealth Minister for Industry, Tourism and Resources, the Hon Ian Macfarlane, has stated that Australia requires $40 billion invested in new energy infrastructure in the next 10 years to avoid power shortages. Moreover, he has claimed that Victoria, in particular, could face blackouts unless $3 billion is invested in two new baseload power stations, just to keep up with the forecast extra demand of 1000 MW to 2500 MW over the next decade. (The Victorian Minister for Energy, Industries and Resources, the Hon Theo Theophanous, has, however, rebutted this 'doomsday prediction'.)

The 'energy-only' design of the NEM assumes that the kinds of price signals referred to above are a sufficient signal (and incentive) for the types of investment that are required. It is the nature of the 'energy-only design' of the NEM that the only payment made to generators for their plant is the price of the electricity that they generate; they do not receive any payment from the market for simply being available to generate.

Of course, the decision to invest in new generation is not a decision driven solely by considerations of the price for electricity that might be obtained by the new plant. Other relevant factors include:

- government incentives;
- the tax and regulatory environment in which the plant must operate;
- the likelihood of market intervention by a regulator;
- work force and labour issues;
- whether there is a sufficiently liquid financial market so that investors can hedge the risk that the generating plant does not obtain the revenue assumed in the project finance model;

- the availability of cheap and reliable fuel for the generating plant; and
- the accuracy of long-term economic and weather forecasts.

While many of these considerations are subjective or cannot easily be incorporated into the design of a market-based model, nevertheless they should be considered when assessing the effectiveness of the energy-only model in eliciting required new investment. These factors might, for example, distort or mask the signals that are being provided by the energy-only model.

Submissions to the Parer Committee

The Parer Committee was presented with a wide range of differing views from stakeholders on whether the NEM was providing adequate signals for investment. On the one hand, the National Electricity Market Management Company (NEMMCO) submitted that there was no need for additional incentives to be provided for new investment, and that improved price signalling by the NEM would occur as the NEM matured. In support of this view, NEMMCO pointed to recent private investment in generating plant (mostly peakers), apparently in response to market signals. Moreover, NEMMCO advised the Committee that the side effects of any capacity market or capacity procurement mechanism should be assessed carefully because:

> "A separate market for capacity procurement could, for example, encourage generators to stand out of the energy market if it is believed that greater profits could be earned in the capacity market."

It was NEMMCO's view that the accuracy of long-term demand forecasting was a much more critical factor in investment in generation capacity. NEMMCO argued that longer term demand forecasting would provide longer lead-times to allow a market response to future demand changes, and that previous examples of apparent market failures in this regard were largely due to inadequate forecasts.

On the other hand, a number of large industrial consumers (who naturally have a desire for lower priced electricity) submitted to the Committee that the NEM was deficient in bringing forth necessary investment in new generation. In their view, the NEM was not stimulating sufficient baseload investment (which would translate into lower wholesale prices), but just investment in secondhand gas-fired peaking generators (which only supply electricity at the extreme spot prices that prevail for a limited number of hours each year).

In the midst of this debate, the National Electricity Code Administrator (NECA) claimed the middle ground. It contended that the NEM had achieved 'exceptional' levels of reliability and security and that, since the NEM started, there had been significant planned new investment in generation through privately financed projects – in particular in 'crucial peaking plant'. However, NECA also acknowledged that:

> "there are legitimate questions … about whether the energy-only market design of the market provides sufficient incentive to secure adequate reserve capacity in a timely and orderly way. We are therefore currently looking again at the merits and options for some form of capacity mechanism, perhaps along the lines of that used in PJM [the Pennsylvania Jersey Maryland market], that might reduce volatility in the spot market and provide a longer-term and smoothed approach for price signals for new investment in generation."

Some of these options are discussed later in this commentary.

Parer Committee's View

In its final report, the Parer Committee adopted a positive view of the potential for the NEM to provide signals for investment and endorsed the energy-only design of the NEM. In particular, the Committee stated that 'the energy-only design of the NEM can provide as strong a set of investment signals as is possible'. However, the Committee considered that the strength of those investment signals was being reduced by a lack of competition in generation, the distortion of retail prices, and insufficient demand-side participation in the market.

The Committee therefore recommended:

- the restructuring of the generation sector so as to make it more competitive. To this end, the Committee recommended that those State and Territory governments that own generation assets should disaggregate their generation businesses and either exit the generation market altogether or reduce their ownership to one generator;
- the inclusion in the ACCC Merger Guidelines of a requirement to consider, in the context of a proposed merger between generation businesses, the ability of the merged generation business to exercise market power at particular times;
- the introduction of measures (such as firm financial transmission rights, an incentive and penalty scheme to encourage improved network performance, more cost-reflective transmission pricing, and a more nationally focused and coordinated approach to transmission planning) to increase inter-regional trade and interconnection, and so promote more sustainable competition between generators across the NEM; and
- the removal of market-distorting mechanisms, such as the New South Wales Electricity Tariff Equalisation Fund and Queensland's Benchmark Pricing Agreement, and (ultimately) the introduction of full retail contestability and the removal of retail price caps in all the NEM jurisdictions.

Capacity Mechanisms

Under an energy-only model, generation capacity only earns revenue when it is dispatched. Because capacity held in reserve and sitting idle for when a shortage arises does not earn revenue (and, in fact, will have ongoing maintenance costs), this may result in an incentive to invest in less reserve capacity than is otherwise considered socially optimal from the point of view of minimising electricity supply shortages (whether due to reliability problems or high demand).

There are a variety of possible options available to encourage the provision of additional reserve capacity, and a number of these were canvassed by NECA in its August 2002 discussion paper, *Capacity Mechanisms: The Options.* These options include:

(a) *Financial penalties:* NEMMCO or NECA could impose a financial penalty on intending generators if they failed to be in service within their committed timeframe.

(b) *Financial contracting for capacity:* NEMMCO, acting on behalf of (and effectively funded by) consumers, could purchase price cap contracts (financial call options) for a given volume of reserve capacity at a given strike price. The contract would oblige the generator to pay NEMMCO an amount of money if the spot price reached the strike price. The possibility of the spot price triggering the financial call option would provide the generator with an economic incentive (but not an obligation) to generate, and to install new capacity if necessary, so as to meet demand at a lower spot price or to make any necessary payments to NEMMCO. The contract premium would provide the generator

with an income stream that could be used to fund investment in further generation capacity.

(c) *Reliability contracts:* NEMMCO could purchase reliability contracts from generators in a capacity-based market. These reliability contracts would be price cap contracts in the nature of a financial call option, which would also oblige generators to physically deliver the required quantity of electricity should NEMMCO call for it. The reliability contract would include a penalty on the generator if it failed to deliver the required generation. Conversely, the generator would receive a premium from NEMMCO for entering into the reliability contract, and the premium would provide the generator with an income stream from which to fund investment in new capacity. The strike price for the financial cap would be set high, so that the capacity represented by the contract was not called upon until the market had failed to supply the required capacity for the demand at any given time. Unlike the financial contracting option, this option also requires the necessary generation capacity to be delivered.

(d) *Dedicated capacity reserve:* NEMMCO could own and operate dedicated power stations so as to ensure that physical supply is available when demand is tightly balanced. However, this is a high-cost option and (undesirably) entails NEMMCO acting as a generator.

(e) *Reserve capacity contracts:* NEMMCO could contract for the required physical capacity on terms that would require it to be made available at a particular price threshold (eg VoLL), possibly with a penalty for non-delivery. This amounts to a permanent contracting of reserve capacity, much like the dedicated capacity reserve option. However, this option is inefficient because it entails the relevant plant being held out of the market, despite the spot price rising above the plant's short-run marginal cost.

(f) *Co-optimised capacity market:* Reserve capacity could be included as a separate component in the NEM's dispatch algorithm, so that generators also bid to provide the reserve capacity that is required in any dispatch period.

(g) *Capacity tickets:* Retailers could be required to purchase sufficient 'capacity tickets' from generators to cover their peak load plus a reserve margin. NEMMCO would determine the relative values of different types of capacity, including transmission capacity, and there would be a penalty for failure to purchase the required number of tickets.

(h) *Capacity payments:* Generators could be paid for the amount of capacity available but which is not being used to generate. Such payments would be made by retailers (and therefore consumers), but with NEMMCO (and not the market) determining their value.

(i) *Capacity procurement:* An obligation could be imposed on generators to provide a specific amount of capacity and they would have to pay a penalty for their failure to do so (in the PJM, this penalty is based on the cost of a newly installed combustion turbine).

The reliability contracts option was the one preferred by NECA in its discussion paper. However, while the Parer Committee reviewed NECA's discussion paper, it endorsed the energy-only model, and rejected reliability contracts as a means of capacity procurement, on the basis that it might encourage generators to stand out of the market and that it would reduce the availability of cap contracts for market participants to manage their commercial risks. Moreover, it would entail

NEMMCO competing for generation capacity with market participants, thus compromising its independence as the market operator.

Indeed, following the evaluation of submissions received in response to its discussion paper (the vast majority of which argued that the NEM was working reasonably well), NECA itself subsequently took the view that no change to the energy-only structure of the NEM was currently required.

However, as recently stated by Ken Thompson, the General Manager of Loy Yang Power, high prices which result from the interaction of supply and demand are the means by which the market signals the need for new investment, and political and regulatory interference in this pricing mechanism may well stifle the required investment, thereby necessitating the introduction of some form of capacity mechanism.[2]

CONCLUSION

The regulation of Australia's energy market has been the subject of recent debate by both Commonwealth and State Ministers, both outside and within COAG Ministerial meetings. Energy Ministers recently failed to reach agreement on (or even discuss) the regulatory reforms that most participants in the energy market consider are necessary. There is a definite risk that cumbersome regulation and government intervention will defer or delay investment.

There has been a range of views expressed on the need for, and structure of, any additional investment incentives or capacity mechanisms in the NEM. It seems fairly clear, however, that in the short term at least the NEM is functioning properly and signalling investment in generation and transmission assets. It is not clear, however, that this will apply for the medium or long-term, or in fact whether those generation and transmission assets are of the right type or in the right location to best serve Australia's needs.

EPIC ENERGY SUBMITS REVISED ACCESS ARRANGEMENT FOR THE DAMPIER TO BUNBURY NATURAL GAS PIPELINE

Lewis McDonald *

THE REGULATOR'S FINAL DECISION

On 23 May 2003, the Western Australian Independent Gas Pipelines Access Regulator (Regulator) released its long-awaited Final Decision on Epic Energy (WA) Transmission Pty Ltd's (Epic Energy's) proposed Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline (DBNGP).

In its Final Decision, the Regulator (again) decided not to approve Epic Energy's proposed Access Arrangement.[1] This was principally because of the Regulator's rejection of Epic Energy's

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2 "Meeting peak demand", published in *Power Generation World* on 17 June 2003 (www.powergenerationworld.com).

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