NATIONAL GENERATORS FORUM

20 Nov 2009

Mr Tom Leuner
General Manager
Markets
Australian Energy Regulator
GPO Box 520
Melbourne VIC 3001

By email: aerinquiry@aer.gov.au

Re: Regulatory investment test for transmission- Issues Paper

Dear Mr Leuner,

The National Generator Forum (NGF) appreciates this opportunity to provide a response to the AER issues paper, "Regulatory investment test for transmission".

The Carbon Pollution Reduction Scheme (CPRS) and expanded Renewable Energy Target (RET) will cause a fundamental shift in the volume, location and type of generation technology entering the national electricity market (NEM)[1]. It appears likely that this, in turn, will increase the quantum and change the pattern of congestion on the network, which will increase the level of uncertainty surrounding access to market for generators going forward.

To ensure the level of transmission development appropriately supports this evolving market environment a robust regulatory test for transmission (RIT-T) is critical.

In this context, we support the AER's proposed approach for capturing the benefits of climate change policies in the RIT-T and note this will help promote the transmission

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[1] Modelling by ACIL Tasman and ROAM commissioned by the AEMC as part of the "Review of Energy Market Frameworks in Light of Climate Change Policies"

investment necessary to support the considerable investment in low emissions generation expected under climate change policies. Regarding the other issues on which the AER is seeking comment we make the following key points:

- Network congestion is likely to become an increasingly material issue under climate change policies, and therefore, whatever flexibility can be introduced into the RIT-T to better address congestion should be carefully considered.

- Consequently, we agree with the AEMC that the approach to scenarios in the existing regulatory test could be bolstered by providing more explicit consideration of the benefits and costs of building transmission now versus building it later through an option value approach.

- We also consider that, as a possible alternative to option value, a probabilistic approach to scenario analysis could deliver similar benefits if applied appropriately.

- Finally, considering the current competition benefits framework, we are concerned that the existing RIT-T does no capture sufficiently the benefits related to the removal of intra-regional constraints, which may be problematic in a future environment characterised by increasing congestion. We think the MCC concept is one worthy of investigating further as a potential mechanism to capture the competition benefits of intra-regional augmentation.

These issues are discussed in more detail below

<u>Congestion under climate change policies</u>

The NGF is concerned that climate change policies will significantly increase the level of network congestion, both interregionally and intraregionally.

We therefore see the development of an appropriate and encompassing framework for management of and investment in the transmission network as fundamental to investor certainty. The RIT-T, therefore, plays an important part in ensuring this network investment occurs in a timely fashion.

The AER's 2008 State of the Energy Market report indicated that the annual cost of congestion had increased from around $36 million in 2003-04 to $107 million in 2006-07. In its most recent 2008 Statement of Opportunities, the (former) National Electricity Market Management Company (NEMMCO) estimated that the present value of annual market benefits arising from removing all transmission network congestion along National Transmission Flow Paths across the NEM would amount to $1.3 billion. NEMMCO also identified a large number of conceptual augmentations that would potentially result in a significant increase in intra-regional network capacity.

Looking forward, the indications are that congestion will become worse as power flows shift across the NEM in response to the Government's climate change policies. The AEMC estimates that by 2020, approximately 8,000 MW of new renewable plant will be needed to meet the RET target, and an additional 5,000 to 7,000 MW of additional gas capacity under a 20 per cent CPRS target. This view is backed by ACIL Tasman and ROAM's work for the AEMC. Similarly, work by the ESAA indicates that generation investment required to meet climate change objectives is in excess of $30 billion.

In economic terms, the inefficiencies arising from increasing NEM congestion are likely to be far more material than the AER's cost estimates would suggest. This is because the AER estimates refer only to productive efficiency costs that arise because lower cost generators cannot be dispatched and higher cost generators must run instead.

However, there are a number of other important consequences of congestion.

First, it creates allocative (pricing) inefficiencies, because the nexus between pricing and dispatch breaks down for generators behind a constraint, whom are forced to bid well below cost in order to ensure their access to market (often referred to as disorderly bidding). Transmission capacity is subsequently rationed on an administrative rather competitive basis.

Second, not only is competition reduced between constrained generators, but congestion also prevents competition between constrained and unconstrained generators. At the same time to manage the reliability and security of the system when constraints bind, the number of generators that "must run" to support the stability of the system – and will therefore be dispatched, regardless of whether or not they are economic – increases. This undermines the efficient operation of the wholesale market.

Third, the effects of congestion on the competitiveness of the spot market are likely to be mirrored in the contract market. A generator that is constrained-off is exposed to unfunded difference payments, and constraint risks will lead generators to enter into fewer contracts than they otherwise might. Material congestion therefore has the potential to undermine the efficiency and liquidity of the contract market.

From a longer term dynamic perspective, increasing network congestion undermines key dynamic (investment) efficiency objectives for the NEM. It may discourage new entry over time if it becomes a systemic problem, compounded by illiquid contract markets.

Investors in new generation capacity cannot be expected to undertake major (sunk) investments and enter into associated fuel and other contract obligations without a reasonable level of certainty with respect to their ability to access the market. As the NEM network becomes increasingly congested, uncertainty about the ability of a new generator to export their output to the regional reference node (RRN) (and therefore whether or not an existing asset might potentially become stranded) will invariably increase.

In this broad context it is critically important that the RIT-T is as comprehensive and effective as possible in ensuring transmission development supports new generation investment and does not inefficiently undermine access to market for generators over time.

For these reasons we consider the following amendments to the RIT-T are worthy of further consideration by the AER

Option value

An important recommendation coming out of the AEMC's NTP review was to include "option value" in the new RIT-T.

While not explicitly defined, ostensibly the language around the AEMC's discussion of this concept seems to suggest its purpose is to bring a more strategic or forward looking perspective when considering transmission options in the NEM. The AEMC expresses concern that traditional tools may regard the future passively and overlook possible [consequential] decisions or contingent investments"[2].

In a theoretical sense, we envisage option value as explicitly weighing the costs and benefits of building transmission now versus the costs and benefits of building later. The methodological framework often employed for doing this is real options analysis[3]. This type of analysis considers a number of factors, which include *inter alia*, the profile of evolving information on demand and supply fundamentals and the extent of cost efficiencies associated with economies of scale[4].

Given that gas-fired and renewable generators—the most probable new entrants under the climate change policies—can be built substantially faster than the supporting transmission network, a strategic approach to transmission investment is likely to become increasingly important.

The AEMC's proposed SENE framework attempts to deal with this very issue. It requires an explicit assessment of the benefits of investing in transmission in the context of an uncertain profile of future utilisation of that investment. The benefit of building early in this regard is that transmission is available to generators as they connect, while the costs are the capital expenditures associated with underutilised transmission capacity if future generation does not materialise.

Conversely, delaying a network build improves the accuracy of information on which to base the transmission investment decisions. The consequential benefit is the reduced risk and potential costs of underutilised capacity. On the other hand, the cost of waiting for more information heightens the risk of transmission bottlenecks if the volume and speed of new generator connections meets or exceeds what is forecast. The risks and costs associated with building too late rather than too early may not be a trivial given the "lengthy construction times, planning and preparation processes associated with transmission development".[5]

We agree with the AEMC that the sorts of inter-temporal tradeoffs considered above do not appear to be fully captured in the RIT-T as currently formulated. Real options

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[2] AEMC, "Final Rule determination-National Electricity Amendment (Regulatory Investment test for Transmission) Rule 2009", p 40

[3] See Boyle, Glenn, Graeme Guthrie, and Richard Meade, "Real Options and Transmission Investment: the New Zealand Grid Investment Test", 23 February 2006. This paper provides a good description of how such an approach might be applied and the factors to take into account.

[4] Ibid pp 9-12

[5] Ibid p 9

may provide an important conceptual tool for assessing such trade-offs in the RIT-T, while at the same time having further application to assessment of SENE related projects.

Possible applications of real options type approaches may be illustrated with two recent examples. Powerlink and Transgrid have been considering an upgrade to QNI for some years now[6]. The scenarios they considered were a high, medium and low growth demand scenario in their most recent report of 13 October 2008. In one sense, this particular analysis was relatively simple because Powerlink's preferred option was the best among the alternatives examined in all the scenarios.

The extent to which the preferred option was in fact economic depended heavily on the timing of the investment; such that it was economic in 2009/10 assuming a high growth scenario and 2014 under a medium growth scenario, while under a low growth scenario the option was not economic until 2021. However, because the RIT-T generally applies an equal weighting to scenarios, there is no clear way of choosing between relative timing of the options.

Another example is Powerlink's recent regulatory test application for network and non-network options required to maintain a reliable supply in SE QLD[7]. Powerlink's preferred transmission option achieved a level of market benefits which was very close to the next best option and in some cases the third best option in the six scenarios examined (in some scenarios the options were so close in market benefits that they were within what would be considered statistical error).

Powerlink acknowledged this and consequently justified its preferred option on the basis of its potential strategic benefits compared with the range of other options in the analysis:

> "by providing additional fault level headroom…this option provides a strategic advantage, as it is likely that new generation will locate near the large energy sources available in the Braemar/Kogan creek area that are suitable for low carbon emission power plants. The location could also provide a connection point for large scale renewable generation technologies such as solar thermal, wind and geothermal generation."[8]

Again, given an equal weighting to the scenarios examined, and the minimal differences in market benefits between the various transmission options, it was difficult to choose a preferred option using the RIT-T framework.

The option Powerlink recommended for further development was not the one offering the largest capacity, as it considered the level of anticipated demand growth was unlikely to justify the initial costs of such capacity. Rather, the option chosen was the one allowing the greatest "flexibility" in expanding capacity should, with evolving

[6] Powerlink/Transgrid, "Potential Upgrade of Queensland/New South Wales Interconnector (QNI)- Assessment of Optimal Timing and Net Market Benefits" Final Report, 2008
[7] Powerlink," Maintaining a reliable electricity supply to Southern (South West and South East) Queensland" Final Report 2009
[8] Ibid, p 42

information, a particular scenario become more likely. Powerlink in effect undertook a qualitative option value analysis, in the absence of the RIT-T providing no real framework for doing so.

A further benefit of a real options type approach is that it can capture low probability but very high impact market events. For instance, a particular transmission option may not be the preferred option in the majority of scenarios considered, but may be the preferred option in one low probability scenario. This may occur because, in its absence, there could be an increased risk of cascading blackouts (for example this scenario may be characterised by some extreme weather event)[9]. This option would not pass the RIT-T as it currently stands.

An option value analysis could capture this transmission option. It would explicitly value the cost and benefits of building now: the costs being those related to the construction of the transmission option and potential stranding; while the benefits would constitute certainty around avoidance of blackouts and their associated costs. It would then compare these with the costs and benefits of "not constructing" that transmission option or building it later; the benefits would constitute the avoided cost of the transmission investment and are compared with the economic costs of blackouts if they occurred.

Conceptually however, in order to get a reasonable feel for the economic costs of the "not constructing" it would appear that some form of probability analysis around the potential for future blackouts would need to be performed. An acknowledgement of this point would suggest that scenario-based approach in the RIT-T itself could be modified to capture some of the benefits of an option value approach.

Probability weighting of scenarios

A potential alternative way of capturing option value type benefits is to assign probabilities to scenarios. If one particular scenario is significantly more likely than the others then this would be reflected in the probability weighted analysis of the market benefits of the transmission options considered. This may narrow the choice space for both the preferred option and its optimal timing.

It would appear that this is what Frontier Economics had in mind when it considered that appropriately calibrated scenario analysis could achieve much the same objective as option value type approaches[10].

Certainly a probabilistic approach to scenario analysis provides a more strategic approach compared to the "lowest common denominator" approach currently in the RIT-T. An equal weighting approach to scenarios will favour investments in terms of their capacity to accommodate a range of potentially divergent outcomes, and thus encourages an incremental or the discrete development of the network over time.

[9] This has been a relevant concern recently, See AEMC's 1st Interim Report "Review of the effectiveness of NEM Security and Reliability Arrangements in light of Extreme Weather Events" released on 29 May 2009

[10] Frontier Economics, May 2009, "Note for the Australian Energy Regulator", in AER submission to the "Regulatory Investment Test for Transmission Draft Rule" May 2009

This may be inconsistent with the strategic approach envisaged in the new national transmission planning arrangements. The focus of these are to look forward and make a call on what scenario or scenarios "are the most likely" and then provide a perspective on the most efficient development path for the network to accommodate them. Incorporating a more probabilistic approach to scenario development in the RIT-T would appear to link better project-based investments performed by TNSPs with the broader strategic development of the network as envisaged under the national planning framework.

Compared to the current RIT-T approach, a further benefit of a probabilistic approach is that it may better capture low probability but very high market impact events in a similar way to the option value approach.

For example, using the blackouts scenario again, while the scenario has a low probability of occurring, the market benefits of the transmission investment option in the scenario may so high as to be almost infinite (infinite because governments may not be willing to contemplate rolling blackouts whatever the cost, or at least ascribe a very high value to ensuring they do not occur). A probability weighting would mean this transmission option would become the preferred option (a low probability but multiplied by a very high market benefit).

In summary, we consider an option value approach and a probabilistic type approach to scenario analysis can deliver similar benefits if appropriately applied in the RIT-T.

Competition benefits

The way competition benefits are currently formulated in the RIT-T means they will generally be relatively small. This is because of the characteristically low elasticity of demand for energy and the fact that wealth transfers cannot be counted under current formulation of competition benefits in the National Electricity Rules (the Rules).

While a focus on net benefits may be justifiable, we consider there may scope to better capture any competition benefits associated with removal of intra-regional constraints. They appear currently not to be captured in the RIT-T, principally because of the lack of a price signal that could help value such benefits intra-regionally. Not fully capturing such benefits may reduce the capacity of transmission development to respond effectively in an environment where congestion is expected to increase significantly due to climate change policies.

As we have briefly discussed already in terms of congestion more broadly, removing intra-regional constraints would improve competition between constrained generators (by removing disorderly bidding), and between constrained and unconstrained generators at the RRN. More predictable access to transmission also increases the liquidity of the contract market and confers dynamic benefits by improving investment certainty for new entrants.

In the absence of a price signal for intra-regional constraints, the NGF considers that one possible proxy for capturing these benefits is the Marginal Costs of Constraints

(MCC) concept. This concept was developed by the AER in the context of the TNSP service incentive scheme.

The MCC estimates how much benefit the market would receive if a transmission constraint was marginally reduced. It does this by modelling how much the cost of generation would be reduced if the transmission limit was increased by one megawatt.

The MCC identifies particular elements of the transmission network that have binding limits that cause generation to be dispatched out of merit order. In the case of intra-regional constraints, the marginal value is determined through the difference between the marginal generation at the regional reference node (setting the price in that region) and the marginal offer price of the generator impacted by the constraint.[11]

The competition benefit could then be calculated as the reduction in MCC associated with intra-regional augmentation, or put another way, the reduction in the difference between the RRP and the previously constrained marginal offer that occurs after the augmentation.

However, the AER dismisses the use of MCC for representing congestion costs for intra-regional constraints because of the potential for it to be influenced by negative bidding. For example, when generators are constrained-off, they often bid at the price floor of $-1000/MWh to ensure their access to the network. This can lead to large MCC values.

We propose, however, that the MCC concept still retains considerable value in terms of its potential use in competition benefits analysis. This is because negative bidding represents a breakdown in efficient competition, since prices offered no longer bear any relationship to cost of supply or the actual prices received for energy.

Consequently, to the extent an augmentation restores efficient competition between generators behind a constraint, this benefit should be counted. In other words, the difference between -$1,000/MWh and the new marginal bid after the augmentation is just as relevantly a competition benefit as a reduction in the spot price at the RRN.

In light of this interpretation, any reduction in the value of the MCC, regardless of whether it reflects the influence of negative bidding (or not as the case may be), can be considered to be an accurate representation of the achieved competition benefits.

Please contact Con van Kemenade in the first instance on (02) 8345 5278 if you wish to discuss any aspect of this submission.

Yours Faithfully,

M. Roberts

Malcolm Roberts
Executive Director

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[11] AER, "Indicators of the impact of transmission congestion', decision, June 2006, Appendix C.