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Mr Joe Spurio
Senior Manager Network Analysis
AEMO

Sent by email to: Planning@aemo.com.au

RIT-T: Project Specification Consultation Report – Heywood Interconnector Upgrade

Dear Mr Spurio,

EnerNOC thanks AEMO and ElectraNet for the opportunity to comment on the proposed South Australia to Victoria Interconnector Upgrade.

Demand Response - a Credible Alternative

EnerNOC wishes to be identified as a proponent of a potential non-network solution for this project. Via this submission, we are seeking discussions with AEMO and/or ElectraNet to further explore the technical requirements of the project and to demonstrate that a non-network solution can and should play a meaningful role in this project.

EnerNOC has a well established business that delivers successful Demand Response (DR) programs both in Australia and internationally under its DemandSMART™ application. Globally, EnerNOC manages ~7,000MW of DR capacity. Further, we have provided non-network solutions to Networks in the NEM every year since 2006/07. Although most of our local network support has been undertaken in NSW, we have previously found immense potential and customer support for DR in South Australia. For example, in 2006 when we successfully bid for NEMMCO's Reserve Trader program we contracted 112MW from 49 South Australian sites or 59% of the 191.3MW contracted to provide the firm 125MW of DR to NEMMCO.

Our experience with the Reserve Trader project reinforces our view that sourcing 190MW in South Australia is highly plausible. Furthermore, EnerNOC is well experienced in contracting, maintaining and managing projects involving large numbers of sites and/or MW. For example, in Western Australia we currently have 90MW (from 146 sites) registered as Reserve Capacity which was verified by the West Australian Independent Market Operator at between 100% and 106% of capacity during a 90 minute dispatch on 22 November 2011. Our Western Australian Reserve Capacity commitment will grow to 240MW by October 2012 and to 276MW by October 2013, at which time we expect ~500 customer sites will be participating in our program. In New Zealand, we now provide upwards of 100MW[1] of Frequency Control DR capacity (on average) from almost 100 sites.

In summary, we believe there is ample DR in South Australia to develop a competitive non-network solution and that EnerNOC has the capability, technology and resources to deliver a viable project.

[1] Two recent under frequency events in New Zealand verified our offering within one second as follows:

- 9/12/2011, HVDC Pole-2 Trip, 49.03Hz, total of 99.3MW offered
- 13/12/2011, Loss of Huntly 220kV bus connection resulting in the disconnection of all Huntly generation, 47.65Hz, total of 80.7MW offered.

Demand Response – Cost Effective, Greater Flexibility

Having worked with several other Network Service Providers, we suspect that the increased interconnector capacity requirement will not be 190MW from day one. More likely, the capacity requirement will grow to 190MW over a period of five to ten years. Further, peak energy flows will happen for only a few tens of hours a year (especially in the initial years). EnerNOC believes that it is both possible and more economical to actively shape and manage that peak rather than building infrastructure to accommodate the full extremes of demand. To use an analogy, it is clearly necessary to build new roads as population grows and traffic increases. However, traffic management is an integral tool that helps ensure an orderly flow of traffic at peak times, and thus reduces the need for more lanes. In the electricity context, a DR program is the traffic management system that can reduce the need to invest in transmission upgrades, thereby increasing the utilitisation and cost-effectivess of the system.

A non-network alternative in the form of a DR program can be flexible so that it meets the actual annual requirements. As one example, one could construct a DR asset that starts at 50MW in the first year with annual increases thereafter of 20MW, reaching a total capacity of 130MW of firm DR in five years. Intuitively (based on our past experience), a deferral of the 190MW upgrade for up to five years is likely to be feasible. It therefore makes sound economic sense to consider DR, either in whole or in part, as a capex deferral alternative for this interconnector.

Unlike the upgrade, a non-network solution can be tailored to suit a changing situation such that if the requirement flattens for a year or more then there is no need to automatically increase the DR available for the program. Conversely, if a higher level of DR is required at any time, sufficient resources to meet the new requirement can quickly be made available. EnerNOC can also provide AEMO/ElectraNet with the means to monitor the capacity of aggregated sites in near real time and to manage the dispatch during an event through our DemandSMART application. Effectively, either AEMO or ElectraNet can have control over how much firm DR they can call upon at any particular time.

This tailoring of the non-network solution also applies to the initial design of the overall project. It seems plausible that a smaller, far less expensive upgrade could be made to work with a permanent non-network solution made up of DR and energy efficiency (EE). For example, a permanent DR program with (say) 50MW of load curtailment and energy efficiency projects that deliver 5-10MW of additional permanent load reduction could be a very economical alternative. Such a program could be coupled with a 130MW-150MW upgrade (or at a more economically significant level) thereby providing substantially lower capital requirements but a wider scope of market benefits (see section below). Peak demand can be 1.4 times higher than average demand[2] with the NEM operating one of the peakiest markets in the world[3], so applying a permanent non-network solution to operate for this range could very well provide the ideal solution.

DR need not mean curtailment only. A DR program can reduce demand and at other times (with the right types of loads) increase demand (this is often referred as “active demand response”). Given the dominance of wind in South Australia, AEMO and ElectraNet could consider a DR asset that could also increase demand at times of abundant wind power, which could reduce or eliminate the need to export some or all excess wind capacity. Active DR is increasingly being seen as an ideal resource for facilitating the integration of intermittent renewable resources such as wind, through both the provision of traditional ancillary services

[2] Data from 2008-09: Australian Energy Market Operator, *An Introduction To Australia’s National Electricity Market*, July 2010, p. 9; Australian Energy Regulator, ‘State Of The Energy Market 2009’, Australian Competition and Consumer Commission, 2009, p. 73.

[3] The proportion of maximum demand that appears for 40 hours or less is 5.9% in the UK, 8.5% in the WEM and 9.8% in the NEM, making the NEM one of the peakiest markets. Data: National Grid 2011 NETS SYS & May 2011 Balancing Services Summary; IMO 2011 SOO & demand data to 31 May 2011 ; AEMO data to 31 May 2011

and specialised wind-balancing programs (like EnerNOC is piloting with the Bonneville Power Authority in the US[4]).

Therefore EnerNOC can provide a non-network solution that ratchets up the available MW each year so as to ensure the most efficient and economic outcome. The DR can be varied and made to include curtailable load, with or without increasing load capability and/or including an energy efficiency offering under our EfficiencySMART™ application. Such a flexible solution can be designed to fit permanently within a smaller upgrade project.

Comparisons are now being made and vigorous (public and expert) criticism aimed at our NSPs about their costs, charges and rates of return[5]. While this criticism has been primarily targeted at DNSPs, by association all NEM NSPs are affected and should therefore be encouraged to reduce their costs where ever possible. In EnerNOC's view, such cost reductions will not be possible without a realistic consideration of alternatives to traditional upgrades. More specifically, EnerNOC sugggests that AEMO and ElectraNet should seriously consider whether a DR asset can improve the cost-effectiveness of the upgrade project. From its experience, EnerNOC believes that a secure, reliable and flexible DR asset can either defer the 190MW project for several years or it can be implemented as a permanent asset alongside a smaller, more economically attractive upgrade. Further, a DR asset can provide ancillary benefits that include:

- the flexibility to provide year-over-year changes in capacity in response to changes in system load;
- direct financial benefits to South Australian businesses that provide capacity;
- and the ability to provide additional services such as wind firming.

Improved Market Benefits with DR

Three market benefits have been identified in the Consultation Report associated with the upgrade. We appreciate that these are a summary of benefits and therefore do not necessarily represent all benefits attributable to the upgrade (should it be implemented as proposed). However, we believe that the non-network solutions proposed by EnerNOC have at their core a DR solution which, when treated equally with the proposed upgrade, will have greater propensity for benefits than the upgrade alone.

The three market benefits identified in the Consultation Report are:

Market Benefit	Comment
The market benefit associated with increasing inter-regional trade during times of peak demand in South Australia, leading to the displacement of higher cost generation in South Australia with lower cost generation imported from elsewhere in the NEM and the deferral of generation investment.	The upgrade may take up to 10 years before the additional capacity is fully utilised and generally network assets are only ever fully utilised for less than 0.5% of the time[6]. Under an upgrade scenario (at 190MW) and at times when the interconnector is at full capacity, price separation can occur such that the South Australian RRP ventures to VoLL. By adding a permanent but variable DR solution to a lesser sized upgrade (say 130MW-150MW), the DR can be ratcheted up by many tens of MW to dampen the wholesale price so that price separation can be better managed. Depending on the price sensitivity at the time, a non-

[4] "EnerNOC Chosen by BPA to Showcase Power of Demand Response to Manage Intermittent Wind Power"

5 Mountain, B. and Littlechild, S, June 2010. *Comparing Electricity Distribution Network Revenues and Costs in New South Wales, Great Britain and Victoria*

6 NEM Data

Market Benefit	Comment
	network solution could then be very effective in reducing the South Australian RRP. Further, wholesale price peaks and network peaks are not always congruent[7]. So the non-network solution could provide relief to a network constraint far more economically when fewer market benefits are realisable.
The net market benefits associated with increasing wind exports from South Australia at times of low South Australian demand, resulting in the displacement of higher cost generation elsewhere in the NEM with lower cost generation and the deferral of generation investment.	The predominant flow of power through the interconnector is to South Australia from Victoria and at a relatively poor average annual capacity factor[8]. Therefore, this perceived benefit (as stated in the Consultation Report) will likely be minimal. EnerNOC believes curtailable loads that can increase their demand to absorb the excess wind (ie Active DR) are identifiable in South Australia and the optimum solution would be to have a permanent Active DR program with a smaller upgrade. This allows for more renewables to be consumed in South Australia while providing a lesser increased capacity (less expensive) interconnection to operate more efficiently than the proposed 190MW upgrade alone.
Potential competition benefits from increasing the ability of generators to compete across the interconnector.	If allowed to compete on an equal basis (for example, for the last 40 hours of peak demand), a non-network solution is highly competitive to an equivalent generation option. So, competition would be increased with the introduction of a non-network solution. Rod Simms, Chairman of the ACCC, has publicly stated promoting demand management is a way to introduce more competition into electricity infrastructure projects[9].

The value of DR to utilities or markets can be quantitatively measured by a variety of metrics, including:

- The capex deferred/ or made deferrable. This is true both from the standpoint of avoided generation resources (as a kWh increase provides the same resource as a kWh decrease), as well as avoided transmission and distribution costs (since DR provides resources without line losses, and can also be locally targeted to avoid or defer specific network investments).

[7] Australian Government Departments of Climate Change and Energy Efficiency and Resources, Energy and Tourism, *Issues Paper, National Energy Savings Initiative*, December 2011, Section 6.2, page 72.

[8] The average annual capacity factor of VIC-SA and SA-VIC interconnector flows since 2005:

	Vic to SA	SA to Vic
2005	81%	5%
2006	81%	6%
2007	25%	38%
2008	28%	37%
2009	41%	32%
2010	45%	28%
2011	54%	22%

[9] Australian Financial Review article, page 1, 11 October, 2011, titled "Competition cop issues wanted list"

- The downward pressure on energy prices for the entire market. As the well-known energy consultancy the Brattle Group explained in its report, "the Power of Five Percent," the participation of just a few per cent of the market in DR can drastically reduce high-priced peak events that lead to savings for all consumers.[10]
- The increased time made available for a major network augmentation (in this case for the upgrade work on the interconnector).
- The improvement in reliability and security (reducing small amounts of demand across a wide range of customers who provide the DR reduces the risk of ever having to load shed large areas).
- Reduction in greenhouse gas emissions, both by the avoided operation of power plants, and through the avoided construction of new generation facilities (and the associated environmental impact).

It should be noted that some of these benefits will vary by location, as different regions face varying levels of peak events as well as divergent costs in terms of resource construction.

Alternatively, if benefits need to be reflected on a customer-by-customer basis, then some or all of the following measurements may be implemented:

- Funds earned through DR, including payments received for each kW of capacity and/or kWh of energy delivered, as appropriate.
- Reduction in energy costs from both the reduced level of consumption, and the associated reduction in maximum demand charges per customer
- Reduction in carbon footprint and the avoidance of greenhouse gas related compliance costs, as appropriate
- Avoidance of loss of service, and the associated business impact, due to the receipt of advance notices provided of grid stress conditions that may have led to blackouts
- Improvements in power quality.

The upgrade, on a standalone basis, increases the cost of electricity and is only of market value at rare and infrequent times when there is an excess peak generation capacity in South Australia and a higher electricity price interstate. Clearly, the market benefits with a non-network solution are more expansive than those associated with the upgrade alone. Therefore, either deferring the upgrade or implementing a hybrid option (which includes a non-network solution that captures 10% of the overall interconnection capacity coupled with a smaller upgrade) will deliver the most benefits to the market.

Recommendations

EnerNOC recommends that AEMO and ElectraNet seriously consider incorporating a DR asset into the upgrade project in one of two ways:

1. Build a DR asset in order to delay the timing of the upgrade. Such a DR asset could deliver a nominal 50MW in the first year and progressively ramp up by about 20MW per annum for five years or more. At the end of that time (ie after about 6 years) the full 190MW upgrade will come into service, or

2. Build a permanent DR asset in order to reduce the size of the upgrade. For instance, a smaller upgrade of (say) 130MW-150MW could be coupled with a permanent DR capacity of (say) 50MW. The DR asset could be built in phases as required, giving the (smaller) upgrade some flexibility in terms of its implementation timing.

[10] Brattle Group, "The Power of Five Percent," 16 May 2007

Either of these recommendations will:

- deliver a credible solution that will better meet the NEO than the upgrade alone,
- be far more flexible – able to increase or decrease capacity as required,
- provide exceptional benefits to South Australian businesses who participate in the program, and
- deliver improved market benefits.

EnerNOC believes the second option with Active DR (ie a permanent 50MW Active DR solution with a smaller interconnector upgrade) will deliver the greatest long-term benefits.

Thank you again for the opportunity to respond to this Consultation Report. Please do not hesitate to contact me directly with any questions related to this submission.

Regards,

Michael Zammit
Principal, Market Development