18 April 2017

NSW Energy Security Taskforce
% Office of the NSW Chief Scientist & Engineer
GPO Box 5477
Sydney NSW 2001

Submission by email to: energy.taskforce@chiefscientist.nsw.gov.au

NSW Energy Security Taskforce

Dear Taskforce

Snowy Hydro Limited welcomes the opportunity to comment on matters related to NSW energy security.

Snowy Hydro Limited is a producer, supplier, trader and retailer of energy in the NEM and a leading provider of risk management financial hedge contracts. We are an integrated energy company with more than 5500 megawatts (MW) of generating capacity across New South Wales, Victoria and South Australia including the iconic 4100MW Snowy Mountains Hydro-electric Scheme. We are one of Australia's largest renewable generators, the third largest generator by capacity and the fourth largest retailer in the NEM through our award-winning retail energy companies - Red Energy and Lumo Energy. Through our retail business, we serve more than one million customer accounts in the NEM including households, Small to Medium Enterprises (SMEs) and Commercial and Industrial customers (C&I) across Victoria, New South Wales, South Australia and Queensland. Snowy Hydro Limited also operates utilities connection business DirectConnect.

The NSW Energy Security Taskforce has been tasked with:

1. assessing the risks to and resilience of the NSW electricity system (including the transmission and distribution networks), from extreme weather events in the context of a changing climate.
2. reviewing the adequacy of the State's management of electricity system security events including prevention, preparedness, response and recovery.
3. making recommendations on actions to address any vulnerabilities identified and/or opportunities for improvements in current practices.

The following summarises Snowy Hydro Limited's position in relation to NSW energy security:

- System restart services in NSW are inadequate to meet the system restart standard and minimise the economic cost to NSW consumers in the event of a system black.
- Removing the restriction on Colongra power station running on diesel fuel would remove an unnecessary risk whereby Colongra is unavailable for generation due to breaching the current outdated restriction.
- Snowy 2.0 would help the NEM transition to meeting Australia's commitment to reduce emissions by 26 to 28% of 2005 levels by 2030.
- Obliging non-scheduled generation and load above a certain size to bid into the Spot market and inform their intention to generate or consume would aid overall market transparency and facilitate more accurate forecasts of supply and demand which will allow AEMO and all Market Participants to make better operational decisions that would maintain the energy security of the NSW electricity system.

Snowy Hydro appreciates the opportunity to participate in this consultation process. For further clarification on our submission, I can be contacted on kevin.ly@snowyhydro.com.au.

Yours sincerely

Kevin Ly
Head of Wholesale Regulation

1.0 RESILIENCE OF THE NSW ELECTRICITY SYSTEM

Snowy Hydro believes the NSW electricity system is fundamentally robust. The recent heatwave in eastern Australia culminating in the tight supply-demand balance situation on Friday 10th of February 2017 demonstrated the robustness of the NSW electricity system.

On the 10th February 2017, operational demand peaked at 16:30 at 14,181 MW just short of record peak operational demand of 14,744 MW recorded on 1 February 2011[1]. The NSW electricity system remained intact despite:

- Planned outages of Liddell 1 and 2 removing approximately 880MW of available generation;
- The forced outage of Tallawarra generators removing 408MW of available generation;
- Colongra units unable to start due to low gas pressure in the fuel supply lines thereby removing 600MW of available generation;
- Reducing wind and solar photovoltaic generation of approximately 300MW between 17:00 and 18:00.

Even though the NSW electricity system remained intact we have a number of concerns with the future resilience of the NSW electricity system.

1.1 Inadequacy of System Restart in the event of a system black

At 17:00 on the 10 February 2017 the interconnectors into NSW were in an overloaded state creating an insecure operating system. We note AEMO directed Tomago aluminium smelter to reduce demand by 290MW at 16:58 to restore the NSW power system to a secure operating state.

It is conceivable that had there been a forced outage of another generation unit and/or the tripping of either the Vic to NSW or the QLD to NSW interconnectors that the NSW power system would have collapsed, resulting in a system black. Snowy Hydro is very concerned with the inadequacy of restart services for NSW. We have highlighted these concerns in a separate submission to the Taskforce[2]. We wish to supplement this submission with further analysis supporting our recommendations for change.

The current system restart services for NSW was procured by AEMO under the System Restart Standard dated 1 August 2013. Under this standard[3] for section 4 - restoration timeframes:

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[1] AEMO, System Event Report, NSW, 10 February 2017, published 22 February 2017.
[2] Snowy Hydro Limited submission to Taskforce, submission number 005.
[3] Reliability Panel, System Restart Standard, dated 1 August 2013.

4. Restoration timeframe

For each electrical sub-network, AEMO shall procure SRAS sufficient to:

> *• re-supply and energise the auxiliaries of power stations within 1.5 hours of a major supply disruption occurring to provide sufficient capacity to meet 40 per cent of peak demand in that sub-network; and*
> *• **restore generation and transmission such that 40 per cent of peak demand** (emphasis added) in that sub-network could be supplied within four hours of a major supply disruption occurring.*

Critically the standard requires 40 per cent of peak demand in the NSW network could be supplied within four hours of the system black event. On the 10th February 2017, 40% of the peak demand for NSW was 0.4 * 14,181 MW = **5672 MW**.

Figure 1 below shows TransGrid's simulation results for the time period up to 4 hours after a NSW system black event. The critical curve is the yellow curve "**Restored On-Line Generation Capacity**" which highlights only **3000MW** of demand can be supplied in 4 hours. This is **<u>significantly lower</u>** than the 5672MW required to meet the System Restart Standard. Clearly, there is a divergence of views between what AEMO and TransGrid believe can be restored in NSW in the event of a system. We note TransGrid is an unbiased Stakeholder in this issue and are the technical experts with respect to the actual switching of transmission elements and co-ordination of the restoration of load blocks to restore the NSW electricity system in event of a NSW system black.

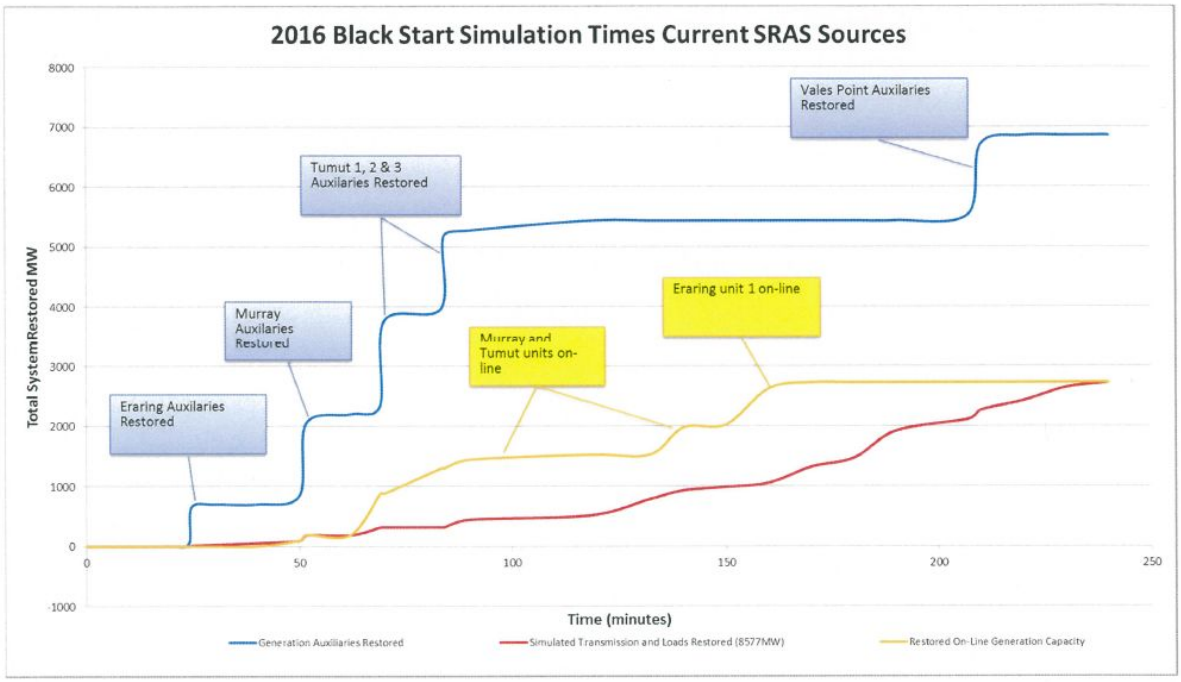

Figure 1: Simulation results for the time period up to 4 hours after a system black event (Source: TransGrid)

This divergence in views from AEMO and TransGrid highlights that there is a clear governance issue with AEMO solely performing the technical assessment and commercial evaluation of system restart services. This issue is clearly enunciated in the Electricity Network Association (ENA) submission[4] to the Reliability Panel. The ENA submission states,

> *The technical and commercial evaluations which are currently both undertaken* ***solely*** (emphasis added) *by the Australian Energy Market Operator (AEMO) should be undertaken independently of each other and conducted by appropriately resourced and skilled personnel. The jurisdictional Transmission Network Service Providers (TNSPs) should advise and comment on these evaluations.*

Recommendations:

1. Adopt ENA's recommendation to have Transmission Network Service Providers (TNSP) provide the technical evaluation of system restart sources.
2. Snowy Hydro is of the view that State and Federal Ministers need to consider the broader issue of the approach AEMO is taking to the awarding of SPAS. We do not believe that focusing on cost minimisation alone will deliver the best outcome for constituents. This is a matter that needs to be considered by Ministers, potentially through the COAG Energy Council, through which AEMO reports. It should also form part of the deliberations of the NSW Energy Security Taskforce.

1.2 Restrictions on diesel generation

The Colongra power station has a licence issued by the Environmental Protection Authority (EPA) that contains pollution limits when operating on distillate and natural gas, and a Planning Approval that limits the operation of Colongra to 75 hours of distillate (diesel) generation per year as a secondary fuel source. This was a limit set as part of the planning approval of the power station in 2006. Since that time, the NEM has significantly evolved with the retirement of thermal generation plant and the replacement of this energy with intermittent generation. The change in the generation mix, and the increased importance of dispatchable generation, has made the restrictions on Colongra obsolete. In short, the restriction is an unnecessary and potentially dangerous restriction on Colongra's ability to restore the NEM to equilibrium during high demand periods.

Further to this, there has been upward pressure on natural gas prices due to declining LNG production in Queensland. AEMO's 2017 Gas Statement of Opportunities[5] (GSOO) highlights the risk associated with declining gas production:

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[4] ENA, submission to Reliability Panel on the Review of the System Restart Standard, http://aemc.gov.au/Markets-Reviews-Advice/Review-of-the-System-Restart-Standard

[5] AEMO 2017 Gas Statement of Opportunities (GSOO), page 1

• Declining gas production may result in insufficient gas to meet projected demand by GPG for supply of electricity from summer 2018–19.
− To meet electricity supply needs, the NEM requires either increases in gas production to fuel GPG, or a rapid implementation of alternative non-gas electricity generation sources. If neither occurs, AEMO projects that declining gas supplies could result in electricity supply shortfalls between 2019 and 2021 of approximately 80 gigawatt hours (GWh) to 363 GWh across South Australia, New South Wales, and Victoria.

With all of the above factors, the on-going restriction of Colongra to run on diesel fuel could create an energy security issue for NSW.

Recommendation:

Snowy Hydro recommends that the outdated restriction on the use of distillate/diesel at Colongra be removed given the fundamentally different NEM in operation today. It is no longer fit for purpose. With demand and supply so finely balanced during peak periods, as evidenced in February 2017, arbitrary restrictions on fuel use at efficient thermal power stations can literally threaten the ability of the power system to keep the lights on. This is in no one's interests.

2.0 ISSUES ASSOCIATED WITH INTERMITTENT GENERATION

Table 2 of AEMO's system event report for NSW on the 10th February 2017 highlights the generation contribution to demand in NSW at 17:00. We have reproduced this table and included the capacity factor for each generation source in table 1 below.

Generation source	Contribution to peak demand (MW) at 17:00	Installed Capacity (MW)	Capacity Factor (%)
Net imports	1745	2888	60.4%
Wind	284	651	43.6%
Large-scale solar	132	211	62.6%
Hydro	2619	2525	103.7%
Thermal	9245	12458	74.2%
Rooftop PV (estimated)	291	1218	23.9%

Table 1: Generation contribution to demand in NSW at 17:00 on 10 February 2017.

From table 1 it can be clearly seen the intermittency of variable generation technologies such as large scale solar, wind and rooftop PVs. This contrast is even more stark when it is compared with dispatchable hydro generation which can safely operate above its installed capacity for short periods ie. the capacity factor of Hydro was 103.7% for the 17:00 trading period.

Snowy Hydro advocates a national and integrated approach to climate change policy. We believe the National Renewable Energy Target plays an important role in meeting Australia's 26-28% of 2005 emissions reduction target by 2030. However, we believe State based renewable energy targets would put the stability and security of the electricity power system at risk in the absence of complementary dispatchable and non-intermittent generation.

The Snowy Scheme offers a number of large, economical pumped hydro developments (both 'brownfield' and 'greenfields') centrally located in the NEM, that could provide large scale energy storage and security services to the NEM - cementing the Snowy Scheme as the battery of the NEM.

Snowy Hydro Limited, with up to $500,000 of support from ARENA, will examine:

- The technical and other feasibility of expansion of pumped hydro capability of the Snowy Scheme (several possible sites, but most likely around Tumut 3); and
- Ways to overcome transmission constraints (north and south) so the Snowy Scheme can play a more effective role in ensuring the stability and security of the NEM.

The Tumut 3 site could support a new power station of up to 4000MW, which would make it the largest pumped hydro station in the world, however the economics of the project suggest a power station capable of around 2000 MW which would increase the capability of the Snowy Scheme by 50 per cent. Figures being quoted of around $2 billion are based on historic data on the proposals with updated figures. The feasibility study will provide more accurate costings.

2000MW of additional, dispatchable, and flexible hydro generation would play a key enabling role to support the increase in penetration of intermittent generation such as wind, rooftop PVs, and large-scale solar. Additionally this additional hydro generation could provide ancillary services such as inertia and spinning reserve which are not available from asynchronous generation from wind and solar.

Recommendation:

That the Taskforce endorses the benefits to energy and system security from an additional 2000MW of pump hydro in NSW.

3.0 ISSUES WITH TRANSPARENCY OF INFORMATION

Section 4.2 of AEMO's system event report in NSW for the 10 February 2017 highlights issues associated with the lack of transparency from non-scheduled generation and load. For instance, Figure 15 in the AEMO report highlights actual demand differing from forecast demand due to non transparent participation of either non-schedule generation and/or non-schedule load.

Figure 15 Demand forecasts and actual demand for New South Wales, 10 February

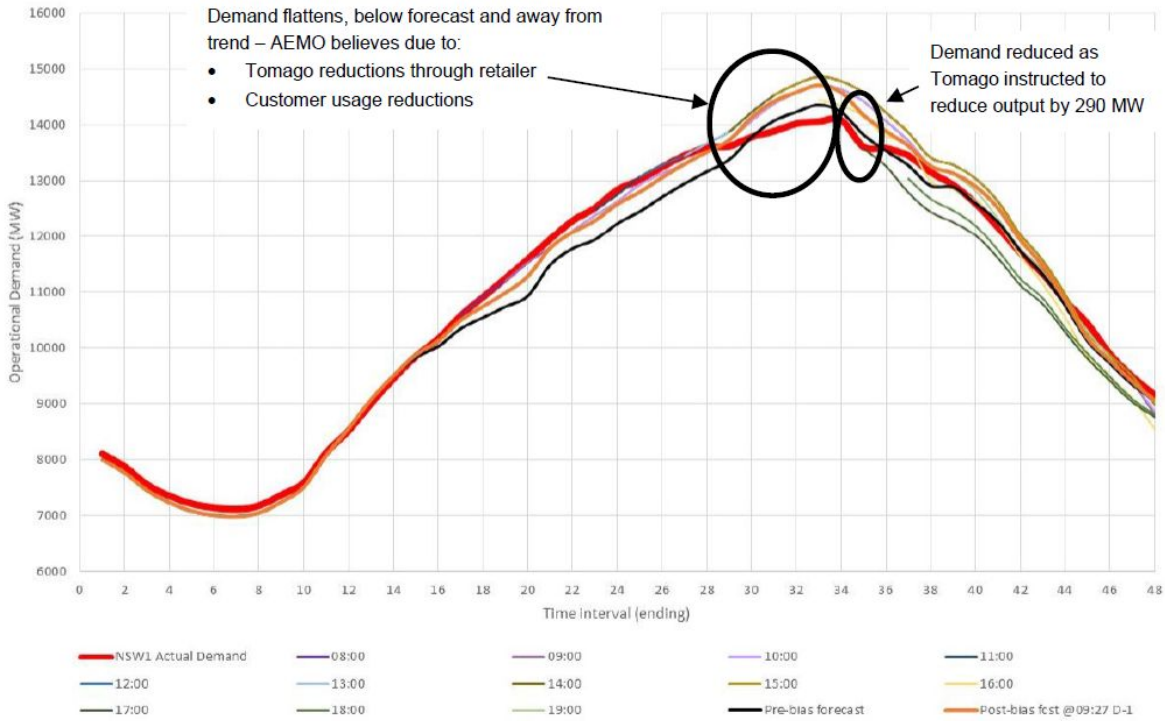

Figure 2: AEMO's Demand forecasts and actual demand for NSW on 10 February 2017.

AEMO states in section 4.2.1 of their report[6] that:

> *The New South Wales Government initiated a media campaign on 9 February to advise customers of potential electricity shortages on 10 February and encourage customers to reduce electricity consumption where possible. This may include setting thermostats for air-conditioners at 26 degrees, and ensuring lights or other electrical appliances are turned off when not required. AEMO believes this initiative may have resulted in demand being approximately 200 MW lower across the peak afternoon period (see demand flattening in Figure 15),* ***however, AEMO cannot measure or verify the impact of the initiative or differentiate it from response of loads due to high spot market prices (emphasis added)****.*

[6] AEMO, System Event Report, NSW, 10 February 2017, published 22 February 2017.

Snowy Hydro and Engie have a consolidated Rule change proposal that would obligate non-schedule generation and load above a certain size to inform the market of their intention to either generate or consume at certain Spot prices.

The current lack of transparency has adverse consequences such as:

- Reduces the accuracy of the pre-dispatch and dispatch prices;
- Causes inefficient generation costs;
- Reduces AEMO's ability to forecast adequate reserves and manage the central dispatch process through accurate representations of constraint equations;
- Increases system security and Frequency Control Ancillary Services (FCAS) cost implications; and
- Impedes efficient pricing of financial contracts.

This Rule change if ratified would resolve the lack of transparency that currently exists with both non-schedule generation and load and resolve the issues highlighted in the list above.

Recommendation

The Taskforce endorses the joint Snowy Hydro / Engie rule change to oblige non-scheduled generation and load above a certain size to inform the market of their intentions to generate or consume energy.