Submission No 29

THE ELECTRICITY OUTAGES AFFECTING FAR WEST NSW IN OCTOBER 2024

Organisation: AGL Energy Limited

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AGL Energy Limited
T 02 9921 2999
F 02 9921 2552
agl.com.au
ABN: 74 115 061 375

Level 24, 200 George St
Sydney NSW 2000
Locked Bag 1837
St Leonards NSW 2065

The Committee on Environment and Planning

Parliament of New South Wales

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Sydney NSW 2000

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Parliamentary Inquiry into Far West NSW outages

AGL Energy (AGL) welcomes the opportunity to respond to the Committee on Environment and Planning's inquiry into the major electricity outages and disruptions in the Far West region of New South Wales in October 2024.

About AGL Energy

At AGL, we believe energy makes life better and are passionate about powering the way Australians live, move and work. Proudly Australian for more than 185 years, AGL supplies around 4.5 million[1] energy, telecommunications and Netflix customer services. AGL is committed to providing our customers simple, fair and accessible essential services as they decarbonise and electrify the way they live, work and move.

AGL operates Australia's largest private electricity generation portfolio within the National Electricity Market, comprising coal and gas-fired generation, renewable energy sources such as wind, hydro and solar, batteries and other firming technology, and storage assets. We are building on our history as one of Australia's leading private investors in renewable energy to now lead the business of transition to a lower emissions, affordable and smart energy future in line with the goals of our Climate Transition Action Plan. We'll continue to innovate in energy and other essential services to enhance the way Australians live, and to help preserve the world around us for future generations.

Of relevance to this inquiry is AGL's operation of the recently commissioned Broken Hill Battery Energy Storage System (BH BESS). Our submission below covers the development and commissioning of the BH BESS, the impact of the outage on X2 Line[2] on the operation of the asset and steps undertaken following the event.

Development and commissioning of the BH BESS

We have experience developing and operating assets in the Broken Hill region, following prior development of both the Broken Hill Solar Plant and the Silverton Wind Farm.[3] These assets were constructed for the Powering Australian Renewables Fund, now Tilt Renewables, given the quality of solar and wind resources in the region. Due to experience operating assets in that region, AGL understood that there were ongoing risks to stability of the local grid, with certain vulnerabilities due to the reliance on the single transmission line into the area. This was seen as an opportunity for AGL to install a Battery Energy Storage System, that

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[1] Services to customers number is as at 31 December 2024.
[2] a single 220 kV transmission line, spanning about 260 km from Buronga 220kV substation to Broken Hill 220 kV substation, serving as the sole connection between the Broken Hill area and the rest of the National Electricity Market (NEM).
[3] These assets are no longer owned or operated by AGL.

could be utilised to provide both energy storage and potentially other system services to assist with the local grid stability.

Pursuant to the National Energy Rules (NER), a market participant is required to comply with a connection and registration process that must be completed in order to commission and connect any asset to the national electricity grid. This involves interactions with both the Australian Energy Market Operator (AEMO) and the relevant Transmission Network System Provider (TNSP), in this case Transgrid, to ensure those assets do not create instability in the local or wider network area. As the relevant connection applicant, AGL was required to propose connection of the BH BESS based on certain technical parameters for the relevant asset including a draft Generator Performance Standard (GPS) in accordance with the National Energy Rules (NER). We have provided a summary of that process, which took place over a 12 month period, below.

Commencing in September 2022, AGL submitted a draft proposed GPS to TransGrid and AEMO for assessment. This did not include any provision for the disconnection of the asset during islanding conditions, that is, conditions where the Broken Hill area was separated from the rest of the NEM due to outages on the X2 Line.

After review by Transgrid and AEMO, a response was provided in November 2022. This included feedback requiring the GPS to include automatic disconnection of the BH BESS under certain conditions, including during low power system strength conditions and when the local network became islanded.

After receiving the detailed response to the draft proposed GPS, AGL spent significant time reviewing and updating the relevant models and connection details prior to submitting a revised proposed GPS. In July 2023, AGL noted in its response to this feedback that the BH BESS was designed with the capability to operate in a grid-forming mode[4] and in AGL's view, keeping the BH BESS in service in the event of the network islanding (rather than it being disconnected) could improve power system stability under low power system strength conditions. However, in September 2023 in the final version of the GPS, clauses were included that would require disconnection of the BH BESS under islanding conditions. These clauses are set out below.

S5.2.5.8(b) - *The generating system must be disconnected*

i. *(1) automatically by a Fast Transfer Trip scheme whenever the part of the network to which it is connected has been disconnected from the national grid, forming an island that supplies a Customer due to the occurrence of the following conditions: a disconnection of Broken Hill Substation No. 1 Transformer, and a subsequent disconnection of Broken Hill Substation No. 2 Transformer; or*

ii. *a disconnection of Broken Hill Substation No. 2 Transformer, and a subsequent disconnection of Broken Hill Substation No. 1 Transformer; or*

iii. *a disconnection of 220 kV Broken Hill to Buronga Line X2; or*

(2) in the event of an outage which could risk the generating system forming an island supplying a Customer as a consequence of a subsequent contingency.

[4] Grid-forming inverters provide some of the system strength services provided by traditional synchronous generators, including synthetic inertia.

The BH BESS was subsequently commissioned in accordance with the final GPS. The BH BESS received Hold Point 2 approval (approval to generate under normal market conditions) from AEMO on 21 August 2024.

Events following the loss of the X2 Line in October 2024

The following is a summarised timeline of the events, focusing on AGL's interaction with Transgrid, following the loss of the X2 Line. While not separately set out below, AGL had ongoing detailed engagement with AEMO throughout the duration of the event.

- Thursday 17 October 2024
    - Following the X2 Line trip in the early hours of the morning AGL's Dispatch Centre, responsible for dispatching our battery assets into the grid, confirms that the BH BESS disconnected as per the protection scheme included in the BH BESS GPS.
    - TransGrid called AGL requesting AGL's urgent assistance in determining whether the BH BESS can be brought online to support the local grid. This involved AGL and TransGrid working through potential engineering and grid issues that needed to be resolved in order to bring the BH BESS back online. A key issue included assessment of whether the BH BESS returning to operation could result in significant damage to equipment or cause power instability.
    - Following these discussions, TransGrid approved re-energisation of the BH BESS auxiliary systems only, allowing control systems and battery chillers to be brought online. Energisation of Core Transformers (required for the BESS to generate) was not yet approved.
- Friday 18 October 2024
    - Following a risk review, AGL advised TransGrid that AGL considered that there was limited risk to AGL's equipment in operating under islanded conditions and that AGL was willing to come online to support on a best-endeavours basis, subject to appropriate documentation dealing with liability and commercial terms being agreed. AGL advised TransGrid that protection settings changes may be needed at the TransGrid end to protect TransGrid equipment.
    - TransGrid advised AGL in the late afternoon that there were additional issues to work through and that the BH BESS would not be able to be brought online over the weekend and that the AGL team should stand down until Monday.
- Saturday 19 October 2024
    - AGL received a phone call from TransGrid advising that following further assessment, it would be preferable to bring the BH BESS online as quickly as possible. AGL reiterated details on the technical risks, requirements for an operational protocol and documentation reflecting the unusual operating mode would need to be agreed with TransGrid and indicated willingness to work over the weekend. AGL did not hear further from TransGrid until Monday.
- Monday 21 October 2024

- AGL continued working with TransGrid and provided a proposed Operating Protocol to TransGrid. Both organisations met to discuss the process to come to an agreement on the appropriate documentation.

- Tuesday 22 October 2024
  - Further meetings between TransGrid and AGL occurred. TransGrid raised a number of risks to the stability of the islanded grid which could potentially result from the BH BESS being brought back online. AGL agreed that these risks existed (although were small in relation to the already known risk to supply). AGL proactively suggested that these risks could be reduced by only synchronising one core of the BH BESS online at any one time and swapping cores during operation for state of charge management.
  - AGL suggested energising one core transformer on the BH BESS to be ready to operate. TransGrid indicated that more modelling was required before doing this.
  - Further discussions continued with AGL providing a first draft of the commercial term sheet, following which, AGL and TransGrid met to discuss key issues. Key issues discussed at this stage included interfacing with AEMO to enable dispatch, liability, operational limitations, NER compliance obligations and pricing structure.
- Wednesday 23 October 2024
  - Further meetings occurred between TransGrid and AGL. TransGrid advised that further studies were underway to determine whether the BH BESS could be brought online to assist operation of the local grid.
- Friday 25 October 2024
  - AGL met with TransGrid to discuss further modelling undertaken by TransGrid. TransGrid raised a concern that the BH BESS may introduce a power instability under certain settings. AGL advised that it considered this to be a highly unlikely scenario but that the risks of this scenario needed to be balanced by TransGrid against the existing supply risks..
  - Revision 1.0 of the Operating Protocol agreed between AGL and TransGrid.
  - Approval given to start energising transformers at the BH BESS. The BH BESS was confirmed ready to commence operations once authorisation was given by TransGrid.
  - The term sheet was signed and AGL confirmed it was ready to provide the service in accordance with the Operating Protocol.
- Saturday 26 October 2024
  - TransGrid provided AGL with a copy of finalised grid stability studies, advised risk mitigations (settings) to be applied during operations and approved AGL's request to change settings on the BH BESS to achieve risk mitigations.
  - AGL makes and verifies required settings changes as required by the Operating Protocol prior to bringing the BH BESS online. Following this, authorisation was given by TransGrid to AGL to begin BH BESS operations.
  - At approximately 4:50pm the BH BESS was brought online and began charging. From this point onwards the BH BESS supported the islanded grid.

During the negotiations explained in the timeline above it was identified that AGL would be required by TransGrid to operate the BH BESS in a way that may technically have been (or potentially been) non-compliant with the National Electricity Law (NEL) and/or the NER including in relation to:

- the requirement to follow AEMO's dispatch instructions (NER clause 4.9);
- the requirement to meet the Generator Performance Standards for the BH BESS (NER clause 4.15).

Transgrid and AGL discussed this concern with the Australian Energy Regulator (AER). The AER confirmed that, on a limited basis, it did not intend to take action against Transgrid and/or AGL while they were providing a temporary solution to respond to the emergency situation described above. Noting there no other suitable alternatives that could be easily deployed in the circumstances.

On the evening of Thursday 31 October 2024, AGL took the BH BESS offline so that X2 Line could be restored. This then allowed for the BH BESS settings to be returned to normal, brought back online and back to normal market trading without incident on Friday 1 November.

Post event outcomes

At this time the BH BESS is still not approved or enabled for operation when the X2 Line is out of service.

Utilising the lessons learned from this event, and to help reduce the operational steps needed to enable the BH BESS for service in the event of any future, similar emergency situation, TransGrid and AGL are proactively working to finalise appropriate documentation and controls functionality.

If you have any questions relating to this submission, please contact Chris Streets at [redacted]

Yours sincerely,

Suzanne Falvi

Executive General Manager - Corporate Affairs

AGL Energy