Snowy 2.0 Connection Project – The Office of Energy and Climate Change (OECC) Comments to NSW Planning

26 June 2022

Dear Mr Preshaw

Thank you for the opportunity to provide advice and commentary on Transgrid's Response to Submissions (RTS) for the Snowy 2.0 – Transmission Connection project. The information below is provided based on OECC's high-level review of the RTS and from the perspective of its importance to meeting NSW electricity needs. On some matters, where we think it would provide clarity and transparency to Transgrid's assessment, we have suggested that Transgrid be asked to provide additional information, if time permits.

The importance of Snowy 2.0 and its connection point to meeting NSW's electricity needs

The Australian Electricity Market Operator's (AEMO) Electricity Statement of Opportunities (ESOO) provides technical and market data for the National Electricity Market (NEM) over a 10-year period, to inform the planning and decision-making of market participants, new investors, and jurisdictional bodies.

The most recent ESOO demonstrates that NSW will be able to meet all reliability standards for the next 10-year forecast period based on the significant investments the NSW Government has announced and is implementing. However, in terms of the medium-term outlook for NSW, AEMO's update to the 2021 ESOO notes that there are projected network limitations to the energy flows from the Snowy 2.0 Project, and from the proposed South-West Renewable Energy Zone to the Sydney, Newcastle and Wollongong load centres.

The timely delivery of Snowy 2.0, along with the associated transmission projects such as the Snowy 2.0 Connection Project and HumeLink, will significantly increase the firm generation capacity available to the Sydney, Newcastle and Wollongong areas, mitigating the loss of generation from retiring coal generators (such as Liddell and Eraring) and improving the medium-term electricity reliability outlook.

The NSW Infrastructure Investment Opportunities (IIO) report released in December 2021 by the new NSW Consumer Trustee (AEMO Services), identifies Snowy 2.0 and the HumeLink Transmission Project as critical inputs to the shape of the Development Pathways for long duration storage and generation infrastructure in NSW. The Development Pathways represent the NSW Consumer Trustee's preferred approach for delivering on the IIO, ensuring costs are minimised for customers and the NSW electricity security and reliability standards are achieved.

The Snowy 2.0 project, along with its associated connection to the public network, is identified as essential to the Optimal Development Path in the Australian Energy Market Operator's (AEMO) Integrated System Plan (ISP), along with other strategic storage initiatives, to firm up intermittent renewable generation in NSW, Victoria and, indirectly, South Australia.

Snowy 2.0 and its transmission connection will not only support reliability by providing firm generation capacity to the grid when there is low supply, but it will also help reduce system security issues and renewable energy curtailment by drawing electricity for pumping when load on the grid is lower than generation.

Co-locating the Snowy 2.0 and HumeLink connections at Upper or Lower Tumut

Transgrid advises that there is no spare capacity on Line 1 or Line 2 of the existing 330kV transmission network. Connecting Snowy 2.0 at either Upper or Lower Tumut Switching Stations would therefore mean no additional generation could be exported until HumeLink was also connected at the same location, and a new switching station built to link the 330kV lines to the 500kV HumeLink line.

Integrating the Snowy 2.0 HumeLink connection point with the existing Upper or Lower Tumut Switching Stations (LTSS) would also result in five key energy system assets (Snowy 2.0, HumeLink, Southern NSW 330 kV network, the Victoria NSW Interconnector (VNI) minor and the existing Snowy Hydro scheme) being located close together. OECC's view is that this would create significant vulnerability in terms of system resilience. A single event in the area, such as a bushfire, could potentially threaten the entire load and generation capacities across all of these important connections. OECC accepts that it makes sense from a network security perspective to locate the Snowy 2.0 connection at Maragle to reduce this vulnerability and improve system resilience.

However, Transgrid should take a consistent and transparent approach to assessing and managing material risks to system resilience. OECC is aware Transgrid has proposed running sections of the HumeLink project parallel to existing transmission lines through areas of high bushfire risk, which would appear contrary to some of their arguments for the placement of the Snowy 2.0 connection.

Transgrid, in their role as the transmission infrastructure planner, have proposed building a new substation at Maragle since the release of the Project Specifications Consultation Report in 2019, at the start of the HumeLink regulatory consultation process. This substation will enable new generation assets in the region, including Snowy 2.0, to connect to both the 500kV HumeLink and the existing Southern NSW 330kV network. The Maragle substation has also been included as the HumeLink connection point in the AEMO ISP since 2020. Both the ISP and the regulatory process involve robust public consultation processes. If the proposed route for HumeLink and the location of Maragle substation remain unchanged, then connecting Snowy 2.0 at LTSS would require HumeLink to be extended from Maragle to LTSS, which is likely to increase project costs, along with environmental and social impacts.

Co-location at the Upper Tumut Switching Station would also result in the HumeLink project needing to be extended to link with Snowy 2.0 to enable the additional generation to be transported to the grid. In this case through Kosciusko National Park (KNP), which is likely to significantly increase the social and environmental impacts on KNP and the surrounding area, along with the costs of HumeLink.

Undergrounding options

Several underground options are shown to be technically feasible and to have significant environmental, social and visual amenity benefits. However, undergrounding approaches are materially more expensive than the construction of overhead lines. The cost estimates in the Options Report appear to be in line with the kind of cost difference we would expect between the two approaches.

Underground cables can take much longer to install and be more costly to repair, but they also are much less vulnerable to environmental factors such as extreme weather or bushfire events and require repair much less frequently on average.

A 2015[1] report by the National Grid in the UK concluded that the cost of operation, maintenance and energy losses over the life of the connection was broadly the same for undergrounding and overhead lines. In contrast, a recent feasibility study[2] assessing undergrounding options for the HumeLink project indicates ongoing operation and maintenance costs of underground options for the HumeLink project, would be significantly higher than for the preferred overhead option. However, this report analyses options for running the 300+ kilometres (km) of HumeLink underground, which is a very different engineering challenge to building and maintaining ~9km of high voltage underground transmission lines for the Snowy 2.0 connection project.

Underground lines can take several months to fix rather than a couple of weeks in the case of overhead lines. However, since the Snowy 2.0 Connection Project is proposed to be built with an n-1 redundancy, and is in an area of high bushfire risk, it is possible there is a lower likelihood of a major outage on the line with the undergrounding options compared to overhead. Unfortunately, there is some uncertainty about comparative risk of outages over the life of the asset, across the options, in the materials reviewed.

The Options Report does show that each of the feasible undergrounding options would take substantially (several years) longer to complete than the preferred option (Option 4 – overhead connecting to line 64 at Maragle). This would delay the completion of the connection project by at least two years compared to the preferred option. However, due to the recently announced delays to the Snowy 2.0 project an extended timeline for completing the Snowy 2.0 connection project may not impact the timing of first power from Snowy 2.0.

Undergrounding options would also be expected to be the strongest mitigation against visual and other environmental impacts, and the Options Report appears to confirm this to be the case. However, the Appendix E to Transgrid's Response to Submissions (the Supplementary Landscape and Visual Impact Assessment) does not explicitly compare the benefits of underground options over overhead options.

Visual impacts of overhead lines

As is discussed in the Supplementary Landscape and Visual Impact Assessment, the choice of structure for overhead connectors and the treatment of the structure can have a positive impact on visual amenity.

If the overhead option is approved, then OECC recommends including conditions which require Transgrid to include provisions for innovation and optimisation of visual amenity in their procurement for design and construct services.

The most appropriate structure to use, and the colouring of the structure, involves a balance of factors, influenced by a range of variables all along the intended route for the conductor line. Structures such as monopoles may have less of a visual impact in some areas along the route, depending on the surroundings. However, monopoles often need to be closer together compared to lattice towers. As a result, more poles would be needed for these sections, potentially increasing the environmental impact.

The footing to secure monopoles in place can also be much larger than for lattice towers, which are secured across four smaller footings. If the environmental impact can be managed and the improvement to the visual impact is considered to be high, such a solution may be beneficial. However, at other parts of the route a lattice structure may be a better option. Similarly, as per the discussion in Appendix E, treating each tower (whether monopole or lattice) to blend, as much as possible, into its particular surroundings, can have material visual amenity benefits. The most appropriate colouring to be used for each structure would be dependent on the specific location of the structure.

[1] 39111-Undergrounding_high_voltage_electricity_transmission_lines_The_technical_issues_INT.pdf (nationalgrid.com)
[2] www.transgrid.com.au/media/hrucirfe/trn-rpt-005-00-app.pdf

Summary

In summary, the Snowy 2.0 Connection Project is an important project, supporting the transition from coal fired generation to an electricity system predominantly supplied by variable renewables and storage. Locating the connection at a new switching station at Maragle has merit as it provides geographical diversity, and greater system resilience.

However, for completeness, we recommend seeking the following additional information from Transgrid:

- An analysis of the system resilience risks of co-locating the connection at LTSS compared to running parts of HumeLink close to existing transmission lines through bushfire prone areas, showing why the risk is acceptable in one situation, such as for the Humelink transmission project but not in the other, such as for the placement of the Snowy 2.0 connection.
- A clear comparison of the potential benefits of the underground options (including vulnerability to environmental factors, and visual impacts) against the potential costs (including operation and maintenance costs, as well as construction delays).

We would also recommend obtaining an independent assessment of the forecast costs for the underground options.

If you have any further questions about this issue, please contact Mrs Colette Grigg, Director, National Energy Markets, on 0477 203 101 or at colette.grigg@planning.nsw.gov.au

Yours sincerely

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