Transgrid

People. Power. Possibilities.

Submissions Report

The HumeLink Project – Material change in circumstance assessment

8 June 2024

1. Executive summary

1.1. Overview

Transgrid proposes to increase the energy network capacity in southern New South Wales (NSW) through the development of new 500 kilovolt (kV) high-voltage transmission lines and associated infrastructure between Wagga Wagga, Bannaby and Maragle. This project is collectively referred to as HumeLink.

The project would be located across six Local Government Areas (LGAs) including Wagga Wagga City, Snowy Valleys, Cootamundra-Gundagai Regional, Upper Lachlan Shire, Yass Valley and Goulburn Mulwaree. HumeLink is a priority project for the Australian Energy Market Operator (AEMO) and the Commonwealth and NSW governments.

The project would deliver a cheaper, more reliable and more sustainable grid by increasing the amount of renewable energy that can be delivered across the national electricity grid, helping to transition Australia to a low carbon future.

Without HumeLink, the electricity supply in NSW will become unreliable as coal-fired generators are retired. HumeLink will play such an important role in bringing consumers more affordable, reliable and renewable energy that it has been declared Critical State Significant Infrastructure (CSSI). The net market benefits associated with the project are estimated at more than $1 billion.

1.2. Your questions answered

What is the purpose of this Submissions Report?

Transgrid's assessment of whether a material change in circumstance (MCC) had occurred for HumeLink that may change the preferred option for the project was published on Transgrid's HumeLink Project page on 1 March 2024. Our assessment, which found that the previously identified preferred option remains the preferred option, attracted seven submissions from a mix of individuals and organisations.

This report summarises feedback from submissions raised about the MCC assessment and provides Transgrid's detailed responses. It does not address any submission topics beyond the scope of the MCC assessment, such as Snowy 2.0 or general queries about the impact of transmission infrastructure on local communities, which are covered by other public documents.

We hope that, by focusing on answering specific questions about the MCC assessment, we can effectively address stakeholder feedback and help people to better understand the process.

What did the submissions raise about the MCC assessment?

Five of the seven submissions asked questions and talked about the MCC assessment of the HumeLink Project (HumeLink). Their main questions centred around:

The basis for options assessment

Submissions wanted to better understand the large cost differences between Options 1C, 2C and 3C, as they have many elements in common.

> *Transgrid's response*: Although the options appear similar, Option 3C is already partially delivered and on track for 2026 delivery. Whereas both Options 1C and 2C have not started and would not be delivered until 2029. When estimating the costs for Options 1C and 2C, we have to take into account the already expended (sunk) costs for the works already completed as part of Option 3C. We also have to add in contingencies for Options 1C and 2C due to their later delivery in a competitive construction market with the potential for additional lump sum costs. (See Section 4.1 for more details.)

The reason for the $498m decrease in biodiversity offset costs

> *Transgrid's response*: The original biodiversity offset cost estimates were developed through desktop analysis on a route that has since changed due to community preferences and further refinement in design. Now that some on-the-ground surveys have been conducted on a route that includes a deviation through the Green Hills State Forest, the cost of biodiversity offsets have almost halved. (See Section 4.1 for more details.)

The reason for the 87% increase in costs associated with lines and substations

> *Transgrid's response*: This has come from the increased costs of materials and labour, and inflationary pressures. (See Section 4.1 for more details.)

The potential to put HumeLink underground

Some submissions suggested undergrounding as a feasible option that Transgrid should investigate and include in the MCC assessment.

> *Transgrid's response*: A 2023 NSW Parliamentary Inquiry found that the cost of undergrounding HumeLink was likely to be around $11.5 billion – more than twice the estimate for an overhead solution for HumeLink. Transgrid therefore considers an underground solution would not be economically efficient under the National Electricity Rules and does not need to be included in the MCC assessment. (See Section 4.2 for more details.)

The potential to delay HumeLink

Submissions note delays in other energy transition projects and question whether HumeLink's 2026 delivery date is still necessary.

> *Transgrid's response*: Delaying HumeLink may result in contractual penalties of up to $846,000 per day given that the Delivery Contracts are already signed and programmes developed. It would also negatively impact electricity consumers by slowing access to cheaper wholesale energy, as well as introduce further uncertainty and risk. It is most cost efficient to complete the project as early and in the shortest timeframe as possible. Also, with the first Snowy 2.0 generating units expected to start commissioning in July 2027, HumeLink needs to keep progressing as planned (see Section 4.5 for more details).

The benefit of a variable (rather than a fixed) contract

Submissions suggest there is less risk of contractors going over budget under a fixed price Design & Construct (D&C) arrangement rather than the variable D&C Incentivised Target Cost (ITC) contract model proposed for HumeLink.

> *Transgrid's response*: A lump sum (fixed price) contract is one of the main factors that led to the insolvency of Clough, which affected both the PEC and Snowy 2.0 projects. This is because the contractor was tied to a fixed price in circumstance where a volatile market which was highly affected by inflation and supply chain constraints made the project infeasible to continue with. As a result, the market is wary of fixed price contracts. Most major transmission projects in Australia are now being delivered under a D&C ITC contract model. By capping the contractor's risk, these ITC models reduce the risk premium added by contractors when bidding for a project which has a fixed price structure

Some submissions also asked **technical questions**, requiring highly detailed answers, about:

- The varied benefit models created to assess the project (see Section 4.3)
- Whether HumeLink should have a higher capacity (see Section 4.4)
- How costs are shared and how those shared costs relate to other major projects (see Section 4.6)
- The timing of Transgrid's MCC assessment given rule changes in October 2023 (see Section 4.7)

1.3. What about the other two submissions?

The other two submissions raised general feedback about the project as a whole. Given they did not ask specific questions about the MCC assessment, the queries raised are not addressed in this report. However, along with the other five submissions, we have given them to the Australian Energy Regulator (AER) to inform its consideration of decisions about HumeLink.

1.4. What are the next steps?

This Submissions Report will be given to the AER for its information. This report will also be made public on Transgrid's website on the HumeLink Project page.

2. Introduction

This section summarises the purpose and structure of this Submissions Report. It explores the background, context and status of HumeLink regulatory process in relation to the MCC assessment, as well as the legal basis and process undertaken to make the MCC assessment.

2.1. Purpose and structure of this report

This Submissions Report summarises the main themes of the submissions regarding the MCC assessment for HumeLink and provides Transgrid's responses.

The structure of the report is set out below:

Section 1: Executive Summary
Section 2: Introduction of the Submissions Report
Section 3: Analysis of submissions
Section 4: Transgrid's responses to the submissions
Section 5: Next steps

2.2. Background and regulatory context

The Australian Energy Market Operator's (AEMO) draft 2024 Integrated System Plan (ISP) continues to identify HumeLink as an actionable ISP project, consistent with its status in the 2022 ISP. AEMO's draft 2024 ISP highlights 'a clear need for urgent delivery of all actionable transmission projects' and calls for work on all actionable projects 'to commence or continue as soon as possible'. AEMO also notes that the actual delivery dates for both future and actionable ISP projects are in the hands of the transmission network service providers (TNSPs).

On 8 December 2023, Transgrid submitted a draft Stage 2 contingent project application (CPA2) to the AER, seeking approval to recover the full construction costs of the HumeLink project. The AER had already approved the recovery of Early Works and long-lead equipment (LLE) expenditure for HumeLink through the CPA1 (Parts 1 and 2) process.

The final CPA2 was submitted on 21 December 2023, representing the last stage of the regulatory approval process for HumeLink. The estimated capital cost of HumeLink (as reflected in the draft 2024 ISP and CPA2) has increased materially since the RIT-T for HumeLink was conducted in 2021. In parallel with preparing the CPA2, Transgrid assessed whether the increased cost to HumeLink could have resulted in a 'material change in circumstance' as defined under the National Electricity Rules (Rules).

On 1 March 2024, Transgrid published an MCC assessment determining that an 'MCC event' had not occurred and invited submissions from stakeholders on any areas where they sought further clarification of the assessment. This Submissions Report captures the queries from the submissions where they relate to the MCC assessment and provides Transgrid's responses.

2.3. Material change in circumstance statutory obligations

The provisions under the Rules relating to a material change in circumstance were updated in October 2023. Under the transitional provisions, the Rules in place before the update continue to apply to any RIT-T for which a Project Assessment Draft Report (PADR) was published until 27 October 2023. The earlier Rules therefore continue to apply to HumeLink.

In particular, clause 5.16A.4(n) from version 202 of the Rules applies to Transgrid, as the RIT-T proponent for HumeLink, requiring that where:

(1) A RIT-T proponent has published on its website a project assessment conclusion report in respect of a RIT-T project; and

(2) there has been [..]:

(i) a material change in circumstances which, in the reasonable opinion of the RIT-T proponent means that the preferred option identified in the project assessment conclusions report is no longer the preferred option; [..]

(ii) …

then the RIT-T proponent must re-apply the regulatory investment test for transmission, unless otherwise determined by the AER.

The Rules define a material change in circumstance as including a change to the key inputs and assumptions (including as a result of an ISP update) used in identifying the:

- need described in the PACR
  or
- credible options assessed in the PACR.

Given these provisions, Transgrid has undertaken an MCC assessment to evaluate whether the change in the capital cost estimate for the Project represents a material change in circumstances. The MCC assessment was published on 29 February 2024.

2.4. Process followed for the MCC assessment

The MCC assessment determines whether the threshold for a material change in circumstance has been met. If triggered, this threshold (described as an 'MCC event') may require Transgrid to re-apply for the RIT-T. The five-stage process for the MCC assessment was to:

1. assess all three options from the HumeLink PACR Addendum
2. assess the impact of selecting each option at the time of the MCC assessment
3. update the capital cost estimates for all three options
4. update the operating expenditure assumptions for all three options
5. update the estimate of market benefits to reflect the draft 2024 ISP assumptions.

The MCC assessment concluded that the preferred option identified in the PACR had not changed as a result of the increase in costs since publication and therefore the RIT-T did not need to be reapplied.

3. Analysis of submissions

3.1. Submissions received

Transgrid received seven submissions regarding the MCC assessment, six during the public feedback period between 1 March and 3 April, and one on 16 May. Five of the seven submissions raised direct queries or specific topics of relevance to the MCC assessment. The other two focused on general comments about the HumeLink project.

The five submissions that focused on the MCC assessment were made by:

- three community members/individuals
- two organisations.

Between them, these submissions raised 80 queries . Each covered a range of topics, some unique to individual submissions, others common across multiple submissions. Some submissions also touched on content in the CPA2 submission. In such cases, Transgrid has focused solely on queries and topics specific to the MCC assessment, rather than on broader aspects of HumeLink.

Table 1 provides an overview of the common topics raised relating to the MCC assessment, and the number of times they were raised across the five submissions.

Table 1 Submission overview

Key theme	Consideration in Submissions Report
Options assessment and basis of estimates	3.1
Undergrounding	3.2
Gross benefit modelling	3.3
Higher capacity HumeLink option	3.4
HumeLink delivery timing	3.5
Associated transmission investment and timing	3.6
Timing of MCC assessment	3.7
HumeLink contract structure	3.8

3.2. Approach to responding to submissions

Because the submissions raised common topics, Transgrid has taken the efficient approach of consolidating our responses by theme. This Submissions Report only addresses queries within the scope of the MCC assessment. Many of the queries relating to broader regulatory and project matters have already been addressed in other public reports. In particular, queries relating to environmental and social aspects of the project may be found in the Submissions Report for the critical State significant infrastructure (CSSI) application, which includes a high-level comparative environmental performance of overhead and underground transmission lines.

4. Response to submissions

This section outlines the queries raised in submissions about the MCC assessment and provides Transgrid's corresponding responses.

4.1. Option assessment & basis of cost estimates

Summary of submissions received

Submissions expressed a need for greater understanding of timing and cost differences between Options 1C ,2C and 3C, particularly given the large degree of commonality between the options. Specifically, the following questions were raised:

1. Why does Option 1C have higher biodiversity costs and a later estimated delivery date for a line that is 93km shorter when compared to Option 3C?
2. Why are new early works activities included for some options and not others?
3. Why is contingency included for some options, but not others?
4. Why are biodiversity offset costs reduced by $498m between the PACR and MCC for Option 3C, particularly in light of the increase in access tracks and associated biodiversity impacts?
5. What is driving the 87% increase in forecasted cost associated with lines and substations between the PACR and MCC assessment?

Response

The answers to the first three questions relate to the fact that Option 3C is already partially delivered and on track to meet its 2026 delivery date, as required by the 2022 ISP, whereas both Options 1C and 2C would not be delivered until three years later in 2029.

Option assessment (Q1)

The analysis indicated that Option 3C remains the preferred option with a 10% lead over Option 2C on a weighted basis (see MCC assessment page 3). Also, Option 2C delivery in 2029 would be too late to align with Snowy 2.0 staged commissioning from mid-2027.

Early works assumptions (Q2)

The MCC assessment assumes that the early works activities required for Option 1C and 2C would be similar in scope and scale to those currently underway in Option 3C. As the early works for Option 3C are largely complete, no additional early works were added to the Option 3C cost estimate. New early works costs have therefore only been added to Options 1C and 2C.

Early works undertaken for Option 3C are not transferrable to Option 1C or 2C, with the exception of some LLE items. As such, the cost estimates for Options 1C and 2C in the MCC assessment include both the early works costs specific to these options and also the costs already incurred for Option 3C (as these cannot now be avoided).

Contingency (Q3)

Transgrid derived Class 4 estimates for Options 1C-new and Option 2C by basing them on the updated estimates for the equivalent components of Option 3C (which have been refined to AACE Class 2-3 estimates over 18 months of early works) and then applying contingencies that recognise the risks and impact on costs from re-contracting with a changed option and later delivery.

The contingency for all options was calculated using the Hollmann model – Transgrid's contingency modelling tool for all estimates of major project contingency.

Additional contingencies were included for both Option 1C-new and Option 2C for risk due to a constrained construction market, lump sum costs and the revised delivery time frame associated with a 2029 delivery date. Further contingency was included in Option 2C given the change in route and 30km of additional line length.

Biodiversity offset cost estimate (Q4)

The original biodiversity offset cost estimates in the PACR were primarily developed through desktop analysis. They involved conservative assumptions for the condition of plant community types and number of threatened species likely to be present. The costs also reflect the relative cost of paying for all offsets through the Biodiversity Conservation Fund (BCF), which represents the highest cost offset pathway.

Since the PACR was released, Transgrid has reduced the biodiversity offset cost estimate for Option 3C by:

- a progressive and iterative process of route selection and refinement based on 'avoid and minimise' planning principles, resulting in the route avoiding high-value plant community types and threatened ecological communities
- extensive biodiversity surveys to inform the Biodiversity Development Assessment Report (BDAR) for the Environmental Impact Statement (EIS), resulting in more accurate information about the quality and integrity of vegetation and presence of threatened species
- engaging biodiversity offset specialists to consider all biodiversity credit acquittal options and identify the optimal pathway for the project
- undertaking additional surveys after lodgement of the EIS, in response to queries and requests raised by the Biodiversity Conservation Division (BCD), to address information gaps as presented in the Revised BDAR for the Amendment Report.

These actions have approximately halved the estimate of biodiversity offset costs through several factors including:

- agreeing on the community-ed Green Hills route deviation which impacts pine plantation rather than high-value native vegetation.
- prioritising the establishment of Biodiversity Stewardship Sites over payment into the BCF
- prioritising the purchase of credits from the open market, where available and cost-effective
- working with the BCD to rule out threatened species that were assumed present but not likely to occur and confirming credit requirements for select threatened species
- planning for future targeted surveys on sites previously inaccessible to the survey team, resulting in reductions in high-value species credit requirements.

The Option 3C cost estimate incorporates an allowance for future circumstances or activities that could drive the eventual cost up, including clearing impacts associated with access tracks, construction compounds and accommodation facilities. Transgrid acknowledges that the scale of these impacts has increased since the EIS and CPA2 submissions due to the Amendment Report being finalised after CPA2 submission. However, the increase is generally in line with the allowances in the CPA2 estimate.

Transgrid has not undertaken any detailed assessment or on-ground survey work for Options 1C and 2C as it was not deemed a prudent use of funding. Similar actions to those outlined above would likely also reduce biodiversity offset costs for Options 1C and 2C. However, the reductions achieved for Option 3C cannot be assumed for Options 1C and 2C, since the planning and environmental approval processes under the *Environmental Planning and Assessment Act 1979* and *Environment Protection and Biodiversity Conservation Act 1999* would need to be undertaken entirely from scratch for these options. Given this would likely take a minimum of two years, the assumptions on which the Option 3C cost estimate is based, including credit pricing, cannot be relied upon.

Line and substation cost increase (Q5)

The line and substation cost increase since the PACR has been driven by three factors:

1. increasing labour costs due to the surge in construction activities / demand for construction workers
2. increasing materials costs due to surge in construction activity globally, supply chain disruptions resulting in materials shortages, the war in Ukraine driving up fuel costs, and fluctuations in global commodity market prices for raw materials
3. inflationary pressures with headline Consumer Price Index (CPI) inflation over the 21/22 and 22/23 financial years averaging more than 6% – the highest year-ended CPI inflation since early 1990s – and the Producer Price Index (PPI) for the manufacturing sector increasing by 17.7% over the 12 months to June 2022.

As noted above in the response relating to 'Contingency (Q3)', Option 2C also involves an additional 30km of transmission line, which is a significant factor in the real terms (2022-23 dollars) cost increase for that option.

4.2. Undergrounding

Summary of submissions received

Some submissions suggested undergrounding as a feasible option that should be investigated by Transgrid and included in the MCC assessment. The statements made in this regard include that:

1. undergrounding would be of a comparable cost to overhead lines
2. a review conducted by Amplitude Consultants stated that the project can be delivered underground for $5.46 billion to $7.3 billion
3. undergrounding could achieve triple bottom line (financial, environment and social) outcomes, the efficiency of the National Energy Market (NEM) and alignment with the National Electricity Objective (NEO)
4. the MurrayLink underground interconnector project could be used as a comparative project.

Response

Cost of undergrounding and Amplitude's review (Statements 1 and 2)

The 2023 NSW Parliamentary Inquiry into the feasibility of undergrounding transmission infrastructure concluded that the cost of undergrounding HumeLink was likely to be around $11.5 billion. This inquiry took Amplitude's undergrounding feasibility review into consideration. Following this inquiry, the NSW Parliament formed a Select Committee to examine the feasibility of undergrounding of transmission infrastructure for renewable energy projects. Transgrid presented to the Select Committee in February 2024. The Committee's report, in March 2024, did not dispute the $11.5 billion cost estimate.

Given the $11.5 billion cost estimate is more than twice the estimate for an overhead solution for HumeLink, Transgrid considers an underground solution would have no prospect of being shown to be economically efficient under the Rules and consequently would fail the to pass the RIT-T. As such, an underground option was not assessed as part of the MCC assessment.

MurrayLink comparison and associated environmental (Statements 3 and 4)

MurrayLink is a 220MW capacity high-voltage direct current (HVDC) transmission line running 176km from Red Cliffs in Victoria to Berri in South Australia, which is a region of comparatively low population and environmental constraints. By contrast, HumeLink is a proposed 2,200MW alternating current (AC) transmission line running for around 365km over significantly more populated and environmentally diverse terrain. The distinctly different characteristics of these projects means that MurrayLink has limited relevance to considering the costs and characteristics of an undergrounding option for HumeLink.

The comparative benefits and environmental performance of overhead and underground transmission lines are considered in detail in the Submissions Report for the HumeLink critical State significant infrastructure (CSSI) planning assessment process, which is available on the Transgrid HumeLink Project page.

Community sentiment and triple-bottom line outcomes (Statement 4)

For the reasons set out above, Transgrid believes that the overhead solution for HumeLink is significantly cheaper and associated with lower overall environmental impacts than an underground solution. It is considered that a lower cost option for energy consumers and having less environmental impact would contribute to an improved community sentiment. It is recognised that the overhead solution does have a greater visual impact and the project is attempting to mitigate this impact as best as possible through negotiations with landowners and neighbouring properties and project design. Transgrid's view is the current overhead design achieves triple-bottom line outcomes.

4.3. Gross market benefit modelling

Summary of submissions received

Submissions raised questions about to the varied benefit modelling results for the project, specifically:

- Why is the EY gross benefits estimate higher than AEMO's draft 2024 ISP assessment?
- Is it appropriate to assume a wind drought in 2029/30, which is seen to increase benefits?

Submissions also asked for more clarity about the cause of the increased benefits forecasts that came from models created by Transgrid, EY and AEMO for the PADR, PACR, 2022 ISP, Draft 2024 ISP and MCC assessment.

Response

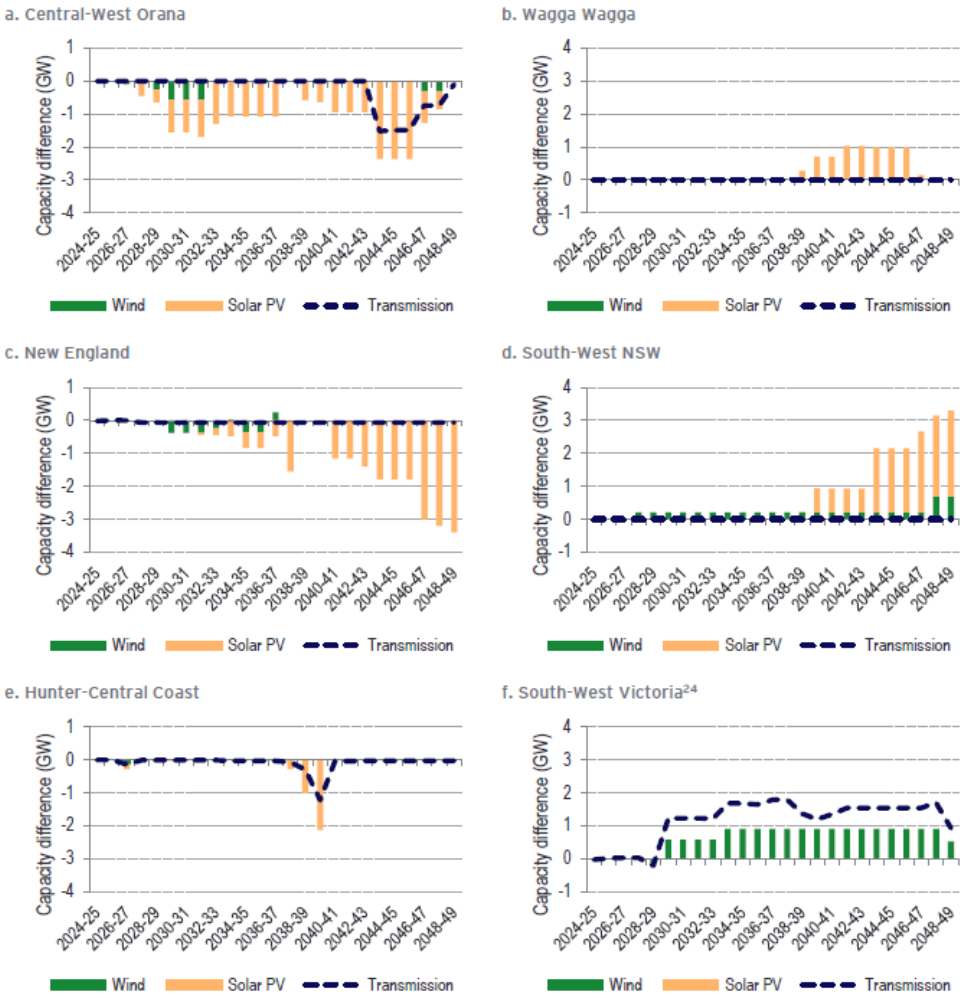
EY gross benefits estimate

In computing this estimate, EY aligned as many input assumptions as possible with the Draft ISP 2024 and followed a similar methodology. Any known differences in input assumptions and methodology are noted in the EY Market Modelling Report[1], Section 7.

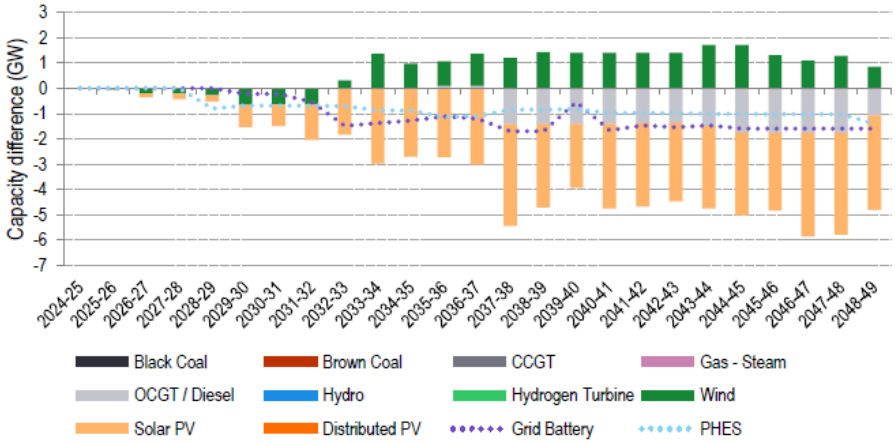
Market modelling for an ISP focuses on cost efficient transmission network development over the long term. One difference is that, whereas AEMO used a 4-node model of NSW network in the Draft ISP 2024, EY used a 9-node model, which identified greater market benefits from the HumeLink Project. Specifically, that HumeLink supports more cost-efficient investment in renewables, enabling more low-cost capacity build away from Central-West Orana and New England, as well as enabling more higher capacity factor wind capacity build in Victoria through the improved connection via VNI West.

These benefits are illustrated in the following diagram from the EY Market Modelling Report (Modelled REZ capacity mix difference between Option 3C and Base Case in the Step Change scenario – Figure 14).

[1] EY Gross Market Benefit Assessment of HumeLink



In addition, the following diagram, from the EY Market Modelling Report (Forecast capacity difference with and without Option 3C, commissioned 2026-27 for the Step Change scenario – Figure 12) shows that solar, large-scale battery storage, pumped hydro and gas capacity across the NEM are forecast to be avoided and replaced with wind capacity with the inclusion of HumeLink. With greater shared energy, as well as the increased storage capacity in Snowy 2.0, alternative types of storage build (both short and long duration) are avoided, and it becomes more efficient to build wind capacity than solar.



The higher forecast gross market benefits calculated by the EY Market Modelling Report could be due to a higher system cost in the Base Case in the EY analysis than the 'without HumeLink' case in the Draft 2024 ISP analysis, or due to lower system cost in the Option 3C case in the EY report, or a combination of the two (see EY Market Modelling Report Section 7).

The EY Market Modelling Report indicates the additional gas capacity in AEMO's analysis (with and without HumeLink) may be a result of the ISP's iterative method for calculating firm capacity and reserve requirements, which differs from EY's dynamic single-solution method. AEMO's capacity outlook model assumes a fixed estimated contribution to firm capacity from generation, transmission, storage and demand-side technology and fixed reserve levels. Firm contribution factors and reserve levels are refined through iterative time-sequential models and final values are not published. In contrast, EY dynamically calculates the contribution of transmission, storage and renewable generation to meeting peak demand and reserve, within a single hourly time-sequential solution for generation and storage entry, exit and dispatch (see EY Market Modelling Report, Section A2). Additional gas capacity both with and without HumeLink in AEMO's analysis may reduce the opportunity for differential investment between the two cases, which reduces the estimated market benefits.

Although there are differences in the market benefits calculated, all the analysis from Transgrid, EY and AEMO confirms that the HumeLink project produces large net positive market benefits. The most significant difference between the EY and AEMO estimate of gross benefits is in relation to generation and storage capital deferral savings. EY modelling estimates that 92% of the gross market benefits came from these savings.

Wind drought

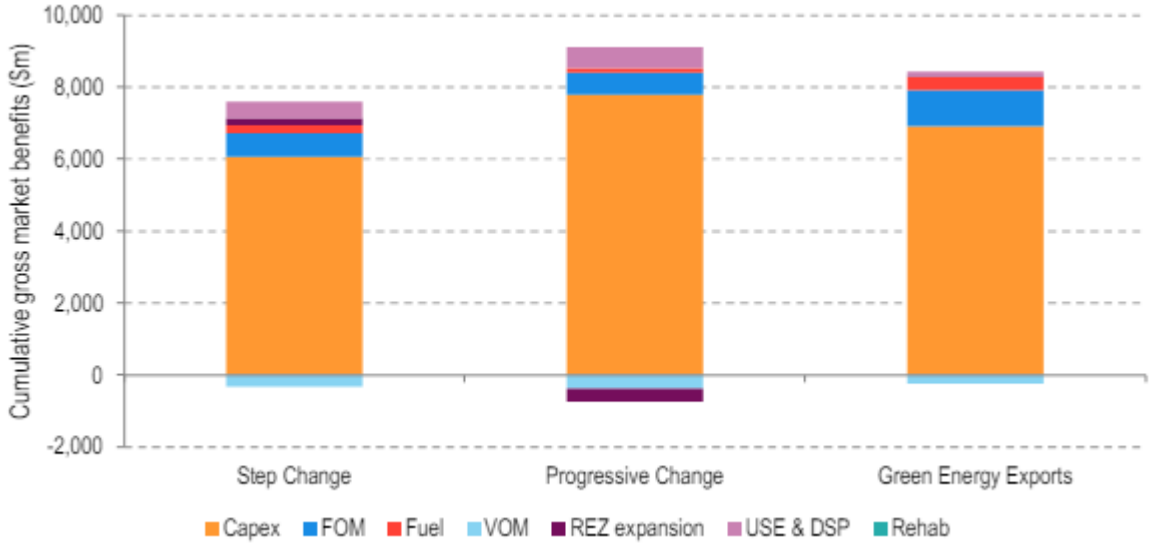
EY considered the impact of HumeLink on renewable wind droughts in the market benefit analysis, with the same sequence of reference years for weather and demand maintained between the PACR market modelling (June 2021) and the MCC Assessment (EY Market Modelling Report). The sequence was not selected to generate a particular outcome.

It is appropriate that the weather years considered include a wind drought to capture the benefits of HumeLink to system resilience. In terms of timing, the coincidence of the assumed renewable energy

targets, coal generator retirement schedule and the weather year combine to create the wind drought in 2029/30.

Importantly, the MCC assessment showed that the wind drought event does not change the preferred option, and only contributes a minor amount to the overall net market benefit. HumeLink would still remain net market positive without including the wind drought.

Figure 10 in Section 5.1 of the EY Market Modelling Report (repeated below) highlights the relatively small contribution that USE & DSP (Unserved Energy & Demand Side Participation) contributes to the gross market benefit of Option 3C across all scenarios, which includes the contribution from the wind drought.



4.4. Inclusion of a higher capacity HumeLink option

Summary of submissions received

Some submissions ask whether the proposed 2,200 MW capacity of HumeLink will be able to achieve all of the following three objectives:

1. connect Snowy 2.0 (2,200 MW)
2. connect renewable generation in southern NSW (4,300 MW)
3. increase the capacity for interstate transfers between NSW, Victoria and South Australia (2,735 MW).

Submissions ask that, given these three objectives total 9,235 MW in capacity requirements, why a larger capacity HumeLink option has not been considered.

They also ask about the assumption, made by both Transgrid and AEMO, of a 660 MW export constraint on Snowy 2.0 should HumeLink not be finished at the time of Snowy 2.0 completion. Noting that the 660 MW export constraint on Snowy 2.0 appears to have a significant impact on the market benefits estimate, submissions ask for more information about how the 660 MW export constraint was derived.

Response

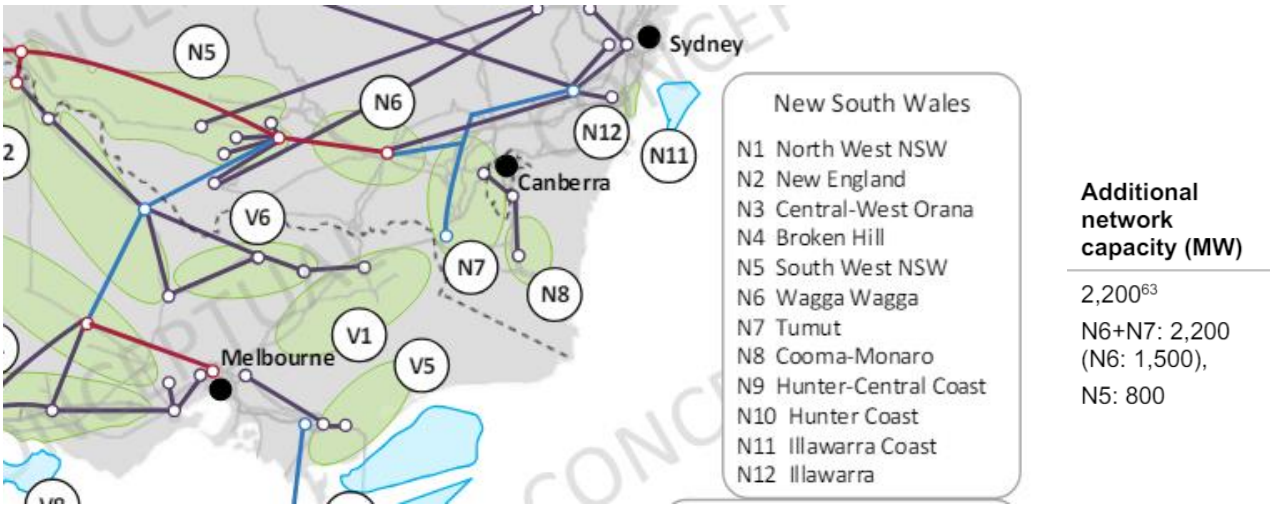
Higher capacity for HumeLink

The Draft 2024 ISP considered network augmentation options with higher network capacity for HumeLink. However, these options are not selected in the optimal development path, which is created using market modelling tools that use forecasted demand and generation traces to develop an optimal network to maintain prescribed system adequacy and reliability. A higher capacity for HumeLink would represent over investment and result in fewer or negative net market benefits.

The differing numbers cited in the submissions all refer to different aspects of capacity that will be augmented by HumeLink.

- **2,200 MW** is the capacity of energy delivered towards Sydney across the existing and new 500 kV HumeLink line to Bannaby. In AEMO's 2023 Transmission Expansion Options Report,[2] the increase in maximum flow capability between Central NSW (CNSW) and Sydney Wollongong Newcastle (SNW) regions provide by HumeLink is 2,200 MW (defined by CNSW-SNW cut-set limit). In the EY Market Modelling Report, the increase in the Canberra/YASS-Bannaby cut set limit provided by HumeLink is also 2,200 MW.
- **2,735 MW** is the increase in capacity provided by VNI West and Project Energy Connect.

AEMO's Transmission Expansion Options Report indicates that the increase of 2,200 MW in Wagga/Tumut REZ capacity and 800 MW in South-West REZ capacity can be accommodated after adding HumeLink (see extracts from Figure 3 and Section 3.8 below). Total additional REZ capacity of 3,000 MW (rather than 4,300 MW) accommodated by HumeLink was identified in this report – sufficient for either 2,200 MW Snowy generation or the southern NSW generation.

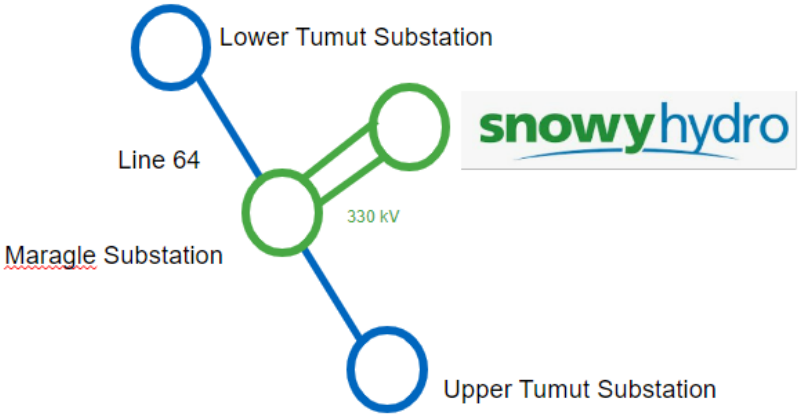


HumeLink does not need a higher capacity because, although the generation capacity that can be installed in Southern NSW or can be transferred from VIC and SA is higher than 3GW, not all the generators will generate their maximum output at the same time.

[2] https://aemo.com.au/-/media/files/major-publications/isp/2023/2023-transmission-expansion-options-report.pdf

660 MW export constraint on Snowy 2.0

Before the 500 kV HumeLink lines are connected, Snowy 2.0 will be connected to the existing 330 kV network by cutting into Line 64 as per the following diagram.



Line 64 has a thermal limitation to cater for the N-1 contingency (a trip of the line either from Upper Tumut to Maragle or Lower Tumut to Maragle). Given the 330 kV Line 64 has a Summer Day normal rating of 714 MVA and a 15-minute rating of 857 MVA, only two units of Snowy 2.0 generators can be commissioned until HumeLink is complete.

Commissioning three units at full capacity would exceed the thermal line rating. With just two units commissioned, Snowy 2.0 generation capacity will be capped at either 667 MW (as per the connection application received by Transgrid for 2,000 MW output consisting of 6 units, each rated at 333.3 MW)[3] or 732 MW (as per the latest information available on Snowy Hydro & AEMO website for 2,200 MW output consisting of 6 units, each rated at 366.7 MW) under an optimistic scenario.

Considering the current utilisation of Line 64 (including existing Snowy generation) as well as thermal and potential stability limitations, Snowy 2.0 is expected to frequently operate at a lower dispatchable power level if commissioning occurs before HumeLink is complete.

4.5. HumeLink delivery timing

Summary of submissions received

The key question from submissions relates to HumeLink's current delivery timing and alignment with the optimal delivery date in AEMO's draft 2024 ISP (July 2029-30 for Step Change). Submissions note that, since the 2022 ISP, Snowy 2.0 and other transmission projects, new gas generators and batteries have been delayed. They question the necessity of the current delivery date for HumeLink, noting it too is at risk of delays.

[3] snowy-2-0-transmission-roads-and-traffic-fact-sheet_-final.pdf (lumea.com.au)

Response

HumeLink was identified as an 'actionable project' in the AEMO 2022 ISP with a target completion date of July 2026. Actionable projects are defined as needing urgent delivery and works should continue and/ or commence as urgently as possible. Early delivery of 'actionable projects' would provide valuable insurance against early coal closures or if the development of generation and storage slows.

Transgrid has planned the delivery of the HumeLink project to meet the 2022 ISP date, and the project has been proceeding with that timeframe as the objective.

The Draft 2024 ISP confirms that HumeLink continues to provide net benefits to the market and remains a key component of the optimal delivery path, taking into account the changes in the costs of HumeLink as well as changes in the costs and timing of other major developments in the NEM more widely, and the revised delivery timing for Snowy 2.0. Given that the first Snowy 2.0 generating units are expected to start commissioning in July 2027, HumeLink needs to keep progressing as planned.

The Project is currently moving into the delivery phase (pending CPA2 determination). Delivery contracts with a fixed end date have already been signed and programmes for delivery developed. Delaying HumeLink now could incur contractual penalties estimated at up to $846,000 per day and would negatively impact consumer electricity bills, by slowing access to cheaper wholesale energy.

Such a scenario would also impact the pace of the energy transition, as contractors would be delayed on HumeLink and unavailable to move onto the next energy transition project.

4.6. Associated transmission investment and timings

Summary of submissions received

Some submissions asked for a greater understanding of linked transmissions investments, how costs are shared, and how those shared costs relate to other major projects when the delivery of those projects is not synchronised. In particular, submissions asked for:

1. an explanation of the synergies with VNI West and Project Energy Connect and the source of the $787 million saving
2. clarification as to whether associated costs from other projects been included in the cost-benefit analysis for HumeLink.

Response

Cost sharing (Point 1)

The $787 million cost savings come from:

- **$697 million from the PEC enhancement**. The PEC enhancement works involve increasing the capacity of a segment of Project EnergyConnect between Dinawan and Wagga Wagga from 330kV to 500kV double circuit configuration, which avoids the need for VNI West to construct a second 500kV transmission line in this segment to achieve the desired capacity specified in the ISP.
- **$90 million from the Gugaa savings**. These are based on market pricing received on HumeLink for the pre-agreed variation for the Gugaa Augmentation works. The variation enables works on the

Gugga substation site to be undertaken upfront by a single contractor to accommodate the full scope of both HumeLink and VNI West, rather than undertaking these works in a piecemeal fashion, which involves significant practical challenges and likely an increased cost.

Cost-benefit analysis (Point 2)

Costs of other projects have not been included in the HumeLink RIT-T assessment. The costs and benefits from other transmission investments will be separately assessed should a RIT-T be initiated for these projects. The market benefits analysis showed significant market benefits for the HumeLink project independent of other transmission investments.

4.7. MCC assessment submission ahead of lodging CPA

Summary of submissions received

One submission asked about the timing of Transgrid's MCC assessment relative to the date of submitting HumeLink's CPA2. Their question is whether the Rules require an MCC assessment to be published prior to a CPA2 submission.

Response

Chapter 5 of the Rules sets out the 'trigger event' that needs to be satisfied for a TNSP to be eligible to submit a CPA for an actionable ISP project, such as HumeLink.

In October 2023, the MCC Rules were updated to require that *at the same time* as a CPA2 application for an actionable ISP project, the RIT-T proponent must also provide the AER with an MCC confirmation containing the RIT-T proponent's assessment, evidence and relevant actions to address the MCC.

However, these changes do not apply to any RIT-Ts for which a PADR was published by 27 October 2023. Therefore Transgrid is not required to have included such a MCC confirmation with its CPA2 Application for HumeLink. As such, the question is whether the trigger event has been satisfied for HumeLink based on the Rules applying to HumeLink before the MCC Rule Change (version 202). Most notably:

Sub-clause 5.16A.5(a)

> *the RIT-T proponent must issue a project assessment conclusions report that meets the requirements of clause 5.16A.4 and which identifies a project as the preferred option (which may be a stage of an actionable ISP project if the actionable ISP project is a staged project);*

Sub clause 5.16A.4(n)

> *if:*
>
> *(1) a RIT-T proponent has published on its website a project assessment conclusion report in respect of a RIT-T project; and*
>
> *(2) there has been [..]:*

(i) a material change in circumstances which, in the reasonable opinion of the RIT-T proponent means that the preferred option identified in the project assessment conclusions report is no longer the preferred option; [..]

…

then the RIT-T proponent must re-apply the regulatory investment test for transmission, unless otherwise determined by the AER.

Transgrid issued a PACR for HumeLink on 29 July 2021 and was then required by the AER to amend the HumeLink PACR to cover an additional option (Option 1C-new). Transgrid published this analysis in a PACR Addendum on 17 December 2021. Both assessments identified Option 3C (now known as the HumeLink Project) as the preferred option.

The requirement under clause 5.16A.4(n) for the RIT-T proponent to form a reasonable opinion as to whether an MCC event has occurred does not affect the status of the PACR as having already been 'published' (or 'issued'), as is clear in the wording of 5.16A.4(n)(1). Also, the requirement for the RIT-T proponent to re-apply the RIT-T if an MCC has occurred does not appear to alter the status of the previous PACR as having already been 'issued'.

MCC

Transgrid views the trigger event to submit a CPA under 5.16A.5(a) is different (and separate) to the consideration of whether a MCC has occurred. It does not appear that the requirement under the CPA trigger event 'to issue a PACR that meets the requirements of 5.16A.4' requires either Transgrid (as the RIT-T proponent) or the AER to be satisfied that an MCC event has not occurred subsequent to the original publication of the PACR.

Transgrid therefore considers that:

- it has met the trigger event in 5.16A.5(a) by issuing a PACR for the HumeLink project.
- this trigger is not conditional on Transgrid subsequently demonstrating that an MCC has not occurred and/or on the AER assessing whether it considers an MCC has occurred.

Given the PACR and PACR Addendum were prepared in accordance with the requirements of clause 5.16A.4, Transgrid considers that this sub-clause has been complied with.

Need for alignment with the most recent ISP

Transgrid had the option to base the MCC assessment on AEMO's 2022 ISP, however decided it would be prudent and efficient to base the MCC assessment on the most up-to-date information, which was AEMO's draft 2024 ISP. In order to use this data, new models were required, which took time to establish.

To mitigate delays, Transgrid submitted its CPA2 application to the AER for assessment and ran the two processes in parallel. The AER was made aware of this scenario and Transgrid's plans. The AER was notified once Transgrid had a firm understanding that a MCC event had not occurred. This enabled the

AER to confidently commence the assessment of Transgrid's HumeLink CPA2 submission based on Option 3C.

4.8. Contract structure

Summary of submissions received

Some submissions questioned the benefits of a variable cost design and construct (D&C) contract compared to a fixed price D&C contract, including:

- suggesting there is less risk of contractors going over budget under a fixed price D&C arrangement
- asking for clarification as to how the $237 million cost saving for the variable D&C contract option was calculated and why it would be classed as a saving.

Response

The proposed Incentivised Target Cost (ITC) commercial model mitigates the challenges with lump sum contracts currently being experienced by contractors. A lump sum contract likely led to the insolvency of Clough, which affected both the PEC and Snowy 2.0 projects. Recent examples of major projects being delivered under a D&C ITC contract model in Australia include Western Harbour Tunnel, North East Link Program, (subcontract to PPP), Warringah Freeway Upgrade, Sydney Metro City & Southwest Line-wide Works, Central Station, Sydney Metro West - Eastern Tunnelling Package and the revised Snowy 2.0 contract.

The D&C ITC commercial model aims to reduce the risk premium ordinarily included by contractors on a fixed price D&C Contract. It has done this by splitting the pricing structure in two. For high-certainty scope elements (such as design, substations, preliminaries and margin, in the case of HumeLink), a lump sum fee model was used. Whereas for scope items with more uncertainty and higher risk to the contractors (such as the transmission lines, in the case of HumeLink), a reimbursable fee model is used with a 'target' cost which is subject to contractual incentives. These incentives include a 'pain share/gain share' cost-sharing arrangement between Transgrid and the Contractor to achieve cost and program savings, deliver the project safely, on time and achieve community benefits. In this way, the ITC model caps the contractor's risk, reducing the risk premium required to be bid for a project.

$237 million savings from variable D&C contract option

The likely cost of a conventional engineering, procurement and construction (EPC) contract was identified as $3.117 billion, compared with the cost of a corresponding ITC contract of $2.88 billion, giving rise to a $237 million cost saving.

The cost savings come from various factors including:

- a lower level of contingency required by the Contractor, due to a more balanced risk allocation and collaborative approach under an ITC contract; and
- contractors being more incentivised to achieve savings and higher productivities, due to the cost and program incentive mechanisms within the ITC contract framework.

5. Next steps

This Submissions Report will be submitted to the AER for its information. A copy of the Submissions Report will also be made public on Transgrid's website.