HumeLink Alliance Inc. - Submission on the stage 1 contingent project application for the HumeLink project, May 30, 2022

1. Introduction

HumeLink Alliance Inc. submits the following concerns to the Australian Energy Regulator (AER) on TransGrid's Contingent Project Application for HumeLink Stage 1 (Early Works), 5 April 2022.

We have a number of significant concerns with the HumeLink project as follows:

1. There will be no social licence to build HumeLink while the assessment process omits environmental externalities from the cost of the project;
2. HumeLink is a connection asset for Snowy 2.0 and should be paid for by Snowy Hydro and NOT the electricity consumers of NSW; and
3. Option 3C has not been robustly established as the preferred option in the Project Assessment Conclusions Report (PACR) or the Addendum to the PACR;

These concerns are discussed below.

2. Issues of concern

2.1 There will be no social licence to build HumeLink while the assessment process omits environmental externalities

TransGrid says the CPA *covers the Stage 1 (early works) component of the Project, which will enable us to: ……*

- *progress activities on the critical path and undertake engagement to retain our social licence in order to achieve AEMO's target delivery date of 2026-27*.

There are two reasons why TransGrid has no social licence to build HumeLink:

i. Omission of environmental costs and the failure to assess undergrounding in the PACR; and
ii. Compensation.

These two reasons are discussed in turn below.

2.1.1 Omission of environmental costs and the failure to assess undergrounding in the PACR

The AER states that 'The purpose of the RIT-T is to identify the transmission investment option which **maximises net economic benefits** (emphasis added)**'** https://www.aer.gov.au/networks-

pipelines/guidelines-schemes-models-reviews/regulatory-investment-test-for-transmission-rit-t-and-application-guidelines-2010

And yet, inconsistent with this stated purpose, the Regulatory Investment Test for Transmission (RIT-T) doesn't require all the environmental costs be taken into account when assessing the cost-benefit of a project.

Maximising net economic benefit requires taking into account all the costs of the project - both direct and indirect. There is a fundamental flaw in the process where the objective is to identify the option that maximises net economic benefits and not all the environmental costs are factored into the analysis, and so the decision about the project.

Significantly the Office of the Australian Energy Infrastructure Commissioner has stated that the RIT-T is not fit for purpose for a project of this size because of the omission of environmental costs.

The NSW Government Guide to Cost-Benefit Analysis policy paper states:

'The general valuation principle is that all first round impacts should be valued as changes relative to the base case regardless of whether the impacts are direct or indirect' (NSW Government Guide to Cost-Benefit Analysis, Policy and Guidelines Paper, NSW Treasury, March 2017, p12).

Omitting significant indirect costs when evaluating large scale transmission projects is inconsistent with NSW Government policy and results in projects going ahead that shouldn't, and environmentally sensitive project options, like undergrounding, being ignored.

The nation is left with energy projects that are highly damaging to the environment. The balance between the environment and essential infrastructure is lost. Projects aren't developed in environmentally sensitive ways such as undergrounding the transmission lines.

By not including the environmental externalities in the assessment, TransGrid does not and will not have a social licence for HumeLink.

A recent paper by the National Parks Association (NPA) states that '*almost all new transmission links are underground throughout Europe, in fact are mandated in some countries, and much of Asia. For instance, in 2010 the Netherlands capped the total length of overhead transmission and distribution – every new kilometre of overhead line must be compensated by undergrounding an equivalent length*', Going underground with the transmission connection for Snowy 2.0, NPA, January 2021, p5.

Engineers tell us that there have been major advances in underground cabling technology, it is entirely feasible and the world is looking on in disbelief as Australia builds more overhead transmission lines.

The AER stated in a letter to HumeLink Alliance Inc.:

'I acknowledge your view that undergrounding option should have been considered as a credible option in its PACR. However, I understand that Transgrid as the jurisdictional planner and AEMO as the national planner (ISP) did not identify an undergrounding option as a credible option in its PACR and latest ISP. The proposed credible options were also subject to consultation during the RIT-T process, and we are not aware that this issue was raised'.

In fact, the issue of assessing undergrounding HumeLink was raised numerous times by landowners and the Victoria Energy Policy Centre, during the RIT-T process.

At the community's urging TransGrid is now assessing undergrounding HumeLink. The final report is expected in June 2022. This option should have been assessed at the outset. There is one passing mention of the undergrounding study in the CPA, Table 5: Key action plans for 2022-23 period, p18, and no mention of undergrounding in the HumeLink Environmental Impact Statement Scoping Report - Reference: 507179-160522-REP-NN-001, which indicates the lack of serious commitment to the undergrounding option. Yes, it is expected it will cost more, but there are significant non-market benefits with the option. Again the flawed assessment process means these important benefits will likely be ignored.

The National Park Association (NPA) state:

> *'The Environmental Planning and Assessment Regulation 2000 (Clause 7(1)(c) of Schedule 2) requires all EISs to include 'an analysis of any feasible alternatives' for a proposed project:*
>
> *"7 Content of environmental impact statement*
>
> *(1) An environmental impact statement must also include …*
>
> *(c) an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure*
>
> *This requirement is repeated in the Secretary's Environmental Assessment Requirements for the Transmission Connection Project, which state "In particular, the EIS must include a summary of the background to the project, including alternatives that were considered to the project……*
>
> *Failure to assess viable and lower impact alternatives is not consistent with TransGrid's statutory obligations nor the community's expectations that all reasonable steps will be taken to minimise the impacts…..',* (*Going underground with the transmission connection for Snowy 2.0,* NPA, January 2021, p9).

By not including a HumeLink undergrounding option in the PACR, there is the same inconsistency with statutory obligations and community expectations that all options will be considered to minimise impacts on agriculture, communities and the environment.

A feasible alternative *'means a substitute action that is available and reasonably capable of being carried out after taking into consideration existing technology and logistics in light of overall project purposes, and that has less impact'.*

Technological advances make undergrounding extra high voltage transmission a feasible option. We note that there are a number of current projects internationally where underground transmission has been selected as the **best** option.

Amplitude Consultants state:

'Some key observations on international trends in HVDC projects…….include:

- *An increased preference for VSC technology and increasing power capacity requirements for VSC projects. A number of VSC [voltage source converter] projects at or above 2 GW are under development. One is already in-service (INELFE, which connects Spain and France), although more are under development including (along with their anticipated commissioning date) the EuroAsia Interconnector (Israel Greece, 2023), SuedOstLink (Germany, 2025), Biscay Gulf (France-Spain, 2025), LEG1 (Libya Greece, 2025) and Suedlink (Germany, 2026). Within the timeframe of the WVTNP, a number of VSC HVDC projects at or above 2 GW are expected to be in-service…….*

- *More HVDC projects with long-distance underground land cables are being developed and installed. The SouthWest Link in Sweden has 190 km of its 250 km DC route length using underground HVDC cables. Two of the German HVDC projects mentioned above, SuedOstLink and Suedlink, will have route lengths using underground HVDC cables of approximately 500 km and 750 km respectively, both using 525 kV underground HVDC cables' (Western Victorian Transmission Network Project High-Level HVDC Alternative Scoping Report,* Amplitude Consultants, June 2021, p42).

A study by the International Council on Large Electrical Systems, or CIGRÉ, shows the relative environmental impact of overhead and underground lines. In all cases undergrounding reduces impacts (see Figure 1 below).

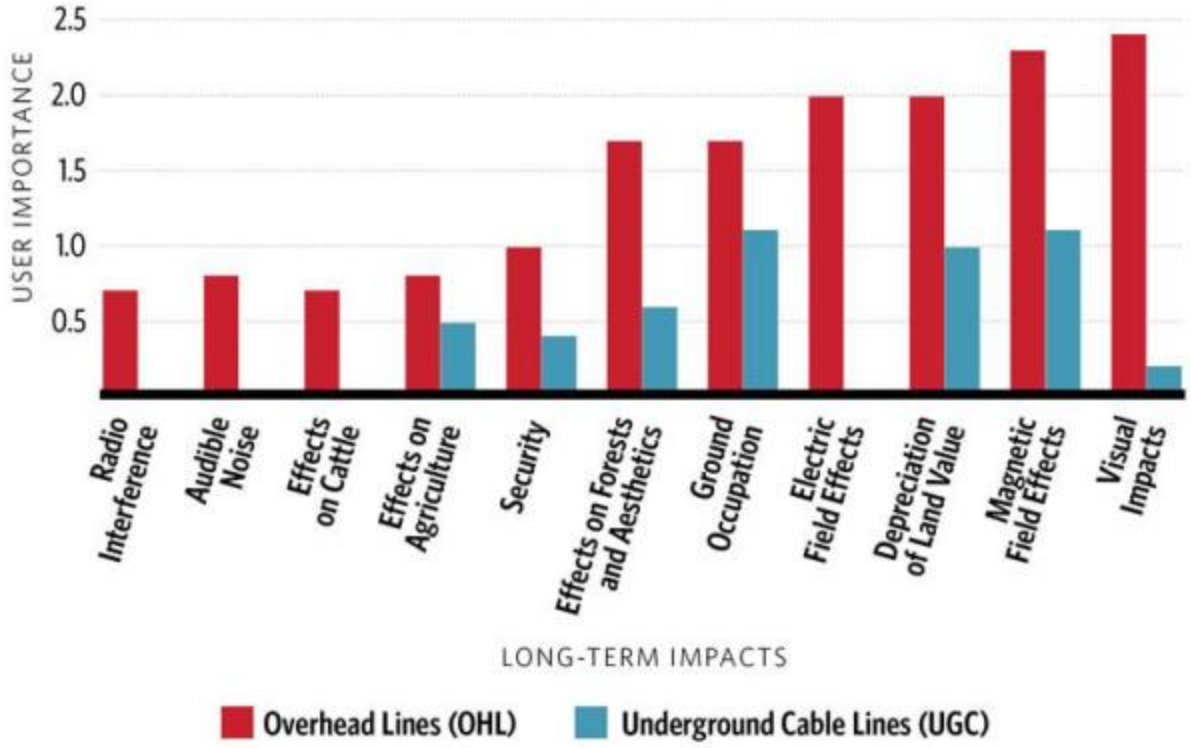


Figure 1: Source - CIGRÉ as referenced by HDR https://www.hdrinc.com/insights/top-5-reasons-use-underground-transmission-lines

The biggest impact of concern with overhead transmission lines, identified in the study, is visual impacts.

The problems with the lack of assessment of visual impacts in the HumeLink project are obvious with recent route refinement decisions by TransGrid, supported by a fact sheet. The fact sheet says for the route assessment, independent consultants GHD, completed a multi-criteria analysis (MCA), '*using GHD's GIS-based methodology known as the 'InDeGO' method (Infrastructure Development – Geospatial Options) to quantitatively assess the preferred route subject to the least constraints. InDeGO assigns a score to each route based on the length of the route that overlays relevant constraints and the rating of the constraint. The higher the score, the higher the enviro-social impact*'. HumeLink Route Options Assessment- Final Report, GHD, March 2022, p3.

This InDeGo method purports to assess the '*enviro-social impact'* and yet it omits visual impacts, the most important impact of concern for communities, as identified by the overseas study. As a consequence of this analysis the now preferred route will have HumeLink running along a ridge above the township of Tumut, with the locals saying instead of Snowy Valleys, the region will now be known as Ugly Valleys.

As our population grows, things like having pristine landscapes of great natural beauty become more valuable. It's important to recognise these high value landscapes now and preserve them for future generations.

The construction costs are one off. The loss of visual amenity is a continuous cost for the nation – for generations.

As a result of the environmental impacts of overhead transmission lines, there are costs imposed on regions. There are costs to regional development, to tourism and to agriculture from overhead transmission lines and increased risk of bushfires.

Costs to regional development

Overhead transmission infrastructure is destroying areas as desirable places for lifestyle farmers – a growth sector for regional economies located two to three hours from major cities. Lifestyle farmers have invigorated and brought prosperity to many regional and local businesses. By not using environmentally sensitive transmission infrastructure solutions such as undergrounding, this important economic stimulus for rural areas is being lost.

Cost to agriculture

A recent report by the Australian Farm Institute commissioned by the NSW government entitled *Managing farm-related land use conflicts in NSW*, reviewed farm land use conflict and identified failures in planning policy.

The report states:

'Critical agricultural assets need to be identified and protected by all levels of government to secure the future of the industry. There is a lack of strategic identification and protection of critical agricultural assets across NSW at present. Current strategies of industries coexisting with agriculture do not appear to be working and are causing significant economic, personal and social impacts on community members', page 12.

And also 'There appears to be a lack of proactive State-wide strategies which plan significant infrastructure developments that conflict with agriculture……', page 24, https://www.farminstitute.org.au/report-managing-land-use-conflict-in-nsw/ .

Overhead transmission infrastructure is infrastructure development that conflicts with agriculture. Modern farming practices are increasingly relying on technologies like drones and precision agriculture to improve productive efficiency. These technologies can't be utilised and many other activities, like aerial operations and irrigation can't be performed in close proximity to overhead transmission lines. It's important that these losses in productive efficiency of neighbouring agricultural operations are taken into account in planning all new transmission projects.

Costs to tourism

Tourism is also affected by overhead transmission lines. Tourism is a major growth industry for regional NSW, with the number of visitors increasing 41% from 2014 to 2019 and expenditure of $14.3 billion in 2019. The NSW Office of Regional Development says 'More people visit NSW than any other state and territory in Australia. Visitors are drawn to the vibrant city of Sydney and the region's **natural landscapes**, and famous food, wine and beverages (emphasis added)'.

Also 'The Snowy Mountains in the South East and Tablelands region has been selected as an iconic location to promote regional Australia…….' https://www.investregional.nsw.gov.au/sectors/tourism/

HumeLink is impacting landscapes of great natural beauty. It is damaging to the natural asset that is the drawcard for visitors to regions. As such HumeLink will harm tourism, an important growth industry for many regions.

Increased risk of bushfires

Also, overhead powerlines increase the risk of bushfires. The 2009 Victorian Bushfires Royal Commission says: *'Although the proportion of fires that are caused by electricity infrastructure is low……..on days of extreme fire danger the percentage of fires linked to electrical assets rises dramatically"*.

Having live overhead lines during a bushfire severely restricts bush fire control and the presence of overhead lines can restrict aerial operations during a bush fire which are nowadays one of the most commonly used methods of fire control.

Deloitte Access Economics put the tangible and intangible costs of the Victoria Black Saturday bush fires at $7.6 billion. By extrapolation, the cost of the 2019-20 Australian bush fire season, 'Black Summer', has been estimated at $230 billion. Increasing the likelihood of these catastrophic costs, needs to be factored into the costs of overhead transmission lines, when comparing options. Conversely, decreasing the likelihood of these catastrophic costs, needs to be factored into the benefits of undergrounding transmission lines, when comparing options.

Until all environmental costs are included in the RIT-T, there will be no social licence for the project.

2.1.2 Compensation

The second reason why TransGrid has no social licence to proceed with Humelink relates to compensation.

Under the NSW Land Acquisition (Just Terms Compensation) Act 1991, compensation is only paid to landowners with the transmission line (or easement) on their properties. People neighbouring the transmission line get nothing. In many cases neighbouring properties with views of the transmission line will be more affected, than the property with the easement. Impacts on neighbouring landowners and communities are first round impacts of the project and, for efficient outcomes to be achieved in the electricity market, they need to be taken into account.

Large numbers of people are being negatively impacted and aren't being compensated. This practice is inequitable, denies those people natural justice and grossly underestimates the cost of the project.

There is also the question of the adequacy of compensation.

In a HumeLink Community Consultative Group meeting a comparison of the compensation paid for wind turbines and transmission towers was presented (see Table 3 below – Appendix A provides more detail on the wind turbine present value calculation).

Table 3:

Comparison: turbines and transmission

Issue	Windfarm	Transmission
Landowner influence over siting	Absolute: right of refusal	Minimal
Visual impact	Very high, although studies show rated more positively by viewers than trans.	Very high, more negative viewer responses. Less visible from longer distances
Noise	Higher than transmission	Present but lower than turbines
Operations and maintenance	More regular maintenance inspections and intervention	Less frequent
Impact on aviation	More likely to be located on ridges away from productive areas	More likely to be located on arable / grazing country
Construction impacts	Isolated clearing, modern turbines can be co-located with forestry	Continuous clearing
Compensation PV	**$528k per turbine + new lease or land recovery**	**$55k per tower $137k per km**
Lifespan	Removal or new lease after 25 years	50 + years, operator has right to rebuild, modify or increase capacity with no further compensation

Source: Kingma, L., Snowy Valleys Community Consultative Group, April 2022.

The disparity is astounding. Farmers voluntarily hosting wind turbines receive $528k per turbine while farmers forced to host transmission towers, which can be much closer to dwellings than wind turbines, get $55k per tower.

The gap between wind turbine and transmission tower compensation is also documented by Renew Economy https://reneweconomy.com.au/transmission-investment-modelling-is-a-giant-well-intentioned-furphy/amp/ .

Further most landowners would also prefer an indexed annuity, given uncertainty about future land values, as is the case with wind turbines, to reflect the ongoing costs of hosting transmission towers, rather than a one-off payment.

Until these disparities and inequities in compensation are addressed there will be no social licence for HumeLink.

2.2 HumeLink is a connection asset for Snowy 2.0

TransGrid implies that HumeLink is needed irrespective of Snowy 2.0. The CPA says: '*HumeLink is a key component of the energy market transition and will reinforce the southern shared network, which transports electricity from generators across southern New South Wales (NSW), and electricity imported from Victoria and South Australia, to major population centres'.*

Also '*HumeLink will open up additional capacity for new generation in areas with high quality resources – primarily, wind and solar generation – in southern NSW, increase the transfer capacity between Victoria and NSW and improve wholesale market competition, reducing customers' final electricity bills*', p1.

These statements imply that HumeLink is much more than a connection asset for Snowy 2.0. For this to be established, as part of Stage 1 (early works) component of the Project, modelling needs to be done on the benefits of HumeLink with and without Snowy 2.0.

If HumeLink has a net benefit without Snowy 2.0, then there is a case for the electricity consumers of NSW to pay for it through higher prices. If HumeLink has a net cost without Snowy 2.0, then the principal reason for HumeLink can be established as connecting Snowy 2.0, and as a connection asset, HumeLink must be paid for by Snowy Hydro.

The VEPC says "*The cost of HumeLink (3C) will increase TransGrid's Regulatory Asset Base from $6,371m to approximately $9,688m, a 52% increase. This single project will constitute one-third of TransGrid's assets.*

As a result, we estimate that TransGrid's revenues will rise by approximately 40%, and Transmission Use of System tariffs (TUOS) in NSW will increase by the same percentage", ("*A review of the HumeLink Project Assessment Conclusions Report*". VEPC Working Paper 2109. Victoria Energy Policy Centre, September 2021, VEPC 2021, p13).

Given the regulated rate of return that TransGrid will receive on its investment in HumeLink, there is a strong incentive for TransGrid to argue that HumeLink is a "shared asset" used by all market participants, rather than a "connection asset" used by Snowy 2.0. In the interests of efficient electricity prices in NSW, this question needs to be independently and comprehensively reviewed during the Stage 1 (early works) component of the Project.

2.3 Option 3C has not been robustly established as the preferred option

TransGrid states in the Contingent Project Application (CPA):

'*We completed the Regulatory Investment Test for Transmission (RIT-T) in July 2021, which identifies HumeLink (Option 3C in the RIT-T) as the preferred option for reinforcing the southern shared network.7 The RIT-T estimates that HumeLink will deliver $491 million in net benefits (in NPV terms), primarily from avoided, or deferred, costs associated with generation and storage infrastructure*', CPA, p2.

There are a number of inaccuracies in this statement as follows.

2.3.1 The PACR net benefits include uncertain competition benefits

Contrary to the statement above that '*HumeLink will deliver $491 million in net benefits (in NPV terms), primarily from avoided, or deferred, costs associated with generation and storage infrastructure'* the reported benefit of $491m is primarily from uncertain competition benefits. The $39m net benefit (excluding competition benefits) is the benefit to the market '*from avoided, or deferred, costs associated with generation and storage infrastructure'.*

The Australian Energy Market Operator (AEMO) consulted with stakeholders on the inclusion of competition benefits in the Integrated System Plan (ISP) cost benefit analysis in October 2021 and, as a result, has NOT included competition benefits in The Draft 2022 ISP saying, *'AEMO has not included competition benefits in the assessment…….due to the significant uncertainty surrounding key assumptions*', (Draft 2022 Integrated System Plan, AEMO, December 2021, p83).

To be consistent with this AEMO position, competition benefits should NOT be included in the cost-benefit analysis of HumeLink. Excluding uncertain competition benefits means HumeLink has a project capital cost of $3,317m (-30%/+50%) and a weighted net benefit of $39m, before taking into account omitted environmental costs of the project. This is a tiny net benefit for a project of this size.

Adding the environmental costs that are left out of the RIT-T process for a line 360km in length (see 2.1 above), to the HumeLink PACR net benefit of $39m, will undoubtedly mean there is a net cost to the State and the nation of proceeding with HumeLink.

2.3.2 Dispute with the PACR upheld by the AER

The RIT-T was not completed in July 2021. A dispute with the PACR was upheld by the AER. The AER determined that the '*PACR failed to consider all credible options to address the network need'* and required the assessment of Option 1C as a 100% double-circuit configuration - Option 1C-new.

The dispute with the PACR that was upheld by AER, was raised by Wunelli Pty Ltd. Having not been informed about the dispute process with the PACR, HumeLink Alliance Inc. submitted a late dispute. The AER stated that they *could not consider the issues raised* in our dispute as it was received after the closing date for disputes. HumeLink Alliance Inc. was not told about the dispute process despite being in consultation with TransGrid since April 2020 – more than a year. We consider the fact that impacted landowners, both directly impacted and those impacted neighbouring the proposed line, were not informed about the dispute process, to be a major failure in consultation.

TransGrid subsequently published an Addendum to the PACR in December 2021 which compared Option 1C-new, as a 100% double-circuit configuration, to Options 2C and 3C, the top-ranked options in the PACR.

HumeLink Alliance Inc. submitted a further Dispute with the Addendum highlighting significant inconsistencies in the comparison of options with the $m/km biodiversity offset cost and line capex cost of Option 1C-new exceeding that of Option 3C, even though, for much of the length of the line, they traverse the same topography (see Table 1 below).

Table 1: Transmission line and biodiversity offset costs

Option	Length (1)	Biodiversity offsets lines (2)	Biodiversity offsets lines	Line capex cost (2)	Line capex cost
	Km	$m	$m/km	$m	$m/km
1C-new	272	821	3.02	1,545	5.68
3C	366	894	2.44	1,796	4.91

(1)Source: Reinforcing the NSW Southern Shared Network (Humelink) Determination on dispute - application of the regulatory investment test for transmission, AER, November 2021, Table 2, p23.
(2)Source: https://www.transgrid.com.au/projects-innovation/humelink#Resources humelink-pacr-addendum-npv-model-results.xlsx.

No analysis has been provided to the community to substantiate the explanation for these inconsistencies. This information is needed for the community and electricity consumers of NSW to have confidence that the option with the highest net benefit is the preferred option.

Also importantly Renew Economy states:

'Costs and benefits and costs to consumers are important but financial models aren't meant to be used deterministically. NPV models generally have wide margins of error at the best of times and are a decision input, not the be-all and end-all' https://reneweconomy.com.au/transmission-investment-modelling-is-a-giant-well-intentioned-furphy/amp/.

The net benefits of Option 1C-new and 3C are very similar, $39m and -$11m respectively. This is a difference of $50m, for a $3.317 billion (-30%/+50%) project. Clearly if the modelling is "*a decision input"* with a "*wide margin of error",* Option 1C-new that is close to 100km shorter, is the preferred option.

2.3.3 Preferred option is not robust to sensitivity analysis

The PACR also presents sensitivity analysis for a number of market events including the following:

a. Two gas fired power station proceeding – Tallawarra B and Kurri Kurri; and
b. VNI West, a new transmission interconnector with Victoria, being delayed;

Tallawarra B and Kurri Kurri going ahead and VNI West delayed are now described by commentators as "practically certain".

The RIT-T Guidelines states "*Sensitivity analysis entails varying one or multiple inputs to test how robust the output of an analysis or model is to its input assumptions*".

Given the likelihood of these events occurring together, sensitivity to varying multiple inputs should have been investigated to test the robustness of the modelling outcomes.

Table 2 below summarises the impact of changes in these market events to HumeLink's net benefit.

With VNI-West delayed, Option 1C-new and Option 3C are ranked equal first. This means the preferred option is dependent on assumptions, and not robust.

The yellow highlighted figures are the net benefit (excluding competition benefits) of the three options assuming **both** Tallawarra B and Kurri Kurri gas power stations proceed and VNI West is delayed. Combining the impacts on net benefits from these "practically certain" market events, means that Option 1C-new is the top-ranked option with the highest net benefit of -$101 million[1].

Table 2: Sensitivity analysis of HumeLink net benefit calculations to market events ($m)

	1C-new	2C	3C
No competition benefits	-$11	-$33	$39
Adjust for KKPS, Tallawarra B and VNI-West delay	-$101	-$292	-$209
Include competition benefits	$335	$399	$491
Adjust for KKPS and Tallawarra B	$180	$250	$334
Impact of KKPS and Tallawarra B	-$155	-$149	-$157
Adjust for VNI-West delay	$400	$300	$400
Impact of VNI-West delay	$65	-$99	-$91
Impact of KKPS, Tallawarra B and VNI-West delay	-$90	-$248	-$248
Adjust for KKPS, Tallawarra B and VNI-West delay	$245	$151	$243

Source: "*Submission to the Australian Energy Market Operator on its 2022 Draft Integrated System Plan*". Victoria Energy Policy Centre, Victoria University, Melbourne, February 2022, Table 1, p33 – **modified to show the weighted net benefit (excluding competition benefits)**.

[1] (($180m-$335m) + ($400m-$335m) + -$11m=-$101m): $180m-$335m is the difference due to Tallawarra B and Kurri Kurri proceeding + $400m-$335m is the difference due to VNI West delayed + -$11m weighted net benefit (excluding competition benefits) of Option 1C-new.

The ranking order reversal of options and negative net benefits (excluding competition benefits), with sensitivity analysis, indicates that the RIT-T modelling outcomes are not robust.

The AER defines a credible option as an option that:

> • *Addresses (or address) the identified need. That is, achieves the objective that the RIT–T proponent seeks to achieve by investing in the network;*

As a credible option, Option 1C-new 'addresses the identified need' that the proponent 'seeks to achieve by investing in the network'. Option 1C-new has a capital cost of $2.695 billion, while Option 3C has a capital cost of $3.317 billion. The PACR states that *"there is currently a high degree of uncertainty in relation to the accuracy of the capital cost estimates",* with the capital cost a 'class 4' estimate, +50% to -30%.

The Better Resets Handbook - Towards Consumer Centric Network Proposals https://www.aer.gov.au/system/files/Better%20Reset%20Handbook%20-%20December%202021.pdf expects '[e]vidence of prudent and efficient decision-making on key projects and programs'. This requires:

1. *'Identification and evidence of the network's need (prudency of the proposal)…….*
2. *Quantitative cost benefit analysis assessing all feasible options to show that the preferred option maximises net benefits'* p21-22.

Given the:

- the highly uncertain capital costs;
- the very small net benefit (excluding competition benefits) of Option 3C and similarity in net benefits of Option 1C-new and 3C;
- the lack of any analysis to explain the cost inconsistencies in the $m/km line and biodiversity offset costs between Option 1C-new and 3C;
- the sensitivity of the ranking of options to assumptions about Kurri Kurri, Tallawarra B proceeding and VNI-West delayed; and
- the environmental costs avoided by going with Option 1C-new which is nearly 100km shorter

there are serious questions that:

i. there is evidence of need for this project; and
ii. the preferred option maximises net benefits.

The very small net benefit (excluding competition benefits) brings into question the need for this project. If it is considered that the very small net benefit is justification for building HumeLink, then Option 1C-new, that has a similar net benefit and is close to 100km shorter, with associated significantly less environmental and social impacts, is clearly the preferred option for the State.

3. Conclusion

If HumeLink must be built it should be underground, it should be Option 1C-new and most likely it should be paid for by Snowy Hydro.

Australia needs best practice with all new transmission infrastructure as we transition from fossil fuels to renewable energy. In most cases undergrounding will be best practice. Undergrounding is an investment in our environmental asset for future generations.

Internationally governments are selecting the underground option as the preferred option. As such governments overseas have come to the conclusion, when you take into account all the environmental costs of overhead transmission lines, undergrounding is the least cost option.

It's time for a realisation in the National Electricity Market that the cost of the social licence with new transmission, is the cost of undergrounding.

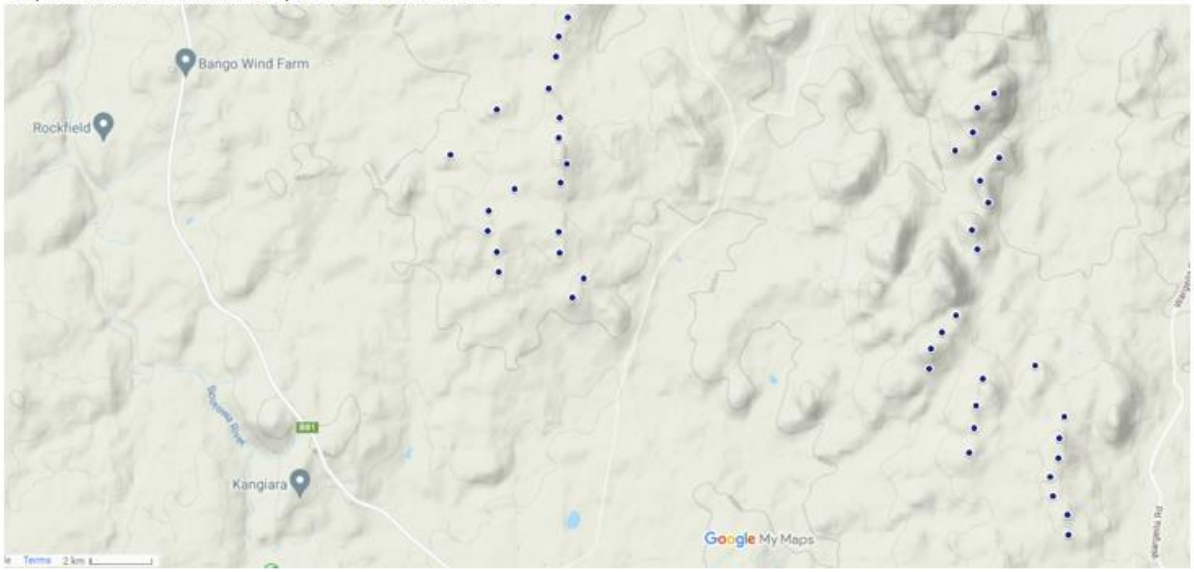
It's essential for communities and the electricity consumers of NSW to have some certainty that HumeLink is needed, is best practice and is paid for by the right market participant – Snowy Hydro or the electricity consumers of NSW. As such it's critical that the project is independently and comprehensively reviewed as part of the Stage 1 (early works) component of the Project.

Appendix A: Calculation of wind turbine compensation

The calculation below shows the present value of compensation per wind turbine for Bango windfarm.

Bango Windfarm		
Capital cost	500000	k$
Annual compensation	1600	k$pa
PVcomp/project	4.9%	
CPI increase for compensation	0.00%	
Discount value	5%	
Pvcomp (total)	24301	k$
Capital cost of project	500000	k$
Pvcomp/capital	5%	
Number of towers	46	
PVComp/turbine	**528**	**k$**

Notes:
Annual compensation = 46 turbines x $30k + $100k neighbors payments + $130k community fund = $1.6m p.a.
Figures provided by wind energy industry participants
50 year life assumed to be comparable to transmission



Year n	Year	Comp p.a. (k$)	PV
0	2024	1610	1610
1	2025	1610	1533
2	2026	1610	1460
3	2027	1610	1391
4	2028	1610	1325
5	2029	1610	1261
6	2030	1610	1201
7	2031	1610	1144
8	2032	1610	1090
9	2033	1610	1038
10	2034	1610	988
11	2035	1610	941
12	2036	1610	897

Year n	Year	Comp p.a. (k$)	PV
13	2037	1610	854
14	2038	1610	813
15	2039	1610	774
16	2040	1610	738
17	2041	1610	702
18	2042	1610	669
19	2043	1610	637
20	2044	1610	607
21	2045	1610	578
22	2046	1610	550
23	2047	1610	524
24	2048	1610	499
25	2049	1610	475