

Submission
No 54

**INQUIRY INTO FEASIBILITY OF UNDERGROUNDING
THE TRANSMISSION INFRASTRUCTURE FOR
RENEWABLE ENERGY PROJECTS**

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Select Committee on the Feasibility of Undergrounding
the Transmission Infrastructure for Renewable Energy Projects
Parliament House
6 Macquarie Street
SYDNEY NSW 2000

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Dear Committee Members,

UNDERGROUNDING - THE BEST AND MOST FEASIBLE SOLUTION FOR ENERGY TRANSMISSION

Thank you for your initiative to undertake a further and more thorough review into the feasibility of undergrounding transmission to support the transition to renewable energy, following the earlier and rushed inquiry by the Standing Committee on State Development which made decisions based on misinformation, inaccurate project timelines and outdated costing data provided by vested commercial interests.

As members of the ***Stop, Rethink HumeLink campaign*** – which represents communities affected by the proposed 360km HumeLink transmission line rather than the commercial entities proposed to build it - we firmly believe that undergrounding is the best solution, both now and for future generations.

Our belief is not exclusive to our community. A recent [Guardian Essentials Poll](#) (31 October, 2023) revealed that 65 per cent of respondents do not support overhead transmission to facilitate the transition to renewables. Furthermore, 70 per cent said development of renewables should not “come at the expense of local communities”. A sentiment that should be considered in the decision of whether undergrounding is feasible and desirable.

The risks associated with high voltage overhead transmission lines passing through fire-prone farmland, forests and communities are too significant to simply accept misinformation and commercially driven claims as facts – particularly when there is solid evidence that contradicts these “facts”. The advantages of undergrounding are evident in terms of economic, environmental and social factors.

While undergrounding may involve a higher initial development cost - which unfortunately has been the sole focus of governments and regulators when making decisions – as demonstrated in our *Undergrounding Transmission: The Best Option* report (**See Supplementary File 1**) it is more cost-effective in the long run for the State of New South Wales (NSW) because it:

- requires less ongoing maintenance, thus reducing the ongoing OpEx requirements for many decades;
- minimises the destruction of bushland and the loss of vulnerable and threatened species;
- eliminates the risk of transmission sparking bushfires;
- does not impede the fighting of bushfires in the vicinity of the transmission towers and lines; and
- mitigates many of the negative impacts on the communities along the 360km route.

THE GREAT INFLATED COSTING CLAIM

As you are aware, there have been many claims about the high cost of undergrounding, with figures often quoted without any basis in fact. For instance, Transgrid, a major proponent of overhead transmission, has favoured a completely discredited figure of more than 10 times the actual cost, and made exaggerated claims that undergrounding would have a major impact to the back pocket of NSW electricity consumers.

Even following Transgrid's publication of its revised but still over inflated undergrounding report suggesting undergrounding would be around three times the cost of overhead at that time (though since being reduced given the increased overhead costing revealed at the Standing Committee hearing), Transgrid continued to make wildly unsubstantiated claims of undergrounding being significantly more expensive.

Furthermore, there is no concrete evidence, by Transgrid or regulators, to support the claim that undergrounding would impose a "huge" additional cost on consumers.

In our earlier [submission](#), we noted that based on [Transgrid's Revised Revenue Proposal 2023-28](#), the costing for the overhead tower HumeLink proposal appears to add \$4.25 a year to the bill of NSW energy users, [without taking into account the Company's recent admission that there had been a 30% cost blowout in its overhead proposal](#).

The failure by Transgrid to provide actual figures regarding revised costs to consumers for both overhead and underground proposals, especially during the previous Standing Committee's hearings, raises serious questions. What is the actual impact undergrounding would have for consumers compared to aboveground, if any? And, would it be anywhere near as substantial as suggested, particularly when considered over the lifetime of the project?

Given that energy consumers are carrying the can for these costs, Transgrid must be compelled to provide clear and verifiable independent estimates of the costs to consumers for both overhead and underground transmission, including both OpEx and CapEx over the lifetime of the project, with detailed explanations about how they have come to these numbers.

New report reveals undergrounding cost claims overinflated by +\$4bn

A new report funded by the community, prepared by Amplitude Consultants, an independent engineering consultancy revealed that the cost claims by Transgrid and repeated by governments related to undergrounding were overinflated.

The Amplitude report - *HumeLink Undergrounding – Review of Transgrid Report and Costing for HVDC Alternatives (See Supplementary File 2)* - found more than \$4 billion (bn) worth of savings and uncovered significant shortcomings in previous cost estimates around undergrounding for the proposed 360km HumeLink. Based on these highly credible numbers compiled by Australian consultants with vast experience in these types of undergrounding projects both in Australian an overseas, undergrounding HumeLink could be done, on a like-for-like basis, for \$7.3bn.

A summary of the cost comparisons is shown below:

Project Variant	GHD 2A-1 Cost Estimate	Amplitude Modified 2A-1 Cost Estimate	Difference (\$AUD)	Difference (%)
Capex Total	\$11,490,000,000	\$7,319,242,000	\$4,170,758,000	36.3%
Transmission Line Capex	\$7,717,000,000	\$4,242,535,000	\$3,474,465,000	45.0%
Transmission Line Capex /km	\$11,349,000	\$6,239,000	\$5,110,000	45.0%

**HumeLink Undergrounding – Review of Transgrid Report and Costing of HVDC Alternatives, Amplitude Consulting 2023*

Much of these savings are generated by a cheaper cost per kilometre than those used in the Transgrid costing report. While Amplitude based its cost per kilometre on a number of recent costing exercises for underground HVDC cables in Australia and benchmarking various global projects, Transgrid's costing report relied on just two projects – EuroAsia and Harmony link. Both these projects – predominantly subsea cable projects with extremely short lengths of underground (23 km and 40km respectively) – have a much higher cost per kilometre than the cost for the longer HumeLink underground land cable project, given their short lengths.

Undergrounding is 1.5x overhead build cost – but cheaper in long run

The new costings in the Amplitude report comes in at 1.5 times the expected cost of the preferred overhead line option. This is before considering the operational expenditure (OpEx), which includes factors such as ongoing maintenance costs and energy leakage.

In its report, Amplitude suggests an OpEx of ~\$15m per annum for an undergrounded HumeLink based on the preferred route and using projects such as Murraylink and Directlink as benchmarks.

Conversely, overhead would be significantly more:

- Applying the questionable 0.5% of the CapEx claimed by Transgrid (well below industry standards), would result in an annual OpEx of ~\$17.5m per annum;
- When applying the Australian Energy Market Operator (AEMO) assumed OpEx of 1% of the CapEx, the annual OpEx would be ~\$35m; and
- When applying Transgrid's annual average of OpEx being at 3.4% of CapEx, the annual operational and maintenance cost comes in at \$120m.

The lower cost of OpEx for undergrounding is driven by the very fact that the cables are underground and not subject to environmental damage from increasingly volatile climate patterns.

A viable alternative underground option – delivered faster and even cheaper at \$5.5bn

The Amplitude report also demonstrated the cost of delivering HumeLink underground could be further reduced by confining the project to a direct line from Maragle to Bannaby (option 1C – new), which Transgrid itself defined in a [report to the AER](#) as a credible option that would meet the need of the project.

Amplitude's high-level cost estimate for the alternate Maragle to Bannaby underground option could be built for \$5.5bn while still fulfilling HumeLink's primary purpose of transmitting energy from Snowy 2.0 to Sydney's outskirts. This option has an even greater reduction in energy loss of 21 per cent and OpEx, with only two converter stations.

CONSTRUCTION OF HVDC UNDERGROUND WOULD ALIGN WITH AEMO OPTIMAL TIMING

Experts debunk claims that undergrounding will delay critical infrastructure

Delays by Transgrid in publishing an assessment of the cost of undergrounding – with the original GHD report taking some nine months to be released have increased time pressure on the project. Transgrid has continued to push overhead solutions as the only option. Nevertheless, experts including Amplitude have debunked Transgrid's claims that going underground would push out Australia's transition to renewables.

In its report, Amplitude states that based on benchmarks of other similar projects, an underground HumeLink can be completed by August 2029. This aligns with the current timing needed to connect Snowy 2.0 to the grid and as in line with the optimal timing identified by AEMO in the [2022 Integrated System Plan](#) (page 80).

Transgrid's delivery schedule based on "traditional" procurement

Transgrid's undergrounding report's schedule has several deficiencies from procurement timings to commissioning times to accommodate the complexity of the systems. The Amplitude report states:

- Procurement time is based on "traditional" procurement processes, but by using more agile strategies used on other projects, this could be slashed from 1.5 years to less than 12 months.

- The Direct Rate of burial is a slow rate and likely more in line of undergrounding in heavily populated areas, when compared to the 180km install of Murraylink.
- Excessive time for joint assembly, with each location only needing no more than 3 days on average, not 1 week.
- The assumed commissioning duration of 8+ months is significantly too long, with Murraylink being commissioned in just one month in the early days of the technology.

Build time comparisons

Amplitude states that based on the realignment of build times with that of other projects, the schedule for undergrounding would be around five to six years – closely aligned to the overhead schedule which Transgrid claims would be four to five years.

GROSS AND MISLEADING CLAIMS USED TO MUDDY THE WATER PROVEN INACCURATE

Bushfire risks – real risks that can't be ignored

The apparent indifference by Transgrid to the community's very real concerns around bushfires, is not consistent with past experience and Transgrid's own reports. Transgrid's own document "[Your Questions Answered, Underground Feasibility Study](#)" states that overhead transmission lines "risk both from and to bushfires and impact on aerial operations". The same document also notes that "underground lines have ... low to negligible risk of and to bushfires and no impact on aerial operations."

Our position on fire risks and the impediment high voltage transmission towers will cause has been supported and substantiated with real evidence in our earlier submissions. It is also an issue that was raised and commented on from many others, including evidence presented by the Rural Fire Service (RFS) at the Standing Committee hearing in Northern NSW.

We urge the select committee to investigate the fire risks and consider it a critical component when assessing the feasibility and superiority of undergrounding transmission lines. After all, it takes just one spark from these transmission lines, or the overhead lines impeding the successful management of a fire (as was the case in the devastating Dunns Road Bushfire which went on to cause huge damage) for the Government to be exposed to many billions in compensation and rebuild costs.

A key question for the committee to investigate is the question of the actual legal liability of the Government and Transgrid in the event of transmission-based fire or failure to control a fire. It seems a key to understanding why Australia has not more quickly embraced undergrounding technology for new transmission infrastructure compared to most other international jurisdictions.

In our view, it is extremely concerning that the Government is willing to take advice on bushfire danger and threats to human life from the vested commercial interests in this project, rather than first-hand accounts from experienced volunteer firefighters who risk their lives in these tragic events and qualified experts. Once again, we reiterate that the Government and/or Transgrid will need to take full accountability for these decisions in the future as they were made fully aware of the risks.

The severity and frequency of bushfires already witnessed at the commencement of the 2023/24 fire season should serve as a warning to the Committee and the Government about the critical importance of this issue as the impacts of global warming increase.

Sterilisation of land – a proven furphy

During the Standing Committee inquiry – perhaps out of desperation as undergrounding being a viable solution started to become clear – claims were made by Transgrid and the Government that undergrounding would sterilise the land above it. Claims that were played back in political meetings following the inquiry. This outrageously inaccurate claim had engineering experts globally aghast. We understand this was discussed at the CIGRE (Conseil International des Grand Réseaux Electrics) Symposium in Cairns recently. There is ample

evidence and real-world examples which prove underground transmission lines have no impact on crop yields and that land used in undergrounding remains productive.

Unlike overhead, undergrounding does not sterilise the land, with the only restriction being that no deep-rooted trees can be planted within the corridor width plus 2 metres. This aside, there are no limitations for cultivation, including agricultural. This is demonstrated in a video by leading European grid operator, TenneT, which has actively embraced undergrounding as a default solution to transmission – see excerpt [here](#) or full video [here](#).

As highlighted by the Forestry Corporation of NSW in its [EIS submission](#) (26 September, 2023), the HumeLink proposal "... would require permanent clearing of forest and result in the sterilisation of the cleared land for future timber production or other forestry uses (Page 4).

Resilience of the transmission

Governments have a responsibility to deliver a power system which is resilient – a position the community supports. However, while HumeLink and other infrastructure projects under the Rewiring the Nation plan are urgent and vital, it is critical that they must also be resilient.

Unfortunately, once again, misinformation would have us all believe that identifying and fixing any faults in undergrounding cables would result in significant rectification delays. Yet experts in the field suggest that overhead lines are more likely to experience both intermittent and permanent faults due to events such as lightning, extreme weather and national security events. Conversely, underground cables are not susceptible to these events, and are less likely to experience intermittent failures.

According to Les Brand, CEO of Amplitude, the likelihood of a properly designed underground cable system fault is very low. He advises that using Murraylink as the benchmark, the longest underground cable in the world for over a decade, it only encountered two cable faults since its commissioning in 2002 – that's less than one every 10 years.

Further methods to identify and pinpoint underground cable faults are well established and proven, and faults can be identified and remedied quickly – at least as quick or quicker than that can be achieved with overhead lines.

It is well acknowledged that overhead power lines inherently lack resilience, as they are susceptible to disruptions caused by storms and fires. The failure during such natural disasters could potentially lead to widespread blackouts throughout the country, including our major capital cities.

Given the current climate emergency, the increasing incidence of natural disasters globally such as storms and fires, and the concerns over a bushfire season that has begun a season early, it is imperative for governments to carefully assess the inherent risks associated with overhead transmission lines. In extreme conditions, governments will be faced with a stark choice of shutting down capital cities or exposing regional communities to extreme danger, death and destruction.

Furthermore, constructing HumeLink as an overhead option runs counter to the principles of sound engineering design endorsed by AEMO. Undergrounding eliminates the risk of power transmission interruptions during severe weather events, thereby enhancing transmission security and resilience as mandated by the Security Legislation Amendment (Critical Infrastructure Protection) Act 2022 (SLACIP Act).

OVERHEAD DEVELOPMENT FORGING AHEAD DESPITE CONCERNS

We wish to draw to the attention of the Select Committee that Transgrid and AEMO continue to press ahead with the overhead option. According to information we have received:

- Transgrid is currently finalising the Contingent Project Application – Stage 2, which is expected to be completed in early December 2023; and
- AEMO is undertaking the feedback loop on the HumeLink overhead option, which is expected by late November 2023.

AEMO and Transgrid should cease and desist HumeLink project until Committee completes inquiry

We are very concerned these actions are disregarding the Select Committee inquiry in progress and may be inconsistent with the eventual recommendations of the inquiry. Further we have had no response from the AER on reapplying the RIT-T to the HumeLink project for the material changes in circumstance for the project.

It is critical that HumeLink as an overhead option is not allowed to advance until the recommendations of the Select Committee are made. Given the serious delays with Snowy 2.0, as well as the optimal timing of HumeLink - late this decade/mid next decade, as defined by AEMO - there is time to get the decision right on the HumeLink project based on real facts, and not on misinformation provided by industry participants who failed to appreciate the feasibility of undergrounding at the outset of the project.

There is considerable community opposition to HumeLink as an overhead line which risks delaying the project. This will likely increase if the Select Committee inquiry process is not respected by market participants.

Regulatory threats and bullying continue

Recent threats made by Transgrid CEO Brett Redman in an Australian Financial Review article on 10 October, [One landowner can't stop the energy transition: TransGrid CEO](#), are extremely concerning and very misleading.

Mr Redman is reported to have said "We may well get to the point, as we did with a very small number on EnergyConnect, where we have to lean into the compulsory process, it can be unavoidable. When you're building a project many, many hundreds of kilometres long you can't skip a property, and we can't afford as a community for one property to stop the big energy transition."

This is another example of Transgrid's bullying tactics and blatant disregard for proper community consultation or alternative views.

We can assure the Committee that opposition to this project does not come from "one property" owner, but from many thousands of community members, environmentalists, firefighters and other concerned citizens who firmly believe overhead transmission is a dangerous, environmentally damaging, outdated and expensive long-term option for this project.

CONCLUSION

We trust this and the hundreds of submissions provided to date, including those by leading experts in underground transmission technology, debunks the misinformation that saw the Government members for the first inquiry and the NSW Premier and Energy Minister determine that undergrounding is not feasible.

Instead, we hope that what we have presented to the committee highlights the facts that clearly show why it should recommend the Government "Stop, Rethink HumeLink" and give proper independent consideration to undergrounding transmission.

Thank you again for your consideration.

Yours sincerely,

MICHAEL KATZ
Stop, Rethink HumeLink campaign

SUPPLEMENTARY FILES

- **Supplementary File 1:** Undergrounding Transmission: The Best Option report, 2023.
- **Supplementary File 2:** Amplitude report - HumeLink Undergrounding – Review of Transgrid Report and Costing for HVDC Alternatives, 2023.