Submission No 117

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

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Submission to Inquiry
Feasibility of undergrounding the transmission infrastructure for renewable energy projects

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To the Hon Emily Suvaal, Committee Chair
Inquiry - Feasibility of undergrounding the transmission infrastructure for renewable energy projects
Standing Committee on State Development Parliament House
6 Macquarie Street
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I welcome the opportunity to provide this submission.

The Australian landmass is currently undergoing a historic and necessary energy transition that poses challenges for landowners, agriculture and the environment. Transgrid's HumeLink project will build towers more than 65 metres high for 500 kV double-circuit transmission over 360 km to link Snowy 2.0 to the main electricity grid[1].

However, there are a number of significant issues with the overhead proposal which include but are not limited to a negative environmental impact, heightened fire risk, depreciation of land value, loss of visual amenity and landscape impact, and more inefficient transmission of energy[2].

[1] Transgrid. HumeLink Transmission Towers Factsheet https://www.transgrid.com.au/media/nhyg4u1i/tran_302546_humelink-transmission-towers-fact-sheet-update-may-2023_fa_web.pdf .
[2] A. Bernard. Bushfire concern for landowners with threat of HumeLink transmission lines (March 9, 2023). The Land https://www.theland.com.au/story/8111868/real-cost-of-humelink-lines/

The alternative proposal, to underground the transmission lines, would substantially address these issues and importantly would also the necessary secure social licence from impacted communities.

Humelink is critical infrastructure that will transmit energy from Snowy 2.0 and is needed to secure the NSW Strategic Objectives of the Net Zero Plan[3]. However, overhead power lines are vulnerable to a range of risk factors. In contrast, if Transgrid constructs the transmission lines underground with superconductor cables, the risks will be reduced[4].

The investment in undergrounding protects the community but also ensures a reliable power supply during extreme weather events such as bushfires, the importance of which cannot be understated. The risk of an overhead transmission line or tower causing a fire is low but not impossible[5]. Two major safety issues that present themselves with overhead transmission are the risk of flashover and the restriction of movement. This inhibition of firefighting operations by emergency services personnel and landowners is caused by the significant risk of flashover. A flashover is an arc of fire and or electricity that can ignite or spark nearby material such as machinery, water or vegetation; it is caused by fire and smoke particles that ionise the air and cause this effect[6].

After extensive investigations by the U.S. Forest Service a number of Californian bushfires were linked to Pacific Energy & Gas (PG&E); the investigations found that

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[3] NSW Government. Net Zero Plan. https://www.energy.nsw.gov.au/nsw-plans-and-progress/government-strategies-and-frameworks/reaching-net-zero-emissions/net-zero

[4] I.McKinnon . R. Taylor. A tenth of all electricity is lost in the grid. Superconducting cables can help (7th of February 2023). ABC https://www.abc.net.au/news/2023-02-07/superconducting-cables-reduce-electricity-lost-in-the-grid/101936866

[5] C. Miller. M. Plucinski. A. Sullivan. A. Stephenson. C. Huston. K. Charman. M. Praksh. S. Dunstall. Electrically caused wildfires in Victoria, Australia are over-represented when fire danger is elevated. Data61, CSIRO, Clayton, VIC, Australia, Land and Water, CSIRO, Canberra, ACT, Australia Department of Environment, Land, Water and Planning, Melbourne, VIC, Australia https://www.sciencedirect.com/science/article/abs/pii/S0169204617301548

[6] National Fire Chiefs Council (NFCC). Control measure Understand signs and symptoms of flashover. https://www.ukfrs.com/guidance/search/understand-signs-and-symptoms-flashover

PG&E caused more than 30 wildfires since 2017. These fires have destroyed more than 23 000 homes, claimed more than 100 lives and resulted in more than $25.5 billion USD in legal settlements. Amongst these fires was the 'Dixie Fire' which was caused by a transmission tower coming in contact with tree matter. That fire was the second largest in Californian history and burned 963 309 acres, destroyed 1329 buildings and cost $637.4 million USD[7].

The CEO of PG&E , Ms Patricia Poppe, has now indicated that they will be undergrounding their overhead transmission network after one of their towers in California caused a bushfire that killed nearly 100 people and destroyed thousands of homes. In a press conference on July the 21st 2021 Ms Poppe said about undergrounding: "*It's too expensive not to do it. Lives are on the line*"[8]. In 2019 PG&E paid $13.5 billion in compensation to fire victims and their families. It is worth noting that the Black Summer Fires that impacted much of New South Wales in 2019/2020 cost $3.65 billion AUD, burned 243 000 kilometres, destroyed 9352 buildings and claimed the lives of 479 people directly and indirectly. Residents of regional communities are rightfully concerned with the fire risk posed by these large towers as unlike California they have no legal recourse in the event of such a disaster being caused or made worse by a tower or transmission line. Transgrid is indemnified against any similar compensatory claims by the NSW Government[9]. It is possible that taxpayers more broadly will be required to meet the recovery costs in the wake of such disasters.

The undergrounding of Humelink also aligns with the purpose and values of the Biodiversity Act 2016 by minimising the visual and ecological impact of overhead power lines. Overhead lines will disrupt scenic landscapes and impact the aesthetic

[7] CBS News Bay Area. Federal investigators seize PG&E equipment in Mosquito Fire probe (September 26, 2022). https://www.cbsnews.com/sanfrancisco/news/mosquito-fire-pge-equipment-seized-federal-investigators-us-forest-service/

[8] M. Miedtke. PG&E will spend at least $15 billion burying power lines (July 22, 2021). https://apnews.com/article/business-government-and-politics-527e93e58c6ac7736488d8cd60003f86

[9] Transgrid. Contract for Supply of Goods (2020). https://www.transgrid.com.au/media/py2jdshp/terms-and-conditions-supply-of-goods.pdf

beauty of the region and the Kosciuszko National Park and this will potentially reduce tourism and economic growth. By replacing the proposed towers with underground cables natural landscapes will be preserved. Furthermore, underground cables have a lower impact on wildlife, reducing the risk of animal related accidents and the disturbance of natural habitats[10].

In light of the increasing frequency and severity of extreme weather events, it is imperative to prioritise the resilience of our power infrastructure. Undergrounding Humelink would significantly enhance our community's resilience by safeguarding the power supply against adverse weather conditions, including storms. Underground lines would appear to be less susceptible to damage from high winds and debris, providing a more robust and resilient power system.

My understanding is that the cost of Humelink and other transmission projects will be provided as a cost to consumers on their energy bills. However, these costs should be clearly explained, so that consumers understand the cost impact to them of the transmission line infrastructure and importantly what the cost impact of undergrounding will be. Transgrid's Revised Revenue Proposal for 2023-2028 on page 24 in figure E-6 indicates that the **Revised Revenue Proposal + Projects cost** is $67.46 but **Humelink** is only $4.25 of that total figure. The report says

"Figure E-6 and Figure E-7 show that, should all these projects proceed in the 2023-28 period, we expect transmission costs to increase in nominal terms (i.e., $Nominal) over the period 30 June 2023 to 30 June 2028, for residential customers in NSW by $67.46 per annum"[11].

These figures appear to be based on the assumption that the current proposal to overhead HumeLink continues as projected.

[10] S. Loss. T. Will. P. Marra. Refining Estimates of Bird Collision and Electrocution Mortality at Power Lines in the United States (2014). National Library of Medicine https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4081594/
[11] Transgrid. Revised Revenue Proposal 2023-2028 (December 2022). https://www.transgrid.com.au/media/z4kfkotv/transgrid-2023-28-revised-revenue-proposal.pdf

Initially I was informed by Transgrid representatives that the cost of undergrounding HumeLink would be up to ten times greater than the cost of overhead lines (which would mean that $3.3 billion would become closer to $33 billion). However Transgrid undertook a study of undergrounding, with reference to a panel that included community representatives who were supported by funded independent consultants. Transgrid would then publish the Concept Design and Cost Estimate for the Humelink Project - Underground study which found that *"the cost of undergrounding the HumeLink transmission lines is estimated to be $11.5 billion which is at least three times more than the entire project's current cost of $3.3 billion. This option is expected to take 7 years to build, compared to 4-5 years for the overhead option"*[12].

These are substantially different projected costs. I believe that it is possible that the cost of undergrounding could be even lower but even if the cost is up to three times more I believe this cost should be given consideration and weighed against the advantages of undergrounding.

It is important that there is public clarity on the costs of transmission and how these will be funded. Regional communities, in particular, are entitled to clear costs and information, especially about disruptive projects they are expected to host for the next eighty to one hundred years.

The long-term economic benefits of undergrounding could be substantial and in my view may lead to increased net savings for energy consumers on their bills. Underground superconductor cables have a longer lifespan, transmit energy more efficiently, require less maintenance, and are more resilient to external factors, resulting in reduced maintenance and repair costs over time. We talk a lot about using energy properly, and the need for clean reliable energy; why then would we consider using a technology that we know has a loss of energy over long transmission distances? We need to reduce energy inefficiencies and provide value to energy consumers. This issue of decline in electricity in overhead lines from transporting it over a longer distance has been known for quite some time. In an article published by Ian Mackinnon

[12] Transgrid. Concept Design and Cost Estimate for the Humelink Project - Underground study (2022). https://www.transgrid.com.au/media/y0mpqzvw/humelink-project-underground-report-august-2022-final.pdf

(Director of the Centre for Clean Energy Technologies and Practices) and Richard Taylor (Principal Research Fellow at QUT's School of Electrical Engineering and Robotics) it was noted that a tenth of all energy transmitted is lost due to retrograde high voltage transmission towers[13]. Underground using superconductor cables may reduce that loss of energy considerably.

I support a careful consideration of the undergrounding of Humelink. Undergrounding Transgrid's HumeLink project could provide considerably greater safety, better reliability, reduced environmental impact, greater resilience, long-term economic benefits, and increased sustainability. This would make it a crucial investment in our community's future. Undergrounding Humelink will be a creative and significant step towards achieving our clean energy targets whilst also minimising environmental and economic impact and securing social licence.

I welcome the inquiry as an opportunity to clarify the concerns I have raised which are reflective of the concerns in the communities I represent. I believe there should be a public discussion of the long term benefits and costs of undergrounding transmission lines and this inquiry is the first such opportunity. Information has been emerging for some time that Snowy Hydro is well behind in its work and now I believe this inquiry provides New South Wales Parliament the opportunity to rethink undergrounding once again[14].

I urge the committee to carefully consider the submissions by community members who have investigated this matter in some detail.

Australia is embarking on an energy transformation which will see renewable energy being sourced from distributed sites across regional NSW and Australia. It is a once in a century change. It will require tens of thousands of kilometres of transmission lines to

[13] I.McKinnon . R. Taylor. A tenth of all electricity is lost in the grid. Superconducting cables can help (7th of February 2023). ABC https://www.abc.net.au/news/2023-02-07/superconducting-cables-reduce-electricity-lost-in-the-grid/101936866

[14] L. Coch.Snowy Hydro 2.0 project hit by delay of up to two years and another cost blowout (May, 2023). https://www.theguardian.com/australia-news/2023/may/03/snowy-hydro-20-project-hit-by-delay-of-up-to-two-years-and-another-cost-blowout

be built affecting hundreds of thousands of people and many many communities. We owe it to them and the environment and future generations to thoroughly consider all the options for transmission infrastructure.

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