

**Submission  
No 163**

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

**Organisation:** NSW Farmers' Association

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# **Submission to the inquiry into the feasibility of undergrounding the transmission infrastructure for renewable energy projects**

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## About NSW Farmers

NSW Farmers is Australia's largest state farming organisation, representing the interests of its farmer members in the state. We are Australia's only state-based farming organisation that represents farmers across all agricultural commodities. We also speak up on issues that matter to farmers, whether it's the environment, biosecurity, water, animal welfare, economics, trade, workforce or rural and regional affairs.

Agriculture is an economic 'engine' industry in New South Wales. Despite having faced extreme weather conditions, pandemic and natural disasters in the past three years, farmers across the state produced more than \$23 billion in 2021-22, or around 25 per cent of total national production, and contribute significantly to the state's total exports. Agriculture is the heartbeat of regional communities, directly employing almost two per cent of the state's workers and supporting roles in processing, manufacturing, retail, and hospitality across regional and metropolitan areas. The sector hopes to grow this contribution even further by working toward the target of \$30 billion in economic output by 2030.

Our state's diverse geography and climatic conditions mean a wide variety of crops and livestock can be cultivated here. We represent the interests of farmers from a broad range of commodities – from avocados and tomatoes, apples, bananas and berries, through grains, pulses and lentils to oysters, cattle, dairy, goats, sheep, pigs and chickens.

We have teams working across regional New South Wales and in Sydney to ensure key policies and messages travel from paddock to Parliament. Our regional branch network ensures local voices guide and shape our positions on issues affecting real people in real communities. Our Branch members bring policy ideas to Annual Conference, our Advisory Committees provide specialist, practical advice to decision makers on issues affecting the sector, and our 60-member Executive Council makes the final decision on the policies we advocate on.

As well as advocating for farmers on issues that shape agriculture and regional areas, we provide direct business support and advice to our members. Our workplace relations team has a history of providing tailored, affordable business advice that can save our members thousands of dollars. Meanwhile, we maintain partnerships and alliances with like-minded organisations, universities, government agencies and commercial businesses across Australia. We are also a proud founding member of the National Farmers' Federation.

## Executive summary

NSW Farmers welcomes the opportunity to provide a submission to the Parliament of New South Wales's inquiry into the feasibility of undergrounding the transmission infrastructure for renewable energy projects.

Australia's emission reduction target of net-zero emissions by 2050 can only be achieved through the adoption of renewable energy. Renewable energy in NSW is supplied from solar and wind installations scattered throughout central and western regions and Snowy Hydro in the state's south. To meet future sustainability goals, these areas of renewable energy production must continue to expand. Just as critical as solar and wind installations or Snowy Hydro is the consequential increase in capacity of the grid to connect these regions of rural NSW with major cities.

The development of transmission line projects in NSW have failed to take note of the impacts on regional communities and on farm businesses. In the haste to cover up the lack of planning for the running down of fossil fuel power, there is lack of a comprehensive understanding of the consequences of changing generation and transmission of power to regional NSW.

The Commonwealth Government's Rewiring the Nations Plan specifies eight critical new transmission projects within NSW which will ultimately transect thousands of kilometers of prime farming land and environmentally sensitive areas.

The undergrounding of transmission lines is a technology that is internationally recognized as an alternative to overhead powerlines with the potential for net benefits for society. Undergrounding reduces environmental impacts and increases the welfare of rural communities. However, undergrounding has been widely deemed unviable by transmission service providers in NSW as current legislation does not require the accounting of social or environmental impacts in project planning. Additionally, ongoing opacity regarding the initial cost of undergrounding transmission infrastructure because of inaccuracies in cost estimate reports is resulting in ill-informed discussions.

The HumeLink project has been an early flashpoint for the unwillingness of the company to adequately consider the value to the community for undergrounding where appropriate. While a report was commissioned, it has not been accepted as being objective in its reporting of viable options, and this has exacerbated the community opposition to the construction as a whole by that company. It is another demonstration of undermining trust in the process of consultation and consideration of all options to avoid or mitigate the impacts on operations on farms and harm to regional communities.

In this submission, NSW Farmers utilizes case studies from members within the path of the HumeLink development as a primary source, however they speak for effected landholders throughout the state. These case studies demonstrate the viability of undergrounding and the importance of taking into consideration the welfare of those in rural areas.

# 1. Economic analysis

## 1.1 Cost-benefit analysis (CBA)

Cost-benefit analysis is a tool that is used to estimate the economic, social, environmental, and cultural costs and benefits of an intervention or suite of interventions in monetary terms. According to the NSW Government Guide to Cost-Benefit Analysis:

*CBA aims to measure the full impacts of any government decision or action on the households, businesses, governments, on-government organizations, and natural assets in a specified community.*

Several considerations are listed in the guide which have been overlooked in the analysis of transmission routes:

- Climate risk: with extreme weather events becoming more frequent and intense climate change can impact on the expected costs and benefits of an initiative. To better enable rigorous decision making, the risks and impacts of climate change should be incorporated into a CBA, where possible. Options should appropriately reflect the risks posed by climate change, such as setting out the extent to which investments are targeted to withstand climate change risks and remain operable and resilient to natural hazards.
- Externalities: Impacts on third parties as a result of production or consumption. Examples of third-party costs include noise, congestion, pollution, and reduction in visual amenity.
- Distributional analysis disaggregates the overall impacts of each option in a CBA by stakeholder groups, identifying those that gain and those that suffer losses.

On page six of the HumeLink Underground report<sup>1</sup> are listed the non-market benefits of the underground and overhead route options. These, however, are not quantified and therefore bear no actual weight in the decision-making process. For the NSW Government, CBA is a mandatory part of a business case, which is required for capital, recurrent and ICT proposals with an estimated total cost of \$10 million or higher. As an example, the entire project cost for HumeLink is estimated to be \$3.3 billion. It is important then that detailed CBA, in which social and environmental costs of various route options, including undergrounding, is quantified. Only economic costs and benefits have been accounted for, which at the very least will (and already has) led to an underestimation of impacts on communities and the environment, and at worst could lead to a suboptimal outcome for society.

## 1.2 Inflation of cost estimates

Cost analysis projections of the initial price of construction of undergrounding are inconsistent and lacking in economic rigour. Several inaccuracies were identified within HumeLink Underground report<sup>1</sup> which inflate the baseline price of construction. In CBA, different options must be compared on a like-for-like basis. This was not followed, as undergrounding costs were provided in 2022 dollars, while overhead costs were provided based on 2020/21 estimates. This would not have captured any inflation over this period, and so the underground costs would have been comparatively overestimated. This basic error shows how the lack of stringent CBA requirements for undergrounding projects leads to cutting of corners. Similarly, the EnergyCo Central-West Orana Transmission Project scoping paper states that undergrounding of approximately 209 kilometers of transmission lines will increase project cost by approximately three times without divulging any economic analysis to justify that figure<sup>3</sup>.

Transgrid has primarily utilized top-down cost analysis in their report which lacks the level of granularity that would produce an accurate cost estimate and the price of underground cable components in the report are significantly higher than values available from alternative sources. Cost comparisons are also derived from international examples that are not suitably comparable to NSW transmission projects.

The Transgrid report assumes no cost reduction if multiple trenches are installed side by side. This is a point that NSW Farmers finds particularly worrying considering the release of the draft of the 2023 Transmission Expansion Options Report<sup>2</sup> which indicates that the transmission capacity of the grid through the Hume Region will need to triple that of the current proposed capacity of HumeLink. If the entirety of this grid capacity were to be from over-head transmission lines, the increased cost of clearing and compensation to landholders would dramatically increase the initial cost of construction (before considering social and environmental cost). Placing underground powerline in adjacent trenches would greatly mitigate these initial costs as well as social and environmental impacts.

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<sup>1</sup>GHD (2022), Concept Design and Cost Estimate HumeLink Project – Underground. Available at: [12567593-REP-Concept Design and Cost Estimate HumeLink Underground \(2\).docx \(transgrid.com.au\)](https://www.transgrid.com.au/12567593-REP-Concept%20Design%20and%20Cost%20Estimate%20HumeLink%20Underground%20(2).docx)

<sup>2</sup>AEMO (2023) Draft 2023 Transmission Expansion Options Report. Available at: [draft-2023-transmission-expansion-options-report.pdf \(aemo.com.au\)](https://www.aemo.com.au/draft-2023-transmission-expansion-options-report.pdf)

<sup>3</sup>EnergyCo (2022), Central-West Orana Renewable Energy Zone Transmission project – scoping report. Available at: [Central-West Orana Renewable Energy Zone Transmission project \(nsw.gov.au\)](https://www.nsw.gov.au/central-west-orana-renewable-energy-zone-transmission-project)

## 2. Domestic examples and global practices

### 2.1 Domestic undergrounding examples

Approximately 30 kilometres south of Orange, Flyers Creek wind installation is undergrounding kilometres of 132 kV transmission lines to preserve the amenity of the area. The project was approved in 2014 with permission to install up to 42 wind turbines. Local government and the wider community intervened when it was revealed that the course of a transmission line would be along a prominent ridgeline. The community were successful in reaching an agreement with Iberdrola Energy to underground kilometres of transmission lines in areas where effects on amenity would be the greatest. A resident of the region stated that the “outcome of the project was as close to perfect as it can be” for the community.

The May 2023 EnergyCo project overview for the New England Renewable Energy Zones provides false information; stating that underground transmission lines are used “in rare cases where it where it is not feasible to secure a corridor for overhead powerlines, such as already developed urban areas or undersea”<sup>4</sup>. This statement not only ignores significant international underground construction projects but also existing projects within the state.

### 2.2 SuedLink

The largest high-voltage direct current (HVDC) underground transmission line in the world is currently under development which will run from the north to the south of Germany. SuedLink is projected to cost approximately AUD \$17 billion for a 750km, 525kV powerline, in comparison to the AUD \$11 billion Transgrid estimates for the cost of undergrounding HumeLink which will be half the length of SuedLink and carry 500kV. This \$6 billion discrepancy raises a number of questions about cost estimates for undergrounding in NSW. A primary reason for the decision to underground SuedLink was to preserve amenity of surrounding regions.

### 2.3 SOO Green Renewable Rail project

Another significant HVDC underground transmission line in development is the SOO Green Renewable Rail project which will travel through Iowa USA towards Chicago and will cover approximately 560 km and carry 525 kV. These international projects are fast-tracking undergrounding technology innovation which are resulting in faster installation and decreased costs. The global adoption of underground transmission infrastructure is a reflection on the positive net positive impact of undergrounding when utilising CBA.

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<sup>4</sup>EnergyCo (2023) New England Renewable Energy Zone – project overview. Available at: [NE REZ - Project Overview - V26-final.indd \(nsw.gov.au\)](https://www.nsw.gov.au/ne-rez-project-overview-v26-final.indd)

## 3. Environmental impact assessment

### 3.1 Wildlife and biodiversity Impacts

The ongoing negative impacts of overhead transmission lines on the environment is a major concern that favours the viability of undergrounding transmission lines. The 70-meter easement of overhead powerlines and land clearing that must take place over the lifetime of the infrastructure will have significant impacts on wildlife and biodiversity conservation. Unlike carbon-offsetting, many experts in the field oppose the concept of biodiversity off-setting as the biodiversity within a region is unique and off-setting in other regions does not mitigate the loss of species in the effected corridor that maintain a healthy ecosystem. In comparison, underground transmission lines require an 11.5-meter corridor, reducing impacts of clearing by a factor of six.

Within the Transgrid feasibility report<sup>1</sup>, when discussing alternative routes it states, "The route travers's higher biodiversity value landscape that could be directly or indirectly impacted. A Biodiversity Offset Strategy will be required which will potentially incur greater costs than other options." It is disturbing to hear the transmission service provider refer to 'clearing areas with a higher biodiversity value' as simply an economic inconvenience.

### 3.2 Reduced electromagnetic fields (EMF)

Undergrounding of transmission lines significantly reduces the potential for humans and wildlife to be affected by long-term EMF radiation produced by the high-voltage wires.



### 3.3 Risk of bushfires and effective mitigation

Overhead powerlines pose a risk of igniting fires through arcing, combustion of metal particles, burning of insulation fluids and vegetation contact with wires. Risk of electrical fires is elevated during high fire danger conditions. In comparison to other sources, bushfires caused by over-head transmission lines have also been shown to burn larger areas of land<sup>5</sup>. Overhead powerlines are susceptible to grounding in dense smoke and exacerbating intense bushfire events. These risks can be almost completely mitigated through the utilisation of underground transmission lines.

In the case of bushfire events, overhead infrastructure act as a massive obstruction to ground and aerial fire-fighting efforts. They pose a risk for planes and helicopters used to drop fire-retardants and act as a major safety concern for volunteer and paid firefighters.

#### Case Study: Ross Smith

Ross Smith is an NSW Farmers member that manages a stud that falls within the HumeLink route. Ross's property will host three new 85-meter towers through his property.

Ross states that more transmission lines will cause constant fear of the next fire event being intensified. Ross emphasises that in the case of a fire, these structures are a major hindrance for those trying to fight fires as there is no safe way to work above them, below them or around them when trying to fight a fire. This has the potential cost hectares of prime farming land, natural environmental and homes that would otherwise be safe if transmission lines were underground.

The construction of Hume Link through Ross's property will result in it being categorised as 'undefendable' by the RFS. Fire smoke leads to arcing, there is no way to safely mitigate in the next fire event with High Voltage powerlines present.

The two 40-meter-high towers Ross currently hosts on his property would be dwarfed by the three 75-meter towers of the Hume Link development. Ross emphasises that the community will not only be inflicted with increased fire risk, but the landscape will be "ruined forever". Undergrounding is an alternative that to avoid destruction to the environment, amenity, safety and lives.

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<sup>5</sup>Miller C., Plucinski M., Sullivan A., Stephenson A., Huston C., Charman K., Prakash M., Dunstall S. (2017), Electrically caused wildfires in Victoria, Australia are over-represented when fire danger is elevated. Available at: [Electrically caused wildfires in Victoria, Australia are over-represented when fire danger is elevated - ScienceDirect](#)

## 4. Operation impacts for landowners

### 4.1 Aerial spraying

For many farmers across the state, aerial spraying or crop dusting is the preferred method of fertiliser application. It can be used on paddock with difficult terrain and cover large paddocks in a fraction of the time. The construction of overhead powerlines can obstruct the flight path of crop-dusting aircrafts and render the use of this technology unviable or only available at a drastically larger price due to increased risk factors.

### 4.2 Biosecurity risks

Biosecurity risks during the construction phase of power lines and ongoing maintenance is a major concern to farmers. During outbreaks of disease, farmers take stringent measures to ensure that substances that may contain pathogens do not enter their property. Overhead powerlines require more frequent ongoing maintenance in comparison to underground powerlines due to their 70-meter easement, increasing the risk of biosecurity breaches that can be of devastating loss to farmers.

### 4.3 Utilisation of modern technologies

Many modern ag-tech solutions developed to assess farm productivity as well as environmental credentials utilise drones. Overhead powerlines will obstruct the use of these technologies, preventing them from engaging in more efficient and sustainable farming practices, often at their capital loss. Overhead transmission line routes are taking advantage of the cleared land that has been developed for agriculture and is of productive benefit to the state.

#### Case Study: Farmer A

Farmer A resides on a sheep farm with the new HumeLink set to traverse her property. Operationally, the construction of over-head transmission lines will greatly impact practices that keep the farm productive.

During clearing of the easement for HumeLink, elm trees will be removed that act as fodder for the sheep during harsh conditions. Construction of the powerlines will also impact the movement of stock from paddock to paddock which is an important factor in maintaining healthy soil and grass.

Farmer A will be unable to utilise aerial spraying after the powerlines are constructed and with many of their paddocks being located on steep hills, ground spraying is very difficult. The route of HumeLink is also going to obstruct the flight path of planes being used for agricultural purposes when taking off from the regional airport.

The farm on which farmer A resides is close to Canberra and is being further encroached upon every day by urban sprawl. The property has been in the family for seven generations but may not be financially viable in the future. Farmer A is deeply concerned about the effect HumeLink may have on land prices if they need to subdivide their land as very few people would be happy to live under the imposing structures.

## 5. Welfare of landholders and regional communities

For NSW Farmers and its members, the consistent lack of recognition of the negative impacts new overhead transmission projects are having on the welfare of those in regional communities is distressing. The 75-meter-tall transmission towers that will be transecting the properties of landholders are incredibly imposing structures that will destroy the natural beauty of the landscape and are often in direct line of sight from residences. Those in regional communities understand the need for increased transmission capacity that is accompanying new renewable energy projects, however it is difficult to accept the overhead transmission infrastructure when there are viable, modern alternatives.

### Case Study: Farmer B

Farmer B is a NSW Farmers member and beef producer based in Gunning.

When asked about the economic, operational and amenity impacts of HumeLink is likely to have on her property, Farmer B emphasised this is about much more than individual farming properties and more about impacts on regions and communities and must be considered in these wider contexts.

The liveability, workability and beauty of the region will be negatively impacted. The imposing structures will dominate the landscape for kilometres either side. Farmer B stresses that the effects these towers will have on the well-being of regional communities is not something that can be healed by compensation payments.

Farmer B states that the transmission network service providers are treating the ill-informed and elderly as “low hanging fruit” and offering them compensation well below the loss in property value they are incurring. Also neighbouring properties could have their properties devalued more than 30 per cent, and receive no compensation. Unfortunately, large developers taking advantage of regional communities is a common theme that continues to feed into a sense of isolation and sense what is being forced upon them would never be expected of those in urban areas. The landholder and the broader regional community will be permanently residing in a “degraded and visually polluted” landscape.

Farmer B states that undergrounding of the grid would address almost all amenity issues at hand for farmers and those in regional communities. When you take into account all the environmental and community costs of transmission lines for the next 80-100 years, undergrounding is the least cost option. The disregard for this alternative is frustrating given that the push for underground transmission in other countries and its clear benefits. Also facts are misrepresented within reports by the transmission network service provider which is unacceptable when these figures are being relied upon by government to make decisions about projects that have major impacts on landholders and regional communities.

### Case Study: Farmer C

Farmer C is a sheep producer outside of Yass. Six new towers over 2km will be constructed on their property as part of HumeLink, one of which will be situated 250 meters from their front door in direct line of sight from the kitchen window.

The line will be going right through the most beautiful part of the property according to Farmer C. Upon negotiation about the possibility of changing the route, Transgrid were originally receptive however they ultimately defaulted back to the original route. Tactically, the tower will be placed just outside of the 200-meter corridor surrounding the residence which would require the transmission service provider to provide further compensation.

When Farmer C was in negotiation with the consultant and asked “What they would do if they were in our situation with the tower being built outside their front door “, They replied they wouldn’t live there but the family would have to cop it on the chin.

All the trauma that is being inflicted upon landholders and regional communities could be mitigated through undergrounding.

## 6. Timeframe considerations

### 6.1. Initial construction period

The initial construction period of underground transmission lines is longer than overhead powerlines due to the excavation of trenches, line testing and laying of cables. Within the Transgrid HumeLink Report<sup>1</sup> it is stated that undergrounding HumeLink would be expected to take approximately seven years as opposed to four-five years for overhead powerlines. However, undergrounding technology of high-voltage transmission lines is an area of rapid innovation that are resulting shorter delivery times for international underground transmission projects. If modern international technologies are adopted, the seven-year timeframe projection could be drastically reduced.

### 6.2. Long-term maintenance

The long-term maintenance of underground infrastructure is generally less intensive than overhead transmission lines and inspections can usually be performed without cutting power supply. These decreased human capital requirements enable experts to focus energy on other transmission projects.

### 6.3. Extension of delivery of Snowy 2.0.

It has recently been announced that Snowy 2.0 has extended its project delivery time frame till 2029. For transmission projects in the south of NSW, this enables vital time to re-consider undergrounding transmission lines through prime agricultural and environmentally sensitive regions.

## 7. Regulatory considerations

It is the view of NSW farmers that the heart of the issue regarding the perceived unviability of undergrounding are the regulations established within the National Electricity Law (NEL) which determine the overarching framework for the National Electricity Market including governing bodies such as the Australian Energy Regulator (AER). Under the regulations, the Regulatory Investment Test for Transmission (RIT-T) which assesses the viability of transmission projects, is only required to account for the price of construction and maintenance, quality, safety, reliability, and supply of electricity. If RIT-T tests were required to account for social and economic factors, the undergrounding of new transmission projects would produce a net-positive benefit for society. Internationally, large scale undergrounding projects such as SuedLink and SOO Green Renewable Rail project are proving that undergrounding is a superior transmission technology.