

**Submission
No 28**

THE ELECTRICITY OUTAGES AFFECTING FAR WEST NSW IN OCTOBER 2024

Organisation: Transgrid
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Submission by Transgrid

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Contents

Contents	2
Executive Summary	3
1. About Transgrid	3
2. The Broken Hill Network	4
3. The Broken Hill Gas Turbines	5
4. Extreme Weather Event and Transgrid’s Response	7
5. Review following 2009 Transmission Tower Failures	10
6. Inquiries	10
7. Communication Protocols – Electrical Outages	10
8. Conclusion	11

Executive Summary

Transgrid welcomes the opportunity to provide this submission to the Legislative Assembly Committee on Environment and Planning's Inquiry into the electricity outages affecting Far West NSW in October 2024.

Transgrid is the primary Transmission Network Service Provider (TNSP) for New South Wales (NSW) and the Australian Capital Territory (ACT), facilitating the secure and efficient transmission of electricity to over three million homes and businesses. With a high-voltage network spanning 13,085 kilometres, Transgrid is a crucial enabler of Australia's energy market and economy.

Transgrid has a proud history spanning more than seven decades of supporting regional and rural communities through its provision of critical electricity services, employment and training opportunities, community partnerships and supporting local businesses. Transgrid has more than 2,000 direct employees, with more than a third of our employees living and working in regional NSW.

Transgrid recognises the significant disruption to communities and businesses in Far West NSW as a result of an extreme weather event on 16 October 2024 and the resulting outages. Transgrid is fully committed to learning from the outage as ensuring a resilient energy network for regional and rural communities is a key priority for us.

This submission details Transgrid's primary and backup energy infrastructure to the Broken Hill region; the impact of the October 2024 extreme weather event on this infrastructure and Transgrid's emergency response; and other pertinent information to assist the Committee in its Inquiry.

Transgrid welcomes the opportunity to appear at the Inquiry and to work collaboratively with the Committee to ensure improved future energy resilience in Far West NSW.

1. About Transgrid

Transgrid is the primary Transmission Network Service Provider (TNSP) for the NSW and ACT region of the National Electricity Market (NEM). Its expansive high-voltage transmission network interconnects more than three million homes, businesses, and communities with safe access to cleaner, more reliable electricity.

Transgrid works in collaboration with governments, regulators, distributors, and other TNSPs to develop and operate the electricity system safely, dependably and as efficiently as possible for consumers.

Transgrid's network comprises 13,085 kilometres of high-voltage transmission lines, 126 substations and switching stations, and five interconnectors linking NSW to Queensland, South Australia and Victoria. As a critical enabler of energy transfer between Australia's largest states, Transgrid underpins both the

electricity system and the broader economy. Transgrid is currently delivering an additional 2,500km of energy superhighways to help enable a once-in-a generation transition to clean energy.

Transgrid maintains a high network reliability performance for consumers, with an average of 99.9993% over the last two decades.

For more than seven decades, Transgrid has been providing critical electricity services to Australian homes and businesses and has a proud history of supporting regional and rural communities through employment and training opportunities, community partnerships and support for local businesses. Transgrid has more than 2,000 direct employees, with more than a third of its employees living and working in regional NSW.

Figure 2: Transgrid's electricity network map



2. The Broken Hill Network

The Broken Hill region is connected to the NEM by the X2 220 kV transmission line. The X2 line is 259.5 km long, originating from the Buronga substation and terminating at the Broken Hill 220/22 kV substation. This infrastructure supports:

- Essential Energy's supply to the Broken Hill town load via the 22 kV supply
- the Perilya Mine via the 220 kV supply
- the Silverton Wind Farm via the X6 transmission line
- Tilt's Broken Hill Solar Farm; and
- AGL's Battery Energy Storage System (BESS).

The X2 transmission line is the primary source of electricity supply to Broken Hill. The X2 line was first installed in 1979. It was designed in accordance with the applicable standards at the time.¹ When accounting for terrain type and structure height,² the design equates to a 162 km/h synoptic wind failure wind speed (with a 1-in-500 probability of exceedance (POE) in any given year) and a 152 km/h downdraft wind failure wind speed. As the failed transmission towers were separated by shorter-than-standard span lengths, the calculated failure wind speeds for the affected towers were between 165.5 and 169.2 km/h synoptic wind speed (between around 1-in-800 and 1-in-1,300 POE in any given year), and between 154.8 and 165.6 km/h downdraft windspeed. These design standards, combined with the shorter-than-standard span mean that the towers should withstand wind speeds of up to 165.5km/h and downdraft windspeed of up to 154.8km/h. The term ‘downdraft windspeed’ refers to the speed of gusty wind created by a downdraft in a thunderstorm.

The X2 transmission line has experienced only one previous tower failure event in its 45-year history, which occurred in 2009 following an extreme weather event.

In accordance with Transgrid’s Asset Management System, we manage and maintain the X2 transmission line by conducting:

- annual aerial inspections, including LiDAR (Light, Detection and Ranging)
- ground inspections every three years
- structure climbing or drone inspections every six years; and
- aerial thermography every four years.

The most recent climbing inspection was conducted in October 2020 and the latest aerial inspection was completed in March 2024 and found no defects on the relevant structures. A thermography inspection was completed in August 2024 and also found no defects.

During planned and unplanned outages of the X2 transmission line, electricity supply is supported by two diesel-fired turbines (referred to as gas turbines or ‘GTs’).

The single line nature of the X2 transmission line is unlike other locations within the network, which are highly meshed enabling energy to be diverted from other lines to ensure reliability of supply. Broken Hill is the only area within the NSW and ACT network for which GTs are used to provide backup supply to manage the risk of unplanned outages.

3. The Broken Hill Gas Turbines

The Broken Hill GTs have been in operation since the early 1980s. From 2003, the GTs were owned and operated by Australian Inland Energy Water Infrastructure, and later by Country Energy and then Essential Energy.

¹ Namely, the *Overhead Line Construction and Maintenance Regulations 1962* (NSW) and ASCE Manual 52.

² Accounted for in accordance with AS/NZS 7000:2016, *Overhead line design*, and assuming a span length of 418 metres.

Following the divestment of electricity transmission assets in 2015, Essential Energy retained ownership and was responsible for maintenance of the GTs in order to provide the backup supply service to Broken Hill.

In October 2018, Essential Energy notified Transgrid of its intention to 'decommission and dispose of' the GTs. If the GTs had been decommissioned, Broken Hill would have been without any backup supply during planned and unplanned outages unless alternative arrangements were made for backup supply.

The regulatory assessment of long-term investment

Following Essential Energy's notice to decommission the GTs in 2018, Transgrid immediately commenced a Regulatory Investment Test for Transmission (RIT-T) process to evaluate future options for maintaining reliable backup supply to Broken Hill. The RIT-T evaluation included an assessment from Aurecon that with further investment in the short term, the GTs remained a viable short-term solution for the provision of backup supply until 2026. Aurecon's condition report identified that to ensure their reliable operation, both GTs were required to be refurbished, meaning that significant capital investment was required to ensure the safe and reliable operation of the assets.

The RIT-T process identified that the optimal long-term solution was for Transgrid to enter into a contract to procure network support from a 200 MW/1500 MWh compressed-air energy storage plant and mini-grid, which under the solution proposed by the proponent, Hydrostor, was scheduled to be commissioned in 2025/26³.

Other potential long-term solutions that were evaluated through the RIT-T included:

- refurbishment of the existing (GTs) over the long-term, with preliminary estimates placing the net benefits of this option approximately 5.8 percent below the preferred option on a weighted scenario basis. Purchasing new GTs was estimated to be \$78 million⁴ in capital costs with ongoing operating costs of \$1.6 million per year with a delivery time of 2026/27.
- construction of a second single circuit 220 kV transmission line from Buronga to Broken Hill with shunt reactors. This option was rated last given the \$474 million⁵ capital cost (and ongoing operating costs of \$4.7 million per year) to consumers and delivery time of 2027/28.

Continued reliance on the GTs remained necessary in the short-term, regardless of which longer-term option was ultimately identified through the RIT-T analysis.

Purchase of the GTs

Transgrid is aware that during the RIT-T process and in parallel, Hydrostor was actively pursuing the acquisition of the GTs from Essential Energy. Following an assessment of the condition of the GTs, Hydrostor withdrew its interest.

As such, in March 2021, Essential Energy wrote⁶ to Transgrid advising of its intention to decommission the GTs if Transgrid did not purchase them by January 2022. In December 2021, to ensure Broken Hill was not

³ Transgrid, *RIT-T: [Maintaining reliable supply to Broken Hill](#)*, Project Assessment Conclusions Report, May 2022

⁴ Nominal 2022 dollars

⁵ Nominal 2022 dollars

⁶ Essential Energy Letter Ref: 20210321 DS:AH '*Broken Hill Gas Turbines Network Support*'

left without backup supply during the interim period, Transgrid agreed to purchase both the GTs for \$15 million (ex GST) from Essential Energy.

Following its acquisition of the GTs in June 2022, Transgrid promptly:

- a. engaged third party advisers and devised a maintenance plan on the GTs to manage their condition
- b. implemented a schedule of regular performance runs on both units every two months to ensure that the GTs performed as required; and
- c. devised and initiated a broader refurbishment project for the GTs based on the initial condition advice.

The first stage of the refurbishment project was completed in 2023. In July 2024, the Stage 2 and 3 refurbishment works commenced. By 25 August 2024, the Stage 3 refurbishment work was completed for GT2 and it was available for service.

Following the successful completion of the refurbishment work on GT2, Transgrid began the planned refurbishment works on GT1 on 27 August 2024. Noting that ordinarily, if one GT becomes unavailable during a planned or unplanned outage of the X2 line, the remaining GT would remain able to provide backup supply. The refurbishment of GT1 was scheduled to be carried out in advance of the summer peak load period and was expected to take approximately seven weeks based on the assessments. However, during the course of these works when the turbine housing was opened, Transgrid became aware of excessive bearing system wear making additional repair work necessary to avoid the catastrophic failure of GT1. Transgrid anticipates the refurbishment to be completed and GT1 to be available by mid-2025 based on the manufacturing lead time of replacement parts.

After identifying the need to replace significant components in GT1 on 18 September 2024, Transgrid took steps to ensure the safe and reliable operation of GT2, including conducting one of its periodic test runs on 15 October 2024, which was the day before the extreme weather event.

The initial cost of the refurbishment for both GTs was at least \$29.85 million.

Transgrid has continued to work in good faith with government and Hydrostor throughout this process to assist in the delivery of Hydrostor's proposed compressed-air energy storage plant and mini-grid solution. This includes progressing a regulatory rule change to help enable the proposed solution.

4. Extreme Weather Event and Transgrid's Response

The Bureau of Meteorology (BOM) issued a severe thunderstorm warning in the vicinity of Broken Hill mid-evening on Wednesday 16 October, advising of potential damaging winds and large hail. This extreme weather event caused seven towers to collapse and damage to two further towers along a 3.5 km section of the X2 transmission line near Broken Hill.

The BOM advised that the damage to infrastructure that occurred south of Broken Hill was consistent with such damaging winds, and the possible presence of a tornado.

This resulted in power outages affecting approximately 12,000 people in Far West NSW. Transgrid immediately mobilised its Emergency Management and Crisis Management teams. On 17 October 2024, a

number of towers on the neighbouring transmission network in northern South Australia also failed during an extreme weather event.⁸

Backup supply

In line with its operating protocols, Transgrid promptly deployed one of its backup GTs at its Broken Hill substation to restore power to Broken Hill. Within two hours of the outage occurring, the gas turbine known as GT2 was started. The other GT, known as GT1, was unavailable while it underwent the refurbishment works described above. Concurrently, line inspections commenced to assess the extent of the damage.

A line patrol identified seven collapsed transmission towers and an additional two damaged transmission towers. Subsequently, an aerial patrol of the entire X2 transmission line confirmed there was no additional damage.

Customers were advised of a planned outage to be completed overnight on 20 October to replenish oil and coolant in GT2, in order to mitigate the risk of an unplanned outage during the peak periods, when weather conditions were likely to put additional pressure on the network.

At 16:30 (AEST) on 21 October, a fire suppression system fault caused the GT2 to trip. Due to the extreme temperatures within the generator casing (up to 1500 degrees Celsius), repairs could not be undertaken until the unit cooled. This resulted in an unplanned outage lasting approximately 24 hours.

On 22 October, additional portable generators arrived, and Transgrid, in partnership with the NSW Government and Essential Energy expedited the restoration of power supply, by working together to safely install and operate the extra generators across the local network to provide additional backup capacity. Transgrid has reimbursed, and is continuing to reimburse, Essential Energy for the additional generators to remain in service until GT1 is returned to service.

At 01:50 (AEST) on 25 October, the GT2 was removed from service to rectify an issue on the GT fuel forwarding pump which required immediate rectification. GT2 was returned to service approximately 5 hours later.

As a further mitigation measure, on 25 October 2024, the Broken Hill region was temporarily split into two mini-grids, one operated by Transgrid and the second distribution mini-grid was operated by Essential Energy from its Pinnacles Place substation, which serviced the greater Far West NSW communities via portable generator sets.

By 26 October 2024, Transgrid had fast-tracked the incorporation of AGL's Broken Hill BESS into the Transgrid mini-grid. This provided additional backup supply to the Broken Hill region.

Repairs of the X2 transmission line

As a further part of the emergency response, more than 100 specialists, technicians, and crews were mobilised from across Australia, including Victoria, South Australia, and key Transgrid bases (Newcastle, Orange, Tamworth, and Western Sydney), to expedite the repair of the storm-damaged section of the X2 transmission line.

⁸ [Blackouts and pylons downed after 130km/h winds hit SA - News | InDaily, Inside South Australia](#)

On 18 October 2024, Lindsey Emergency Response Structures were selected as the preferred temporary solution for the X2 transmission line. Following environmental approvals and site mobilisation, installation of the structures began on 23 October 2024, with an anticipated completion date of 6 November 2024.

Transgrid expedited the restoration of the X2 transmission line as the region's primary power supply and, after considerable efforts, the X2 transmission line was re-energised on 31 October 2024 six days ahead of schedule.

Transgrid continues to undertake regular routine inspections of the Lindsey Emergency Response Structures, and the permanent structures remain on track for commissioning in 2025.

Stakeholder engagement

Throughout the incident, Transgrid proactively engaged with the community and stakeholders, providing frequent updates via various communication channels including:

- providing status updates and taking questions at the daily media conferences with the Minister
- regular communications including meetings with local MPs and their offices, the Mayor and General Manager of the Council, the Department of Premier and Cabinet, the Minister for Climate Change, Energy, Environment and Water and her office, and the Department of Climate Change, Energy, Environment and Water
- regular interviews with and responses to media outlets
- Transgrid's social media accounts; and
- the Transgrid website.

Transgrid worked closely with Essential Energy and the NSW Government to coordinate all communications, noting that all direct communications with Essential Energy's customers were undertaken through Essential Energy as their service provider given the restrictions contained in the *Privacy Act 1988* (Cth) regarding sharing personal information with third parties.

Public statements regarding the status of the outage and emergency response were developed in collaboration with Essential Energy.

Transgrid provided information for call centre staff to ensure they had the information to handle specific enquiries and complaints related to the incident. The information was updated daily and/or when required, while the emergency response was rolled out. Callers were also referred to the website if required which had important information about the outage, Transgrid's response, compensation and grants available. The call centre is staffed 24/7.

Throughout the emergency response, Transgrid had community engagement officers based in Broken Hill to assist with community enquiries and provide critical updates to local stakeholders. On 24 October 2024, the NSW Premier announced a funding package to support residents and businesses affected by the power outages. Transgrid contributed \$1.5 million to the community support package.

On 7 November 2024, Transgrid launched an additional \$500,000 funding program for community organisations and not-for-profit groups in the Broken Hill and Far West NSW areas impacted by the power

outages. To ensure Broken Hill organisations were aware of these grants and to support their applications, Transgrid had staff on the ground for two weeks to promote the program and provide information. Transgrid also provided an online grant writing webinar. As at the time of this submission, just under \$300,000 has been allocated to community organisations. A second round of \$200,000 of funding will be launched in March.

5. Review following 2009 Transmission Tower Failures

In the 2009 tower failure event, five transmission towers collapsed along a 2.5 km section of the X2 transmission line, approximately 100 km north of the Buronga substation.

The two GTs were started by their then owner Country Energy 1¼ and 2½ hours after the event, resulting in only a short outage of supply to Broken Hill. The collapsed towers were replaced initially by emergency structures, with the replacement towers constructed and the X2 line returned to service within eight days.

Transgrid established an investigation committee to report on the event and permanent restoration of the line, and to make other recommendations it considered appropriate.

The cause of the towers collapsing was found to have been a wind-storm event with localised wind speeds beyond the tower design capabilities. Metallurgical testing determined that there was no pre-existing damage to the steelwork, and the condition of the towers, quality of steel and construction were found not to have been factors in the tower collapses.

The committee recommended that the temporary structures should be replaced with permanent structures, and that a design review to determine the most effective structures for the permanent replacement towers should be carried out. That review recommended that the temporary structures should be replaced with permanent concrete poles, which were built in 2016.

6. Inquiries

There are currently two inquiries by regulatory agencies, the Independent Pricing and Regulatory Tribunal and Australian Energy Regulator, examining the outage in Far West NSW. Transgrid is fully co-operating with these inquiries.

Transgrid is also assisting the Australian Energy Market Operator (AEMO) in relation to its review of the incident.

7. Communication Protocols – Electrical Outages

Operational issues are managed and controlled between the 24/7 Control Centres at each respective Network Service Provider (**NSP**). Each Control Centre is responsible for overseeing all operations on their respective networks which includes the response to incidents and emergencies. Official operational communication is done between the Transgrid Control Centre and the Essential Energy Control Centre.

Outages to critical assets, or outages that affect significant parts of the power system, are communicated to the NEM Responsible Officer (NEMRO) at AEMO, and both the Jurisdictional System Security Coordinator

(JSSC) and the Jurisdictional Designated Officer (JDO) in the Minister's Office. For emergency assistance or engagement, Energy and Utility Services Functional Area Coordinator (EUSFAC) will also be notified. This notification and communication are made by the Transgrid Jurisdictional Responsible Officer (JRO).

8. Conclusion

Transgrid is fully committed to providing a resilient and reliable energy supply in Far West NSW. This includes working with government and Hydrostor to progress its long-term compressed-air energy storage plant and mini-grid solution.

Transgrid continues to prioritise the resilience and reliability of the Broken Hill electricity system. Additional backup generation, provided during the outage, remains in place until the permanent towers are erected and both GTs are returned to service.

We are committed to working closely with relevant regulatory bodies and stakeholders to learn from the outage in the Far West of NSW. Ensuring a more resilient energy network for regional communities is a key priority for Transgrid.

Transgrid welcomes the opportunity to appear at the Inquiry and to work collaboratively with the Committee to continue to improve future energy resilience for the benefit of the communities of Far West NSW.