Managing fire risk across the electricity and transmission networks



Managing bushfire risk is imperative during project planning and design, and when the network is operating.

As the VNI West project develops, VicGrid will work with fire and safety experts – including the Country Fire Authority (CFA) – and government regulators such as Energy Safe Victoria (ESV) to address bushfire risk and respond to community questions. Comprehensive studies will be carried out as part of the planning and approvals process, including a detailed fire risk assessment.

As required by law, VicGrid must demonstrate to ESV that the transmission line design minimises risks to people, property, and bushfire safety as far as practicable.

Regulation and oversight

The Victorian Government regulates how the electricity transmission network is maintained and operated. The transmission network service provider (TNSP) responsible for operating transmission lines must follow safety processes and procedures set by Energy Safe Victoria (ESV). ESV is the regulator responsible for electricity, gas, and pipeline safety in Victoria.

Design and construction requirements vary depending on voltage, reflecting differences in firefighting practices for 220kV and 500kV transmission lines. All transmission lines must meet strict safety requirements, including the AS/NZS 7000:2016 overhead line design standard, and comply with the Country Fire Authority Act 1958 (Vic).

ESV also requires transmission and distribution network operators to prepare bushfire mitigation plans and audits these plans annually.

Firefighting responsibilities

Victoria's three fire authorities – the Country Fire Authority (CFA), Fire Rescue Victoria (FRV), and Forest Fire Management Victoria (FFMV) – have distinct but complementary roles when it comes to bushfire management.

Primary responsibility for bushfire response is shared as follows:

- **CFA:** private land
- **FFMV:** public land
- **FRV:** within its geographic footprint, including metropolitan Melbourne and major regional centres

Firefighters across all three agencies are trained in control measures for safely fighting fires near transmission lines.

Each agency also has established policies and operational procedures to support safe and coordinated bushfire response.

Managing vegetation within transmission easements

The TNSP will implement a Transmission Vegetation and Easements Program to maintain safe clearances between vegetation and transmission lines to reduce bushfire risk.

Vegetation is monitored through a regular inspection and maintenance program, including aerial surveys using high-resolution cameras to enable light detection and ranging (LiDAR) data, and aerial imagery.

What happens to the transmission network during a bushfire?

The TNSP has a commitment to provide its customers with a reliable and safe electricity supply.

During a bushfire, the TNSP works closely with emergency authorities – including Emergency Management Victoria (EMV), CFA, FRV, and FFMV – and follows agreed and mandatory directions. In some circumstances, this may include temporarily turning off power to parts of the transmission network to support safety and firefighting operations.

Transmission vs distribution lines and networks

Electricity travels via two types of power lines: transmission lines and distribution lines.



Transmission lines carry electricity at extra high voltages from generators (such as coal-fired power stations and wind and solar farms) to terminal stations. These lines typically operate at voltages between 132kV and 500kV. At terminal stations and substations, the voltage is reduced before electricity is passed into the distribution network.



Distribution lines then carry electricity from substations to homes and businesses. They operate at much lower voltages, ranging from 240V up to 66,000V (66kV).

Transmission and distribution networks are managed separately and have different requirements, including specific fire prevention and vegetation management processes.

Easements to support firefighting

Transmission easements can support firefighting by acting as low-fuel areas that may help slow the spread of bushfire. Because they are largely free of vegetation, easements can sometimes function as a control line during fire response.

The TNSP will work with FFMV on activities such as backburning where appropriate. A backburn is a controlled fire lit near the edge of an active bushfire to remove fuel ahead of the fire, helping to reduce its intensity.

Planned burning

FFMV and the CFA carry out planned burns to manage and reduce fuel loads. These burns are designed to lower bushfire intensity by slowing fire spread and improving the chance of early suppression.

The TNSP is notified in advance of planned burns. Burns are scheduled for suitable weather conditions, with wind direction managed to reduce risk to transmission infrastructure. In general, smoke from planned burns does not pose a risk to electricity infrastructure.

FFMV is also responsible for other preparedness activities like slashing and mowing.

Aerial firefighting

The TNSP will work with EMV and the CFA to support safe aerial firefighting near high-voltage transmission lines.

Transmission towers and lines are clearly marked on aeronautical maps. The safe flying distance from transmission towers is determined by each pilot, based on their experience and Civil Aviation Safety Authority (CASA) regulations.

In 2023, the Australian Energy Infrastructure Commissioner, CFA, and ESV published an information sheet on managing bushfire risk across the lifecycle of overhead transmission lines.

This information sheet addresses a range of concerns, including how the companies that own and maintain transmission lines work with fire authorities to ensure aerial firefighting is possible near transmission lines.

Fire prevention control

Terminal stations and transmission lines are remotely operated so they can be shut down when required. If a fault occurs on the transmission network, protection systems automatically detect it and switch off power to prevent an electrical fire.

For faults on a 220kV transmission network, power is turned off within 120 milliseconds (0.12 of a second). For faults on a 500kV transmission network, power is turned off within 80 milliseconds (0.08 of a second).

Once power is switched off, the risk of electrical ignition is removed. Transmission lines themselves are not flammable, and fire cannot travel along them.

Lightning strikes

Transmission towers are fitted with earth (grounded) wires installed above the transmission lines. These wires are designed to intercept lightning strikes and safely direct the energy into the ground through the tower structure.

This reduces the likelihood of damage to transmission lines, helps maintain electricity supply, and lowers the risk of bushfires being ignited by dry lightning in the immediate area. Ground wires are a standard and essential feature of safe and reliable transmission networks.

Victorian Bushfires Royal Commission

The 2009 Victorian Bushfires Royal Commission made a number of recommendations focused on reducing fire risks associated with electricity distribution infrastructure. These included increased inspections, improved hazard management, enhanced training, and infrastructure upgrades.

The Commission did not make recommendations about how Victoria's electricity transmission network should be operated or maintained.