

Managing fire risk across the electricity transmission network

Managing the risks posed by bushfires is an important consideration in both project planning and design, and in eventual operation by a network service provider.

TCV will work with the experts like CFA and Government authorities such as ESV as the VNI West project develops to ensure bushfire risk is addressed, and community questions answered. Comprehensive studies will be conducted as part of the permitting and approvals process, which will include fire risk assessment.

We will be required to demonstrate to the satisfaction of ESV that the design of the new transmission line minimises hazards and risks to the safety of people and property and bushfire danger as far as practicable as required by legislation.

Regulation and oversight

The maintenance and operation of the Victorian transmission network system is highly regulated by the Victorian Government. The network operator appointed to operate the powerlines – known as the TNSP (transmission network services provider) – must implement processes and procedures outlined by Energy Safe Victoria (ESV), the energy safety regulator responsible for electricity, gas and pipelines safety.

The processes and protocols reflect slight differences in firefighting procedures between 220kV and 500kV lines. All design and construction must meet a range of safety requirements, including the AS/NZS 7000:2016 Overhead line design standard and follow the Country Fire Authority Act 1958 (Vic).

Bushfire Mitigation Plans will be prepared for both the distribution and transmission networks in compliance with ESV regulations, and audited annually by ESV.

The Bushfire Mitigation Management Plan for the Electricity Transmission Network outlines how the electricity transmission network is managed to mitigate bushfire risk.

Fire Fighting Responsibilities

Victoria's three fire authorities – Country Fire Authority (CFA), Fire Rescue Victoria (FRV) and Forest Fire Management Victoria (FFMV) – have significant and complementary roles when it comes to bushfire management. CFA has primary responsibility for bushfire response on private land.

FFMV has primary responsibility for bushfire response on public land. FRV has primary responsibility for bushfire that occurs within its geographic footprint and that includes metropolitan Melbourne and major regional centres.

Firefighters receive training on the control measures for fighting fires near transmission lines. Victoria's three fire authorities also have appropriate policies and operational procedures in place.

The Australian Energy Infrastructure Commissioner, the CFA and Energy Safe Victoria have recently published a [bushfire and transmission information brochure](#).

This addresses a range of concerns, including how the companies that own and maintain transmission lines work with fire authorities to ensure that aerial fire-fighting is possible in the vicinity of transmission lines.

Managing vegetation within transmission easements

The TNSP will also have a Transmission Vegetation and Easements Program that focuses on maintaining safe clearances between vegetation and transmission lines to reduce bushfire risk. As part of the regular inspection and maintenance program, monitoring will take place from the air, using high-resolution cameras to enable light detection and ranging (LiDAR) data and aerial imagery to be taken.

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. In the event of a bushfire, it will work closely with Emergency Management Victoria (EMV), Fire Rescue Victoria (FRV), Country Fire Authority (CFA) and Forest Fire Management Victoria (FFMV) and follow all agreed and mandatory directions. If required, this can include turning off the power across parts of the transmission network.

The transmission network and distribution networks are different types of infrastructure and require a different management approach. Each network has specific management plans that set out processes and procedures for fire prevention and vegetation management.

The difference between transmission and distribution lines and networks

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

Transmission power lines

transport electricity at extra high voltages from generators such as a coal-fired power stations, wind or solar farms, to terminal stations. They generally range in voltage from 132kV up to 500kV. The voltage of electricity from the transmission network is stepped down at the terminal stations and substations to a lower voltage before it is transferred to the distribution network.



Distribution power lines

transport the electricity from the substations and carry electricity through many of our residential streets to homes and businesses. They range in voltage from 240V up to 66,000V (66kV).



Using easements to support firefighting efforts

As transmission easements are largely free of vegetation, they have a low fuel load and can act as a line of defence against bushfires. The TNSP will work with FFMV on backburning operations. A backburn is a fire lit close to the edge of an active bushfire, which burns out the fuel between the bushfire and an established control line. Backburning helps reduce the intensity of a bushfire by reducing fuel load. FFMV is responsible for planned control burns and preparedness activities, like slashing, mowing and creating fuel breaks on public land.

Use of aerial firefighting

As occurs elsewhere in Victoria, the TNSP will work with EMV and CFA to ensure aerial firefighting can operate in the vicinity of high-voltage transmission lines. The transmission towers and lines are well defined on aeronautical maps. The safe flying distance from the transmission towers is determined by the individual pilot based on their experience and regulations set by the Civil Aviation Safety Authority (CASA).

Planned burning

Planned burning is undertaken by FFMV and the CFA to manage and reduce fuel load. This can help reduce the intensity of a bushfire, by slowing it down and increasing the likelihood of suppression during the early stages of the fire. FFMV and the CFA will notify the TNSP in advance of planned burns. Planned burns are organised on days when weather conditions are suitable, and the wind is heading away from transmission infrastructure. In general, smoke from a planned burn is not a risk to electricity infrastructure.

Fire prevention control

Terminal stations and transmission lines are remotely operated so that they can be shut down when required. If a fault were to occur on the transmission network, the protection systems will detect and switch off the power in a very short period of time to prevent an electrical fire. For a fault on a 220kV transmission network, power is turned off within 120 milliseconds (0.12 of a second). Similarly, for a fault on a 500kV transmission network, power is turned off within 80 milliseconds (0.08 of a second). Once the power has been turned off, there is no longer any risk of electricity sparks starting a fire. Fire is unable to travel along transmission lines because the lines are not flammable.

Lightning strikes

Transmission lines have ground/earth wires installed above the lines at the top of the transmission tower. The ground wire is designed to shield the transmission lines from lightning strikes. If lightning strikes the ground wire on top of the tower, the power in the strike is directed safely into the ground through the ground wire and towers without putting the transmission lines at risk of strike. Redirecting lightning strikes safely to ground allows the electricity supply to be maintained without interruptions, avoids damage to network infrastructure, and reduces the risk of a bushfire being ignited from dry lightning strikes in the immediate area. Ground wires form an essential part of a safe and reliable transmission network.

Victorian Bushfire Royal Commission

The 2009 Victorian Bushfires Royal Commission made, among others, eight key recommendations focused on reducing the risk of fires related to electricity distribution infrastructure. This included more inspections, better hazard management plans, improved training and infrastructure upgrades. The commission did not place any recommendation on the operation or maintenance regime of the electricity transmission network for Victoria.

