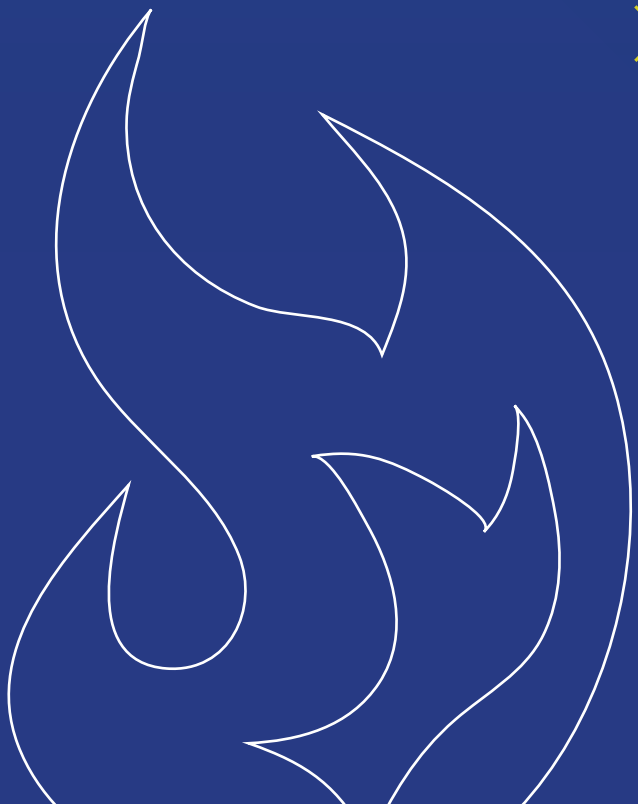
Energy Networks Australia

Bushfire Factsheet

January 2020

- Australia's electricity network extends about 918,000km **supplying 11 million customer** connections.
- The electricity network is made up of the **high voltage** transmission network and **medium to low voltage** distribution network.
- The distribution network alone comprises **more than seven million power poles**.
- The network is **vulnerable to bushfires** that are an ever-present threat across Australia.
- **Electricity can also ignite fires** when objects contact powerlines or damage to poles cause lines to contact the ground.



Impact of bushfires

Bushfires can have a direct and indirect impact on electricity networks.

Fire can damage power poles and other equipment and heat and smoke from fires can cause overheating at substations.

The transmission network can manage heat and smoke from fires by reducing the transfer capacity of interconnectors (known as 'derating'). This reduces the risk of damage but may result in reduced flows of electricity. These limits on equipment use may have impacts on customers.

Damage or 'derating' can result in power outages to local communities or, particularly in the case of transmission, weaken the overall power grid.

When infrastructure is damaged, crews respond as soon as it is safe to do so and repair the damage.

Bushfire recovery

Before damage can be assessed and power restored, emergency services must first control bushfires and deem the area safe for network crews to access.

Source: Endeavour Energy

The top priority is safety.

Time to restore supply can vary depending on the extent of the fires, blockage of road access and smoke. Network crews will inspect all lines and equipment before restoring power. Even access by air may be limited if there is excessive smoke.

Networks will first focus on key lines that supply larger areas and critical customers (like hospitals) and then work their way down to restoring individual properties.

In disaster situations, networks have arrangements in place for mutual assistance where skilled crews and resources can be shared between networks to speed up the power restoration process.

Crews work with emergency services, government, local communities and, where applicable, the Australian Defence Force.

Where significant delays restoring power back to the main grid are likely, networks may deploy portable generators to temporarily restore power.

Electricity starting fires

Electricity can start bushfires when infrastructure is damaged or foreign objects contact powerlines. This can cause arcing and generate sparks that can ignite dry vegetation.

While the number of bushfires ignited by electricity is very low, once started they have the potential to burn large areas.

Mitigating the vulnerability of networks to damage and faults is essential.

Ignition Cause	% of bushfires	% area burnt
Accidental	29.7	10
Escape	27.4	5
Unknown	17.8	11
Lightning	16.0	46
Arson	6.4	13
Electrical	2.7	14

C.Miller et al. Landscape and Urban Planning (2017)

Vegetation

Networks continually inspect, prune and clear vegetation around powerlines to reduce the chance of contact.

Higher voltage lines require larger areas cleared than lower voltage lines.

While this reduces the chance of impact, mobile branches or objects in high winds can still cause contact.

Networks use aerial surveillance such as helicopters and drones to inspect larger and remote areas. These can use high resolution cameras and Light Detection and Ranging (LiDAR).

Figure 1: **Pruning around different voltage powerlines in South Australia (Source: SA Power Networks)**

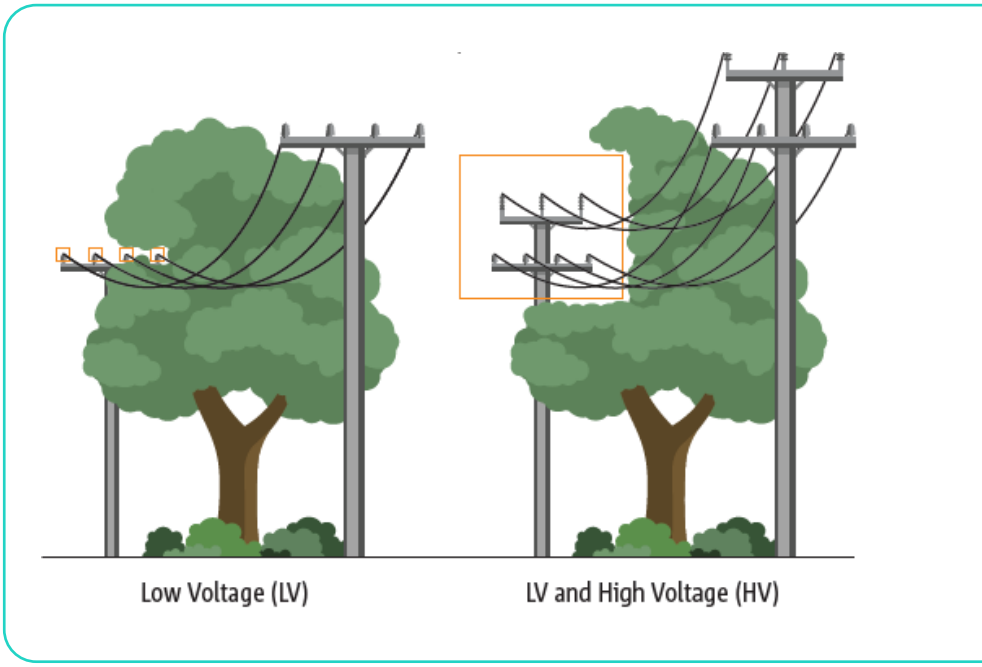
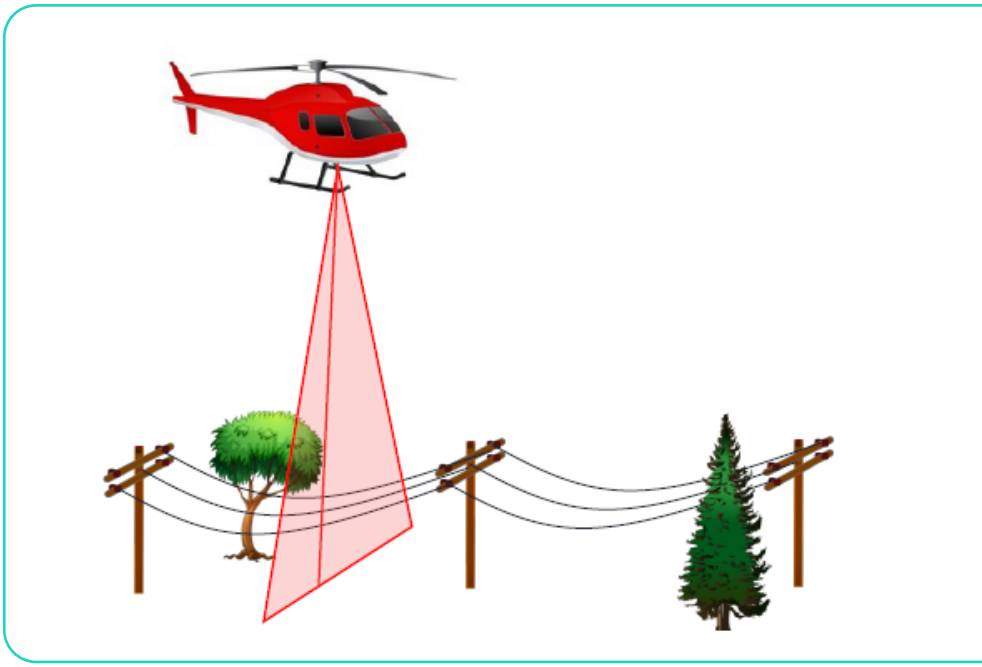


Figure 2: **Using LiDAR for vegetation management (Source: CitiPower/Powercor)**



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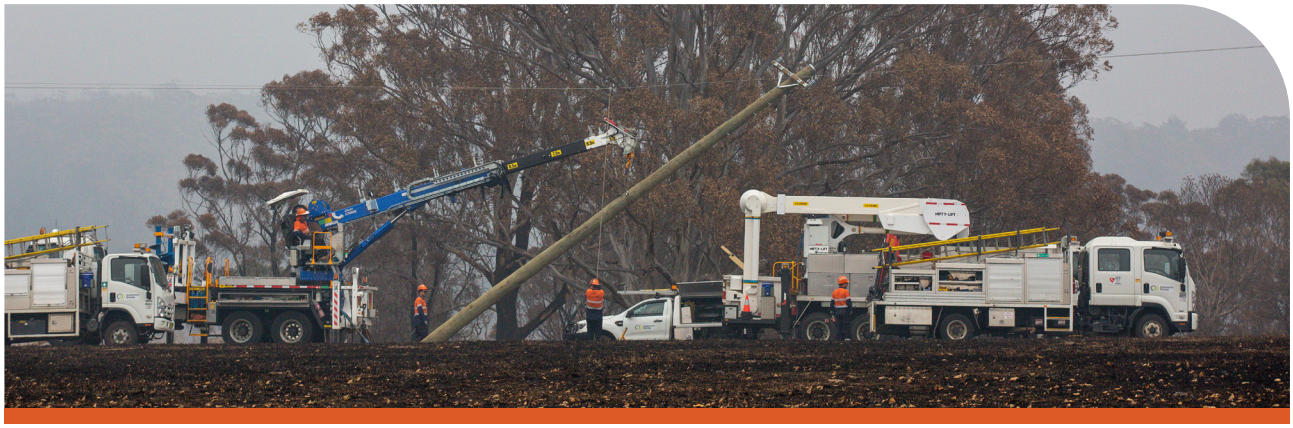

Source: Endeavour Energy

Technical solutions

If powerlines contact the ground or each other, arcing can occur resulting in sparks which can ignite dry vegetation or other material nearby.

To mitigate the impact of lines contacting the ground or each other, several technical solutions can be used including:

» Conductor spacers/spreaders to prevent power lines clashing together in high winds;

» Rapid Earth Fault Current Limiters REFCL reduce electrical arcing at the point a fault occurs on the network (for Victorian networks);

» Covered conductors are insulated coatings on powerlines in high-risk areas that are designed to reduce the danger from faults or fallen lines and;

» Fault protection relays that detect and eliminate dangerous faults on the electricity network.

Auto-reclosers

Most overhead line faults are transient[1]. This could mean a branch contacts powerline, but then falls off in high winds.

An auto-recloser will open when a fault is detected and then attempt to re-close after a pre-programmed period.

If the fault has passed, such as the branch falling off and no longer making contact, the auto-recloser will close and power will be restored.

If the fault has not passed, it will open again and continue the cycle of closing for a set number of times.

This technology improves restoration time for customers, but in high fire danger the opening and closing may cause sparks at the fault that could ignite a fire.

Before the start of the bushfire season, networks will change the protection settings on auto-reclosers. By reducing the number of attempts to zero, the recloser will open when a fault is detected and will need to be manually closed after assessment by a network crew.

While this means longer restoration times, it will reduce the risk of fires.

De-energising the network

Cutting the electricity flow through powerlines significantly reduces the chance of sparks.

This sometimes occurs in South Australia, where high fire risk areas of the network can be de-energised on days when the fire danger is extreme.

1 www.publish.csiro.au/rs/pdf/rs19005

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