Investing in new technology, research and development

The Victorian Government's Powerline Bushfire Safety Program is investing in research and development initiatives that can be used to reduce the risk of fires starting from powerlines.

The Government is committed to ensuring that the fight against the threat of bushfires uses the best proven technologies available and draws upon the know-how of those at the forefront of innovation.

The program sponsored a $10 million research and development fund to enable technological developments to produce practical and enduring solutions to support efforts to reduce bushfire risk.

The areas of priority include:

- **Bushfire mapping and modeling**, to direct program activity to the locations of greatest bushfire risk

- **Powerline faults and fire ignition**, to understand how powerlines may fail and cause bushfires to start

- **Improved powerline technology**, to minimise powerline faults and ensure that power distribution networks are as safe as possible.

Research and Development advancements

The Powerline Bushfire Safety Program (PBSP) continues to work closely with industry, regulators and the research community to improve the knowledge of powerline started bushfires and the development and application of technological solutions that will set new standards for powerline safety on Victoria's electricity distribution network.

Mapping and Modelling

Since 2013, PBSP has assessed bushfire risk relativities across the entire electricity distribution network in order to target finite resources in a way that best serves to reduce Victoria's exposure to powerline related bushfire risk.

By combining specialist bushfire risk analysis and modelling, geo-spatial analysis and engineering expertise, PBSP has facilitated targeted investment in new electricity infrastructure in a way that maximises safety benefits.

As a result of the PBSP investment in mapping and modelling to date:

- Estimates of ignition likelihood and fire consequence can be calculated for all parts of the network

- The risk benefits of deploying particular classes of electricity asset in particular locations can be quantified

- Geographic areas of relatively high bushfire risk have been identified and are being targeted.

Powerline Bushfire Safety Program

Rapid Earth Fault Current Limiter (REFCL) Technology

PBSP conducted a series of world-first trials of REFCL technology for use on electricity networks to reduce fire risks on bare-wire overhead powerlines.

Rigorous testing of REFCL technology was completed at United Energy's Frankston South Zone Substation in 2014 which demonstrated unequivocally that REFCLs are highly effective in significantly reducing arc ignitions on 22kV powerlines.

Further testing of REFCL technology at AusNet Services Kilmore South Zone Substation was completed in 2015. These trials tested comparative performance of a range of REFCL configurations to identify optimal fault detection and suppression capability on a live network.

Through this research, the Victorian Government and electricity distribution businesses identified and confirmed new fault detection and suppression standards required to significantly lower the risks that 22kV powerlines will start bushfires in worst bushfire risk conditions. These standards are now in force from the 1 May 2016 commencement of the *Electricity Safety (Bushfire Mitigation) Amendment Regulations*.

Covered Conductor

The covered conductor predominantly used by Victorian distribution businesses is aerial bundled cable.

With over 28,000km of SWER and 60,000km of high voltage multi-wire 22kV mostly bare-wire powerlines in Victoria, a cost-effective alternative to enhance the market has been sought.

PBSP launched a grant program in 2016 to accelerate the development of new or enhanced high voltage covered conductor, providing fire reduction options to the electricity distribution industry.

The grant program sought enhanced technology solutions to:

- Reduce the impact of bushfires starting from powerlines used in the Victorian electricity distribution system

- Increase the amount of covered conductor used to replace high voltage bare-wire lines.

Progress is being made to move forward an innovative safer powerline cable technology that will shape the future reduction of bushfires starting from high voltage bare-wire powerlines.

Fault Signature Testing

To improve fault detection technology, a fault signature modelling project has been able to identify plant species with the highest fire risk from powerline faults in Victoria.

The research results provide an understanding of the ignition process through conduction of high voltage electricity through vegetation including:

- A consistent sequence of phases of the ignition process and which stage ignition is most likely to occur

- Which plants are most and least likely to start fires through conduction of electricity

- Fire probability of different faults and the level of detection sensitivity required to detect faults.

A reference database of fault signatures, along with the Research Final Report, has been made publicly available on the DataVic website.

A **Vegetation Detection Challenge** was launched in 2017 resulting in four teams of researchers, PHD students and those with a general interest in the project, working on the development of an algorithm to identify which vegetation species is touching a powerline. Prizes were awarded to the top three teams, all of which are continuing to work on the further development of their algorithms.