

# EXTREME WEATHER

## Victorian Bushfires | Australia | February 2009

This case study is part of an extreme weather impact project, in partnership with Swiss RE Corporate Solutions and Marsh & McLennan Companies, which aims to identify and share best practice within the energy sector to enable more agile and adaptive response to extreme weather and natural hazard impacts on energy systems and supplies.

### CASE STUDY AT GLANCE



**WEATHER EVENT**  
Fire



**ORGANISATION**  
Department of Environment, Land, Water and Planning (DELWP)



**INDUSTRY SUB-SECTOR**  
Energy policymaker



**RESILIENCE RESPONSE**  
Physical



**RESILIENCE COSTS**  
A\$750m in Powerline Bushfire Safety Programme



**SOLUTIONS FOR RESILIENCE**  
Preventing bushfires through power line upgrades

Victoria, Australia experienced record-breaking weather and extreme bushfires in January and February 2009. The events of Black Saturday (7 February) led to the death of many, as well as the destruction of forests, woodlands and whole communities. Following this event, the Victorian Bushfires Royal Commission conducted an investigation into the causes, preparations, responses and impacts of the bushfires, and published a detailed report on its findings. With this came 67 recommendations for the State in a bid to minimise an event of this scale ever happening again.

Much material has been published on Black Saturday. As a differentiator, this case study focuses on the experiences of the Victorian Government in implementing preventative measures in its electricity systems under Recommendations 27 and 32. It specifically highlights many of the barriers and enablers experienced during this implementation, and documents some key lessons learned<sup>1</sup>.

### CONTEXT

#### ORGANISATIONAL PROFILE: DELWP

- The Department of Environment, Land, Water and Planning (DELWP) manages a diverse portfolio including energy policy, energy safety and electricity and gas in the State of Victoria.
- It oversees multiple programmes including the Powerline Bushfire Safety Programme.

#### 2009 BUSHFIRES – BLACK SATURDAY

- 15 of the most damaging fires were burning on 7 February, 2009, otherwise known as Black Saturday.
- There were record temperatures in excess of 43°C and storm force winds in the run up to, and during, the fire.
- 173 people died, 2,133 houses were destroyed and devastation of other property, infrastructure and the

environment was abundant.

- The Royal Commission estimates the cost of the disaster to stand in excess of A\$4 billion<sup>2</sup>.

#### ENERGY IMPACTS



According to the Royal Commission, five of the 15 major fires that began on Black Saturday were caused by failed electricity assets<sup>3</sup>. Ageing infrastructure contributed to three of these five electricity-caused fires. Specifically, fatigued and corroded infrastructure caused conductor failure, a failed pole cap and a broken tie wire which, in turn, caused major fires.

Loss of power and telecommunications are thought to have hindered relief efforts. In some cases, power was cut off for two weeks<sup>4</sup>.



<sup>1</sup> Detailed lessons learned from Black Saturday can be found in the Royal Commission reports.

<sup>2</sup> <https://bit.ly/2GFtReL>

<sup>3</sup> <https://bit.ly/2BGdKK5>

<sup>4</sup> <https://bit.ly/2rb9Vq6>

## BLACK SATURDAY VERSUS OTHER BUSHFIRES

No other bushfire event has been as impactful as Black Saturday. Although Victoria has experienced extraordinarily hot weather, as recently as January 2019, the extreme wind has not been present. A recent fire of note was the St. Patrick's Day fire in March 2018. High winds in combination with ageing infrastructure caused a major event in southwest Victoria. There was no loss of life, but a lot of property damage, including the destruction of 18 homes and 45 sheds in the Terang area<sup>5</sup>. There was also a loss of power for days. This had a significant impact on the local dairy industry.

## RESILIENCE: RESPONSE AND PREVENTION FOR FUTURE EVENTS

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**WE ARE FOCUSED ON HOW [TO] HAVE A STABLE ENERGY SYSTEM THAT HAS VERY LIMITED RISK.**

- Lorna Mathieson, Program Director, Energy Programs, DELWP -

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After Black Saturday, a Royal Commission report was initiated investigating the event. As part of its recommendations, more focus was placed on lowering power line ignition risk. A technical taskforce was formed and the Powerline Bushfire Safety Programme was created with A\$750 million investment.

This programme has focused on technology as well as supporting frameworks that enable the technology and try to make it standard practice. The work on prevention has various components:

**Undergrounding powerlines:** Initially, many wanted to underground all powerlines, but the time and investment (around A\$60 billion) was too high. A\$250 million has been used to underground power lines in high risk areas (for more on identifying high risk areas, see Balancing risk and investment box). By the end of 2019, there will be roughly 500km of bare wire retired and replaced with underground wire.

**Leading-edge technology:** Research on leading-edge technologies has led to the implementation of rapid earth fault limiters (REFCLS) and automatic circuit reclosers. REFCLS are a type of ground fault neutraliser. The technology is widely used in Europe, but not for the prevention of bushfires, so this application will be a first. There has been a lot of research in trying to understand how the technology will operate in the Victorian network and its implications. The Government is also rolling out automatic circuit reclosers which, on days of total fire ban or code red days, will only get one shut off before the power gets disconnected, in a bid to prevent any ignitions.

**Policy and frameworks:** A lot of work was needed to enable the roll out of this technology on the network. This included regulatory changes, legislative changes and also civil penalties put in place for the electricity industry.

**Centralised Government response:** Since Black Saturday, the central emergency management agency that coordinates in these events is much more prominent within Government.

### SPOTLIGHT ON MODELLING

The programme has worked closely with CSIRO to build models and mapping tools that overlay distribution and transmission systems with maps of the State and the Tolhurst fire model, which replicates the conditions of Black Saturday. This helps to identify where the highest risk areas are.

A hybrid risk approach has also been utilised whereby risk modelling has been balanced with 'on-the-ground' know-how. The Government has overlaid computer modelling and risk analysis with an 'on-the-ground' emergency management perspective. For example, after areas for projects have been identified, the Emergency Management Commissioner would be consulted to understand the preservation of life and landscape perspective. It is important to consider proximity to cities, access routes and ability to suppress fires within, say, 20 minutes to half an hour – a critical time period.

### POWER LINE BUSHFIRE SAFETY PROGRAMME: FINANCIALS

The Programme is part-funded directly by the Victorian Government, and part-recovered through consumer bills.

**A\$250m** Appropriation funded from Victorian budget.

**A\$750m** Off-budget and recovered from energy consumers. ~A\$30 extra per bill.

### BALANCING RISK AND INVESTMENT

The Victoria Government have used computer modelling to target areas of highest risk, to try and “get the biggest bang for our buck to reduce as much of the risk”. It has focused on the extreme risk areas. For example, Victoria has a mix of grass fires on plains and bushfires. It has targeted areas around some of the bush because there is a lot of fuel load there, lots of people live there and the gum trees in the area burn readily. After the areas of highest risk are targeted, there is hope that another business case can be formed to request funding for other high risk areas.

<sup>5</sup><https://bit.ly/2ClzzPh>

## BARRIERS



**Unknown technical challenges:** There are unknown unknowns when installing new technology, such as REFCLs, on networks. For example, the effect of weather and the effect on voltage and balancing will not be known until installation and monitoring is in place.



**Distributed energy:** The Victorian Government announced funding for 750,000 rooftop solar installations. As they are rolled out and feeding the network, balancing the lines will be impacted.



**Time required:** Changing legislation and regulation takes time – it can be an 18 month to two-year journey before technology can be rolled out on the ground.



**Industry resistance:** There can be resistance for new unknown technology on the network.



**Existing network restrictions:** Complications arise from the fact that the Victorian power network is primarily above ground, rather than underground.



**Prioritisation of current events:** The implementation of prevention measures is being undertaken in a State with a challenging environment, prone to bushfires each year. This can delay installation as safety and response is prioritised.

## ENABLERS



**Collaboration:** Collaborative relationships between the policymaker and distribution businesses, in particular, are evolving. Finding the middle ground on issues is important. But being able to engage on technical issues, for example, and sharing knowledge, is valuable.



**Active engagement:** The Government is learning to become more technical and engage on technical issues with experts.

## ANTICIPATION OF FUTURE EVENTS

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**IT WOULD BE A MISTAKE TO TREAT BLACK SATURDAY AS A ‘ONE-OFF’ EVENT.**

**- Royal Commission Report Summary-**

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Temperatures are increasing, coastal areas are being impacted and crops are growing in different areas as climate zones are shifting. As these climate zones move, they are creating higher risk states than before. The Royal Commission report stated, “as components of the distribution network age... there will probably be an increase in the number of fires resulting from asset failures unless the State Government and distribution businesses take urgent preventative steps”.

