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How an Australian State Fought Back Against Grid-Sparked Wildfires

After the 2009 Black Saturday bushfires, Victoria rejected forced power outages and initiated sweeping grid upgrades that continue today

By **Peter Fairley**

Photo: Ashley Cooper/Alamy

This 2010 photograph shows rebuilding efforts at Marysville which was one of the worst-affected communities of the catastrophic 2009 Black Saturday bushfires in Australia.

Nine years before Paradise, California burned to the ground, a similar tragedy unfolded in Australia. On a searing, windy day in 2009 that came to be known as "Black Saturday," hundreds of fires erupted in the state of Victoria. One of the worst razed the bucolic mountain town of Marysville, northeast of Melbourne. And just as sparks from a Pacific Gas & Electric (PG&E) power line launched the Camp Fire that destroyed Paradise, Marysville's undoing began with high-voltage current.

In all, the Black Saturday fires killed 173 people and caused an estimated AUS $4 billion ($2.75 billion) in damage. Fires started by power lines caused 159 of the deaths.

California's wildfires have "brought it all back," says Tony Marxsen, an electrical engineering professor at Monash University in Australia. His parents honeymooned in Marysville. "It was a lovely little town nestled up in the hills. To see it destroyed was just wrenching," he recalls.

Marxsen says faded memories increased Marysville's death toll. "It had been 26 years since Australia's last major suite of deadly fires," he says. "People had come to believe that they could defend their house against a firestorm. Some stayed, and they all died."

While they go by different names, California's wildfires and Victoria's bushfires are driven by the same combination of electrical networks and extreme weather, stoked by climate change. How Victoria responded after the Black Saturday fires—work that continues today—differs significantly from what is happening in California today, especially in PG&E's territory.

Victoria rejected the widespread power shutoffs employed by PG&E. Both experts and the public in Victoria concluded that the disruption caused by power shutoffs would make people and communities less safe in an emergency. Marxsen notes that more than twice as many people died of extreme temperatures during the Black Saturday fires as from the fires, and people rely on electric air conditioning to stay cool. "Cutting off power may sound like a good solution. It certainly reduces drama. But it could actually increase deaths," he says.

Instead of shutting off power, Victoria's government adopted a suite of measures to try to shut off the fires. For example, whereas California utilities largely set their own standards for crucial activities such as trimming vegetation along power lines, Victoria's government set or strengthened a number of mandates for utilities. Ultimately, authorities imposed a stringent risk-reduction standard on utilities, along with a deadline for meeting them.

The state simultaneously beefed up its utility regulator, Melbourne-based Energy Safe Victoria (ESV), which now has four times as many arborists and engineers overseeing power infrastructure as it did in 2009.

The regulator's role is to "test, challenge, and expose" what the utilities do, says ESV director Paul Fearon. While ESV's approach is largely collaborative, it can also prosecute utilities whose equipment and procedures fall short of expectations.

The risk-reduction actions that utilities have undertaken since 2009 and that ESV oversees are a mix of the mundane and the high-tech. The mundane starts with stepped-up inspections of utility equipment and tree trimming. There has also been some 'hardening' of the system, including burying about three percent of Victoria's 90,000-kilometers of rural power lines.

Since burying all high-risk lines priced in at an impossible AUS $40 billion, says Fearon, reducing fire risk on most of Victoria's circuits is about making overhead lines safer. In some cases, bare conductors have been replaced with insulated wires, but better technology is the biggest part of the solution. For example, Victoria mandated the upgrading of automatic circuit reclosers—equipment that may be implicated in the PG&E-sparked Kincade fire that ravaged Sonoma County last month.

Reclosers are circuit breakers that can quickly stop power flows during a fault and then just as quickly restore it. That's usually what happens in rural fire-prone areas, where transient line faults are common events. However, reclosers can multiply fire risk from a broken line or one with a tree leaning against it. They use repeated high-energy blasts to determine whether a fault is temporary or permanent. During hot and windy periods, that current can start a fire.

Victoria utilities have replaced about 2,000 reclosers with 'smart' reclosers that can be remotely controlled. In high-risk periods, the reclosers are set to operate at higher sensitivity and will not attempt to restore power—increasing outages but eliminating hundreds of potential fire sources.

(California utility San Diego Gas & Electric switched up its reclosers to reduce fire risk after its lines caused deadly wildfires in 2007. PG&E did not initiate that transition until last year.)

Photo: Tony Marxsen

IND Technology's early fault detection system alerted utility crews in Victoria to this fraying spur line. Arcing between its conductors would have posed a high fire risk on a windy summer day.

Victoria developed more advanced technology through an R&D program, led by Marxsen, that studied how lines ignite bushfires and how technologies could block those mechanisms. As *Spectrum* reported last week, that research delivered several potent new tools that Victoria's utilities have begun to deploy, including a sensitive monitoring system that PG&E began testing in June. (Marxsen chairs the monitoring system's developer, Melbourne-based grid equipment developer IND Technology.)

Victoria's campaign to prevent bushfires is not all roses. For one thing, several utilities have a mixed safety record. After a trio of 2017 grass fires traced back to Melbourne-based Powercor Australia, ESV inspectors uncovered overgrown vegetation in the territories of Powercor and its corporate sibling United Energy. (Both are subsidiaries of Hong Kong-based CK Infrastructure Holdings.)

In April, Powercor pled guilty to vegetation-clearing violations and other criminal charges related to the 2017 fires. It was ESV's first prosecution and the first safety prosecution of a major power company in Australia. Then, late last month, ESV filed suit again, alleging systemic shortcomings at Powercor.

The new criminal charges are pegged to two fires sparked by Powercor equipment in March 2018, one of which started after a 50-year-old wooden power pole snapped in high winds. "A competent inspection would have discovered that the pole was termite-infested and had long lost its structural integrity," says Fearon.

Powercor and United Energy have since improved their act, revamping their vegetation management methodology. But Fearon says the 2018 fires might not have happened if Powercor had "pursued an appropriate level" of maintenance. "They're not getting prosecuted for starting fires. They're getting prosecuted for not sufficiently minimizing the risks," he asserts.

IEEE Spectrum contacted a representative for Powercor and United Energy, which did not provide comment on the companies' fire management performance.

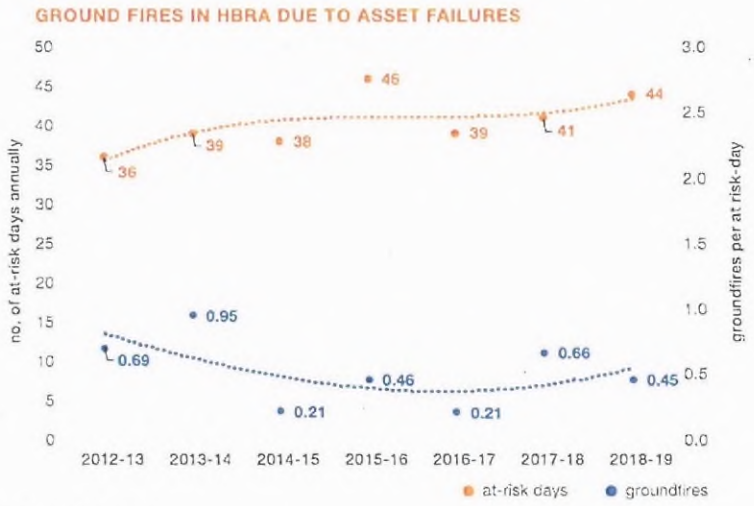

Image: Energy Safe Victoria

A statistically-uncertain reduction in bushfires in high-risk zones, measured per dangerous weather day.

Whether Victoria's fire risk is lower now than it was ten years ago also remains unproven. Incident statistics suggest that it is, but the data points are sparse and thus the trend lacks statistical significance. Marxsen is hopeful that this year's fire season, which is just beginning, will provide a definitive answer.

What *is* certain is that Victoria has not forgotten Black Saturday, and how deadly firestorms can be. The state's ongoing efforts to safeguard its grids have kept their wildfire potential in the news. Fearon says public awareness may even be rising thanks to searing news reports from California, and the increasingly observable effects of climate change.

"The memory of the catastrophe in 2009 has not dimmed," says Fearon. "It's growing because people can see that the weather patterns are changing and temperatures are rising."

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