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Sent: Sunday, July 5, 2020 6:31 PM
To: Wildfire Safety Division
Subject: Comments on Appendix_1_GlobalStrategies_WSD_DRAFT_vF

Please accept the following comments on the draft Appendix 1 that outlines powerline wildfire safety practices in the State of Victoria, Australia. These comments are intended to offer clarification to support a fuller understanding of Victoria's experience as WSD finalises the Strategy. In putting them forward, I do not speak for any institution, government agency or utility – these are my own views and any errors in them are solely mine.

1. PSPSs in Australia:

Pre-emptive disconnection of powerlines to prevent them starting fires is not widely used in Australia. The exception is the State of South Australia where State legislation provides immunity for the utility. Its use there as a fire mitigation strategy has attracted media attention over the 2019/2020 Summer when, despite PSPSs, two serious fires were started by powerline assets that were not de-energised: the Yorketown and Cudlee Creek fires.

The reality of PSPS is that while it is a trivial task to disconnect a powerline, it can take a long time and huge effort to confirm it is safe enough to reconnect it. The detailed data published by CPUC on California's 2019 PSPS outages indicates essential facilities may have to be able to maintain service for perhaps up to 100 hours without power. Australia's critical community infrastructure in rural areas could not do this.

The PSPS option has been debated many times in Australia's most populous high fire-risk eastern seaboard States (New South Wales and Victoria) and has so far been rejected with only very minor exceptions for a number of reasons, some of which mirror California's experience:

- a. **Community views:** 2011 research conducted by Victoria's Powerline Bushfire Safety Taskforce, not long after the Black Saturday fires, showed communities demand two things: the power must stay on; and, powerlines must be fire-safe. They specifically do not accept suggestions that they must give up one to get the other – they demand both, together. Victoria's ongoing program of investment in new powerline fire-safety technologies reflects this strongly held community position.
- b. **Community reliance on electricity:** Electricity supply is increasingly vital for rural communities to maintain local fire-fighting capacity and to keep the public informed about approaching fires so they can take appropriate action. Last Summer's fires (where no significant fires in NSW and Victoria were reported to have been caused by powerlines) have vividly illustrated this. As multiple powerline networks were progressively destroyed by huge fires, the loss of all telecommunications, water and fuel pumping constrained the ability of affected communities to maintain effective defence against the fires. The ongoing digitalisation of our society is increasing our reliance on access to data communications in particular.
- c. **Public health:** Australia's worst fires nearly always occur during the late stages of severe heatwaves in which the elderly and very young must have access to electricity for cooling. Victoria's Black Saturday fires on the 9th of February 2009 killed 174 people and traumatised the State. Just two weeks earlier in late January 2009, a three-day heatwave was estimated by Victoria's Department of Health to have caused 374 excess deaths across the State. This tragic fact received little media attention but has remained front-of-mind for policy-makers. Power supply is essential for air-conditioning, which is essential for public health.
- d. **Financial incentives:** Australia has a national Service Target Performance Incentive Scheme (STPIS) that provides financial incentives to network utilities to keep customers on supply. Supply outages cost utilities a lot of money - the STPIS incentive reflects the loss of value suffered by customers during

supply outages and the amounts involved can be large. STPIS drives a lot of network investment decisions as well as network operating policies and procedures to ensure supply outages are minimised. STPIS was first developed in Victoria in 2008 and adopted nationally shortly after. STPIS penalties can only be avoided if legislated regulation overrides utility decisions in such a way that an outage is due solely to the regulations, or the outage is due to exceptional circumstances – typically an unprecedented weather event. High fire-risk weather does not qualify as ‘exceptional’. It also applies only to network businesses, so outages due to shortages of generation do not trigger penalties. Without STPIS or an equivalent, it is not clear what financial incentive network owners would ever have to abandon the use of penalty-free PSPSs given the high financial risk of powerline fire litigation.

2. Network topology in Australia:

The draft Appendix 1 states that Australian networks have more redundancy than those in California due to greater use here of ‘looped topology’. This is incorrect. My work on Australian rural electricity distribution networks is extensive and stretches back decades. In the last few years I have been working with California’s utilities on a number of networks in high fire-risk areas of California. I have seen no significant difference in the level of path redundancy. The Californian networks with which I am now familiar tend to be somewhat smaller on average than those in high fire-risk areas of Victoria where a single network might range up to 800 route-miles of powerlines or more. The use of Automatic Circuit Reclosers (ACRs) in some Californian utilities is not as extensive as it is in Victoria. However, these differences do not affect redundancy of supply paths. My conclusion is that overall, the levels of path redundancy in Australian and Californian networks are very similar – both rely on long radial lines to supply rural areas. This is simply to say the economics of electricity distribution apply pretty universally to produce similar network topologies to supply areas with similar customer densities.

3. Victoria’s F-Factor scheme:

It was recognised in the aftermath of the Black Saturday fires, that the (then new) STPIS was rewarding utility practices that were not necessarily minimising powerline fire-risk. In effect, financial rewards for supply reliability outweighed those for fire-safety in some investment decisions and operational practices. The classic example was the worst of the Black Saturday fires, the Kilmore East Kinglake fire, where a fallen powerline was automatically reclosed onto live supply multiple times over a short period before it was permanently disconnected, a practice designed to preserve reliability of supply. The fire from this event killed more than 120 people. A proposal for an F-factor scheme to increase financial incentives for fire safety was drafted in 2009, shortly after the Black Saturday fires. Following consultation, the Government of Victoria formally announced the F-Factor Scheme in June 2011 with a flat rate penalty of \$25,000 per powerline-started fire.

Victoria’s F-Factor scheme was designed to create a financial incentive to counter the STPIS incentive in decisions where the twin goals of fire-safety and supply reliability favour mutually exclusive solutions. It can be best understood in the context of Australia’s national STPIS scheme. The draft Appendix 1 does not present this context and readers may not fully understand the lessons that might be drawn. The scheme was modified to its current form (accurately described in the draft Appendix 1) relatively recently in 2016 and the penalty now varies by both location and fire-risk. It can exceed one million dollars per ignition on the relatively few highest fire-risk days of the year in locations with very high fire-consequence.

One powerful indirect benefit of the F-Factor scheme has been the improvement in powerline fire data quality. Since all powerline fires now mean money, not just the ones that generate litigation, all of Victoria’s powerline fire reports are much more accurate and they are independently audited by Victoria’s safety regulator, Energy Safe Victoria. This has transformed Victoria’s powerline fire data from a collection of numbers plagued with anomalies, uncertainty and diverse definitions to a robust, accurate database of reliable facts to shape the development of forward wildfire strategy. Good data is one of the most overlooked but valuable assets in the challenge to make powerline networks fire-safe. The emphasis in WSD’s draft strategy on reliable data is to be commended.

4. Victoria’s fire-safe network performance standard:

The draft Appendix does not mention a key enabler of Victoria’s adoption of new fire-safe technology: a mandated network performance standard formalised in regulations with annual compliance tests prior to each fire season. This fire-safe performance standard was developed in a series of ground-breaking ignition research projects funded by the

Government of Victoria's Powerline Bushfire Safety Program. Regulations require electricity networks in the 45 highest fire-risk areas of Victoria to be upgraded to be able to achieve this standard. The standard is technology-neutral, though the only solutions so far adopted by utilities fall into the class of technologies known as Rapid Earth Fault Current Limiters (REFCLs). Last Summer, 21 of Victoria's networks met this performance standard on high fire-risk days and though official analysis is yet to be published, no fires were reported to be started by the many powerline faults that occurred on those networks on high fire-risk days. Two large Californian utilities are trialling REFCLs. However, it can easily be forgotten that it is Victoria's mandated fire-safe network performance standard that is the driver. How the required standard is best achieved is a separate (engineering) question for utilities to decide. The precise form of regulation is also important. Victoria's regulations require annual proof (test results) of the capacity to achieve the performance set out in the standard but leave utilities accountable for the use of that capacity, so the STPIS and F-Factor schemes still apply.

5. New technologies to cut powerline fire-risk:

Most of the technologies mentioned in the draft Appendix 1 are also being trialled or adopted in Australia. There are two differences that might warrant mention here:

- a. **Fire detection/location camera networks:** Victoria has never faced difficulty in almost immediately detecting and locating new fires using traditional approaches and the latest satellite methods are providing 'belt and braces' assurance for this. The major powerline fires on Black Saturday were all detected and located very quickly (in a couple of minutes) using traditional methods. As a result, Victoria to the best of my knowledge has not sponsored new technology solutions to address a need in this area. This is an interesting contrast with California.
- b. **Early Fault Detection (EFD) technology:** EFD finds powerline faults before they happen. It is a radically different technology that was developed and trialled in Victoria's final powerline bushfire safety research project that finished in mid-2019. EFD has already had good results in trials in the US, including in California and is being adopted by a number of Australian utilities. I have a special interest in this technology as one of my roles is Chairman of IND Technology which invented and supplies EFD systems to utilities around the world, so it could be fairly claimed that I am biased. However, the results of all EFD trials and case studies to date speak for themselves – EFD has proven fire-risk benefits, especially in detecting and locating conductor damage and loose clamps before powerlines fall and similarly, finding vegetation contact before ignition occurs. EFD is now being trialled by two (soon to be three) major California utilities as well as a major utility in the Mid-West with discussions underway with utilities on the East coast and in the North West. In terms of clear demonstrated fire-risk benefit, EFD is right up there with the other technologies mentioned in the draft Appendix 1.

Finally, I wish to extend my heartfelt congratulations to the WSD team for the excellent strategy it has drafted. Having been a passionate contributor to nearly all aspects of Victoria's response to Black Saturday over the last ten years, I am impressed with the Strategy's strength and soundness. My comments above should be treated purely as additional clarification detail to support it.

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