Power Line Bushfire Safety:

Victorian Government Response to The Victorian Bushfires Royal Commission Recommendations 27 and 32

December 2011

Summary

The Victorian Government has committed to implementing all the recommendations of the Bushfires Royal Commission. To honour this commitment, approximately $700 million in additional investment will be made over the next decade in changes to its electricity networks, in addition to the $50 million already committed in the 2011-12 Budget. This includes an investment of up to $250 million from the Government. This investment will seek to reduce the risk of bushfire starts by almost two-thirds, whilst maintaining a reliable and affordable electricity supply. The Victorian Government will also invite the Commonwealth to contribute to this program to further reduce risk, which could increase the total investment up to approximately $1 billion.

Background

The 7 February 2009 bushfires were the worst natural disaster Victorians have ever experienced. The subsequent 2009 Victorian Bushfires Royal Commission was unequivocal in identifying electricity distribution assets as the cause of the worst of these fires. It was equally unequivocal in recommending that Government take an active role in fixing the problem.

The Victorian Government accepts the findings of the Royal Commission. It is committed to implementing all its recommendations.

The Bushfires Royal Commission produced its final report in July 2010. The report made 67 recommendations. Eight of these related specifically to electricity supply assets. Of these, two were of sufficient complexity that the Royal Commission recommended further analysis by an expert taskforce:

2009 Victorian Bushfires Royal Commission recommendations investigated by the Taskforce

Recommendation 27

- Progressive replacement of all single-wire earth return (SWER) power lines in Victoria with aerial bundled cable, underground cabling or other technology that delivers greatly reduced bushfire risk. The replacement program should be completed in the areas of highest bushfire risk within 10 years and should continue in areas of lower bushfire risk as the lines reach the end of their engineering lives.
- Progressive replacement of all 22-kilovolt (kV) distribution feeders with aerial bundled cable, underground cabling or other technology that delivers greatly reduced bushfire risk as the feeders reach the end of their engineering lives. Priority should be given to distribution feeders in the areas of highest bushfire risk.

Recommendation 32

- Disable the reclose function on the automatic circuit reclosers on all SWER lines for the six weeks of greatest risk in every fire season.
- Adjust the reclose function on the automatic circuit reclosers on all 22kV feeders on all total fire ban days to permit only one reclose attempt before lockout.

Consistent with the Royal Commission's suggestion, the Government established the Powerline Bushfire Safety Taskforce with terms of reference to:

- Investigate the technology and operational practices to reduce catastrophic bushfire risk with acceptable impacts on cost, supply reliability, landowners and the environment;
- Employ analysis, trials, expert advice and community and stakeholder consultation;
- Recommend a plan to reduce bushfire risk within the 10 year timeframes recommended by the Royal Commission that maximises value to the Victorian public; and
- Advise on options for fairly and efficiently recovering the costs of implementing the plan.

The Taskforce presented its final report to Government on 30 September 2011. Based on the Taskforce's findings and recommendations the Government has structured a package of initiatives that includes:

- Making better use of safety equipment on Electricity Distribution Networks;
- Replacing the most dangerous power lines;
- Improving supply reliability to those who need it most; and
- Further research into improving safety.

These are discussed below.

Making Better Use of Safety Equipment on Networks

Occasionally faults occur which can transmit electrical current to the ground. Under certain conditions this can start a fire. Network safety equipment detects these faults and shuts off the current to the affected area - in much the same way as a household safety switch.

Unlike the wiring in a house, however, electricity distribution networks are vast, and are exposed to the elements. This means these networks experience a large number of faults – the majority of which are transient in nature (e.g. a branch which contacts a wire in high winds, then blows off). Consequently devices are required which shut off power in the event of a fault, but then restore power (reclose) quickly if the fault has cleared.

Automatic Circuit Reclosers, or ACRs, are one such device. ACRs can be set to attempt a number of recloses and for varying time intervals. The more reclose attempts allowed, and the longer the gap between attempts, the less the impact will be on customer reliability.

What the Royal Commission found – and the Taskforce confirmed through laboratory testing – is that under the most dangerous fire conditions even one or two reclose attempts may be sufficient to start a fire. However, limiting reclose attempts will increase the risk of customers losing supply. Optimally, therefore, reclose attempts would only be modified in response to high bushfire risk.

There are thousands of ACRs installed across electricity networks. Many of these ACRs can only be changed manually. As this can take several weeks, and as dangerous bushfire conditions can arise rapidly, network businesses currently have to make manual adjustments to reduce the number of ACR recloses. This must be done at the beginning of the fire season, in anticipation of potentially dangerous days. This means there is a strong possibility of "false alarms" (disruptions to supply where there was no need to do so – i.e. where there is no material fire risk) and longer outages whilst network businesses patrol the lines before manually reinstating them. To reduce such "false alarms", safety devices are required which can either be adjusted remotely, or self-adjust, to quickly respond to changing risk conditions.

The Taskforce identified two types of equipment which satisfy these requirements:

- Remotely controlled Automatic Circuit Reclosers (ACRs); and
- Rapid Earth Fault Current Limiters (REFCLs).

Remotely controlled ACRs will allow electricity distribution businesses to change the reclose settings on hundreds of such devices centrally, in response to changing fire conditions. This will minimise disruptions to customer supply, and significantly reduce the risk of starting a bushfire.

REFCLs achieve a similar outcome, but work in a different way. These devices work on multi-phase distribution networks (22 kilovolt). They instantaneously eliminate the current in any line which experiences a ground fault. Power is restored immediately if the fault clears. As the devices act in milliseconds, without the need for human intervention, they hold considerable potential to reduce customer supply interruptions, whilst greatly reducing the risk of starting a fire.

As recommended by the Taskforce, the Government will now require electricity distribution businesses to install both of these devices across the State over the next decade. Electricity distribution businesses will be required to specify, through their Bushfire Mitigation Plans, the location and timing of asset roll-out. Progress against these Bushfire Mitigation Plans will then be reviewed by Energy Safe Victoria on an annual basis. This is estimated by the Taskforce to cost approximately $500 million over 10 years.

The settings on the new ACRs will be changed to account for fire weather. This is consistent with Royal Commission recommendation 32. However the Taskforce research has more precisely defined the time periods and locations where automatic reclose should be disabled or restricted. The Government will require electricity distribution businesses to adjust settings to ACRs as per Taskforce recommendation 2:

Powerline Bushfire Taskforce Recommendation 2

Electricity distribution businesses should adjust the protection systems for 22kV and SWER powerlines based on the severity of the day and the fire loss consequence of the area so that at a fault there are:

Area	***Total Fire Ban day***	***Code Red day***
Rural powerlines in the worst areas (approximately 20 per cent of rural powerlines)	*Two fast protection operations*	*One fast protection operation*
Rural powerlines in remaining areas (approximately 80 per cent of rural powerlines)	*One fast and one slow protection operation*	*One fast and one slow protection operation*

For the 2011/12 fire season, to the extent practicable and possible, the electricity distributors change the protection systems at 10.00am or when the fire danger index exceeds 30, whichever occurs earlier, until the fire danger index falls below 30.

It will take time to roll-out the new safety devices. Pending completion of this roll-out, electricity distribution businesses will manually change settings on approximately 200 ACRs in the areas of highest fire loss consequence, at the commencement of the fire season. Energy Safe Victoria is currently overseeing this process.

Once the roll-out of new ACRs and REFCLs is completed, average supply reliability will be *improved* over current practice. This is because the number of "false alarms" will be reduced. In future, supply disruptions will be limited to instances of genuine safety concern.

Replacing the Most Dangerous Power Lines

The above changes to network safety equipment are expected to deliver significant reductions in bushfire starts across the State. However, there will still be "black spots" in the State's electricity distribution network, where dangerous poles and wires create an unacceptable bushfire hazard.

The State's electricity distribution network is vast. There are close to 100,000 kilometres of SWER and 22 kilovolt wires across Victoria.

A process is required whereby Government, safety agencies and electricity distribution businesses can work together to identify, and replace, the most dangerous power lines. This will require an assessment of local bushfire risk; the condition of existing electricity assets; and a decision as to which replacement technology (insulation, aerial bundling, undergrounding) will yield the best result.

The Government will contribute up to $200 million over 10 years for a program of power line conductor replacement. Based on the estimates of the Taskforce, this will replace over 1,000 km, with the final length to be replaced dependent on detailed engineering and geographic assessment. The focus will be on locations with the highest fire loss consequences.

Improving Supply Reliability for Those Who Need It Most

The above measures will greatly reduce bushfire risk. In the long term they will also improve customer reliability. However the Government recognises that, in the short term, there may be impacts on customer reliability. For the most vulnerable in our community, such impacts can present a genuine problem.

The Government is committed to minimising the impacts of bushfire safety initiatives on electricity supply reliability. Consequently it will provide $40 million to minimise disruptions to reliability that result from measures taken to reduce powerline bushfire risk.

This fund will be directed to providing support for people and communities that require practical solutions when power is disrupted.

Further Research into Improving Safety

The Taskforce undertook an important body of primary research focussed on identifying cost-effective ways of reducing bushfire risk whilst maintaining supply

reliability. While this research has provided useful results to date, the Taskforce informed Government of the need to continue this important work.

Government accepts this recommendation. It will allocate $10 million over the next 5 years to continue research and development to identify cost-effective risk reduction technologies and procedures. This work will reside in the public domain, to ensure that safety agencies and electricity businesses – both in Victoria and other jurisdictions - have ready access to this important information.

Oversight

This 10 year program of works will be subject to strict conditions and oversight arrangements to ensure that the most cost effective technologies are employed, and that taxpayer dollars do not fund upgrades that should be paid for by the electricity distribution businesses.

How the Package Will Be Paid for

The Royal Commission noted, in its July 2010 report, that "*The Commission makes its recommendations for the benefit of the entire community. For that reason it considers it inappropriate that electricity consumers bear the entire cost of implementing those recommendations.*[1]" This reflects the fact that many of the benefits of reduced incidence of bushfires benefit all Victorians – not just those who live in the immediate vicinity of fire-affected areas.

The Government accepts the judgement of the Commission. It acknowledged this in its November 2010 commitment to establish a Safer Electricity Asset Fund. This fund was specifically designed to fund the replacement of the most dangerous electricity assets in Victoria, and not leave it up to businesses and households to do so.

In May 2011 $50 million over four years was allocated to the Safer Electricity Assets Fund. This amount will now be increased up to $250 million over 10 years, based on the information gained by the Taskforce's investigations.

The Victorian Government will also invite the Commonwealth Government to contribute an additional $250 million to this program. This would bring the total value of the works to close to $1 billion.

The remaining costs stem from the roll-out of remotely controlled ACRs and REFCLs, as required by Bushfire Mitigation Plans. Once Bushfire Mitigation Plans have been approved by Energy Safe Victoria, the electricity distribution businesses may then apply to the Australian Energy Regulator (a division of the ACCC) for permission to increase their electricity tariffs in order to raise the revenue needed to finance the assets. The Australian Energy Regulator will review these applications to ensure that cost claims made by the businesses are accurate and efficient.

The Taskforce has estimated that these costs will total around $500 million over the 10-year roll-out period. Electricity consumers will not be confronted by these costs all at once. This is because:

- the assets will be rolled out progressively over a 10-year period;

[1] *Victorian Bushfires Royal Commission Final Report, Vol. 2, Ch. 4, July 2010, p. 158*

- businesses will recover their costs in the form of depreciation over the useful life of the asset (estimated by the Taskforce at approximately 45 years) – plus associated operation and maintenance costs; and
- as a result of installing new assets (including ACRs, REFCLs and power lines), businesses will avoid certain costs they otherwise would have incurred. The Australian Energy Regulator will ensure these avoided costs are netted out of any future cost pass-through to customers.

Of the five electricity distribution businesses in Victoria, only two will be affected by the above asset roll-out – Powercor, in the Western portion of the State; and SP Ausnet, in the Eastern portion of the State[2]. Consequently, based on Taskforce estimates, for households in one of these two electricity distribution areas, each year energy bills will be about one tenth of one per cent higher (0.1%) than they otherwise would have been. By the conclusion of the 10-year program of works, the total bill increase will reach 1.1 per cent, or around $13 per year.

[2] The remaining three businesses (Jemena, United Energy and Citipower) do not cover common bushfire areas, do not have SWER networks, or are in the process of replacing their SWER networks based on existing revenues.

Table: Taskforce Recommendations and Government Actions

<table>
<tr><th>No.</th><th>Recommendation</th><th>Government</th></tr>
<tr><td>1</td><td>Electricity distributors implement the 2009 Victorian Bushfire Royal Commission's recommendation 27 by:
a) installing new generation protection devices to instantaneously detect and turn off power at a fault on high fire risk days:
• on SWER powerlines in the next five years (new generation SWER ACRs)
• on 22kV powerlines in the next 10 years (rapid earth fault current limiters)
b) target replacement of SWER11 and 22kV powerlines with underground or insulated overhead cable, or conversion of SWER to multi-wire powerlines, in the next 10 years
to the level of between $500 million and $3 billion, consistent with the package of measures selected by the Victorian Government. These should be implemented in the highest fire loss consequence areas first.
Any new powerlines that are built in the areas targeted for powerline replacement should also be built with underground or insulated overhead cable.</td><td>Accepted. Energy distribution businesses to be required to install remotely controlled ACRs and REFCLs over next 10 years across the State. Estimated cost - $500 million.
Powerlines to be replaced based on assessment of relative cost-benefit in terms of risk reduction. Budgeted amount up to $200 million.
The Government will request an additional $250 million from the Commonwealth Government to further reduce risk.
This 10 year program of work will be subject to strict oversight and review.
Total estimated cost: $700 - 950 million</td></tr>
<tr><td>2</td><td>Electricity distributors implement the 2009 Victorian Bushfires Royal Commission's recommendation 32 by adjusting the protection systems for 22kV and SWER powerlines based on the severity of the day and the fire loss consequence of the area so that at a fault there are:
<table><tr><th>Area</th><th>Total Fire Ban day</th><th>Code Red day</th></tr><tr><td>Rural powerlines in the worst areas (approximately 20 per cent of rural powerlines)</td><td>Two fast protection operations</td><td>One fast protection operation</td></tr><tr><td>Rural powerlines in remaining areas (approximately 80 per cent of rural powerlines)</td><td>One fast and one slow protection operation</td><td>One fast and one slow protection operation</td></tr></table>For the 2011/12 fire season, to the extent practicable and possible, the electricity distributors change the</td><td>Accepted. In the 2011/12 fire season the businesses will, on direction from Electricity Safe Victoria, following consultation with the Fire Services Commissioner, alter settings on ACRs in areas of greatest risk, for the duration of the fire season.
Where remotely controlled ACRs are installed, safety settings will be altered in direct response to changing fire danger according to the recommendations of the Taskforce.</td></tr>
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	protection systems at 10.00am or when the fire danger index exceeds 30, whichever occurs earlier, until the fire danger index falls below 30. *Until the old style SWER ACRs are replaced, they should be manually changed in the highest fire loss consequence areas of the state during the worst bushfire period as declared by the Fire Services Commissioner.*	
3	*To ensure the greatest benefits are achieved from the Taskforce's recommendations 1 and 2:* *a) The electricity distributors act to minimise the potential for recommendation 2 to adversely affect customers' reliability of supply.* *b) Victorians should continue to be advised, as part of the State's regular fire-preparedness communication program, that they may experience reduced levels of supply reliability on high fire risk days and should take appropriate precautions, including consideration of a back-up power supply if they are highly reliant on a reliable electricity supply.* *c) The Victorian Government nominate the body responsible for the inputs to, and assumptions for, statewide fire loss consequence modelling.* *d) By 31 October 2011, the Fire Services Commissioner ensure there is effective liaison between the electricity distributors and the State Control Centre (including through an industry liaison officer) in the lead up to, and on, high fire risk days, to inform the operation of protection systems.* *e) ESV seek funding to commission research and analysis on the detailed operation of protection systems on high fire risk days, and issue the framework to be used to make decisions, in the lead up to and on high fire risk days, on the operation of the protection systems.* *f) The electricity distributors systematically develop a rationale for the circumstances under which a powerline should or should not be patrolled (and to what extent) before it is turned back on after a period of time. The rationale must include consultation with the emergency services to ensure no evidence has been detected of a fire or other dangerous situation.* *g) Subject to a Victorian Government decision on the Taskforce's recommendations by the end of November 2011, the electricity distributors submit a revised Bushfire Mitigation Plan, which demonstrates how the required outcomes will be achieved, to ESV by the end of March 2012.* *h) By 30 June 2012, the electricity distributors submit a plan to ESV to reduce the fire risk associated with low voltage lines and service lines where it is cost-effective to do so.*	Accepted. Energy Safe Victoria will oversee electricity distributors' program of bushfire reduction operations to ensure practical steps are taken to reduce reliability impacts. Businesses will also be subject to regulatory incentives to maintain supply. The Fire Services Commissioner and fire agencies will continue to advise Victorians of the need to be fire-ready – including the potential for electricity supply disruptions. The Fire Services Commissioner will be the person responsible for determining the appropriate bushfire map for a given purpose. Where this relates to electricity supply assets, this will be done in consultation with Energy Safe Victoria. The Fire Services Commissioner will maintain effective liaison between electricity distributors and the State Control Centre. The $10 million research and development initiative will be available to fund ESV's future research needs regarding bushfire. Electricity distribution businesses will continue to be required to update bushfire mitigation plans annually. This will include strategies for reducing bushfire risk associated with low voltage and service lines (not specifically

		addressed by the Royal Commission).
4	*The Victorian Government should improve the capacity for ongoing research and development to further reduce the likelihood that powerlines start bushfires and assist ESV to effectively and appropriately regulate the electricity distributors.* a) *Funding of not less than $2 million per annum for five years should be provided for research and development.* b) *Appropriate independent governance arrangements should be established to oversee the allocation of the funding.* c) *ESV, electricity distributors and other parties should be able to apply for the funding.* d) *The funding should be provided contingent on the results of the research and development being made publicly available.* e) *Priority should be given to improved fire loss consequence modelling, research and analysis to optimise the operation of network reclose devices, and developing new protection technologies to reduce bushfire risk and minimise impacts on supply reliability.*	Accepted. $10 million will be made available over the next 5 years for ongoing research and development into further potential reductions in bushfire risk. The outcomes of this research will be put in the public domain, to maximise the use of the findings. The findings may inform future regulatory requirements. Equally they may inform future publicly funded initiatives. The fund will be administered by the Department of Primary Industries, with governance suited to maintaining strict probity and accountability.
5	*The Safer Electricity Assets Fund should be used to fund, in priority order:* 1. *Research, development and demonstration ($2 million per annum over five years) – fund research and development projects that will further reduce the likelihood that powerlines will start bushfires.* 2. *Private costs that are imposed on individuals by the Taskforce's recommendations to address equity and financial hardship concerns ($40 million) – contribute to the cost of service lines and private overhead lines, or alternative supply options.*	Accepted. The $50 million allocated in the May 2011 budget for the Safer Electricity Assets Fund will be allocated as recommended by the Taskforce. Up to an additional $200 million will be allocated to the Safer Electricity Assets Fund to enable the power line replacement initiative discussed above.
6	1. *ESV implement a reporting and compliance framework to ensure that the recommendations that are accepted by the Victorian Government are implemented by the electricity distributors.* 2. *ESV publish the outcomes of the reporting and compliance function and report on the status of the implementation of each recommendation accepted by the Victorian Government in its annual Comparative Safety Performance report.* 3. *A review be undertaken by ESV or an independent body at the end of five years to assess whether the Taskforce's recommendations continue to be the most cost-effective means to reduce the likelihood of powerlines starting bushfires, and to assess the effectiveness of the implementation of the Taskforce's recommendations.*	Accepted. ESV will, through its review of Bushfire Mitigation Plans, ensure actions required of electricity distribution businesses are carried out. The results will be published by ESV. A review will be undertaken at the end of five years to assess the merits of continuing the Taskforce's recommendations.