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Safety Performance Report on Victorian Electricity Networks 2013

June 2014

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Preface

Energy Safe Victoria (ESV) is the independent technical regulator responsible for electricity, gas and pipeline safety in Victoria.

As part of this role, ESV annually reviews the safety performance of Victoria's major electricity businesses (MECs). This report presents those findings for the 2013 calendar year so the community, Parliament and industry can assess how well Victoria's electricity distribution and transmission businesses are meeting their safety objectives.

This is the fourth year that ESV has publicly reported on the safety performance of Victoria's MECs: CitiPower, Powercor, Jemena, United Energy, SP AusNet (distribution), SP AusNet (transmission), Basslink and now Transmission Operations Australia (TOA).

This report focuses on key safety indicators, as well as the operation of the Electricity Safety Management Schemes (ESMS), which became a mandatory requirement on the electricity distribution businesses following the 2009 Victorian Bushfires Royal Commission.

Victoria's regulatory regime requires the MECs to provide ESV with documentation for review that details the safety systems they have in place to reduce the risk of their infrastructure starting fires. An ESMS and a Bushfire Mitigation Plan (BFMP) are submitted to ESV every five years, while Electric Line Clearance Management Plans (ELCMPs) are submitted annually.

The primary responsibility for ensuring network safety rests with the MECs but ESV holds them accountable by requiring them to actively participate in targeted audits to confirm compliance with these safety systems.

ESV's audits are informed by trends and other risk-based assessments that enable us to analyse performance. This report also includes comments on a number of strategic and regulatory issues facing industry.

ESV provides comment and input on the MECs' safety programs included in their periodic price and revenue proposals that are submitted to the Australian Economic Regulator (AER).

The reliability and safety performance of electricity networks, including their propensity to start fires, is ultimately a function of environmental factors as well as how well the networks are planned, designed, maintained and operated. This is in turn a reflection on the design and effectiveness of both economic and safety regulatory regimes.

While network assets are by their nature long-life, some more than 70 years old, they are subject to ongoing refurbishment based on asset management decisions made by the utilities to determine the maintenance requirement for individual asset classes. The impact of changes to network design, maintenance and operation on the safety performance of electricity networks may not become evident for many years.

This report provides objective evidence of the efficacy of initiatives adopted by the Victorian Government to meet Recommendation 34 from the 2009 Victorian Bushfires Royal Commission (VBRC), namely to "... amend the regulatory framework for electricity safety to strengthen Energy Safe Victoria's mandate in relation to the prevention and mitigation of electricity-caused bushfires ...".

Paul Fearon
Director of Energy Safety
June 2014

Summary

This is ESV's fourth annual report on the safety performance of Victoria's (MECs) and covers the third year of the current five-year regulatory price determination period. This report looks at:

- how the Victorian networks performed in terms of fire starts and asset failures
- the distribution MECs' progress in meeting the investment and expenditure benchmarks for safety programs
- the compliance of distribution MECs with ESV directions and exemptions
- the results of audits of the MECs' ESMS, BFMPs and ELCMPs
- community and worker safety
- commentary on the strategic and regulatory issues facing Victoria's electricity networks.

Network performance

The performance of the Victorian electricity distribution network has, on average, deteriorated each year for the past three years. This is, however, not uniform across the industry with some of the Victorian MECs, principally SP AusNet, improving its performance. Overall trends have continued into the first quarter of 2014. In 2013 there were:

- 925 **fire starts** from electrical distribution assets**,** which have increased each year for the past three years. This number exceeds the annual f-factor target of 870 fires
- 2269 electrical distribution **asset failures,** which have increased each year for the past three years. This is compared with 1119 asset failures in 2011
- 780 **fire starts due to asset failure.** These have increased each year from 341 fire starts in 2011, mostly due to pole top structure failures.

Although the weather patterns can explain some aspects of the short and medium-term performance it is evident that some distribution MECs' individual asset classes and components appear to be reaching end-of-life at a rate faster than the replacement programs.

ESV also observes, as it did last year, that some distribution MECs may be approaching the limit of risk-based or condition-based management of ageing assets, and recognises the challenge in applying traditional inspection regimes to determine end-of-life for individual assets. The need for the businesses to continually adopt new condition assessment techniques or targeted, age-based asset replacement to address these issues is only reinforced given the continuing trends into 2014.

The distribution MECs have established network development, replacement and maintenance programs to improve network reliability and reduce the probability of network assets creating a safety hazard or starting a fire.

Notwithstanding the significant capital investment and maintenance expenditure being made in the network, and the effort that has been put into condition assessment, ESV would have expected to see a reduction in the number of asset failures. Despite these targeted programs, the number of asset failures has increased, especially power pole top, HV fuse, LV asset, bare conductor, and HV ties. The failure rate remains high and is the major cause of asset and vegetation fires.

The total number of asset failures in 2013 (2269 compared with 1119 in 2011) represents a 103 per cent increase in two years.

The operation or failure of electrical network assets, as well as contact with the electrical network, has the potential to initiate a fire. The probability and consequence of the fire initiation is a function of the physical location of the fire source, the surrounding vegetation and the prevailing weather conditions, such as wind speed, wind direction, humidity and temperature.

The weather in 2013 was hotter than in previous years, with more Total Fire Ban (TFB) days and average annual rainfall. Some of the increase in the number of fires in both vegetation and poles and crossarms can be attributed to the prevailing weather conditions over the 2013 summer increasing the probability of fire ignition.

In 2013 there were 925 fires, which exceeded the f-factor target of 870 fires. While the total number of fires exceeded the annual f-factor target, the five-year moving average (722) was still less that the f-factor target (870).

In 2013, the MECs reported that since 2011:

- the total number of fires has increased from 398 to 925
- the total number of fires caused by asset failure has increased from 341 to 780
- the total number of fires caused by contact with assets has increased from 57 to 130
- the total number of vegetation fires has increased from 99 to 298.

In 2013, the MECs reported that vegetation caused fewer outages in both low bushfire risk areas (LBRAs) and hazardous bushfire risk areas (HBRAs) than the previous year and less urgent pruning was required.

The number of **pole top structure failures** needs to be reduced if the Victorian distribution network is to achieve world's best practice. The difference in performance, as indicated by the pole top structure failure index and the pole top structure fire index, across the Victorian networks presents an opportunity for benchmarking and sharing of information to improve the reliability and safety performance of the network. Pole top structure failures are a major cause of asset fires and a major contributor to vegetation fires in certain parts of the network. Victorian distribution MECs may benefit from examining the performance of other, overseas jurisdictions that are reported to have "virtually eliminated" pole top structure fire problems many years ago.

HV fuse failures also need to be addressed to reduce the number of asset failures, which are another major cause of asset fires and a major contributor to vegetation fires. While HV fuses fail in large numbers, few of these asset failures lead to vegetation fires. Nevertheless, HV fuse failures and fires constitute a safety hazard, are costly and have an adverse impact on reliability.

There were a total of 228 **conductor and HV tie failures** in 2013, a failure rate of one conductor or HV tie failure per 710km of overhead powerline per annum. This is a small improvement on the 233 conductor and HV tie failures in 2012.

Safety programs, directions and exemptions

The 2010 AER determination on the allowable expenditure for distribution MECs, for the five-year period between 2011 and 2015, included expenditure for asset replacement and treatment programs that it identified as being primarily safety driven. ESV continually monitors the volume of work undertaken by the distribution MECs to ensure the programs are delivered to achieve the intended safety outcomes over the five-year period. In some

cases volumes have been revised and other programs have been substituted but, over the longer period, performance can be directly correlated with at least the agreed level of investment and maintenance work completed.

Following acceptance by government of the recommendations made by the 2009 Victorian Bushfires Royal Commission, ESV issued a number of directions to the distribution MECs aimed at improving the safety of overhead powerlines. As many of the altered regulatory requirements could not be met immediately, ESV issued exemptions and approved a transition program to ensure that staged compliance could be achieved within a timeframe, that ranged from three to five years.

Taking the status of safety program investment and compliance with the directions and exemptions, as at December 2013 in turn:

CitiPower reported on the progress of eight safety programs:

- two were ahead of ESV's annualised five-year target
- one was on target
- five were behind ESV's annualised five-year target.

CitiPower reported that all power poles and associated structures, assessed in 2013 as requiring replacing or reinforcement, had been replaced or reinforced. Based on the information provided, and performance to date, ESV is satisfied that all the safety programs proposed to the AER and agreed with ESV will be achieved by CitiPower by the end of 2015.

In September 2013, ESV amended the exemption granted to CitiPower**,** and extended the completion date for CitiPower to complete the cyclic clearing of powerlines until December 2014. The progress of cyclic clearing to December 2013 was found to be consistent with the revised completion percentages contained in the application.

CitiPower reported on the progress of three exemptions:

- one exemption was ahead of target
- one exemption was on target
- one exemption has been completed.

While the ABC or insulated cable cyclic clearing program was marginally behind schedule, ESV is satisfied that this did not result in an increased safety risk. Based on the information provided, and performance to date, ESV expects that CitiPower will meet the targets as agreed with ESV.

Powercor reported on the progress of eight safety programs:

- four were ahead of ESV's annualised five-year target
- one was on target
- three were behind ESV's annualised five-year target.

Powercor advised that all power poles and associated structures, assessed in 2013 as requiring replacing or reinforcement, were replaced or reinforced. Based on the information provided, and performance to date, ESV believes Powercor will need to increase the rate of its activity to achieve the safety programs by the end of 2015, as proposed to the AER and agreed with ESV.

In September 2013, ESV amended the exemption granted to Powercor, and extended the completion date for Powercor to complete the cyclic clearing of powerlines until December

2014. The progress of cyclic clearing to December 2013 was found to be consistent with the revised completion percentages contained in the application.

ESV also granted exemptions to Powercor for the requirement to maintain a clearance space in accordance with the Code of Practice for Electric Line Clearance as specified in the Electricity Safety (Electric Line Clearance) Regulations 2010 for:

- the township of Ballan
- Moreys Rd Nullaware
- Chute Rd Waterloo

Powercor reported on the progress of three directions and four exemptions:

- two directions were on target
- one direction was behind target
- two exemptions were behind target
- two exemptions have been completed.

While the ABC or insulated cable and the bare powerlines in LBRA cyclic clearing programs were marginally behind schedule, ESV is satisfied that this did not result in an increased safety risk. Based on the information provided, and performance to date, ESV expects that Powercor will meet the targets as agreed with ESV.

Powercor is behind schedule on the direction relating to the space between HV and HV circuits. Failure to complete this program as forecast may have adverse safety implications.

In April 2012, ESV directed Powercor to install sufficient SWER ACRs to eliminate the need to attend and manually suppress the automatic reclose function on any SWER powerline in the worst fire consequence areas of its network. Powercor complied and installed 178 new electronic SWER ACRs, controlling the 179 SWER lines in the highest risk areas.

Based on the information provided, and performance to date, Powercor will need to accelerate the rate of its activity to achieve all of the agreed ESV exemption and direction targets.

United Energy reported on the progress of 22 safety programs:

- five were ahead of the United Energy forecast
- three were in line with the United Energy forecast
- 14 were behind the United Energy forecast.

United Energy reported that some of its safety programs would continue to track lower than originally forecast and that the majority of programs would not meet the original forecasts. The increasing number of asset failures does not bear out United Energy's position that many of the assets were still fit for service and replacement would be an unnecessary cost to the customer. United Energy's review of the safety programs demonstrates that the aggregate investment is unlikely to equate to the benchmark funded by the AER. ESV also notes that while the revised safety programs may have merit, they are of a lower priority than the safety programs approved by the AER and supported by ESV.

United Energy also reported on the progress of 13 additional safety programs:

- four were ahead of United Energy's forecast
- three were in line with United Energy's forecast
- four were behind United Energy's forecast
- two have been completed.

United Energy reported on the progress of three directions and five exemptions:

- three directions were on target
- two exemptions were behind target
- three exemptions have been completed.

While the ABC or insulated cable in LBRA and HBRA cyclic clearing programs were marginally behind schedule, ESV is satisfied that this did not result in an increased safety risk. Based on the information provided, and performance to date, ESV expects that United Energy will meet the targets as agreed with ESV.

Jemena reported on the progress of 14 safety programs:

- six were ahead of Jemena's forecast
- three were in line with Jemena's forecast
- five were behind Jemena's forecast.

Based on the information provided, and performance to date, ESV believes Jemena will need to accelerate its rate of activity to achieve the safety programs by the end of 2015, as proposed to the AER and agreed with ESV.

Jemena reported on the progress of two directions and three exemptions:

- two directions were on target
- three exemptions have been completed.

Based on the information provided to date, ESV expects Jemena to achieve all of the targets agreed with ESV.

Jemena also had an annual program to confirm that all of the required spacers were in place and functional prior to 1 November 2013. Progress on this program was not reported to ESV.

SP AusNet reported on the progress of 10 safety programs:

- six were ahead of SPA's forecast
- two were in line with SPA's forecast
- two were behind SPA's forecast.

Based on the information provided, and performance to date, ESV expects SP AusNet to achieve all of the original safety programs proposed to the AER and agreed with ESV by the end of 2015.

SP AusNet reported on the progress of three directions and three exemptions:

- three directions were on target
- three of the exemptions have been completed.

ESV granted an exemption to SP AusNet for the requirement to maintain a clearance space in accordance with the Code of Practice for Electric Line Clearance as specified in the Electricity Safety (Electric Line Clearance) Regulations 2010 for overhead electric lines fitted with covered conductor or insulating covers.

Based on the information provided to date, ESV expects SP AusNet to achieve all of the targets agreed with ESV.

Electricity Safety Management Schemes

The Electrical Safety (Management) Regulations require all MECs to operate within the scope of an accepted ESMS. Revised schemes are to be resubmitted to ESV for review at least every five years. These schemes include the MECs' BFMPs, which are submitted to ESV for review, now at least every five years.

During 2013, ESV completed the audit of all the fundamental elements of the accepted ESMS, submitted by the MECs, as specified in the Electrical Safety (Management) Regulations. These audits confirmed that all of the MECs had well developed, comprehensive ESMSs, supported by documented policies and procedures, many supplemented by other management systems and certifications. In 2013, 1750 observations were made by ESV during these audits. These observations identified a number of non-conformances across the five distribution MECs relating to design standards and a failure to follow documented processes.

None of the audit findings was considered to pose an immediate safety risk in the operation of the network. All of the distribution MECs have developed action plans to address the non-conformances and issues identified by the audits and regular progress reports are being provided to ESV.

The new transmission company TOA submitted an ESMS to ESV as required by the *Electricity Safety Act 1998*. The ESMS was accepted by ESV following an assessment against the requirements of the Electrical Safety (Management) Regulations, supported by an ESMS verification audit.

MEC bushfire mitigation

All of the MECs submitted BFMPs to ESV as specified by the *Electricity Safety Act 1998*. ESV reviewed and approved all of these BFMPs.

Prior to the 2013 summer period ESV completed the annual bushfire mitigation (BFM) field audit of the distribution MECs against the requirements specified in their approved plans. Field audits were not conducted on CitiPower as it is not located in a High Bushfire Risk Area, nor SP AusNet (transmission) where the next field audit is scheduled for 2014.

A total of 597 distribution sites in the HBRAs and 175 distribution sites in the LBRAs were included in the 2013 audits, with a high degree of compliance observed.

A separate BFM audit was conducted in the region around Bendoc following the transfer of responsibility for the electrical network to SP AusNet. A total of 170 sites were audited, identifying a number of areas requiring attention. The auditor expressed the view that there appeared to have been a lack of network maintenance prior to the transfer to SP AusNet.

Generally the BFMPs were clear, well presented and defined the basis for each MEC's BFM activities. They were supported by a comprehensive set of mature policies and procedures that were regularly updated. ESV was pleased to find there was a strong connection between the BFMPs and the activity in the field.

The state of asset maintenance was observed to be adequate preparation for the 2013-2014 bushfire season, with no areas of non-compliance observed.

The BFM audits on the distribution MECs' network assets in HBRA found that they were all in good condition. The audit of the assets in LBRAs indicated that in most cases considerable work was still required to bring both their maintenance and vegetation management up to the same standard as that in the HBRA.

Jemena reported a BMI of 0.0 in December 2013, indicating that Jemena had completed its preparation for the 2013-2014 fire danger period.

SP AusNet reported a BMI of 0.0 in December 2013, indicating that SP AusNet had completed its preparation for the 2013-2014 fire danger period.

Significant vegetation management issues were identified in the Powercor LBRA townships of Lorne, Aireys Inlet and Fairhaven abutting the Otway Ranges. These were assessed by the auditor as requiring high priority action. Powercor reported a BMI of 0.3 in December 2013, indicating that Powercor had a small number of work items to complete prior to the commencement of the 2013-2014 fire danger period. ESV was of the view that none of these items represented a serious bushfire risk.

The audit identified a number of deteriorated crossarms in the network. United Energy reported a BMI of 0.0 in December 2013, indicating that United Energy had completed its preparation for the 2013-2014 fire danger period.

Electric line clearance

In 2013 ESV reviewed annual ELCMPs for eight MECs:

- with eight approved
- 27 other responsible persons (ORPs) also submitted ELCMPs, with 16 being approved. ESV is continuing to work with all of the ORPs to facilitate approval of their plans.

ESV found that, in general, the MEC ELCMPs were clear, well presented and defined the basis of each company's vegetation management activities. They were supported by a comprehensive set of mature policies and procedures that were regularly updated.

In addition to the review of ELCMPs, ESV audited six MECs, and 20 councils for compliance with the Code of Practice for Electric Line Clearance. These audits identified 282 instances of non-compliant vegetation, 125 of which had been actioned as at the end of December 2013. Following the pre-summer cut, the auditor found all of the electric lines located in HBRA complied with Code clearance requirements.

ESV was pleased with the auditor's report that there was a strong connection between the distribution MECs' ELCMPs and the activities in the field.

ESV concluded that Jemena, Powercor, SP AusNet, and United Energy's preparedness in HBRA for the 2013-2014 fire season was in line with their plans, however, vegetation clearance around electric lines in the LBRA for certain Distribution MECs was observed to be of a lesser standard.

An emerging issue for the industry was the continuing community reaction in certain locations to the extent of consultation and the degree of vegetation cutting required to achieve the required vegetation clearance around electric lines. ESV raised these concerns directly with the relevant distribution MECs.

ESV noted that all of the distribution MEC ELCMPs:

- have improved their notification, consultation and dispute resolution processes
- implemented additional engineering solutions
- adopted alternative compliance mechanisms for vegetation management
- improved their practices in the field.

Another issue is the continuing lack of management of vegetation that is within the clearance space around electric lines maintained by certain other responsible persons. This is particularly the case in some areas where municipal councils and VicRoads were the responsible person. ESV has worked with all of the distribution MECs on a number of initiatives to facilitate compliance and is addressing these issues in the remake of the Electricity Safety (Electric Line Clearance) Regulations 2015.

During the year, ESV also worked with all distribution MECs to improve the quality of vegetation clearance compliance reporting, with more than 10,000 spans now subject to regular reporting for compliance with the Code of Practice. This reporting confirmed a large degree of compliance with the Code, with approximately six per cent of all spans identified as requiring action to achieve the required vegetation clearance. ESV, all distribution MECs, and certain councils have increased their focus on compliance and placed a higher priority on collectively working towards achieving a greater degree of compliance. ESV places the highest priority on achieving the required vegetation clearance around high voltage (HV) electric lines and addressing structural tree limbs in solid contact with low voltage (LV) electric lines.

Safety indicators – Community

It is pleasing to report that in 2013 there were no reported fatalities due to electric shock. However, there were two incidents that resulted in serious injury to an MEC worker and six incidents causing serious injury to the public. The underlying trend for serious injuries from electrical causes to the public and MEC workers was similar to previous years.

ESV was please to see the number of electric shocks from MEC assets reduce from an average of around 20 per annum to one in 2013.

Work practice audits

ESV seeks to maintain the electrical safety standards for electrical work carried out by electrical workers as well as maintain public and industry awareness of electrical safety requirements in accordance with section 6 of the *Electricity Safety Act 1998*. In 2013, ESV implemented a Work Practice Observations (WPO) program for operators of electrical infrastructure, to ensure that electrical work is undertaken in accordance with established industry standards.

The first cycle of 17 observations of work being undertaken across the Victorian electricity distribution network, identified opportunities for improvement in:

- job planning
- safety culture
- personal protective equipment
- worksite communication
- operating - switching operations
- HV live work
- LV testing, metering and servicing.

Advanced Metering Infrastructure

In 2006 as part of the Advanced Metering Infrastructure (AMI) program, the Victorian Government committed to the installation of “smart” meters. The rollout of smart meters to approximately 2.6 million Victorian customers is well advanced and expected to be completed during 2014.

In addition to providing metering information, the data provided by these smart meters is being used to improve the safety and reliability of the Victorian distribution network. One Victorian distributor has developed a system for analysing data from the smart meters to assist in identifying and locating potential faults on the distribution network.

Strategic and regulatory issues facing Victoria’s electricity networks

The observations and commentary in this, ESV’s fourth annual safety performance report, are set against a backdrop of an increasing expectation on MECs to better manage risk, deliver returns to shareholders, as well as provide a more efficient and reliable service to the community – all in the face of increased weather volatility and extremes.

The reduction in electricity consumption in recent years has only heightened the natural tensions and pressure on MECs and the economic regulator to ensure balanced outcomes are achieved. These will be matters for consideration by industry, government and regulators as they approach the next five-year price determination to be conducted by the AER over the coming year into 2015.

The saw-toothed pattern of investment that was identified last year persists. This is where investment is lower immediately after a regulatory price determination. This may reflect, in part, the features of the five-year cost-of-service pricing regime and the adequacy of incentives to take a longer-term and more consistent view to managing long-life assets, including developing the resource and skills base for capital programs as well as making the necessary investment in higher-risk new technologies.

Raising the minimum technical safety standard of network construction in particular areas presents a number of challenges for regulators and governments.

Squaring the circle of lower prices at a time of reducing demand and increasing cost can only be achieved when businesses are incentivised to create value-adding products and services, and by accessing revenue streams from energy-related and other product markets. Achieving the outcome of efficient integration is a matter of regulatory design and administration that is outside ESV’s direct statutory remit.

It does, nevertheless, have serious implications for the outcomes for the community in terms of safety, reliability and security of supply. With insufficient “skin in the game” by the MECs it will be harder to achieve the balanced outcomes for community through regulatory mandate or prescriptive regulation without the burden of higher costs generating further pressure on electricity prices.

For some businesses, individual asset classes and components appear to be reaching end-of-life at a rate faster than the replacement programs and the ability to predict end-of-life. In higher bushfire risk areas, new and higher standards of construction will be required increasing further the risk of asset stranding in the face of reducing demand. The future of the network itself as the only option for energy delivery will need to be re-assessed by industry, governments and regulators as they consider the form of regulation and the traditional notion of the natural monopoly.

ESV will continue to ensure that adequate investment allowances for safety programs are considered by the AER, notwithstanding the challenges in realistically forecasting costs for a future period- especially when they are based on asset condition - an approach ESV observes may be reaching the limits of effectiveness.

ESV will also continue to monitor for any slippage or delay against the AER's reliability and safety-related capital and maintenance cost benchmarks. Whether underspending is reflected in a growing inherent risk profile being adopted by MECs, or is a reflection of over-forecasting during price determination reviews, ESV continues to believe that the equivalent investment should be made to provide the community with a level of service and safety they have paid for.

Ultimately, the primary responsibility for addressing the competing priorities of shareholders, reliability, service and safety still lies with the MECs. ESV observes however that the pressure to take greater risk, especially with an ageing network, means that the current approaches both to the administration and design of economic regulation may not be sustainable in the longer term.

Structure of the report

The remainder of the report is structured as follows:

Chapter 1: Introduction
Overview of the relevant acts and regulations, the MEC performance reporting regime and an overview of the MEC network characteristics.

Chapter 2: Electricity Safety Management Scheme
Information on the key performance indicators employed by ESV to monitor and audit MEC compliance with safety standards. Results of ESMS audits conducted by ESV on MECs.

Chapter 3: Bushfire mitigation
Information on the key performance indicators employed by ESV to monitor and audit MEC compliance with Electricity Safety (Bushfire Mitigation) Regulations. Results of BFM audits conducted by ESV on the MECs.

Chapter 4: Electric line clearance
Information on the key performance indicators employed by ESV to monitor and audit MEC compliance with Electricity Safety (Electric Line Clearance) Regulations. Results of electric line clearance audits conducted by ESV on the MECs and other responsible persons.

Chapter 5: Safety programs
Progress reports and ESV review of the agreed MEC safety programs.

Chapter 6: Directions and exemptions
Progress reports and ESV review of the of the ESV directions and exemptions on MECs.

Chapter 7: Safety and reliability indicators – Network
Reports and ESV review of the asset failures and fires caused by electricity distribution and transmission assets and the efficacy of overhead electric line development, replacement and maintenance programs.

Chapter 8: Safety indicators – Community
Reports and ESV review of community safety incidents involving electric shock together with a summary of work practice audits and the serious electrical incidents investigated by ESV.

Chapter 9: Investigations – Serious electrical incidents
Summary of ESV investigations into serious electrical incidents.

Chapter 10: Investigations – Work practice audits
Results of work practice observatons conducted by ESV on MECs.

Chapter 11: Advanced Metering Infrastructure
Report on the use of remotely readable interval, or smart meters, to improve the safety and reliability of the electricity network.

Introduction

Energy Safe Victoria was established on 10 August 2005 with the passing of the *Energy Safe Victoria Act 2005.* ESV has overall responsibility for the safety and technical regulation of electricity, gas and pipelines in Victoria, and reports annually to the Victorian Parliament on the functions and programs that it administers.

ESV is committed to the safe, efficient supply and use of electricity and gas. This is the fourth year that ESV has reported on the safety performance of the Victorian distribution MECs and the third year it has reported on safety performance of the Victorian electricity transmission businesses. This report informs stakeholders, the community, government and industry on how well these businesses are meeting their safety obligations.

This report also provides transparency on ESV's role in regulating the safety of electricity supply in Victoria and focuses on the key safety indicators reported by the MECs:

- incidents on the electricity network
- progress of critical safety programs
- progress of directions placed on the electrical distribution MECs to meet the recommendations of the 2009 VBRC and the Powerline Bushfire Safety Taskforce (PBST)
- operation of the ESMS; and
- results of audits on the MECs, including those to assess the readiness of the distribution MECs for the bushfire season.

Network safety regulation

Victoria has adopted an outcomes-based regulatory approach for MECs, as distinct to employing a prescriptive regime. This is achieved through legislation that imposes a general duty and requires all MECs to develop, introduce and maintain an Electrical Safety Management Scheme for acceptance by ESV. This outcomes-based regulatory approach accords with the best practice approach undertaken by the Victorian Government in its regulatory reforms.[1]

ESV's regulatory approach to electricity network safety management is depicted in Figure 1, and the key elements are expanded below.

[1] Department of Treasury and Finance, Melbourne, Victorian Guide to Regulation, May 2011

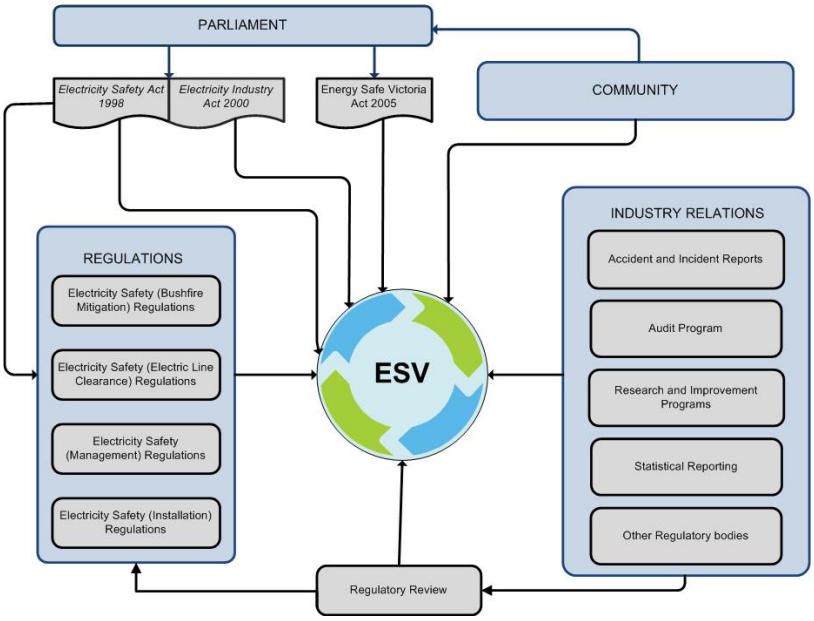

Figure 1: ESV's approach to MEC electricity safety management

The principal electrical safety legislation that applies to Victorian MECs is the *Electricity Safety Act 1998.* This is underpinned by supporting regulations that include:

- The Electricity Safety (Management) Regulations 2009 set out the requirements for an ESMS that is required to be submitted to ESV by all MECs every five years for acceptance and is audited by ESV.
- The Electricity Safety (Bushfire Mitigation) Regulations 2013 set out the requirements for a BFMP that is required to be submitted to ESV by all MECs for acceptance and audit by ESV.
- Electricity Safety (Electric Lines Clearance) Regulations 2010 set out the requirements for ELCMPs, which is required to be submitted to ESV by all MECs each year for acceptance and audit by ESV. It is a requirement that all persons responsible for maintaining electric line clearance (ELC) produce a plan annually. During the period, responsible persons other than MECs included certain municipal councils, persons responsible for the management of public land, owners or operators of electric lines, and the Roads Corporation (VicRoads). These entities are required to produce an ELCMP annually and submit the ELCMP to ESV upon request for review and audit. MECs' plans generally cover the regional and rural areas, with local council plans applying to specific declared areas in towns and cities.
- Electricity Safety (Installation) Regulations 2009 specify the safety requirements relating to electrical installations and electrical work and contain certain specific requirements for electricity suppliers.

Characteristics of the Victorian transmission and distribution networks

The Victorian distribution and transmission MECs are collectively referred to in the legislation as major electricity companies (MECs). The MECs were formed following disaggregation of the State Electricity Commission of Victoria and, while generally similar in engineering terms, have evolved differently as various engineering solutions have been adopted.

The MECs also have different characteristics such as geography, topography, customer base and operating environment, which may influence their safety performance (see tables 1 and 2 below). As such a direct comparison of the performance of the individual MECs may be misleading.

Powercor and SP AusNet have extensive overhead rural electricity distribution networks, with Powercor having considerably more electric line length than any of the other networks. Jemena and United Energy have predominantly overhead urban electricity distribution networks, while CitiPower services the central business district and the inner-urban areas. Approximately 97 per cent of CitiPower's central business district network is underground while the inner urban network is mainly overhead.

The electrical transmission networks are managed by SP AusNet, Basslink and Transmission Operations Australia. SP AusNet was formed following disaggregation of the State Electricity Commission of Victoria and its transmission network covers the whole state of Victoria, including the interconnecting electric lines to New South Wales and South Australia. The Basslink transmission network was developed post the State Electricity Commission of Victoria and is a comparatively short transmission link to Tasmania. The TOA network was commissioned in 2013 to connect the Mount Mercer wind farm to the SP AusNet transmission network.

This performance report is not intended to compare the safety performance of the MECs; instead it highlights the outcomes for each individual business and provides commentary on the performance of each business relative to its previous performance.

Distribution business	Approximate number of customers	Approximate area	Approximate powerline length (km)	Approximate number of poles
CitiPower	320,995 85% residential	157 sq km - Melbourne CBD and inner suburbs.	7400 25% CBD 40% underground	60,000
Jemena	320,600 89% residential	950 sq km – City, north-west suburbs and Melbourne International Airport.	6136 86% urban 27% underground	100,200
Powercor	748,000 85% residential	150,000 sq km – Melbourne's Docklands precinct, west from Williamstown to the SA border, north to the Murray and south to the coast.	84,000 92% rural 11% underground	540,000
SP AusNet	665,000 89% residential	80,000 sq km – Outer-eastern suburbs, north to the NSW border, south and east to the coast.	48,900 85% rural 10% underground	380,000
United Energy	660,000 90% residential	1500 sq km – South-eastern suburbs and south to the coast.	12,800 25% rural 20% underground	215,000
TOTAL	**2,714,595**		**159,236**	**1,295,200**

Table 1: Characteristics of the Victorian distribution networks

Transmission business	Transmission voltages	Approximate powerline length (km)	Approximate number of towers
SP AusNet	500kV AC and 220kV AC from Victorian power station switchyards. 330kV AC and 275kV AC interconnections with NSW and SA respectively. 66kV AC sub-transmission across Victoria.	6572	13,000
Transmission Operations Australia	132kV between Elaine Terminal Station and Mt Mercer wind farm	22	162
Basslink	500kV AC and 400kV DC (HVDC) link connecting Loy Yang power station in south east Victoria to George Town terminal station in north Tasmania.	67 3.2km of 500kV AC OH line 57.4kM of 400kV DC OH line 6.6kM of 400kV DC UG cable 290km of 400kV DC SM cable	142
TOTAL		**6661**	**13,304**

Table 2: Characteristics of the Victorian transmission networks

Information reported and published

ESV's reporting requirements were expanded with the introduction of the mandated ESMS regime in December 2009 leading to the development of standard data definitions and an improved reporting framework. The reporting requirements are outlined in the ESV Distribution Business Electrical Safety Performance Reporting Guide[2] and the Transmission Electrical Safety Performance Reporting Guide[3].

This reporting is designed to provide an insight into the effectiveness of the ESMS regime in improving network safety performance by reducing risk due to asset failure and managing the consequence of any asset failure.

As part of the five-year regulatory price determination period, administered by the Australian Energy Regulator (AER), all distribution MECs have implemented agreed safety programs for the five-year period from 2011 to 2015. Distribution MEC safety performance, together with the progress in delivering these safety programs, is included in this report.

ESV has implemented a five-year audit plan for the MECs and the results of the 2013 audits are included in this report.

Monitoring compliance with safety standards

ESV monitors the performance and compliance of each MEC through a comprehensive reporting regime and program of compliance audits that includes the collection and analysis of incident data and monitoring key performance indicators.

[2, 3] Reporting guides available on ESV website at http://www.esv.vic.gov.au/Electricity-Professionals/Electricity-Safety-Management-Schemes-ESMS.

Key performance indicators

The ESV *Distribution Business Electrical Safety Performance Reporting Guide* and the *Transmission Electrical Safety Performance Reporting Guide* set out both the serious electrical incidents that are reported to ESV, within an established timeframe, as well as the suite of key performance indicators that are reported to ESV quarterly.

These indicators provide ESV with the capacity to monitor the safety performance and compliance of the MECs with their approved schemes, identify trends and track changes.

Actual safety performance is audited regularly as part of ESV's formal BFM, ELC, and ESMS audit programs, and informally audited during quarterly ESMS management and performance meetings with each of the MECs, and on an ad-hoc basis on matters of interest to ESV.

Agreed safety programs

The regulatory price determination process requires each distribution MEC to submit proposals to the AER for funding its operations for a five-year period. During 2010 ESV worked closely with the distribution MECs and the AER to review the five-year works program and support the distribution MECs programs of performing work to maintain and improve the safety of their networks.

Each distribution MEC submitted a plan to the AER detailing asset replacement or treatment programs to be completed by 2015. The outcome of the AER's deliberations was an agreed increase in expenditure for asset replacement or treatment programs that the AER identified as being primarily safety driven. ESV monitors the progress of this work to ensure that the agreed and funded safety programs have been delivered.

Victorian f-factor scheme

Following Black Saturday, the f-factor scheme was introduced to encourage improvements in the management of electricity distribution assets to reduce the number of fires started by these assets and reduce the risk of loss or damage caused by the fires. The f-factor scheme is administered by the AER and for the period (2012–2015), distribution MECs will be rewarded or penalised for performing better or worse than their respective fire start targets.

The f-factor scheme defined fires as any fire started by an electricity distribution MEC asset:

- that starts in or originates from an electrical distribution system
- is started by a tree, or part of a tree, falling or coming into contact with an electrical distribution system
- is started by a person, bird, reptile, or other animal in or on an electrical distribution system
- is started by lightning striking a distribution system or part of an electrical distribution system
- is started by any other thing forming part or coming into contact with an electrical distribution system or
- is otherwise started by an electrical distribution system.

This differs from the long-standing ESV threshold for a serious electrical incident; an incident that causes or has the potential to cause death or injury to a person or significant damage to property or a serious risk to public safety:

- any fire damage

- greater than $250,000 damage to property, other than network assets
- damage that has potential for significant public or media interest, or
- damage serious enough to warrant on-site action to mitigate risk to the public by Police, Ambulance Service, MFB, CFA, Victorian WorkCover Authority, a statutory body or an emergency service provider.

The f-factor scheme determined the number of fire starts of the distribution MECs over five calendar years 2006–2010, (4281) and established an annual f-factor target (870) based on this historical five-year average.

Electricity Safety Management Scheme

The *Electrical Safety (Management) Regulations* were amended in 2009 to require all MECs within Victoria to operate within the scope of an accepted Electrical Safety Management Scheme (ESMS). MECs are required to submit an ESMS to ESV for review and acceptance every five years. The ESMS may be revised at any time, again subject to ESV acceptance. All of the MECs have prepared an ESMS that has been reviewed and accepted by ESV.

Key performance indicator	Measure	Target	2013 performance
Degree of compliance (four audits per annum)	Number of observations	NA	1750
	Number of non-compliances observed	0	9
Fires due to electricity network	F factor	870	925
	BMI, “0” by declaration date (four distribution MECs, excluding CitiPower)	4 x 0	3 x 0

Table 3: ESMS key performance indicators

The regulation underpinning the ESMS is wide-ranging and applies to all of MEC network operations. Through oversight of these schemes, ESV is well placed to test, challenge and expose the safety performance of the MECs whose principal safety objective is to manage the risks associated with the planning, design, construction, maintenance and operation of the electricity network, with special attention to the prevention of bushfires.

The ESMS includes the following requirements:

- identify network risks through a formal safety assessment framework
- manage network risks so as is reasonably practical
- listing of the technical standards adopted by the MEC
- ability to develop and implement new technology expeditiously to reduce network risk
- ability to change and adapt quickly to changing community expectations
- a mechanism for the safety regulator to closely monitor performance
- provisions for the safety regulator to influence the safety-related decision-making of the industry; and
- prescribe penalties for non-compliance.

Electricity Safety Management Scheme audits

ESV audits MEC compliance with the ESMS periodically, generally focussing on the different elements of the accepted ESMS. ESV’s initial plan was to audit all of the fundamental

elements of the accepted ESMS at least once during their five-year life. This plan commenced in 2011 and was completed in early 2014.

The ESV audit program was developed using the information provided in each accepted ESMS, BFMP and ELCMP. ESV has adopted a risk-based approach to these audits, assessing the various network characteristics, asset age, operating environment and prior audit outcomes. ESV has also been informed by data collected since the last audit and the MEC initiatives in the management of electrical assets.

During 2013, ESV completed an audit on four elements of the Electrical Safety (Management) Regulations 2009 on all eight Victorian MECs:

- Regulation 11 Formal safety assessment – asset operators and employer operators
- Regulation 15 Standards for works on applicable assets – where there are published technical standards
- Regulation 16 Standards for works on applicable assets – where there are no published technical standards
- Regulation 18 Applicable assets – Asset management plan requirements.

ESV conducted desktop audits to confirm that approved policies and procedures had been implemented and field audits to demonstrate the deployment of the policies and procedures. The field audits have been, by their nature, a limited sample taken at a point in time and are not designed to inspect all of the individual assets.

All of the MECs were found to have comprehensive ESMSs, many supplemented by other management systems and certification such as PAS 55, ISO 9001, ISO 14001, AS4801 and OHSAS 18001. Not all MECs maintained external certification to these standards, but had management systems that were either independently certified or based on the requirements of these systems.

The ESMSs were found to be well developed and supported by procedures and the implementation of a comprehensive library of system records to support each of the businesses. Illustrating these good practices were the improvements that had been made to the ESMSs including new software applications for managing assets, predictive tools for assessing remaining asset life, new management system certification programs, and revisions to the Asset Inspector's Manual.

Senior management personnel were represented at each of the audits, demonstrating a strong interest and commitment to their ESMSs. A range of personnel, employees and subcontractors were interviewed and found to be cooperative and well prepared for the audit.

Outcomes of audits were graded as:

- Compliant - evidence of compliance with the applicable processes and procedures to meet statutory and business requirements
- Opportunity for improvement (OFI) - general compliance with processes and procedures to meet statutory and business requirements, with an opportunity for the process or procedure to be improved
- Area requiring attention (ARA) - evidence of non-compliance that appeared to be of a minor or a "once off" nature that did not appear to pose a safety risk or major deviation from the process or procedure

- Non-Compliant (NC): no evidence of compliance with the applicable processes or procedures and or the processes or procedures did not meet statutory and business requirements.

A total of 1750 observations were made by ESV during these audits. A total of 13 areas requiring attention and 83 opportunities for improvement were identified. The areas requiring attention represented minor departures from the ESMS while opportunities for improvement represented improvement suggestions that were generally minor in nature. Although not significant, a number of document control errors and drawing amendment issues were identified, demonstrating that greater care needed to be taken in reviewing, amending, issuing and controlling company documents in hard and soft copy formats.

The audits identified a total of nine non-conformances across all five distribution MECs relating to design standards and failure to follow documented processes. All of the distribution MECs failed to comply with the current Australian Standard AS2067 Substations and High Voltage Installations Exceeding 1kV a.c., regarding the clearance space around transformers and the current Australian Standard AS7000 Overhead Line Design – Detailed Procedures regarding risk assessment on assets. All of the distribution MECs have developed action plans to address the issues identified by the audits, and are providing regular progress reports to ESV.

Appropriate corrective actions with timeframes for closeout have been developed for each of the non-conformances and ESV regularly monitors each distribution MEC's actions in resolving the issues identified as a result of each audit. None of the findings is considered to be critical to the operation of the ESMS.

A full ESMS verification audit was also completed on the new, small transmission company, TOA. The audit concluded that while TOA complied with the regulatory requirements some items required follow-up verification. The audit reviewed more than 34 areas for compliance, and no non-compliances were detected that which affected the operation or administration of their ESMS. TOA has initiated action to address a number of the opportunities for improvement suggested by ESV.

MEC Bushfire Mitigation Plans

In accordance with the *Electricity Safety Act 1998*, all MECs submitted BFMPs by 30 June 2013. ESV reviewed and approved the BFMPs for:

- CitiPower (distribution)
- Jemena (distribution)
- Powercor (distribution)
- SP AusNet (distribution) including the recently acquired Bendoc network
- SP AusNet (transmission)
- United Energy (distribution)
- Basslink (transmission)
- TOA (transmission).

Key performance indicator	Measure	Target	2013 performance
Degree of compliance (one audit per annum)	Number of sites visited in HBRA Number of sites visited in LBRA	400 400	597 175
	Number of non-compliances observed (considering the status of current exemptions granted by ESV)	0	0

Table 4: MEC BFM key performance indicators

ESV completed the annual BFM field audit of all MECs prior to the 2013 summer period with an emphasis on the policies, procedures and practices employed to mitigate fire ignition as described in their BFMPs and ELCMPs. Field audits were not completed on CitiPower, which has no High Bushfire Risk Areas, nor SP AusNet (transmission) that was not due for a field audit until 2014.

ESV found that, generally, the BFMPs were clear, well presented and defined the basis for each MEC's BFM activities. They were supported by a comprehensive set of mature policies and procedures that were regularly updated. ESV audited the extent of individual MEC compliance with these plans and assessed the accuracy of the MEC's database regarding their assessment of the condition of the assets.

Field audits were conducted on selected electric lines with the auditor's attention drawn to assets that had some maintenance feature that the MEC would be expected to be aware of, have recorded in its database, and demonstrated the application of sound asset management principles.

The state of asset maintenance observed was considered to be adequate preparation for the 2013-2014 bushfire season, with no areas of non-compliance observed. A number of useful improvements to the BFMPs were identified during these audits, all of which are being addressed by the MECs.

A total of 772 distribution sites were audited, 597 sites in the HBRA, 175 sites in the LBRA, and a large degree of compliance was observed.

A separate audit of the SP AusNet newly acquired area of responsibility in the region around Bendoc was completed in 2013 with a total of 170 sites visited. The audit identified a small number of areas for attention that SP AusNet is currently addressing.

An audit of Basslink observed no areas requiring attention.

An audit of TOA observed no areas of non-compliance or areas requiring attention. A number of opportunities for improvement were identified that are being addressed by TOA.

The bushfire mitigation index (BMI) provides stakeholders with a simple indication of the readiness of each distribution MEC for the upcoming fire season. Each distribution MEC has a different method for calculating the BMI, which is expected to be zero for the entire summer fire season. Most distribution MECs achieved the zero target for the 2013-2014 summer fire season.

Jemena

The audit found that the network assets in HBRA were in good condition, However, in LBRA, considerable work was still required to bring asset maintenance and vegetation management up to the same standard as that in the HBRA. A number of poles and crossarms were found to have exceeded their planned inspection date and a number of defective or missing items were not recorded in the Jemena database.

Jemena reported a BMI of 0.0 in December 2013, indicating that Jemena was well prepared for the 2013-2014 fire danger period, and supported by the data provided below:

- there were no outstanding pre-summer vegetation inspections or cutting in HBRA
- three vegetation spans required pre-summer cutting in HBRA
- no POEL inspections or defects
- 28 vegetation spans required cutting by ORPs and councils
- 80 network attachments required maintenance
- 60 program maintenance orders recorded.

Powercor

The audit found that the network assets in HBRA were in good condition. However, in LBRA considerable work was still required to bring asset maintenance and vegetation management up to the same standard as that in the HBRA. Significant vegetation management in the LBRA townships of Lorne, Airey's Inlet and Fairhaven, abutting the Otway Ranges, were identified as unacceptable and assessed as a high priority.

Powercor reported a BMI of 0.3 in December 2013, indicating that Powercor still had some work to do to be prepared for the 2013-2014 fire danger period, and supported by the data provided below:

- 209 non-compliant vegetation spans in HBRA (code 55/56)
- one limited life pole outside inspection policy
- no spans requiring pre-summer inspection
- 39 POELs in HBRA that need to be disconnected on TFB days
- 208 surge diverters, classified by the distribution MEC as unacceptable. ESV is concerned that these unacceptable assets are still on the network
- two brown porcelain EDO mounts. ESV is concerned that these assets are still on the network, a decade after being classified as unacceptable
- five black/brown EDO fuse tubes. ESV is concerned that these assets are still on the network, a decade after being classified as unacceptable
- 158 bird covers, 22kV and 66kV. ESV is concerned that there are 23 unacceptable assets still on the network.

United Energy

The audit found that the network assets in HBRA were in good condition. However, in LBRA considerable work was still required to bring asset maintenance and vegetation management up to the same standard as that in the HBRA. The audit identified a number of deteriorated crossarms, further questioning United Energy's crossarm inspection program. A number of defective or missing items were not recorded in the United Energy database. United Energy reported a BMI of 0.0 in December 2013, and advised that all outstanding items were addressed before the fire declaration date, indicating that United Energy was well prepared for the 2013-2014 fire danger period, and supported by the data provided below:

- no asset inspections overdue
- no unserviceable poles overdue for maintenance
- no pre-summer vegetation inspection of spans outstanding
- no pre-summer cutting of spans outstanding
- 19 network attachments (Priority one – Overdue six weeks) requiring maintenance
- 85 network attachments (Priority two – Overdue six months) requiring maintenance
- no POEL asset inspections or defects overdue for maintenance.

SP AusNet (distribution)

The audit found that the network assets in HBRA were in good condition. The quality of vegetation management was found to be of a high standard in both LBRA and HBRA. The audit noted a marked improvement in the accuracy of the information contained in the SP AusNet data base. However, a number of defective or missing items were not recorded in the SP AusNet database.

SP AusNet reported a BMI of 0.0 in December 2013, indicating that SP AusNet was prepared for the 2013-2014 fire danger period, and supported by the data provided below:

- no pre-summer vegetation inspections or cutting outstanding in HBRA
- three POELs overdue for inspections or defects
- 17 POELs in HBRA need to be disconnected on TFB days.

Summary

In summary, ESV was pleased with the auditor's report that there was a strong connection between the MECs' safety plans and their activities in the field.

The issues reported did not imply imminent asset failure, nor should they be extrapolated across all MECs. None of the areas requiring attention were seen to affect the BMI nor pose a risk of fire start for the 2013-2014 fire season. The principal purpose of the audit was to assess the efficacy of an MEC's system and, as such, specific areas were targeted where ESV had not undertaken previous BFM audits.

ESV concluded that Jemena, Powercor, SP AusNet, United Energy, Basslink and Transmission Operations Australia's preparedness for the 2013-2014 fire season in HBRA, was generally in line with their plans. However, asset management and vegetation clearing in the LBRA areas for certain distribution MECs was observed to be of a lesser standard, requiring attention.

The effect of recent changes to the *Electricity Safety Act 1998* that came into force on 1 April 2014 requires distribution MECs to be responsible for tree clearing that was previously the responsibility of:

- a public land manager that was not a municipal council, and
- VicRoads.

This will require distribution MECs to revise their existing ELCMPs and BFMPs and assess the impact of this new responsibility on the immediate and longer-term operation of the business.

Electric line clearance

While trees close to electric lines present a safety risk, a greater risk is that of fire ignition. The revised Electricity Safety (Electric Line Clearance) Regulations 2010 came into operation on 29 June 2010. These regulations clarified the minimum clearance space between trees and electric lines and reinforced the need for all responsible persons to assess vegetation and act to remove vegetation to reduce any hazard.

Key performance indicator	Measure	Target	2013 performance
Degree of compliance (one audit per annum)	Number of sites visited in HBRA Number of sites visited in LBRA	400 400	597 175
	Number of non-compliances observed	0	0

Table 5: ELC key performance indicators

In 2013 ESV reviewed the annual ELCMPs for eight MECs and 27 other responsible persons (ORP); a total of eight MEC and 16 ORP ELCMP have been approved, and ESV is working with all of the other ORPs to facilitate approval of their plans.

MEC	ORP	
• CitiPower (distribution)	• Alpine	• Marybrnong
• Jemena (distribution)	• AGL HYdro	• Melbourne
• Powercor (distribution)	• Alcoa	• Metro trains
• SP AusNet (distribution)	• Ararat	• Monash
• SP AusNet (transmission)	• Ballarat	• Moreland
• United Energy (distribution)	• Baw Baw	• Northern Grampians
• Basslink (transmission)	• Benalla	• Port Phillip
• TOA (transmission)	• Brimbank	• Snowy Hydro
	• Cardinia	• Southern Grampians
	• Fosterville	• VicRoads
	• Frankston	• Whittlesea
	• Hobsons Bay	• Yarra City
	• Horsham	• Yarra Ranges
	• Indigo	

Table 6: Companies that submitted ELCMPs to ESV

ESV found that, in general, the ELCMPs were clear, well presented and defined the basis of each company's vegetation management activities. They were supported by a comprehensive set of mature policies and procedures that were regularly updated.

In addition to the review of the annual ELCMPs, ESV carried out vegetation clearance audits on six MECs and 20 councils.

MEC	Council	
• Jemena (distribution)	• Bayside	• Moorabool
• Powercor (distribution)	• Booroondara	• Morington Peninsula
• SP AusNet (distribution)	• Cardinia	• Stonnington
• United Energy (distribution)	• Darebin	• South Gippsland
• Basslink (transmission)	• Frankston	• Southern Grampians
• TOA (transmission)	• Glen Eira	• Wangaratta
	• Glenelg	• Whittlesea
	• Indigo	• Wodonga
	• Manningham	• Yarra City
	• Moira	• Yarra Ranges

Table 7: Companies that were audited by ESV

The ESV audit of compliance with the Electricity Safety (Electric Line Clearance) Regulations 2010 identified 282 instances of non-compliant vegetation, 125 of which had been actioned as at the end of December 2013. Following the pre-summer cut, the auditor found no spans with vegetation near electric lines in HBRA that did not comply with the requirements of the clearance Code.

ESV was pleased with the auditor's report that there was a strong connection between the distribution MECs' safety plans and activities in the field.

ESV concluded that Jemena, Powercor, SP AusNet, and United Energy's preparedness, in HBRA for the coming fire season was in line with their plans, however, vegetation clearance around electric lines in the LBRA for certain distribution MECs was observed to be of a lesser standard.

An emerging issue for the industry was the continuing adverse community reaction in certain locations to the extent of consultation and the degree of vegetation cutting required to achieve the required vegetation clearance around electric lines. ESV raised these concerns directly with the distribution MECs, ensuring an increased focus in all 2013 ELCMPs.

All of the distributors have improved their notification, consultation and dispute resolution processes, implemented additional engineering solutions and adopted alternative compliance mechanisms for vegetation management.

Another emerging issue for the industry was the management by other responsible persons of non-compliant vegetation around electric lines, particularly in areas where municipal councils were the responsible person. ESV addressed these issues, as well as other stakeholder issues, in the remake of the Electricity Safety (Electric Line Clearance) Regulations 2015.

During the year, ESV worked with all distribution MECs to improve the quality of vegetation reporting. This reporting confirmed a large degree of compliance with the Electricity Safety (Electric Line Clearance) Regulations 2010, with about six per cent of all spans (10,000 spans) requiring vegetation clearance.

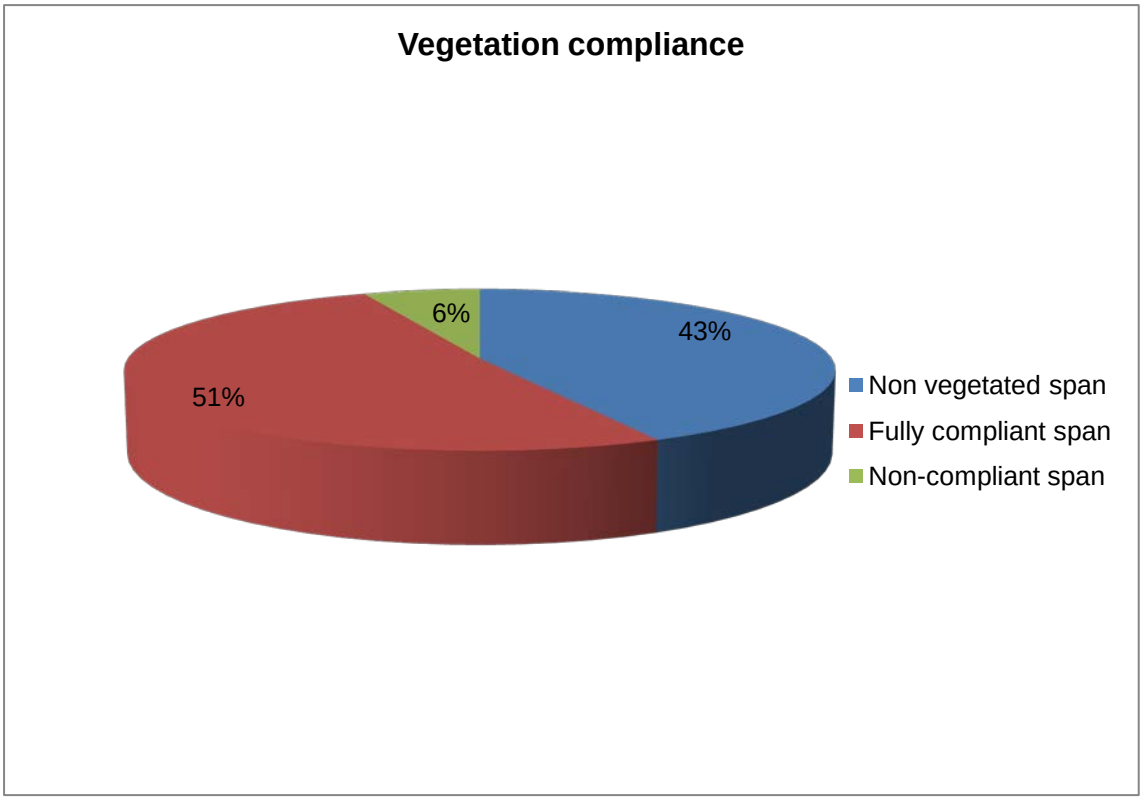

Figure 2: Vegetation compliance

Based on the information from this improved reporting, ESV, all distribution MECs and all councils have increased their focus and placed a higher priority on working collectively towards achieving a greater degree of compliance with the highest priority placed on achieving the required vegetation clearance around HV electric lines and addressing structural tree limbs in solid contact with LV electric lines.

Safety programs

Over time, the network operating environment, duty cycle and network events contribute to the ageing of assets. These require maintenance or replacement to reduce the probability and rate of asset failure. The rapid rate of electrification of Victoria during the middle of last century means that many assets are nearing the end of their initial design life. To minimise the occurrence and consequence of asset failure, appropriate risk mitigation programs have been implemented. The distribution MECs have continually refined their asset replacement decision-making practices. Asset replacement decisions, by some distribution MECS are now based on more sophisticated asset inspection techniques and the use of the latest condition assessment technology, compared with 20 years ago.

Asset upgrades use new materials that have the potential to reduce the number of asset failures, reduce the number of outages, reduce the number of fires, and lead to an improvement in the reliability and safety of the electricity network. Despite a targeted condition assessment and asset replacement program to reduce breakdowns, the number of asset failures has not reduced for all asset classes, especially crossarms and HV fuses. To reduce the asset failure rate, the industry may need to review its condition assessment techniques and reliability approach to asset replacement. Where the current condition monitoring is problematic, a move to more informed assessment including consideration of an age-based replacement approach may be warranted to mitigate asset failure.

The 2010 AER determination on the allowable expenditure for distribution MECs for the five-year period between 2011 and 2015 included expenditure for asset replacement or treatment programs that it identified as being primarily safety driven.

AER's determination contained the written expectation that ESV would continually monitor the volume of work undertaken by the distribution MECs to ensure the programs are delivered to achieve the intended safety outcomes as proposed. ESV has included this monitoring as an integral part of specific ESMS audits and, in other cases, as the topic for specific studies.

For this report ESV has classified both specific safety initiatives proposed by MECs and the projects for the replacement or treatment of assets approved by the AER and identified by them as being primarily safety driven, as safety programs. Where the MEC did not provide a specific forecast for these programs in the current regulatory price determination period, ESV has annualised the quantities for illustrative purposes

Since each distribution MEC has a different risk profile, the safety-related works differ for each organisation. However, in general, the safety-related works apply to:

- accelerated rate of replacement of crossarms, power poles, conductor, insulators and high voltage fuses
- accelerated rate of replacement of low voltage overhead neutral screen service cables; and
- installation of new high voltage protection equipment or upgrade of high voltage protection equipment, automatic circuit reclosers (ACRs) and rapid earth fault current limiters (REFCLs) – also known as a ground fault neutralisers (GFN).

The distribution MECs' current asset replacement programs are largely based on the results of asset inspection and condition monitoring programs.

Legend

The following colour coding indicating the status of the safety programs has been applied:

RED PROGRAM TOTAL TO DATE < 90 PER CENT OF FORECAST TO DATE
GREEN PROGRAM TOTAL TO DATE ± 10 PER CENT OF FORECAST TO DATE
BLUE PROGRAM TOTAL TO DATE > 110 PER CENT OF FORECAST TO DATE

Safety program status: CitiPower

CitiPower reported on the progress of eight safety programs.

Progress on two of the programs is ahead of the ESV forecast:

- Crossarm replacement
- Pole replacement staked

Progress on one program is on target:

- Pole replacement stay

Progress on five of the programs is behind the ESV forecast:

- LV overhead conductor replacement
- HV conductor replacement
- Pole replacement LV
- Pole replacement HV
- Pole replacement sub-transmission

CitiPower did not establish an annual forecast for these safety programs. The forecasts shown in the table are based on the figures supplied to the AER for revenue determination purposes and annualised by ESV to monitor progress.

CitiPower reports that little conductor has been replaced to date (0km of LV conductor and 2km of HV conductor) and no conductor was replaced in 2013. Accordingly, ESV has recorded that these programs are behind ESV's forecast. Being on a small base the progress on these programs is of less concern at this time.

CitiPower reports that all power poles and associated structures, assessed in 2013 as requiring replacing or reinforcement, have been replaced or reinforced.

LV, HV, and sub-transmission power pole replacement programs are behind the ESV forecast, however being on a small base the progress of these programs is of less concern at this time. The planned power pole replacement program has been offset to some degree by an increase in the number of staked power poles. It is pleasing to see that crossarm replacement and power pole replacement programs (staked and stay power poles) are well ahead of ESV's forecast.

Based on the information provided, and performance to date, ESV remains confident that all of the safety programs proposed to the AER and agreed with ESV can be achieved by CitiPower by the end of 2015.

Program	Measure	2013 ESV forecast[#]	2013 completed to date	Program forecast	Comments
LV overhead conductor replacement	Route kilometres of conductor replaced	1.5	0	2.5	Program is 100% behind ESV forecast
HV overhead conductor replacement	Route kilometres of conductor replaced	7.5	2	12.5	Program is 73% behind ESV forecast
Crossarm replacements	Number of crossarms replaced	2100	3221	3700	Program is 53% ahead of ESV forecast
Pole replacements - Staked poles	Number of poles staked	780	1163	1325	Program is 49% ahead of ESV forecast
Pole replacements - Stay poles	Number of poles replaced	38	41	65	Program is 7% ahead of ESV forecast
Pole replacements - LV	Number of poles replaced	336	169	574	Program is 50% behind ESV forecast
Pole replacements - HV	Number of poles replaced	135	111	231	Program is 17% behind ESV forecast
Pole replacements – Sub-transmission	Number of poles replaced	33	15	56	Program is 54% behind ESV forecast

Table 8: CitiPower safety program status

[#]CitiPower did not set annual forecasts. The 2013 ESV forecast was based on the volume of work submitted to the AER for revenue determination purposes.

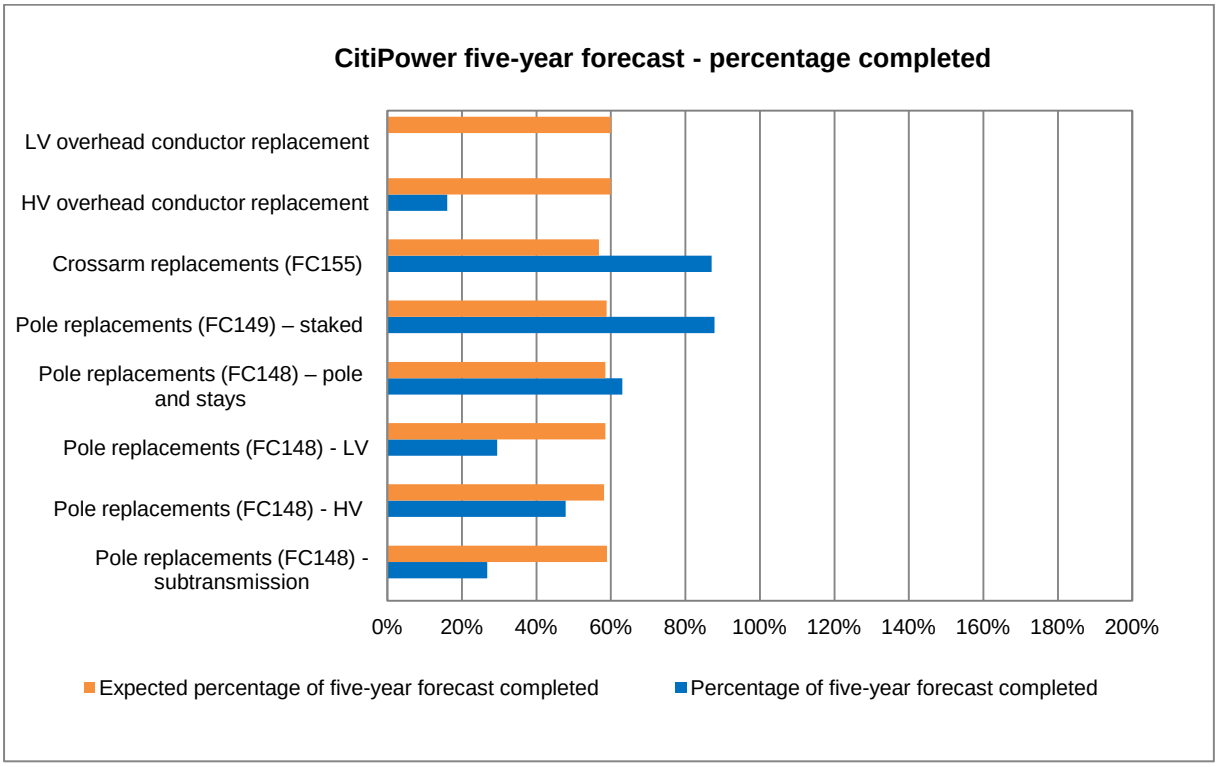

Figure 3: CitiPower progress of safety-related programs

Safety program status: Powercor

Powercor reported on the progress of eight safety programs.

Progress on four of the programs is ahead of the ESV forecast:

- Crossarm replacement
- Pole replacement staked
- Pole replacement stay
- Pole replacement HV

Progress on one of the programs is in line with the ESV forecast:

- Pole replacement LV

Progress on three of the programs is behind ESV's forecast:

- LV overhead conductor replacement
- HV conductor replacement
- Pole replacement transmission

Powercor did not establish an annual forecast for these safety programs. The forecasts shown in the table are based on the figures supplied to the AER for revenue determination purposes and annualised by ESV to monitor progress.

Powercor reports that it has replaced less overhead conductor than ESV's progressive forecast, putting at risk the program target to replace 20km of LV overhead conductor and 2380km of HV overhead conductor and, in turn, affect the delivery of the required safety objective.

Powercor advised that all power poles and associated structures, assessed in 2013 as requiring replacing or reinforcement, have been replaced or reinforced.

It is pleasing to see that the crossarm replacement and power pole replacement programs (HV and stay power poles) are well ahead of ESV's forecast.

Based on the information provided, and performance to date, for Powercor to achieve all of the safety programs proposed to the AER and agreed with ESV by the end of 2015, it will need to ramp up its activities from the progress reported to date.

Program	Measure	2013 ESV forecast[#]	2013 completed to date	Program forecast	Comments
LV overhead conductor replacement	Route kilometres of conductor replaced	12	5	20	Program is 59% behind ESV forecast
HV overhead conductor replacement	Route kilometres of conductor replaced	1420	173	2380	Program is 87% behind ESV forecast
Crossarm replacements	Number of crossarms replaced	9600	20,194	16,000	Program is 110% ahead of ESV forecast
Pole replacements - Staked poles	Number of poles staked	2781	3293	4760	Program is 18% ahead of ESV forecast
Pole replacements – Stay poles	Number of poles replaced	56	160	96	Program is 185% ahead of ESV forecast
Pole replacements - LV	Number of poles replaced	617	677	1056	Program is 9% ahead of ESV forecast
Pole replacements - HV	Number of poles replaced	1935	2897	3312	Program is 49% ahead of ESV forecast
Pole replacements – sub-transmission	Number of poles replaced	196	160	336	Program is 18% behind ESV forecast

Table 9: Powercor safety program status

[#]Powercor did not set annual forecasts. The 2013 ESV forecast was based on the volume of work submitted to the AER for revenue determination purposes.

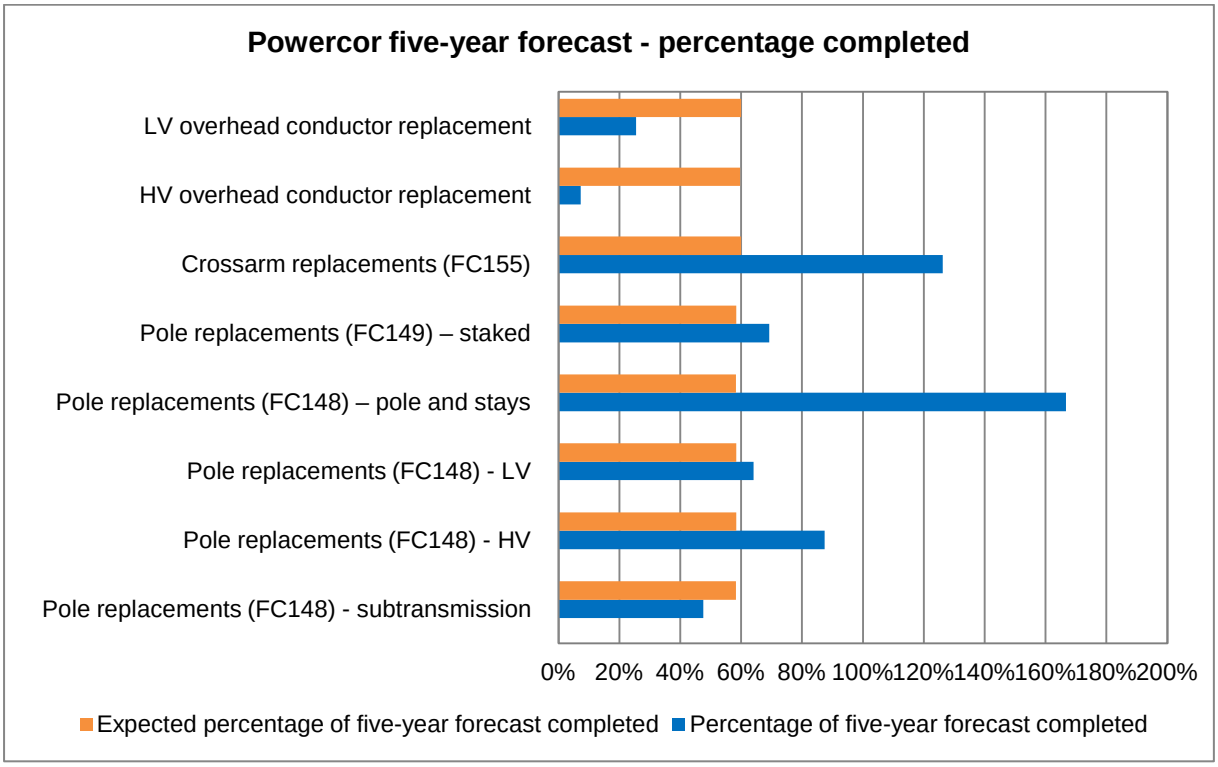

Figure 4: Powercor progress of safety-related programs

Safety program status: United Energy

United Energy reported on the progress of 22 safety programs.

Progress on five of the programs is ahead of the United Energy forecast:

- Replace other conductors in HBRA
- Replace overhead steel conductors in HBRA
- Stake poles; based on condition
- Replace poles; based on condition
- Removal of public lighting switchwire

Progress on three of the programs is in line with the United Energy forecast:

- Pole top structure; surge diverter replacement
- Pole top structure; HV fuse replacement
- Replace existing SWER lines

Progress on 14 of the programs is behind the United Energy forecast:

- Service line clearance; OH services requiring undergrounding
- Service line clearance; OH services requiring relocation
- Install backup protection schemes
- Install LV ABC in HBRA
- Install HV ABC in HBRA
- Replace crossarms; based on age condition
- Inspect, clean, tighten; pole top fire mitigation
- Replace sets of insulators; pole top fire mitigation

- Replace crossarms – pole top fire mitigation
- Install GFN
- Planned replacement of non-preferred services (height)
- Planned replacement of non-preferred services
- Overhanging trees capex (underground, line relocation, ABC, etc.) – HBRA
- Overhanging trees capex (underground, line relocation, ABC, etc.) – LBRA

United Energy informed ESV that in line with good asset management practice and in response to new technologies, more recent forecasts, improved information and consideration of emerging issues it has reviewed its improvement plans and condition assessment criteria to minimise risk and the hazards associated with network operations.

United Energy has reported that some of its safety programs are tracking lower than originally forecast, and that the majority of programs will not meet the original forecasts. United Energy asserts that its own asset inspection revealed that many of the assets were still fit for service and replacement would be an unnecessary added cost to the customer. This view is inconsistent with the increasing number of asset failures in service.

ESV understands that United Energy's safety programs were carefully developed, evaluated and prioritised as part of the AER 2010 determination, with program forecasts based on the best information available at the time. United Energy's review, while achieving a comparable expenditure, appears to be departing from the original AER projects. ESV is of the view that while many of the proposed safety programs have merit, they are of a lower priority than the safety programs approved by the AER. This view is not shared by United Energy.

United Energy also reported on the progress of 13 additional safety programs.

Progress on four of the programs is ahead of United Energy's forecast:

- P brackets with pole caps replacement
- Fitting armour rods and vibration dampers
- Bird and animal proofing
- Conductor clashing prevention

Progress on three of the programs is in line with United Energy's forecast:

- Low transformer mounting height
- LIDAR
- Low Tramways overhead conductor

Progress on four of the programs is behind United Energy's forecast:

- Doncaster pillars
- Air Break Switch replacement with Gas Switches
- Kaon fuse replacement
- DC systems upgrade

Progress on two of the programs is complete:

- Zone substation security fencing upgrade
- Zone substation earthing upgrade

Asset replacement: crossarms, insulators, pole tops, HV surge diverters, HV fuses, switch wire, pole replacement, pole staking

United Energy advised ESV that the crossarm replacement program has been reduced from 53,088 crossarms to 30,170 crossarms. ESV is concerned that United Energy only replaced 11,336 crossarms up until 2013 (year end), compared with its original target of 30,853 crossarms.

United Energy has asserted that its asset inspection reveals that many of the assets are still fit for service. This reduction in volume is not supported by United Energy's pole and crossarm failure rate, which is trending upwards (255 in 2013). United Energy has the highest pole and crossarm failure rate of any Victorian distribution MEC. It would also appear that United Energy does not have accurate information on its crossarm population.

Crossarm replacement is not keeping pace with the rate of crossarm failure, seriously impacting the program's safety objectives of fewer asset failures leading to fewer fires. United Energy's crossarm condition assessment has identified fewer crossarms for replacement, which is inconsistent with the increasing failure rate. United Energy has advised ESV that it had recently reduced the pole inspection cycle from five years to 30 months in an effort to address this issue.

The cutback in the safety programs associated with replacement of pole top sets of insulators, the inspection, cleaning and tightening of pole top hardware is also of concern to ESV, considering the number of pole top fires experienced by United Energy (77 in 2013), which is trending upwards.

ESV notes the marginal increase in HV fuse and surge diverter replacement programs, the low failure rate and small number of fires caused by the failure of these assets.

ESV also notes the expansion of the switchwire removal program. Switchwire is removed opportunistically, in conjunction with other works (generally crossarm replacement). The number of spans to be removed has increased from 7236 spans to 30,445 spans.

ESV notes that United Energy plans to replace or stake more poles, 6287 poles instead of the original plan to replace or stake 4903 poles.

Replacement and relocation of LV services

United Energy plans to reduce the number of LV services to be replaced, relocated or placed underground by 23,488 services, from 165,472 services to 141,984 services. CAPEX funding was allowed by the AER for the implementation of a more permanent solution. United Energy's plan to do more of this work by vegetation management is at best a short-term, OPEX solution.

Overhead conductor replacement: SWER lines with 22kV, steel and other conductor in HBRA

United Energy plans to replace 173km less steel and other conductor in HBRA, 33km instead of the original plan to replace 206km as well as replace less SWER with 22kV overhead conductor, 12km instead of 44km.

This may adversely impact these BFM initiatives recommended by the taskforce, and adversely impact program safety objectives of fewer asset failures and fewer fires.

Underground or relocate or replace LV services with overhanging trees and installation of HV and LV ABC in HBRA

United Energy does not plan to replace the 700 LV services with overhanging trees in HBRA and LBRA and does not plan to install any HV or LV ABC in HBRA. CAPEX funding was allowed by the AER for the implementation of a more permanent solution. United Energy's plan to do more of this work by vegetation management provides is at best a short-term, OPEX solution.

Installation of GFNs and backup protection schemes

United Energy still plans to install the original 15 backup protection schemes, but only one additional GFN, instead of the original estimate of seven additional GFNs. The installation of an additional GFN is unlikely given the number of technical issues remaining.

Based on the information provided and performance to date, for United Energy to complete all of the safety programs proposed to the AER and agreed with ESV by the end of 2015, United Energy would need to increase its activities from the progress reported to date. While the additional safety programs proposed by United Energy may have merit, ESV is of the view that they are of a lower priority than the safety programs allowed by the AER.

Program	Measure	2013 UE forecast	2013 completed to date	Program target	Comments
Service line clearance – overhead services requiring undergrounding	Number of services	1697	1	1771	Program is 100% behind UE forecast. UE is unlikely to meet its original target
Service line clearance – overhead services requiring relocation	Number of services	6785	1047	7083	Program is 85% behind UE forecast. UE is unlikely to meet its original target
Install backup protection schemes	Zones substations completed	9	4	15	Program is 55% behind UE forecast. Program will be completed by the end of the current regulatory period
Replace other conductors in HBRA	Kilometres of conductor replaced	2	4	126	Program is100% ahead of UE forecast
Replace overhead steel conductors in HBRA	Kilometres of conductor replaced	23	27	80	Program is 17% ahead of UE forecast. UE has revised the final target down from 80 to 23
Stake poles – based on age and condition	Number replaced	1184	1797	2098	The program is 52% ahead of UE forecast. All poles identified as being suitable for staking have been staked
Replace poles – based on age and condition	Number replaced	1600	1884	2805	Program is 11.5% ahead of UE forecast. All poles assessed as having reached the end-of-service life have been replaced
Install LV ABC in HBRA	Metres of LV ABC	8850	1338	14,750	Program is 85% behind UE forecast
Install HV ABC in HBRA	Metres of HV ABC	14,400	0	24,000	Program is 100% behind UE forecast
Pole top structure – Surge Diverter replacement	Number replaced	708	749	1054	Program is in line with UE forecast. All surge diverters identified as needing to be replaced have been replaced
Pole top structure – HV fuse replacement	Number replaced	622	671	808	Program is in line with UE forecast. All HV fuses identified as needing to be replaced have been replaced
Replace crossarms – based on age and condition	Number of crossarms replaced	30,053	11,080	50,088	Program is 63% behind UE forecast. All end-of-life crossarms identified to date are said to have been replaced
Inspect, clean, tighten – pole top fire mitigation	Poles completed	1000	0	3300	Program is 100% behind UE forecast. All end-of-life components identified to date are said have been replaced
Replace sets of	Number of	800	651	3400	Program is 19% behind UE

insulators – pole top fire mitigation	insulator sets replaced				forecast. All end-of-life components identified to date are said to have been replaced
Replace crossarms – pole top fire mitigation	Number of crossarms replaced	800	393	3000	Program is 500% behind UE forecast. All end-of-life components identified to date are said to have been replaced
Install GFN	Number of zone substations	2	0	7	Program is 100% behind the UE forecast. Work will not proceed until technical problems have been resolved
Replace existing SWER lines	km of existing SWER removed	0	0	44	Program is in line with UE forecast
Removal of public lighting switchwire	Spans removed	4824	10,382	7236	Program is in 115% ahead of UE forecast. Switchwire is removed when the adjacent LV crossarms are replaced
Planned replacement of non-preferred services due to height	Number of services	10,850	8834	12,618	Program is 19% behind UE forecast. All “low” services identified have been rectified
Planned non-preferred services replacements	Number of services	83,000	71,646	144,000	Program is 13% behind UE forecast. All services identified as requiring to be replaced have been replaced
Overhanging trees capex (u/g, line relocation, ABC, etc.)–HBRA	Spans removed	420	0	700	Program is 100% behind UE forecast. Program has been revised. The program is unlikely to reach the original target
Overhanging trees capex (u/g, line relocation, ABC, etc.)– LBRA	Spans removed	17	0	28	Program is 100% behind UED forecast. Program has been revised. The program is unlikely to reach the original target.

Table 10: United Energy safety program status

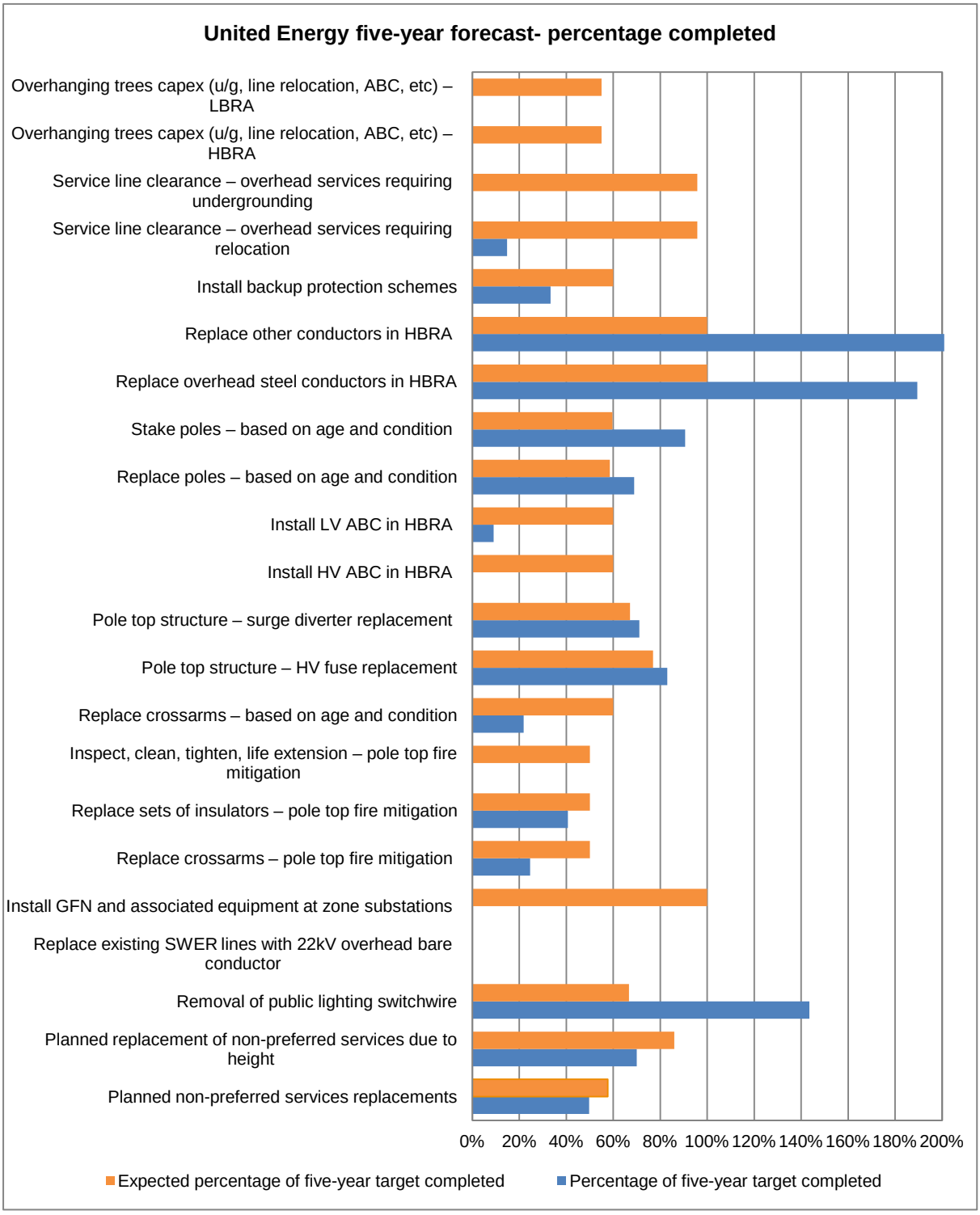

Figure 5: United Energy progress of safety-related programs

Program	Measure	2013 UE forecast	2013 completed to date	Program target	Comments
Doncaster pillars	Number removed	230	174	790	This program is 24% behind the UE forecast
Air break switch replacement with gas switches	Number replaced	215	157	915	This program is 27% behind UE forecast
P brackets with pole caps replacement	Number replaced	400	496	1200	This program is 24% ahead of forecast
Kaon fuse replacement	Number installed	10	0	50	This program is 100% behind UE forecast and has not started
LIDAR	Trialled	0	0	1	This program is in line with UE forecast and has not started.
Conductor clashing prevention	Number of sites	10	1040	30	This program is well ahead of UE forecast
Fitting armour rods and vibration dampers	Number Installed	500	1094	1900	This program is 118% ahead of UE forecast
Low transformer mounting height	Number resolved	7	7	17	This program is in line with UE forecast
Low tramways projects	Number of locations	4	4	4	This program is in line with UE forecast
Zone substation security fencing upgrade	Number of zone substations	1	6	6	This program has been completed
Zone substation earthing upgrade	Number of locations	0	3	3	This program has been completed
DC systems upgrade	Number of zone substations	23	20	43	This program is 13% behind UE forecast
Bird and animal proofing	Number of structures	319	377	793	This program is 18% ahead of UE forecast

Table 11: United Energy additional safety program status

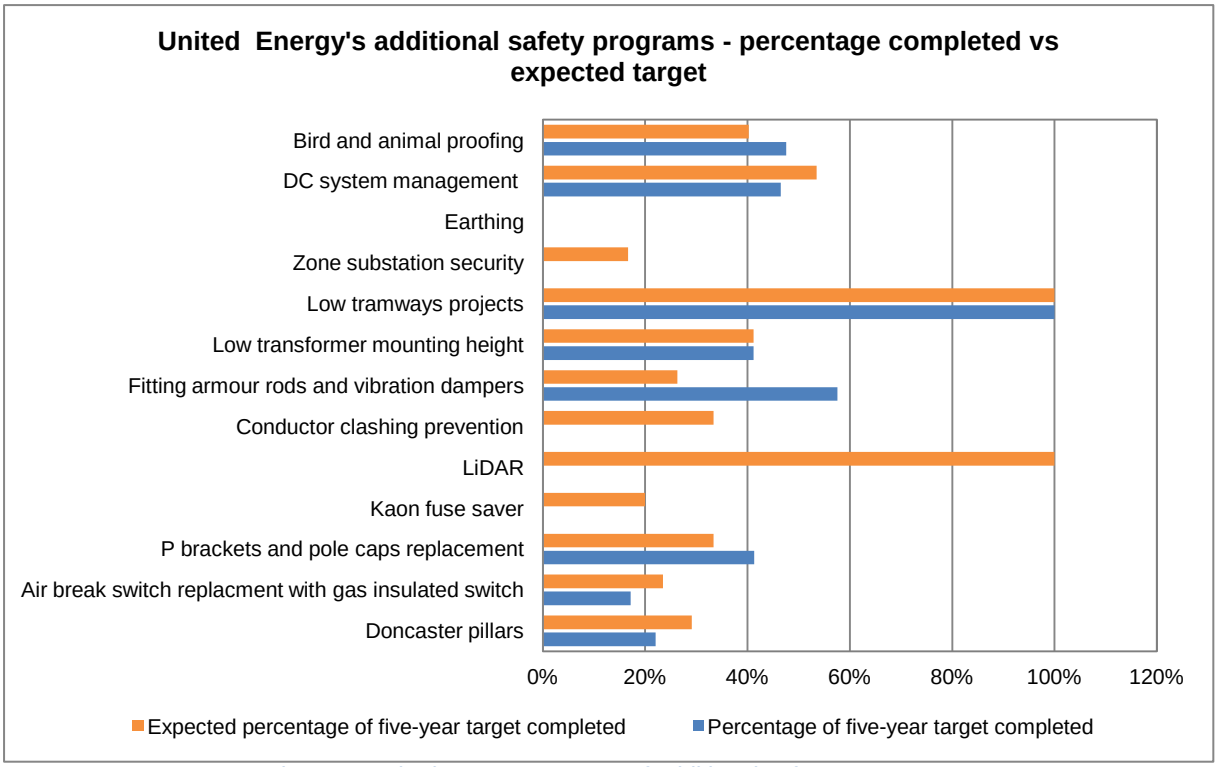

Figure 6: United Energy Progress of additional safety programs

Safety program status: Jemena

Jemena reported on the progress of 14 safety programs.

Progress on six of the programs is ahead of Jemena's forecast:

- Replace overhead conductor, mainly steel
- Stake undersized poles
- Stake poles – based on age and condition
- Replace poles; based on age and condition
- Removal of public lighting switchwire
- Planned replacement of non-preferred services (height)

Progress on three of the programs is in line with Jemena's forecast:

- Service line clearance, overhead services requiring undergrounding
- Replace crossarms, based on age and condition
- Replace existing SWER lines

Progress on five of the programs is behind Jemena's forecast:

- Service line clearance; overhead services requiring relocation
- Replace undersized poles
- Install GFN
- Replace crossarms or insulator sets – pole top fire mitigation
- Planned non-preferred services replacements

Jemena proposes to replace more power poles than forecast as a greater number of power poles have been assessed as requiring replacement. Likewise based on condition assessment, more crossarms than forecast have been assessed as requiring replacement.

Jemena's ground fault neutraliser (GFN) installation program has been delayed pending resolution of issues associated with GFNs. Jemena will need to ramp up its activity in this program in the current period to ensure that it meets its initial projections.

It is pleasing to see that the programs to stake and replace power poles and replace service cables due to height are well ahead of forecast.

Replace undersized poles is behind forecast due to Jemena assessing more poles than forecast as suitable for staking.

Based on the information provided, and performance to date, for Jemena to achieve all of the original safety programs proposed to the AER and agreed with ESV by the end of 2015, Jemena would need to ramp up its activities in certain programs.

Program	Measure	2013 JEN forecast	2013 completed to date	Program target	Comments
Service line clearance – overhead services requiring undergrounding	Number of services replaced	0	0	672	Program is in line with JEN forecast
Service line clearance – overhead services requiring relocation	Number of services replaced	78	64	2691	Program is 18% behind JEN forecast
Replace overhead conductor – mainly steel	km of overhead conductor replaced	57	65	112	Program is 14% ahead of JEN forecast
Stake undersized poles	Number of poles staked	582	861	1100	This program is 48% ahead of JEN forecast. More poles than forecast have been assessed as suitable for staking
Replace undersized poles	Number of poles replaced	708	99	1385	Program is 86% behind forecast
Stake poles – based on age and condition	Number of poles staked	558	995	1114	This program is 78% ahead of JEN forecast
Replace poles – based on age and condition	Number of poles replaced	774	1033	1294	This program is 33% ahead of JEN forecast. A larger number of poles than forecast have been assessed as requiring replacement
Replace crossarms – based on age and condition	Number of crossarms replaced	8469	8958	14,117	This program is in line with JEN forecast. A larger number of crossarms than forecast have been assessed as requiring replacement
Replace crossarms or insulator sets – pole top fire mitigation	Number of crossarms replaced	1701	1388	2835	This program is 18% behind of JEN forecast
Install GFN	Number of	1	0	3	Program is behind JEN

	zone substations				forecast. The program has experienced technical difficulties and it is unlikely that this program will be completed on time
Replace existing SWER lines	Km of existing SWER removed	13	14	13	Program is in line with JEN forecast
Removal of public lighting switchwire	Spans removed	2974	3416	5100	Program is 14% ahead of JEN forecast. Jemena has surveyed its network and identified all of the public lighting switchwire locations.
Planned replacement of non-preferred services due to height	Number of services	1487	2769	3987	This program is 86% ahead of JEN forecast.
Planned non-preferred services replacements	Number of services	15,500	11,420	30,000	Program is 26% behind JEN forecast due to priority being given to the “planned replacement of non-preferred services due to height” program

Table 12: Jemena safety program status

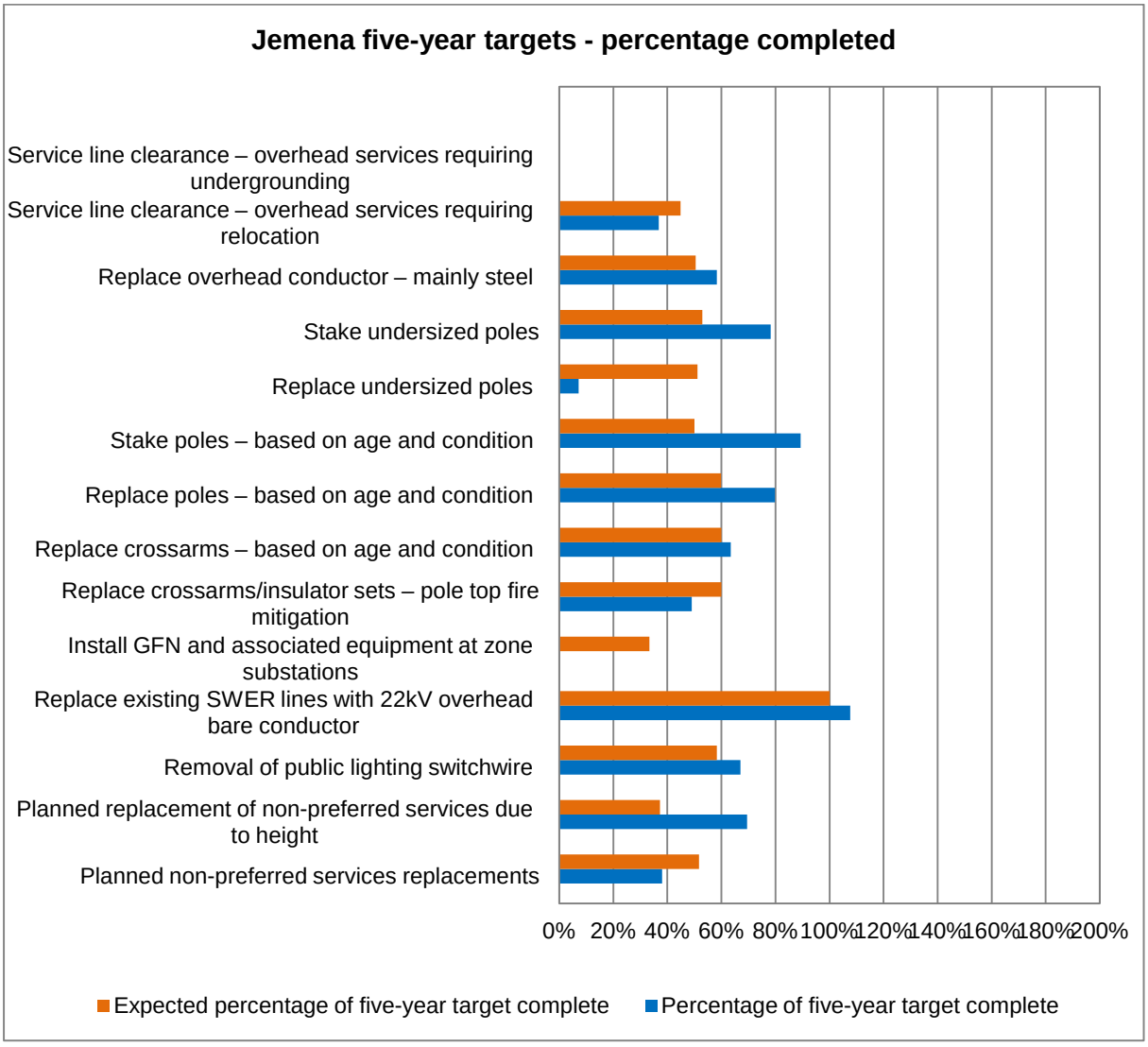

Figure 7: Jemena progress of safety-related programs

Safety program status: SP AusNet distribution

SP AusNet reported on the progress of 10 safety programs.

Progress on six of the programs is ahead of SPA's forecast:

- Replace or upgrade three-phase ACR controllers
- Replace all SWER OCRs,
- Targeted bird and animal proofing in HBRA
- Targeted replacement of EDOs
- Replace HV pin type insulator sets – pole top fire mitigation
- Crossarm replacement

Progress on two of the programs is in line with SPA's forecast:

- Augment spans (u/g, relocate, ABC) – Overhanging trees in HBRA
- Pre-emptive replacement of copper conductor

Progress on two of the programs is behind of SPA's forecast:

- Targeted replacement of EDO fuse tubes
- Pre-emptive replacement of steel conductor

It is pleasing to see that all of the programs except two are on or ahead of forecast, especially the crossarm and HV fuse replacement programs. The targeted replacement of 11,246 EDO fuse tubes that commenced in 2013 is behind target. The pre-emptive replacement of steel conductor is marginally behind target and ESV does not consider this to be a serious issue.

Based on the information provided, and performance to date, ESV expects SP AusNet to achieve all of the original safety programs proposed to the AER and agreed with ESV by the end of 2015.

Program	Measure	2013 SPA forecast	2013 completed to date	Program target	Comments
Augment spans (u/g, relocate, ABC) – Overhanging trees in HBRA	Number of spans	1070	968	2000	Program is 9% behind SPA forecast
Replace or upgrade 3-phase ACR controllers	Number of units upgraded or replaced	118	234	234	Program is 98% ahead of SPA forecast
Replace all SWER OCRs	Number of OCRs replaced	250	283	525	Program is 13% ahead of SPA forecast
Targeted bird and animal proofing in HBRA	Number of asset sites fauna proofed	4568	6145	6000	Program is 35% ahead of SPA forecast
Targeted replacement of EDO fuse tubes	Number of EDO fuse tubes replaced	3380	1349	11,246	Program is 60% behind SPA forecast
Targeted replacement of EDOs	Number of EDOs replaced	10,820	13,147	20,339	Program is 22% ahead of SPA forecast
Replace HV pin type insulator sets – pole top fire mitigation	Number of insulator sets replaced	2166	3018	5650	Program is 39% ahead of SPA forecast
Pre-emptive replacement of copper conductor	Kilometres of conductor	112	117	284	Program is 4% ahead of SPA forecast
Pre-emptive replacement of steel conductor	Kilometres of conductor	793	704	1771	Program is 11% behind SPA forecast
Crossarm replacement	Number of crossarms replaced	29,659	35,914	46,785	Program is 21% ahead of SPA forecast

Table 13: SP AusNet distribution safety program status

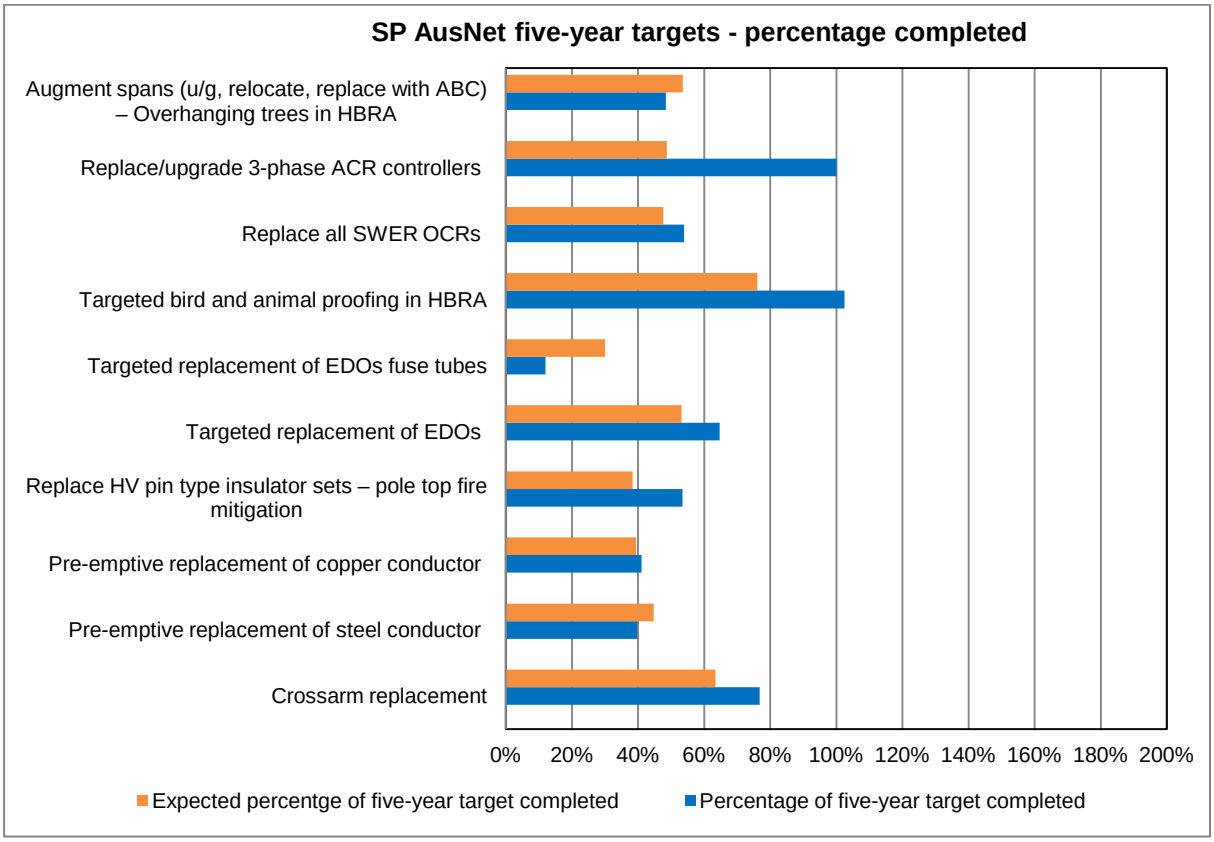

Figure 8: SP AusNet distribution progress of safety-related programs

Directions and exemptions

Following the acceptance by government of the recommendations made by the 2009 Victorian Bushfires Royal Commission, ESV issued a number of directions to the distribution MECs to improve the safety of overhead electric lines. These directions, and other changes made following Black Saturday, required the distribution MECs to initiate changes to their asset management programs. Additional changes were also made to Electric Line Clearance Regulations in 2010. As many of the altered regulatory requirements could not be met immediately, ESV issued exemptions and approved a transition program designed to ensure that staged compliance could be achieved within the approved timeframe, ranging from three to five years.

The progress of exemption and direction programs is reported to ESV quarterly. It is reviewed and audited regularly as part of the formal, annual BFM, ELC and ESMS audit programs and informally during quarterly ESMS steering committee meetings with each of the MECs.

Powercor was issued with a number of VBRC-related directions by ESV associated with BFM. Progress on two of the directions was on target and progress on one of the directions was behind target.

At the start of the period Powercor had four exemptions from current regulatory requirements. One was successfully completed prior to 2013, one was completed in 2013 and two programs were behind ESV projections. Based on the information provided to ESV,

for Powercor to achieve all of the agreed ESV exemption and direction targets, Powercor would need to ramp up its activities significantly from the progress reported to date.

In August 2012, CitiPower and Powercor notified ESV that they had delayed their line clearance programs and in December 2012, applied for an amendment to the exemption that had been granted by ESV. The progress of their cyclic clearing programs to December 2012 was found to be consistent with the revised completion percentages contained in the application, and it became apparent that both CitiPower and Powercor would not achieve the original targets for these exemptions. In September 2013 both distribution MECs were granted a 12-month extension to their exemption timeframe, until December 2014.

ESV also granted exemptions to Powercor for the requirement to maintain a clearance space in accordance with the Code of Practice for Electric Line Clearance as specified in the Electricity Safety (Electric Line Clearance) Regulations 2010 for:

- the township of Ballan
- Moreys Rd, Nullaware
- Chute Rd, Waterloo.

United Energy was issued with three VBRC-related directions by ESV associated with BFM. It is pleasing to report that progress on all VBRC-related programs is well ahead of United Energy's initial projections.

At the start of the period United Energy had five exemptions from current regulatory requirements and associated programs and these are all on or ahead of United Energy's initial projections.

Based on the information provided to date, ESV expects United Energy to achieve all of the agreed ESV exemption and direction targets.

Jemena was issued with three VBRC-related directions by ESV associated with BFM. Progress on these programs is broadly in line with Jemena's initial projections, with the direction relating to the survey of HV spans complete, the fitting of vibration dampers ahead of projection and the fitting of armour rods slightly behind those projections.

Jemena has provided a revised forecast for the number of vibration dampers and armour rods to be installed based on the results of its inspection program, and ESV expects that Jemena will achieve the revised safety program forecasts within the agreed timeframe.

At the start of the period Jemena had three exemptions from current regulatory requirements and associated programs. One of these programs was ahead and two were progressing in line with Jemena's projections.

Based on the information provided to date, ESV expects Jemena to achieve all of the agreed ESV exemption and direction targets.

SP AusNet was issued with three VBRC-related directions by ESV associated with BFM. Progress on these programs is in line with SP AusNet's initial projections.

At the start of the period SP AusNet had three exemptions from current regulatory requirements and associated programs. Two of these programs were progressed in line with the SP AusNet projections. The program for the cyclic clearing of bare electric lines in low bushfire risk areas was behind the projection for the period, but it is understood to now be on track.

ESV granted an exemption to SP AusNet for the requirement to maintain a clearance space in accordance with the Code of Practice for Electric Line Clearance as specified in the Electricity Safety (Electric Line Clearance) Regulations 2010 for overhead electric lines fitted covered conductor or insulating covers.

Based on the information provided to date, ESV expects SP AusNet to achieve all of the agreed ESV exemption and direction targets.

Directions and exemptions: CitiPower

In September 2013, ESV amended the exemption granted to CitiPower and extended the completion date for CitiPower to complete the cyclic clearing of electric lines by one year. The progress of cyclic clearing to December 2013 was found to be consistent with the revised completion percentages contained in the application.

CitiPower reported on the progress of three exemptions.

Progress on one of the exemptions is ahead of target:

- Cyclic clearing – Powerlines

Progress on one of the exemptions is on target:

- Cyclic clearing – ABC or insulated cable

Progress on one exemption is complete:

- Overhanging trees (cut) – completed in 2011

While both cyclic clearing programs were marginally behind schedule, ESV is satisfied that this does not result in an increased safety risk.

Based on the information provided, and performance to date, ESV expects that CitiPower will meet the targets as agreed with ESV.

Program	Measure	2013 target to date	2013 completed to date	Program target	Comments
Cyclic clearing – ABC or insulated cable	Per cent of spans	75%	83%	100%	Program is 8% ahead of schedule
Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)	Per cent of spans	75%	87%	100%	Program is 12% ahead of schedule
Overhanging trees (cut)	Per cent of spans	100%	100%	100%	Program was completed in 2011

Table 14: CitiPower exemptions status

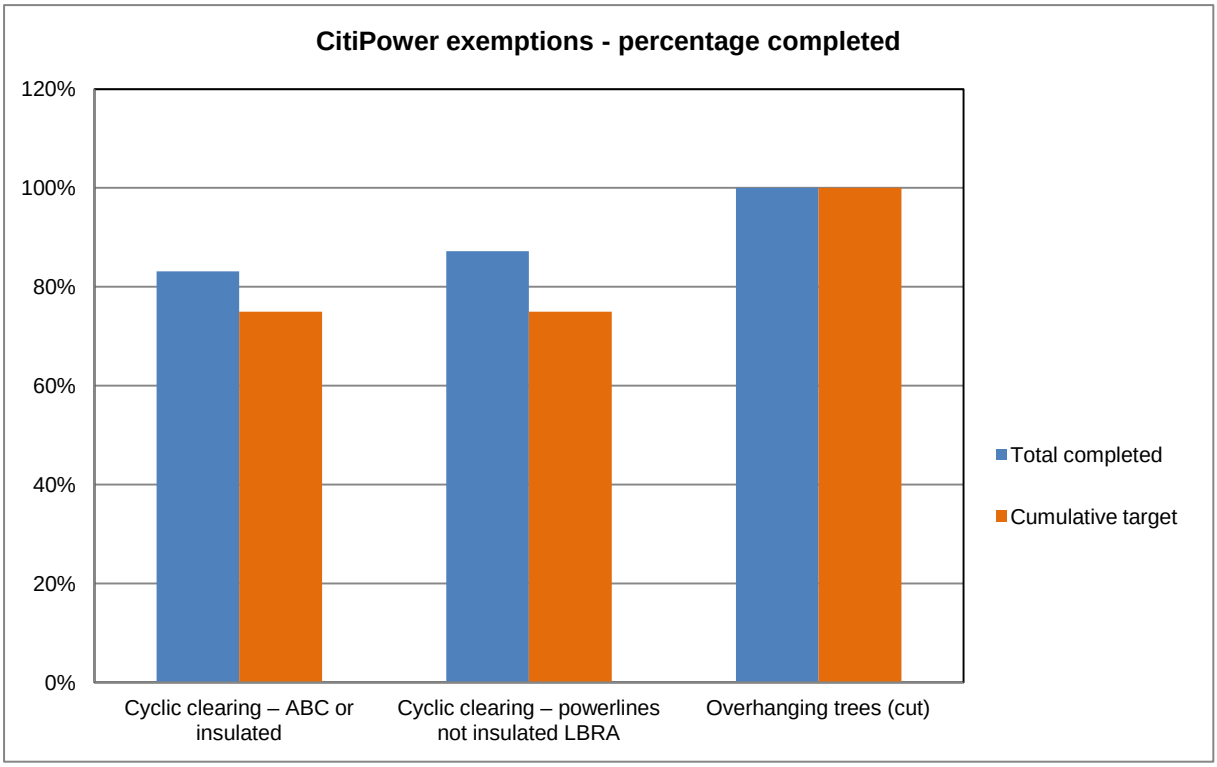

Figure 9: CitiPower progress of exemptions

Directions and exemptions: Powercor

In September 2013, ESV amended the exemption granted to Powercor, and extended the completion date for Powercor to complete the cyclic clearing of electric lines by one year.

The progress of cyclic clearing to December 2013 was found to be consistent with the revised completion percentages contained in the application.
Powercor reported on the progress of three directions and four exemptions.

Progress on two of the directions is on target:

- Vibration dampers – HBRA
- Armour rods – HBRA

Progress on two of the exemptions is behind target :

- Cyclic clearing – ABC or insulated cable (all areas)
- Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)

Progress on one of the directions is behind target:

- Survey of HV spans (clearances) – HBRA

Progress on two of the exemptions has been completed :

- Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)
- Overhanging trees (cut) – completed in 2011

Powercor notified ESV that it had delayed its ELC program and in December 2012 applied for an amendment to the exemption granted, seeking to extend the completion date by one

year. The progress of cyclic clearing to December 2012 was found to be consistent with the revised completion percentages contained in the application.

Powercor's directions program commenced with inspection and assessment of each HV span in HBRAs. The installation targets were set prior to the detailed development of the project and were based on an estimate using a small sample. Information received from Powercor indicates that they may have overestimated the number of vibration dampers and armour rods to be installed. Powercor confirmed that armour rods and vibration dampers will be fitted at all locations as required. ESV is mindful that if the funded quantities of armour rods and vibration dampers are accurate then the direction may not be completed as required.

ESV notes that Powercor is behind schedule on the direction relating to the space between HV and HV circuits. It is ESV's view that the failure to complete this program as forecast may have adverse safety implications.

In April 2012, ESV directed Powercor to install sufficient SWER ACRs to eliminate the need to attend and manually suppress the automatic reclose function on any SWER powerline in the worst fire consequence areas of its network. Powercor complied and installed 178 new electronic SWER ACRs controlling the 179 SWER lines in the highest risk areas.

Based on the information provided, and performance to date, for Powercor to achieve all of the agreed ESV exemption and direction targets Powercor will need to ramp up its activities from the progress reported to date.

Program	Measure	2013 to date	2013 completed to date	Program target	Comments
Survey of HV spans (clearances) - HBRA	Spans surveyed	2117	868	10,586	Program is 59% behind schedule
Vibration dampers - HBRA	Number of spans	35,890	34,992	197,000	Program is 3% behind schedule
Armour rods - HBRA	Number of spans	35,890	34,992	20,000	Program is 3% behind schedule
Cyclic clearing – ABC or insulated cable (all areas)	Per cent of spans	75%	61%	100%	Program is 14% behind schedule
Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)	Per cent of spans	75%	64%	100%	Program is 11% behind schedule
Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)	Per cent of spans	100%	100%	100%	Program was completed in 2013
Overhanging trees (cut)	Per cent of spans	100%	100%	100%	Program was completed in 2011

Table 15: Powercor: Directions and exemptions status

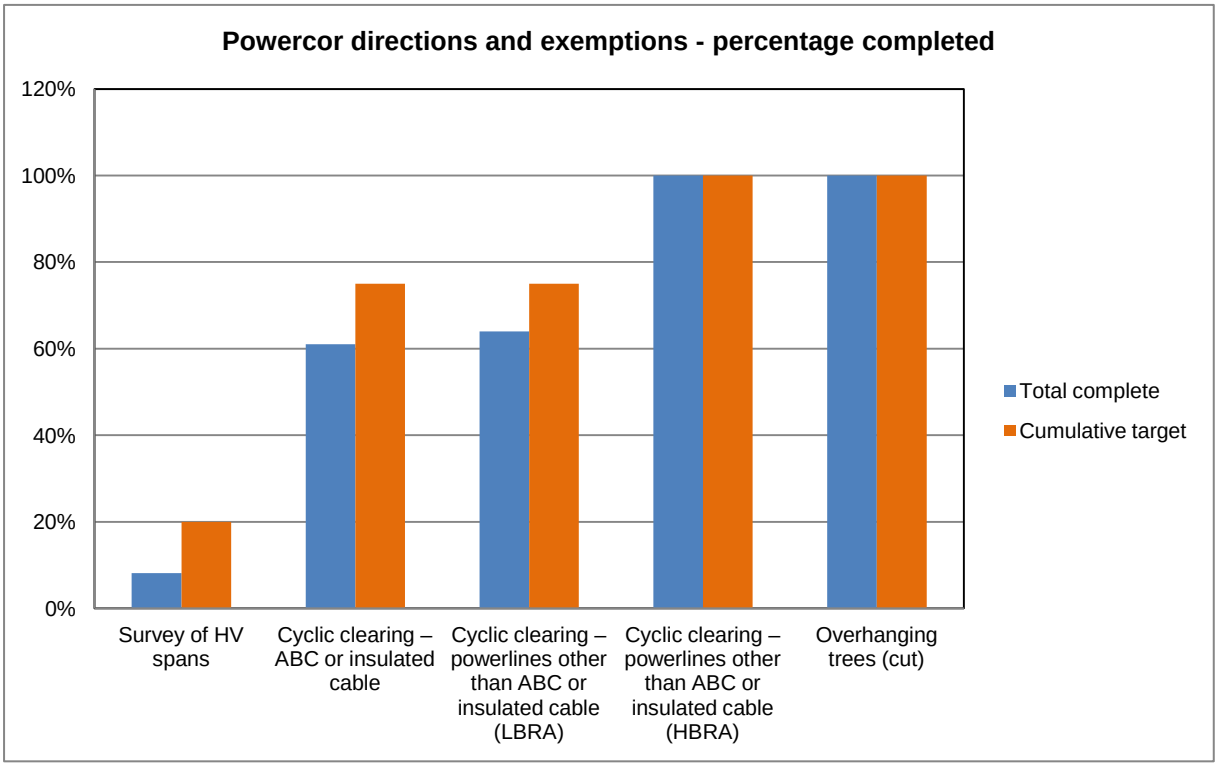

Figure 10: Powercor progress of directions and exemptions:

Directions and exemptions: United Energy

United Energy reported on the progress of three directions and five exemptions.

United Energy's program is to inspect all HV spans in their HBRA and install armour rods and vibration dampers as required. This inspection process is ahead of target, Armour rods or vibration dampers have been installed at all locations identified as requiring an armour rod or a vibration damper.

Progress on three directions is on target:

- Fitting of vibration dampers (HBRA)
- Fitting of armour rods (HBRA)
- Survey of HV Spans

Progress on two exemptions is behind target

- Overhanging Trees (cut) - Powerlines other than ABC and insulated cables (LBRA)
- Overhanging Trees (cut) - Powerlines other than ABC and insulated cables (HBRA)

Progress on three exemptions has been completed:

- Cyclic clearing – ABC or insulated cable (all areas)
- Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)
- Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)

Based on the information provided to date, ESV expects United Energy to achieve all of the targets agreed with ESV.

Program	Measure	2013 target to date	2013 completed to date	Program target	Comments
Fitting of vibration dampers (HBRA)	Number of spans surveyed	837	837	As Required	Program is on schedule. Not included in graph
Fitting of armour rods (HBRA)	Number of spans surveyed	849	849	As Required	Program is on schedule. Not included in graph
Survey of HV spans (clearances)	Number of spans surveyed	9801	10299	19602	Program 5% ahead of schedule
Cyclic clearing – ABC or insulated cable (all areas)	Per cent of spans	100%	100%	100%	Program was completed in 2013
Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)	Per cent of spans	100%	100%	100%	Program was completed in 2013
Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)	Per cent of spans	54%	100%	100%	Program was completed in 2013
Overhanging trees (cut) - Powerlines other than ABC and insulated cables (LBRA)	Number of spans	54%	40%	100%	Program is 14% behind schedule
Overhanging trees (cut) - Powerlines other than ABC and insulated cables (HBRA)	Number of spans	60%	22%	100%	Program is 38% behind schedule

Table 16: United Energy directions and exemptions status

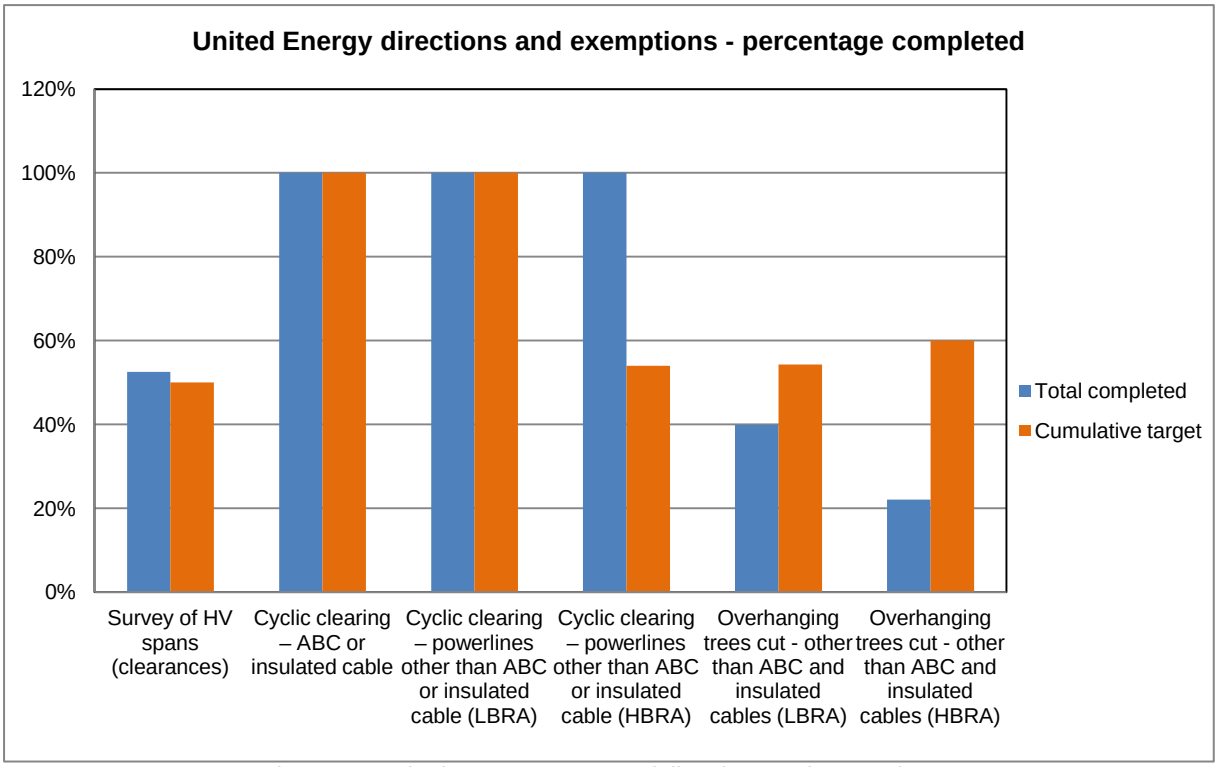

Figure 11: United Energy progress of directions and exemptions

Directions and exemptions: Jemena

Jemena reported on the progress of two directions and three exemptions.

Progress on two of the directions is on target:

- Fitting of armour rods (HBRA)
- Fitting of vibration dampers (HBRA)

Progress on three of the exemptions has been completed:

- Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)
- Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)
- Cyclic clearing – ABC or insulated cable (all areas)

Jemena also had an annual program to confirm that all of the required spacers were in place and functional prior to 1 November. Progress on this program was not reported to ESV.

The program to fit armour rods was found to be on target despite fewer armour rods being fitted than forecast. Jemena's asset inspection identified that fewer armour rods were required. The number of spans that required remediation had been over-estimated by Jemena and they have confirmed that armour rods will be fitted to all spans as required, allowing the desired safety outcome to be achieved by the agreed date.

Based on the information provided to date, ESV expects Jemena to achieve all of the targets agreed with ESV.

Program	Measure	2013 target to date	2013 completed to date	Program target	Comments
Fitting of armour rods (HBRA)	Number of spans	3500	1615	5100	Program is 54% behind schedule
Fitting of vibration dampers (HBRA)	Number of spans	3500	2430	5100	Program is 30% behind schedule
Cyclic clearing – ABC or insulated cable (all areas)	Per cent of spans	100%	100%	100%	Program was completed in 2013
Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)	Per cent of spans	100%	100%	100%	Program was completed in 2013
Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)	Per cent of spans	100%	100%	100%	Program was completed in 2013

Table 17: Jemena directions and exemptions status

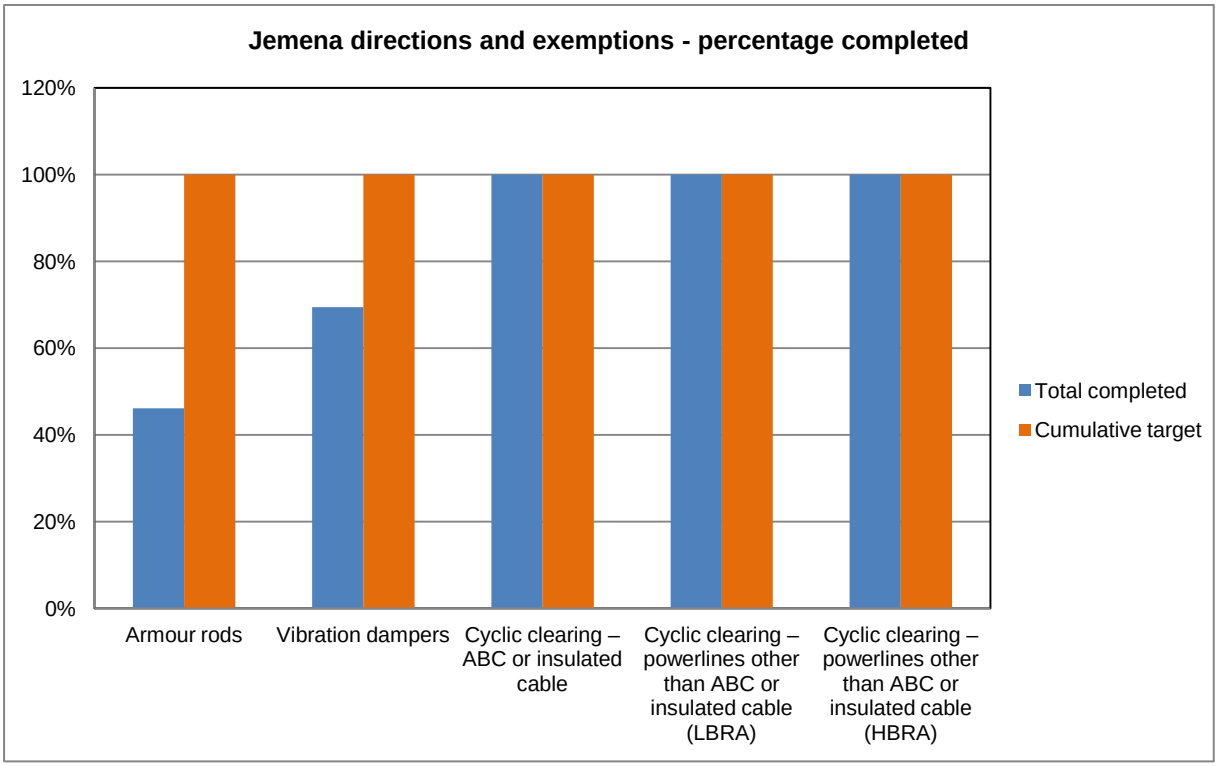

Figure 12: Jemena progress of directions and exemptions

Directions and exemptions: SP AusNet

SP AusNet reported on the progress of three directions and three exemptions.

Progress on the three directions is on target

- Fitting of armour rods (HBRA)

- Fitting of dampers (HBRA)
- Fitting of HV spacers (HBRA)

Progress on the three exemptions is complete:

- Cyclic clearing – ABC or insulated cable (all areas)
- Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)
- Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)

Based on the information provided to date, ESV expects SP AusNet to achieve all of the targets agreed with ESV.

Program	Measure	2013 target to date	2013 completed to date	Program target	Comments
Fitting of armour rods (HBRA)	Number of spans	15,009	15,517	59,645	Program is 3% ahead of schedule
Fitting of vibration dampers (HBRA)	Number of spans	15,009	15,517	59,645	Program is 3% ahead of schedule
Fitting of HV & LV spacers (HBRA)	Number of Spans Inspected	5500	5394	10,242	Program is 2% behind schedule. Spacers are installed as required
Cyclic clearing – ABC or insulated cable (all areas)	Per cent of spans	100%	100%	100%	Program was completed in 2013
Cyclic clearing – Powerlines other than ABC or insulated cable (LBRA)	Per cent of spans	97%	100%	100%	Program was completed in 2013
Cyclic clearing – Powerlines other than ABC or insulated cable (HBRA)	Per cent of spans	100%	100%	100%	Program was completed in 2013

Table 18: SP AusNet: Directions and exemptions status

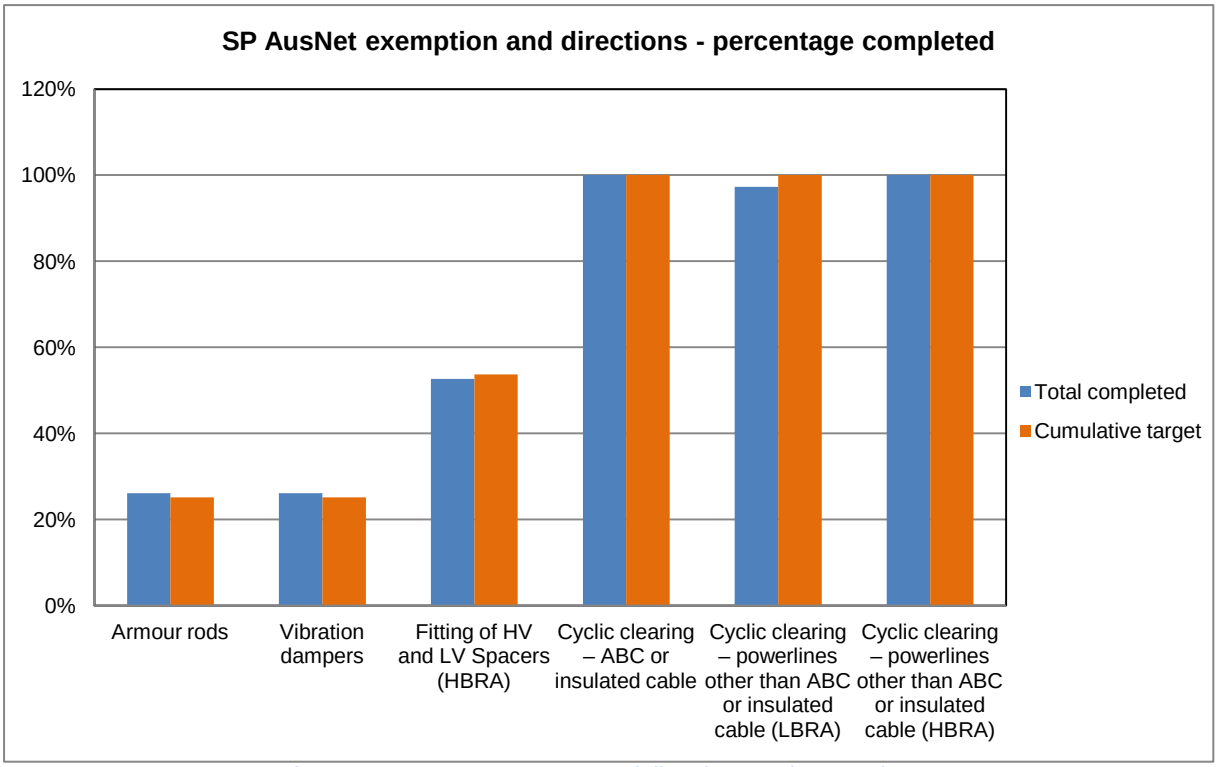

Figure 13: SP AusNet progress of directions and exemptions

Safety indicators: Network

ESV reports on MEC data that provides an indication of the safety performance of the Victorian electricity network.

Lead indicators:

- progress of the distribution network safety programs
- progress of directions placed on the distribution MECs
- management of exemptions granted to the distribution MECs
- degree of MEC compliance (ESMS, BFM, ELC) identified by ESV audits.

Lag indicators:

- number of asset failures
- number of fires started by the MEC assets, particularly in HBRAs
- effectiveness of MEC electric line maintenance programs in preventing asset failures and fires, particularly in HBRAs
- extent to which community safety was impacted by persons infringing the No Go Zone limits or gaining unauthorised access to MEC assets
- number and severity of electrical incidents attributable to MEC assets.

Key performance indicator	Measure	Annual target	2013 performance
Safety of the electricity network	AER; Fires due to electricity network (f-factor)	< 870	925
	AER; Number of vegetation fires (five-year average)	< 157	298
	AER; Number of asset fires (five-year average)	< 693	612
	Number of asset failures (2011 vs 2013)	< 1119	2269
	Number of vegetation outages HBRA (2011 vs 2013)	< 129	115
	Number of vegetation outages LBRA (2011 vs 2013)	< 3352	3003

Table 19: Network safety indicators

CAPEX and OPEX programs

The MECs have established network development, replacement and maintenance programs to improve network reliability and reduce the probability of network assets creating a safety hazard or starting a fire. These programs address:

- conductor failure, complete or partial separation of electric wires
- pole failure, leaning or fallen conductor support structure to the point where the live conductors have become a hazard
- neutral service cable connection failure, complete or partial separation of electric wires or an increase in the impedance of the service cable connection
- crossarm failure, complete or partial deterioration of the crossarm wood to the point where the live conductors have become a hazard
- HV fuse failure, complete or partial failure of any of the components of the fuse assembly; and
- BFM, the status of the components most commonly associated with fire ignition.

With all the capital (CAPEX) and operations (OPEX) expenditure of the network and the effort that has been put into condition assessment and asset replacement over the past few years, ESV would expect to see a reduction in the number of asset failures. Despite targeted programs, the number of asset failures has increased, especially power pole top, HV fuse, LV asset and bare conductor or HV ties. The failure rate remains high and a major cause of asset and vegetation fires. To reduce the failure rate of these assets, and the continuing risk to the community and its employees, the industry may need to review its risk-based and condition-based assessment techniques for the replacement of assets that are approaching the end of their useful life.

Asset failure may render the asset or parts of the network inoperable, result in an asset fire or result in vegetation fire. The total number of asset failures has increased from 1119 in 2011 to 2269 in 2013, an increase of 103 per cent in two years.

Item	Total	CitiPower	Powercor	Jemena	United Energy	SP AusNet
Pole top failure	892	20	420	76	250	126
LV asset failure	661	33	141	161	131	195
HV fuse failure	319	2	215	1	15	86
Conductor or HV tie failure	228	5	90	10	31	92
Pole failure	40	1	20	4	5	10

Table 20: Powerline performance by distributors

Item	Total	SP AusNet	Basslink	TOA
Conductor failure	0	0	0	0
Tower failure	0	0	0	0

Table 21: Powerline performance by transmission businesses

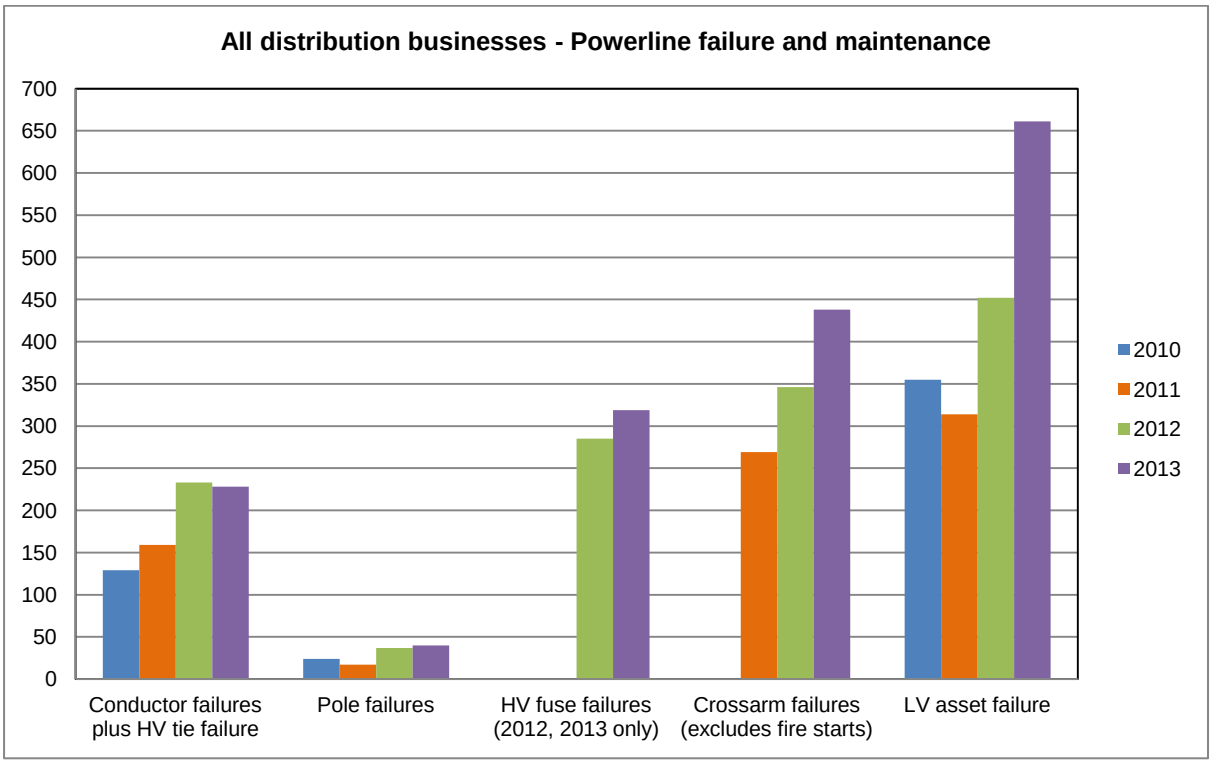

Figure 14: All distribution businesses - Powerline failure and maintenance

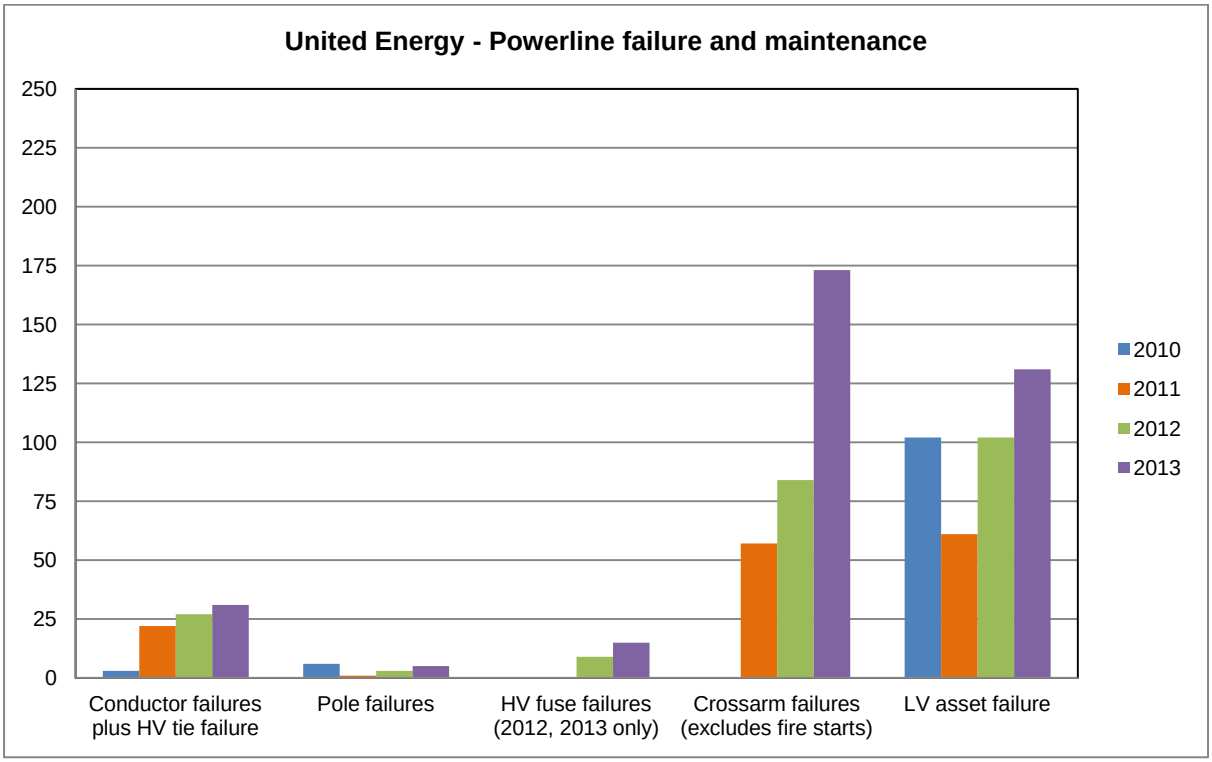

Figure 15: United Energy - Powerline failure and maintenance

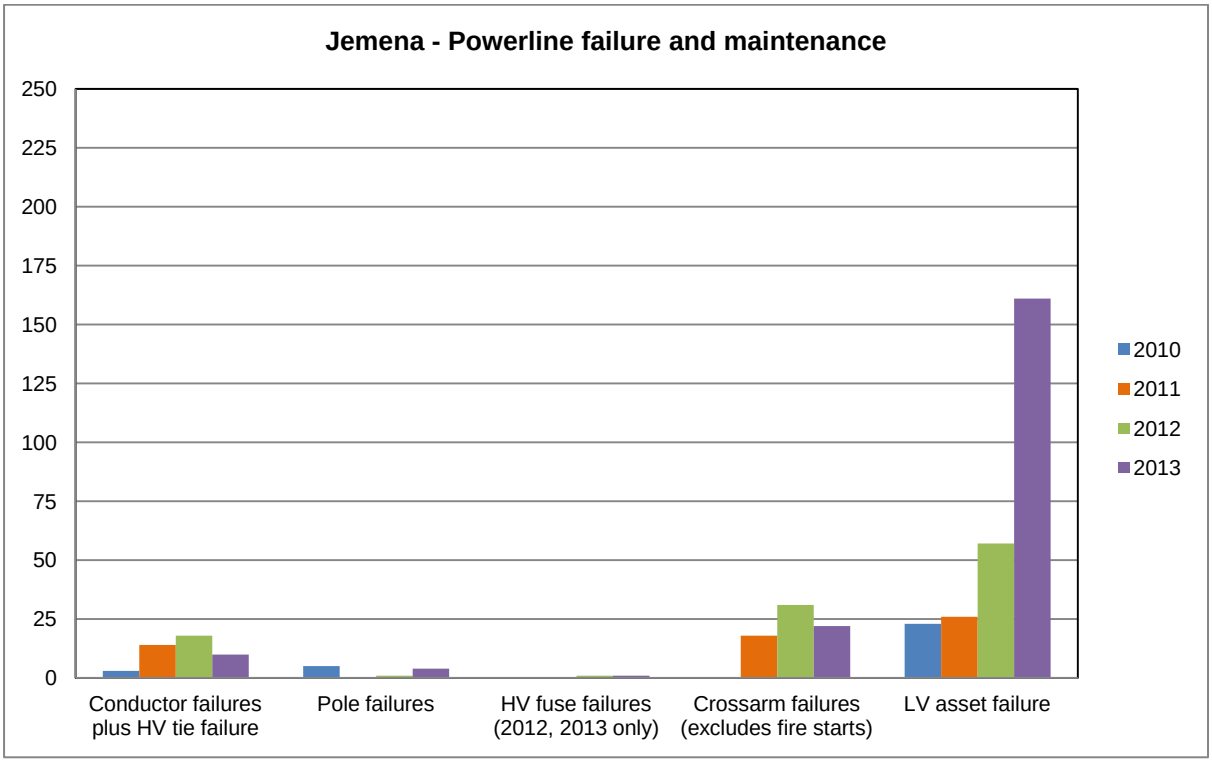

Figure 16: Jemena - Powerline failure and maintenance

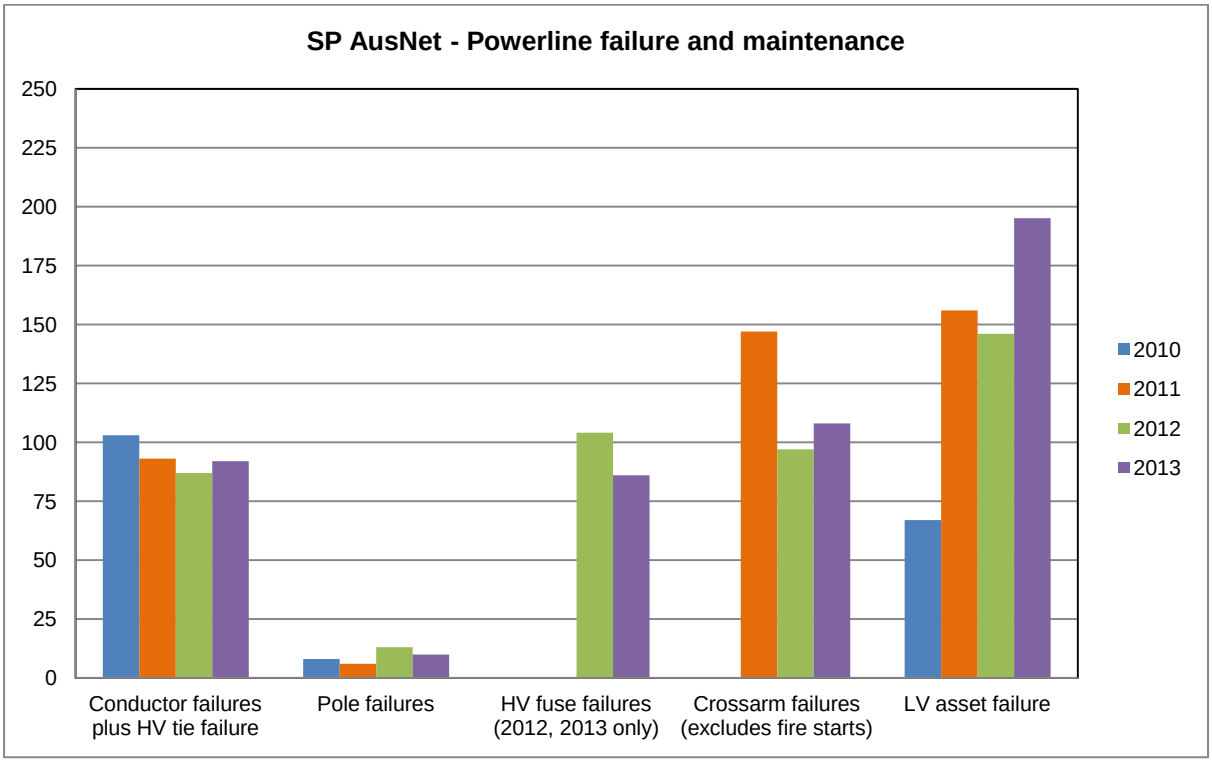

Figure 17: SP AusNet - Powerline failure and maintenance

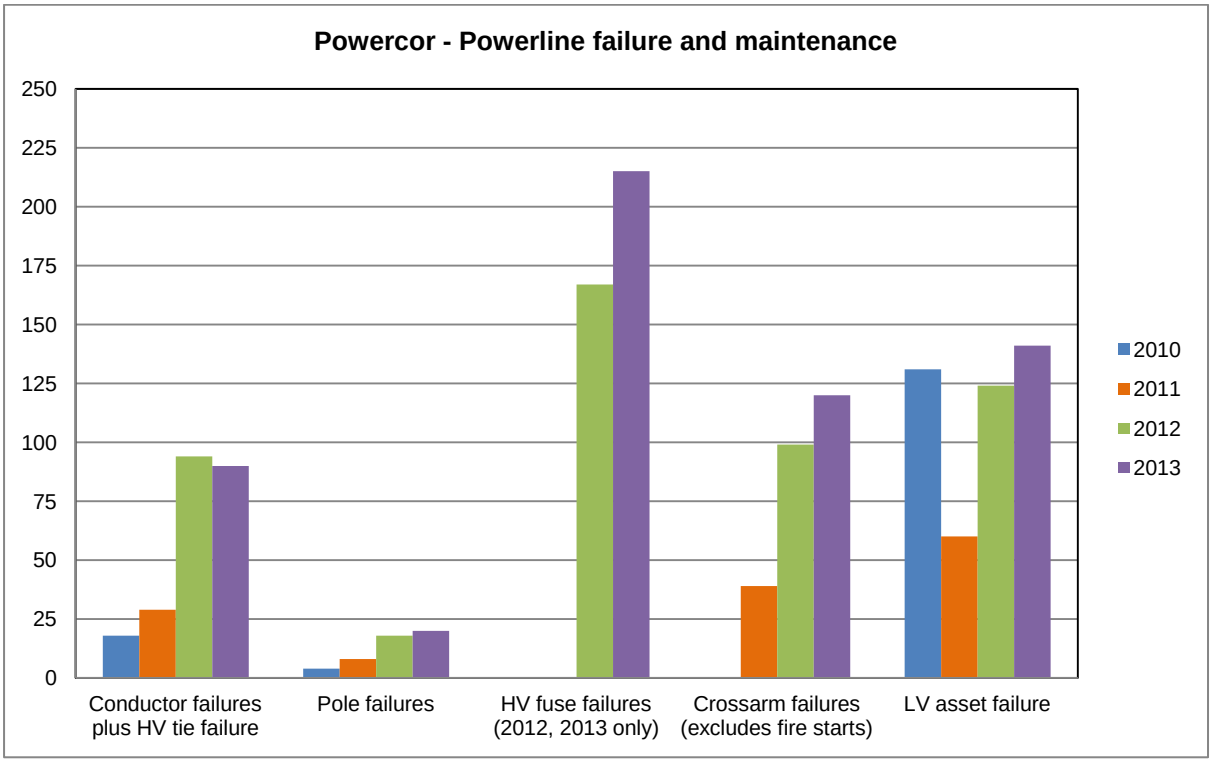

Figure 18: Powercor – Powerline failure and maintenance

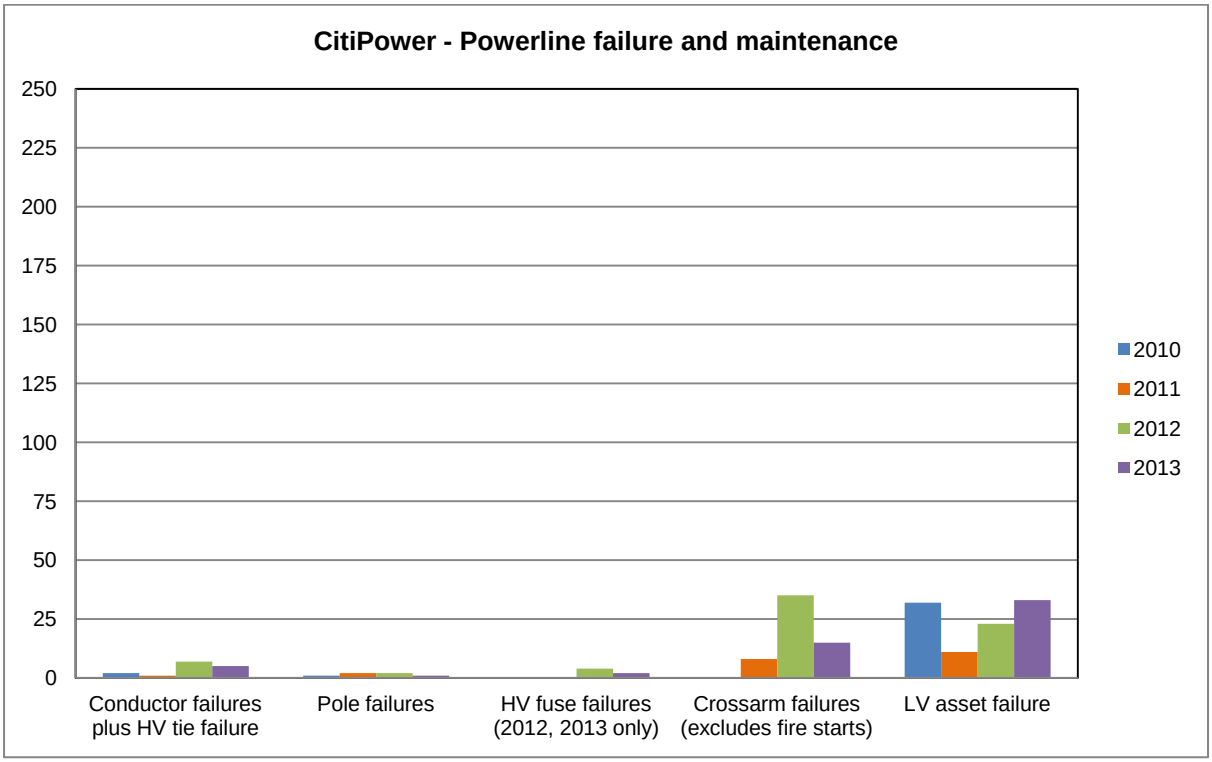

Figure 19: CitiPower - Powerline failure and maintenance

Asset failures and fires caused by electricity network assets

The operation or failure of electrical network assets, as well as contact with the electrical network, have the potential to initiate a fire. The probability and consequence of the fire initiation is a function of the physical location of the fire source, the surrounding vegetation and the prevailing weather conditions; wind speed, wind direction, humidity and temperature.

The weather in 2013 was hotter than in previous years, with more TFB days and average annual rainfall. Some of the increase in the number of fires in both vegetation and poles and crossarms can be attributed to the prevailing weather conditions over the 2013 summer increasing the probability of fire ignition.

The total number of fire starts "tracks" the number of TFB days.

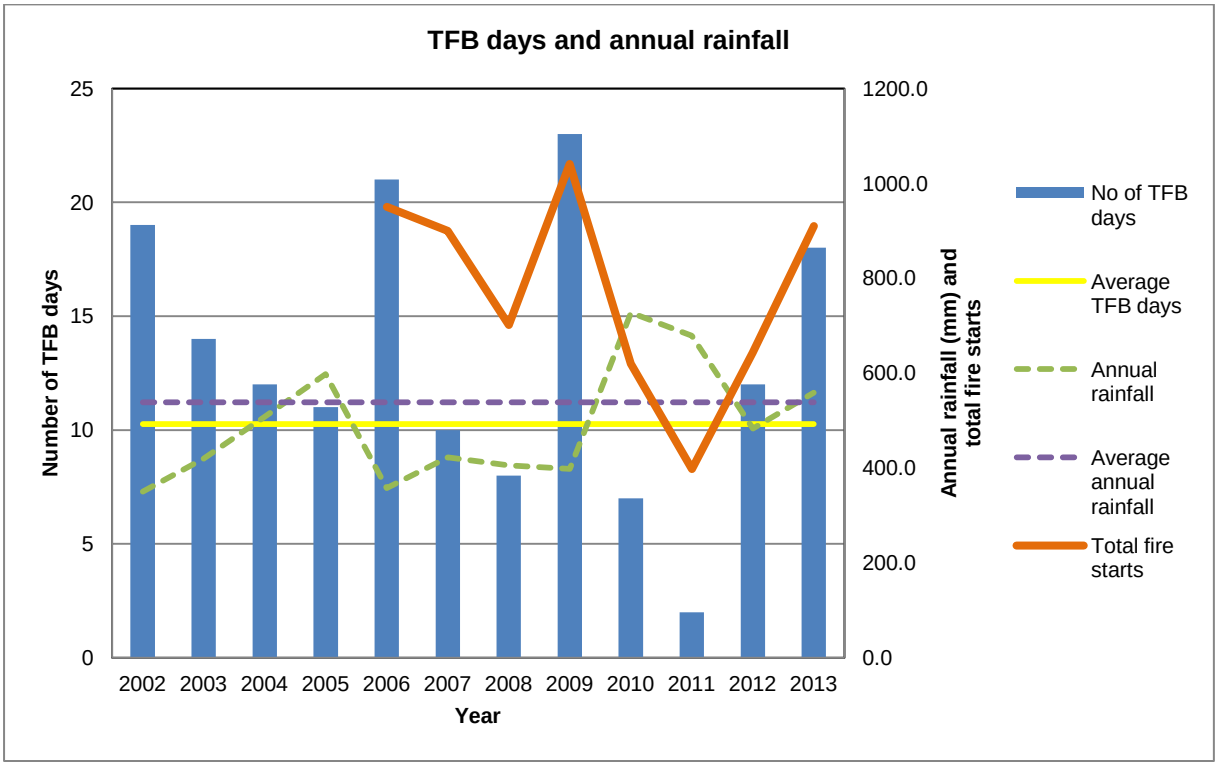

Figure 20: Number of TFB days declared by CFA and annual rainfall data

[Melbourne Airport; recent data from the Bureau of Meteorology; annual rainfall, the number of TFB days declared by the CFA (used as a proxy to indicate dry conditions) and the long-term (40-year) averages.]

In 2013 the actual number of fires was 925, which exceeded the f-factor target of 870 fires.

Distributor	F-factor target (per annum)	f-factor fires (2013 actual)
CitiPower	30.4	33
Jemena	56.8	91
Powercor	401.8	498
SP AusNet	256.8	176
United Energy	124.2	127
TOTAL	**870**	**925**

Table 22: f-factor scheme fire start targets / 2013 performance

Source *Final determinations and explanatory statement F-factor scheme determinations 2012-15 for Victorian electricity distribution network service providers, 22 December 2011. AER fire start reports refer to:* http://www.aer.gov.au/node/25673

While the total number of fires exceeds the annual f-factor target, the five-year moving average (722) is less that the f-factor target (870).

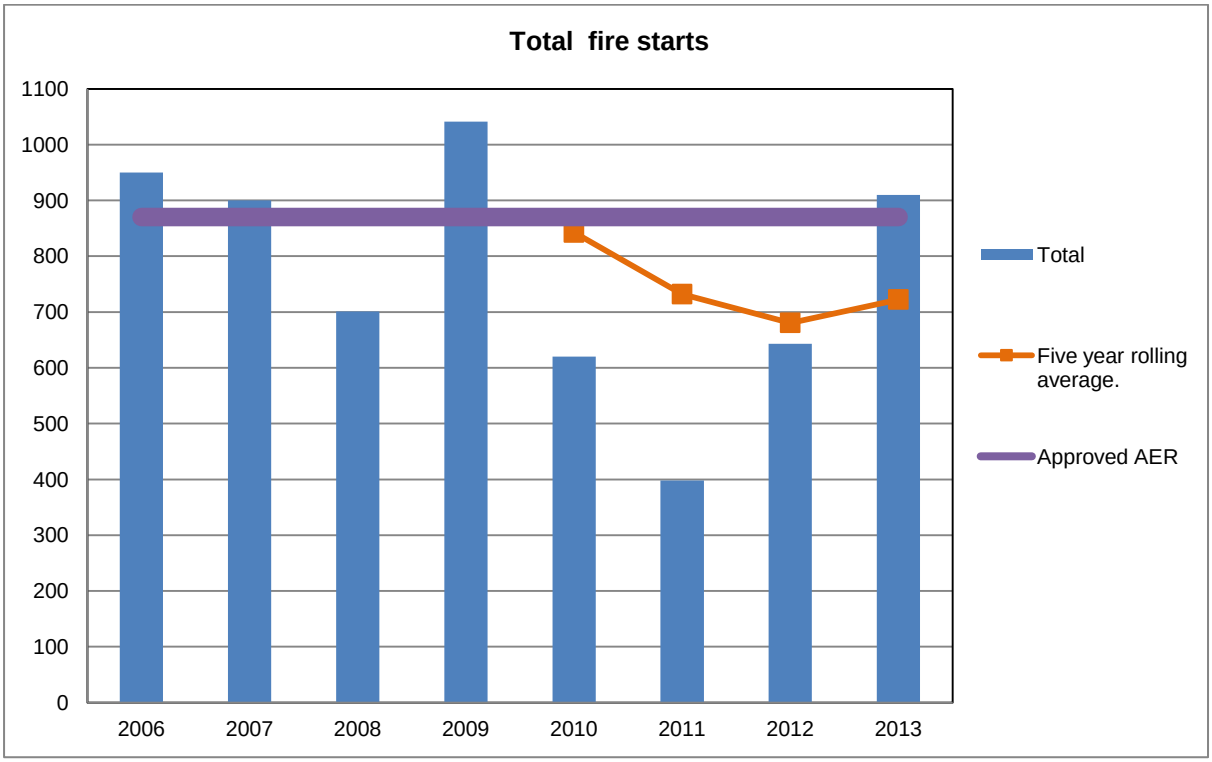

Figure 21: Total number of fires

All fires due to asset failure or contact with assets
In 2013, the MECs reported that since 2011:

- the total number of fires increased from 398 to 925 (132 per cent increase).
- the total number of fires caused by asset failure increased from 341 to 780.
- the total number of fires caused by contact with assets increased from 57 to 130.

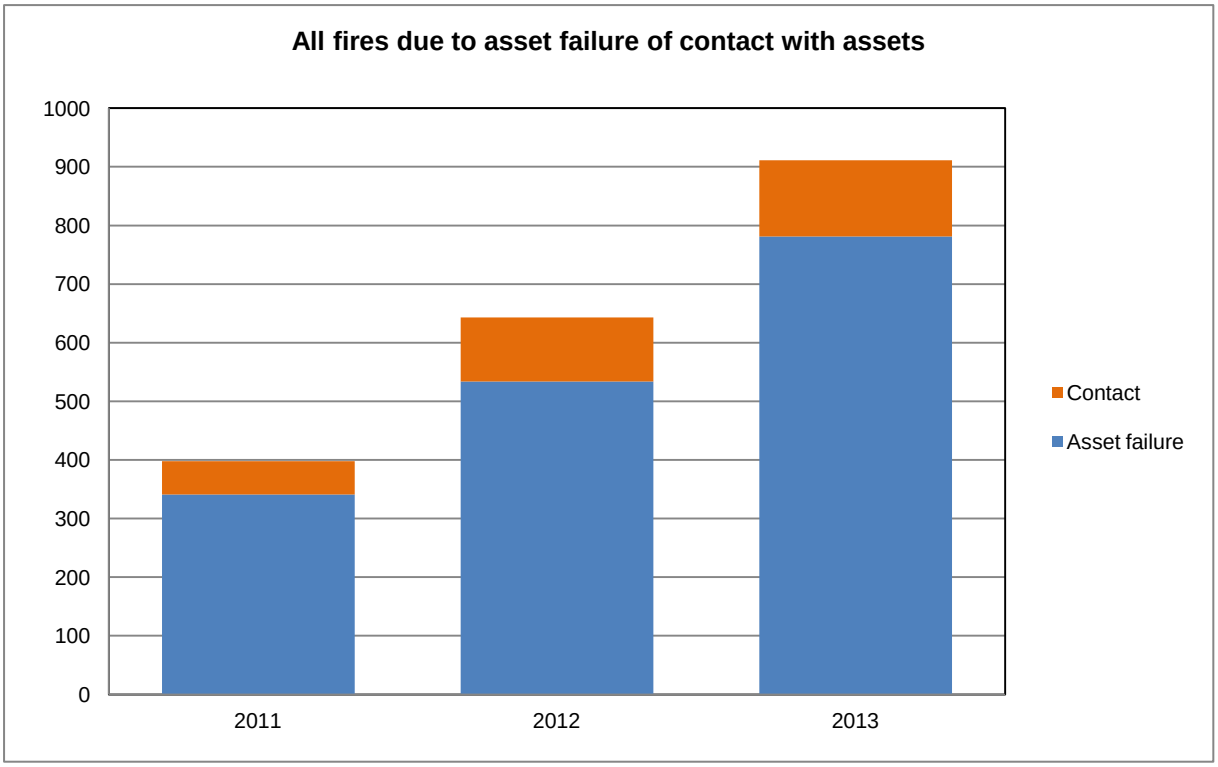

Figure 22: All fires due to asset failure or contact with assets

Jemena and Powercor exceeded their annual f-factor targets by 55 per cent and 21 per cent respectively, while SP AusNet improved on its f-factor target by 32 per cent.

Based on pole population, Powercor contributed a disproportionately high number of fires (54 per cent), and SP AusNet contributed a disproportionately low number of fires (19 per cent).

Vegetation fires due to asset failure or contact with assets

In 2013, the MECs reported that since 2011:

- the total number of vegetation fires increased from 99 to 298 (201 per cent increase)
- the number of vegetation fires caused by asset failures increased from 42 to 168
- the number of vegetation fires caused by contact with assets increased from 57 to 130
- trees caused 60 (46 per cent) vegetation fires (a marginal increase from 56 in 2012).
- HV fuses and poles or crossarms caused 63 (38 per cent) vegetation fires (an increase from 20 in 2011).
- LV fuses and equipment caused 54 (32 per cent) vegetation fires (an increase from 39 in 2012).

It should be noted that even vegetation located well outside the vegetation clearance space can cause a fire.

Photo 1: Hazard tree located outside of the easement fell into 66kV electric line and started a fire.

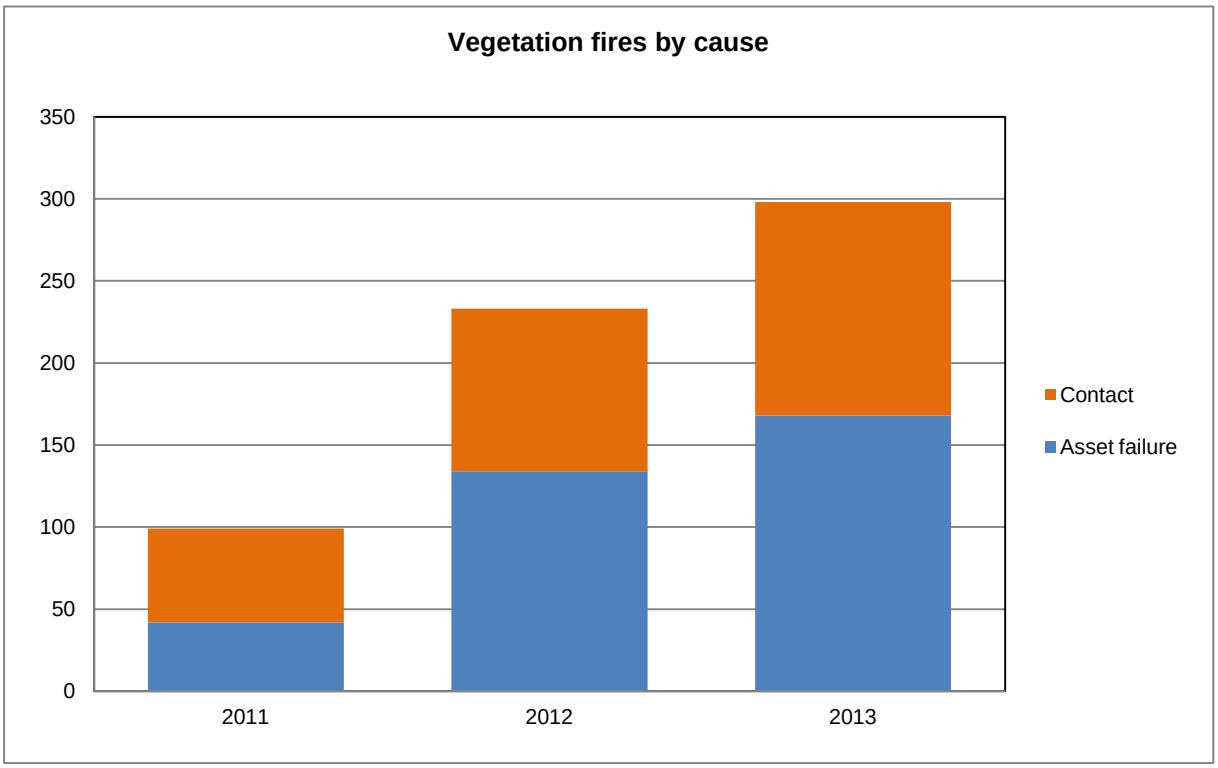

Figure 23: Vegetation fires by cause

CitiPower, Jemena and United Energy all exceeded the number of fire starts approved by the AER for vegetation fires by more than 300 per cent. This increase, while of concern to ESV, is off a low base and generally confined to LBRA.

Powercor and SP AusNet exceeded the number of fire starts approved by the AER for vegetation fires by 102 per cent and 13 per cent respectively. Powercor and SP AusNet's networks may be more exposed to fire risk than the other distribution MECs due to the prevailing geography (HBRAs), environmental conditions, service area and length of rural electrical distribution networks. This increase is of more concern to ESV since many of the fires occurred in HBRA.

Distribution MEC	Number of fire starts approved by the AER resulting in vegetation fires	2013 actual number of vegetation fire starts
CitiPower	2	9
Jemena	4	16
Powercor	80	162
SP AusNet	63	71
United Energy	14	39
TOTAL	**163**	**297**

Vegetation fires in HBRA and LBRA

In 2013 the MECs reported that since 2011:

- the number of vegetation fires in HBRA increased from 59 to 153 (159 per cent increase)
- the number of vegetation fires in LBRA increased from 40 to 144 (260 per cent increase)
- based on pole population, Powercor contributed a disproportionately high number of vegetation fires in HBRA (65 per cent).

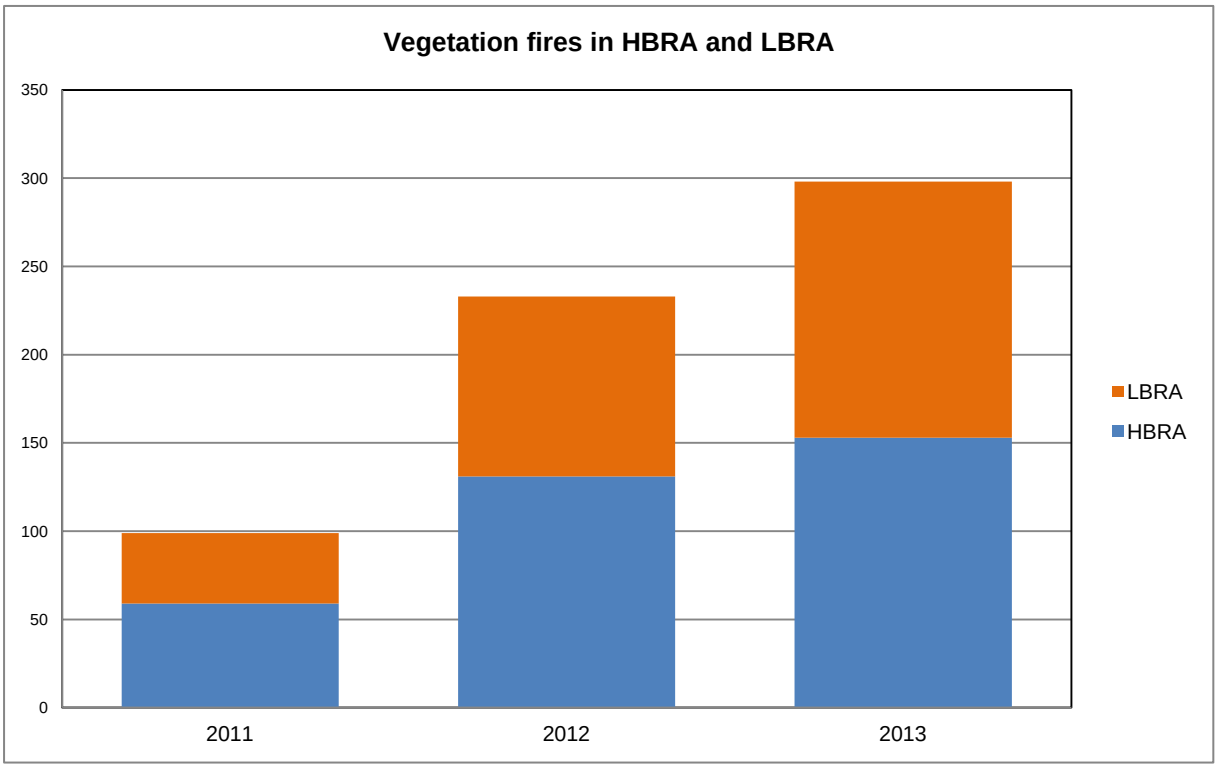

Figure 24: Vegetation fires in HBRA and LBRA

Community reaction in certain localities to the extent of consultation and the degree of tree cutting required to achieve vegetation clearance around electric lines has remained an issue for the industry. ESV raised these concerns directly with the relevant distribution MECs, focussing on the practical implementation of the improvement programs detailed in their 2013 ELCMPs, reviewed by ESV.

The management by other responsible persons of non-compliant vegetation around electric lines, in particular by municipal councils in areas where they are the responsible person remained an issue for the industry.

Information provided by the distribution MECs indicated that while the number of outages had reduced, trees continued to be a major cause of power outages. ESV vegetation audits indicated that in some areas the distribution MEC's figures were incomplete and there were many more trees in close proximity to electric lines that had gone unreported to ESV.

ESV continued its program to improve the reporting of ELC across the state by distribution MECs and other responsible persons to test, challenge, expose and improve the reliability and safety performance of electric lines near "vegetation".

Based on limited data, in 2013, the number of instances where vegetation:

- caused an outage in LBRA appeared to be 10 per cent fewer; 3003 compared with 3352 in 2012. Outages were mainly across United Energy, Jemena and SP AusNet networks
- caused an outage in HBRA appeared to be 11 per cent fewer; 115 compared with 129 in 2012. Outages were mainly across United Energy and Powercor networks
- required urgent pruning in LBRA appeared to be 38 per cent fewer; 2115 compared with 3422 in 2012. Outages were mainly across the United Energy network
- required urgent pruning in HBRA appeared to be 13 per cent fewer; 73 compared with 84 in 2012. Outages were mainly across the United Energy network.

Asset failures

In 2013, the MECs reported that since 2011:

- the total number of asset failures increased from 1119 to 2269 (103 per cent increase)
- the total number of fires caused by asset failures increased from 341 to 780
- asset failures started more vegetation fires than tree contact; 168 fires compared with 60 respectively.

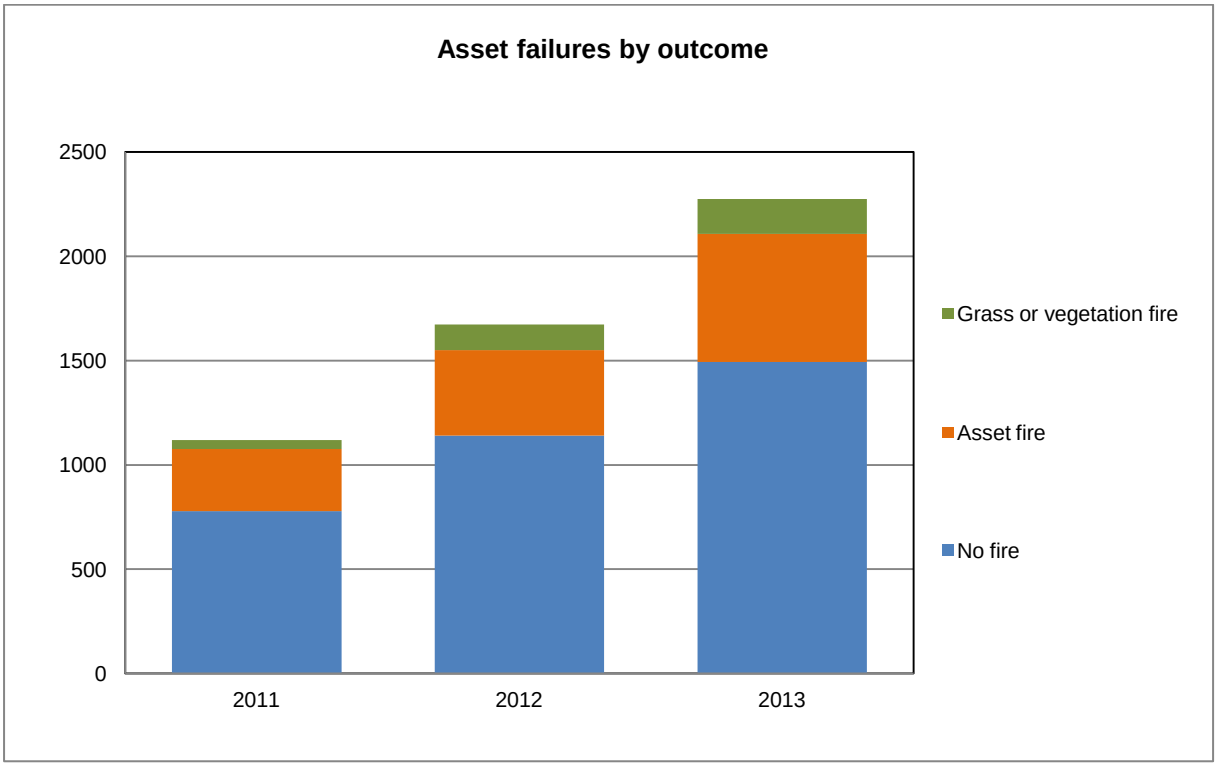

Figure 25: Asset failures by outcome

- 1251 (55 per cent) of all asset failures were due to HV fuses and pole top structures (an increase from 519 in 2011)
- 493 (80 per cent) of the asset fires (no vegetation fire) were due to HV fuses and pole top structures (an increase from 212 in 2011)
- 63 (38 per cent) of the vegetation fires were due to HV fuses and pole top structures (an increase from 20 in 2011).

The largest number of asset failures occurred in Powercor region (40 per cent) and the largest number of fires caused by asset failures occurred in Powercor region (54 per cent). Powercor's network may be more exposed to pole top fires than the other distribution MECs due to the proximity of assets to the coast, environmental conditions, and weather conditions.

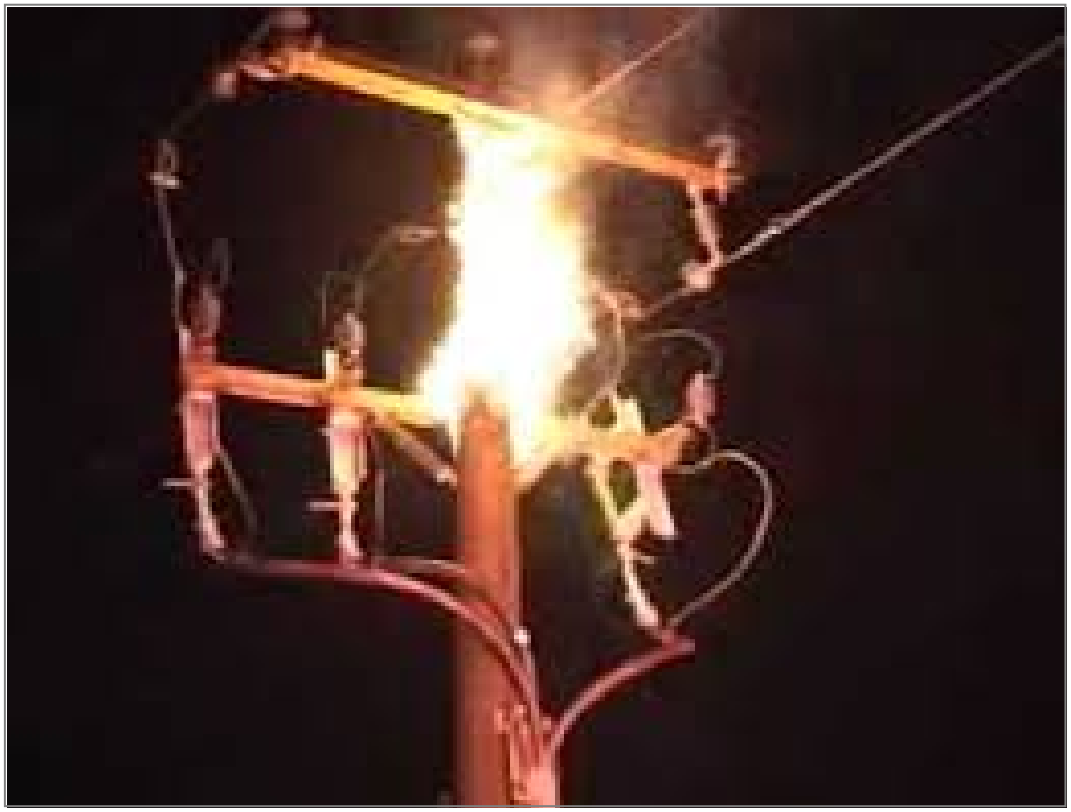

Photo 2: Pole top fire

The number of asset failures that resulted in an asset fire, in Jemena, Powercor and United Energy networks, was greater than the number of fire starts approved by the AER for asset failures resulting in an asset fire.

Distribution MEC	Number of fire starts approved by the AER for asset failures resulting in an asset fire	2013 actual number of asset failures resulting in an asset fire
CitiPower	24	23
Jemena	50	71
Powercor	302	326
SP AusNet	194	105
United Energy	84	87
TOTAL	**654**	**612**

Table 23: Number of distribution MEC asset failures resulting in asset fires

The number of asset failures that resulted in a vegetation fire, in all distributors' networks except SP AusNet and CitiPower, was greater than the number of fire starts approved by the AER for asset failures resulting in a vegetation fire.

Distribution MEC	Number of fire starts approved by the AER for asset failures resulting in a vegetation fire	2013 actual number asset failures resulting in an vegetation fire
CitiPower	2	6
Jemena	3	12
Powercor	68	93
SP AusNet	57	34
United Energy	11	23
TOTAL	**141**	**168**

Table 24: Number of distribution MEC asset failures resulting in vegetation fires

Poles top structure

Pole top structure failures need to be addressed to significantly reduce the number of asset failures, a major cause of asset fires and a major contributor to vegetation fires especially in the United Energy, Jemena and Powercor networks as indicated by the pole top structure failure and pole top structure fire indices (pole top structure failures or pole top structure fires per thousand poles). ESV has commenced an investigation into the cause for this increase in pole top structure failures and fires.

Distribution MEC	Pole top structure failure index 2011	Pole top structure failure index, 2013
United Energy	0.3	1.2
Jemena	0.2	0.8
Powercor	0.2	0.8
CitiPower	0.2	0.4
SP AusNet	0.4	0.3

Table 25: Pole top structure failure index

Distribution MEC	Pole top fire index 2011	Pole top fire index 2013
United Energy	0.03	0.38
Jemena	0.05	0.55
Powercor	0.08	0.57
CitiPower	0.02	0.08
SP AusNet	0.02	0.04

Table 26: Pole top fire index

The total number of pole top structure failures that resulted in an asset fire (411) was less than the total number of fire starts approved by the AER for pole top structure failures that result in a pole top structure fire (419) across the Victorian network. However, Jemena, Powercor and United Energy exceeded their individual targets.

Distribution MEC	Number of fire starts approved by the AER for pole top structure failures resulting in a pole top structure fire	2013 actual number of pole top structure failures resulting in a pole top structure fire
CitiPower	8	5
Jemena	47	52
Powercor	235	264
SP AusNet	68	14
United Energy	61	76
TOTAL	**419**	**411**

Table 27: Pole top structure failures resulting in pole top structure fires

The number of pole top structure failures that resulted in a vegetation fire was greater than the number of vegetation fires approved by the AER for Jemena and Powercor.

Distribution MEC	Number of fire starts approved by the AER for pole top structure failures resulting in a vegetation fire	2013 actual number of pole top structure failures resulting in a vegetation fire
CitiPower	0	0
Jemena	0	2
Powercor	13	36
SP AusNet	7	4
United Energy	2	1
TOTAL	**23**	**43**

Table 28: Pole top structure failures resulting in vegetation fires

The deteriorating performance of United Energy, Jemena and Powercor pole top structure populations is of some concern to ESV. Pole top structures cause the largest number of asset failures, the largest number of asset fires and the largest number of grass / vegetation fires. While pole top structures fail in large numbers, few of these asset failures lead to vegetation fires. Nevertheless, pole top structure failures and fires constitute a safety hazard, are costly and have an adverse impact on reliability. ESV is concerned that:

- 695 of the 932 pole top structure failures (75 per cent) were due to Powercor and United Energy assets
- 377 and 454 pole top structure fires (83 per cent) were due to Powercor and United Energy assets
- 36 of the total 43 pole top structure failures (83 per cent) that resulted in a vegetation fire were due to Powercor assets.

Analysis of asset failures over the past three years indicates that pole top structures (and HV fuse) failures increase during the first quarter each year. ESV has commenced an investigation into the cause for this increase in pole top structure failures and fires during the first quarter each year.

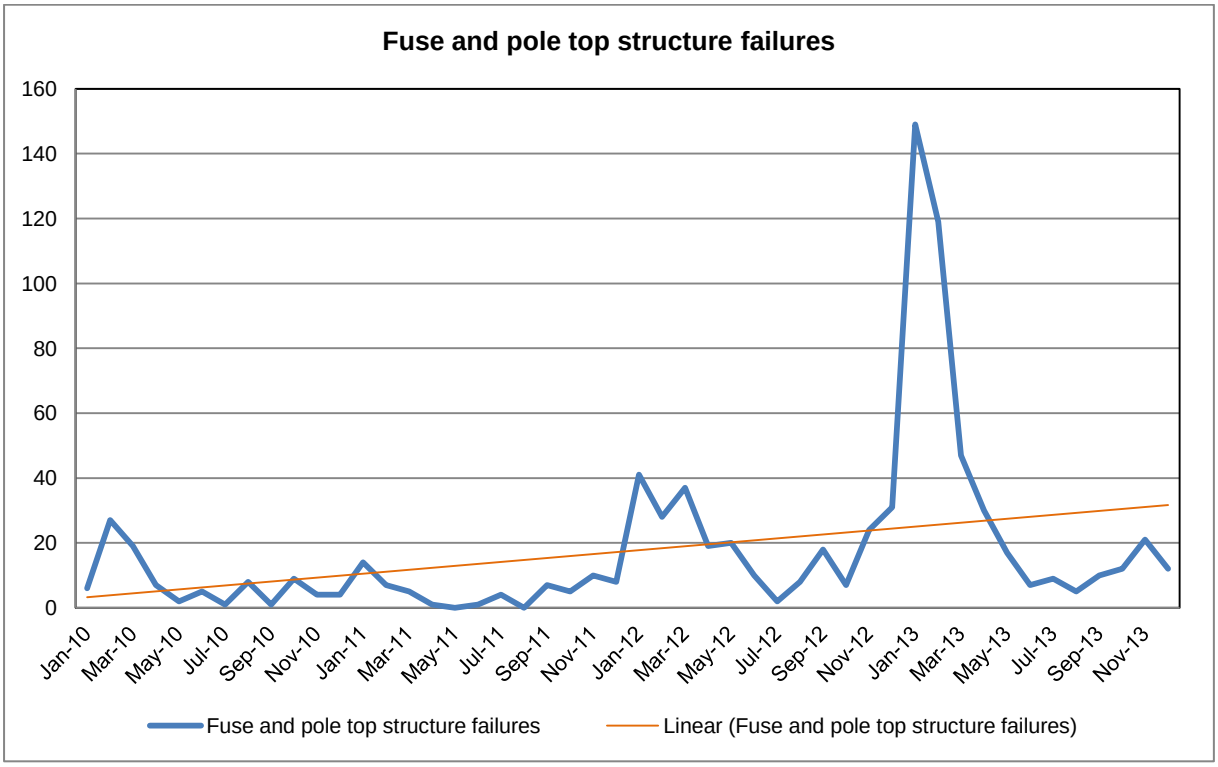

Figure 26: Asset failure: HV fuses and pole tops structures

The number of pole top structure failures, in some parts of the network, needs to be reduced if the Victorian distribution network is to be comparable with world best practice. Some parts of the industry need to consider moving from their current approach to pole top asset replacement to a more systematic approach to asset replacement, review their condition assessment techniques, review their pole top design practices and review the risk-based approach for the management of poles top assets.

The difference in performance, pole top structure failure index and pole top structure fire index, of apparently comparable Victorian networks presents an opportunity for benchmarking and sharing of information to improve the reliability and safety performance of the network.

The industry has long recognised that little natural insulator washing occurs during long periods of dry weather, which together with light rain or fog can lead to tracking and cause power pole top fires. The washing of insulators undertaken in some areas of Victoria to improve the pollution performance of HV electric lines could be considered elsewhere.

Victorian distribution MECs may benefit from examining the reporting of overseas jurisdictions that claim to have almost eliminated pole top structure fire problems many years ago by appropriate insulator selection, employing insulator coatings, improving pole top framing, better pole selection, gang nailed banding, insulator washing and the installation of high resistance ground wires. There may also be some benefit in examining initiatives employed by other industries, such as “loose-nut indicators” employed by the transport industry.

There may also be some benefit in all distribution MECs exploring the application of GFNs and smart meters used by some distribution MECs to mitigate or predict the imminent failure of network assets such as HV fuses and pole top structures by signature analysis.

In the apparent absence of action by some distribution MECs, ESV has commissioned a study into pole top structure failures.

HV fuses

HV fuse failures also need to be addressed to reduce the number of asset failures, another major cause of asset fires and a major contributor to vegetation fires. While HV fuses fail in large numbers, few of these asset failures lead to vegetation fires. Nevertheless, HV fuse failures and fires constitute a safety hazard, are costly and have an adverse impact on reliability.

While the number of fuse failures increased from 173 to 319 between 2011 and 2013, and the number of HV fuse failures, without fire, increased from 162 to 217, it is pleasing to see that the number of HV fuse hang ups resulting in an asset fire reduced from 161 to 82, a reduction of almost 50 per cent by both Powercor and SP AusNet.

ESV notes that SP AusNet has moved from its previous condition-based HV fuse replacement regime to a targeted replacement program and the number of HV fuse failures has reduced from 96 to 86 between 2011 and 2013, compared with an increase in the number of HV fuse failures with other distribution MECs, from 73 to 215. These results support ESV's view that the industry as a whole needs to review its risk-based approach and condition- assessment techniques for the management of HV fuse assets.

Again, this difference in performance of apparently comparable networks presents an opportunity for benchmarking and sharing of information to improve the reliability and safety performance of the Victorian distribution network.

The number of HV fuse failures that resulted in a fire was less than the number of fire starts approved by the AER due to HV fuse failure for all distribution MECs.

Distribution MEC	Number of fire starts approved by the AER for HV fuse failure resulting in a fire	2013 actual number of fire starts by HV fuse failure resulting in a fire
CitiPower	1	1
Jemena	1	0
Powercor	68	43
SP AusNet	100	56
United Energy	11	1
TOTAL	**180**	**102**

Table 29: HV fuse failures resulting in a fire

Bare conductor and HV tie failures

There were a total of 228 conductor and HV tie failures in 2013, a failure rate of one conductor or HV tie failure per 710km of overhead electric line per annum. This is a small improvement on the 233 conductor and HV tie failures in 2012. Due to the comparative length of overhead electric lines, most of the conductor and HV tie failures occurred on the Powercor network (90) and SP AusNet network (92), noting that the Powercor network is 70 per cent longer than the SP AusNet network.

LV asset failures

The number of LV asset failures appears to be increasing. The number of failures (661 in 2013) is of no real concern when compared with the number of LV assets on the network. The number of LV asset failures reported now includes the imminent LV asset failures detected by SP AusNet “smart meters”. Most of these are repaired by SP AusNet before they result in actual asset failures.

Safety indicators - Community

No Go Zone infringements

Access to electricity switchboards and substations by unauthorised persons may result in serious injury or death and affect the continuity of electricity supply. The MECs go to considerable lengths to prevent unauthorised access and ensure that assets are secure.

There was a large increase in the level of unauthorised access in 2013, a total of 115 occasions, compared with 78 unauthorised access incidents in 2012. Most of the increase in unauthorised access was in the Powercor region, and appears to involve criminal damage or theft.

The WorkSafe No Go Zone clearance space establishes the minimum approach distance around live electrical assets where a person can work with safety. It includes an allowance for what a person may be holding and the machinery the person may be operating.

In 2013 there were a total of 151 No Go Zone incidents reported to ESV, a reduction from the 170 reported in 2012. These numbers only include faults and incidents of contact with assets that were reported to the distribution MECs or ESV and most of the incidents involved the “digging up” of underground assets.

Lead indicators such as near misses and breaches of the clearance zone are rarely reported to the distribution MECs and not included in the statistics.

Due to the potential for such incidents to result in serious injury or death, ESV continues to actively promote the “Look Up and Live” message and the “Dial Before You Dig” service. All of the MECs offer advice and issue permits for work near electric lines, as required.

A reverse polarity, when the active and neutral cables are interchanged, can lead to a serious injury or fatality. In 2013 there were no instances where polarity was reversed compared with three instances in 2012.

High voltage injections may be caused by a lightning strike on or near the electricity network, or a high voltage electric line coming into contact with the low voltage supply network as a result of vegetation contact, the failure of a network asset, or a vehicle hitting a power pole. High voltage injections may cause significant damage to a customer’s premises and appliances or result in very serious injury or death.

In 2013 there were at total of 117 instances of high voltage injection, compared with 104 in 2012, and trending upwards, noting that the trend follows that of pole and crossarm failures.

Item	2013 Total	CitiPower	Powercor	Jemena	United Energy	SP AusNet
No Go Zone infringements	151	43	48	23	10	27
Unauthorised access	115	9	76	15	5	10
Reverse polarity	0	0	0	0	0	0
High voltage injections	117	1	32	11	51	22

Table 30: Safety incidents involving the public by distribution MEC

Item	Total	SP AusNet	Basslink
No Go Zone infringements	1	1	0
Unauthorised access	16	16	0

Table 31: Safety incidents involving the public by transmission MEC

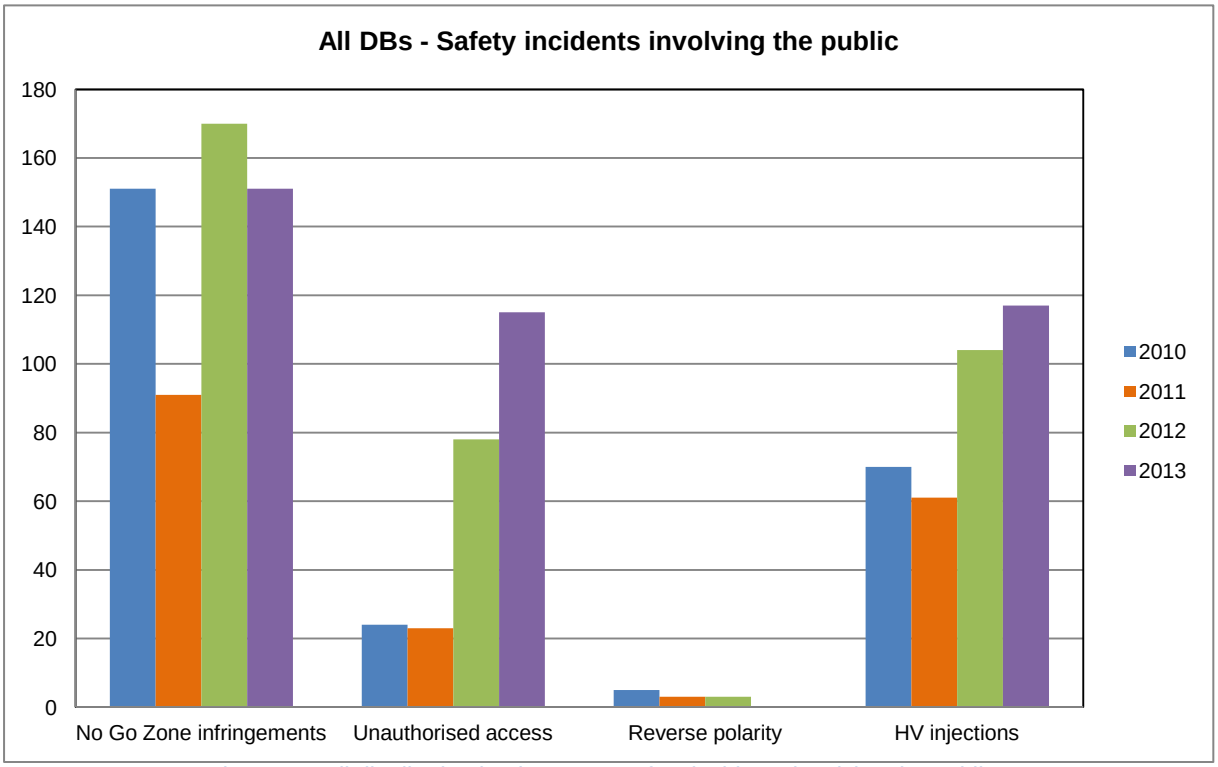

Figure 27: All distribution businesses - safety incidents involving the public

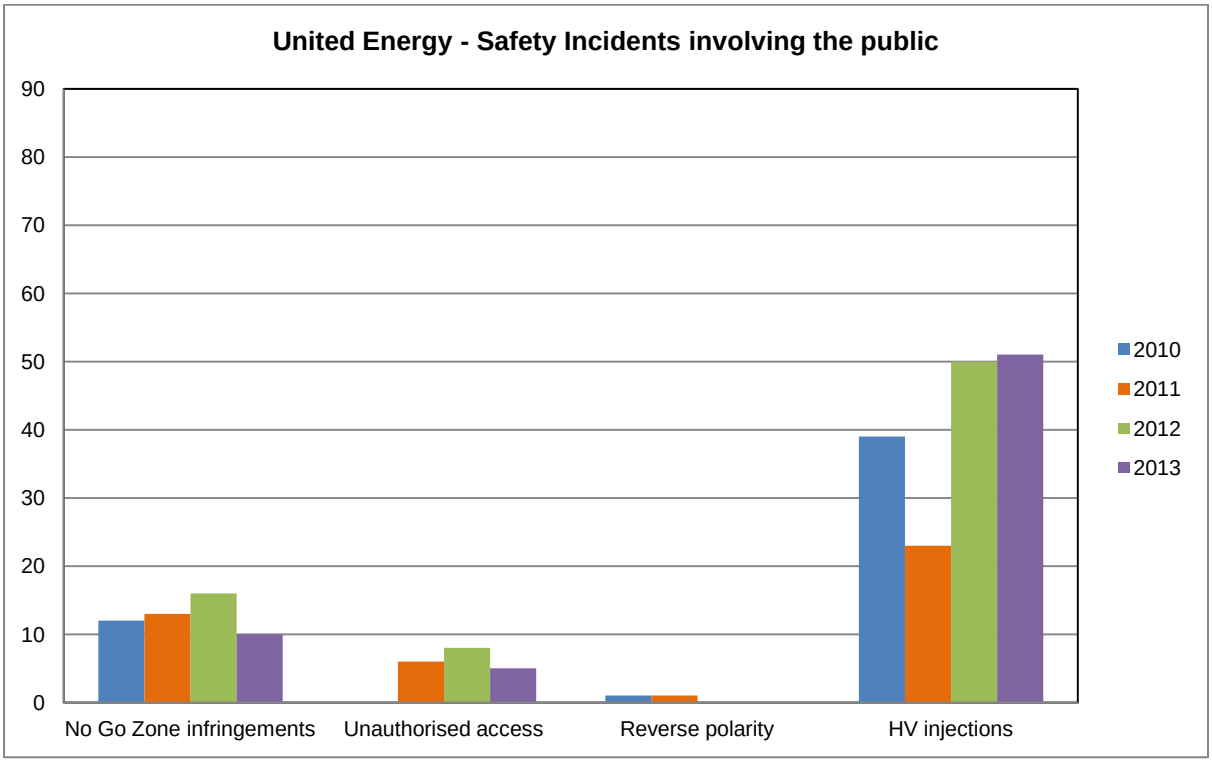

Figure 28: United Energy - Safety incidents involving the public

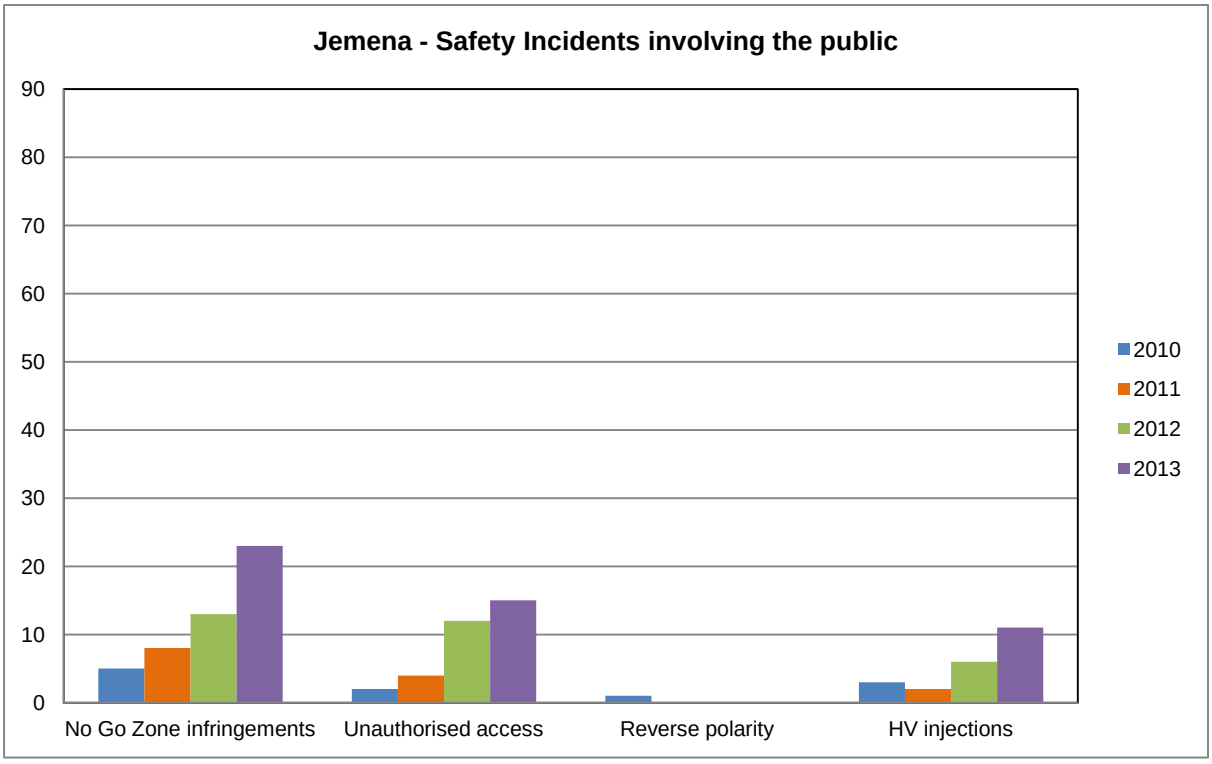

Figure 29: Jemena - Safety incidents involving the public

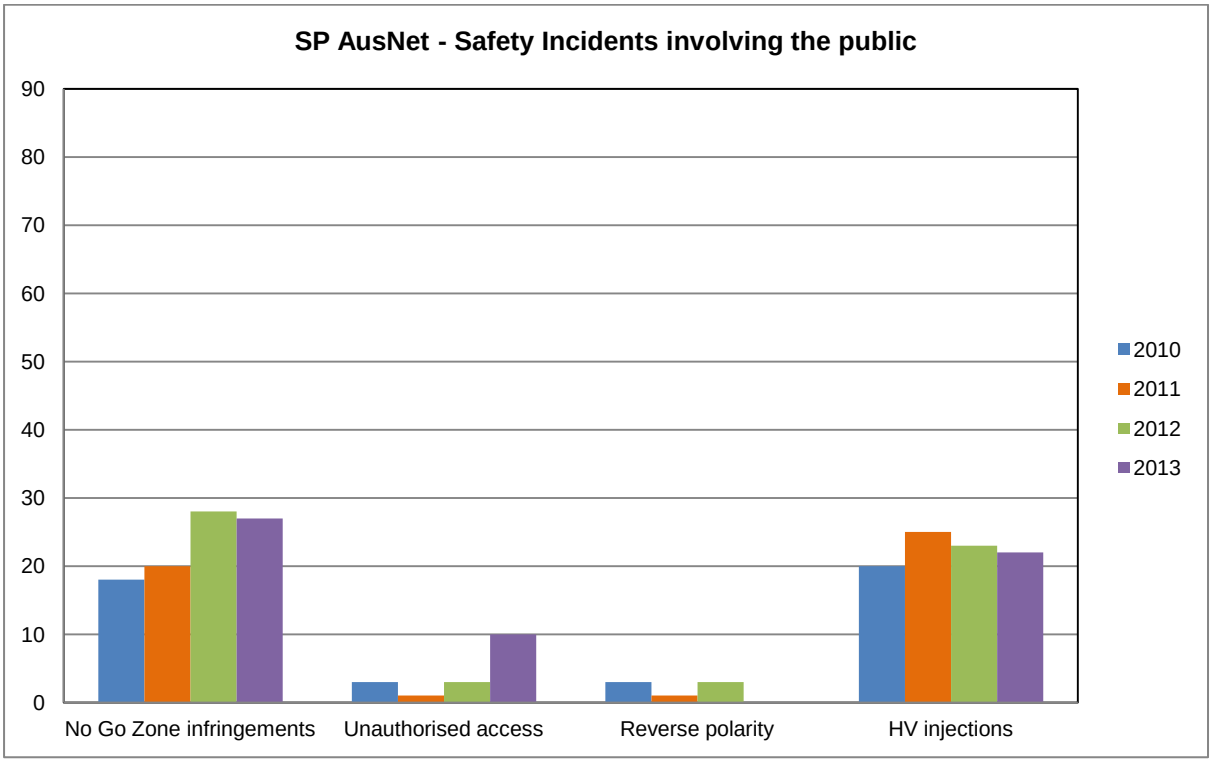

Figure 30: SP AusNet - Safety incidents involving the public

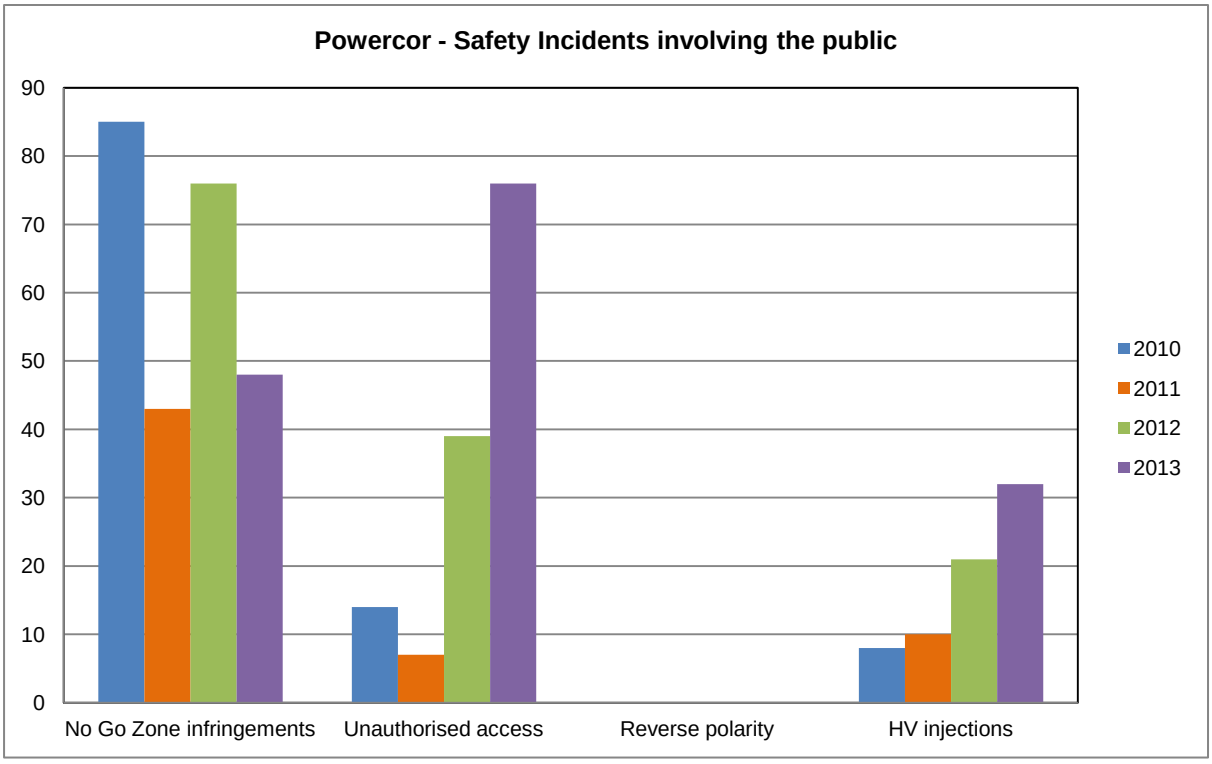

Figure 31: Powercor - Safety incidents involving the public

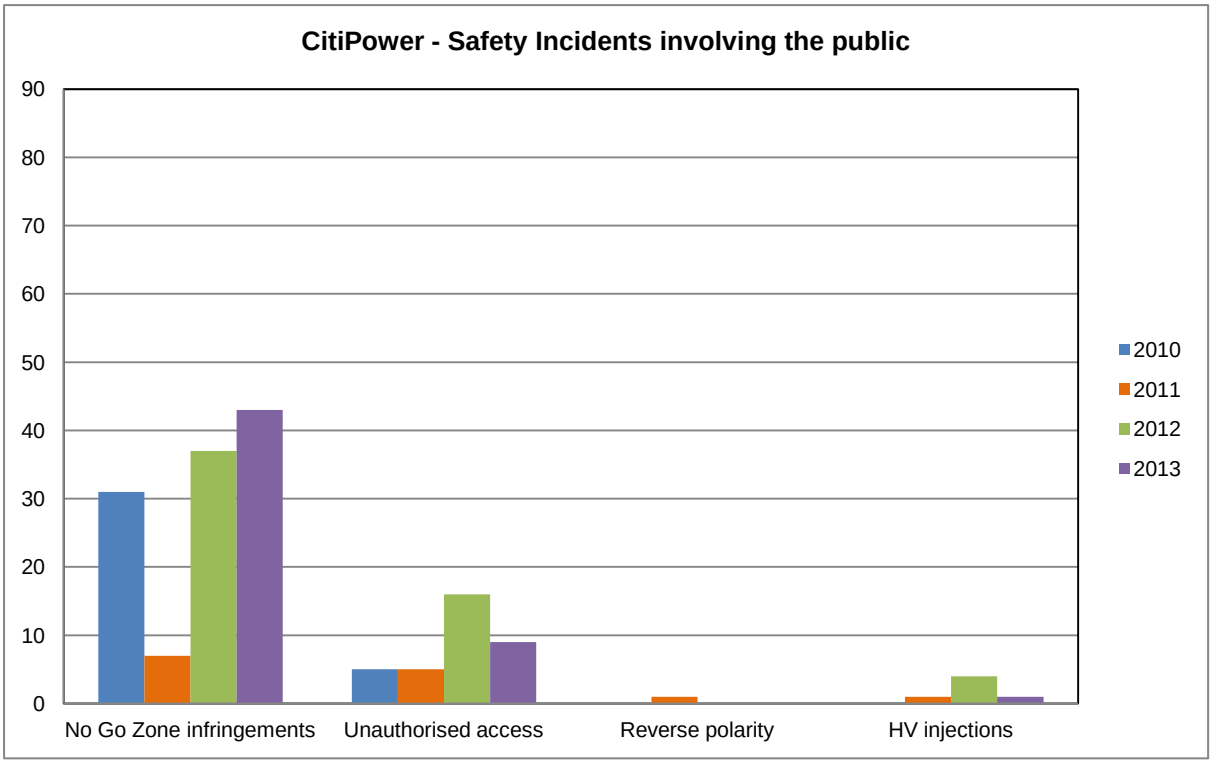

Figure 32: CitiPower - Safety incidents involving the public

Incidents involving electric shock

The electrical safety of the public, the workforce, workers and MEC contractors is the highest priority for ESV. Electric shock incidents, including those resulting in serious injury or fatality, are key performance indicators for electrical safety.

It is pleasing to report that in 2013 there were no reported fatalities due to electric shock. However, there were two incidents that resulted in serious injury to an MEC worker and six incidents causing serious injury to the public. The underlying trend for serious injuries from electrical causes to the public and MEC workers was similar to previous years.

ESV was pleased to see the reduction in the number of electric shocks from MEC assets in 2013, down from an underlying level in previous years of about 20 per annum.

Item	2013 total	CitiPower	Powercor	Jemena	United Energy	SP AusNet
Electric shock - fatal	0	0	0	0	0	0
Electric shock - serious injury (Public)	6	2	2	1	0	1
Electric Shock - serious injury (MEC workers)	3	0	1	0	1	1
Electric Shock – non-serious injury	3	2	1	0	0	0

Table 32: Electric shock from electrical distribution assets

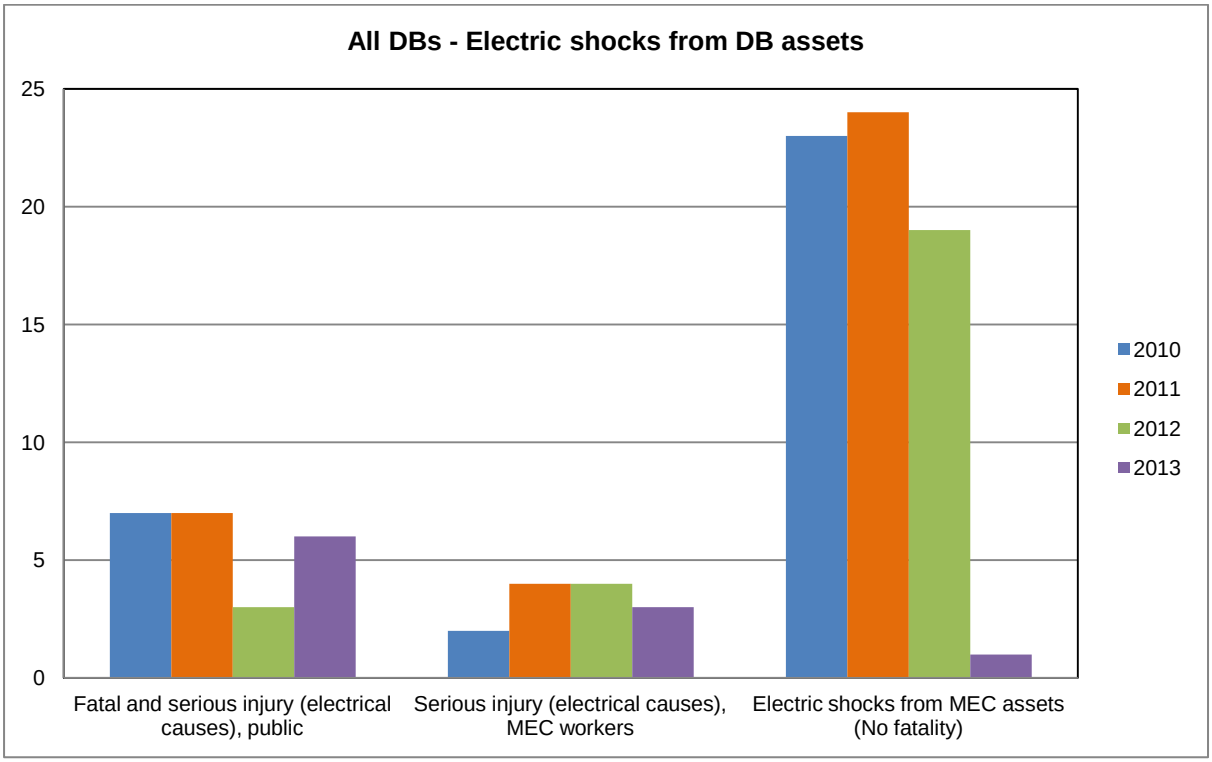

Figure 33: All distribution businesses - Electric shocks from distribution assets

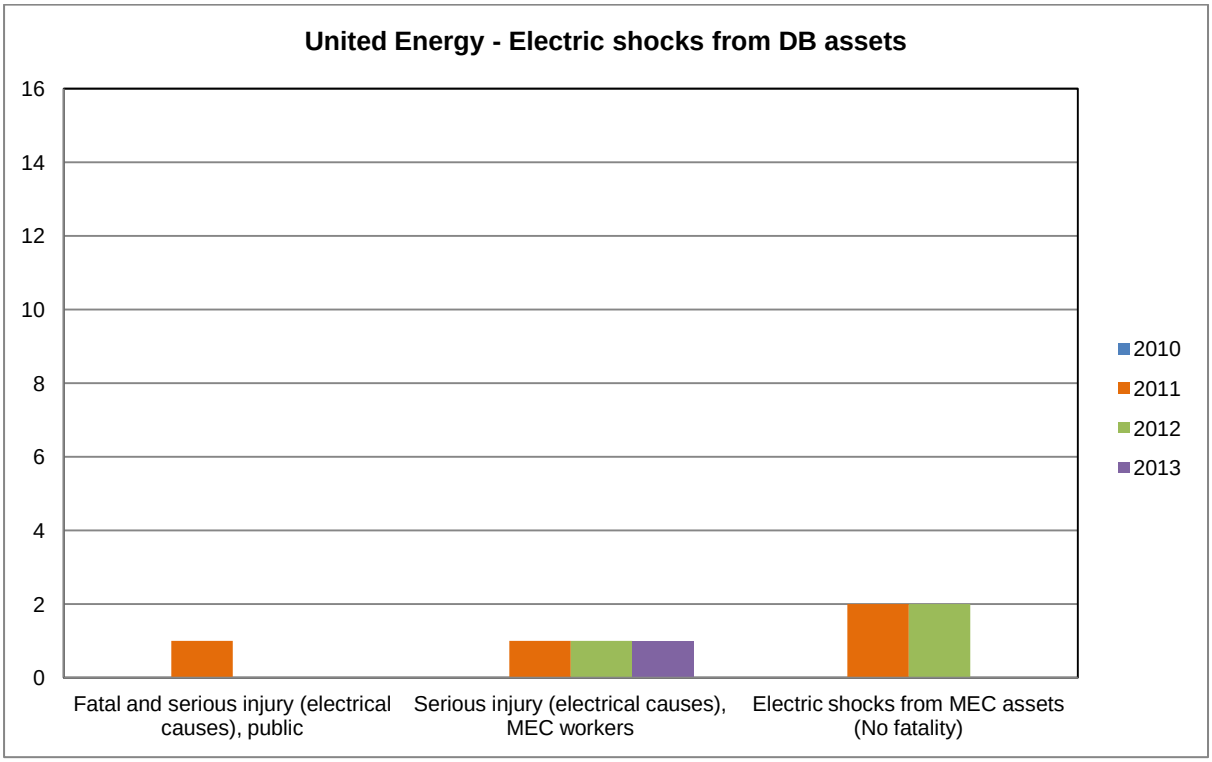

Figure 34: United Energy - Electric shocks from distribution assets

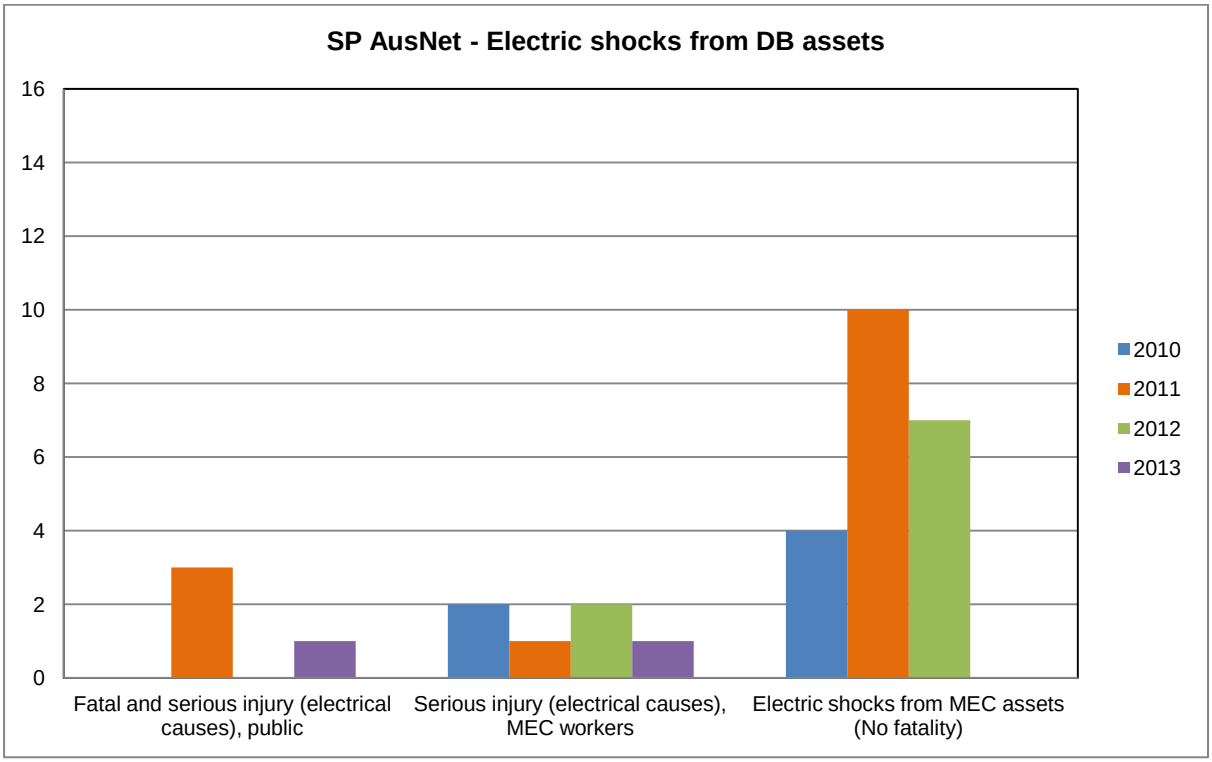

Figure 35: SP AusNet - Electric shocks from distribution assets

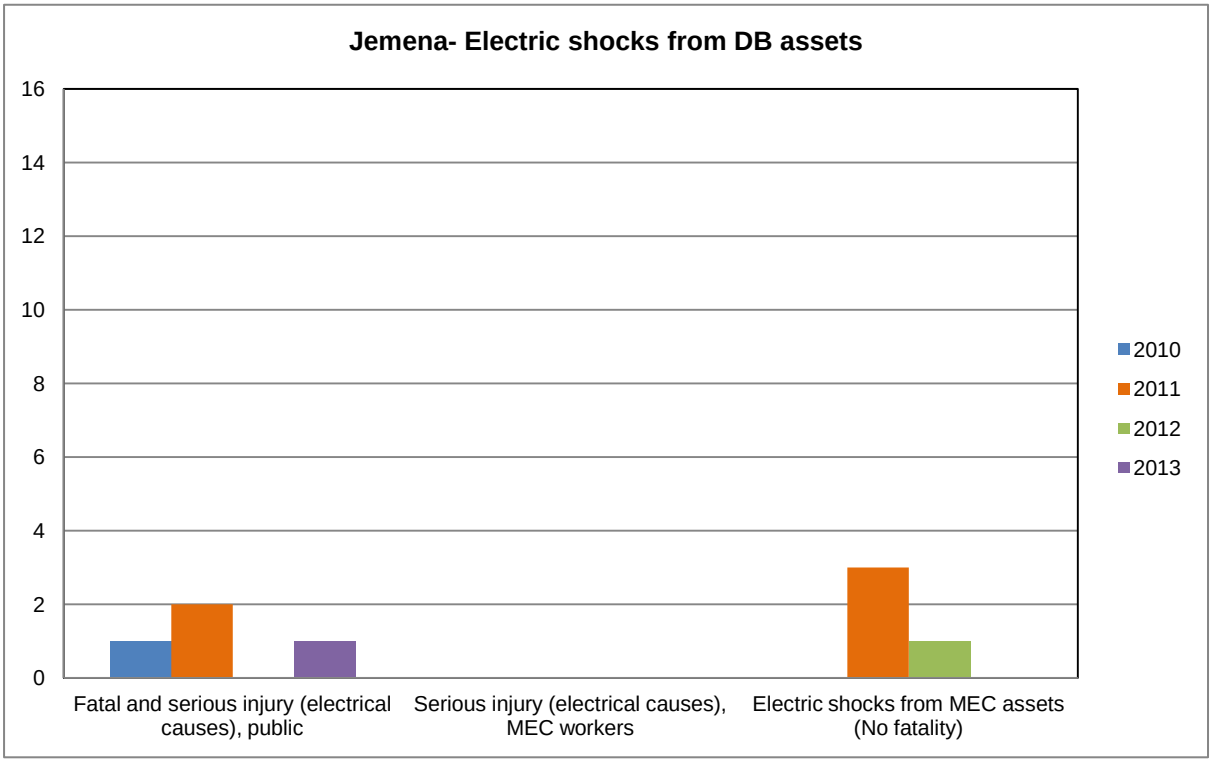

Figure 36: Jemena - Electric shocks from distribution assets

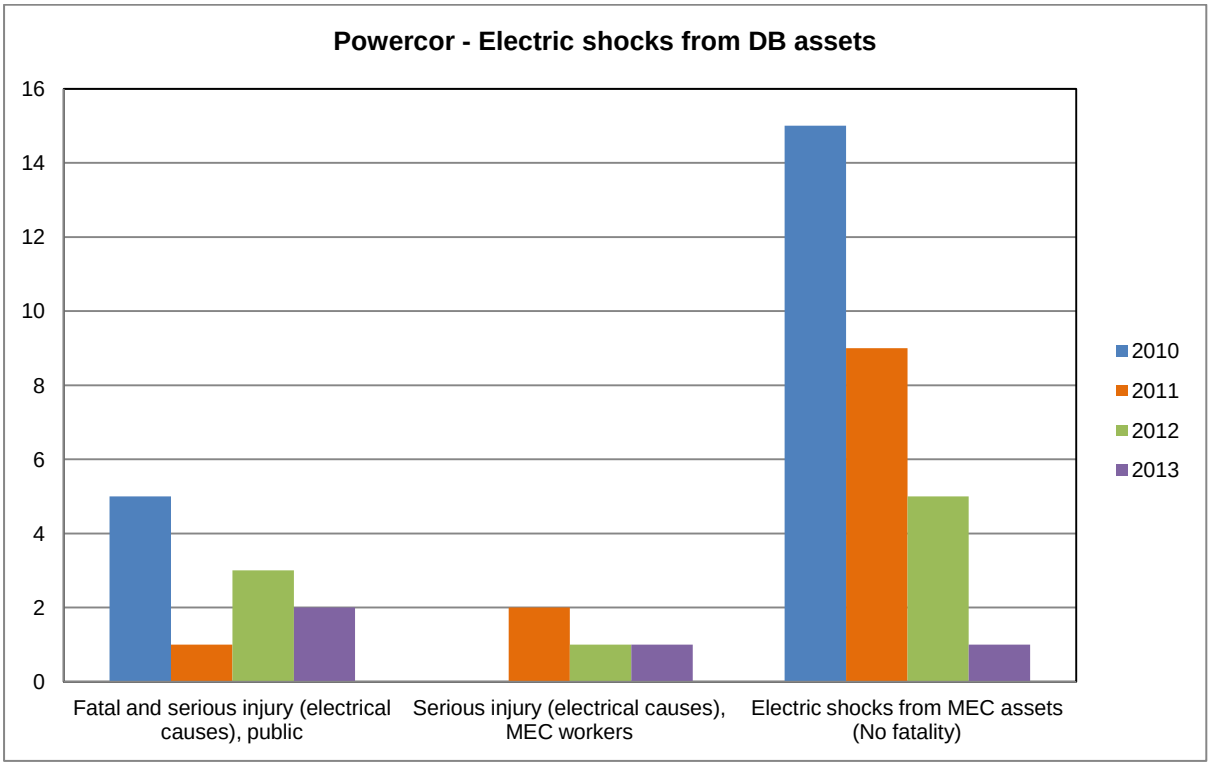

Figure 37: Powercor - Electric shocks from distribution assets

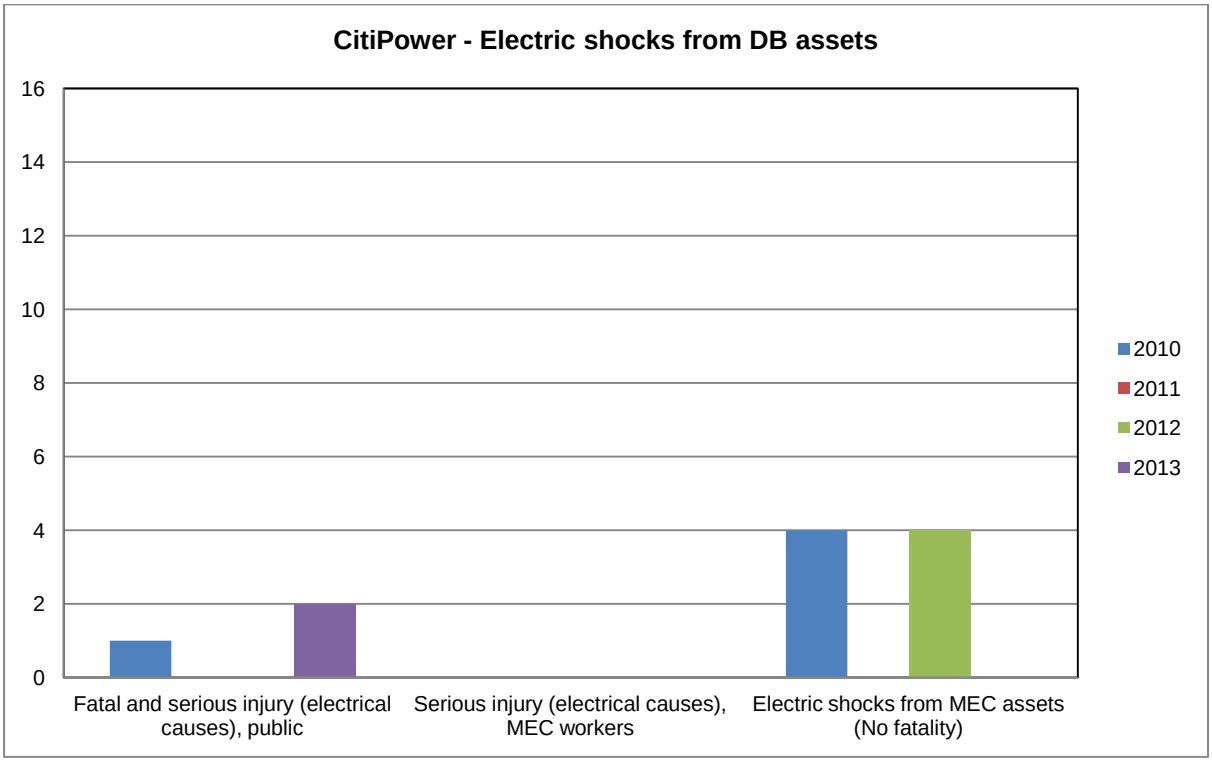

Figure 38: CitiPower - Electric shocks from distribution assets

Investigations: Serious electrical incidents

ESV investigated a number of serious electrical incidents during 2013.

1. January 2013: a cyclist sustained serious injury when he made contact with a HV conductor. A crossarm fire resulted in the HV conductor falling close to the ground in an energized state.
2. January 2013: a roofing plumber installing flashing on a building, inadvertently contacted the live, 22kV overhead system, sustaining a severe injury.
3. March 2013: a farmer was moving irrigation pipes when a pipe made contact with a live overhead high voltage electric line. The farmer received an electric shock and was taken to hospital for observation.
4. April 2013: the failure of the neutral conductor caused an increase in the supply voltage to a house. This caused a fire which in turn led to a fatality.
5. May 2013: an NBN civil contractor cut into a high voltage underground cable causing flash burns that required hospitalisation.
6. May 2013: a customer reported receiving an electric shock from the kitchen sink. The load neutral (neutral to customer's switchboard) was not connected to the neutral link. Two days before the incident, metering work was performed by the distribution MEC.
7. May 2013: a fire occurred at a unit following a meter exchange. There had been a previous fire at the residence, the supply had been disconnected and a defect notice issued. The meter technician restored supply to the unit without realising that a defect notice had been issued.
8. June 2013: ESV investigated incident where a resident had reported receiving an electric shock from a ducted gas heater. A tree was thought to have been rubbing on the low voltage service associated with the site, causing a loss of neutral connection.
9. July 2013: an ultra-light aircraft struck a SWER line and crashed, killing two people.
10. July 2013: while replacing a low voltage crossarm, an MEC contract lineworker received an electric shock that required hospitalisation.
11. October 2013: a person, while cleaning and replacing house guttering, received an electric shock that required hospitalization. The low voltage service had been terminated in a manner that compromised the active conductor insulation, energising the bracket and guttering.
12. October 2013: a HV operator was admitted to hospital following the isolation of a 22kV transformer and receiving an electric shock from a falling, live, high voltage fuse assembly.
13. November 2013: while working on a billboard mounted on a building wall, two workers received significant electrical burns when a length of aluminum fixing material made contact with a 22kV line. The workers were admitted to hospital, suffering severe burns.
14. November 2013: a linesman received an electric shock resulting in resuscitation and hospitalisation.

15. December 2013: a worker at a building site lifted a metal ladder into the high voltage electric line and suffered severe burns requiring hospitalisation.

16. December 2013: the occupant of a residential property received an electric shock from the shower tap following damage to the neutral connection, during the installation of a meter the previous day.

17. December 2013: a car driver drove into a low voltage pillar. Straightening the low voltage pillar caused an electric arc that burnt the person's leg.

Works practice audits

ESV's seeks to maintain the electrical safety standards for electrical work carried out by electrical workers as well as maintain public and industry awareness of electrical safety requirements in accordance with section 6 of the *Electricity Safety Act 1998*.

In 2013, ESV implemented a Work Practice Observations (WPO) program for operators of electrical infrastructure, to ensure that electrical work is undertaken in accordance with established industry standards. These observations assess the electricity distribution MEC's compliance with the elements of its ESMS that relate to regulation 15 Standards for works on applicable assets—where there are published technical standards and regulation 16 Standards for works on applicable assets—where there are no published technical standards of the Electricity Safety (Management) Regulations 2009.

The current observations test workforce compliance through adherence to the requirements of The Blue Book (the Code of Practice for work on or near high voltage electrical apparatus), The Green Book (Electrical Safety Rules for the VESI Distribution Networks that incorporates the provisions of *The Blue Book*), VESI Installation Supply Connection Tests and Procedures, VESI Field Workers Handbook and the VESI HV Live Work Rules.

The first cycle of observations; of directly employed distribution workers, contractors and service agents; resulted in 17 audits being carried out on work being undertaken across the Victorian electricity distribution network, including:

- animal proofing of pole-top transformers, live and under Electrical Access Permit
- various types and methods of pole and HV or LV cross-arm replacements
- insulator replacement
- replacement of pole-top assembly using glove and barrier techniques
- re-stringing spans of HV overhead conductor
- HV underground cable jointing
- service cable replacement
- metering (direct).

The audit observed 64 opportunities for improvement or areas requiring attention. Some of the issues trended across the distribution industry and many of the issues involved the failure to complete all of the steps in a process or the partial application of a risk control.

Job planning

The daily work plan or instruction was not always seen as accurate or complete enough to enable the work crew to carry out the work without making significant changes to the work method(s) selected.

Safety culture
The level of adherence to industry work practices indicated a mature safety regime. However, the observations identified a failure to complete all of the steps in a process or the partial application of a risk control. The majority of these failures could be dealt with by work-site leaders and their crews taking ownership of the safety culture and regularly challenging their workmates to comply with industry standards and the risk control requirements identified in the Job Safety Analysis (JSA) and Safe Work Method Statement (SWMS).

Personal protective equipment
The lack of appropriate safety equipment prior to the commencement of work was regularly noted by the observers, including workers not wearing company approved safety glasses, and worn work boots with exposed steel caps.

It was observed that some workers, when working at height, selected fall restraint harnesses that were not tagged to verify inspection within the current test cycle, and ladders that were in use were not tagged to indicate that they had been checked and safe to use.

Most notably and frequently observed were workers that failed to check the condition of their LV and HV insulating gloves prior to use.

Workers were also observed wearing incorrect PPE for the task, wearing hard-working gloves in lieu of insulating gloves, creating the potential for electric shock or arc flash burns.

Worksite communication
A lack of communication was often observed when work crews were coordinating who was going to do what and when, or where persons were being paired up to do a task.
Most notably a lack of communication between ground crews, safety observers and the crew aloft was of serious concern, particularly when the purpose for having the safety observer was to ensure the safety of the persons aloft.

Operating - Switching operations
On occasions, during switching operations, HV operators failed to discharge conductors prior to the application of earth and short circuits and record switching or operating steps as required by company procedures.

HV live work
Generally the HV live work was observed to be undertaken in accordance with the VESI HV Live Work Rules. However, on a number of occasions cleaning and inspection of insulated equipment prior to use (including HV insulated sections of EPV's) was not undertaken.

On one occasion, line workers did not consider moving the location of the joint or overlap of a two stage HV hard cover to the alternate position furthest away from the work being undertaken. In another case, a crew failed to follow company procedures when breaking HV bridges by not using a hopper cable.

LV testing, metering and servicing
The tests required to be carried out by the VESI Installation Supply Connection Tests and Procedures were not always completed correctly when undertaking metering and servicing activities. There appeared to be a lack of understanding of the tests and as to why all tests must be carried out. On a number of occasions, the Neutral Integrity Test Point (NITP) was not established by test prior to subsequent on supply testing.

A summary report outlining the opportunities for improvement and key areas requiring attention *(Work Practice Observation Program – Audit Report 2013, Victorian Electricity Distribution Businesses)* was published in March 2014 and conveyed to the Victorian Electricity Distribution Businesses.

Advanced Metering Infrastructure

In 2006 as part of the AMI program, the Victorian Government committed to the installation of "smart" meters, electrical meters that were capable of being remotely read and controlled, in all residences and small businesses in Victoria. The rollout of smart meters to approximately 2.6 million Victorian customers is well advanced and expected to be substantially completed by 2014. In addition to providing metering information, the data provided by these smart meter is being used to improve the safety and reliability of the Victorian distribution network.

In addition to installing communication infrastructure to a central location, one Victorian distribution MEC has developed a system for analysing the regular stream of data from the smart meters to assist in identifying imminent faults on the distribution network before they occur, and quickly locating faults that have occurred on the distribution network.

The distribution MEC has developed algorithms to analyse the electrical data arriving from "upstream" of the meter, from the high voltage network, to identify various signatures that in turn indicate a potential asset failure. Using this technique, assets that are about to fail can be identified and replaced before they completely fail resulting in an unsafe condition or power outage.

One area in which this is having a real benefit is in the identification of potential connection failures in low voltage service cables supplying customer installations. This program helps maintain safety, reliability and quality of electricity supply to customer installations.

The quick identification and location of a fault allows faster resolution and isolation of the fault, improving safety as well as minimising outage time for the customer.

The distribution MEC expects to continue this program with further safety and reliability outcomes.

Indicators published in annual safety performance report

The following information will be published annually by ESV. Statistics based on the calendar year (January to December).

Item	Reporting requirement
Fire starts in vegetation (grass or trees and shrubs)	Number of fire starts in HBRA in vegetation (all fires due to electrical causes)
Power pole and crossarm fires	Number of pole and crossarm fires due to electrical causes
Conductor failure	Number of conductor failures (excluding service cables and failure due to impact)
Power pole failure	Number of pole failures (all poles, i.e. 66kV, HV, LV and P/L – excludes poles struck by vehicle)
Reverse polarity	Number of incidents
HV injections	Number of incidents
No Go Zone Infringements	Number of incidents
Unauthorised access	Number of incidents
Bushfire Mitigation Index	Number of days where BFM Index is above zero during the fire danger period as declared by the Country Fire Authority (relates to previous year's declared fire period)
Fatal injury (electrical causes), MEC workers	Number of incidents (includes contractors)
Serious injury (electrical causes), MEC workers	Number of incidents (includes contractors)
Electric shocks from MEC assets	Electric shocks from MEC assets (split into HV and LV)
Shock due to neutral failure	Number of incidents

Table 33: Indicators published in annual safety performance report

Abbreviations

AC	Alternating current
ACR	Automatic circuit reclosers
AER	Australian Energy Regulator
AMI	Advanced Metering Infrastructure
BFM	Bushfire mitigation
BFMP	Bushfire mitigation plan
BPL	Basslink Pty Ltd
CBD	Central business district
CP	CitiPower
DC	Direct current
ELC	Electric line clearance
ELCMP	Electric Line Clearance Management Plan
ESMS	Electricity Safety Management Scheme
ESV	Energy Safe Victoria
GFN	Ground fault neutraliser
HBRA	Hazardous bushfire risk area
HV	High voltage
JEN	Jemena Electricity Networks
kV	kilovolt (1000 volts)
LBRA	Low bushfire risk area
MEC	Major Electricity Company
OIC	Order in Council
PAL	Powercor Australia Ltd
PBST	Powerline Bushfire Safety Taskforce
REFCL	Rapid earth fault current limiter
SPA	SP AusNet
SWER	Single wire earth return
UE	United Energy
VBRC	Victorian Bushfire Royal Commission
VESI	Victorian Electricity Supply Industry