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Electricity Safety Case (ESMS) Preparation and Submission Guideline for MECs

Safety Guideline

VICTORIA State Government

This guideline has been endorsed by the Director of Energy Safety in Victoria.

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Contents

Introduction

Purpose

The purpose of this guideline is to assist Major Electricity Companies (MECs), as defined by the Electricity Safety Act 1998 (the Act), with the preparation and submission of an Electricity Safety Management Scheme (ESMS) for electricity transmission and distribution networks. An MEC must submit an ESMS to ESV for acceptance in accordance with the requirements of Part 10 Division 2 of the Act and the Electricity Safety (Management) Regulations 2019 (the ESMS Regulation).

The interpretation and administration of this regulatory framework is detailed in ESV's *Energy Infrastructure Safety Management Policy*.

Background

ESV is the independent technical regulator responsible for electricity, gas and pipeline safety in Victoria. ESV was created under the Energy Safe Victoria Act 2005, and has objectives, functions and responsibilities conferred on it under this Act and the Electricity Safety Act 1998 (the Act), Gas Safety Act 1997 and Pipelines Act 2005. The role of ESV is broad and includes regulating the design, construction and maintenance of electricity, gas and pipeline networks across Victoria.

Scope

This guideline only applies to ESMSs of MECs that are licensed to operate an electrical distribution and/or transmission network.

Statutory Duties

Section 98 of the Act establishes general duties to be met by MECs that form the basis for the development of an ESMS. These duties require MECs to design, construct, operate, maintain and decommission its supply network to minimise risk *as far as practicable* (AFAP). Specifically, the Act requires the MEC to minimise:

- the hazards and risks to the safety of any person arising from the supply network;
- the hazards and risks of damage to the property of any person arising from the supply network; and
- the bushfire danger arising from the supply network.

Practicable, means having regard to:

- the severity of the hazard or risk in question;
- the state of knowledge about the hazard or risk and any ways of removing or mitigating the hazard or risk;
- the availability and suitability of ways to remove or mitigate the hazard or risk;
- the cost of removing or mitigating the hazard or risk.

This requires all reasonable measures to be implemented in order to reduce or remove risk, and so that cost impacts are not given excessive emphasis.

The ESMS shall demonstrate that all practicable controls have been considered and implemented unless they are not practicable. Any control deemed not practicable shall be justified in the ESMS.

Elements of an ESMS

Background

The Act requires an ESMS to specify a Safety Management System.

The Electricity Safety (Management) Regulations specify that the Safety Management System must:

- describe how the MEC will meet its duties under section 98 of the Act;
- comply with the requirements of AS 5577;
- contain a description of the technical and other measures undertaken, or to be undertaken, to minimise, as far as practicable, the risks identified in the formal safety assessment;
- describe how the MEC will monitor and maintain the integrity of the supply network via an acceptable asset management system; and
- explain how the measures taken to reduce risks, and how the means by which an MEC monitors and maintains integrity of supply will enable the MEC to meet its duties under section 98 of the Act.

AS 5577 Structure

AS 5577 set outs the content common to all ESMS's that, together with other regulatory requirements (listed above) are to be presented to the regulator to enable acceptance of an ESMS.

The standard, AS 5577, is generally structured along the Plan, Do, Check, Act requirements consistent with many standards.

An ESMS may be structured in any way with the example shown below as a suggested way of addressing the requirements of the Act, Regulation and AS 5577.

ESMS Sample Structure

Figure 1 – Sample of the organisation of an ESMS

Section 1 – Introduction
Section 2 – Safety Assessment
    2.1 – Network Description
    2.2 – Formal Safety Assessment
Section 3 – Safety Management System
    3.1 – Technical Standards, System Planning and Design
    3.2 – Construction
    3.3 - Asset Management
    3.4 – Network Operation
    3.5 – Emergency Preparedness and Management
    3.6 – Training and Competency
    3.7 – Incident Reporting, Investigation and Review
    3.8 – Management and Governance
    3.9 – Records
Section 4 - Exemptions

Each section from the sample structure has more details listed below.

ESMS Contents

Section 1 – Introduction

Regulation Requirement

r.7 Specification of Australian Company Number or Australian Business Number

An electricity safety management scheme must specify the ACN or, if the scheme operator does not have an ACN, the ABN.

AS 5577 Requirement

Nil

Guidance

An ACN or ABN assists ESV to identify the legal entity that is submitting an ESMS. The ACN or ABN shall match the Distribution or Transmission licence issued by the Essential Services Commission (ESC).

This section should also include the title of the business as per the Distribution or Transmission licence.

Regulation Requirement

r.8 Person responsible for supply network

An electricity safety management scheme must specify-

(a) the name, title of the position and the business address of the person who has ultimate responsibility for the management, control and safe operation of the supply network, and,
(b) the name, title and business address of the person who has authorised the electricity safety management scheme.

AS 5577 Requirement

Nil

Guidance

This section requires:

(a) Senior management details such as the CEO who has ultimate responsibility for the supply network, and
(b) Management details such as the General Manager Network who has authorised the ESMS.

The person responsible for the supply network must have sufficient control of the network and its resources to ensure that the ESMS is implemented, maintained and complied with.

Regulation Requirement

r.9 Person responsible for electricity safety management scheme

An electricity safety management scheme must specify the title of the position of the person who is responsible for preparing, submitting and updating of the scheme.

AS 5577 Requirement

Nil

Guidance

This section requires details of the person who prepared, submitted and updated the ESMS. If this is more than one person then the ESMS should name the senior person who is responsible for the preparation of the ESMS.

Section 2 – Safety Case

Section 2.1 – Network Description

Regulation Requirement

r.11 Scheme description—major electricity companies

An electricity safety management scheme submitted by an MEC must contain a description of the design, construction, operation and maintenance of the supply network to which the scheme relates.

The description must provide sufficient information to enable Energy Safe Victoria to identify the location, extent and scope of every supply network, and to assess the risks associated with the safety of the supply network.

AS 5577 Requirement

(4.1 Basis of Section)
The ESMS shall include or refer to a description of the network(s), including or referencing suitable maps showing all network assets and the location of associated facilities such as substations and switching substations.

The description should include the physical scale and dimensions of the electricity network, such as

(a) geographical location and spread;
(b) construction types, operating voltages etc.;
(c) connection types and numbers, loads etc.;
(d) extent of Network Operator's operations;
(e) major fixed assets (e.g. terminal stations, control centres etc.); and
(f) other relevant matters.

This information should include use of, or reference to, suitable maps, drawings, diagrams, lists and registers.

The description should include details of the resources required to safely operate and maintain the system throughout its life cycle. These resource details may include

(i) numbers, qualifications and experience of, and span of control over, the necessary workforce;
(ii) description of other necessary resources;
(iii) means to ensure that resources are monitored and maintained; and
(iv) system support availability and backup provisions.

Guidance

The purpose of the facility description is to provide all information and data relevant to the identification and assessment of risks. It also informs the FSA conducted by an MEC, and assists ESV to understand and assess the adequacy of the risk control approach to minimise risk AFAP.

The facility description, which also defines the scope of the FSA:

- needs to provide enough information to enable the assessment of the extent and scope of network risks by ESV
- feeds into the FSA by providing enough detail to enable the identification of any risks associated with the assets, function and operations
- should provide a high-level business description of the company's operation and function
- identifies safety-related business units and their functions (e.g. all contracted functions)
- identifies physical assets, their condition, and any local factors that affects the assets which may include:
  - weather, topography, vegetation, interaction with public, animals, vehicles, buildings
  - network details (size, length, material, age, construction types, voltages)
  - safety critical devices (eg. CBs, REFCLs, protection schemes)
  - interfaces with other networks and companies (e.g. mutual aid agreements)
  - customer and load information

Section 2.2 – Formal Safety Assessment

Regulation Requirement

Nil

AS 5577 Requirement

(4.3.2 Planning for safe operation)
When developing the ESMS, the MEC shall utilise a Formal Safety Assessment (FSA) undertaken in compliance with the Standard (see Appendix A of AS 5577).
The ESMS shall have appropriate processes and procedures for the production of Formal Safety Assessments.

The Formal Safety Assessment shall comply with the principles of AS/NZS ISO 31000 and shall include methodologies appropriate to the network under consideration for the following:

(a) Establishing the context of the specific assessment being undertaken and including the setting of risk acceptance criteria.
(b) Risk identification — recognising sources of risk external to the electricity network as well as those arising from the electricity network itself.
(c) Risk analysis, including consideration of the consequences of the risks and the likelihood of the consequences occurring.
(d) Risk evaluation by comparison of the level of risk with risk acceptance criteria.
(e) Risk treatment, including where reasonably practicable the elimination of the source of risk and where elimination is not reasonably practicable, the identification of treatments or controls so that residual risks are reduced to as low as reasonably practicable (ALARP). (NOTE: Act requires AFAP[1])

Control measures required to reduce safety risks to the public, property, the environment and network personnel to an acceptable level shall be incorporated into the appropriate procedures.

The Network Operator shall ensure that any Formal Safety Assessment carried out considers activities related to the following:

(i) Network planning.
(ii) Site safety management.
(iii) Network safety management incorporating—
(A) Network structural integrity;
(B) External interference management;
(C) Fault condition monitoring and response; and
(D) Change of operating conditions and remaining asset life review.
(v) Substation's operations and maintenance.
(vi) Emergency response.

Guidance

Refer to ESV's *Energy Infrastructure Safety Management Policy* for more information regarding risk assessments.

The ESMS is to provide the Formal Safety Assessment (FSA) process and explain the logic (case) behind the MECs decision to implement a specified level of risk control. The FSA section must clearly explain how the adopted risk control approach is appropriate to each Network risk, is practicable, and meets the statutory general duties of the Act. This section provides the MECs case that risk has been minimised AFAP.

[1] An MEC has the flexibility to adopt any risk assessment methodology so long as it provides a clear case for the selection of risk controls based on consideration of the frequency and consequence of incidents, the available risk control means, and practicability. AFAP is demonstrated where all controls that can be implemented are implemented and any controls that are not implemented are justifiable by being impractical. If this is due to costs, the costs must be grossly disproportionate to risk reduction to be deemed not practicable.

An acceptable FSA will contain a clear description of the FSA methodology and decisions and the adopted risk control approach, including the:

- personnel involved (position/title, expertise if relevant)
- data and information used to identify hazards and assess risks (including incidents)
- relevant standards used in the FSA process
- definitions of likelihood and consequence
- a risk framework to show the outcome of a likelihood and consequence and actions arising from the outcome
- definition of AFAP, including AFAP decision criteria, including details on the use of disproportionate factors
- a description of risk controls adopted to minimise risk AFAP
- how risks have been reduced AFAP, and why risk controls available - but not adopted - are not practicable
- identification of uncertainty arising from incomplete or indirect data, and how this has been considered in the FSA process.

The components of the FSA AFAP presentation include the:

- Risk description
- Controls and their function/s
- Effectiveness of controls at minimising risk
- Likelihood
- Consequence
- Risk ranking
- Demonstration of risk minimisation AFAP.

Presentation of risks can be in the form of tables and supplemented by bow-tie representation of the event, control barriers, loss of control, and consequences, or use other methods consistent with sound risk assessment practices.

Table 1 provides an example of one approach to presenting risk description and assessment that demonstrates that risk has been minimised AFAP. MECs may use any appropriate method to present an AFAP case.

At a high level, the example demonstrates each identified risk (with a risk description), causes and controls through to the risk rating and demonstration of risk minimisation AFAP.

NOTE 1: The example below is generic and MECs may need to modify it to adequately address particular risks.

NOTE 2: The ESMS shall explain the link to the bushfire mitigation plan and the electric line clearance plan as particular controls for mitigation of bushfires.

NOTE 3: Appendix B of AS 55777 is informative only and not applicable in Victoria. The *Energy Infrastructure Safety Management Policy* shall be referenced for risk assessments.

Table 1 – Example of presentation of risk minimisation AFAP (worst case consequence shown)

Risk Description Hazard, Event, Cause, Consequences	**Control(s) and Function** List all controls that are, or to be, implemented (and by when)	**Effectiveness of Control at minimising risk**	**Likelihood**	**Consequence** Foreseeable worst case and Highest Risk Ranking (Most Frequent Consequence)	**Risk Rating (Matrix)**	**Risk reduction AFAP justification** Provide a statement (including any quantitative data) of how risk has been reduced AFAP including all controls implemented and why. List all controls not considered or implemented and why. Discuss gross disproportionality costs where applicable with cost details.
Tree contacts HV line causing bushfire in HBRA **Hazard** – HV overhead powerline **Event** –tree contact causing ground fire ignition **Cause** – Tree contact **Consequences**: bushfire, potential loss of life and/or property	**Vegetation Clearing** – prevent tree from contacting live HV overhead conductors.	**Partially effective** **Reason** – tree kept clear of lines. However, tree or branch can fall, grow more than expected, bark or small branch can be blown in high wind, and contact HV. **Performance** - Known number of incidents, outcome of audits, ESV compliance checks. **Dependencies** –relies on training, following rules, regulations **Reliance** – highly reliant upon control **Control** – mostly in control. Tree cutting limits can be set by MEC. Weather and other factors can lead to loss of control.	**Likely**	**Catastrophic** (multiple fatalities)	**Extreme**	**Available risk controls (what else could be done):** Insulate line (see next risk event analysis) **Further controls considered:** LiDAR survey of network for tree clearance checks annually (pre-summer) **Cost:** Estimated to be $xxx to be conducted every year. Relatively easy to implement due to readily available service providers **Outcome:** Implement LiDAR surveys as an additional control every year (pre-summer) as the cost is not disproportionate to the risk reduction gained and it is easy to implement. This is expected to reduce the likelihood of the risk from Likely to Unlikely and change to the risk rating from Extreme to High.

	HV protection – Protection system limits energy to an adequate level that prevents fire starting in vegetation	**Largely ineffective** **Reason** – protection system may not operate, or not operate quickly to prevent fault current flowing **Performance** - Known from incidents, Engineering knowledge. **Dependencies** –relies on correct design, application of standards, knowledge of system at that site, knowledge of limits to prevent fire, means available to prevent fire **Reliance** – not reliant upon **Control** – in control. Protection levels set accurately and, checked and maintained over life of protection system				
Tree contacts HV line causing bushfire in HBRA (high consequence area) **Hazard** – HV overhead powerline **Event** –tree contact causing ground fire ignition **Cause** – Tree contact **Consequences**: potential loss of life	**Insulated overhead powerline** – insulate contact from trees.	**Substantially effective** **Reason** – insulates from contact. However, tree can fall and break insulated overhead line causing contact with ground vegetation. **Performance** - Known from low number of incidents. **Dependencies** – adequate design **Reliance** – high reliance upon this control **Control** –in control.	**Rare**	**Catastrophic** (multiple fatalities)	**High**	**Available risk controls (what else could be done):** Underground the HV overhead lines. Cost is $xxx. This is considered to be disproportionate. **Further controls considered:** Nil. **Cost:** To insulate the overhead lines in certain areas. Estimated to be $xxx for 'extreme' consequence areas. Consequence rating applied from Tolhurst ratings. Feasible to implement due to readily available materials and the cost is not considered grossly disproportionate.. **Outcome:** Implement program to insulate xxx km of line in (defined area) over xxx years.

	HV protection – Protection system limits energy to an adequate level that prevents fire starting in vegetation	**Largely ineffective** **Reason** – protection system may not operate, or not operate quickly to prevent fault current flowing **Performance** - Known from incidents, Engineering knowledge. **Dependencies** –relies on correct design, application of standards, knowledge of system at that site, knowledge of limits to prevent fire, means available to prevent fire **Reliance** – not reliant upon **Control** – in control. Protection levels set accurately and, checked and maintained over life of protection system				
Worker (public) contacts bare overhead conductor causing fatality **Hazard** – Live overhead bare conductor **Event** – Conductor contact **Cause** – Inadvertent contact **Consequence -** potential loss of life	**No Go Zone** – limits a person to work no closer than a specified limit	**Largely ineffective** **Reason** – Specified limits and permit outlines NGZ. However work by public difficult to predict and control. **Performance** - Known from many incidents, results of audits, ESV compliance checks. **Dependencies** – adequate regulations, training, understanding of requirements **Reliance** –reliant upon	**Likely**	**Major** (Fatality)	**Extreme**	**Available risk controls (what else could be done):** Insulate overhead lines. Cost is $xxx per metre for LV and $xxx per metre for HV . LV is considered practicable. HV is considered to be disproportionate. Shut down lines. Cost is $xxx for HV. This is considered practicable for short time (< 8hrs). **Further controls considered:** Site barriers. **Cost:** To insulate the overhead lines in certain circumstances. Estimated to be $xxx for high risk activity. Cost incurred by the public and may be rejected or work undertaken without permission. **Outcome:** Implement insulation of line on LV lines. This is expected to

		Control – not in control. Work by the public is not in MEC control.				reduce the likelihood of the risk from Likely to Rare the risk rating change from Extreme to High (for LV lines)
	Electrical protection – Protection system operates to prevent electrocution	**Performance** - Known from incidents, Engineering knowledge. **Dependencies** –relies on correct design, application of standards, knowledge of system at that site, knowledge of limits to prevent fire, means available to prevent fire **Reliance** – not reliant upon **Control** – in control. Protection levels set accurately and, checked and maintained over life of protection system				
(List further risks)						

Table 2 - Example of presentation – Likelihood descriptions for use in table 1

Likelihood Descriptor	Description	Indicative Frequency
Almost Certain	Is expected to occur	Occur twice or more multiple events (over life of asset)
Likely	It will probably occur	One or more event (over life of asset)
Possible	May occur	No events (over 75% of life of asset)
Unlikely	Not likely to occur	No events (over 90% of life of asset)
Rare	Most unlikely to occur	No events (over life of asset)

Table 3 - Example of presentation – Consequence descriptions for use in table 1

Consequence Rating	Minimal	Minor	Moderate	Major	Catastrophic
Description	Slight injury with no medical intervention	Minor injury with medical intervention	Serious Injury	Fatality	Multiple fatalities

Table 4 – Example of presentation - Risk matrix for use in table 1

	Consequence				
Likelihood	Minimal	Minor	Moderate	Major	Catastrophic
Almost Certain	Significant	High	Extreme	Extreme	Extreme
Likely	Moderate	Significant	High	Extreme	Extreme
Possible	Low	Moderate	Significant	High	Extreme
Unlikely	Negligible	Low	Moderate	Significant	High
Rare	Negligible	Low	Moderate	Significant	High

Table 5 - Example of presentation – Control Effectiveness descriptions for use in table 1

Risk Control Effectiveness	Description
Fully Effective	Control is well designed for the risk, addresses the root causes and is effective and reliable at all times. Control is deemed to be operational in excess of 99% of the time.
Substantially Effective	Control is designed correctly and is in place and effective. Control is deemed to be operational between 80% and 99% of the time.
Partially Effective	Whilst the design of the control may be largely correct in that it treats most of the root causes of the risk, it is not currently very effective in that it does not treat root causes. Control is deemed to be operational between 50% and 80% of the time.
Largely Ineffective	Significant gaps. Either the control does not treat root causes or does not operate at all effectively. Control is deemed to be operational between 25% and 49% of the time.
Totally Ineffective	Virtually no credible control. If any control exists it would be operational less than 25% of the time.

Risk description

This column shows the risk description, which is a statement summarising the key elements of a risk, and forms the basis for its analysis and assessment. A risk description summarises a scenario and should contain elements that describe the:

- hazard
- event
- causes of the event
- foreseeable worst case consequences of the event

Control and function

This column identifies all relevant controls that can reduce the risk identified by the risk description. The two control types are:

- preventative controls that aim to prevent a cause or initiating event from occurring; and
- mitigating controls that reduce the severity of the consequence of a risk event after it has occurred.

Risk controls are aligned with the risk description's context and assessed for their individual effectiveness. A description of how the risk control functions act to minimise a risk should be clearly defined, and where multiple functions exist for a control, only the functions relevant to the specific risk description should be detailed.

Effectiveness of control to minimise risk

This is the estimate of a control's effectiveness at minimising the risk and the reason why that estimate is relied upon. Reasons to rely on a control's effectiveness can include outcomes from monitoring activities, incidents, and near misses.

The reasoning for the effectiveness rating should outline:

- Reason for rating – including justification of conditions required to be effective, and when the control is not effective, ie circumstances/conditions under which the risk control can be defeated or is unable to achieve the level of risk control intended (failure mode/s)
- Risk control performance measures – quantities that can be measured and compared with targets, KPIs, expectations, etc. to indicate effectiveness
- Risk control's dependencies - the factors that a risk control needs in order to achieve its function
- Effect on risk - extent to which the risk control can address an event
- Reliance on control - Extent to which the control can be relied upon to minimise risk AFAP (availability on demand/when needed, reliability and resilience)
- Control of control - Extent to which the control element is controlled by the MEC and how this is achieved

Likelihood

This is the result from the assessment of the chance of the event occurring after applying controls. A FSA should clearly describe the criteria used for this assessment.

Consequence

This is the result from the assessment of the consequences after applying controls. A FSA should clearly describe the criteria used for this assessment.

Risk ranking

This is the result from the assessment of the risk after applying controls. A FSA should clearly describe the criteria used for this assessment.

Demonstration of risk minimisation AFAP

This needs to show how AFAP has been achieved. It also needs to establish what is not practicable in terms of further minimising risk.

Section 3 – Safety Management System

Regulation Requirement

r.26 For the purposes of section 99(2)(b) of the Act, the ESMS for a supply network of an MEC must specify a safety management system that –

(a) describes how the MEC will meet its duties under section 98 of the Act; and
(b) complies with AS 5577 and contains a description of the technical and other measures undertaken or to be undertaken to reduce, as far as practicable, the risks identified in the formal safety assessment carried out in accordance with that standard; and
(c) specifies the means by which the MEC will monitor and maintain the integrity of the supply network taking into account the expected operational life of the network.

AS 5577 Requirement

Nil

Guidance

The ESMS requires a description of how the MEC's design, construct, operate, maintain and decommissioning processes and procedures minimise network risk as far as practicable (AFAP[2]). Also, the ESMS needs to describe the network monitoring processes and procedures and maintenance process and procedures used as part of an asset management system.

Details can be found in the sections below.

Section 3.1 – Technical Standards and Design

Regulation Requirement

Nil

AS 5577 Requirement

(4.3.4.1 Published national or international technical standards)
A MEC shall identify the published national or international technical standards used by it in—

(a) the design and construction of existing network assets;
(b) design and construction of new network assets; and
(c) the commissioning, installation, operation, maintenance and decommissioning of network assets.

If the MEC chooses not to use an applicable relevant standard or chooses not to comply with particular provisions of that standard, the MEC shall document

- *the reason for the non-use of or non-compliance with the standard*
- *the alternative provisions for the design, construction, commissioning, installation, operation, maintenance and decommissioning of network assets that will ensure a level of safety in relation to those activities that is at least equal to or greater than the level of safety that would ensue from compliance with that standard.*

(4.3.4.2 Industry/company codes)
A MEC shall identify the industry or company codes used by it in—

(a) the design and construction of existing network assets;
(b) the design and construction of new network assets; and
(c) the commissioning, installation, operation, maintenance and decommissioning of network assets.

If the MEC chooses not to comply with particular provisions of an industry or company code, the MEC shall document

- *the reason for the non-compliance with the code*

[2] Following Appendix B of the standard may not be sufficient to show compliance with s98 of the Act.

- *the alternative provisions for the design, construction, commissioning, operating, maintenance and decommissioning of network assets that will ensure a level of safety in relation to those activities that is at least equal to or greater than the level of safety that would ensue from compliance with that code.*

Guidance

Standards

The ESMS shall list all the key relevant published national or international standards issued by standards bodies which the MEC used to manage safety risks in the design, construction, commissioning, installation, operation, maintenance and decommissioning of network assets and development of internal standards.

Preference for standards to be used includes:

- Australian Standards (AS)
- British Standards Institute (BSI)
- International Organisation for Standardisation (ISO)
- International Electrotechnical Commission (IEC)
- Government regulations
- Codes of practices (for example Blue Book)
- Industry Guidelines (for example ENA, VESI guidelines)

Where a standard is not used, or partly adhered to, the MEC shall justify the reasons for the non-compliance to the standard and provide evidence that the alternative has an equal or better safety level compared with the published standard.

All work should be in accordance with the latest standards and the ESMS shall provide a justification for the use of non-current standards.

Design

The ESMS should specify the design principles, process and procedures used to ensure that all identified risk risks are eliminated or reduced to an acceptable level during the life cycle of the network.

The design process should consider Safety in Design (SID) principles.

Section 3.2 – Construction

Regulation Requirement

Nil

AS 5577 Requirement

(1.2 Fundamental Principles)
The MEC is responsible for the safe construction of the network. The MEC cannot delegate its accountability for the safety of its workers and its contractors and sub-contractors.

Guidance

The ESMS should specify the effective processes for the control of construction and commissioning activities to ensure they are implemented in accordance with the specifications.

The construction processes shall comply with regulations, codes of practice and OH&S requirements.

Section 3.3 - Asset Management

Regulation Requirement

Division 3 - Regulation 26: Safety management system—MEC

> *For the purposes of section 99(2)(b) of the Act, the ESMS for a supply network of an MEC must specify a safety management system that:-*
>
> *(b) specifies the means by which the MEC will monitor and maintain the integrity of the supply network taking into account the expected operational life of the network;*

AS 5577 Requirement

1.2 Fundamental Principles

> *(h) The structural and functional integrity and safe operation of the electricity network is to be maintained in accordance with the MECs ESMS throughout the whole operating life of the network.*

ESV Guidance

The ESMS should specify an appropriate asset management approach that meets the general duties arising from the Act.

The asset management approach ensures that the ESMS is adequate for monitoring and maintaining the integrity of the assets, taking into account the expected service life of the assets and the requirement to minimise risks AFAP.

Asset ‘sustainability’ and ‘integrity’ refers to the management of long-term degradation of network assets that could contribute to, or cause incidents arising from foreseeable risks.

The ESMS shall demonstrate that the asset management system is sufficient to sustainably manage assets across their whole operating life.

The ESMS must consider:

- Upcoming age related volume of work (commonly known as a ‘bow-wave’)
- Risks associated with increasing volume of asset management activity with ageing network
- Minimising the risks AFAP given the profile of the ageing network currently and in the long term (given that typical asset life is in the range of 25 to 50 years depending on the asset).

The asset management approach needs to consider the actual performance of assets individually and collectively.

The integrity of the network must be considered as part of the asset management system. The ESMS must demonstrate that outcomes, where failures of assets may cause a serious incident, are adequately minimised.

The ESMS must demonstrate the adequacy of current asset management practices. Past incident history may be an indication of asset issues and, together with asset degradation rates, asset age, installed asset volumes, and asset replacement volumes, the asset management system must demonstrate that it is adequate to reduce risk AFAP.

The asset management system should link the asset inspection process and risk of failure. Techniques to inspect assets need to consider the consequence of failure and be effective in finding the start of degradation, the point of failure and the point where actions are required to prevent failure. The ESMS must demonstrate that the timeframe for actions and explanation of what actions are needed to prevent failure are adequate. Where inspections are not effective or unable to be

performed, the ESMS shall describe all techniques used to manage assets, including age based replacement and, only if the risk is negligible, run to failure. Inspection timeframes shall be in accordance with the Electricity Safety (Bushfire Mitigation) Regulations.

Improvements to the asset management system, including inspection techniques, shall be inherent in the asset management process. The ESMS shall include sufficient detail to enable an understanding of the improvement processes.

Section 3.4 – Operation and Decommissioning

Regulation Requirement
Nil

AS 5577 Requirement
(1.2 Fundamental Principles)
Before any part of the electricity network is placed into operation for the first time or when returned to operation after a fault or maintenance, appropriate measures for inspection, commissioning and testing are to be conducted to ensure it is safe to operate.

Before any part of the electricity network is decommissioned the MEC is to ensure that any decommissioned network assets are safe and the integrity of any remaining network assets are not compromised.

Guidance

Operation

The ESMS should specify processes for the control of access to the network and the governance to ensure they are implemented in accordance with the MEC processes.

In particular, the requirements of the Blue Book shall be met.

Decommissioning

The ESMS should specify the processes for controlling decommissioning activities to ensure they are implemented as specified. Different types of assets may have different decommissioning process requirements.

Section 3.5 – Emergency Preparedness and Management

Regulation Requirement

Nil

AS 5577 Requirement

(4.3.3 Planning and preparation for abnormal operations)
The MEC shall plan and prepare for operation of the network in foreseeable abnormal circumstances or during significant disruption to normal operations.
These circumstances may include the following:

- *Operating connected to emergency power sources.*
- *Operating without normal supply assets such as powerlines or transformers.*
- *Operating at other than normal voltage levels.*
- *Operating under communication outages.*
- *Operating under changed conditions to avoid further damage to the network.*

(4.4.7 Emergency preparedness and response)
The MEC shall plan and prepare for emergency events resulting from the network's operation and maintenance and also from external events that may affect the safe operation of the network.
In the event of an emergency, the MEC shall ensure that any response is performed in a safe manner.
NOTES:

1. Liaison with emergency services and stakeholders may assist the MEC to be adequately prepared for an emergency event.
2. AS 3745, Planning for emergencies in facilities, provides guidance.

Guidance

The ESMS should contain clear steps of action to mitigate and recover from the consequences of all reasonably foreseeable emergencies and incidents, and should address the following:

1. Detailed response and recovery strategies for all reasonably foreseeable emergencies including:
   – Significant loss of supply (e.g. in CBD, significant events, to transport, state-wide, etc.)
   – Bushfires
   – Natural events (e.g. severe storms, high winds, extreme heatwave, etc.)
   – Terrorism
   – Power quality (e.g., brown out over a large area, loss of frequency, etc.).
2. Emergency roles and responsibilities.
3. The incident escalation process, which may provide the:
   – Categorisation of emergencies (for example, emergency definitions involving level 1-5 emergencies)
   – Description of what triggers emergency management team activation
   – Description of what triggers an emergency escalation.
4. Emergency and key emergency responder contacts (internal and external) with 24/7 availability.
5. Arrangements for utilising third party support (which may also cover arrangements for the storage of equipment).
6. A general emergency response overview, which may include details about the:
   – Isolation of supply
   – Emergency control centre
   – Restriction of supply process
   – Remediation process following an incident.
7. Management of change and handover responsibilities.
8. Stakeholder communication protocols.
9. Emergency response personnel training and competency.
10. Specification of the emergency response exercises and training to be undertaken each year.
11. The triggers for an emergency management plan review.
12. Procedures and systems in place to respond to the Victorian Energy Emergency Communications Protocol (VEECP) process and phases
13. Response to media via single person.

Section 3.6 – Training and Competency

Regulation Requirement

Nil

AS 5577 Requirement

(4.4.5 Training and Competency)
The MEC shall ensure that all persons involved with the design, construction, commissioning, operation, maintenance and decommissioning of the network are suitably competent and adequately trained to carry out their duties.

The MEC shall establish and maintain procedures for identifying, facilitating and/or providing the training needs of all personnel operating the network covered by the ESMS.

As a minimum, personnel responsible for the operation and maintenance of the network shall, as applicable to their position, be adequately trained in the obligations of the ESMS and briefed in the requirements of the controls and actions identified during the formal safety assessment.

NOTES:
1. Competency is the consistent application of knowledge and skill to the standard of performance required in the workplace.
2. Detail on the framework for national competencies for electricity supply can be found at the www.ee-oz.com.au website.

Guidance

The ESMS should specify and identify training system needs and how:

- Training will be provided
- Training records will be kept
- Personnel are qualified
- Skills and competencies are reviewed for currency and relevance to the MEC's needs.

It should also provide information about:

- The training systems to be used
- How contractor competencies are identified and evaluated
- Minimum qualifications, skills and competencies required
- The mechanisms in place to:
  – ensure that only persons with the qualifications, skills and competencies appropriate to a given type of work are assigned to carry out that work
  – provide the necessary training for persons assigned to carry out work
- The frequency of retraining and requalification

Section 3.7 – Incident Reporting, Investigation and Review

Regulation Requirement

s.142 Notification of serious electrical incidents

(1) An electricity supplier must report to Energy Safe Victoria in accordance with the regulations any
(2) An electricity supplier must report to Energy Safe Victoria in accordance with the regulations any serious electrical incident of which it is aware and which occurs in relation to an electrical installation to which it supplies electricity.

Requirements for reporting of serious electrical incidents by major electricity companies

(1) For the purposes of section 142(1) and (2) of the Act, an electricity supplier that is an MEC must
(a) notify Energy Safe Victoria of a serious electrical incident within 2 hours after the incident occurs; and
(b) give to Energy Safe Victoria a written incident report that includes the details specified in reporting guidelines issued by Energy Safe Victoria from time to time and in the manner and within the time specified in the guideline.

(2) This regulation applies if a serious electrical incident –
(a) caused the death of or injury to a person; or
(b) caused significant property damage; or
(c) caused significant disruption to the community; or
(d) involved an electric line with a nominal voltage of more than 66 000 volts; or
(e) involved an imminent risk of electrocution; or
(f) involved a fire originating from the MEC's supply network; or
(g) involved any of the following –
(i) an explosive failure of an asset; or
(ii) a reverse polarity; or
(iii) a high voltage injection; or
(iv) a switching operation that inadvertently caused energisation; or
(v) a person coming into contact with an energised network asset; or
(vi) an energised bare conductor that is less than 4.3 metres above the ground; or
(vii) part of the MEC's supply network becoming dislodged from its supporting structure; or
(viii) an uncontrolled release of a live conductor.

Reporting of other serious electrical incidents by major electricity companies

(1) This regulation applies to serious electrical incidents other than serious electrical incidents described in regulation 28(1).
(2) For the purposes of section 142(1) and (2) of the Act, an electricity supplier that is an MEC must report to Energy Safe Victoria a serious electrical incident to which this regulation applies in the manner and within the time specified in reporting guidelines issued by Energy Safe Victoria.

AS 5577 Requirement

(4.5.2 Incident investigation and corrective and preventive action)
(4.5.2.1 Accident/incident investigation and reporting)
The MEC shall establish procedures for identifying, notifying, recording, investigating and reporting accidents and incidents. This shall cover any event associated with the network that either causes or has the potential to cause any one or combination of the following:
(a) Death or significant injury to network personnel or the public.
(b) Significant damage to property.
(c) Significant impact on the safe operation of the network.

NOTES:
1 Significant needs to be defined by the MEC.
2 Reporting includes notification of relevant regulatory authorities as required by legislation.

Note: Incident reporting shall be to the regulatory requirements and ESV incident reporting guideline.

(4.5.2.2 Corrective and preventive action)

The MEC shall develop and implement procedures for determining, approving and implementing corrective and preventive actions.
NOTE: Corrective actions are taken to deal with an existing issue while preventive actions address potential issues.

The agreed actions shall, as far as reasonably practicable, eliminate or mitigate the identified hazard and shall be appropriate and commensurate to the risk identified. The agreed actions shall be documented and their implementation monitored and confirmed.
The basis for any action shall be documented. The outcomes of corrective or preventative actions taken, along with their effectiveness, shall be subjected to independent internal review.

Guidance

Incident Reporting

The MEC shall have process and procedures for reporting of incidents that abide by ESVs Incident Reporting Guideline.

Corrective and preventive action

The MEC shall have process and procedures for corrective and preventive action with details on:

- Method used to understand the causes of, and factors that contribute to, incidents
- Process used to address incident causes, whether the incident occurs on the MEC's network or other MEC network, so that future incidents do not occur
- Responsibilities for identifying, reviewing and implementing actions identified in an investigation report
- Management process used in the review and implementation of recommendations made by incident investigation teams
- Training in investigative methods and procedures for the personnel responsible for conducting incident investigations.
- The way actions identified by incident investigations will be fed back to the formal safety assessment, for example, new controls to be applied to a risk event.

Section 3.8 – Management and Governance

Regulation Requirement

Nil

AS 5577 Requirement

(4.5.4 System audits)
The MEC shall establish procedures for planning and implementing audits to determine the MEC's compliance with, and the effectiveness of, the ESMS's plans and procedures. System audits should also assess compliance with regulatory requirements and ensure the ESMS adequately addresses these issues.

The MEC shall consider the hazards identified and risks evaluated in the Formal Safety Assessment to ensure that audits evaluate—

(a) the effectiveness of the ESMS in controlling the risks identified; and
(b) the effectiveness of the monitoring procedures in place to identify new or changed hazards and risks.

Audits shall be performed by competent personnel who are independent of the section of the ESMS being audited. The audit procedures shall cover the timing of audits, including the conduct of external independent audits where chosen or where required by regulatory authorities.

Audit procedures shall cover arrangements for verifying the implementation and effectiveness of corrective and preventive actions designed to address any non-conformances identified during the audit.

The outcomes of audits shall be subject to management review.

NOTE: Guidance regarding auditing is given in ISO 19011.

(4.6.1 Management review)
The MEC shall establish procedures for regular management review of the effectiveness and appropriateness of the ESMS.

NOTE: This should include review by the MEC of those elements of the ESMS considered high risk, and take into account the outcomes from the various procedures covering the measurement and evaluation of elements of the ESMS.

The ESMS shall be reviewed and, if necessary, updated at least every five years or in the event of any change to the ESMS. This includes, for example, changes to legislative requirements, organizational structure and operational experience.

(4.6.2 Change management)
The MEC shall establish procedures for managing changes to the ESMS, procedures, network design, construction, operation, maintenance and decommissioning so that they are made in a controlled manner, reviewed, recorded and approved by the MEC.

Any change to the network or its operating context shall be reviewed and approved by the MEC. Change shall be considered to have taken place if the engineering design has been upgraded or modified. Change shall be considered to have taken place if any event or newly identified hazard initiates an operational, technical or procedural change in the measures to (as a minimum)—

(a) protect the network and associated components;
(b) promote public safety awareness of the network;
(c) operate and maintain the network safely;
(d) implement emergency response arrangements;
(e) prevent or minimise loss of supply;
(f) carry out required inspections; and
(g) ensure that the plans and procedures continue to comply with the network's engineering and design standards.

The change management procedures shall address implementation of any resulting ESMS changes, including notification and training of staff impacted by the change and the allocation of responsibilities for any identified actions. The change management procedures shall also include communication of changes to relevant stakeholders.

NOTE: Change triggers may also arise from external influences such as, but not limited to, legislative changes, coronial findings and Royal Commission recommendations.

Guidance

System audits

The MEC shall have process and procedures for planning and implementing audits to determine the MEC's compliance with, and the effectiveness of, the ESMS's plans and procedures.

The ESMS should contain detail that meets the System Audit requirements of AS 5577.

Management review

The MEC shall have procedures for regular management review of the effectiveness and appropriateness of the ESMS.

The ESMS should contain detail that meets the Management Review requirements of AS 5577.

Change management

The MEC shall establish procedures for managing changes to the ESMS, procedures, network design, construction, operation, maintenance and decommissioning so that they are made in a controlled manner, reviewed, recorded and approved by the MEC.

The ESMS should contain detail that meets the Change Management requirements of AS 5577.

Section 3.9 – Records

Regulation Requirement

r.27 Records

(1) An accepted ESMS operator must, in accordance with this regulation, establish and maintain a system for keeping records relating to its accepted ESMS.
(2) The accepted ESMS operator must keep the following records—
(a) the accepted ESMS;
(b) any revisions of the accepted ESMS;
(c) any written audit reports of the accepted ESMS;
(d) any reports of investigations of incidents involving—
(ii) if the accepted ESMS operator is an MEC, the MEC's supply network;
(e) a copy of each report given by the accepted ESMS operator to Energy Safe Victoria;
(f) if the accepted ESMS operator is an employer operator, a register of the names and qualifications of persons nominated to carry out electrical work under the accepted ESMS.
(3) The accepted ESMS operator must keep records under subregulation (2)—
(a) at the address nominated by the accepted ESMS operator in the accepted ESMS; and
(b) in a manner that makes their retrieval reasonably practicable; and
(c) in a secure manner; and
(d) for the period of 7 years after their creation.

AS 5577 Requirement

Note: Record systems shall be to the regulatory requirements.

Guidance
The ESMS shall have details and processes that establish and maintain a system for keeping records relating to its accepted ESMS in accordance with the regulation.

Section 4 – Exemptions

Regulation Requirement

r.32 Exemptions from regulation requirements

(1) Energy Safe Victoria may, on the application of an MEC, exempt an ESMS from any of the requirements of these Regulations.
(2) An application for the purposes of subregulation (1) must be in writing and state—
(a) the name, address and telephone number of the applicant; and
(b) the regulation in relation to which the exemption is requested; and
(c) the reasons the applicant is applying for the exemption.
(3) An exemption under subregulation (1) may be subject to conditions specified by Energy Safe Victoria.
(4) An MEC to whom an exemption is granted under subregulation (1) must comply with the conditions (if any) of the exemption.

AS 5577 Requirement

Nil

Guidance

The ESMS shall contain a copy of all current exemptions granted by ESV.

Any exemption requested but yet to be granted shall be described with details of the regulation for which exemption is sought, when it was sought, reasons for exemption, justification for exemption and risk analysis of proposed exemption.

Exemptions will be granted or rejected subject to ESV process.

Revision of an ESMS

In accordance with s.107 of the Act, the MEC shall submit a revised ESMS to ESV if

(a) developments in technical knowledge or the assessment of hazards relevant to the supply network make it appropriate to revise the accepted ESMS; or

(b) a proposed modification to the supply network will result in a significant increase in the overall level of risk to the safety of any person or property arising from the supply network; or

(c) a proposed modification to the work practices covered by the accepted ESMS will result in a significant increase in the overall levels of risk to the safety of any person or property arising from the supply network; or

(d) the major electricity company proposes to make a significant change to the accepted ESMS.

If there is a proposal to change process, procedure or methodology of a key risk control, the MEC should consider discussing the proposal with ESV as early as possible.

Some examples of changes that may result in a resubmission include:

- Introduction of technology such as REFCL which alters the risk profile of starting a bushfire
- Change to the organisation such as major restructure resulting in significant role changes for senior managers and other key managers responsible for critical risk areas
- Changes to procedures that are part of critical controls of the ESMS such as asset inspection regimes, no go zone processes, etc.