Bushfire Prevention Strategy
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Executive Summary

The scope of the Bushfire Prevention Strategy includes all factors within Essential Energy's control that could impact the achievement of objectives related to network initiated bushfire, primarily through fires started by the electricity network, or by people operating or otherwise working on the network.

This strategy does not cover network impacts resulting from bushfires started by factors outside of Essential Energy's control, for example extreme weather events; these will be addressed by other network strategies.

The scope of the strategy includes network and non-network interventions; it also considers enablers such as people, process, data and system improvements.

There is a risk of fire associated with the operation of an electricity distribution network through the release of energy during equipment operation and fault conditions. Elimination of fire risk associated with the operation of an electricity distribution network is not practicable. In the event of ignition Essential Energy has limited ability to control the consequences of a fire, which can be dependent upon external factors such as the severity of fire weather. Societal perceptions and expectations regarding bushfire risk is dynamic and dependent upon recent events.

Essential Energy must maintain oversight and understanding of these factors and balance any response to them against the other objectives of the business, including safety, reliability and affordability. Balancing these objectives will require an informed and structured approach that is in the best interest of all stakeholders.

This strategy has been developed with the input from a broad range of internal and external stakeholders. It establishes performance objectives for bushfire risk management and identifies the strategy to shift performance towards these objectives.

The objectives of the strategy over the 5-year horizon are to:

- Minimise safety risk SFAIRP
- Managing risk within the corporate risk appetite
- 100% compliance with 'significant obligations' and 'critical controls'
- Meet corporate targets for efficiency
- Reduced variability and uncertainty in controllable performance

The objectives of the strategy over the 15-20 year horizon are to:

- Reduce controllable risk by 20%
- Minimum whole of life cost

A suite of 38 initiatives have been identified to improve bushfire risk management performance from current level to a desired future state.

The costs to the organisation to deliver the initiatives identified in the strategy have been estimated at $6.5 million and will deliver an estimated 44% improvement in bushfire performance in terms of over the life of the strategy.

The strategy describes bushfire prevention assurance and delivery dashboards that will be used to track delivery and performance of the strategy. Measures are defined to monitor the delivery and effectiveness of the strategy. Trigger criteria are also defined for strategy review. Unless triggered earlier, the next major review will be in 2022, as part of the lead-in to the next Regulatory Submission.

1 Bushfire Prevention Strategy

Figure 1 shows the Asset Management Strategy Map. Within this, Bushfire Prevention is one of the 'Network Strategies'.

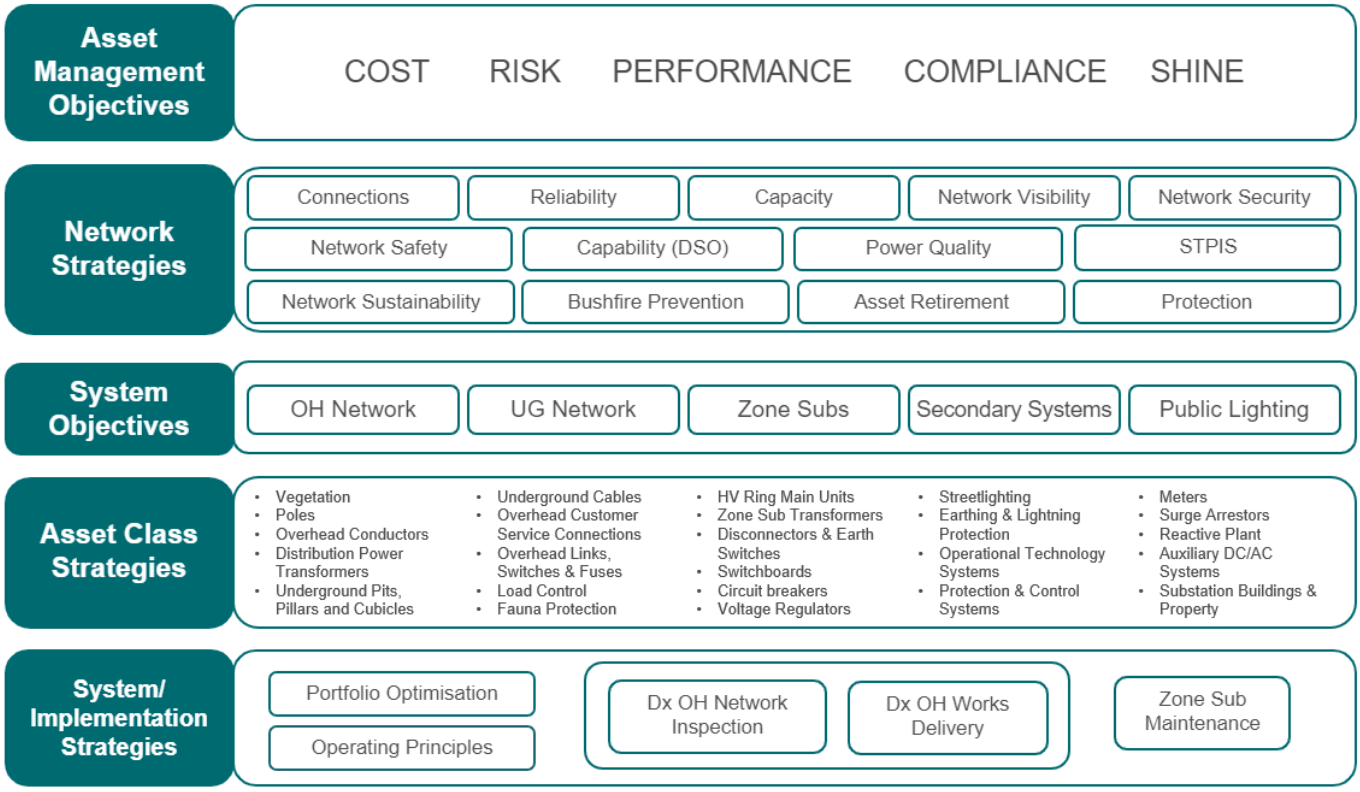

Figure 1 – Asset Management Strategy Map

Prior to development of this strategy, Essential Energy had an established Bushfire Risk Management Plan, which set out an annual view of operational risk management activities. The Bushfire Prevention Strategy sits above the Risk Management Plan as it sets the:

- Direction and long-term objectives
- Strategic 'levers' for bushfire risk management

Bushfire Prevention is a complex subject. There is a real risk of fire start through normal operation of the network and not just through 'failures'. Once ignition occurs, Essential Energy has limited ability to control the spread and ultimate consequences of a fire.

With current technology it is not possible to eliminate the risk of network caused fires, and it is not cost effective to replace the entire overhead distribution network.

The level of inherent bushfire risk is volatile as it is dependent on the severity of the annual fire season plus longer-term impacts of climate change; we also need to manage dynamic stakeholder perceptions and expectations, which can be highly dependent on recent events.

As a business, we must maintain oversight and understanding of all of these factors, to ensure we are continually reviewing and improving our approach, while also balancing this against our other objectives, including safety, reliability and affordability. This is a complex undertaking and it requires an informed, structured approach to manage it and achieve a successful outcome.

The format of this strategy is based on the Institute of Asset Management Subject Specific Guidance for 'Asset Management Policy, Strategy & Plans'.

2 Strategy Development Approach

2.1 Inputs & Development Approach

Key inputs to the bushfire prevention strategy include:

- Annual Bushfire Risk Management Plan
- Annual Fire Report
- Bushfire Formal Safety Assessment (FSA)
- Bushfire Bow-Tie

The development approach for the strategy included:

- A series of workshops (environmental context, plus objectives setting)
- A strategic gap analysis (Objectives-to-Performance)
- Identification and assessment of opportunities to close the identified gaps
- Identification of a number of strategic themes under which opportunities could be practically grouped
- Identification of priority initiatives and an implementation roadmap

2.2 Consultation & Collaboration

Strategy development included extensive internal stakeholder consultation and collaboration, including through a series of workshops that were conducted throughout June to November 2018.

The strategy was also informed by a workshop with the Customer Advisory Group (workshop held March 2019).

3 Scope

3.1 Purpose of the Strategy

The purpose of the strategy is to:

- Establish the medium and long-term bushfire prevention objectives
- Identify the preferred strategy to seek to meet the objectives, taking into account required trade-offs between performance, cost and risk

3.2 Scope

The strategy includes factors within Essential Energy's control or influence that could impact the achievement of the stated objectives, related to network-initiated bushfire.

This includes fires started by the electricity network, or by people operating or otherwise working on the electricity network.

The scope of the strategy includes network and non-network interventions; it also considers enablers such as people, process, data and system improvements.

3.3 Duration of the Strategy

The strategy considers the 5-year period, commencing once approved, within the context of the long-term 20 year period from FY21 to FY41.

4 Principles and Objectives

4.1 Asset Management Policy

Details of Essential Energy's Asset Management Policy as it relates to Bushfire Prevention will be included in this section once the draft Policy has been approved for use by the business.

4.2 Asset Management Themes

Figure 2 shows the Essential Energy Asset Management Themes (or drivers) used to inform the Bushfire Prevention Strategy development.

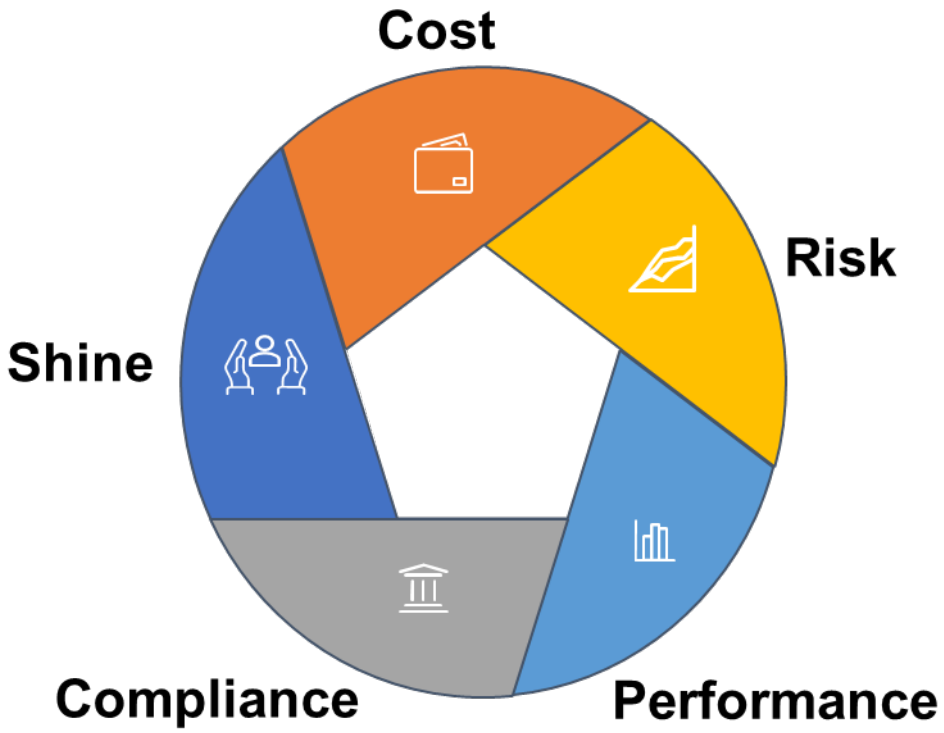

Figure 2 – Essential Energy Asset Management Themes

4.3 Bushfire Prevention Objectives

Figure 3 shows the detailed Bushfire Prevention Targets and Objectives, developed through stakeholder workshops. The left-hand column of Figure 2 shows 5 year 'objectives', aimed at focussing short-to-medium term activities. The right-hand column then shows 15-to-20 year 'objectives'.

A number of 5 year targets are kept unchanged as 20 year objectives. These are shown in, Figure 3; new objectives for the 20 year time horizon are shown in bold.

The targets and objectives contextualise the objectives shown in Figure 2, for bushfire prevention.

5 Year	15-20 Year

• Minimise safety risk SFAIRP
  • Technical Controls
  • System-level – community and EE
• Managing risk within the corporate risk appetite
• 100% compliance with 'significant obligations' and 'critical controls'
• Meet corporate targets for efficiency
• Reduced variability and uncertainty in controllable performance
	• Minimise safety risk SFAIRP
	  • Technical Controls
	  • System-level – community and EE
	• Managing risk within the corporate risk appetite
	• **20% reduction in controllable risk**
	• 100% compliance with 'significant obligations' and 'critical controls'
	• Meet corporate targets for efficiency
	• **Minimum whole of life cost**
	• Reduced variability and uncertainty in controllable performance

Figure 3 – Bushfire Prevention Objectives

5 Stakeholders

5.1 Key Stakeholders

The key stakeholders for the bushfire prevention strategy were identified considering the Essential Energy's organisational context.

Key external stakeholders with an interest or influence in our bushfire prevention strategy include, but are not limited to:

- NSW Government – our **shareholder** expects us to prevent harm and minimise loss to the business, either through fires that result in loss of network assets, or harm or loss to the public
- AER, IPART and equivalent safety regulators for Queensland and ACT – our **regulators** variously expect us minimise the risk associated with network-initiated bushfires so far as is reasonably practicable
- Customers and local community groups – our **customers** view safety as a 'given' and expect us to do what is reasonably necessary to avoid harm or loss due to network initiated bushfires
- Emergency services – expect us to collaborate with them in terms of planning for potential bushfire events and in any incident response scenarios
- Insurance companies – require us to be open and transparent; may decline to insure us if our residual risks are seen as too high, or if our controls are not seen as adequate
- Other DNSPs – what we do affects the industry definition of good/best practice. Similarly, our performance can impact other DNSPs e.g. in the event of a significant bushfire event, regulators may prescribe intervention measures for other DNSPs

- Suppliers – influence the gamut of available engineering controls that can be applied to minimise bushfire risk, through research and development
- Research institutes – expand the body of knowledge of bushfire prevention by undertaking research and development of analytic and bushfire prevention techniques

Key internal stakeholders include the Board and the Executive Leadership Team as well as those parts of the business involved in bushfire prevention as owners of risk controls:

- AM&E – set strategy; plan and design the network, provide input to customer-driven development (new connections); undertake investment optimisation; operate the network; undertake contingency and resilience planning; provide assurance of ASP work
- C&NS – plan and deliver agreed works programs; respond to fault and emergency situations; operate the customer call centre
- Fleet – ensure fit for purpose vehicles, taking account of risk of the risk of fire starts
- Corporate Legal, Risk & Compliance – strategy meets compliance obligations; bushfire risk maintained within corporate risk appetite
- Corporate Insurance/Claims – rely on appropriate risk management arrangements to obtain insurance; also to comply with defined practices in order to be able to claim on insurance
- Finance – set organisational budgets
- Corporate Safety, Health, Environment – set corporate safety, health and environmental risk management strategies; also owners of the PESAP
- Regulation & Corporate Affairs – link to regulators, manage key stakeholder relationships; understand community expectations, manage stakeholder comms

5.2 Value of Bushfire Prevention to Customers

While major network initiated fires are relatively infrequent events, it carries significant societal concern due to:

- ‘dread’ factor,
- potential impact on vulnerable groups,
- Individual’s ability to control their exposure to a fire event once started

It is recognised that a number of these factors may be driven by fire events on other networks (not Essential Energy).

Therefore, it is recognised that effective bushfire prevention carries a high value to customers.

6 Influences and Opportunities

6.1 Electricity Network Safety Management System

Figure 4 shows the relationship between the relationship between Essential Energy's Electricity Network Safety Management System (ENSMS) and the Bushfire Prevention Strategy within the Essential Energy's Asset Management System. The Formal Safety Assessment – Bushfire identifies threats and controls that have influenced the development of the Bushfire Prevention Strategy.

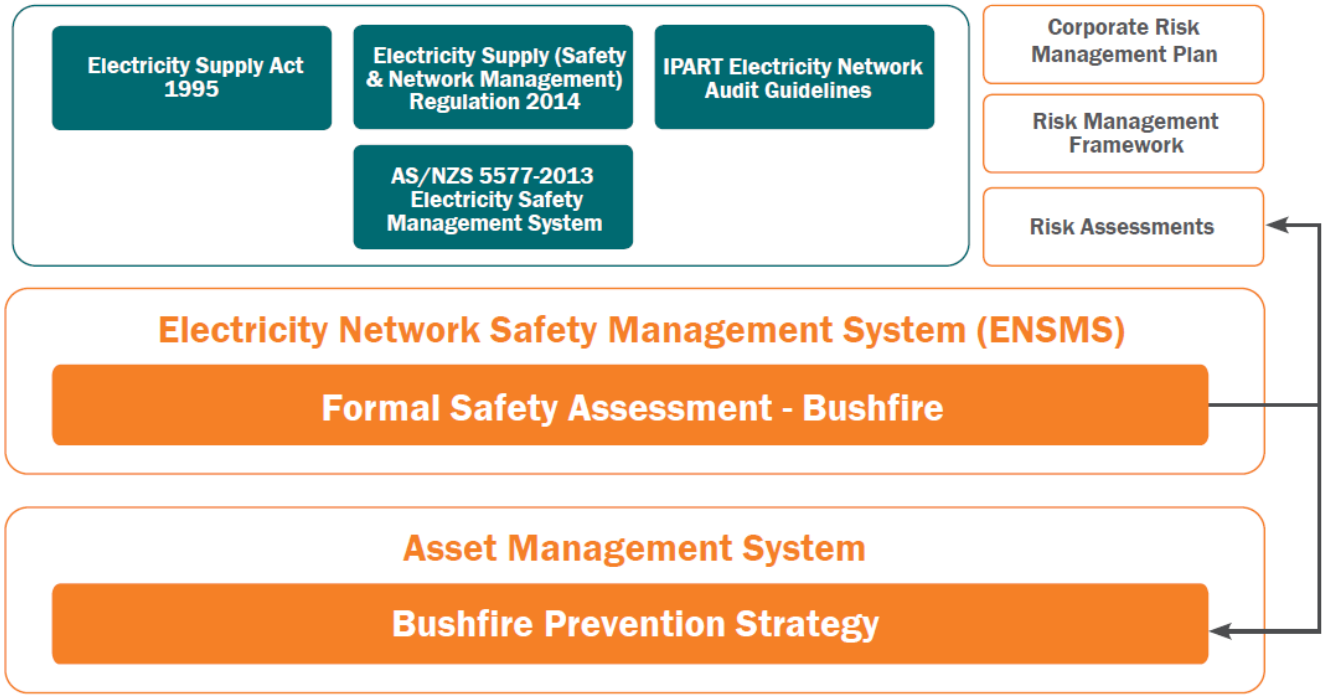

Figure 4 - Relationship between ENSMS and Bushfire Prevention Strategy

6.2 PESTEL and SWOT Analysis

PESTEL and SWOT analysis were undertaken to gain an understanding of the contextual environment for this bushfire strategy.

Key learnings from this exercise are summarised in Figure 5 below:

Key Opportunities 	• Emerging technology • Existing risk approach • Internal capability • Existing Transformation Program	• Reducing costs of technology • Potential future subsidy schemes for new technology • Assets reaching end of economic life	• Significant research targeting improved capability to model factor influencing bushfire risk
	Performance	Cost	Risk
Key Threats 	• Strategy & data • Assets reaching end of functional life • Vegetation delivery • Increasing stakeholder expectations; risk of class actions • Impact of 2-way power flows and protection issues	• Decreasing revenue • External pressure on pricing • Potential for economic penalties for fire starts	• Climate change • Remaining insurable

Figure 5 – Key Learnings from PESTEL & SWOT

In addition, a number of research institutes are currently undertaking work in the following areas of Bushfire Risk Management:

- Bushfire & Natural Hazards CRC – a range of projects around fire spread prediction, mapping bushfire hazards and fire behaviour modelling
- CSIRO – fire spread prediction models, impact of bushfires on infrastructure, impact of climate change on bushfire risk
- Bushfire Risk Management Research Hub – focussed on NSW bushfires, including drivers of bushfire frequency and severity
- University of Melbourne – Bushfire behaviour and management, Phoenix modelling
- Industry Pilots & Trials – Rapid Earth Fault Current Limiting (REFCL), Early Fault Detection (EFD), IntelliRupter, Distribution Fault Anticipation (DFA), use of LiDAR and other imagery techniques to assess tree health

This is seen as an opportunity for Essential Energy to leverage.

7 Current Position

7.1 Historic and Current Asset Performance

Figure 6 shows the recent performance (2016-19) in terms of total fire starts:

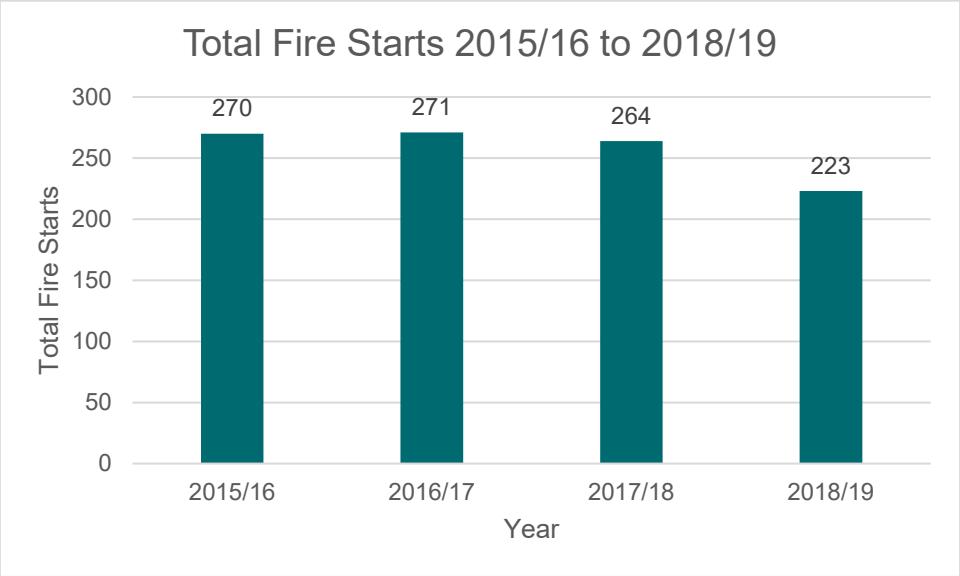

Figure 6 – Recent Firestart Performance

While this appears relative static, Figure 7 shows a longer-term trend, suggesting network-initiated fires are declining:

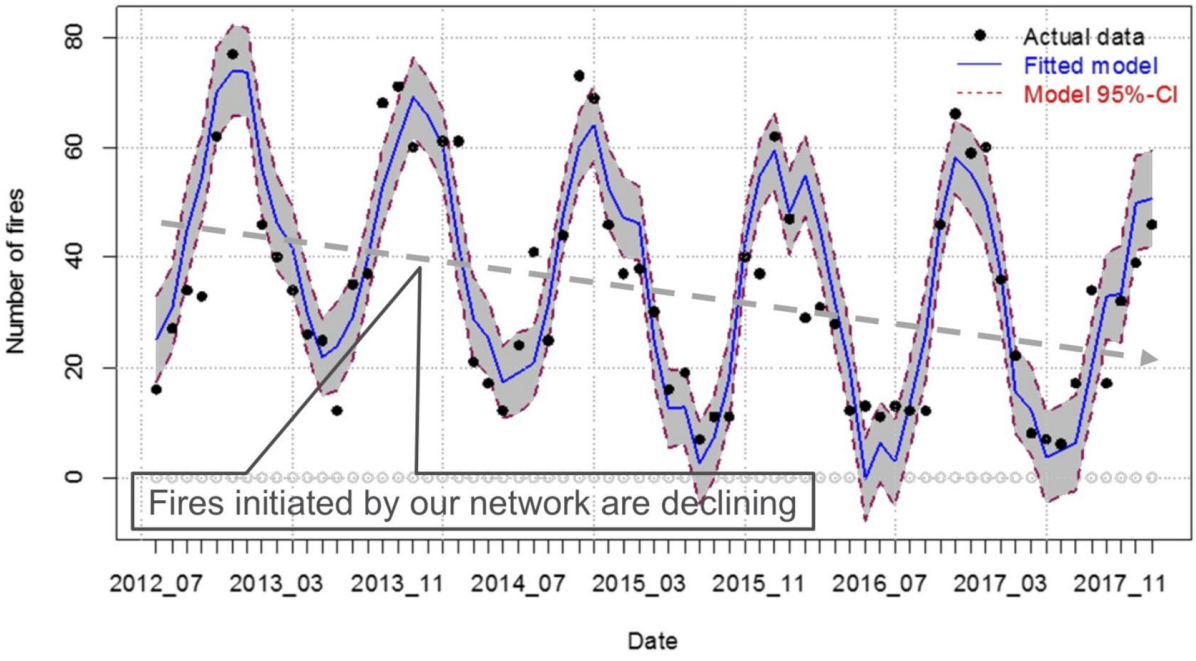

Figure 7 – Longer-term Performance Trend

Figure 8shows current performance from a risk perspective, including individual risk of fatality and monetised annual value of residual bushfire risk.

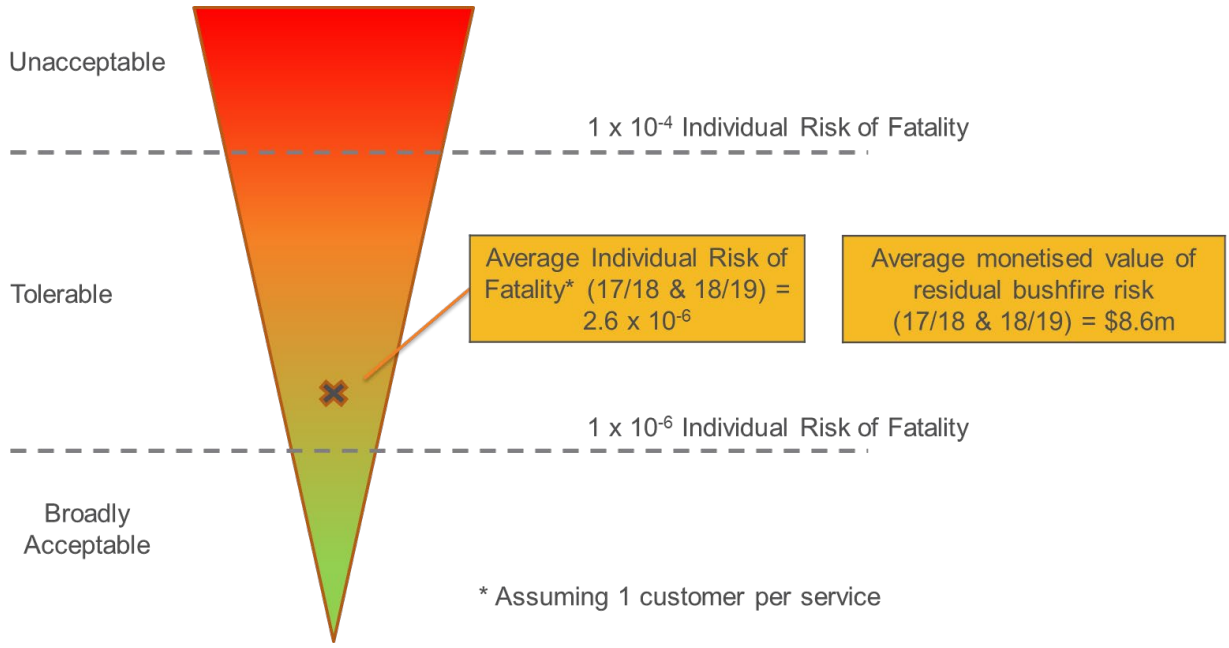

Figure 8 – Current risk performance for bushfire

This shows that the residual individual risk from bushfire is tolerable, provided appropriate controls are in place to manage the risk as low as reasonably practicable.

The residual monetised value of fire risk is calculated based on recent firestart history and using the Essential Energy fire risk model and value framework (value of actual firestarts in P1-P4 fire zones).

Fire start performance is recorded against the following primary cause categories:

- Asset breakdown
- Vegetation
- Birds/Animals
- Human Activity

Data is then broken into secondary causes underneath these categories.

Detailed analysis of fire start causes is set out in the Annual Fire Report and Bushfire FSA. The analysis is not repeated here except for the key insights, which include:

- The influence of weather (higher number of network fires in seasons with higher extreme fire weather days)
- Heightened risk of fire start from electricity networks on TFB days/days with elevated fire danger weather
- Asset Failures are a significant cause of fires (predominantly OH network)
- High contribution of tree contact, particularly on TFB days
- Low contribution from Birds/Animals and Human Activity, particularly on TFB days
- Worst performance is on the 33kV system, particularly in Hillston, Hay and Coleambally
- Industry focus on constructing more fire resilient systems (particularly in fire prone areas)

Other key inputs to this strategy include:

- Learnings from historical major fire events

- Current audit findings
- Authoritative external good practice

Learnings from historical major fire events that remain relevant include the importance of:

- Tree clearances, Hazard tree removal
- Management of private line defect rectification
- Pole top maintenance, aged conductors, tie wires, HV clashing, fuses
- Inspections
- Co-operation with the CFA (now RFS)
- Emphasis on risk assessments underpinning investment cases (controls)

Findings from recent IPART audits of the ENSMS that are relevant to this strategy include:

- Requirement to produce a Bushfire Formal Safety Assessment (FSA)
- General requirement to improve stakeholder engagement as part of FSA development

IPART also recently published a review of Bushfire Risk Management Practice. This emphasises the importance of hazard tree management (fall-ins and blow-ins), plus the related competence of inspectors to identify hazard trees.

7.2 Previous and Existing Strategies

Previous and existing strategies are considered here in terms of 'technical controls' and the overarching 'system of control'.

7.2.1 Technical Controls

Figure 9 sets out the current technical controls for bushfire risk, in the context of the hierarchy of risk control:

Hierarchy of control	Current
Eliminate	
Replace or Reduce	• UG distribution • (Re)location of lines • Disconnection of supply to Private Lines if fail to treat (bushfire risk) asset defects • Manage asset health • Vegetation management • Protection capability and settings
Isolate	• Clear zones around UG equipment and Zone Substations
Control (Admin)	• Public awareness • Works practices and training
Protect	• Fire response
Discipline	-

Figure 9 – Current technical controls for bushfire risk

These controls are described in the Annual Bushfire Risk Management Plan.

7.2.2 System of Control

The current system of control is represented in the bushfire bow-tie. Figure 10 shows a schematic representation.

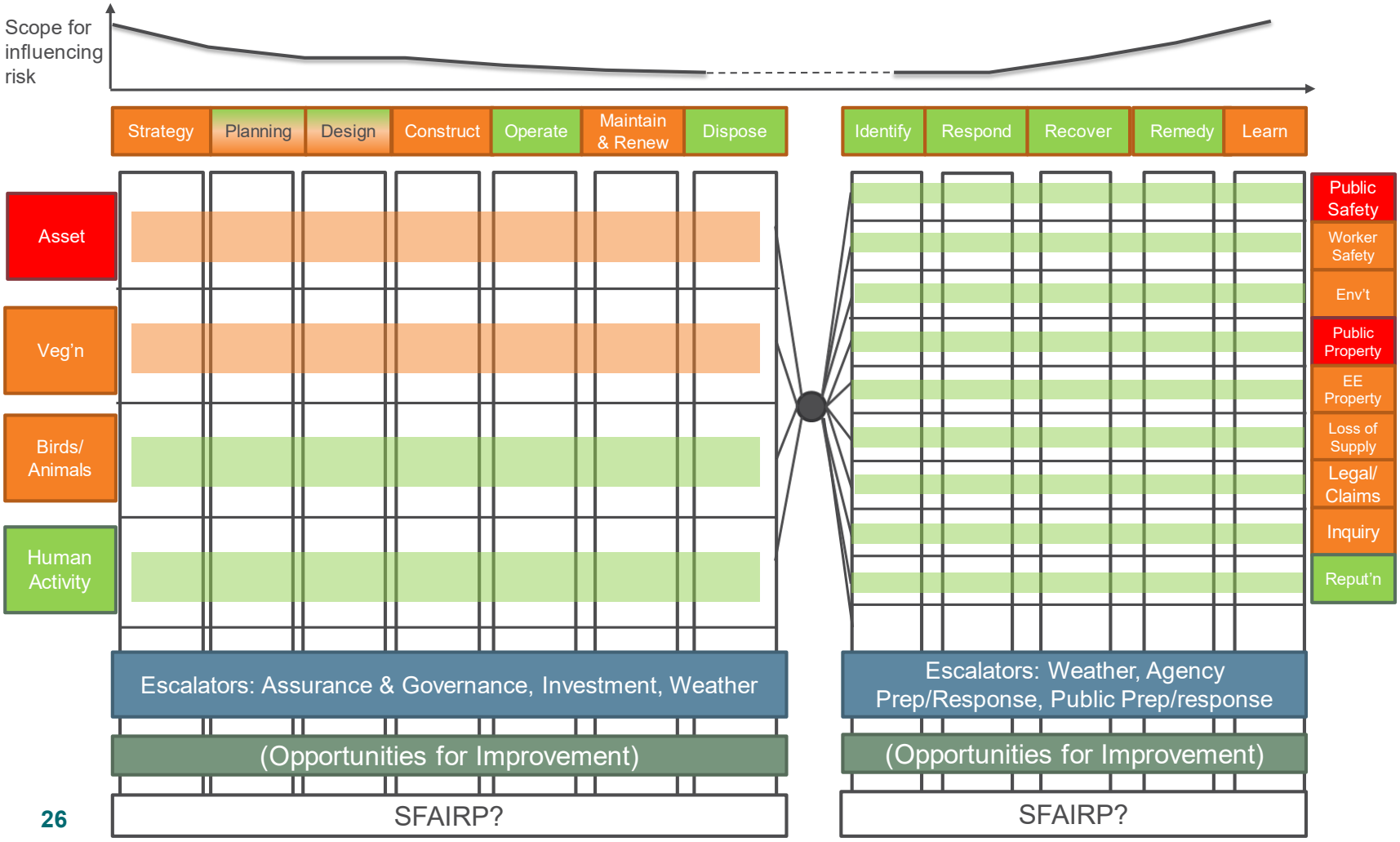

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Figure 10 – Schematic representation of Bushfire Bow-Tie

The bushfire bow-tie is an expanded version of the bow-tie shown in the Bushfire FSA. The main difference is that the Bushfire FSA considers only those consequences directly relevant to the ENSMS (public safety, worker safety, environmental harm, public property damage and EE property damage); it does not include consequences for network reliability (loss of supply, legal and financial claims against EE, the risk of a Royal Commission, or Public Enquiry and reputational damage. The bushfire bow-tie that informs this strategy considers all of these consequences and associated risks.

Detailed explanation and analysis of the bushfire bow-tie is documented in the Bushfire Strategy Review Pack and so is not repeated here except for key insights, which include:

- No major gaps
- Most areas of the bow-tie are generally effective – particularly on the right hand side (mitigative controls)
- Analysis identified a range of independent controls – mitigating the risk of systemic failure
- There are a number of critical controls currently rated as 'red' (ineffective) or 'amber' (requires improvement)
- The majority of current controls are in parts of safety lifecycle where there is least scope for influencing risk (mid-section)
- From the perspective of 'primary causes', the overall effectiveness of the controls in both 'Asset Breakdown' and 'Vegetation' was assessed as Amber
- From the perspective of 'scope for influencing risk', the overall effectiveness of the controls in 'Strategy' and 'Learning' was assessed as Amber
- Some improvements to current controls are needed in Planning, Design, Construction and Maintenance Delivery

7.2.3 Summary of previous and existing strategies

Previous and existing strategies can be summarised as 'short-term and risk-based'.

The application of technical and other risk controls is current broadly based on risk. This includes planning, design, operation, inspection, maintenance and renewal programs and activities aimed at managing bushfire risk.

A key component to this current strategy is the concept of 'fire zones'. These are developed based on fire risk modelling using the Phoenix Rapid Fire system plus internal modelling using fire start history and other attributes.

The current strategy differentiates geographically on fire risk using fire zone (e.g. for inspection type, frequency etc.); some aspects of strategy also differentiate temporally across fire season, using TFB days.

However, previous and current strategies are considered short-term in that they were primarily driven by the annual Bushfire Risk Management Plan, with no defined long-term performance objectives.

7.3 Previous and Existing Plans and Delivery

The Bushfire Risk Management Plan sets out the following key activities for bushfire risk management:

- Planning & design requirements for bushfire risk areas e.g. type of conductors suitable for fire prone areas
- Construction methods and standards
- Identification and remediation of network asset defects that could initiate fires
- Vegetation management
- Protection
- Rectification of defects on private lines
- Disconnection
- System operation on TFB days
- Fault & emergency patrol procedures
- Work practices, including bushfire prevention & survival
- Staff training
- Public awareness
- Incident/crisis management (escalation and recovery)

- State emergency and fire agency collaboration (including training and joint agency exercises)
- Fire start investigations
- Oversight committees

Works plans contribute to bushfire risk management are included within the annual Statement of Works. Delivery of these programs is monitored through the Bushfire Management Index (BMI), which reflects progress with critical line inspection and maintenance and vegetation management.

Progress is also monitored internally through the Bushfire Preparedness group and Bushfire Risk Working Group (BRWG); assurance is provided by the Bushfire Risk Assurance Panel (BRAP).

Essential Energy also produces an Electricity Network Safety Management System Performance & Bushfire Preparedness Report, which is submitted to IPART in advance of the fire season each year.

7.4 Lessons for a New Bushfire Prevention Strategy

The Bushfire FSA and Bushfire Bow-Tie demonstrate the broad range of activities that contribute to successful management of bushfire risk.

This goes far beyond the annual works program, including enablers such as people competency and compliance, appropriate standards and processes, good data and analytics, fit for purpose IT systems, good communication and stakeholder relationships.

The future bushfire strategy needs to be recognised as comprising three key elements:

- Maintain existing controls (particularly critical ones) that are working effectively
- Improve current controls not working effectively
- Consider additional reasonably practicable treatments that could further improve bushfire risk management

8 Future Position

8.1 Future Service Requirements & Forecast Performance

The bushfire prevention targets and objectives defined in Section 4.3 require service improvements across the three dimensions of performance, cost and risk.

In addition, from the PESTEL/SWOT analysis referred to previously:

- Stakeholder performance expectations are increasing
- Pricing challenges are going to increase – decreasing revenue and increasing external pressure on pricing
- Increasing risk and uncertainty due to climate change

Forecast performance will be influenced by:

- Assets reaching the end of functional life
- Impacts of 2-way power flows
- Potential for economic penalties for fire starts

Performance impacts are potentially offset by emerging technology plus findings from ongoing research activity aimed at improved capability in fire risk modelling.

Figure 11 shows an assessment of the net impact of these factors, based on a 'Challenge/Advantage Index'. This applies a numeric rating to the factors identified in the PESTEL and SWOT analyses, ranging from +3 to -3 dependent on the level of challenge or advantage that it presents to bushfire prevention over time. The figure then shows the net position from all factors affecting performance, cost and risk over time.

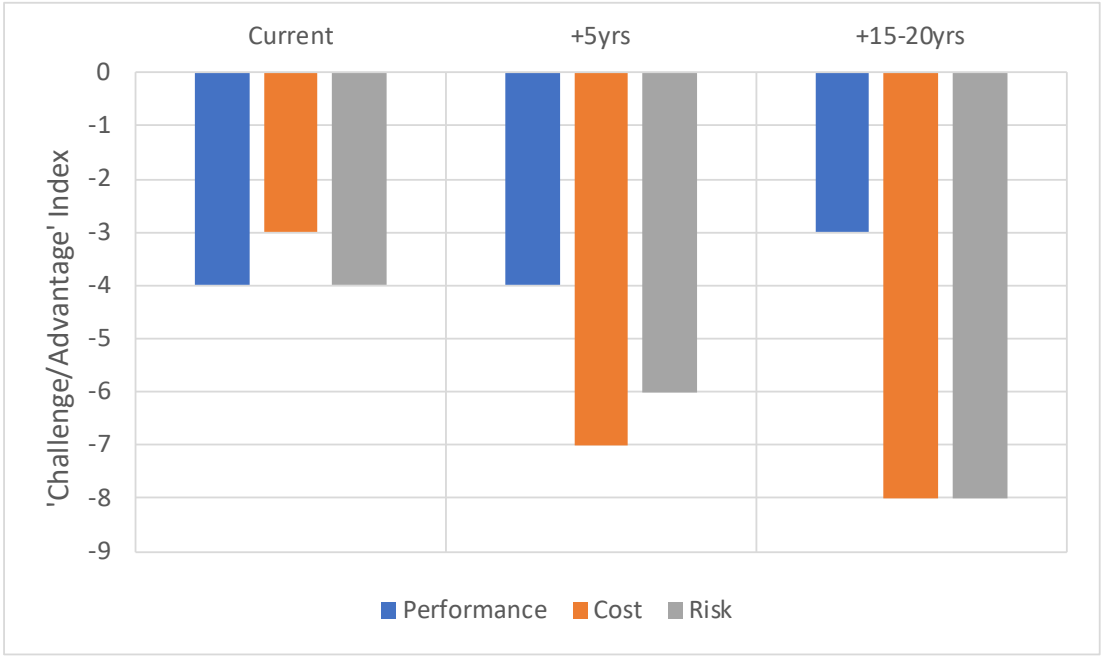

Figure 11 – Bushfire Prevention Challenge/Advantage Index

Overall, this suggests that our performance could improve, if available opportunities are appropriately exploited. However, cost and risk are likely to increase, based on currently available information.

8.2 Gap Analysis

This section sets out the findings from a gap analysis between the bushfire prevention targets and objectives, and the current state.

8.2.1 5yr Target: Minimise Safety Risk SFAIRP

Safety risk shall be eliminated, and where it is not reasonably practicable to do so, needs to be tolerable (below individual risk of fatality of 1 in 10,000 per annum or lower – as informed by societal concern); then it needs to be minimised as low as reasonably practicable. This requires us to be able to demonstrate that we have applied controls to the point where additional measures would be 'grossly disproportionate'. Put simply, we need to be able to provide a robust, reasoned and appropriate response to the questions:

- What more could we have done?
- Why haven't we done it?

The expectation is that we have undertaken an 'exhaustive search for alternatives (that offer lower risk)' and conducted 'detailed evaluation of the resulting risk reductions and realistic estimates of the associated cost increments' [1].

In the case of bushfire, where the consequences could include multiple fatalities, 'a numeric risk assessment may be necessary to determine the risk reductions achieved by alternative designs'.

Figure 12 shows the potential future alternative technical controls that should be considered alongside those listed in Figure 9:

Hierarchy of control	Current	Potential Future Alternatives
Eliminate		• Stand-Alone Power Systems, Microgrids
Replace or Reduce	• UG distribution • (Re)location of lines • Disconnection of supply to Private Lines if fail to treat (bushfire risk) asset defects • Manage asset health • Vegetation management • Protection capability and settings	• Switch off the power on high fire danger days • Alternative asset condition monitoring technologies e.g. Meshnet • Alternative fault detection/mitigation technologies e.g. REFCL, EFD, DFA, Intelliruptor
Isolate	• Clear zones around UG equipment and Zone Substations	-
Control (Admin)	• Public awareness • Works practices and training	• -
Protect	• Fire response	• Fire detection technologies e.g. Meshnet
Discipline	-	-

Figure 12 – Potential future alternative technical controls

These will be considered for inclusion into the bushfire prevention 'toolkit' on a case by case basis, following formal pilots, trials and cost-benefit evaluation.

[1] AS5577: Electricity Network Safety Management System, Appendix B

From a ‘safe systems’ perspective, gaps to the SFAIRP safety objective are determined from the Bushfire FSA, which identifies the following critical controls identified as being currently poor or ineffective:

- Performance analysis, risk modelling and strategy
- Construction standards and works practices
- Asset inspection and maintenance program delivery
- Distribution protection system
- Learning

The Bushfire FSA also identifies the following secondary controls as being poor or ineffective:

- Procurement and contract management

The Bushfire FSA goes on to identify the following additional controls (treatments) as reasonably practicable controls:

- Improved AM strategies to incorporate more granular differentiators for fire risk
- Define residual risk management requirements for managing the risk of newly identified or overdue fire start defects during fire season
- Improved Vegetation Strategy
- Develop a Fauna Strategy
- Improve bushfire data collection, data analytics and risk modelling
- Improved understanding of societal perceptions of bushfire risk
- Improved understanding of the impacts of climate change on bushfire risk
- Improved bushfire assurance and governance arrangements, including Bushfire Risk Compliance Plan
- Improved benchmarking of bushfire performance across other DNSPs
- Expand monitoring of momentary protection pick-ups
- Trial alternative technologies
- Trial alternative non-network options
- Improved benefits realisation

The Bushfire FSA states to prioritise those controls/treatment associated with the highest residual threats (asset breakdown and vegetation), according to the hierarchy of control and highest benefit-cost ratio.

Existing controls that are associated with disproportionate costs or where greater reduction in risk can be achieved through alternative control measures should be considered for modification, replacement or removal.

8.2.2 5yr Target: Manage risk within the corporate risk appetite

Figure 13 shows the breakdown of bushfire risk in the context of current corporate risk appetite statement:

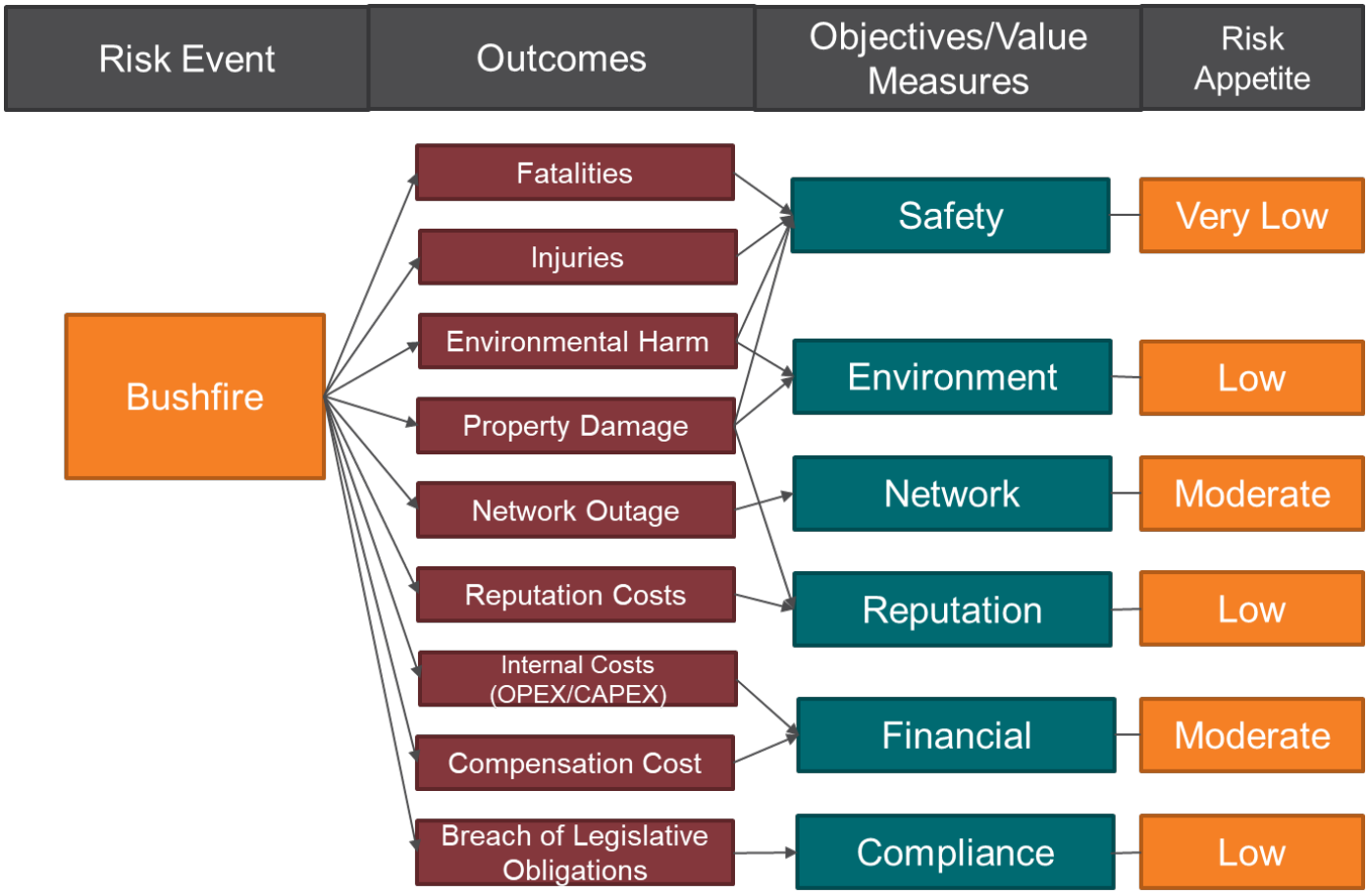

Figure 13 – Bushfire risk within the context of the corporate risk appetite

The current Corporate Risk Policy provides high level examples of the application of the risk appetite statement e.g. (for safety, compliance and environment risk) "Essential Energy prioritised asset inspection and defect rectification towards areas of highest public safety, compliance and environmental risks e.g. minimum vegetation clearances in high risk bushfire zones). Essential Energy's bushfire risk management controls and initiatives will need to be consistent with this appetite. Examples may include:

- Clarification of any absolute tolerable risk limits in terms of the corporate risk framework
- Principles to guide trade-off decisions across different risk types

This work is required to be undertaken in close collaboration with Corporate Risk.

8.2.3 5yr Target: 100% compliance with significant obligations and critical controls

Figure 14 shows a summary of the significant obligations relating to bushfire prevention and the approach to defining critical controls.

Significant Obligations	Critical Controls
• Commitments to ISSC3 compliance (Managing vegetation near power lines) • ISSC20 (Activities within electricity easements) • ISSC31 (Management of private overhead lines) • ISSC33 (Network configuration during high bushfire risk days) • Obligations arising from NSW Electricity Supply Act, NSW Electricity Supply (Safety and Network Management) Regulations, NSW Rural Fires Act • Obligations arising from QLD Electricity Act	• Identified from EE Critical Controls Framework

Figure 14 – Significant obligations and approach to defining critical controls

The performance gap in this area relates to:

- Understanding of the specific obligations that flow from various artefacts listed in Figure 14. To address this, it is recommended that a Bushfire Risk Compliance Management Plan is developed, detailing the specific obligations, their owners, current controls, owners plus competence and self-assurance measures.
- Application of Critical Control Framework to the bushfire bow-tie plus business validation of the results. This will be undertaken once the Critical Controls Framework is finalised and issued.

8.2.4 5yr Target: Meet corporate targets for efficiency

To balance the objectives of safety, performance and cost in relation to bushfire risk, it is necessary to understand the costs and value of bushfire prevention activities. Once the value derived from a given control is understood a framework can be applied to determine whether the control should be maintained, modified or replaced.

Tactics to increase efficiency may then include:

- Finding overlaps of high fire risk with other network objectives e.g. poor performing feeders
- Bundling treatments to achieve cost efficiencies
- Disposing of high risk/high cost parts of the network altogether (e.g. via SPS, Microgrids)

8.2.5 5yr Target: Reduced variability and uncertainty in controllable performance

The nature of the fire season each year is considered to be an important factor influencing the variability in our performance (number of fire starts). The main gap in this area is to understand this relationship to allow us to 'normalise' our performance for the characteristics of individual fire seasons.

Key sources of uncertainty currently are:

- Tails of distributions on bushfire consequences
- Effects of Climate Change

8.2.6 20yr Objective: 20% reduction in controllable risk

To develop a strategy to achieve this objective, we first need to understand our current risk profile and the drivers of fire risk. We then need efficient ways to identify the higher risk assets for treatment and we need an effective toolkit of risk treatments

Key enablers to this strategy will include:

- The Network Risk Register
- Improved asset risk models (including asset failure, fire ignition and fire spread)
- More granular mapping of fire risk at the network level (e.g. review of current fire zone boundaries)
- Identification of more risk treatment options (particularly to 'Eliminate' or 'Reduce' the risk)

8.2.7 20yr Objective: Minimum whole of lifecycle cost

To achieve minimum whole of lifecycle cost from a bushfire perspective requires:

- Defined whole of lifecycle cost methodologies for asset management strategy development
- Improved understanding of the benefits of alternative asset interventions for bushfire risk management
- Improved understanding of intervention costs, to support robust cost-benefit calculations

8.3 Adjusting the Future Position

Priority actions to address the gaps identified above and adjust the future position towards achievement of the bushfire prevention objectives include:

1. Establish and implement a process for assessment of alternative technical controls (network and non-network)
2. Address poor/ineffective critical controls plus high priority additional reasonably practicable controls from the Bushfire FSA
3. Develop a framework for the modification, replacement and removal of disproportionate controls
4. Confirm community perceptions/societal concern around bushfire risk
5. Develop a bushfire risk assurance dashboard to demonstrate and track performance against safety assurance arrangements
6. Operationalise the corporate risk appetite for bushfire risk
7. Develop a Bushfire Risk Compliance Management Plan
8. Determine the cost and value derived from current bushfire risk controls to support value-based decision making
9. Establish capability to 'normalise' bushfire performance for fire season severity
10. Model the effects of Climate Change on the EE network for credible climate change scenarios
11. Integrate enhancements to the bushfire consequence model to enable a granular view of Essential Energy's bushfire risk profile.
12. Investigate alternative risk controls/treatments (to build toolkit of controls to meet 20% risk reduction target)
13. Develop whole of lifecycle cost methodologies and supporting data/insights

In addition to these priority actions, stakeholder engagement undertaken to develop the Bushfire Bow-Tie identified over 40 opportunities for improvement. These should be considered for inclusion within the strategy, based on cost-benefit analysis.

9 Strategy Options

9.1 Strategy Scenarios

9.1.1 All strategy scenarios must:

- Be compliant with legislation and regulations
- Support risk and value-based asset management decision making
- Be customer-centric
- Be differentiated

Dimensions of strategy considered for the defined scenarios included:

- What interventions are included: preventative, mitigative, network, non-network, enablers i.e. people, process, data, system
- The pace of change: quick change or over time

On this basis, the following practicable strategic options are identified:

- Change Nothing
- Targeted Technical Interventions – Quick Change
- Whole of System Interventions – Over Time

9.1.2 Change Nothing

- Keep going as we are – same fundamental system of control
- Just fix up the issues with the effectiveness of the current controls
- Then maintain effectiveness going forward

9.1.3 Targeted Technical Interventions

- This would target a small number of significant changes to the technical interventions deployed onto the network e.g. EFD, SAPS
- Everything else as for 'Change Nothing' scenario

9.1.4 Whole of System

- This is a broad strategy to build on the 'Change Nothing' scenario, plus
- Plug the gaps/continuous improvement in our current knowledge and toolkit – including preventative and mitigative treatments, network and non-network solutions and performance enablers (people, processes and systems)
- Respond to the changing contextual environment plus get ahead through improved forecasting capability and influence

9.2 Strategy Scenarios Comparative Analysis

Figure 15 presents a comparative analysis of these options against the dimensions of:

- Effectiveness (in achieving the bushfire prevention objectives)
- Impact on business risk or uncertainty in achieving the objectives (in the context of the PESTEL/SWOT analysis and considering the ability to reverse any change i.e. extent of 'no regrets')
- Business impacts
- Delivery risk
- Cost of making the change

Strategy Scenario	Effectiveness	Business Risk/ Uncertainty	Business Impacts	Delivery Risk	Cost
Change Nothing	Low – won't be SFAIRP into the future if we don't consider changes to the current system of control; won't meet efficiency targets without better targeting; won't address variability/uncertainty in performance without effort	High risk as it is going to be difficult to demonstrate/defend that we are doing 'enough' to manage risk into the future through this strategy	Low impact	Low risk	Low cost
Targeted Technical	Med – assumes that a limited range of technical interventions will not be fully effective	High – it is not clear that there is a 'silver bullet' technical solution at present	Unknown	Unknown	Unknown
Whole of System	Med - due to longer timeframe to achieve than 'Targeted Technical' scenario	Med – due to complexity of a large number of identified initiatives plus longer timeframes over which the business is 'exposed'. However, offers greater adaptability.	Med	Low	Med

Figure 15 – Strategy scenarios comparative analysis

9.3 Basis for Selecting the Preferred Strategy

The approach to selecting the preferred strategy is as follows:

- Rule out any options that do not provide at least a 'Medium' rating for Effectiveness
- Consider remaining options against decision criteria ranked as:
  1) Effectiveness
  2) Business Risk
  3) Delivery Risk
  4) Cost
  5) Business Impact

Using this approach rules out the 'Change Nothing' scenario. Figure 16 compares the remaining two scenarios.

Criteria Rank	Criteria	Targeted Technical Scenario	Whole of System Scenario
1	Effectiveness	Med	Med
2	Business Risk/Uncertainty	High	Med
3	Delivery Risk	Unknown	Low
4	Cost	Unknown	Med
5	Business Impact	Unknown	Med

Figure 16 – Basis for selecting the preferred strategy

On this basis the 'Whole of System' scenario is selected. This is due to the reduced business risk and uncertainty.

10 Chosen Strategy

10.1 Description

The detail of the chosen strategy will be developed through consideration of the Priority Actions identified above, plus the improvement opportunities identified from stakeholder engagement.

Opportunities have been assessed for 't-shirt size' costs and benefits (see Figure 17). These scales were determined on the basis of $10m residual bushfire risk resulting from the current system of control. A 1% improvement in this level of risk represents $100k. This represents a disproportion factor of 2 for comparable costs and benefits, which is the value proposed for use in the next iteration of the Appraisal Value Framework for bushfire risk management.

Opportunities where costs exceed the benefits are excluded in the first instance. Remaining opportunities are prioritised with initial focus on those with low costs and med/high benefits.

T-Shirt Size	Cost Scale (cost to implement the initiative)	Benefits Scale (performance improvement or reduction in risk or cost
Small	<$200k	<1%
Medium	$200k-$2m	1-10%
Large	>$2m	>10%

Figure 17 – T-shirt scaling applied to improvement initiatives

Opportunities have been grouped into four strategic themes:

- **'Strengthen the Bookends'**: is concerned with targeting controls and treatments in the 'strategy' and 'learning' sections of the Bushfire bow-tie
- **'Maintain the Middle'**: addresses poor or ineffective controls in other sections of the Bushfire Bow-tie
- **Doing the Right Thing**: focusses on achieving the target efficiencies, through enhanced understanding of the costs and value of risk controls/treatments
- **Doing It Right**: focusses on improved assurance and governance of bushfire risk management; providing improved confidence to the business that bushfire prevention activities are being delivered as planned and are effective and efficient

Figure 18 lists specific initiatives under each strategic theme, identifies which bushfire objectives each initiative contributes to and shows the 't-shirt size' costs and benefits.

Before implementation, each initiative should be subject to more detailed cost-benefit analysis, as per the AM Decision Making framework. A decision will be taken at that time as to the ongoing justification for the initiative.

Initiative ID	Initiative (*Denotes critical control)	Objective							Cost	Benefit
		Minimise SFAIRP	Corp Risk Appetite	Compliance	Efficiency	Reduced Uncertainty	Controllable Risk	WoLC Cost		
Theme: Strengthen the Bookends										
1	Consolidate bushfire data and information into a single source of truth	✓			✓		✓	✓	L	M
2	Improved bushfire data analytics and insights as drivers of bushfire performance and risk*	✓		✓	✓		✓	✓	L	H
3	Enhanced bushfire risk modelling, fire zone mapping & forecasting capability*	✓		✓	✓		✓	✓	M	H
4	Establish a methodology to enable normalisation of bushfire performance for annual fire season conditions	✓			✓	✓	✓		L	L
5	Clarify societal expectations and concern around bushfire risk	✓			✓		✓	✓	L	M
6	Model the effects of Climate Change on the EE network for credible climate change scenarios					✓		✓	L	M
7	Improved benchmarking of our performance and practice against other DNSPs	✓	✓				✓	✓	L	M
8	Formalised pilots & trials of alternative bushfire prevention options	✓			✓		✓	✓	M	H
9	Formalise Bushfire FSA*	✓		✓					L	M
10	Review the Vegetation Strategy*	✓		✓	✓		✓	✓	L	M
11	Improved bushfire investigations and data capture*	✓		✓	✓		✓	✓	L	M

Initiative ID	Initiative (*Denotes critical control)	Objective							Cost	Benefit
		Minimise SFAIRP	Corp Risk Appetite	Compliance	Efficiency	Reduced Uncertainty	Controllable Risk	WoLC Cost		
12	Formalised benefits realisation process for bushfire prevention activities	✓			✓		✓	✓	L	H
Theme: Maintain the Middle										
13	Review Distribution Protection Guidelines*	✓		✓	✓		✓	✓	L	L
14	Review design standards for fauna contact content	✓			✓		✓	✓	L	L
15	Align Poor Performing Feeder program with fire risk	✓			✓		✓	✓	L	M
16	Review Construction Standards for bushfire risk content and address issues with compliance*	✓		✓	✓		✓	✓	L	L
17	Review Construction, Maintenance & Renewal QC and QA processes*	✓		✓	✓		✓	✓	L	L
18	Improved adherence to Commissioning Standards*	✓		✓	✓		✓	✓	L	L
19	Provide visibility of known asset defects to System Control	✓			✓		✓	✓	L	L
20	Investigate alternative bushfire protection settings	✓		✓	✓		✓	✓	L	M
21	Improved delivery of Asset Inspection and defect remediation*	✓		✓	✓		✓	✓	L	M
22	Improved delivery of protection maintenance*	✓		✓	✓		✓	✓	L	L
23	Improved delivery of Private Lines Management*	✓		✓	✓		✓	✓	L	L
24	Improved vegetation management datasets*	✓		✓	✓		✓	✓	L	L

Initiative ID	Initiative (*Denotes critical control)	Objective							Cost	Benefit
		Minimise SFAIRP	Corp Risk Appetite	Compliance	Efficiency	Reduced Uncertainty	Controllable Risk	WoLC Cost		
25	Improved delivery of vegetation inspections and cutting*	✓		✓	✓		✓	✓	M	M
26	Improved vegetation audits*	✓		✓	✓		✓	✓	L	L
27	Investigate the bushfire risk drivers for asset decommissioning or disposal	✓			✓	✓	✓	✓	L	L
28	Improved external stakeholder relationships		✓				✓		L	L
29	Improved regulator reporting processes and collaboration		✓				✓		L	L
30	Improved internal relationships & comms				✓		✓	✓	L	L
Theme: Doing the Right Thing										
31	Develop process for the assessment and evaluation of new control options, including making best use of available subsidy or incentive schemes	✓			✓		✓	✓	L	L
32	Improved understanding of the costs and value of current controls	✓			✓		✓	✓	L	M
33	Value-based review of current controls	✓			✓		✓	✓	L	M
Theme: Doing It Right										
34	Review Assurance & Governance arrangements including BRAP & BRWG Charters*		✓	✓		✓			L	M
35	Develop Bushfire Prevention system safety argument	✓	✓			✓			L	M

Initiative ID	Initiative (*Denotes critical control)	Objective							Cost	Benefit
		Minimise SFAIRP	Corp Risk Appetite	Compliance	Efficiency	Reduced Uncertainty	Controllable Risk	WoLC Cost		
36	Develop Essential Energy framework for modification, replacement or removal of controls with disproportionate costs	✓	✓		✓	✓	✓	✓	L	M
37	Operationalise the Corporate Risk Appetite into bushfire risk management		✓						L	M
38	Develop Bushfire Risk Compliance Management Plan*			✓					L	H

Figure 18 – Bushfire Prevention Initiatives

While the initiatives listed above represent the required improvements/priorities, there is also a need to maintain those critical controls that are currently functioning effectively. This includes:

- Distribution Planning Manual
- Design Standards & Manuals
- TFB Day Works Practices
- Qualified workforce
- Network visibility and control via SCADA & comms
- Non-routine asset inspections
- Delivery of Pre-Summer Bushfire Inspections
- Emergency defect remediation
- Protection maintenance (zone subs)
- CallTaker System, plus Call Centre monitoring of social media and emails
- Control Room Response to fire incidents

10.2 Performance

The program of initiatives defined above includes:

- 16 x 'L' benefit (<1%)
- 17 x 'M' benefit (1-10%)
- 5 x 'H' benefit (>10%)

If 'L' benefits are assumed to be 0.1% each, 'M' benefits are 1% each and 'H' benefits are 10% each, but with 50% overlap, then the total benefits from the program of initiatives represents a 44% increase in performance. This is assumed to be conservative, but indicative of a reasonable improvement in performance overall, towards the overall population of defined objectives.

***Note this is on top of the current 'BAU' activities, which also need to be maintained.

10.3 Lifecycle Cost

The cost of the defined program of initiatives:

- 35 x 'L' cost (<$200k)
- 3 x 'M' cost ($200k-$2m)
- 0 x 'H' cost (>$2m)

If 'L' costs are assumed to be $100k on average and 'M' costs are assumed as $1m, then the total cost of the initiatives is approximately $6.5m.

10.4 Risk

Most initiatives contribute to multiple initiatives as follows:

- SFAIRP – 31 initiatives
- Corp Risk – 7 initiatives
- Compliance – 18 initiatives
- Efficiency – 29 initiatives
- Uncertainty – 6 initiatives
- Controllable risk – 32 initiatives

- WoLC cost – 30 initiatives

On this basis it is assumed that the inherent risk or uncertainty of the defined program failing to meet the overall objectives is low. However, the complexity of the program creates a medium residual risk.

10.5 Key Resource Considerations

Appendix A lists the initiative owners and proposed timing. From this, key resource considerations are:

- The program is heavily reliant on AM Branch, Asset Engineering, Network Intelligence plus C&NS
- Other contributors will be System Control, Network Design, Regulation and Corporate Risk & Compliance

11 Roles and Responsibilities

11.1 Ownership and Approval of the Bushfire Prevention Strategy

The bushfire risk management strategy is a Network Strategy and is owned by Asset Management Branch.

The strategy shall be endorsed by the Bushfire Risk Assurance Panel (BRAP), shall be reviewed by the ELT and approved by the Executive Manager Engineering.

11.2 Updating and Review of the Bushfire Prevention Strategy

This strategy should be subject to detailed review and update by June 2022.

It should also be reviewed in the event of any of the following events:

- Major bushfire event
- Audit that identifies significant issues with the strategy
- Royal Commission, or similar external major report or inquiry that produces authoritative recommendations for bushfire risk management

11.3 Stakeholder Analysis & Comms Plan

Key stakeholders have been identified as:

- Future initiative owners
- Those who will need to provide other resources or input to the strategy implementation
- Critical Control owners
- Those who will be otherwise impacted by the strategy
- Those who need to be aware of the strategy (including external stakeholders e.g. RFS, other DNSPs)

Figure 19 shows the Comms Plan (method and timing) for each stakeholder group.

Stakeholder Group	Comms Method	Timing
ELT	Group briefing	Feb 2020
Otherwise impacted (major)	One-to-one meetings	Jan – May 2020
Otherwise impacted (minor)	Group briefing session	May 2020
Aware	Email (general broadcast)	May 2020

Figure 19 – Comms Plan

12 Performance Management

Bushfire performance management is undertaken through data collection, which supports analytics, leading to insights that feed into this strategy, before being translated into a plan, that gets delivered and then reviewed for its impact.

Key artefacts in this process include the Annual Fire Report, the Bushfire FSA and the Bushfire Bow-Tie. These need to be maintained through annual production or review (respectively).

12.1 Measures to Monitor Strategy Delivery

Strategy delivery is monitored through the Bushfire Strategy Delivery Dashboard.

This monitors the delivery status (red/amber/green) of the identified critical controls and treatments from the strategy. It is reported to the BRAP quarterly and subject to annual review to gain any learnings to improve future delivery.

Indicators for operational readiness are defined in the Annual Bushfire Risk Management Plan.

12.2 Measures to Assure Realisation of Expected Benefits

In-year assurance is provided through leading and lagging measures.

The main leading measure is the Bushfire Assurance Dashboard. A prototype of this dashboard is provided in Appendix B. This is based on the Goal Structuring Notation technique and sets out the various activities and artefacts that are required to provide assurance that a specific goal (or objective) will be achieved. This is developed for the SFAIRP objective for bushfire risk management. Red/amber/green colour coding on the dashboard reflects the status of individual artefacts.

The Assurance Dashboard will be reported to the BRAP quarterly and subject to annual review to gain any learnings to improve future delivery.

The main lagging measures are:

- Number of fire starts versus forecast – to be monitored monthly for reporting to the BRWG; also quarterly to the BRAP and subject to annual review
- Performance versus the defined bushfire prevention targets/objectives – to be reported to the BRAP, annually.

12.3 Future Improvements

Future improvements include to consider the opportunities for improvement that didn't pass the cost-benefit analysis in this strategy review, in case the costs or benefits change and these opportunities become viable.

13 References

- IAM SSG – Asset Management Policy, Strategy & Plans
- Bushfire Risk Management Plan
- Annual Bushfire Report
- Bushfire FSA
- Bushfire Bow-Tie
- AM Policy
- PESTEL & SWOT
- Asset Risk Management Framework
- Appraisal Value Framework
- Fire Model
- IPART report on bushfire risk management practice
- Bushfire Strategy Review pack
- IPART Bushfire Season Readiness (Preparedness) Report
- Corporate Risk Policy

Appendix A: Prototype Bushfire Assurance Dashboard