Business case: Bushfire Risk Management Programs

2025-2030 Regulatory Proposal

Supporting document [5.6.1]

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SA Power Networks

Empowering South Australia

Contents

Glossary

Acronym / term	Definition
ABC	Aerial bundled cable
AER	Australian Energy Regulator
Augex	Augmentation expenditure
Capex	Capital expenditure
CBA	Cost-benefit-analysis
ESCI	Electricity Sector Climate Information
FDPS	Fire Danger Protection Settings
HBFRA	High Bushfire Risk Area
HV	High voltage
MBFRA	Medium Bushfire Risk Area
NER	National Electricity Rules
NPV	Net present value
Opex	Operating expenditure
PSPS	Public Safety Power Shutoffs
RCP	Regulatory Control Period
REFCL	Rapid Earth Fault Current Limiters
Repex	Replacement expenditure
SCADA	Supervisory control and data acquisition
SWER	Single Wire Earth Return
UG	Underground
VCR	Value of Customer Reliability

1 About this document

1.1 Purpose

This document provides a business case to support forecast expenditure for the 2025-30 Regulatory Control Period (**RCP**) on programs in the area of Bushfire Risk Management.

1.2 Expenditure category

The expenditure forecast for these programs comprises one input to our overall capital expenditure (capex) on network augmentation (**Augex**).

1.3 Related documents

This document should be read in conjunction with the following documents that specifically relate to these programs, and together form a suite of supporting documents to our Regulatory Proposal for these programs:

- Bushfire Risk Mitigation Programs, Forecasting Structure document - a structural overview of the approaches used to prepare the forecasts for the Bushfire Risk Mitigation Programs, included in this business case; and
- Bushfire Risk Modelling, Model Framework document (Bushfire Model Framework) - details the bushfire risk model and cost-benefit model specifically used to evaluate the Bushfire Risk Mitigation Programs and their forecasts, including the input assumptions and their basis.

In addition to these documents, we also have available the various excel models and associated data input files, discussed in the Bushfire Model Framework. These are very large files, and therefore are not provided as supporting documents to our proposal, but output results from adjustments of various inputs can be provided if required.

Table 1: Related documents

Ref	Title
[1]	5.6.2 - Bushfire Risk Management forecasting structure - Methodology
[2]	5.6.3 - Bushfire Model Framework - Methodology
[3]	5.6.4 - CSIRO bushfire modelling report - Consultant Report

2 Executive summary

This document provides business cases for two programs associated with bushfire risk management:

1. Bushfire Risk Mitigation program; and
2. Public Safety Power Shutoff Mitigation program.

Bushfire Risk Mitigation program

The Bushfire Risk Mitigation program responds to customers' concerns and the need to reduce the risk to the community of bushfires starting from distribution network assets.

All overhead electricity infrastructure has an inherent fire risk associated with it. Customers and stakeholders have encouraged us to reduce this risk to as low as reasonably possible, to the extent that such risk reduction is consistent with our regulatory obligations and requirements, efficient and commensurate with customers' willingness to pay.

An investment of $18.7 million (June $2022)[1] in augex over five years is proposed to:

- implement sensitive protection on 306 feeders to reduce the risk of a fire start; and
- convert 48km of bare overhead conductor to Aerial Bundled Conductor (**ABC**) on 4 feeders.

This investment will deliver a net-benefit for customers with benefits of reduced bushfire risk to the community (safety and property damage) outweighing the cost of the investment, with an Net Present Value (**NPV**) result of $278 million over the life of the assets involved in the program (15 years for protection, 50 years for ABC), assuming the program is delivered uniformly over the 2025-30 RCP and current climate and land use remains unchanged.

This recommendation is preferable to other options considered because:

- sensitive protection is the most cost-effective solution to reduce bushfire risk from the network compared to other alternatives considered (e.g. covered overhead conductor, undergrounding, REFCL);
- the targeted use of Aerial Bundled Cable (ABC) provides an additional net-benefit in some high-risk parts of our network;
- the increased use of Public Safety Power Shutoffs does not align with customer preferences expressed through our engagement to reduce the impact of this strategy on customers, and
- bushfire consequence modelling by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) indicates that the benefits of the avoided bushfire risk impacts resulting from the proposed program will exceed the costs of that program over the life of the assets.

In the 2020-25 RCP, undertook a bushfire mitigation program exclusively in high bushfire risk areas due to the unavailability of bushfire consequence modelling from CSIRO outside of these areas. In 2021, we engaged CSIRO to expand their bushfire consequence modelling to medium bushfire risk areas, which cover a larger proportion of the state, as well as to refine their existing modelling of the high bushfire risk areas based on their latest knowledge.

Whilst a larger program would still be economically efficient (i.e. having regard to the benefits of risk avoidance), as indicated by the NPV, given considerations of affordability and recommendations by the People's Panel, the program has been limited to $18.7 million. Therefore the proposed program for 2025-30 primarily targets those medium bushfire risk areas where our newly available modelling indicates that the

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1 All dollar figures throughout this document are in June $2022 real dollars unless specified otherwise

benefits of avoided bushfire risk impacts resulting from the proposed program will exceed the costs of that program over the life of the assets).

The outcomes of this proposed program align to our customers' expectations as reflected in the recommendations of the People's Panel.

Public Safety Power Shutoff Mitigation program

The Public Safety Power Shutoffs Mitigation program is a new program that responds to customers' concerns and the need to reduce the impact to the community of Public Safety Power Shutoffs, where power supply is disconnected on the highest bushfire risk days to avoid fire starts from the network.

An investment of $3.5m (June $2022) in augex over five years is proposed to implement remotely operated switchgear and undertake limited and targeted upgrading/undergrounding of powerlines, to maintain supply to 12 towns and urban fringe areas during these conditions. This investment is efficient for customers with benefits of avoided unserved energy outweighing the costs of the investment, with an NPV result of $9.1 million over the life of the assets involved in the program (15 years for remotely operated switchgear, 50 years for undergrounding) assuming the program is delivered uniformly over the 2025-30 RCP.

This recommendation is preferable to other options considered because:

- the sensitive protection implemented as part of the Bushfire Risk Mitigation program does not reduce the risk of a fire start to a level equivalent to a Public Safety Power Shutoff, and hence further investment in sensitive protection is not a credible option to address this need;
- remote switchgear is a more cost-effective solution to reduce bushfire risk from the network compared to other alternatives considered (e.g. extensive undergrounding), and;
- based on reasonable assumptions regarding the frequency of Public Safety Power Shutoffs over the life of the asset, the benefits for customers of avoided unserved energy (valued using the Value of Customer Reliability (**VCR**)) outweigh the costs.

The outcomes of this proposed program align to our customers' expectations as reflected in the recommendations of the People's Panel.

3 Background

3.1 The scope of this business case

This business case responds to the need to manage risks associated with bushfires.

It considers options to mitigate these risks through upgrades to our existing network assets across two programs, each aimed at mitigating different risk components:

1. Bushfire Risk Mitigation Program - reducing the customer and community risk (ie land and property damage and public safety impact) resulting from bushfires started by our electricity distribution network by reducing the likelihood that our network will start a bushfire during the bushfire season.
2. Public Safety Power Shutoff Mitigation Program - reducing the extent of interruptions to our customers' supply when we shutoff portions of our network during periods of extremely high bushfire risk (referred to here as Public Safety Power Shutoffs).

This business case does not consider options to:

- replace assets where the need to replace is largely a function of the age / condition of the existing assets, which are considered in our '5.3.1 - business case for network asset replacement expenditure'; nor
- enhance business-as-usual recurrent operating practices (eg line patrols, inspection, maintenance and vegetation), where are embedded within our operating expenditure forecast using the Australian Energy Regulator's (**AER**) base-trend-step method.

3.2 Our performance to date

The Bushfire Risk Mitigation Program is a continuation of programs we commenced in the 2015-20 RCP and continued in the 2020-25 RCP. The Public Safety Power Shutoff Mitigation program is a new program we propose to implement in the 2025-30 RCP.

We included two programs in our Regulatory Proposal to the AER for the 2020-25 RCP, which were both focused on our feeders in designated High Bushfire Risk Areas (**HBFRA**). The AER accepted this forecast in making its Distribution Determination for the current RCP. The two programs included:

- a $9.4 million (2020$) program to upgrade the protection systems of 152 feeders in order to allow an ultra-fast fault clearance protocol, which we can enable during times of high bushfire risk (these protection settings significantly reduce the likelihood that a network fault will result in a fire); and
- a $3.6 million (2020$) program to replace approximately 1,031 surge arrestors.

Our expenditure on our bushfire mitigation programs overall in the 2020-25 RCP is expected to be broadly aligned to the forecast reflected in the AER's Regulatory Determination for this RCP, being circa $2.5 million less than the AER forecast. This outcome was due to:

- us changing the order of the feeders being upgraded as it became clear during the initial phases of the roll-out that it was more cost effective to group and schedule upgrades by zone substation, rather than by individual feeders as we had thought in the business case approved in the AER 2020-25 Determination; and
- this led us to find efficiencies in optimising our delivery of bushfire work (between augex and replacement expenditure (**repex**) solutions, and we expect to achieve an estimated risk removal from high bushfire risk that is equal to that expected by our 2020-25 business case.

3.3 Drivers for change

3.3.1 Bushfire Risk Mitigation Program

Although we have robust business-as-usual practices to manage the bushfire risk each season (eg pre-bushfire season line patrols, inspections and vegetation management), as is the case with all electricity networks, faults on our network can still result in fires; and, particularly during the bushfire seasons, any one of these fires has the potential to result in a major bushfire that can result in significant losses to customers and the community.

[redacted]

[redacted]

The bushfire consequence associated with a fire started from our network is dependent on a large range of factors, including feeder characteristics (eg voltage); the fire start location; the local weather conditions, the surrounding fuel types, land use types, and population size.

In 2016, with input and advice from the CSIRO, we developed a model to quantify bushfire risk due to our network in HBFRA. This model provided a detailed picture of the bushfire risk associated with each individual feeder in these areas and was used to evaluate the program forecast that formed part of our Regulatory Proposal for the current RCP. Due to the computational complexity of this modelling at the time, we were unable to assess the bushfire risk in the Medium Bushfire Risk Area (**MBFRA**) to the level of detail necessary to target an upgrade program.

In 2021, we engaged CSIRO to revise their model and extend it to the MBFRA, enabling the identification of areas in the MBFRA where the benefits of avoided bushfire risk impacts resulting from a program will exceed the costs of that program over the life of the relevant assets. This model revision has included revised bushfire simulation and loss analysis by CSIRO across our whole high and medium bushfire risk areas, revised analysis of our fire start rates, and considers the reduction in bushfire risk from upgrades and works undertaken in 2015-20 and 2020-25. Hence the program we are proposing for the 2025-30 Regulatory Proposal is primarily focused on addressing the risk in the MBFRA which was not able to be quantified prior to the 2020-25 RCP.

More comprehensive explanations of our bushfire risk model, its formulations and the underlying inputs and assumptions are provided in the Bushfire Model Framework document.

[redacted]

3.3.2 Public Safety Power Shutoff mitigation program

We have powers to de-energise (or 'shutoff') portions of our network for significant safety reasons, such as when bushfire conditions are extremely high (called Public Safety Power Shutoffs)[4]. This reduces the bushfire risk of our network as that portion of the network can no longer start a fire[5]. However, shutting off a portion of our network also means that the customers supplied from that portion of the network will have their supplies interrupted[6]. Switching off electricity supply to a community during extreme bushfire conditions has its own risks, including to the health of that community. Therefore, we only switch off supply to a community when the fire danger rating and weather conditions suggest the likelihood is very high that our network supplying that community could start a major bushfire.

We have policies that define the bushfire conditions when we would apply a Public Safety Power Shutoff for bushfire reasons and the process to implement the shutoff and coordinate this with other parties (eg the Country Fire Service, CFS). Currently, this typically means that we only apply a Public Safety Power Shutoff to a portion of our network when the Fire Danger Rating in that local area is in the Catastrophic band[7].

The number of times we apply a Public Safety Power Shutoff during the bushfire season depends on the severity of the bushfire conditions during that season. In some years, we may not need to apply any Public Safety Power Shutoffs. However, in other years we will apply Public Safety Power Shutoffs multiple times or across a wider portion of our network. For example, in 2019/20, which was a particularly bad bushfire season, we used Public Safety Power Shutoffs 3 times, interrupting supplies to 38,000 customers in total for a duration typically ranging between 6 to 12 hours. Some of these customers had supplies interrupted multiple times that year. In contrast, due to cooler and wetter conditions over the 2020/21, 2021/22 and 2022/23 bushfire seasons, less than 100 customers were impacted by Public Safety Power Shutoffs during these three seasons.

A significant factor driving the need to consider a Public Safety Power Shutoff Mitigation program is an increasing appetite (both internally and by key stakeholders) to make better use of this ability to reduce the risk of our network starting a major bushfire. This increased appetite is driven by various factors, including:

- our recent bushfire risk modelling with CSIRO, which has been able to identify high risk feeders including those in areas that have been classified as a Medium Bushfire Risk Area;
- the growing appreciation and concern of the effects of climate change on increasing bushfire risk (both by our customers and key stakeholders), and desires by them for us to take actions to mitigate this increasing risk; and
- a growing safety awareness of our customers and stakeholders and their desires that we manage our network in situations that can impose major community safety risk, which is being driven partly by their concerns on climate change and recent significant weather events.

This appetite has increased considerably after the 2019/20 season, although due to the cooler and wetter conditions over the subsequent three bushfire seasons, this has not yet translated into a consistent increased impact of Public Safety Power Shutoffs to our customers. However, in 2023/24, we have already implemented a Public Safety Power Shutoff in response to unseasonable fire danger conditions at Ceduna in September 2023, impacting 2,500 customers. Therefore, we do not consider the historical impact of Public Safety Power Shutoffs to provide a suitable indication of their impact in the future.

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4 SA Power Networks has the right to undertake these Public Safety Power Shutoffs under the South Australian Electricity Act 1996.

5 The network typically starts a fire because of a network fault, which results in high fault currents, and it is these fault currents that start the fire. Deenergising the network means that these fault current cannot occur, even if the network suffers significant damage, removing the primary fire start mechanism.

6 In the context of the need and funding mechanism of this program, it is important to note that interruptions arising from a Public Safety Power Shutoff are excluded from our reporting of reliability measures for both the STPIS and our jurisdictional targets.

7 There can be some circumstances where we will apply a Public Safety Power Shutoff in an Extreme fire danger rating, typically if wind speeds are sufficiently high.

Importantly, a modest increase in the use of Public Safety Power Shutoffs is unlikely to significantly impact on the overall bushfire risk discussed above, because of the overall make up of bushfire risk across the fire danger ratings[8]. However, increasing its use would significantly increase the total number of customers who will have their supply interrupted during the bushfire season – and interrupted at critical times.

To better quantify the potential customer impact of our use of Public Safety Power Shutoffs for bushfire reasons, we have undertaken a review of our feeders in bushfire risk areas. This review has sought to identify the set of candidate feeders for this program, where these feeders are those that have:

- a high likelihood of a Public Safety Power Shutoff, because of their bushfire risk;
- a high consequence in terms of the number of customers that would be interrupted; and
- a low-cost upgrade solution to reduce the consequence ie reduce the number of customers who would be interrupted.

The third point, which is very important to scoping the upgrade program, is considered through a technical review of potential feeders by identifying whether:

- there are a significant portion of customers upstream of high bushfire risk sections and/or limited sections of feeder in high-risk areas that could be upgraded; and
- there is limited existing remote switching available between this customer cohort and the high bushfire risk portion of the feeder.

Based on this review, we have identified 17 feeders that are suitable candidates for a program of this type. There are currently approximately 25,000 customers supplied from these 17 feeders. Based on the current feeder arrangements, we estimate that due to an increasing appetite to use Public Safety Power Shutoffs to manage bushfire risk, the majority of these customers could be interrupted once or twice per five-year period, with a typical interruption duration of between 6 hours based on historical Public Safety Power Shutoffs (which have lasted 3-12 hours).

However, with modest upgrades (involving the installation of remote switches and some piecemeal undergrounding), we estimate that approximately 11,000 (44%) of these customers could remain on supply, without increasing the bushfire risk.

8 It is also important to note that an increased appetite to use Public Safety Power Shutoff to reduce bushfire risk, is also likely to be mirrored by an increased appetite to enable the Fire Danger Protection Settings associated with our recommended option more often than assumed in our base case cost-benefit analysis of that program. Consequently, a change in the Public Safety Power Shutoff policy is unlikely to materially affect the cost-benefit analysis results of the Bushfire Risk Mitigation program discussed in Section 5.

3.4 Industry practice

Managing bushfire risk continues to be a significant focus of ours. We have a comprehensive and mature Bushfire Risk Management System which has been in place since the late 1980s following the findings into the 1983 Ash Wednesday fires, and has been progressively improved since. The system was reviewed by independent consultants, Jacobs, in 2012 and described as "generally mature, logical, defendable, appropriately documented and well managed."[9]

Importantly, each year we implement enhanced line patrol, inspections, and vegetation management in bushfire risk areas to mitigate risks prior to the start of each bushfire season. There are legislative obligations associated with managing and monitoring these activities. As discussed above, we also have powers to switch off supply when bushfire conditions are extreme (called Public Safety Power Shutoffs).

The capex programs proposed here should have enduring benefits that will enhance these existing business-as-usual activities. Most notably, they are aimed at economically and efficiently reducing the risks associated with starting major bushfires.

Other electricity distribution businesses in Australia and internationally have recently undertaken capex programs to achieve similar aims. Most notably:

- the Victorian Government's Powerline Bushfire Safety Program led to the installation of 1288 remotely controlled protection devices with sensitive protection settings, installation of REFCL at 45 zone substations, and 734km of bare-wire powerlines replaced with underground or insulated overhead conductors between 2012 and 2023, as reported in the PBSP Benefits Realisation Report,
- Pacific Gas & Electric (PG&E) in California have implemented sensitive protection across their entire network in high fire threat areas, and have reported a 68% weather normalized reduction in reportable ignitions associated with the program in their 2023 Wildfire Mitigation Plan; and
- as reported in their 2023 Wildfire Mitigation Plan, Southern California Edison uses sensitive protection settings on over 900 circuits on their network, and is currently replacing relays to expand this coverage. In addition, they have implemented covered conductor across 44% of their high fire threat areas.

9 SAPN, *SA Power Networks Bushfire Risk Management Strategies, Development of Strategic Options for Bushfire Risk Management,* 18 December 2012

4 The identified need

The two bushfire risk management programs in this business case were arrived at:

- after significant customer input; and
- following consideration of the regulatory framework under the National Electricity Rules (**NER**) and the National Electricity Law and, in particular, how the proposed expenditure is required to achieve the capex objectives and reasonably reflects the capex criteria, having regard to relevant capex factors.

The identified needs to which the two programs respond are set out below.

Bushfire risk mitigation program

The identified need of this program is as follows:

- to respond to customers' concerns[10], identified through our consumer and stakeholder engagement process, regarding the minimisation of our bushfire safety risk, where this is prudent and efficient and derives a net benefit for customers – that is, where the benefits for customers by way of reduced risk of quantified / monetised safety impacts (injury or death, damage to properties, buildings, crops) outweigh the costs of the network expenditure to reduce bushfire safety risk;
- to prudently and efficiently manage bushfire safety risks on our network;[11] and
- to meet two of the capex objectives, as the expenditure is required to continue to comply with our regulatory obligations and requirements[12], and to maintain the safety of our distribution system. [13] In particular, we have a duty imposed by statute to take 'reasonable steps' to ensure that the distribution system is safe and safely operated[14] as well as an obligation to maintain and operate the distribution system in accordance with good electricity industry practice[15]. Both of these duties require us to have regard to objectively determined standards of safety. Given that our distribution system starting a major bushfire is one of the most significant safety risks associated with that system, it is important that we continuously monitor, assess and evaluate our approach to managing these risks to consider what constitutes 'reasonable steps' and 'good electricity industry practice' – the environment is continually changing and adapting, both technologically and economically, therefore what may have been viewed as reasonable steps or good industry practice at one time, may well not be at a later time.

Further, while not an explicit part of the identified need, we are also mindful to consider how our prudent and efficient management of bushfire safety risk will make our network more resilient to the future effects of climate change and mitigating increases in bushfire risk resulting from climate change.

10 This is pursuant to clause 6.5.7(c)(5A) of the National Electricity Rules (NER).

11 Pursuant to the expenditure objectives in Clause 6.5.7(a) and the criteria in clause 6.5.7(c) of the NER.

12 Clause 6.5.7(a)(2) of the NER.

13 Clause 6.5.7(a)(4) of the NER.

14 Section 60(1) of the Electricity Act.

15 Clause 5.2.1(a) of the NER.

Public Safety Power Shutoff Mitigation program

The identified need of this program is:

- to respond to customers' concerns[16], identified through our consumer and stakeholder engagement process, regarding the need to minimise the impact on supply reliability for impacted customers where we initiate Public Safety Power Shutoffs during bushfire risk times, and where minimising that impact is efficient for customers.[17] That is, where the benefits for customers by way of avoided unserved energy outweighs the costs of the network expenditure of the program; and
- to meet the capex objectives of complying with our regulatory obligations and requirements, and to maintain the safety of our distribution system, when we do initiate a Public Safety Power Shutoff. [18]

Further, while not an explicit part of the identified need, we are also mindful, as we are with the Bushfire Risk Mitigation Program, to consider how our prudent and efficient management of bushfire safety risk will make our network more resilient to the future effects of climate change and mitigating increases in bushfire risk resulting from climate change and its impact on customers.

[16] This is pursuant to clause 6.5.7(c)(5A) of the National Electricity Rules (NER).

[17] Pursuant to the expenditure objectives in Clause 6.5.7(a) and the criteria in clause 6.5.7(c) of the NER.

[18] These are the objectives in clauses 6.5.7(a)(2) and 6.5.7(a)(4) of the NER, and relate, in particular, to our statutory duties to take 'reasonable steps' to ensure that the distribution system is safe and safely operated , and to maintain and operate the distribution system in accordance with good electricity industry practice (as outlined above in relation to the identified need for the bushfire risk mitigation program).

5 Evaluation of Bushfire Risk Mitigation Program

5.1 The options considered

Table 2 lists the options for which we have undertaken detailed cost-benefit analysis, having considered these options to be credible upgrade bushfire risk mitigation options to implement during the 2025-30 RCP.

These options were analysed using a special-purpose cost-benefit-analysis (**CBA**) model that we developed to evaluate the bushfire mitigation program (the Bushfire CBA model). This model is explained in more detail in the Bushfire Model Framework document. This document also provides more detail on the options considered, the assumptions associated with these options and the basis of these assumptions.

Importantly, the Bushfire CBA model was used to evaluate the option costs and benefits (in terms of bushfire risk reduction) of upgrading each individual feeder in bushfire risk areas. For some options, this evaluation is also applied at a feeder section level to determine if there would be a net-benefit in upgrading that section. The purpose of this analysis is to identify the feeders (or feeder sections if relevant for that option) that provide a net-benefit (in present value terms over the life of the upgrade). Only those feeders (or feeder sections if relevant for that option) are then included in the option costs and benefits listed below.

For all options (including the base case 'do nothing' option), the evaluation assumed that:

- unit costs were derived from historical spends on similar projects;
- asset lives were assumed to be 15 years for electronic assets (eg protection devices) and 50 years for conductor upgrades (eg undergrounding and covered conductor);
- our routine annual bushfire management practices (eg pre-season line patrols, inspections and vegetation management) occur in line with recent historical practices - note, the costs of these works are not included in the tables below as there are considered equivalent across all options;
- our proposed repex program avoids an increase in bushfire risk from deteriorating asset condition;
- the feeder protection upgrades and associated reductions in bushfire risk in the current bushfire risk mitigation program are implemented during the current RCP as forecast in our previous Regulatory Proposal and included in the AER's Regulatory Determination;
- the currently paused program to replace select surge arrestors in the current RCP is not restarted (see the reasoning for this in the section below on non-credible options);
- the bushfire risk reduction benefit is measured relative to the forecast bushfire risk as we enter the next period, given the above assumptions; and
- for the base evaluation of all options provided in the tables below, the future effects of climate change on future bushfire risk are not included; the possible effects of climate change are considered as part of the sensitivity analysis of options discussed in Section 5.4.

Table 2: Summary of options considered

Option	Description
The base case – 'do nothing'	A bushfire risk mitigation program is not undertaken in the 2025-30 RCP. Note, this option is assumed to be zero cost and zero benefit (in terms of bushfire risk reduction) for comparison against the other upgrade options.
Alternative options	
Option 1 – Implementing feeder-level ultra-fast protection scheme (protection)	This option allows for the upgrades necessary to implement a feeder-level ultra-fast protection scheme, which was the primary preferred solution found through our modelling for the 2020-25 Regulatory Proposal. This option: ▪ only includes upgrades to feeders where our bushfire cost-benefit analysis model has found a net-benefit for customers (in terms of bushfire risk reduction) in undertaking the upgrade; ▪ excludes all feeders that were included in the forecast program for the 2020-25 RCP; and ▪ assumes that the sensitive protection settings implemented as part of this program are enabled during days with the two highest fire danger ratings (Extreme and Catastrophic), which reflects our current operating policy for the feeders with this upgrade.
Option 2 – upgrade of feeder to covered conductor or undergrounding	This option allows for the upgrade of the existing overhead HV component of the whole feeder or feeder sections to either covered conductor or undergrounding. Four sub-options were considered: ▪ Option 2a (covered conductor feeder) – upgrading all overhead sections of the HV feeder to covered conductor, where our bushfire cost-benefit analysis model has found a net-benefit for customers (in terms of bushfire risk reduction) in upgrading that whole feeder; ▪ Option 2b (Underground (**UG**) feeder) - undergrounding all overhead sections of the HV feeder, where our bushfire cost-benefit analysis model has found a net-benefit for customers (in terms of bushfire risk reduction) in upgrading that whole feeder; ▪ Option 2c (covered conductor sections) – upgrading only overhead sections of the HV feeder to covered conductor, where our bushfire cost-benefit analysis model has found a net-benefit for customers (in terms of bushfire risk reduction) in upgrading that feeder section; and ▪ Option 2d (UG sections) - undergrounding only overhead sections of the HV feeder, where our bushfire cost-benefit analysis model has found a net-benefit (in terms of bushfire risk reduction) in upgrading that feeder section.
Option 3a - Implementing feeder-level ultra-fast protection scheme + upgrading feeder sections to covered conductor or undergrounding (protection + sections)	This option allows for: ▪ the upgrades necessary to implement a feeder-level ultra-fast protection scheme, using the same assumptions as Option 1; and ▪ additional upgrade of individual sections of the overhead HV feeder to either covered conductor or undergrounding, but only where there is an incremental net-benefit for customers in upgrading that section (above that provided by the protection upgrade).
Option 3b - Implementing feeder-level ultra-fast protection scheme + upgrading feeder sections to covered conductor (capex constrained)	This option was introduced when further analysis on Option 3a after the conclusion of the People's Panel indicated that a larger program than that originally engaged on as part of the People's Panel could be economically justified. However, given customer feedback on the overall price-service balance at the time, our preference was to constrain the program to the total capex recommended by the People's Panel. This option allows for: ▪ the same protection upgrades as Option 3a ▪ additional upgrade of individual sections of the overhead HV feeder to covered conductor for the feeders included in Option 3a which provide the highest NPV, up to the capex constraint

5.2 Options investigated but deemed non-credible

Table 3 lists the main options we deemed to be non-credible for 2025-30 and summarises our reasoning.

Table 3: Summary of non-credible options

Non credible option	Reasoning
Installation of Rapid Earth Fault Current Limiters (REFCL)	We have not evaluated REFCL through our cost-benefit model. We acknowledge that REFCL is being applied as a method to reduce bushfire risk in Victoria. However, a number of characteristics of our network are significantly different to Victorian arrangements (eg our predominant use of steel cross arms and our earthing arrangements), and hence significant time and effort would be required to design and develop a REFCL system that would work on our network, without any guarantee that this can be achieved. At this stage, we consider that if we allowed for the uncertainty in the cost and benefits of this for our specific purposes then this would not be shown to be a preferred option, particularly against the option implementing feeder-level ultra-fast protection scheme, which is a low-cost option that provides a significant reduction in bushfire risk when it is in operation. However, we will monitor the development and application of REFCL in Victoria with view to consider it in future if we are satisfied that proven positive results in Victoria could be replicated in South Australia.
Increased use of Public Safety Power Shutoffs	Noting the results presented in Section 3.3 above, it is unlikely that we can achieve significant reductions in bushfire risk by increasing the use of Public Safety Power Shutoffs, without significantly increasing the number of times that these shutoffs are applied each year. Further, it would be inconsistent with the expectations of our customers as reflected in the People's Panel recommendations, for us to pursue an option of more Public Safety Power Shutoffs when they have explicitly recommended that we invest to minimise the scope of customers that are affected by these shutoffs. Increased use of Public Safety Power Shutoffs would also introduce additional costs for customers which would outweigh the benefits of the avoided bushfire risk. Most notably these costs would include: ▪ the economic costs associated with significantly increased supply interruptions; and ▪ the additional public safety impacts associated with communities in bushfire risk areas not having electricity supply at times of extreme heat. Additionally, the increased supply interruptions associated with its increased use is not in line with the preferences expressed by our customers to consider ways to improve the resilience of our network to extreme weather events. For these reasons, we have not considered significantly increasing the use of Public Safety Power Shutoffs as a bushfire mitigation option, in the context of the mitigation strategy discussed here. Nonetheless, we will continue to evaluate our implementation of Public Safety Power Shutoffs to see whether we can further improve and optimise their use. It is important to note that the objective of the Public Safety Power Shutoff program is to reduce the extent of customer supply interruptions when Public Safety Power Shutoffs are required. This program could include upgrades to reduce the need for a shutoff or upgrades to reduce the number of customers interrupted when a shutoff occurs, but its primary objective is not to reduce bushfire risk.
Recommencing the program to replace surge arrestors and roll out across other feeders	Based on provisional analysis of the revised costs and benefits of recommencing this program, we found this upgrade is unlikely to provide a net-benefit for the vast majority of feeders in bushfire risk areas. We found a small number of feeders that may provide a net-benefit (currently 4 feeders). However, if a more detailed review of these feeders supports their upgrade then these would be upgraded within the current program or opportunistically in other works. Therefore, we did not include this program as a credible option for 2025-30. However, we will continue to monitor this need and may reconsider it for future RCPs. This option is also not an alternative to the options we are treating as credible. This program would most likely need to operate independently, at least in part, of these credible options as it addresses a specific characteristic of this asset type.

5.3 Analysis summary and recommended option

5.3.1 Options assessment results

Table 4 below presents the results of our cost benefit analysis across the range of options considered.

Table 4: Options assessment results

Option	Cape x	5-year Opex	Net-benefit (over life of asset)[19]	Annual benefit [20]	Annual net benefit	Benefit-Cost ratio (over life of asset)	percentage bushfire risk reduction
Option 0 (do nothing)	**0.0**	**0.0**	**na**	**0.0**	**0.0**	**na**	**0%**
Option 1 (protection)	15.1	1.5	155.5	15.7	14.0	9.5	44%
Option 2a (ABC feeder)	63.3	6.3	49.5	6.6	2.2	1.5	18%
Option 2b (UG feeder)	82.2	0.0	34.7	5.4	1.5	1.4	15%
Option 2c (ABC sections)	77.4	7.7	61.7	8.2	2.9	1.5	23%
Option 2d (UG sections)	91.3	0.0	45.1	6.4	2.1	1.5	18%
Option 3a (protection + segments)	**26.9**	**2.7**	**161.6**	**16.8**	**14.3**	**6.8**	**47%**
Option 3b (protection + segments – capex constrained)	**18.7**	**1.9**	**157.2**	**16.0**	**14.1**	**8.4**	**45%**

Assumptions

The results presented above were developed from our Bushfire CBA Model. As noted, the Bushfire Model Framework document provides a more detailed description of this model and its application. This document also provides the underlying assumptions associated with all options, including their unit costs, lives, and the expected percentage reduction in the likelihood of starting a fire.

In understanding the above results, the following points are important:

- Capital expenditure (**capex**) – this reflects the total forecast capex ($ millions) for the program to be incurred over the 2025-30 RCP;
- Operating expenditure (**opex**) – the cost-benefit analysis used the average opex per annum over the life of the upgraded assets in its calculations. The 5-year opex ($ millions) presented in the above table is a notional amount based on this average annual opex to aid in understanding the cost-benefit analysis results. It does not reflect the actual opex that will be incurred in the 2025-30 RCP, which will be dependent on the actual operating requirements and maintenance cycles of the upgraded assets;
- annual benefit ($ millions) – reflects the *expected* bushfire risk reduction that we estimate will be achieved by the option in total, and as such, it can be considered the annual bushfire risk reduction delivered by the end of the 2025-30 RCP, assuming the option has been implemented. The annual benefit will accrue in line with the implementation of the option and associated asset lives.

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[19] This represents the total present value of the net-benefit over the life of the feeder upgrades, where year 0 for any feeder upgrade is treated as the year of the upgrade.

[20] The annual benefit and annual net-benefit is the respective value, which can be viewed as the undiscounted constant annual value stream achieved by the upgrade over its life.

- annual net-benefit – the annual net-benefit ($ millions) is calculated as the annual benefit (in bushfire risk reduction) minus the *equivalent annual cost*[21] of the option. The annual net-benefit provided in this table reflects the total annual net-benefit that we estimate will be achieved by the option once completed. The annual net-benefit will accrue during the 2025-30 RCP in line with the implementation of the program;[22]
- benefit-cost ratio – the benefit-cost ratio indicates the dollar value of the benefit in bushfire risk reduction for every dollar of the option's life-time cost. This metric provides an alternative view of the relative effectiveness of one option against another in providing benefits; and
- percentage bushfire risk reduction – this represents the percentage reduction in bushfire risk achieved by the whole program compared to the bushfire risk entering the 2025-30 RCP, and as such, it should represent the percentage reduction in bushfire risk leaving the next RCP assuming the program has been implemented in full.

5.3.2 Recommended option

Our recommended option is Option 3b: implementing a feeder-level ultra-fast protection scheme on feeders in high and medium bushfire risk areas, where we estimate there is a net-benefit (in terms of the bushfire risk reduction) in performing the upgrade. Option 3b also includes upgrading targeted sections of bare overhead conductor to ABC where we estimate there is a net-benefit (in terms of the bushfire risk reduction) in performing the upgrade, and the total cost of the program does not exceed the costs used in our stakeholder engagement program which set our overall price-service balance.

The $18.7 million capital cost of this option will allow us to expand the current program to upgrade an additional 306 feeders in the 2025-30 RCP and convert 48km of bare overhead line to ABC.

This option is the least cost option (other than 'do nothing') and ranks second in terms of the benefit-cost ratio, the benefit, net-benefit, and percentage bushfire risk reduction.

We selected this as our recommended option as it:

- addresses the identified need discussed in Section 4;
- represents a low-risk solution in terms of its implementation as it represents a relatively simple upgrade to existing systems that we have experience of applying during the current RCP;
- strikes the right balance between the preferences of our customers to reduce bushfire risk and limit price increases in the context of cost of living concerns, including aligning with the total costs used in our stakeholder engagement program; and
- it addresses the preference of our customers to make the network more resilient to extreme weather events that pertain to bushfire risk, particularly in the face of the effects of climate change.

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[21] The equivalent annual cost of an option is the fixed cost stream over the life of the upgrade that provides the same present value of the true cost stream (capital and operating) of that option. This approach, why we have used it, and its limitation are discussed in the Bushfire Model Framework document.

[22] As the net-benefit of the upgrade of each feeder or feeder section for each option is evaluated independently, the total annual net-benefit of the option as presented in the table is not dependent on the timing of the upgrade within the next RCP.

Based on the review of these options and cost-benefit results (both from a bottom-up review by relevant internal subject matter experts and the top-down challenge applied across our proposal forecasts), we have rejected the other options primarily for the following reasons.

Option 0 (do nothing)

This is the least cost option, but does not address the identified need to reduce bushfire risk and associated direct economic costs and safety impacts to the community. It also increases the likelihood that bushfire risk will increase because of climate change.

This option does not align with our customer and stakeholder preferences, particularly given that other credible options have appreciable net-benefits in terms of bushfire risk reduction.

Option 2 (ABC feeder, UG feeder, ABC sections, UG sections)

The four sub-options associated with upgrading overhead HV conductor to either covered conductor or undergrounding (either at the whole feeder or section level), are all much higher cost solutions to our preferred option and provide much lower benefits and so much less reduction in bushfire risk.

These options provide around $10 million less net-benefit per annum than our preferred option, and their benefit to cost ratio is in the order of a fifth of our preferred option (ie there is approximately $6 more benefit for every dollar of spent on our preferred option compared to these options).

Option 3a (protection + feeder sections)

This option provides the greatest benefit, net-benefit and bushfire risk reduction. However, it has a significantly higher capital cost, at an additional $8 million (44% higher) to our preferred option with only an additional $0.8 million (5% higher) in annual benefits, resulting in a lower benefit-cost ratio. In addition, this option was only found to be economic later in our stakeholder engagement process based on a decision to model conductor upgrades over a 50 year asset life. As such, the additional capital cost of this option was not taken into account as part of the People's Panel recommendation on our overall price-service balance.

We consider it unlikely that a 44% increase in capital costs for only a 5% increase in annual benefits is in line with customer preferences expressed via the Focused Conversation and People's Panel stages of our engagement for a modest program targeted towards the most cost-effective opportunities.

Given these results and concerns, we are not recommending this option as preferred. We consider that this position is in line with customer preferences on the overall tradeoff between service and price.

Comment on future role for undergrounding (Option 2 and Option 3)

As noted below, the upgrade of significant lengths of overhead conductor to undergrounding should provide other benefits not quantified in our analysis, most notably improvements in supply reliability and reductions in some existing overhead network costs.

But given these results, these other benefits would need to at least be in the order of the benefit in bushfire risk reduction for these options to be preferred at this time. We consider this to be unlikely in the majority of cases. Therefore, we have not attempted to evaluate these benefits in this broader context to determine the preferred option.

However, we may reconsider programs of this type in this broader context for later RCPs, when the effects of climate change are clearer and there is less scope to use the protection system upgrade as the preferred method to reduce bushfire risk. In addition, we may consider undergrounding as an option to mitigate the customer impacts of Public Safety Power Shutoffs.

5.4 Scenario and sensitivity analysis

We assessed the sensitivity of the cost-benefit analysis results of the preferred option to the following:

- the effects of published climate change projections over the life of the upgraded assets;
- changes to key analysis assumptions; and
- the combined effects of climate change and changes to key assumptions.

Changes in assumptions across all options (eg a percent change in unit costs) provide similar relative changes to options costs, benefits and net-benefits across options as in the base case analysis, but these changes do not change the preferred options as the reasons discussed above still hold.

Table 5 shows the results of our sensitivity analysis, indicating the assumptions that we varied and their effect on the capex and annual net benefit of the program[23].

Table 5 results of preferred option sensitivity studies

Study	Capex ($ millions)	annual net-benefit ($ millions)
Base case	**18.7**	**14.1**
Climate change RCP4.5	18.7	17.7
discount rate lower (3.5%) (4.05% base case)	18.7	14.2
discount rate higher (4.5%) (4.05% base case)	18.7	14.1
option cost lower (-20%)	15.0	14.5
option cost higher (+20%)	22.4	13.7
fire start rate lower (-20%)	18.7	10.9
fire start rate higher (+20%)	18.7	17.3
protection fire start reduction lower (60% reduction) (70.5% base case)	18.7	11.9
protection fire start reduction higher (80% reduction) (70.5% base case)	18.7	16.2
opex rate lower (1%) (2% base case)	18.7	14.3
opex rate higher (3%) (2% base case)	18.7	13.9
Climate change RCP4.5 + discount rate higher	18.7	17.6
Climate change RCP4.5 + option cost higher	22.4	17.3
Climate change RCP4.5 + option FS change lower	18.7	14.9
Climate change RCP4.5 + option FS change higher	18.7	20.2
Climate change RCP4.5 + fire start rate lower	18.7	14.5

[23] For this analysis, we assume that all feeder protection upgrades and feeder segments with the ABC upgrade in the base case occur.

5.4.1 The effect of climate change projections

The base case assumptions are considered a conservative estimate of future bushfire risk, as they do not allow for the future effects of climate change, which could increase bushfire risk over the life of the upgrades. We have used climate change projections published by the Electricity Sector Climate Information (ESCI) project to assess how climate change could change the optimum level of feeder upgrades for the next RCP[24]. We have assessed the climate change scenario RCP4.5[25], which is considered an intermediate emissions scenario by the Intergovernmental Panel on Climate Change.

The results presented above show that, as expected, this scenario increases the net benefit of the preferred program. This is because the scenarios increase the bushfire risk over the life of the upgrade, increasing the benefit of the upgrade[26].

5.4.2 The effect of changes to key assumptions

We assessed how changes to various assumptions affect the annual net-benefit of the preferred option. The results presented indicate the following:

- the annual net-benefit remains positive for all studies, ranging between $10.9 million and $20.2 million compared to the base case net-benefit of $14.1 million; and
- if we allow for an increase in bushfire risk due to climate change then 'downside' changes in other assumptions still result in a higher net-benefit compared to the base case.

Other findings from our sensitivity analysis are as follows:

- a large portion of the program ($15.6 million, 77%) is insensitive to changes in key assumptions, including 291 of the 306 feeder protection upgrades and 25km of the 58km of ABC upgrade;
- the remaining portion of the program is sensitive to 'downside' changes in key assumptions, primarily higher option costs, a lower current bushfire risk, lower improvement in bushfire risk achieved by the upgrade;
- however, when RCP4.5 is considered, all protection upgrades and 35km of ABC upgrade are insensitive to all 'downside' changes considered. This result suggests that even if some option assumptions turn out to be more optimistic than assumed in the base analysis, then the effects of climate change are still likely to result in the upgrade of all feeders in the base case program having a net-benefit over the life of the upgrades; and
- the selection of the preferred option over other options does not change with the sensitivity studies, partly because these sensitivities occur across options, but also because the preferred option is a capital constrained option.

24 The ESCI climate model outputs provide future projections of the daily fire danger index. These outputs are used to alter our estimates of the current number of days per bushfire season in the various fire danger rating to adjust the estimate bushfire risk provided by our model. The methodology we use to calculate these adjustments is discussed in document 5.6.3 - Bushfire Model Framework – Methodology.

25 The ESCI project recommends that a climate risk analysis should use two pathways: RCP4.5, a moderate pathway, and RCP 8.5, a very high pathway.

26 It is also worth noting that the increased risk due to climate change would result in additional feeders and feeder segments being found to provide a net-benefit if upgraded. However, this effect is not shown in the sensitivity results presented here, as the preferred option being tested assumes only those upgrades in the base case occur.

5.4.3 Concluding comments on the sensitivity results and the recommended program

We consider that these results demonstrate that our recommended program capex is reasonable considering uncertainty in modelling assumptions.

Although some studies suggest that the optimal program may be greater than found through our base analysis, particularly given the results of the climate change scenarios, we do not consider that the scale of the recommended program for the 2025-30 RCP should be increased. This is in keeping with the conservative approach to forecasting applied across our entire proposal, with affordability and cost-of-living pressures in mind. Therefore, we consider the prudent action is to reassess these feeders during the 2025-30 RCP, using revised estimates of bushfire risk at that time, and if necessary, these upgrades can be considered for the following RCP.

Furthermore, as we are not explicitly allowing for the published projections of future climate change in the recommended program, the results of our combined study (climate change and the effects of 'downside' assumption change) provides confidence that the recommend program capex is likely to provide a net-benefit, even if some assumptions turn out to be more optimistic than actual outcomes.

5.5 Option 0

5.5.1 Description

Option 0 represents not undertaking any further bushfire risk mitigation program in the next RCP. It can be considered the 'do nothing' option, but only in the context of addressing the identified need.

For the avoidance of doubt, our routine business-as-usual bushfire management activities that we perform every year will be maintained, but the costs of these activities are not included in the analysis. Note, this assumption is consistent across all options.

5.5.2 Costs

Option 0 represents a zero-cost option for the next RCP.

As we are only assessing the program necessary for the next RCP, we also assume zero costs in the following RCP (2030/31 to 2034-35).

Table 6: Option 0 Costs by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 - 30
Capex	0	0	0	0	0	**0**
Opex	0	0	0	0	0	**0**
TOTAL COST	**0**	**0**	**0**	**0**	**0**	**0**

5.5.3 Risks

For cost-benefit analysis purposes, it is assumed that the bushfire risk (without a mitigating option) will be maintained at the level we expect it to be at the start of the 2025-30 RCP, $35.6 million per annum. This risk has been summarised in Section 3.3. This risk level assumes that the current bushfire mitigation program we are undertaking in the current RCP is implemented largely as we forecast in our previous Regulatory Proposal (accepted by the AER in its Determination).

5.5.4 Quantified benefits

The option assumes there are zero quantified benefits (in terms of bushfire risk reduction).

5.5.5 Unquantified benefits

The option assumes there are zero material unquantified benefits.

5.6 Option 1

5.6.1 Description

Option 1 allows for the upgrades necessary to implement a feeder-level ultra-fast protection scheme, which was the primary preferred solution found through our modelling for the previous Regulatory Proposal. The scope of works of this option includes installing, upgrading and/or recommissioning protection devices with the following features:

- Fire Danger Protection Settings (**FDPS**): a sensitive settings profile that provides near instantaneous fault clearance for all faults detected by the device – these settings can then be applied on high fire danger days; and
- Supervisory control and data acquisition (**SCADA**) control: to enable remote disabling of reclose, remote application of FDPS and remote disconnection.

The specific works necessary on any feeder to implement FDPS and the resultant reduction in the likelihood of starting a fire is dependent on the current protection devices on that feeder.

The FDPS can be viewed as a far more sensitive set of protection settings, and therefore, when they are enabled it can result in less discrimination and coordination for faults along a feeder. This has the potential to lead to poorer supply reliability while the FDPS are enabled. Therefore, we have assumed a policy of only enabling the FDPS on a feeder when the surrounding area is in the three highest fire danger ratings[27] (Severe, Extreme, and Catastrophic). A large portion of the bushfire risk is associated with these three rating categories. There are only short periods of time during each bushfire season when the feeder will be in these three rating categories, and therefore, the potential degradation in reliability from enabling the FDPS during these times should be small to negligible.

Our analysis of this option assumes that FDPS would be enabled in line with this policy, which is constantly reviewed in response to annual reviews of Fire Danger Season operations. Given the businesses' objective to reduce bushfire risk, it is highly unlikely that FDPS will be applied less frequently than this policy. If FDPS were to be applied more frequently in the future, this would increase the benefit of this option.

This option allows for 306 feeders to be upgraded in high and medium bushfire risk areas (see Table 7, which shows the breakdown of feeders by SA fire ban district). These 306 feeders represent the feeders that our Bushfire CBA model has found a positive net-benefit in undertaking this upgrade on those individual feeders.

[27] Note, for our bushfire risk modelling and presentation of results here, we use the previous Australian Fire Danger Rating System (AFDRS), which used the following six categories: Low-Moderate, High, Very High, Severe, Extreme, Catastrophic. For consistency with the modelling we have identified the top three categories, however, the new AFDRS has amalgamated the Severe rating with the Extreme category. In practise, the FDPS will be applied for Extreme and Catastrophic.

Table 7 Feeder numbers to be upgraded by fire ban district

Fire ban district	Feeders in bushfire risk areas	Upgraded feeders to end of current RCP	Upgraded feeders next RCP
ADELAIDE METROPOLITAN	6	1	2
EASTERN EYRE PENINSULA	37	0	11
FLINDERS	51	4	35
KANGAROO ISLAND	26	0	0
LOWER EYRE PENINSULA	49	8	5
LOWER SOUTH EAST	133	24	15
MID NORTH	158	23	69
MOUNT LOFTY RANGES	250	110	38
MURRAYLANDS	123	3	58
RIVERLAND	66	0	17
UPPER SOUTH EAST	58	3	15
WEST COAST	59	0	4
YORKE PENINSULA	95	0	37
Total	**1111**	**176**	**306**

5.6.2 Costs

The program costs only include those associated with the assets that will form the upgrade, including the capital cost of the upgrade and an approximation of the ongoing operating and maintenance costs of the assets throughout their life. These costs are in $2022 and were based on average costs for similar projects during the 2020-25 RCP. The assumptions associated with these costs and their basis is set out in the Bushfire Model Framework document and are summarised below.[28]

- New substation protection relay: $120,000
- New 11kV or 33kV recloser: $100,000
- New Single Wire Earth Return (**SWER**) recloser: $75,000
- New recloser controller: $40,000
- Protection device recommission: $10,000
- Asset life: 15 years

The costs do not include any offset for avoided costs. There could be some small amount of offset operating costs (depending on the level of replaced devices and their operating costs). But these costs are assumed to be negligible for analysis purposes, and any avoided costs should be less than the overall operating costs of the upgraded assets over the next RCP, for which we are not claiming an opex step change.

The program is assumed to be implemented uniformly across the next RCP (note the caveats in Section 5.3 concerning the opex amounts included in this table).

Table 8: Option 1 Costs by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 – 30
Capex	3.01	3.01	3.01	3.01	3.01	15.05
Opex	0.06	0.12	0.18	0.24	0.30	0.90
TOTAL COST	3.07	3.13	3.19	3.25	3.31	15.96

[28] These cost figures include both corporate and network overheads. However, it is important to note that these overheads have been excluded when conducting forecasts, as well as cost-benefit analyses throughout this document.

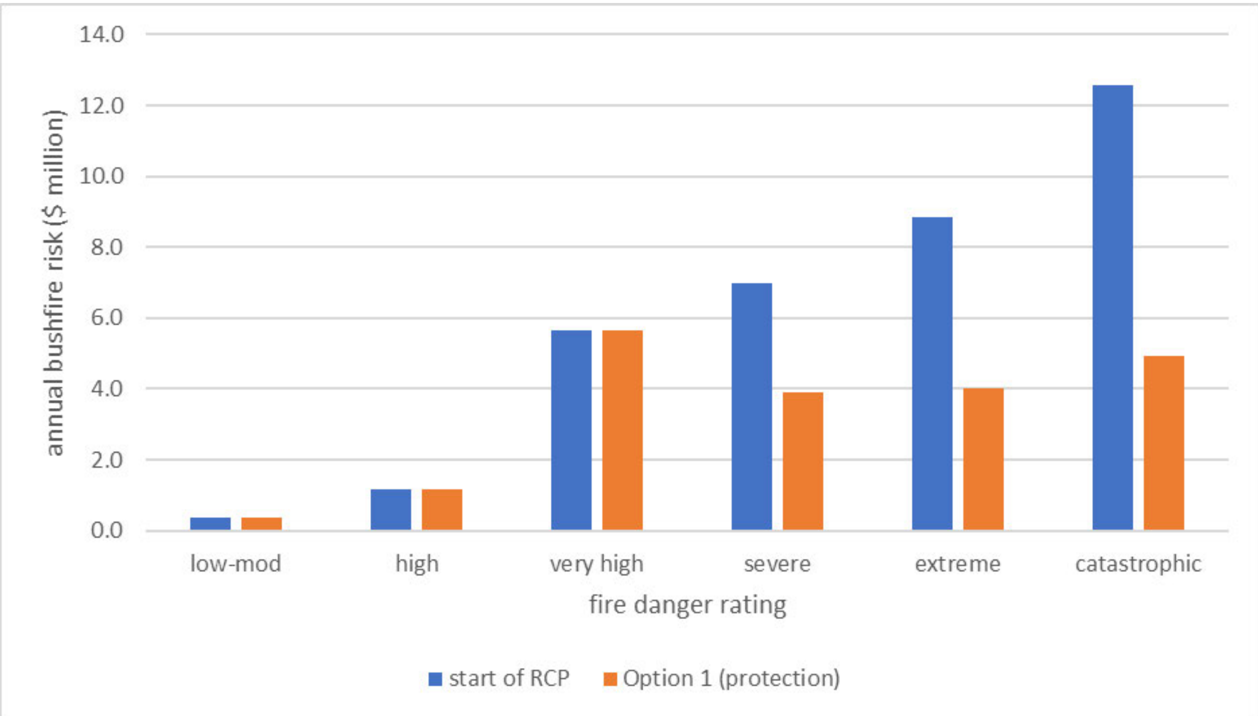
5.6.3 Risks

Option 1 will reduce the annual bushfire risk in high and medium bushfire risk areas to $20 million from the level estimated at the start of the 2025-30 RCP, $35.6 million. The table and chart below show the breakdown of bushfire risk at the start and end of the next RCP in each fire ban district and each fire danger rating if Option 1 is implemented in line with the above costs.

Table 9 Option 1 bushfire risk in 2025-30 RCP by fire ban district

Fire ban district	**Annual bushfire risk next RCP**		
	entering ($ million)	**leaving ($ millions0**	**% reduction**
ADELAIDE METROPOLITAN	0.3	0.2	37%
EASTERN EYRE PENINSULA	0.3	0.2	43%
FLINDERS	3.5	1.3	62%
KANGAROO ISLAND	0.0	0.0	0%
LOWER EYRE PENINSULA	0.4	0.3	23%
LOWER SOUTH EAST	1.1	0.8	25%
MID NORTH	10.4	4.4	58%
MOUNT LOFTY RANGES	13.1	9.4	28%
MURRAYLANDS	2.4	1.1	55%
RIVERLAND	0.9	0.5	48%
UPPER SOUTH EAST	1.0	0.6	43%
WEST COAST	0.3	0.3	15%
YORKE PENINSULA	1.9	0.9	54%
Total	**35.6**	**19.9**	**44%**

Figure 5 Option 1 bushfire risk in 2025-30 RCP by fire danger rating



5.6.4 Quantified benefits

The quantified benefits relate to the reduction in the bushfire risk achieved by Option 1. These benefits are estimated to be $15.7 million per annum, once the program is implemented in full, but this amount will accrue during the next RCP approximately in line with the implementation of the program (see Table 10[29]).

Table 10: Option 1 Benefits by Type ($m 2022 Real)

Benefit Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 – 30
Bushfire risk reduction	3.1	6.3	9.4	12.6	15.7	47.1

5.6.5 Unquantified benefits

Our approach to quantify bushfire risk, and in turn Option benefits, does not include some losses where their value is less tangible, including:

- environmental costs due to major bushfires ie pollution and greenhouse gases;
- damage and economic disruption extending beyond the fire footprint eg smoke damage; and
- health and safety costs that could be indirectly associated with major bushfire events (eg mental health issues).

These costs could be material, but there is less agreement on the best approach to estimate these costs and so we have not attempted to quantify them. Further, for this option, we do not anticipate any other material unquantified benefits (or dis-benefits).

5.7 Option 2

5.7.1 Description

This option allows for the upgrade of the existing overhead HV component of the whole feeder or feeder sections to either covered conductor or undergrounding. Four sub-options have been considered:

- Option 2a – upgrading the whole feeder to covered conductor
- Option 2b – undergrounding the whole feeder
- Option 2c – upgrading the feeder sections to covered conductor
- Option 2d – undergrounding feeder sections.

Similar to Option 1, these options only include upgrades to feeders or feeder sections, where our bushfire CBA model has found a positive net-benefit in undertaking this upgrade on those individual feeders or feeder sections (see Table 11 for upgrade volumes).

Table 11 Option 2 – Number of feeders upgraded and length of line upgraded

Option	feeders upgraded	km of overhead line upgraded
Option 2a (ABC feeder)	27	829.2
Option 2b (UG feeder)	15	538.2
Option 2c (ABC segment)	125	1013.7
Option 2d (UG segment)	77	597.6

29 Note, these benefit figures assume that the bushfire risk does not increase materially over this time period due to external factors, such as climate change. If this was the case then the benefits could be greater than shown here, as discussed in Section 5.4.

5.7.2 Costs

The option costs only include those associated with the assets that will form the upgrade, including the capital cost of the upgrade and an approximation of the ongoing operating and maintenance costs of the assets throughout their life. The assumptions associated with these costs and their basis is set out in the Bushfire Model Framework document and are summarised below:

- Unit cost for covered conductor: $84,132 per km
- Unit cost for undergrounding: $168,265 per km
- Asset life: 50 years

The costs do not include any offset for avoided costs. For these options, particularly the undergrounding option, there could be some material amount of offset operating costs associated with the management of the current overhead bare conductors (eg vegetation, inspection, patrol). But these avoided costs have not been estimated, given these options were not our recommended option.

Similar to Option 1, the program is assumed to be implemented uniformly across the next RCP (see tables below). Note the caveats in Section 5.3 concerning the opex amounts included in this table.

Table 12: Option 2a Total Cost by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 – 30
Capex	12.7	12.7	12.7	12.7	12.7	63.3
Opex	0.3	0.5	0.8	1.0	1.3	3.8
TOTAL COST	12.9	13.2	13.4	13.7	13.9	67.1

Table 13: Option 2b Total Cost by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 – 30
Capex	16.4	16.4	16.4	16.4	16.4	82.2
Opex	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL COST	16.4	16.4	16.4	16.4	16.4	82.2

Table 14: Option 2c Total Cost by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 – 30
Capex	15.5	15.5	15.5	15.5	15.5	77.4
Opex	0.3	0.6	0.9	1.2	1.5	4.6
TOTAL COST	15.8	16.1	16.4	16.7	17.0	82.0

Table 15: Option 2d Total Cost by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 – 30
Capex	18.3	18.3	18.3	18.3	18.3	91.3
Opex	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL COST	18.3	18.3	18.3	18.3	18.3	91.3

5.7.3 Risks

The charts below show the breakdown of bushfire risk at the start and the end of the next RCP in each fire ban district and each fire danger rating if Option 2a to 2d were implemented in line with the above costs.

Figure 6 Option 2 annual bushfire risk by fire ban district

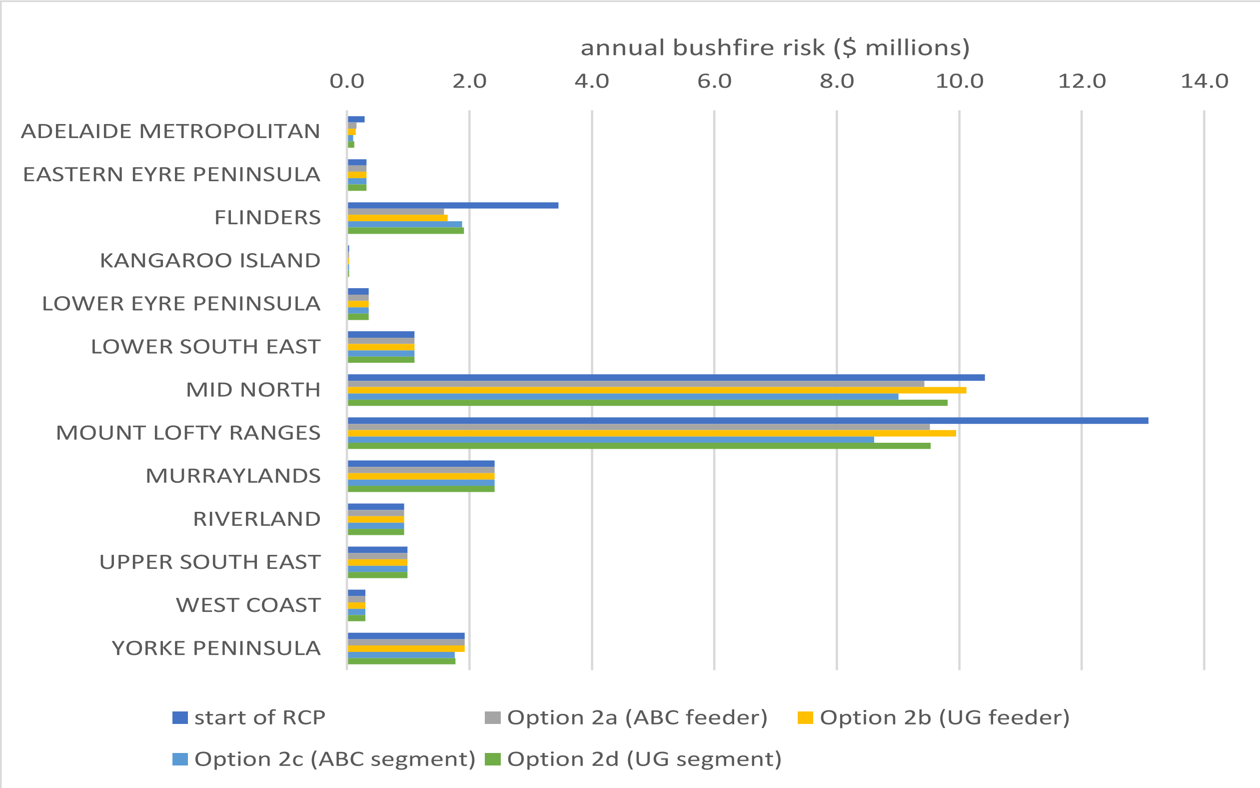
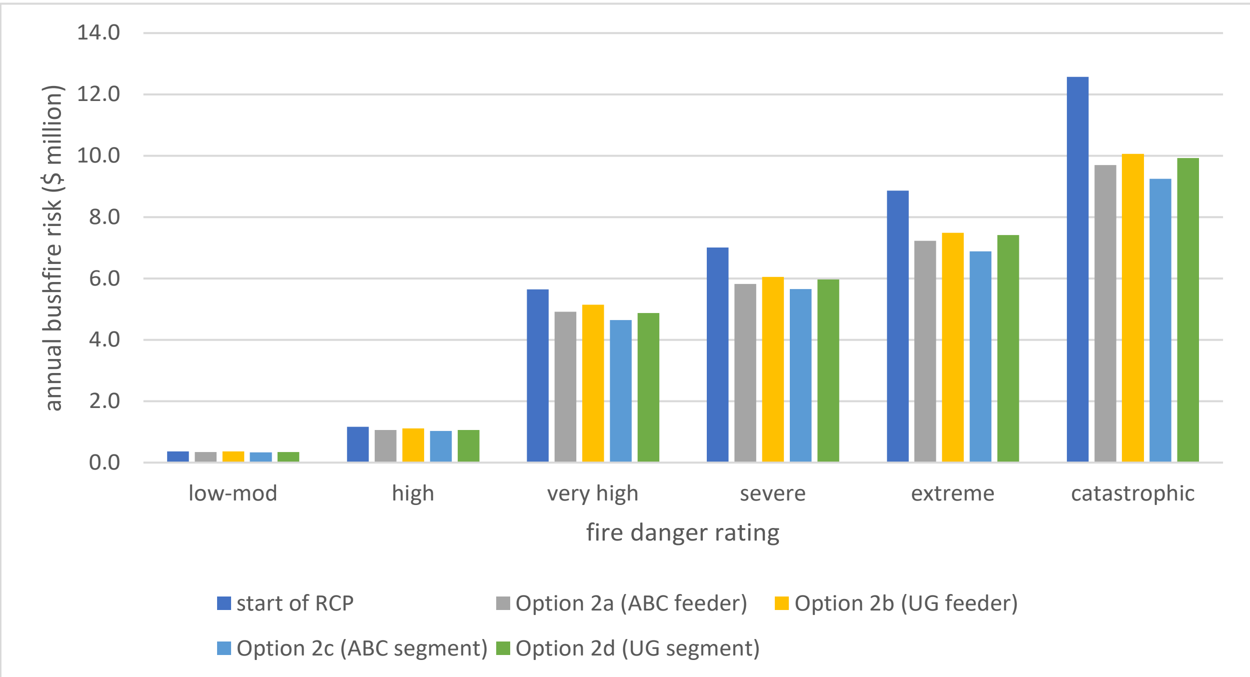


Figure 7 Option 2 annual bushfire risk by fire danger rating in 2025-30 RCP



5.7.4 Quantified benefits

The quantified benefits relate to the reduction in the bushfire risk achieved by Option 2a to 2d. These benefits will accrue during the next RCP approximately in line with the implementation of the program, as shown in Table 16.

Table 16: Option 2 Benefits by sub-option ($m 2022 Real)

Bushfire risk reduction	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 - 30
Option 2a	1.3	2.6	3.9	5.3	6.6	19.7
Option 2b	1.1	2.2	3.2	4.3	5.4	16.2
Option 2c	1.6	3.3	4.9	6.6	8.2	24.7
Option 2d	1.3	2.6	3.8	5.1	6.4	19.2

5.7.5 Unquantified benefits

Option 2 includes the same unquantified bushfire risk costs and in turn benefits as discussed above for Option 1.

In addition, the evaluation of this option has not quantified the following benefits:

- the avoided operating costs of the existing bare conductors (eg vegetation, inspection and patrol) have not been quantified, which could also be considered benefits of these options,
- these options are also likely to provide a material benefit in terms of supply reliability improvement (ie they will avoid some fault types associated with the existing overhead network); and
- the undergrounding sub-options are likely to reduce the need for Public Safety Power Shutoffs (**PSPS**) on any feeders where significant portions of undergrounding have occurred, avoiding costs and supply risks associated with implementing a PSPS.

Note, these unquantified benefits could be material. But for the reasons discussed in Section 5.3, we have not attempted to quantify these benefits at this time.

5.8 Option 3a

5.8.1 Description

This option allows for the protection upgrade of Option 1 and the overhead conductor upgrade of feeder sections in Option 2c and 2d.

Similar to Option 1 and Option 2, these options only include upgrades to feeders or feeder sections, where our Bushfire CBA model has found a positive net-benefit in undertaking this upgrade on those individual feeders or feeder sections. For the overhead conductor upgrades, this option only includes upgrades to feeder sections where the *incremental* benefit (above that provided by the protection upgrade) provides a net-benefit (note, this reduces the benefit of the conductor upgrade compared to Option 2 on its own).

This option allows for the upgrade of the protection systems on the same 306 feeders of Option 1, but also allows for 150km of covered conductor upgrade across 54 feeders and 2.4km of undergrounding across 4 feeders.

5.8.2 Costs

The option costs only include those associated with the assets that will form the upgrade, including the capital cost of the upgrade and an approximation of the ongoing operating and maintenance costs of the assets throughout their life. The assumptions associated with these costs and their basis is as those for Option 1 and Option 2 above.

Similar to Option 1 and 2, the program is assumed to be implemented uniformly across the next RCP (see table below). Note the caveats in Section 5.3 concerning the opex amounts included in this table.

Table 17: Option 3a Total Cost by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 - 30
Capex	5.4	5.4	5.4	5.4	5.4	26.9
Opex	0.1	0.2	0.3	0.4	0.5	1.6
TOTAL COST	5.5	5.6	5.7	5.8	5.9	28.5

5.8.3 Risks

The charts below show the breakdown of bushfire risk at the start and the end of the next RCP in each fire ban district and each fire danger rating if Option 3a is implemented in line with the above costs.

Figure 8 Option 3a annual bushfire risk by fire ban district

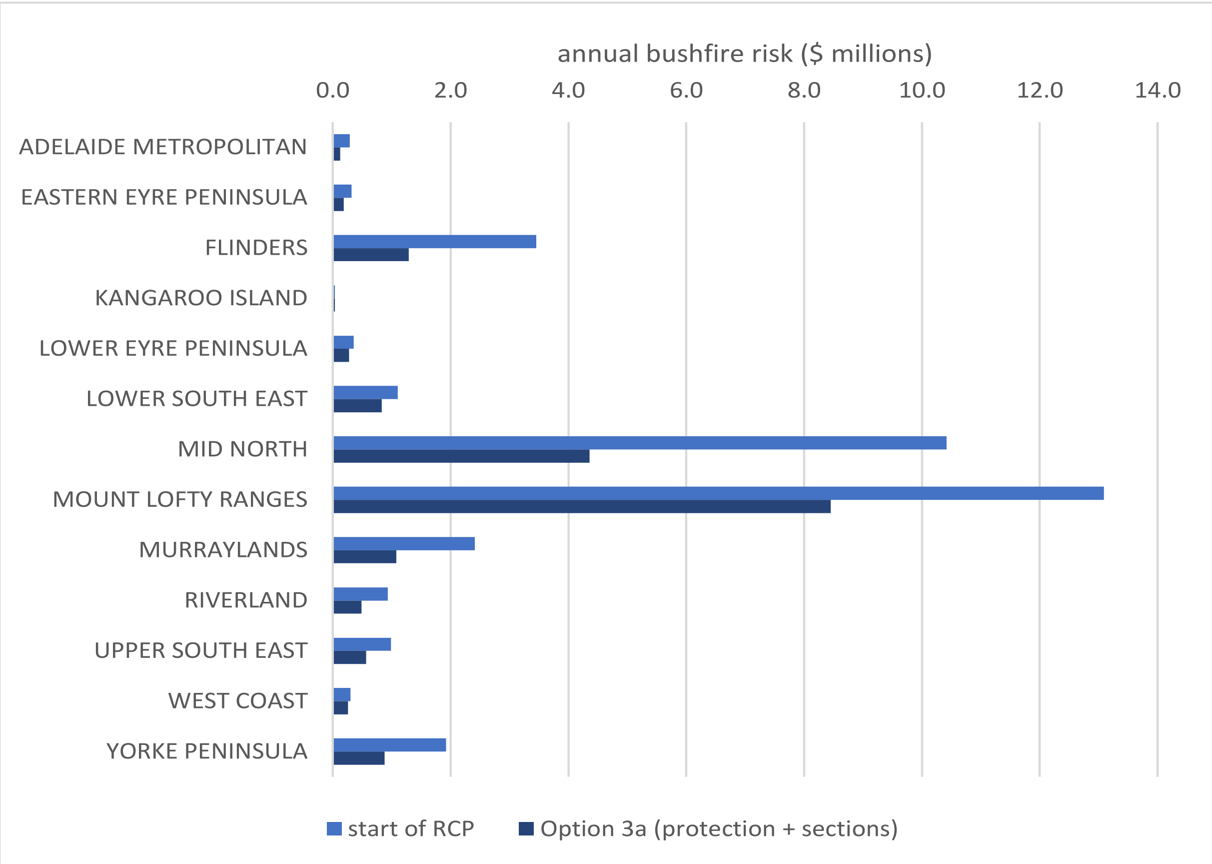
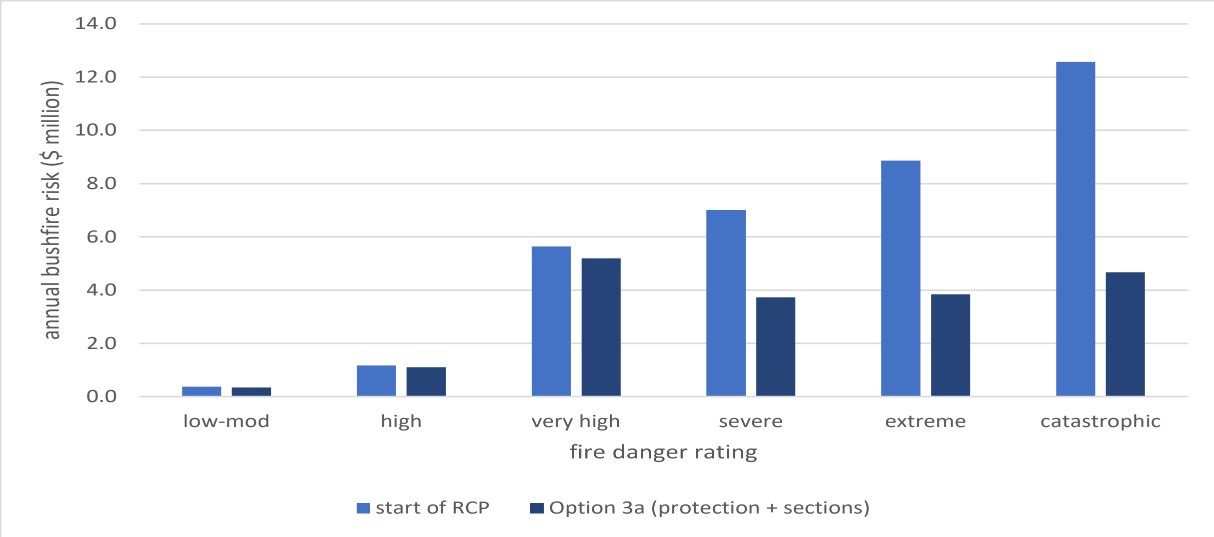


Figure 9 Option 3a annual bushfire risk by fire danger rating in 2025-30 RCP



5.8.4 Quantified benefits

The quantified benefits relate to the reduction in the bushfire risk achieved by Option 3a. These benefits will accrue during the next RCP approximately in line with the implementation of the program, as shown in Table 18.

Table 18: Option 3a Benefits by sub-option ($m 2022 Real)

Benefit	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 - 30
Bushfire risk reduction	3.4	6.7	10.1	13.4	16.8	50.4

5.8.5 Unquantified benefits

Option 2 includes the same unquantified benefits as discussed above for Option 1 and Option 2. Similar to Option 2, the unquantified benefits associated with the conductor upgrade portion of Option 3a could be material. But for the reasons discussed in section 5.3, we have not attempted to quantify these benefits at this time.

5.9 Option 3b

5.9.1 Description

This option allows for the protection upgrade of Option 1 and the highest-NPV overhead conductor upgrade of feeder sections in Option 2c and 2d, up to a total program cost of $18.7 million which aligns with the costs used as part of stakeholder engagement on our overall price-service balance.

Similar to Option 1 and Option 2, these options only include upgrades to feeders or feeder sections, where our Bushfire CBA model has found a positive net-benefit in undertaking this upgrade on those individual feeders or feeder sections. For the overhead conductor upgrades, this option only includes upgrades to feeder sections where the *incremental* benefit (above that provided by the protection upgrade) provides a net-benefit (note, this reduces the benefit of the conductor upgrade compared to Option 2 on its own).

This option allows for the upgrade of the protection systems on the same 306 feeders of Option 1, but also allows for 48km of covered conductor upgrade across 4 feeders. These 4 feeders include 2 feeders with protection upgrades planned for the current RCP and 2 feeders with protection upgrades in the next RCP.

5.9.2 Costs

The option costs only include those associated with the assets that will form the upgrade, including the capital cost of the upgrade and an approximation of the ongoing operating and maintenance costs of the assets throughout their life. The assumptions associated with these costs and their basis is as those for Option 1 and Option 2 above.

Similar to Option 1 and 2, the program is assumed to be implemented uniformly across the next RCP (see table below). Note the caveats in Section 5.3 concerning the opex amounts included in this table.

Table 19: Option 3b Total Cost by Cost Type ($m 2022 Real)

Cost Type	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 - 30
Capex	3.7	3.7	3.7	3.7	3.7	18.7
Opex	0.1	0.1	0.2	0.3	0.4	1.1
TOTAL COST	3.8	3.9	4.0	4.0	4.1	19.8

5.9.3 Risks

The charts below show the breakdown of bushfire risk at the start and the end of the next RCP in each fire ban district and each fire danger rating if Option 3b is implemented in line with the above costs.

Figure 10 Option 3b annual bushfire risk by fire ban district

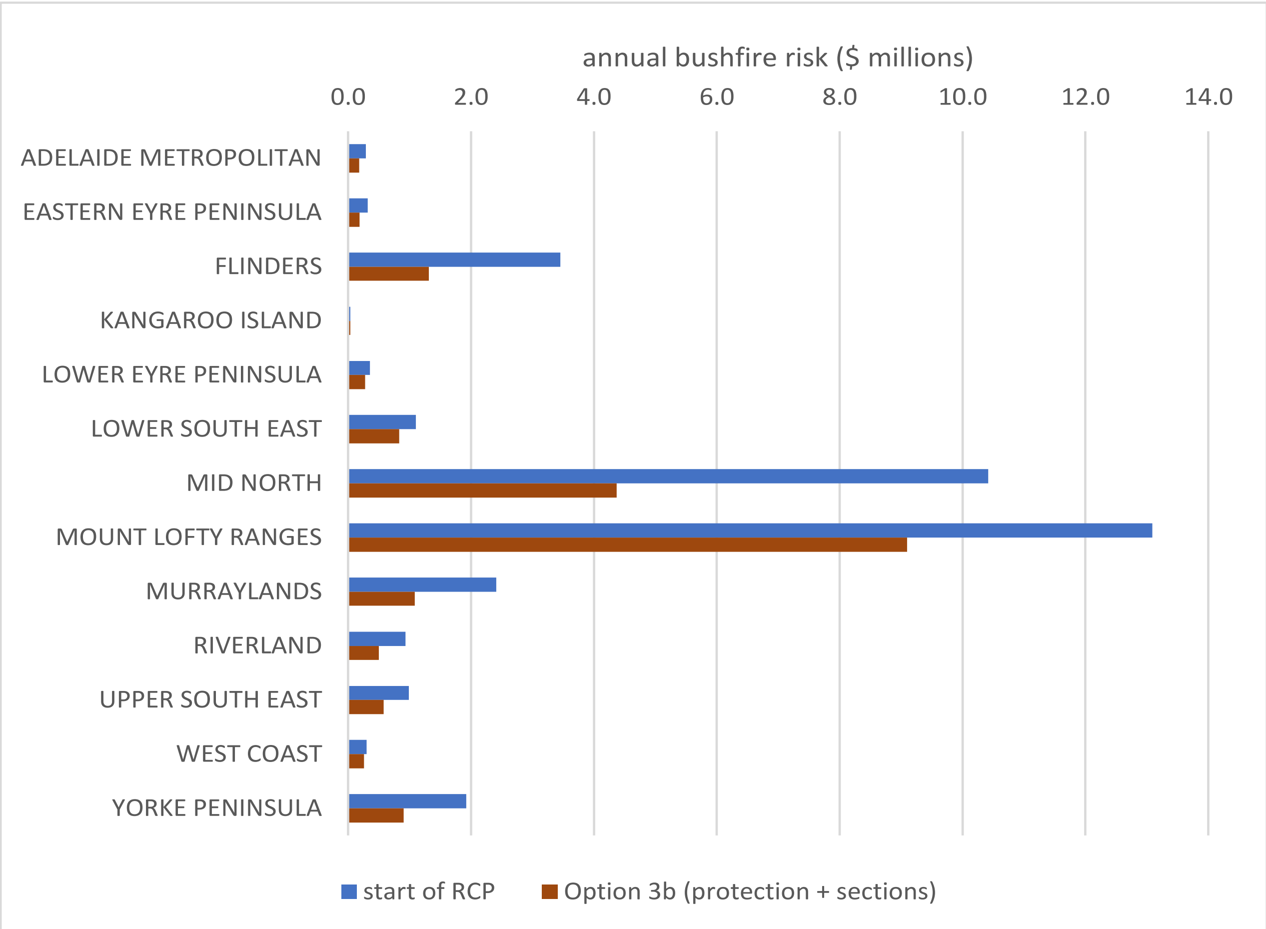
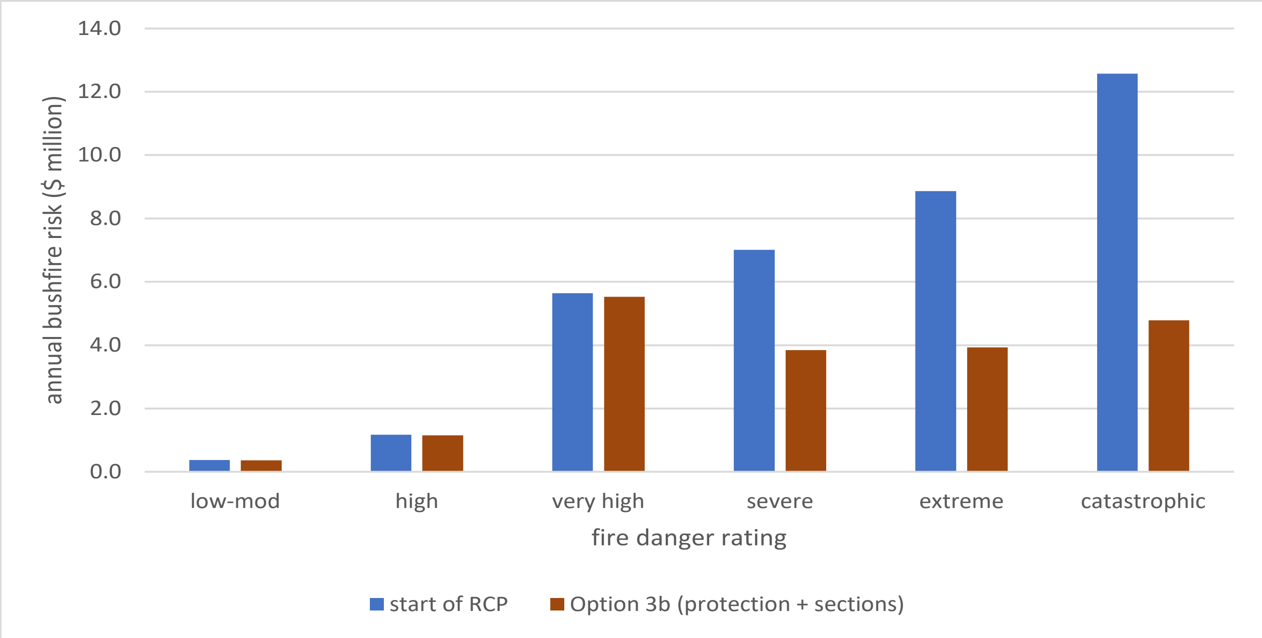


Figure 11 Option 3b annual bushfire risk by fire danger rating in 2025-30 RCP



5.9.4 Quantified benefits

The quantified benefits relate to the reduction in the bushfire risk achieved by Option 3b. These benefits will accrue during the next RCP approximately in line with the implementation of the program, as shown in Table 18.

Table 20: Option 3b Benefits by sub-option ($m 2022 Real)

Benefit	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025 - 30
Bushfire risk reduction	3.2	6.4	9.6	12.8	16.0	48.1

5.9.5 Unquantified benefits

Option 3b includes the same unquantified benefits as discussed above for Option 1 and Option 2.

Similar to Option 3b, the unquantified benefits associated with the conductor upgrade portion of Option 3b could be material. But for the reasons discussed in section 5.3, we have not attempted to quantify these benefits at this time.

6 Evaluation of Public Safety Power Shutoff Mitigation Program

6.1 Evaluation methodology to define program options

We developed a cost-benefit analysis model (PSPS Mitigation Cost-Benefit Analysis model) to evaluate the costs and benefits of upgrading the 17 candidate feeders, discussed in Section 3.

The capital cost of each feeder upgrade was calculated based on the scope of remote switching and/or undergrounding upgrades identified via the technical review of that feeder and our high-level internal unit costs for these types of upgrade. Operating costs of the upgrade are assumed to be zero for the evaluation.

The upgrade benefit is calculated as the avoided customer interruptions achieved by the upgrade. This is calculated based on the estimate of the customer minutes avoided, using the same approach we use for reliability analysis to estimate the economic value of the unsupplied energy associated with the interrupted customers. This estimate used the VCR based on the 2022 AER published VCR, with assumptions being:

- the average interruption duration is 6 hours (based on the average historical duration of Public Safety Power Shutoffs); and
- the average frequency of a Public Safety Power Shutoff is 1 in 5 years (based on a conservative estimate of their frequency under current policies).

The results of the cost-benefit analysis of each feeder is shown in the table below.

Table 21 Feeder cost-benefit analysis results

			$'000s				
Feeder	Customers improved	Upgrade	Capital cost	Current annual reliability risk from PSPS[30]	Resulting annual risk	Avoided annual risk	Net-benefit [31]
PP04	1988	remote switches	$68	$132	$13	$119	$2,406
GA53	1508	remote switches	$136	$134	$44	$90	$1,663
GA26	2290	targeted undergrounding	$1,583	$146	$0	$146	$1,460
SD54300	988	remote switches	$68	$115	$60	$56	$1,055
EL11	987	remote switches	$272	$126	$63	$63	$815
HH386A	553	targeted undergrounding	$227	$62	$27	$35	$523
SD31100	588	remote switches	$136	$33	$0	$33	$444
GA800A	381	remote switches + targeted undergrounding	$68	$46	$23	$23	$355
GA15	491	remote switches	$136	$40	$11	$29	$365
NU19	280	remote switches	$68	$61	$45	$16	$205
GA43	691	remote switches	$454	$42	$1	$41	$177
GA02	513	remote switches	$272	$45	$15	$31	$131
MTB12	385	remote switches	$272	$75	$52	$23	-$32
BM56	272	remote switches	$272	$16	$0	$16	-$176
GA31	83	remote switches	$272	$10	$6	$5	-$424
ST11	1202	remote switches + targeted undergrounding	$1,871	$126	$54	$72	-$400
GA22	310	remote switches + targeted undergrounding	$870	$20	$1	$19	-$538

[30] The 'risk' and 'avoided risk' values provided in this table are calculated based on the customer interruptions as explained in the preceding paragraphs.

[31] This represents the present value of the net-benefit over the life of the feeder upgrades, where year 0 for any feeder upgrade is treated as the year of the upgrade.

6.2 Evaluation of program options

Based on the feeder-level cost-benefit analysis results shown above, we have considered three program options, as follows:

- **Option 0 'do nothing'**, we do not implement the Public Safety Power Shutoff Mitigation program in the next RCP;
- **Option 1 'optimal program'**, we only undertake the upgrade on those feeders where we have found a positive net-benefit for the upgrade; and
- **Option 2 'full program'**, we undertake all identified upgrades on all 17 feeders, including those with a negative net-benefit.

The interrelationship between the analysis in this section and the overall capex figures are shown below.

Table 22 results of cost-benefit analysis of options

Option	$ millions			customers improved
	Capital cost	**Benefit**	**Net-benefit[a]**	
Option 0 'do nothing'	$0.0	$0.0	$0.0	0
Option 1 'optimal program'	$3.5	$14.5	$9.6	11,258
Option 2 'full program'	$7.0	$17.4	$8.0	13,510

a – the benefit and net-benefit are provided as the present value over a 50-year analysis period, allowing for the life of the upgrade, assuming a 15-year life for electronic assets (eg remote switches) and a 50 year life for conductor upgrades (eg undergrounding)

The results of the cost-benefit analysis of the three options are shown in Table 24.

6.2.1 Recommended option

Our recommended option is Option 1 (optimal program). The $3.5 million capital cost of this option will allow us to reduce the number of customers interrupted during Public Safety Power Shutoffs by approximately 11,250, supplied from 12 bushfire risk feeders with high modelled bushfire risk as per the CSIRO bushfire consequence modelling. Approximately 65% of these customers are in the Mount Lofty Ranges and regions surrounding Adelaide, 25% are in the Mid North fire ban district, and 10% are the Flinders fire ban district.

This option is the lowest cost option (other than the 'do nothing' option) and has the greatest net-benefit. We have selected this as our preferred option as it:

- addresses the identified needs discussed in Section 4,
- represents a low-risk solution in terms of its implementation as it represents technology we have experience using (ie installing remote-operated switches and some targeted undergrounding); and
- strikes the right balance between the preferences of our customers to improve the resilience of supply of our worst served customers and limit price increases.

Based on the review of these options and cost-benefit results (both from a bottom-up review by relevant internal subject matter experts and the top-down challenge applied across our proposal forecasts), we have rejected the other options primarily for the following reasons:

Option 0 (do nothing)

This is the least cost option, but it does not address the identified need. It also increases the likelihood that the number of customers interrupted during Public Safety Power Shutoffs over the next RCP will increase due to climate change, and does not derive net benefits for customers in terms of reducing the number of customers interrupted.

Option 2 (full program)

This option reduces the number of customers who could be interrupted during Public Safety Power Shutoffs by approximately 13,500, an increase of 2,250 improved customers over the recommended options.

However, this option is the highest cost option, at $7.0 million (an increase of $3.6 million from the recommended option) and has a lower net-benefit than the recommended option ($1.6 million less than the recommended option over the life of the upgrades).

6.3 Sensitivity analysis

We assessed the sensitivity of the findings of the cost-benefit analysis of the options (excluding the 'do nothing option') to changes in key assumptions. The results of this analysis are summarised in Table 23, which provide the option's capital cost, net-benefit (over the upgrade life), and customers improved.

These results indicate that the recommended option (Option 1) always maximises the net-benefit, and approximately 50% of the optimal capex is insensitive to changes in the key assumptions. The optimal capex of the recommended option reduces for some 'downside' changes in key assumptions (eg lower VCR, less frequent PSPS, lower duration improved).

However, our consumer engagement has found that customers have support for a program of this type, and it is noted that Public Safety Power Shutoffs occur at a time when access to electricity is valued more highly by customers due to extreme heat and the need to support emergency response functions such as communications and water supply. Therefore we have undertaken a combined study assessing the impact of a 20% increase in VCR and changes to other assumptions. If we allow for the high-end range of VCR, then changes in the other key assumptions most often result in an optimal capex close to or above the base case of the recommended option (see 'Combined VCR higher (+20%)' in Table 23).

Given these results, we consider that the reasoning provided above for our selection of the recommended option is still valid, in light of a reasonable range in the key assumptions. Furthermore, the results of our combined study (high-end range of VCR and the effects of assumption change) provides confidence that the recommended program capex is likely to provide a net-benefit, even if some assumptions turn out to be more optimistic than actual outcomes.

Table 23 Sensitivity studies – capex, lifetime net-benefit and customers improved

	capex		net-benefit		customers improved	
	Option 1	Option 2	Option 1	Option 2	Option 1	Option 2
base case	$3.5	$7.0	$9.6	$8.0	11,258	13,510
discount rate lower (3.5%) (4.05% base case)	$3.5	$7.0	$10.9	$9.5	11,258	13,510
discount rate higher (4.0%) (4.05% base case)	$3.5	$7.0	$8.7	$7.0	11,258	13,510
option capital cost lower (-20%)	$3.0	$5.6	$10.7	$9.9	11,643	13,510
option capital cost higher (+20%)	$4.2	$8.5	$8.6	$6.2	11,258	13,510
VCR lower (-20%)	$3.5	$7.0	$6.7	$4.6	11,258	13,510
VCR higher (+20%)	$3.8	$7.0	$12.6	$11.5	11,643	13,510
% customers improved (-20%)	$3.5	$7.0	$6.7	$4.6	9,006	10,808
% customers improved (+20%)	$3.8	$7.0	$12.6	$11.5	13,972	16,212
average duration improved (9 hr)	$5.6	$7.0	$17.4	$16.7	12,845	13,510
average duration improved (3 hr)	$1.2	$7.0	$2.9	-$0.7	7,764	13,510
frequency of PSPS pa (3 in 10 years)	$5.6	$7.0	$17.4	$16.7	12,845	13,510
frequency of PSPS pa (1 in 10 years)	$1.2	$7.0	$2.9	-$0.7	7,764	13,510
Combined VCR higher (+20%) + other change						
option capital cost lower (-20%)	$4.5	$5.6	$14.0	$13.4	12,845	13,510
option capital cost higher (+20%)	$4.2	$8.5	$11.5	$9.6	11,258	13,510
% customers improved (-20%)	$3.5	$7.0	$9.0	$7.3	9,006	10,808
% customers improved (+20%)	$5.6	$7.0	$16.5	$15.7	15,414	16,212
average duration improved (9 hr)	$5.9	$7.0	$22.5	$22.0	13,117	13,510
average duration improved (3 hr)	$2.8	$7.0	$4.1	$1.1	10,054	13,510
frequency of PSPS pa (3 in 10 years)	$5.9	$7.0	$22.5	$22.0	13,117	13,510
frequency of PSPS pa (1 in 10 years)	$2.8	$7.0	$4.1	$1.1	10,054	13,510

7 Deliverability of recommended option

We have developed a plan to ensure that we can deliver these bushfire risk management programs together among all of the increased volume of work reflected in the programs that comprise our total network expenditure forecast in our Regulatory Proposal. This plan considers the detailed implications of our proposed overall uplift in total network expenditure for our required workforce and supporting internal services of information technology, fleet, property and human resources.

We consider that our plan is realistic and achievable over the 2025-30 RCP. The details of our approach are set out in our accompanying document, '5.2.5 - Resourcing Plan for Delivering the Network Program'.

This program is also a continuation of an existing program with a modest increase in scale. It has no major dependency on other projects or programs. Therefore, no material deliverability concerns are anticipated with this program.

8 How the recommended option aligns with our consumer and stakeholder engagement

The service outcomes enabled by the expenditure and programs proposed in this business case, are aligned to achieve outcomes that were directly supported by our customers as ultimately reflected in the recommendations of the People's Panel. This is noting that:

- the topic of bushfire safety / risk has been a key focus of our consumer and stakeholder engagement program. One of our four key themes that have framed our engagement under a desire to 'focus on what matters' to our customers has been the theme of a 'reliable, resilient and safe electricity network';
- in engaging on this theme, and under the specific topic of 'reliability and bushfire safety' we undertook a series of deep-dive workshops called 'Focused Conversations' with a broad range of consumer, industry, government and regulatory body representatives. In these Focused Conversations we sought recommendations on the service outcomes that customers prefer and expect;[32]
- with particular regard to the Bushfire Risk Management Programs covered in this business case, we engaged on the identified needs of these programs, and outlined our current expenditure and programs to manage bushfire risk, and potential future solutions to manage bushfire risk;
- we then posed three scenarios, and ultimately engaged on four as directed to by our customers, in terms of how we could respond to the identified need, and the expected outcomes for customers in relation to service, expenditure and price – these included (1) doing nothing (2) spending to maintain safety (3) spending to further mitigate bushfire risk where efficient for customers and (4) spending to improve bushfire risk even where it is not efficient for customers;
- while our customers and stakeholders were consistently mindful of energy affordability concerns, the Focused Conversation arrived a clear consensus recommendation to the People's Panel as the next stage in our engagement program, that we should invest sufficiently in order to:
    1. further mitigate bushfire risk where it is efficient for customers (benefits outweigh costs) – by implementing sensitive protection to reduce bushfire risk; and
    2. minimise the reliability impact on customers when public safety power shutoffs are enacted.
- Ultimately, the People's Panel deliberated on and affirmed the results of the Focused Conversations in their formal recommendation, and we committed to taking this recommendation forward as reflected in the recommendations contained in this business case.

Since conducting the People's Panel process, we published a Draft Proposal to play back how we have given effect to customer recommendations and to confirm that those recommendations remain valid given continued cost of living pressures and to obtain further input to refine our Regulatory Proposal. Submissions received on our Draft Proposal overwhelmingly suggest that the recommendations of the People's Panel remain valid with respect to the Bushfire Risk Mitigation Programs outlined in this business case, noting that:

- members of the People's Panel affirmed that their recommendations, including in respect of property expenditure as set out in this business case, remain current;[33]

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[32] This was covered in workshops 1, 3 and 4 for the Reliability and bushfire safety Focused Conversation. Materials presented at the Focused Conversations are available on our TalkingPower website under the page titled 'focused conversations'. [https://www.talkingpower.com.au].

[33] DemocracyCo, *Submission: SA Power Networks Draft Regulatory Proposal 2025-30*, 30 August 2023.

- some parties such as that from SACOSS[34] and the Department of Energy and Mining [35] generally urged further consideraiton of the overall magnitude of our forecat capital expenditure across in totality. However, at the same time DEM noted that it specifically supported the Bushfire Risk Mitigation Programs where these are suitably targeted and efficient – this business case now outlines our justification and demonstration that these programs are indeed prudent and efficient for customers;
- members of the Regional and Remote Customers Sub-Committee of the Customer Advisory Board affirmed that we have struck a reasonable balance between affordability pressures and service levels, and that it supports the Bushfire Risk Mitigation Programs;[36]
- the Energy and Water Ombudsman of South Australia believes that all of our proposed service levels and expenditure to support a reliabille, reslience and safety (including the Bushfire Risk Mitigation Programs) distribution network are in the best interests of consumers;[37] and
- the chair of the Arborists Reference Group submitted that the proposed inclusion of a Public Safety Power Shutoff Mitigation program was an appropriate alternative to undergrounding and that this reflected a good focus on customer service in our Draft Proposal.[38]

34 SACOSS, *South Australian Council of Social Service Submission on SA Power Networks' 2025-30 Draft Regulatory Proposal*, September 2023.

35 DEM, *South Australian Department of Energy and Mining* – Submission, October 2023.

36 RRCSC, *Regional and Remote Customers Sub-Committee – Draft Regulatory Proposal 2025-30*; 28 August 2023.

37 EWOSA, Energy and Water Ombudsman of South Australia – Submission to SA Power Networks: Draft Regulatory Proposal 2025-30, p.2.

38 Sandham, John Sandham - Submission via email: 28 August 2023.

8.1 Alignment to customer values research

To guide the development of expenditure forecasts that enable price-service outcomes that align with the expectations and preferences of our broader customer base, we engaged expert economic consultants to undertake a customer values research study (study).[39] The study employed a partial profile discrete choice experiment to identify how much South Australian households and businesses are willing to pay through their electricity bills to achieve certain service outcomes.

One service outcome upon which the study focused was the willingness of the broader customer base to pay for investments to reduce the number of customers who experience service interruptions due to Public Safety Power Shutoffs. This service outcome is directly implemented through this business cases Public Safety Power Shut Off Program.

The study results estimated, at a confidence level of 95%, that:

- South Australian households, on average, are willing to pay an additional $3.72 ($2025) per annum on their electricity bills to reduce the number of customers experiencing service interruptions due to Public Safety Power Shutoffs from 5,000 down to 1,000 customers a year; and
- South Australian small businesses, on average, were not willing to pay to decrease the number of customers experiencing service interruptions due to Public Safety Power Shutoffs.

Noting the results, our recommended option for the Public Safety Power Shutoff Program was scaled back to return bill impacts which are within our residential customer segments willingness to pay. Therefore, this business case's recommended option for the Public Safety Power Shutoff Program will reduce the number of customers experiencing outages down to 2,700 per year for an expected residential bill impact of $0.26 ($2025) and commercial bill impact of $1.81 ($2025) per year.

[39] 0.2 - Customer values research - Consultant Report

9 Alignment with our vision and strategy

This business case aligns with our Risk Appetite Statement, which highlights:

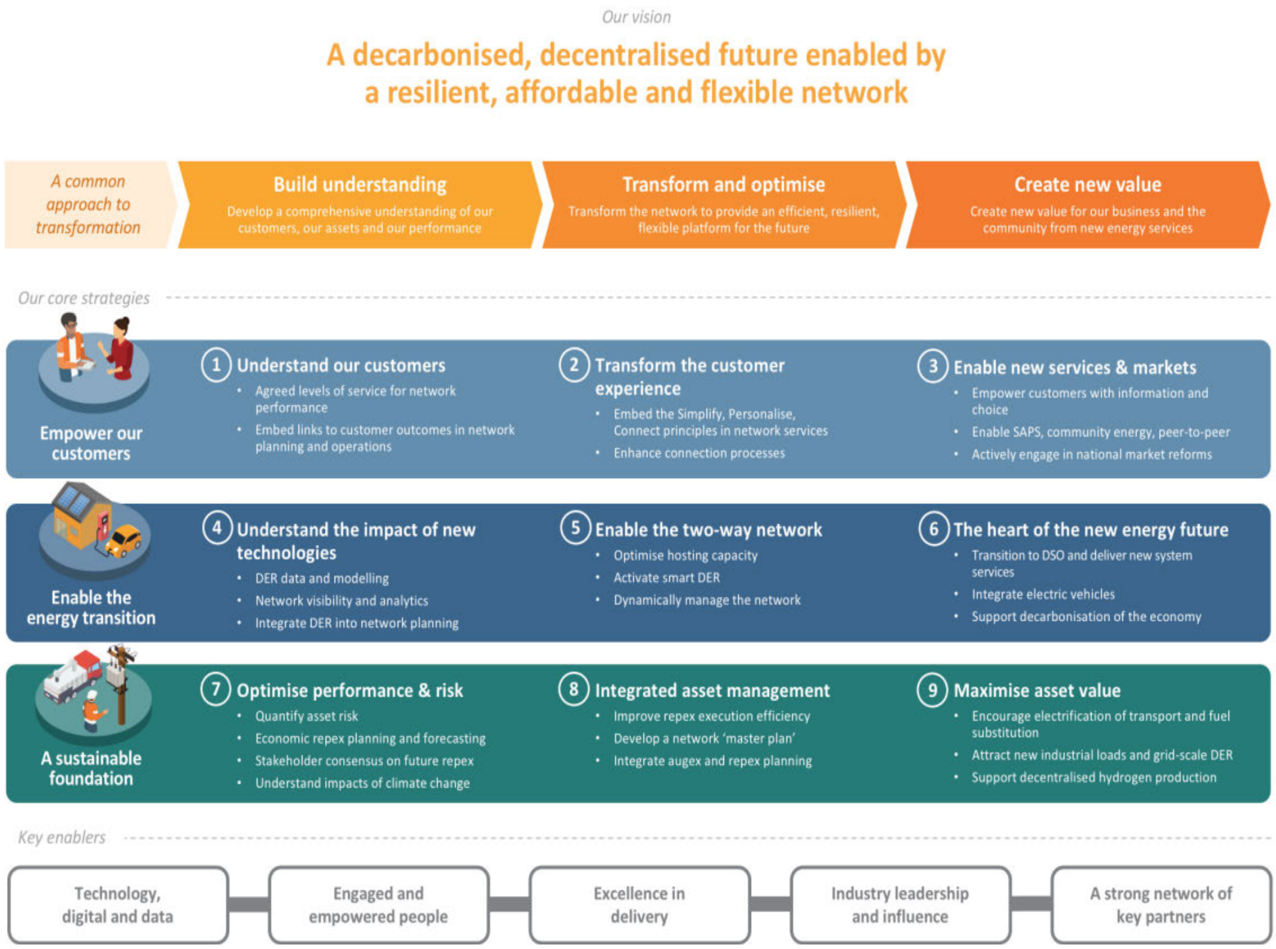
- the Board's expectation that we should accept as little risk as reasonably practical in the management of potential bushfires starting from operations and/or assets; and
- the Board's increasing appetite to invest in programs that improve network safety performance and minimise the effects of disconnection.

However, the recommended option in this business case does not seek to pursue risk reduction at any cost, but rather to do so where this is efficient for customers (benefits outweigh costs).

This business case is aligned to progress our overall company 'Network Strategy' and our vision within this strategy displayed in figure 11 below. This is noting that the recommended program is aligned to several of the core strategies within the Network Strategy, as follows:

- 'empower our customers' – the program arises from a comprehensive, multi-staged consumer engagement program that saw us iterating our expenditure forecasts with our customers over five iterations to identify and align our expenditure to achieve the service level and price outcomes that our customers expect and prefer being mindful of alternatives and trade-offs;
- 'Optimise performance and risk' – developing the capability to forecast risk (including climate / safety risk) for all assets over time; and
- 'Integrated asset management' – targeted investments to harden the network against key risks such as fire start.

Figure 12: SA Power Networks – Network Strategy 2020-2030



10 Reasonableness of cost and benefit estimates

Our Bushfire Model Framework document sets out our input assumptions and the basis for these, including option costs and other assumptions, bushfire risk assumptions, and how we calculate bushfire risk and benefits. It also explains how we undertake the cost-benefit analysis of options for the Bushfire Risk Mitigation Program[40].

We believe that our assumptions are reasonable, and our risk assessment and cost-benefit methodology aligns with the recent AER statements on its expectation for formal quantitative risk assessments and cost-benefit analysis. The key features of our approach that demonstrate the robustness of our analysis are as follows:

- **We have engaged expert advice on bushfire modelling**

  To understand potential bushfire risks under different conditions discussed above, we engaged CSIRO to undertake extensive bushfire simulation of the areas covered by our study. As part of this project, CSIRO has performed approximately five million bushfire propagation simulations using its own bushfire simulation software. CSIRO also calculated loss information associated with each individual bushfire event.

- **We are calculating risks across a large range of fire start locations and bushfire conditions**

  CSIRO determine the bushfire risk by separately calculating bushfire probabilities and bushfire consequences across a very large range of possible bushfire events, covering fire start locations that traverse our network and possible bushfire conditions.

  The range of bushfire events cover:

  - 122,000 individual fire start locations, along the 1,111 feeders covered by our study; and
  - approximately 40 different weather and bushfire conditions for each of these fire start locations, ranging from the lowest bushfire danger conditions during the bushfire season to the highest.

  In total, this amounts to CSIRO analysing approximately 5 million bushfire events to estimate risk.

- **We have calibrated many aspects of our model using historical data of SA bushfire events**

  We have calibrated many of the inputs and assumptions of our modelling using our own fire start database as well as other information on historical SA bushfire events. In this way, we can have confidence that the calculated risks are a reasonable representation of *our* risks. Most notably:

  - we have estimated fire start probabilities from our own recent history;
  - CSIRO has used various data sources to ensure that assumed fire suppression rates are moderated such that the fire sizes and event frequencies predicted by our model reflect actual SA outcomes.

- **We have only included program elements where we can demonstrate that there will be a net-benefit due to that element.**

  We have used our purpose-built Bushfire Risk model, Bushfire Cost-Benefit Analysis model and the PSPS Mitigation Cost-Benefit Analysis model to assess the proposed program options and test whether they produce a net-benefit (i.e. the benefits exceed the costs in discounted cash flow terms). Using our approach, we have been able to do analysis and testing for individual feeders and feeder segments, such that we can determine where on our network it would be prudent and efficient to

[40] The 5.6.3 Bushfire Model Framework Methodology document focuses on the bushfire risk calculations and cost-benefit analysis of the Bushfire Risk Mitigation Program, as this is a more complex piece of analysis and a more significant program in scale. The explanation of the methodology and key assumptions of the Public Safety Power Shutoff Mitigation program is set out in this business case.

implement the program, and in turn have reasonable confidence that the proposed program is optimal.

- **The sensitivity analysis shows that the program will provide a net-benefit in light of uncertainty at this time.**

  We have tested the optimal program and its net-benefits to changes in key assumptions, including published climate change projections. This analysis as found that the effect on net-benefits of any 'downside' changes in key assumptions (eg option costs higher than assumed) are most likely to be offset by the effects of climate change.