

REFCL Operations

Decision paper and statement of reasons

December 2024

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Summary

Between May and July 2024, Energy Safe Victoria consulted on our preliminary views on how electricity distribution businesses should operate rapid earth fault current limiters (**REFCLs**) to protect the community while balancing supply reliability considerations. We outlined proposed expectations for the operating frequency and settings of REFCLs, testing and maintenance, potentially broadening the use of REFCLs and record keeping and reporting by distribution businesses to show compliance with their regulatory obligations.

We received four submissions in response to our consultation paper, and eight responses to our plain English survey. This decision paper and statement of reasons summarises the feedback in those submissions and survey responses and provides our final positions.

There was broad agreement with our initial views on operating REFCLs on declared Total Fire Ban Days, where those REFCLs have been installed to mitigate bushfire risk as opposed to other reasons (e.g., for supply reliability benefits). Submissions mostly focused on our expectations for other times throughout the year and for REFCLs that have been installed for other reasons. Key issues raised by stakeholders include:

- The need for distribution businesses to maintain operational flexibility.
- Potential adverse impacts on supply reliability associated with increased operating frequency and use of higher sensitivity settings.
- Bypassing or disabling REFCLs to manage adverse impacts on supply reliability.
- Timeframes for implementation of any new or changed expectations.

We have maintained our positions on operating frequency (how often a REFCL is in-service) and operating settings (fault detection sensitivity level and response to phase-to-earth faults) for REFCLs installed to mitigate the risk of bushfire. Stakeholders supported using the highest sensitivity settings on declared Total Fire Ban Days and when the Fire Behaviour Index (**FBI**) exceeds 30.¹ We also consider that high sensitivity settings are essential during the declared Fire Danger Period and on any day when the bushfire risk is rated as 'High' or above under the Australian Fire Danger Rating System (**AFDRS**). While we expect REFCLs to remain in-service throughout the year, we accept submissions that lower sensitivity settings may be suitable during periods of relatively low bushfire risk.

We have, however, revised our expectations for the operation of certain non-prescribed REFCLs. We agree with submissions that non-prescribed REFCLs installed at zone substations serving low bushfire risk areas do not necessarily need to operate at higher sensitivity settings at times of high fire danger. However, they should still be operated to reduce electrocution risks year-round.

We acknowledge that operating REFCLs at high sensitivity settings may, in some cases, adversely affect supply reliability by making it harder to identify the exact location of faults and therefore extending the time to restore supply. However, we maintain the view that distribution businesses should not rely on bypassing or disabling REFCLs as a long-term solution to minimise adverse impacts on supply reliability. Following consultation, we have strengthened our position and now expect distribution businesses to commit to implementing solutions to address adverse supply reliability impacts, such as by deploying REFCL-compatible auto circuit reclosers (**ACRs**) and fault-locating devices and making network upgrades. If it is not practicable for a distribution business to immediately do this, we expect their electricity safety management scheme (**ESMS**) and bushfire

¹ The FBI runs from 0 to 100+, with increasingly high values indicating increasingly dangerous fire behaviour. An FBI of 24-49 indicates high fire danger, 50-99 is extreme and 100+ is catastrophic. It is consistent with but more granular than the Fire Danger Ratings based on the Australian Fire Danger Rating System.

mitigation plan (**BMP**) to specify their commitment to meet these expectations within a reasonable timeframe.

We noted in the consultation paper that it may be practicable to extend electricity supply from a REFCL-protected substation to an area currently served by a non-REFCL-protected substation, thereby providing REFCL protection in that area. We acknowledge that switching REFCL protection between lines could increase network capacitive losses, making it harder to maintain expected performance levels. We expect distribution businesses to carefully balance REFCL coverage and sensitivity to achieve the best risk reduction for each zone substation.

We have otherwise maintained our expectations that distribution businesses will consider broadening the use of REFCLs on their supply networks to contribute towards minimising hazards and risks as far as practicable, consistent with their general duties. Also, to ensure testing and maintenance of REFCLs are well planned and completed ahead of the times they are most needed (e.g., ahead of declared Fire Danger Periods for REFCLs installed to mitigate bushfire risk). And, finally, that distribution businesses will keep records to demonstrate their compliance with the approach to managing and operating REFCLs, as outlined in their ESMSs and BMPs.

Our final expectations for how electricity distribution businesses should manage and operate REFCLs are outlined in the REFCL Operations Policy, which can be found on the Energy Safe website at <https://www.energysafe.vic.gov.au/REFCL-operations-policy>.

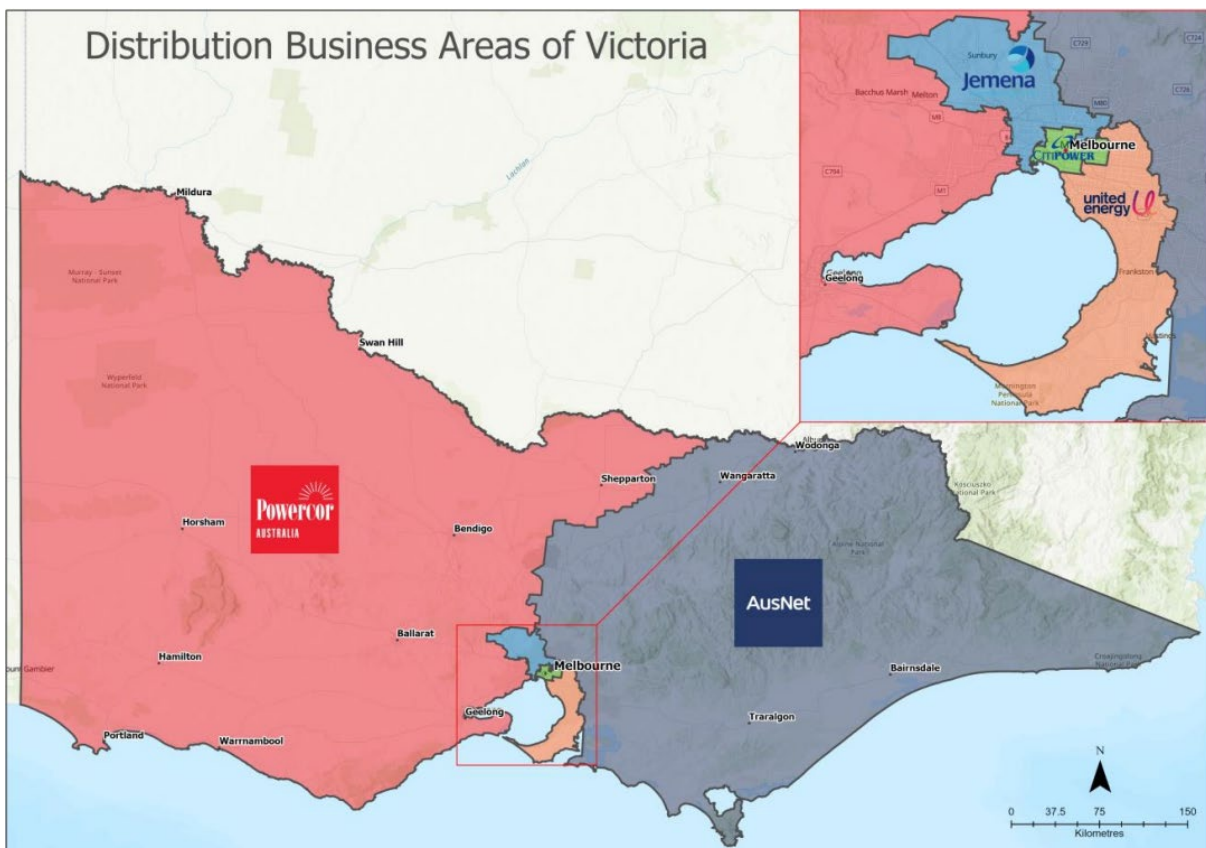
1 Background

This section provides some information on the Victorian electricity distribution businesses, the introduction of prescribed requirements to install REFCLs and the energy safety legislative framework that is most relevant to the issues covered in this paper. It also provides information about our consultation process.

1.1 Electricity distribution businesses

There are five electricity distribution businesses that own and operate supply networks in Victoria, each with defined areas as shown in Figure 1. Two distribution businesses own and operate most of the rural powerlines – Powercor Australia Ltd (**Powercor**) in the west of the state and AusNet Electricity Services Pty Ltd (**AusNet Services**) in the east. Jemena Electricity Networks (Vic) Ltd (**Jemena**) and United Energy Distribution Pty Ltd (**United Energy**) own and operate a relatively small number of rural powerlines on the outskirts of Melbourne and on the Mornington Peninsula. CitiPower Pty Ltd (CitiPower), which owns and operates the powerlines in the Melbourne CBD and inner suburbs, does not own or operate any rural powerlines.

Figure 1: Electricity distribution areas



1.2 Installation of REFCLs

Following the Black Saturday bushfires in 2009, the Victorian Bushfires Royal Commission (**VBRC**) found that some of the most devastating fires were ignited by faulted powerlines and recommended undergrounding powerlines, insulating overhead powerlines or using technology to reduce bushfire

risk. The Victorian Government's Powerline Bushfire Safety Taskforce (**PBST**), tasked with investigating ways to best implement the VBRC's recommendations, subsequently recommended that distribution businesses should, among other things, install REFCLs at specific points in their supply network to reduce the risk of 22 kilovolt polyphase powerlines starting fires.

A REFCL, installed in a zone substation, acts like a safety switch by rapidly detecting phase-to-earth faults on powerlines and reducing voltage to mitigate bushfire and electrocution risks. If the fault is temporary, power supply is maintained to customers. However, if the fault persists, the REFCL instructs a circuit breaker to switch off the power, cutting supply to all customers on that line until the fault is fixed.

Although some distribution businesses had plans to trial REFCLs between 2016–2020, a faster and more extensive rollout was mandated by the Victorian Government. Through amendments to the legislative framework, the Victorian Government required distribution businesses to install REFCLs at 45 zone substations serving the highest bushfire consequence areas by specified dates. Twenty-two of these are in each of AusNet Services' and Powercor's supply areas, while one zone substation is in Jemena's supply area.

1.3 Legislative framework

The *Electricity Safety Act 1998* (Vic) (**Act**) and associated regulations establish the regulatory requirements that apply to distribution businesses, which are monitored and enforced by Energy Safe.

Part 10 of the Act establishes a general duties framework together with obligations for distribution businesses to submit ESMSs and BMPs to Energy Safe outlining how they will meet their general duties and what their proposals are for the mitigation of bushfire. The general duties require distribution businesses to design, construct, operate, maintain and decommission their supply networks to minimise hazards and risks as far as practicable. This includes hazards and risks to the safety of people, hazards and risks of property damage, and bushfire danger.

Part 10A of the Act requires distribution businesses to install technology to achieve the 'required capacity' (see below) at specified zone substations. These zone substations were selected because they service the highest bushfire consequence areas. Modelling under worst-case conditions suggests that fire ignitions in these locations are more likely to have catastrophic impacts.

'Required capacity' is defined as the ability to do the following in the event of a phase-to-ground fault:

- to reduce the voltage on the faulted conductor in relation to the station earth when measured at the corresponding zone substation for high impedance faults to 250 volts within 2 seconds, and
- to reduce the voltage on the faulted conductor in relation to the station earth when measured at the corresponding zone substation for low impedance faults to—
 - 1900 volts within 85 milliseconds
 - 750 volts within 500 milliseconds, and
 - 250 volts within 2 seconds
- During diagnostic tests for high impedance faults, to limit—
 - fault current to 0.5 amps or less, and
 - the thermal energy on the electric line to a maximum I^2t value of 0.10.

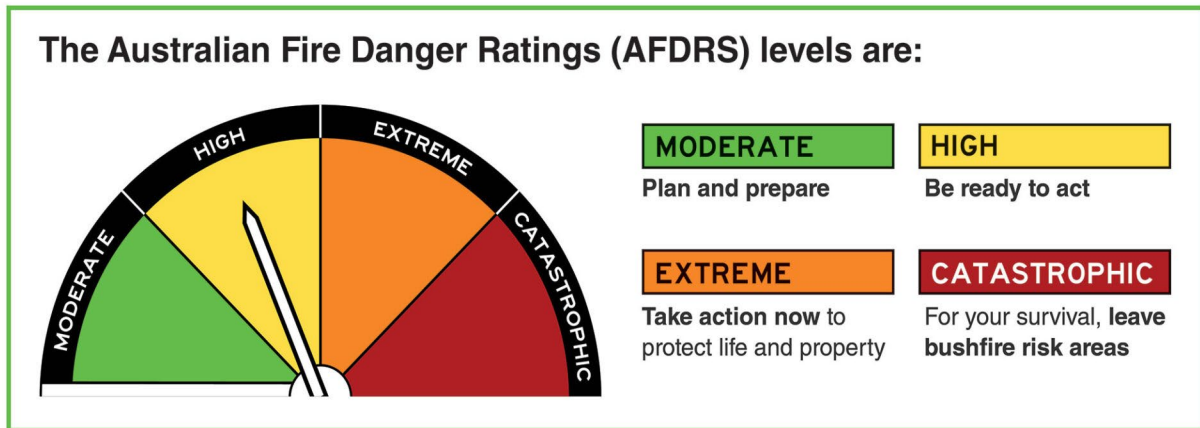
While the Act and associated regulations do not specifically refer to REFCLs, REFCLs are currently the only technology that can achieve this performance standard.

1.4 Bushfire risk indicators

Noting that REFCLs are intended to mitigate bushfire risks, bushfire risk indicators are a relevant consideration for when and how REFCLs should be operated. Bushfire risk indicators include the AFDRS levels, the FBI, declared Total Fire Ban Days and declared Fire Danger Periods.

AFDRS levels

The AFDRS levels are intended to indicate how dangerous a fire could be if one starts. The AFDRS was updated in 2022 to simplify the levels. The current AFDRS levels are as follows:



Note: The white bar under Moderate indicates No Rating for days where no proactive action is required by a community. This does not mean that fires cannot happen, but that any fires that start are not likely to move or act in a way that threatens the safety of the community. Source: <https://afdrs.com.au/>.

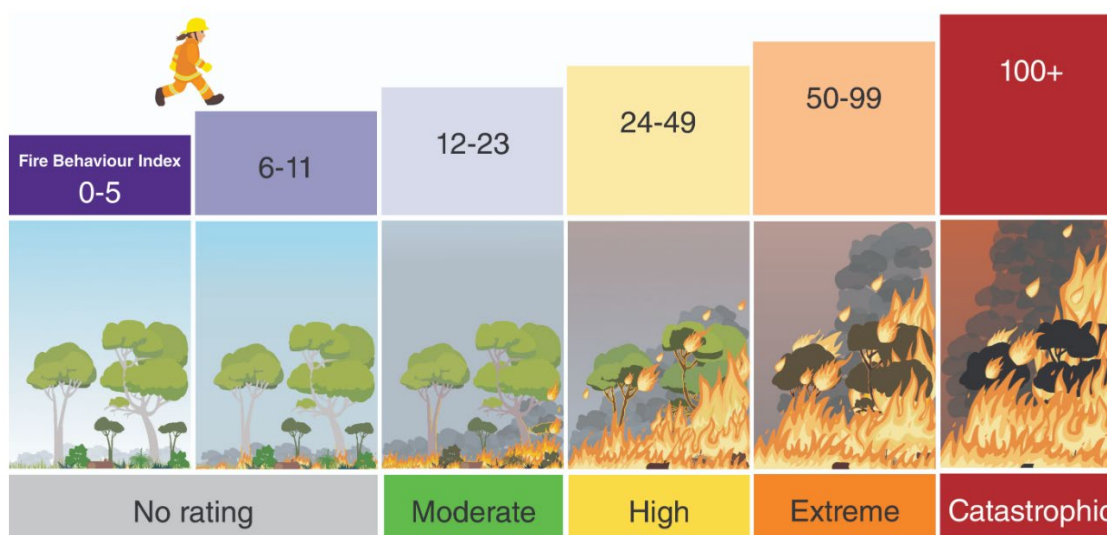
In terms of bushfire risk, the AFDRS levels assume the following:

- **Moderate:** Most fires can be controlled.
- **High:** Fires can be dangerous.
- **Extreme:** Fires will spread quickly and be extremely dangerous.
- **Catastrophic:** If a fire starts and takes hold, lives are likely to be lost.

This means that, whenever the AFDRS level is 'High' or above, there is a real risk that a bushfire start could lead to a dangerous situation and become an uncontrolled fire.

FBI

The FBI is a numerical scale (from 0 to 100+) that provides finer detail than the AFDRS levels. The FBI is divided into step-up categories, where each step represents a transition in fire behaviour, such as a significant change in potential fire spread, suppression difficulty or the expected scale of impact to life and property. The current FBI step categories are as follows:



The FBI supports decision-making on fire behaviour, prescribed burns, suppression strategies, and the potential impact on life and property. Rather than measuring a single factor, the FBI integrates various fire characteristics (like intensity, flame height, spread rate, and spotting potential) based on fire models for specific vegetation types. It helps determine safe conditions for prescribed burns, suitable suppression strategies, equipment use, and the need for Total Fire Bans.

Total Fire Ban Days

In addition to the AFDRS levels and the FBI, the Country Fire Authority's (CFA) Chief Officer may declare a day to be a Total Fire Ban Day. When doing so, the Chief Officer considers additional factors such as current fires in the landscape, resource commitment and increased likelihood for human and lightning induced fires. Therefore, a Total Fire Ban Day can be declared for areas that have not reached an 'Extreme' level under the AFDRS and the FBI.²

Fire Danger Periods

The CFA also declares a Fire Danger Period each year for each municipality, which is the period when the CFA restricts the use of fire in the community to help prevent fires from starting. It varies based on factors such as the amount of rain, grassland curing rate and other local conditions and is intended to indicate the period during which fires are more likely to occur. A Fire Danger Period may be declared as early as October in some municipalities, and typically remains in place until the fire danger lessens, which could be as late as May.

1.5 Consultation on our preliminary views

We undertook a staged consultation process on our initial views on how distribution businesses should operate REFCLs, providing the distribution businesses and the broader community with opportunities to engage and provide feedback.

The distribution businesses received a copy of our consultation paper in February 2024 and were invited to make an initial submission. Although we welcomed submissions on any aspect of the consultation paper, the specific topics we sought views on included:

- the key considerations that informed our preliminary views (i.e., public safety benefits, ensuring efficacy of REFCLs, impacts on supply reliability and bushfire risk ratings)
- operating frequency, which refers to how often a REFCL is in-service (that is, switched on and operating to mitigate bushfires and reduce the risks of electrocution)

² <https://www.cfa.vic.gov.au/warnings-restrictions/total-fire-bans-fire-danger-ratings/about-total-fire-bans>

- operating settings, which refers to the level of fault detection sensitivity and how a REFCL responds when it detects a phase-to-earth fault
- maintaining REFCL performance, via testing and maintenance programs
- broadening the use of REFCLs beyond just those that are prescribed in legislation
- record keeping and reporting requirements to demonstrate compliance.

In May 2024, we commenced a public consultation process seeking to better understand community perceptions of the potential trade-offs between safety and reliability:

- We held two information sessions with a focus on supporting engagement by people with a particular interest in the subject matter and the broader community, particularly those in high bushfire consequence areas where REFCLs are installed. There were 19 attendees across the two sessions.
- We also conducted a plain English survey using similar questions to those in the consultation paper.

Overall, we received four submissions from the distribution businesses (one from Jemena and AusNet Services and two joint submissions from Citipower, Powercor and United Energy (**CPUE**)), one submission from an interested individual and eight responses to our plain English survey.

The issues raised in submissions and survey responses, and our final positions are discussed in Chapter 2.

2 Issues and final position

This chapter summarises the feedback in submissions and survey responses we received through our consultation and provides our final position having regard to these submissions.

2.1 Key considerations for REFCL operations

Considerations that informed our preliminary positions

As outlined in the consultation paper, the key considerations that informed our initial views on how distribution businesses should operate REFCLs included:

- Public safety benefits, including bushfire mitigation, and electrocution and arc flash risk reduction.
- The need to ensure the efficacy of REFCLs through operation under various conditions throughout the year and early remediation of any issues.
- Potential impacts on reliability of electricity supply, including positive and adverse impacts.
- Bushfire risk indicators, particularly the AFDRS levels, declared Total Fire Ban Days and declared Fire Danger Periods.

Summary of submissions

Jemena agreed that the key considerations outlined in the consultation paper are the key issues for guiding REFCL operations.

AusNet Services supported the key considerations in the consultation paper and acknowledged the safety benefits of REFCLs, including the reduced risk of electrocution associated with contact with electric lines. However, AusNet Services noted that the extent to which REFCLs mitigate the risk of electrocution relative to other forms of protection has not been quantified.

CPUE also agreed that public safety, REFCL efficacy and supply reliability are key considerations for REFCL operations, however, CPUE submitted that REFCLs are not expected to prevent electrocution from direct contact with live powerlines, as the initial shock can still cause serious injury or death. In addition, CPUE noted that more emphasis should be placed on supply reliability as a public safety issue, particularly in the context of vulnerable customers.

CPUE also submitted that the “AFDRS levels should be considered in the context of the BMP, with respect and consideration to all other bushfire mitigation controls and risk indicators.” Energy Safe understands this comment is intended to highlight that distribution businesses take a multi-faceted approach to bushfire risk mitigation that does not solely rely on REFCLs and that the AFDRS levels are relevant to their broader bushfire risk response as outlined in their BMP.

The individual submitter said they did not object to the considerations in the draft operations policy being the key considerations for how the distribution businesses should operate REFCLs.

One survey respondent noted that a relevant consideration not covered in the consultation paper is how customers are compensated for increasing power outages.

Considerations that inform our final positions

There was general agreement that the key considerations outlined in the consultation paper were the relevant considerations, although views varied on how much each should influence our policy on REFCL operations.

We note submissions highlight a lack of data about the non-fire related benefits of REFCLs (i.e., the prevention of electrocution from direct contact with live powerlines). While we accept that knowledge and understanding of the broader benefits of REFCLs is still building, we do not believe this means we should entirely dismiss the potential benefits for preventing electrocutions. We also recognise that most incidents are likely to involve indirect contact, such as workers operating machinery while wearing protective clothing, rather than direct contact. On this point, we note the Victorian Electricity Supply Industry (**VESI**) has adopted processes that involve requiring REFCLs to be in-service (where they are available) during linework to safeguard workers from electrocution and arc-flash.³ Given this, we consider that potential electrocution and arc flash risk reduction benefits of REFCLs are still relevant to inform our views.

We agree with submissions that supply reliability is also important for public safety, especially for vulnerable groups like the very young, elderly and sick, who depend on electricity for medical equipment, heating, and cooling during extreme weather. As discussed further below, our expectation is that distribution businesses will commit and take steps to deploy REFCL-compatible ACRs and fault-locating devices and to undertake network upgrades to address supply reliability concerns.

We note CPUE's comment about the AFDRS levels being relevant to consider in the context of the broader suite of bushfire risk controls outlined in their BMP. We agree with this, but we also consider that bushfire risk indicators like the AFDRS levels are directly relevant to when we would expect REFCLs to be operating at peak performance. They also provide consistent, authoritative and up-to-date advice about the potential for, and consequences of, bushfire starts. For this reason, we maintain the view that bushfire indicators like the AFDRS levels, the FBI, declared Total Fire Ban Days and declared Fire Danger Periods are relevant considerations for when and how REFCLs should be operated (see section 1.4 for a summary of these bushfire risk indicators).

Regarding the survey respondent's view on compensation for supply interruptions, we note that this issue falls outside Energy Safe's remit and is therefore beyond the scope of this paper.

While we do not find it necessary to change the key considerations based on the submissions and survey responses, they have further informed our thinking on the operating parameters discussed in the sections below. The submissions have particularly underscored the importance of the need for distribution businesses to invest in solutions to address supply reliability issues.

2.2 Operating frequency

Operating frequency refers to how often a REFCL is in-service (that is, switched on and actively working to mitigate bushfire risk, and provide electrocution and arc flash risk reduction). It is possible for REFCLs to be in-service continuously throughout the year, or alternatively REFCLs could be in-service only during specified periods or on specified days.

Preliminary position

Our initial view, as outlined in the consultation paper, was that distribution businesses should commit to having REFCLs in-service continuously throughout the year, with exceptions only for scheduled maintenance or emergency works. Our view was that the public safety benefits of REFCLs are most likely to be realised under continuous operation, and that continuous operation would provide the greatest opportunity to identify and address system defects and asset weaknesses under lower-risk

³ VESI, [Minimum Rules for carrying out High Voltage Live Work](#), s 8.5.1

conditions. We also noted that potential supply reliability benefits of REFCLs (i.e., the ability of REFCLs to reduce the frequency of momentary outages due to temporary faults) are most likely to be realised under continuous operation.

Our initial view was that these operating frequency requirements should apply to all installed REFCLs, regardless of whether they were installed to meet prescribed requirements under the Act and associated regulations or installed for other reasons. Also, we would expect distribution businesses with REFCLs to include enforceable in-service availability commitments in their ESMSs and BMPs.

Summary of submissions

Jemena agreed with our identified benefits and risks of continuous operation and with keeping REFCLs in-service year-round. Jemena agreed with there being minimal downtime for maintenance and both planned and unplanned outages. Jemena also agreed with the need for consistent operating frequency expectations for all REFCL installations, regardless of the reason for their implementation.

AusNet Services agreed with the benefits of the proposed REFCL operating frequency in terms of bushfire mitigation but cautioned against overstating other safety benefits until they are thoroughly tested and quantified. AusNet Services suggested there is insufficient operational experience with REFCLs to fully understand potential unintended detrimental impacts, particularly in relation to supply reliability, and cautioned against setting prescriptive requirements for the operation of REFCLs.

CPUE submitted that, while it effectively operates its REFCLs year-round, consistent with the proposed baseline requirements, it should maintain the flexibility to use bypass mode outside of the declared Fire Danger Period. While CPUE supports operating prescribed REFCLs continuously throughout the year, it believes the requirements should be flexible enough to allow REFCLs to be taken out-of-service where network access, maintenance and operational requirements demand it.

CPUE disagreed with there being consistent operating frequency expectations for all REFCLs. CPUE submitted that some non-prescribed REFCLs may be installed for overall benefit, rather than bushfire mitigation, in which case supply reliability may be a significant justification for the project. CPUE said it would be unreasonable to expect these REFCLs to align with the same operating frequency requirements for prescribed REFCLs. CPUE suggested that, if a continuous operating frequency was mandated for non-prescribed REFCLs, it would be difficult to justify their expansion in the future.

The individual submitter highlighted the potential negative impacts of REFCL operations on supply reliability and, consequently, public safety. The submitter criticised the consultation paper for lacking transparency, data, and detail on these impacts, particularly during extreme weather. The submitter emphasised the importance of maintaining supply for vulnerable groups and raised concerns about broader disruptions, such as loss of communication and business operations, during outages caused by REFCLs. The submitter called for data-driven analysis before finalising our expectations.

The individual submitter also questioned the statement in the consultation paper that “over the last 7 years, there have been an average of 58 contact incidents involving high voltage distribution powerlines each year.” The submitter noted it was unclear how many of these incidents occurred on REFCL-protected powerlines and how many could have been mitigated by a REFCL.

Most of the survey respondents disagreed with REFCLs being operated continuously throughout the year. Various reasons were given including the potential negative supply reliability impacts, a suggestion that REFCLs are only used for fire prevention and need not be used outside of declared Fire Danger Periods, and that non-continuous operation allows for maintenance. While one respondent thought the same rules should apply to all REFCLs, four respondents thought they should not.

Final position

We remain of the view that operating REFCLs continuously throughout the year (except for scheduled maintenance or emergency works) will contribute to achieving the best possible safety outcomes in terms of bushfire mitigation and potential for electrocution and arc flash risk reduction. It will also provide the greatest opportunity to identify and address any issues under lower-risk conditions so that REFCLs will work effectively when they are most needed. We expect distribution businesses to provide enforceable in-service availability commitments in their ESMSs and BMPs along with a clear outline of the circumstances in which they may take REFCLs out-of-service.

As noted in the preceding section, while we recognise that there is limited data about the non-fire related benefits of REFCLs, we do not believe this means we should entirely dismiss the potential benefits. As noted, the VESI requires REFCLs to be active during linework where available, to protect workers from electrocution and arc-flash. We also note that, in the 2020 REFCL Functional Performance Review, distribution businesses highlighted the additional safety benefits of REFCLs in reducing the risk of electrocution for workers and the public. Although operational REFCLs cannot eliminate the risk of electrocution, the significant reduction in current flow during line contact dramatically lowers this risk.

However, we also acknowledge the concerns in submissions about the risk of more prolonged outages compared with traditional fault protection devices, which can also have significant detrimental safety impacts for the community. As discussed further below, we believe supply reliability issues are best managed by applying appropriate operating settings and through distribution businesses investing in solutions to otherwise address supply reliability issues that can't be managed through operating settings. There are options available now and our expectation is that distribution businesses will commit and take steps to do this as soon as practicable.

We note submissions that REFCLs need to be taken out-of-service for various reasons including for maintenance, to locate and rectify high impedance defects, to manage the dynamic nature of networks, and for day-to-day operational requirements. While we accept this, our expectation is that these circumstances will be limited to essential maintenance or emergencies and that any downtime will be managed efficiently and effectively to minimise the time that REFCLs are out-of-service.

We also note submissions that non-prescribed REFCLs should not be subject to the same expectations as prescribed REFCLs. We understand that some non-prescribed REFCLs may have been installed for reasons other than bushfire risk mitigation, such as to harness the positive supply reliability benefits of REFCLs. However, this does not change our view that continuous operation is essential to maximise the potential safety benefits (including through supply reliability) and to enable the identification and remediation of system defects and asset weaknesses. That said, we believe this is a relevant consideration for operating settings, discussed further below.

Regarding the request for data-based analysis on the supply reliability impacts of REFCLs under continuous operation, we note that the impacts will evolve as REFCL-compatible devices are introduced and the network is upgraded. As a result, we consider that analysing current reliability data provides limited insight for future settings. However, the need for data to understand impacts over time has informed our thinking on the record keeping and reporting requirements in section 2.6.

In respect to the query about contact incidents, we note that there was an average of 58 contact incidents over the seven years from 2016 to 2023 on 22 kV feeders supplied from REFCL-protected zone substations. We expect REFCL protection would have provided a benefit in each case. This compares to an average of 265 contact incidents per annum for the same period across all Victorian networks.

Policy on operating frequency

As set out in the final Policy, we expect REFCLs to, as far as practicable, be in-service continuously throughout the year. We expect distribution businesses to commit to having REFCLs in-service

continuously throughout the year, with exceptions for scheduled maintenance or emergency works. We expect distribution businesses to provide enforceable in-service availability commitments in their ESMSs and BMPs along with a clear outline of the circumstances in which they may take REFCLs out-of-service.

If a distribution business believes that continuous operation is not practicable in their circumstances or that a different approach will ensure that they minimise hazards and risks as far as practicable, the distribution business should provide evidence during the ESMS/BMP submission and acceptance process to enable Energy Safe to review and assess.

2.3 Operating settings

Operating settings refers to the level of fault detection sensitivity and how a REFCL responds when it detects a phase-to-earth fault. REFCLs are configurable in that they can be operated to provide varying levels of fault detection sensitivity, utilise different types of fault confirmation tests and respond in different ways to a confirmed fault. While configuring REFCLs to achieve the 'required capacity' performance level (see section 1.3) may minimise hazards and risks and bushfire danger in many situations, it may not always be the best or most appropriate approach.

Preliminary position

As outlined above, our initial view was that REFCLs should be in-service year-round, with limited exceptions. We noted that operating settings are, therefore, the mechanism by which distribution businesses can balance safety benefits with supply reliability issues.

Our initial view was that the distribution businesses should make the following minimum commitments with respect to their operating settings:

Fire danger	REFCL operating setting
Declared Total Fire Ban Day	Operated at the highest sensitivity settings to provide the highest practicable level of fault protection. In most cases we expect this to be a setting that can detect high impedance faults or fault current of 0.5 amps or more, as is the case under the 'required capacity' performance level.
<ul style="list-style-type: none"> • Declared Fire Danger Period • Any other day through the year when the AFDRS level for the relevant area is 'High' or above 	Operated at high sensitivity settings to provide a high level of fault protection. We expect this to be a setting that is able to prevent most bushfire starts (i.e., detects high impedance faults or fault current of 1.0 amps or more).
All other times so long as the AFDRS level is 'Moderate' or below	May be operated at lower sensitivity settings to provide a lower level of fault protection. We expect this to be a setting that is still able to prevent risks of electrocution and arcing leading to serious injury or death (i.e., detects low impedance faults or fault current of 2.0 amps or more).

Our initial view was that the operating settings should apply regardless of whether the REFCL was prescribed or not. That said, we acknowledged that REFCLs that have been installed for reasons other than to meet prescribed requirements in the Act and regulations and may not yet be capable of operating at the 'required capacity' performance level. We noted this would be a relevant consideration when assessing what is proposed by the relevant distribution business in their ESMS/BMP.

Our initial view was also that distribution businesses should avoid bypassing or disabling REFCLs when a sustained or permanent fault is confirmed, unless absolutely necessary and only for a very limited period.

Summary of submissions

Jemena agreed that using operating settings is the appropriate way to balance public safety benefits and supply reliability for prescribed REFCL installations, noting that REFCL benefits and risks vary with fire danger levels and supply reliability impact. Jemena also supported using the AFDRS levels to guide settings on declared Total Fire Ban Days and for distribution businesses to maintain flexibility to reduce sensitivity outside of the declared Fire Danger Period. Jemena submitted that, when the AFDRS level is below 'High,' it may be sufficient to operate at reduced sensitivity.

Jemena indicated that its non-prescribed REFCLs installed in urban areas should be considered differently, especially as urban networks tend to be larger, serve more customers, and rely heavily on underground cables. Jemena also stated that these REFCLs use only passive Arc Suppression Coils without active devices like Residual Current Compensation, resulting in different performance characteristics. Therefore, Jemena suggests differing expectations for non-prescribed REFCL operating settings.

Jemena also agreed with limiting the use of bypass mode for sustained faults on low bushfire risk days but stated that a gradual transition to this approach is necessary to allow for further experience with recently commissioned REFCLs and the development of solutions like Fault Location, Isolation, and Service Restoration (**FLISR**) technologies, Remote Controllable Gas Switches (**RCGS**), and ACRs.

AusNet Services submitted that operating settings for REFCLs should vary depending on factors such as network design and topography, with flexibility required to manage different risks. AusNet Services agreed that the highest sensitivity settings are appropriate for Total Fire Ban Days or when the FBI exceeds 30, submitting that less sensitive settings are appropriate on lower bushfire risk days.

AusNet Services also submitted that the use of bypass mode or disabling of REFCLs is required for various reasons, including to locate and rectify high impedance network defects, to manage the dynamic nature of networks, and for day-to-day operational requirements. As such, a prescribed availability benchmark may be impractical to enforce on a station-by-station basis.

CPUE acknowledged the safety benefits of REFCLs but submitted that most benefits stem from keeping REFCLs active, not necessarily from operating at high-sensitivity settings. CPUE outlined that operating at higher sensitivity settings year-round could disproportionately impact supply reliability and unnecessarily complicate fault detection.

CPUE submitted that they should retain the option to use bypass mode outside the declared Fire Danger Periods to minimise negative impacts on supply reliability. CPUE also submitted that different expectations should apply to non-prescribed REFCLs, as mandating operational settings in these circumstances would make economic justification challenging for expanding these systems across the network.

The survey respondents provided mixed views on our application of the AFDRS levels to guide REFCL operating settings. Some agreed that it is a common-sense approach whereas others disagreed, with one respondent suggesting that often the fire danger rating is 'high' when the risk is not really that high and using these ratings would result in more unnecessary outages.

Most of the survey respondents disagreed with limiting the use of bypass mode or disabling REFCLs, citing the need for distribution businesses to have operational flexibility to improve supply reliability.

Final position

There was broad agreement amongst submissions that prescribed REFCLs, which have been installed in high bushfire consequence areas, and non-prescribed REFCLs installed in high bushfire

risk areas to mitigate bushfire risk should be operated at their highest sensitivity settings on Total Fire Ban Days. For prescribed REFCLs, this means operating at the 'required capacity' performance level, while for non-prescribed REFCLs this means operating at the highest practicable sensitivity settings.

As such, the areas of contention are the operating settings to be applied on other days throughout the year and our expectations for non-prescribed REFCLs that have been installed for reasons other than bushfire mitigation (e.g., REFCLs installed in low bushfire risk areas and primarily for supply reliability benefits).

As noted in the consultation paper, during the declared Fire Danger Period and other days throughout the year when the AFDRS level is 'High' or above, the risk of fire starts, and the potential consequence of fire starts, are elevated. As such, we consider it entirely reasonable to expect distribution businesses to operate prescribed REFCLs at high sensitivity settings to provide a high level of fault protection with the aim of preventing most bushfire starts. This does not necessarily mean operating REFCLs to meet the 'required capacity' performance standard, but at settings that are sensitive enough to pick up most faults that could lead to a fire. We also consider this to be appropriate for non-prescribed REFCLs that have been installed in high bushfire risk areas to mitigate bushfire risk, again noting that the actual settings that can be applied will differ given non-prescribed REFCLs do not necessarily have the same performance capabilities as prescribed REFCLs. We have not been presented with information through the consultation process that persuades us otherwise. While we also maintain the view that the AFDRS levels are appropriate to inform when the settings should apply, we do also note that the FBI (which is a more granular version) may also be used by distribution businesses in their ESMS/BMPs to justify their operating settings.

Outside declared Fire Danger Periods, so long as the AFDRS level is also 'Moderate' or below, we accept that the risk of fire starts, and the potential consequence of fire starts, are diminished. As such, we agree with submissions that it may be appropriate for prescribed REFCLs to be operated at lower sensitivity settings during these times. However, we maintain the view that lower sensitivity settings should still ensure REFCLs contribute toward minimising risks of electrocution and arcing leading to serious injury or death. As discussed in preceding sections, while we recognise that there is perhaps some uncertainty about the non-fire related benefits of REFCLs, we do not believe this means we should entirely dismiss the potential benefits.

If a REFCL is installed at a zone substation that doesn't supply high bushfire risk areas, lower sensitivity settings may also be acceptable, even on Total Fire Ban Days. We note Jemena's comments regarding REFCLs in urban areas and agree that there should be no expectation to operate REFCLs that protect powerlines purely located in urban areas that are low bushfire risk at higher sensitivity settings during declared Fire Danger Periods. With appropriate settings, these REFCLs can still enhance safety by reducing electrocution risks. Each distribution business should assess their circumstances and propose suitable settings in their ESMS and BMPs.

We note that an area's bushfire risks can change over time. For example, an area that was low bushfire risk can over time become a higher bushfire risk area. Distribution businesses must remain aware of changing bushfire risks and ensure that the REFCL settings are appropriate for the areas serviced.

Multiple submitters argued that bypass mode and disabling REFCLs should be allowed to help manage supply reliability concerns. However, as bypass mode and disabling REFCLs significantly reduces potential safety benefits, we do not consider this to be the appropriate long-term solution. While we accept that there may be a transition period, we expect distribution businesses to commit and take steps to deploy REFCL-compatible devices and undertake network upgrades to address supply reliability issues directly. This approach aims to ensure REFCL technology continues to mitigate safety risks while concurrently reducing supply reliability impacts. Although bypass mode may still be used in limited cases, businesses should prioritise these investments to minimise reliance on bypass mode for reliability.

Policy position on operating settings

As set out in the Policy, we expect distribution businesses to commit to operating REFCLs as follows:

- For prescribed REFCLs, as per our preliminary position (see table above).
- For non-prescribed REFCLs installed at zone substations serving high bushfire risk areas, our preliminary position acknowledges the need for bushfire risk mitigation. However, actual settings may differ to account for the lower performance capabilities of non-prescribed REFCLs compared to their prescribed counterparts.
- For non-prescribed REFCLs installed at zone substations supplying only low bushfire risk areas, lower sensitivity settings may be applied even during declared Fire Danger Periods and on Total Fire Ban Days.

In all cases, it is the responsibility of distribution businesses to assess and determine the specific settings to be applied in their circumstances to ensure that they minimise hazards and risks as far as practicable. We will expect distribution businesses to provide evidence to substantiate their settings during the ESMS/BMP submission and acceptance process to enable Energy Safe to review and assess.

Also, while immediate alignment with these expectations may not be feasible for all zone substations, we expect distribution businesses to have committed plans in place to achieve alignment within the short to medium term.

2.4 Broadening the use of REFCLs

It is possible for distribution businesses to expand REFCL coverage on their supply networks in two ways by installing REFCLs at additional zone substations or extending the coverage of an existing REFCL.

Preliminary position

In the consultation paper we emphasised that distribution businesses do not necessarily fulfil their general duties by simply adhering to prescribed requirements (i.e., by only installing REFCLs when they are prescribed). Our initial view was that distribution businesses should consider expanding REFCL coverage on their supply networks where that would contribute towards minimising hazards and risks as far as practicable.

However, we also acknowledged that installing additional REFCLs or extending the coverage of existing REFCLs may not always be practicable. We noted that we expect distribution businesses to assess the practicability and to demonstrate as part of the ESMS/BMP submission and acceptance process how they are doing what is necessary and appropriate to minimise hazards and risks as far as practicable.

Summary of submissions

Jemena supported the broader installation and use of REFCLs, indicating that it will consider implementing non-prescribed REFCLs where financially viable. Jemena noted it is in the process of installing a 'base level' REFCL at the Footscray West zone substation and has plans to install a REFCL at the Sunbury and Coburg North zone substations. Jemena indicated that this expansion will improve the safety and reliability of its supply network in areas supplied by those zone substations, ultimately providing better service to their customers.

CPUE also supported future expansion of REFCLs under an appropriate framework and indicated it is looking to expand its REFCL network where practicable. However, CPUE noted that mandating REFCL operating frequencies or performance for non-prescribed REFCLs could make it challenging for distribution businesses to justify implementation, given that doing so may increase supply reliability issues.

A survey respondent commented that REFCLs should only be installed at zone substations that feature a high level of fire risk. The respondent argued that there is a risk that if they are installed elsewhere they could hinder industrial commercial growth in those areas.

Final position

While we see no reason to modify our expectations that distribution businesses should be considering the broader use of REFCLs, we consider it appropriate to clarify our position on extending REFCL coverage through network switching.

Regarding the comment that additional REFCL deployments will be considered where financially viable, it is important to note that the Act requires distribution businesses to minimise hazards and risks as far as practicable, where practicable means having regard to:

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

While cost is a relevant factor, it is only one part of the assessment. As outlined in Energy Safe's [Energy infrastructure safety case guidelines](#), we interpret the legislation to require each available and suitable control to be implemented unless the cost of doing so is so grossly disproportionate to the benefit that it would be clearly unreasonable to justify the expense. It is the responsibility of the energy infrastructure company to demonstrate whether the cost of a measure is grossly disproportionate to the benefit within the given context.

In the consultation paper, we noted there may be opportunities to extend the coverage of existing REFCLs by switching supply between zone substations. However, we recognise that doing so may increase network capacitive losses, potentially making it challenging to maintain the 'required capacity' performance level or other intended settings. Given that we generally expect prescribed REFCLs to be operated at the 'required capacity' performance level on declared Total Fire Ban Days, it may not be appropriate to extend REFCL protection in this manner on those days. However, in circumstances where extending REFCL protection in this manner has minimal impact on performance, this approach may be feasible on high bushfire risk days.

We expect distribution businesses to carefully balance REFCL coverage with sensitivity to achieve the best possible risk reduction for areas supplied by each zone substation, consistent with their general duties. More broadly, distribution businesses should assess whether deploying additional REFCLs or otherwise extending REFCL coverage is a practicable means to reduce bushfire or other safety risks.

Policy position on broadening the use of REFCLs

In their ESMSs and BMPs, distribution businesses must demonstrate how they identify hazards and risks and implement controls to minimise hazards and risks as far as practicable. As part of the ESMS/BMP submission and acceptance process, we expect distribution businesses to show how they have considered and assessed the potential use of REFCLs on additional parts of their supply networks, and how their approach fulfils their general duties under the Act.

2.5 Maintaining REFCL performance

It is crucial that REFCLs are regularly tested and maintained to ensure their reliability and effectiveness when needed for protection.

Preliminary position

Our view as set in the consultation paper was that distribution businesses must have comprehensive plans for testing and maintenance of REFCLs on their supply networks. These plans should ensure that testing and maintenance is completed ahead of the declared Fire Danger Periods wherever possible and is done efficiently to minimise out-of-service times.

We noted that robust vegetation and asset inspection programs are also essential to reduce the potential number of faults that occur on a supply network. While these programs do not necessarily improve the operation of REFCLs, they can reduce the frequency of faults that trigger REFCLs in the first place thereby diminishing adverse supply reliability impacts and improving safety overall.

Summary of submissions

Jemena agreed that regular testing and maintenance of REFCLs is essential to ensure effective and reliable operation, and it noted that the Annual Validation Testing process for prescribed REFCL installations helps identify any weaknesses or defects in the system. Jemena also noted, however, that Annual Validation Testing is not conducted at non-prescribed REFCL sites as those REFCLs are not mandated to be able to operate at the 'required capacity' performance level. Additionally, that primary earth fault testing is not performed at these locations, meaning the sensitivity of the REFCL system remains largely unknown.

Three survey respondents agreed with the need for regular testing and maintenance to ensure the safe and reliable operation of REFCLs.

Final position

We maintain the view that it crucial to regularly test and maintain REFCLs to ensure they are reliable and ready to operate when needed, particularly during bushfire seasons. REFCLs are complex systems with both high-voltage equipment and advanced software, so careful planning for maintenance and testing is essential.

We note Jemena's comment regarding the mandated Annual Validation Testing not being undertaken for its non-prescribed REFCL as they are not required to perform at the 'required capacity' performance level. However, we consider that if non-prescribed REFCLs provide a safety benefit, they should still be tested by the distribution business to determine whether they are operating at the performance level expected of that REFCL and to improve their overall state of knowledge about the REFCL performance. As there are no prescriptive requirements for non-prescribed REFCLs, testing could occur at varying times, frequencies, or using different standards or methods. The distribution business will need to propose their approach in their ESMS or BMP submission.

Policy position on maintaining REFCL performance

Our baseline expectations regarding the testing and maintenance of REFCLs are as follows:

- Distribution businesses must have detailed forward plans to regularly test all components of REFCL systems, including high-voltage equipment and computer systems. This ensures REFCLs are reliable and can provide protection when needed, especially in high-risk periods.
- All maintenance and network hardening related to REFCLs installed to mitigate bushfire risk should be completed before the declared Fire Danger Period each year. This allows time to address any issues arising from testing.
- Testing and maintenance of REFCLs must be done efficiently, minimising out-of-service time as much as possible.
- Robust asset and vegetation inspection programs must also be in place to reduce the likelihood of faults that could trigger REFCLs, ensuring optimal performance and minimal supply disruptions.

2.6 Record keeping and reporting

Appropriate monitoring and record keeping by the distribution businesses is critical to ensure REFCL operations are in line with their regulatory obligations and can be provided to Energy Safe upon request to demonstrate compliance.

Preliminary position

As noted in the consultation paper, we expect distribution businesses to continue keeping records, including annual compliance reports, annual capacity testing reports, and other relevant data, and to report this information to Energy Safe under current arrangements. We also stated that we expect distribution businesses to maintain specific records showing how they've operated REFCLs in line with their accepted ESMSs and BMPs. Specifically, for distribution businesses to keep records of:

- For each REFCL, the amount of time it was in-service each week throughout the year.
- If a REFCL was out-of-service at any time, the dates and times it was out-of-service and the reason why it was out-of-service.
 - In the case of a planned REFCL outage, the purpose of the outage mapped to the planned testing and maintenance program.
 - In the case of an unplanned REFCL outage, the cause of the outage and any actions taken to minimise the risk of reoccurrence.
- For each REFCL, the settings that were applied at each point throughout the year mapped to the REFCL operational settings outlined in the accepted ESMS and BMPs.
- Details of each fault that occurs on the network, including the date, time and location of the fault, whether it was temporary or sustained/permanent, the cause, whether REFCL operated when the fault occurred and the REFCL settings that were applied at the time.

With a view to driving greater consistency in record-keeping, the primary purpose of including this information in the consultation paper was to obtain feedback from the distribution businesses on the potential format and template for these records. We noted we would also welcome views on how to streamline the record keeping and reporting requirements.

Summary of submissions

Jemena recognised the need for reporting on prescribed REFCL installations but believes extending these requirements to non-prescribed REFCLs would impose a significant burden and affect plans to expand deployment of REFCLs.

The survey respondents generally agreed with our record keeping and reporting expectations.

Final position

We consider that record keeping by the distribution businesses, particularly records showing how they have complied with their regulatory obligations, is critical to allow us to maintain appropriate regulatory oversight. While we acknowledge Jemena's concerns about compliance burden, we also expect distribution businesses to ordinarily have systems in place to enable them to monitor their own compliance, and to demonstrate compliance to us when requested. As such, we see no reason to adjust our expectations.

For clarity, however, we are not suggesting that we intend to extend current reporting arrangements for prescribed REFCLs to non-prescribed REFCLs (e.g., annual capacity testing is mandatory for prescribed REFCLs, and the production of reports of this testing are a required commitment in the relevant distribution businesses' BMP). We are simply saying that we expect distribution businesses to keep records as outlined above to specifically show how they have complied with their ESMS/BMP.

Policy position on record keeping and reporting

We expect distribution businesses to specify in their ESMS and BMP the REFCL-related records they will maintain (as outlined above) and to confirm that these records will be made available to Energy Safe upon request.

Appendix A: Detailed summary of submissions and response

The tables in this appendix provide a detailed outline of the submissions made in response to the questions in our consultation paper, and our response.

Table A1 – Key Considerations

Question	Submitter comment	Energy Safe response
<p>1 Do you agree that the issues outlined here are the key issues to inform how the distribution businesses should be expected to operate REFCLs?</p>	<p>CPUE agreed with the key considerations of public safety, REFCL efficacy and reliability. They did not agree with bushfire risk indicators being a key consideration (see question 2).</p> <p>Jemena agreed with the key considerations.</p> <p>AusNet Services stated that they agreed with our objectives, however, the content of their submission raised concerns with public safety benefits and reliability issues (discussed further below in ‘overstating benefits of REFCLs’ and question 3).</p>	<p>There appeared to be a general agreement with the key considerations in the consultation paper, though views varied on how much these should influence a REFCL operations policy.</p>
	<p>CPUE suggested that the language and expectations regarding electrocution risk should be narrowed as REFCLs do not make high voltage lines safe from direct contact.</p> <p>Similarly, AusNet Services outlined that REFCLs were designed for bushfire mitigation and while other safety benefits are likely, they have not been tested or quantified. As such, safety benefits should not be overstated and must be balanced with other considerations accordingly.</p>	<p>While REFCLs do not completely eliminate the risk from direct contact with live electrical lines, most incidents involve indirect contact, such as those involving workers operating machinery or while wearing protective clothing. We expect that there is a material risk reduction for these types of incidents. This is why the Victorian Electricity Supply Industry (VESI) has adopted REFCL protection without allowing bypass during linework, to safeguard workers from electrocution and arc flash.⁴ Energy</p>

⁴ VESI, [Minimum Rules for carrying out High Voltage Live Work](#), s 8.5.1

	<p>Another submitter also suggested further data analysis is required to assess impacts.</p>	<p>Safe believes that this level of protection should be extended to the wider community as well.</p>
	<p>CPUE requested further emphasis on supply reliability as a public safety issue, particularly in the context of vulnerable customers.</p>	<p>We recognise the safety benefits of maintaining supply reliability, particularly for vulnerable groups such as the very young, elderly, and those who rely on electricity for medical equipment or temperature control during extreme weather.</p> <p>Our aim is not to downplay the importance of reliability. Instead, we emphasise it by expecting distribution businesses, where practicable, to invest in REFCL-compatible equipment that directly mitigates impacts on reliability.</p>
<p>2 Do you consider any of the issues to be irrelevant to the operation of REFCLs?</p>	<p>CPUE advised that bushfire risk indicators (section 3.4 of the consultation paper) should be excluded from the REFCL operations paper and form part of a separate consideration addressing the application and configuration of all bushfire safety mechanisms in the context of high (or forecast high) fire danger conditions. This is also appropriate for references to the AFDRS.</p>	<p>We acknowledge that the distribution business’s approach to mitigating risks of bushfire is multi-faceted, which is reflected in their BMPs. Nevertheless, it is appropriate that we communicate our expectations regarding REFCL operations, to ensure consistent, best practice operation of this critical safety measure.</p> <p>Bushfire risk indicators provide an authoritative and consistent baseline as to what areas require mitigation of bushfire risk, as well as regularly updated information as to where and when there is a real risk that a bushfire can start.</p> <p>When undertaking a holistic review of their BMP, should entities find that our expectations for REFCLs are not balanced appropriately with other mechanisms, then this can be demonstrated and justified as part of their BMP submission.</p> <p>Refer also to Question 11.</p>
	<p>CPUE advised that material changes also need to be made to other critical protection systems, such as fast overcurrent, disablement of reclose and live line sequence as they work with REFCLs to reduce fire risk.</p>	<p>We agree that investment is necessary in REFCL-compatible equipment in order to optimally mitigate fire risk.</p>
	<p>CPUE advised that extending REFCL-protected areas cannot be considered an “operational” measure, as REFCL networks are configured to meet required capacity on a predefined network. They note that an “operational transfer” would likely reduce earth</p>	<p>As noted in the consultation paper, additional deployment of REFCL technology or extending the coverage of existing REFCLs may be a practicable way to mitigate relevant hazards and risks and should therefore be pursued to fulfil general duty requirements. If evidence is presented that shows that extending REFCL protection is not practicable, or results in the substation</p>

	<p>fault sensitivity, compromising the complying substation's performance against required capacity criteria.</p> <p>CPUE also considers that expanding coverage or installing additional REFCLs would require legislative action due to the capital investment needed.</p>	<p>not being able to meet the required capacity, then evidence should be presented to Energy Safe to that effect in the ESMS/BMPs.</p>
<p>3 Do you have any information or data about the positive or adverse impacts of REFCLs on supply reliability?</p>	<p>CPUE advised that the number of supply interruptions, as measured by the System Average Interruption Frequency Index (SAIFI), has deteriorated on REFCL protected networks during both fire and non-fire seasons whilst improving on non-REFCL protected networks over the same period.</p> <ul style="list-style-type: none"> • SAIFI performance during fire season has deteriorated by 38% • SAIFI performance during non-fire season has deteriorated by 24%. <p>This equates to ~140,000 and ~60,000 additional customers respectively on average experiencing a sustained outage each year.</p> <p>They advised that SAIFI data suggests the benefits in maintaining supply with REFCLs (section 3.3 of the consultation paper – potential positive impacts) are materially outweighed by sustained outages post-REFCL implementation.</p> <p>Similarly, AusNet Services indicated that since implementation of REFCLs, REFCL-protected areas have seen an increase in the frequency and duration of outages.</p> <p>Additionally, CPUE also advised that the levels of customer, local and state government enquiry and complaints has increased in REFCL-protected networks post-commissioning, leading to increased scrutiny in how these challenges are managed.</p> <p>Jemena outlined that initial deployments of REFCLs have successfully neutralised most transient earth faults without supply interruption. In bypass mode, REFCL is only bypassed when a sustained earth fault occurs, which is now considerably minimised.</p>	<p>Submitters suggested that reliability has decreased since implementation of REFCLs, and that benefits are outweighed by negative impacts.</p> <p>We acknowledge that uniform expectations may not be suitable for all those that operate REFCLs. REFCL-operations and their impacts vary depending on network-specific characteristics (for example, size of network, prescribed vs non-prescribed, geographic area etc).</p> <p>Should data demonstrate that it is impracticable for a specific network to operate REFCLs in accordance with our expectations, distribution businesses should use this to support their BMP submission. We can then consider and test this data, on a network-specific basis, and gain an understanding as to how it directly impacts a network.</p> <p>As outlined in the consultation paper, there is technology available to help address reliability concerns, including REFCL compatible ACRs and fault locating devices. We expect investment in such devices will diminish adverse supply reliability impacts while ensuring the efficacy of REFCLs. Submissions indicate such investment is already underway (Table A5).</p> <p>Energy Safe agrees that a potential positive impact of REFCLs is that it can improve supply reliability compared with traditional fault protection devices by avoiding unnecessary outages. As per the example provided in Section 3.2 of the consultation paper, when a REFCL detects a fault, it initially reduces the voltage on the affected line but increases the voltage on</p>

		<p>unaffected lines to keep supply on while it determines whether the fault is temporary or not.</p>
	<p>A submitter advised that the consultation paper lacks the required detail, quantification and transparency regarding supply reliability and associated public safety impacts from extending the REFCL regime.</p> <p>Clarification is requested as to how many of the average number of contact incidents were REFCL-related and/or mitigated in another way.</p>	<p>The impact of REFCLs on reliability will evolve as REFCL-compatible devices are introduced and the network is upgraded. As a result, analysing current reliability data provides limited insight for future settings.</p> <p>We note that there was an average of 58 contact incidents per year over the 7-year period 2016-2023 on 22 kV feeders supplied from REFCL protected zone substations. We expect REFCL protection would provide a benefit in each case. This compares to an average of 265 contact incidents per annum for the same period across all Victorian networks.</p>
<p>4 Are there other issues that we should consider in relation to the operation of REFCLs?</p>	<p>AusNet Services advised that REFCL technology in service on their network is still relatively new and they are still working through reliability issues.</p>	<p>We believe our expectations are practicable and expect the REFCL Operations Policy to be in effect immediately. Distribution businesses should consider this policy when developing their next BMP and using it as a baseline in determining whether their REFCL operations minimise risks AFAP.</p>
	<p>Jemena advised that there are the following constraints when assessing non-prescribed REFCLs:</p> <p>Their network size is generally much larger (>300A) than prescribed REFCL sites (<150A), which can affect performance.</p> <p>They typically don't undergo Primary Earth Fault Testing (PEFT) to assess performance and sensitivity, resulting in a lack of information.</p>	<p>Refer to Question 7.</p>
	<p>One submitter stated that they 'expect a transparent and quantified (data-driven, modelled) projection of the reliability impact is provided to the Victorian public prior to mandating the implementation of this extended operating regime.'</p>	<p>The REFCL Operations policy is not mandating the implementation or extension of REFCLs. It outlines our expectations for REFCL operating frequency and settings, aiming to ensure consistent and best-practice standards.</p>

Table A2 – Operating frequency

Question	Submitter comment	Energy Safe response
<p>5 Do you agree with the benefits and risks of the options for operating frequency of REFCLs? Do you consider there to be any benefits and risks that have not been captured in the examples?</p>	<p>Jemena agreed with our identified benefits and risks.</p>	<p>Jemena had nothing further to add to our identified benefits and risks. The other respondents provided additional feedback, which is addressed below.</p>
	<p>AusNet Services advised there is currently insufficient operational experience with REFCL technology to fully understand potential unintended detrimental impacts, particularly in relation to reliability. They suggest that prescriptive requirements for the operation of REFCL technology could result in unintended detrimental impacts.</p>	<p>We expect distribution businesses to have gained significant experience and knowledge, including in relation to any detrimental impacts, in their roll-out of REFCLs since 2017. We expect distribution businesses to continue to build upon their knowledge and experience with REFCLs, which will inform their BMP/ESMSs.</p> <p>Our REFCL operating policy outlines our baseline expectations for their operation. If these expectations prove impractical in specific contexts, evidence can be provided during the BMP/ESMS process for our consideration.</p>
	<p>AusNet Services advised that safety benefits other than bushfire mitigation have not been adequately tested or quantified. Accordingly, they must not be overstated and must instead be given the appropriate weighting in balancing overall network considerations, such as reliability.</p>	<p>We recognise there is some uncertainty around the broader, non-fire-related benefits of REFCL technology in the absence of comprehensive research on the topic. However, the 2020 REFCL Functional Performance Review⁵ found that AusNet Services and Powercor highlighted the additional safety benefits of REFCLs in reducing the risk of electrocution for workers and the general public. The review recommended that distributors align their practices to maximise these benefits, including integrating live-line sequencing on REFCL-protected networks.</p> <p>While REFCLs may not prevent death or injury from direct contact with live electrical lines, most incidents involve indirect contact, such as workers using machinery while wearing protective clothing. This is why the Victorian Electricity Supply Industry (VESI) has adopted REFCL protection without allowing bypass during linework, ensuring workers are protected from</p>

⁵ [REFCL Functional Performance Review](#) – Report for Energy Safe Victoria, prepared by Powers Systems Consultations Australia Pty Ltd for Energy Safe Victoria, 14 October 2020.

		<p>electrocution and arc-flash.⁶ We believe this level of protection should be extended to the wider community as well.</p>
	<p>A submitter advised there are known public safety detriments arising from a loss of supply, particularly for elderly and vulnerable individuals, including life support equipment, emergency communications, general situational awareness, and cooling during extreme heat days. There are also broader community impacts including loss of communications, information technology, EFTPOS, refrigeration, and impacts on individuals working from home.</p>	<p>We agree that a loss of electricity supply has the identified detrimental impacts, including public safety detriments for the welfare of the community and particularly for vulnerable persons (see for example, section 3.3. of our consultation paper). We have taken these factors into consideration in developing our expectations regarding REFCL operating frequency.</p>
	<p>A submitter sought clarification on whether we intend to mandate the permanent suppression of auto-reclose on all overhead powerlines and, where instantaneous or very fast tripping capability is available, mandating that this is applied also.</p>	<p>We do not intend to mandate any specific requirements regarding these matters. We expect distribution businesses to demonstrate how they have considered and selected all proposed protection operation settings in their ESMS/BMP submissions, in accordance with their general duty.</p>
	<p>CPUE identified that continuous operation of REFCLs, in accordance with the Powercor and United Energy BMPs (which includes use of bypass mode), achieves other benefits including:</p> <ul style="list-style-type: none"> • the network remains hardened resulting in a reduced likelihood of cross-country faults • personnel maintain the skills to manage and maintain REFCL protected networks • REFCL protection is available for live line work • safety benefits of no current injection (and associated Earth Potential Rises etc.) for momentary/transient faults. 	<p>The identified benefits are also achieved by operating REFCLs continuously without use of bypass.</p>
<p>6 Do you agree that REFCLs should be in-service continuously throughout the year?</p>	<p>Jemena and CPUE agree that REFCLs should be in-service continuously throughout the year. However, CPUE supports continuous operation in alignment with their current BMP, which includes the operation of bypass mode.</p>	<p>We believe REFCLs should operate continuously throughout the year, actively mitigating bushfire risks and reducing the risk of electrocution, except in limited circumstances. Frequent use of bypass mode to manage reliability issues does not meet our expectations for ‘continuous operation.’ We expect distribution businesses to deploy REFCL-compatible ACRs and fault-</p>

⁶ VESI, [Minimum Rules for carrying out High Voltage Live Work](#), s 8.5.1.

		<p>locating devices to address reliability concerns while still allowing REFCLs to deliver safety benefits.</p>
	<p>CPUE advised REFCLs will need to be taken out of service where network access, maintenance and operational requirements demand it.</p> <p>AusNet Services identified many occasions where REFCLs must be bypassed or disabled including:</p> <ul style="list-style-type: none"> • to locate and rectify high impedance defects, which can take days to several weeks • to manage the dynamic nature of networks, particularly for augmentations outside of fire periods • for day-to-day operational requirements including network switching, REFCL equipment faults, and other unforeseen issues. <p>Jemena advised REFCLs need to be taken out of service at times including for maintenance and both planned and unplanned outages.</p>	<p>We accept that there are times when REFCLs must be taken out of service or bypassed. However, our expectation is that these circumstances will be extremely limited. We also expect distribution businesses to provide enforceable in-service availability commitments in their ESMS/BMPs.</p>
	<p>AusNet Services advised that a prescribed availability benchmark may be impracticable to enforce on a station-by-station basis.</p>	<p>As noted, we expect prescribed REFCLs to operate continuously. If continuous operation is impractical at any station, evidence can be provided during the BMP/ESMS process. We also expect distribution businesses to include enforceable in-service availability commitments for each station in their BMP/ESMS.</p>
	<p>A submitter called for us to undertake a data driven analysis prior to extending our operating expectations for REFCLs. In particular, to test our claim that “when REFCLs are in continual operation there is the opportunity for system defects and network asset weaknesses to be revealed under conditions where it will not cause a catastrophe, so that they can be fixed before the correct operation of the system becomes vital for bushfire mitigation” (page 23, consultation paper). They suggest selecting some “trial feeders” to be operated over the non-fire season and then analyse the fault quantities and profiles during</p>	<p>Continuous operation of REFCLs throughout the year allows for the identification of defects or weaknesses under lower-risk conditions. REFCLs significantly reduce bushfire risk and offer protection against electrocution, with continuous operation providing the highest safety outcomes.</p> <p>Distribution business already commit to in-service targets in their BMPs and where they are not achieved, perform additional insulation tests to ensure the network is sufficiently hardened ahead of the bushfire season each year. We consider this to be a settled matter for which further trials and data analysis is not required.</p>

	and following the trial period, or, a retrospective fault data-analysis.	
Survey – Do you agree REFCLs should be in service all year?	<p>One respondent strongly agreed, and another agreed on the condition that impacted customers receive compensation for increasing power outages.</p> <p>One respondent had no opinion, noting that they do not understand the subject enough.</p> <p>Two respondents disagreed. One thought that REFCLs are used for fire prevention only and consideration needs to be had to the likelihood of extended outages. The other thought that REFCLs are too constraining on how networks are operated and restrict reliability improvements.</p> <p>Three respondents strongly disagreed. One of these thought that there is no need to operate them outside of fire danger periods and that non-continuous operation provides a window for maintenance and installation of REFCLs.</p>	<p>We recognise that bushfire risks vary throughout the year, and our expectations regarding operating settings reflect this. Lower sensitivity may be acceptable when the AFDRS is ‘moderate’ or below.</p> <p>While our position supports continuous operation, REFCLs can be taken out of service for maintenance, though these occasions should be minimised as much as possible. We accept that REFCLs can impact network reliability, but we expect distribution businesses to invest in technologies to address this issue directly, without needing to rely on bypass mode.</p>
7 Should different expectations apply to REFCLs that have been installed to meet prescribed requirements under the Act and associated regulations compared with those that have been installed for other reasons?	<p>Jemena supports the same expectations for operating frequency for prescribed and non-prescribed REFCLs. However, it indicated that different performance expectations are required for non-prescribed REFCLs, which is addressed at question 12 below.</p>	<p>Prescribed REFCLs were installed for bushfire mitigation and are to be in continuous operation, actively mitigating bushfires. For non-prescribed REFCLs installed to mitigate bushfire risks, our expectations are the same as for prescribed REFCLs.</p> <p>We agree that non-prescribed REFCLs may be installed for reasons other than bushfire mitigation, such as to improve supply reliability and other safety benefits such as reduction of electrocution and arc flash risk. Distribution businesses may present in their BMP/ESMS how they will operate non-prescribed REFCLs to best meet their general duty.</p> <p>See Question 12.</p>
	<p>CPUE identifies that REFCLs may be installed for overall benefit, rather than bushfire safety, where reliability may be a significant justification for the project. It would be unreasonable to expect these systems to align with the operating frequency for REFCLs that specifically target bushfire safety. If the proposed operating frequency requirements are mandated for non-prescribed REFCLs, it will be difficult to justify their expansion in future. There should be flexibility to operate non-prescribed REFCLs in accordance with their BMPs.</p>	

<p>Survey – should the same rules apply for all REFCLs, whether they were prescribed or not?</p>	<p>One respondent thought the same rules should apply to all REFCLs because it is easier and leaves no grey area.</p> <p>Three respondents had no opinion, with two stating they did not understand the ramifications of the same rules applying.</p> <p>Four respondents thought the same rules should not apply. One stated that REFCLs are not helping reliability, are yet to be proven to stop bushfires, and that lot of network fire risks are in areas with Single Wire Earth Return (SWER) lines, which REFCLs do not work on.</p>	<p>REFCLs do significantly reduce bushfire risk and can improve supply reliability compared with traditional fault protection devices by avoiding unnecessary outages.</p> <p>A separate program requiring distribution businesses to install new generation automatic circuit reclosers (ACRs) was prescribed by the Government and has since been delivered, with Energy Safe oversight (s 1200 of the Act). We expect distribution businesses to demonstrate how they have considered and selected all additional potential controls to minimise the risk of fire ignition arising from SWER lines as far as practicable in their ESMS/BMP submissions, consistent with their general duty. We continue to independently consider new controls and will challenge distribution business where they have not already been considered as part of their ESMS/BMP submissions.</p>
<p>8 Are there any other considerations we should have regard to about the operating frequency of REFCLs?</p>	<p>CPUE advised that Victorian REFCL networks have a hybrid system earthing design. REFCLs and traditional low impedance systems are used interchangeably, with traditional systems acting as back up and always available. An operating frequency of >98% would require duplication of protection and control systems to ensure redundancy and ensure planned outages, maintenance and breakdowns are tolerated without loss of REFCL protection. Significant investment would be required to achieve a 100% in-service objective for the same reasons.</p>	<p>We acknowledge the limitations inherent in how REFCL protection has been deployed to date, in that it is not duplicated. Powercor is already achieving a relatively high availability level and our position acknowledges that there may be limited circumstances where REFCL protection may be unavailable. However, we do expect all distribution businesses to continue to actively consider how they can further minimise instances where REFCL protection is unavailable.</p>
	<p>Jemena advised that it only has one mandated REFCL system at Coolaroo, which commenced operations recently. It needs to gain more operational experience with the system, and to develop and implement compatible technologies. Once implemented, bypass mode will only be used when absolutely necessary.</p>	<p>This approach accords with our expectation that distribution businesses will invest in REFCL compatible ACRs and fault locating devices to reduce reliance on using bypass to maintain supply reliability.</p>

Table A3 – Operating settings

Question	Submitter comment	Energy Safe response
<p>9 Do you agree with the benefits and risks of</p>	<p>CPUE did not agree with high sensitivity year-round.</p>	<p>We do not expect high sensitivity year-round. When the AFDRS is moderate or lower, REFCLs can run at lower sensitivity if they</p>

<p>the options for operating settings of REFCLs? Do you consider there to be any benefits and risks that have not been captured in the examples?</p>	<p>They advised that most benefits are from having REFCLs ‘in service’ year-round, rather than on high settings. An increase in sensitivity will overwhelmingly degrade reliability, and lead to negative outcomes due to loss of supply. Additionally, it will exacerbate difficulties in finding complex faults (for example, as experienced in Trentham in 2022).</p> <p>It maintained that operating REFCLs in ‘fire risk mode’ during the declared fire danger period, and ‘bypass mode’ outside of the declared fire danger period, meets safety and reliability obligations.</p>	<p>still prevent electrocution and arcing risks that could cause serious injury or death.</p> <p>In limited cases, networks may need to use bypass mode to locate and fix complex or high-impedance faults and when networks become significantly unbalanced due to a range of factors. In these instances we expect distribution businesses to specify in their BMP or ESMS how they will minimise any associated safety risks as far as practicable, in accordance with their general duty.</p> <p>Frequent use of bypass mode to mitigate reliability impacts is not appropriate. To address reliability concerns, we expect investment in REFCL-compatible equipment that reduces reliability impacts while maintaining REFCL safety benefits.</p> <p>Note differing expectations apply for some non-prescribed REFCLs. Refer to question 12 for further information.</p>
	<p>AusNet Services advised that set point 1 (most sensitive) remains appropriate for TFB days, and when FBI is above 30. Set points 2 and 3 are appropriate when balancing reliability, safety and fire mitigation.</p> <p>Operating at various settings allows:</p> <ul style="list-style-type: none"> • latent defects to be detected and addressed (that cannot be detected via traditional means) • monitor and maintain capacitive balancing of the network during high fire danger periods 	<p>AusNet Services’ proposed operating settings largely align with the draft expectations in our consultation paper, with minor variations that we consider acceptable.</p>
	<p>CPUE advised that the use of bypass mode was appropriate outside the declared fire danger period, providing a reasonable balance between safety and reliability.</p> <p>AusNet Services advised that the use of bypass or disabling of REFCLs is required to:</p> <ul style="list-style-type: none"> • locate and rectify high impedance defects, which can take days to several weeks • manage the dynamic nature of networks, particularly for augmentations outside fire danger periods 	<p>There are no direct safety benefits from REFCLs operating in bypass mode. The indirect safety benefits of bypass outlined in submissions, such as improved reliability or network-specific operational issues, can be achieved with investment in REFCL-compatible equipment such as ACRs and fault locating devices. We expect entities to implement suitable measures, so bypass does not need to be relied upon to maintain supply reliability.</p> <p>As we note in the consultation paper, it may be necessary to use bypass mode in exceptional circumstances. Such foreseeable circumstances and any additional controls that will be applied to minimise the associated safety risk as far as</p>

	<ul style="list-style-type: none"> day-to-day operational requirements (for example, network switching, equipment faults and unforeseen issues) 	<p>practicable should be outlined in a BMP and/or ESMS submitted for acceptance. When it is decided that bypass mode is to be used, records of the decision-making process should be kept in accordance with record keeping and reporting expectations.</p>
	<p>AusNet Services advised that the application of REFCLs varies between and within networks for a variety of reasons including terrain/topography, scale of network and complexity of assets. AusNet Services requires flexibility to apply REFCL settings based on network risks.</p>	<p>The REFCL Operations policy outlines our expectations that will guide our assessment of ESMS and BMPs, but they are not prescriptive requirements. If a business considers it impracticable to implement these expectations in a specific context, they should provide evidence for us to review and assess. However, on the whole these expectations should be implemented.</p>
	<p>Jemena agreed that operating settings for REFCLs have different benefits and risks depending on the fire danger level and supply reliability impact.</p>	<p>We agree that different REFCL operating settings will be appropriate depending on the circumstances.</p>
	<p>Jemena advised that management of the fault site to a desired level is not easily achieved since the RCC compensation is carried out at the ZSS using the bus voltage. On a number of non-prescribed REFCLs, this is not practical because they employ passive ARC Suppression Coils (ASC) and lack an active compensation device such as RCC.</p>	<p>Our position does not impact the definition of 'required capacity', which is measured at the station bus. The other settings discussed in our position should also be interpreted as being measured at the station bus.</p> <p>Note differing expectations apply for some non-prescribed REFCLs. Refer to question 12 for further information.</p>
<p>Survey - Do you agree REFCLs should not be bypassed or disabled?</p>	<p>The survey provided the following answers:</p> <p>Two respondents agreed that REFCLs should not be bypassed or disabled.</p> <p>One respondent had no opinion.</p> <p>One respondent disagreed that REFCLs should not be bypassed or disabled, noting that:</p> <ul style="list-style-type: none"> people need to maintain safety around power lines at all times and use of REFCLs may lead to complacency Overuse of REFCLs may result in people being less safe in their homes the use of REFCLs needs to be balanced with increasing power outages 	<p>Most survey responses thought REFCLs should be able to be bypassed or disabled, citing the need for operational flexibility and improved reliability. There is no direct safety benefit from REFCLs operating in bypass mode and, as noted, reliability impacts are best managed directly with suitable investment in compatible equipment. We do recognise that bypass may be necessary in exceptional cases, which should be outlined in a BMP submitted for approval. More details are available in Question 9 on 'use of bypass'.</p> <p>Feedback also indicated that REFCLs are too sensitive. Our view is that an appropriate level of sensitivity is crucial for detecting faults, particularly on Total Fire Ban days when the highest setting is required. On other days, sensitivity should vary based on fire risk indicators, which we consider an appropriate balance for managing bushfire risks.</p>

	<p>Four respondents strongly disagreed that REFCLs should not be bypassed or disabled, noting that:</p> <ul style="list-style-type: none"> • they need to be able to bypass for operational flexibility and improved reliability under fault conditions. • devices are designed and constructed to be so sensitive that they are difficult to build and install/commission, as well as maintain, within a network 	
<p>10 Do you agree that operating settings are the appropriate way to balance public safety benefits alongside considerations of supply reliability?</p>	<p>CPUE did not agree that operating settings are an appropriate way to balance safety and reliability.</p> <p>CPUE contended that increasing sensitivity year-round to target a specific safety outcome will significantly impact reliability and is unlikely to result in a material public safety improvement.</p> <p>Energy Safe’s proposed commitments could reduce reliability, which customers across Victoria have little appetite for.</p>	<p>As noted, it is not our expectation that REFCLs are operated at a high level of sensitivity year-round, however we do consider that near-continual operation provides for the greatest safety benefits. REFCLs in bypass mode do not protect against electrocution risks associated with line contact incidents.</p> <p>Also as noted, it is our expectation that reliability impacts will be mitigated by investment in REFCL-compatible equipment.</p>
	<p>AusNet Services balances their REFCL network using the protection philosophy, balancing bushfire mitigation with customer reliability and electrical safety.</p> <p>AusNet Services’ Energy Sentiments tracker consistently shows reliability, safety and lowering costs as the top 3 areas their customers would like to see prioritised, demonstrating that all three need to be balanced to meet their expectations.</p>	<p>We consider that the expectations outlined in our policy, as well as the opportunity for investment in REFCL-compatible equipment, allow for the balancing of bushfire mitigation with customer reliability and electrical safety.</p>
	<p>Jemena agrees for prescribed REFCLs. However, there are limited opportunities to implement multiple sensitivity settings for non-prescribed REFCLs.</p> <p>Question 4 expands on these limitations.</p>	<p>Differing expectations apply for some non-prescribed REFCLs. Refer to question 12 for further information.</p>
<p>11 Are the AFDRS levels appropriate for guiding the operating settings of REFCLs? Do you agree with the way we have applied</p>	<p>CPUE suggests that the AFDRS are out of scope for consideration alongside REFCLs. AFDRS needs to be considered in a holistic context of a BMP which considers all other bushfire mitigation controls and risk indicators.</p>	<p>We believe it’s important to outline our expectations for how REFCLs are operated. Using bushfire risk indicators is the most effective approach, as they provide reliable, up-to-date information on areas where bushfire risks are present.</p>

<p>the AFDRS levels in our preliminary views?</p>	<p>Their submission also indicates that current operating modes (declared fire danger period and Total Fire Ban Days) are simple and manageable. If AFDRS is used, it will be difficult to track and monitor.</p>	<p>If entities find that our expectations for REFCLs don't strike the right balance with other safety measures during their BMP review, they can demonstrate and justify this in their BMP submission.</p> <p>We recognise that these new expectations may require changes to current operations, potentially creating initial challenges. However, we expect these difficulties to ease as the industry adapts. As mentioned in Question 4, the REFCL Operations Policy is effective immediately and should be used as a baseline when developing BMPs to ensure REFCL operations minimise risks as far as practicable.</p>
	<p>Jemena outlined that:</p> <ul style="list-style-type: none"> • On Total Fire Ban days, AFDRS levels are appropriate for guiding operating settings of prescribed REFCLs. • During Declared Fire Periods, flexibility on operational sensitivity is crucial. This is to strike a balance between effective protection against bushfires and network reliability. If AFDRS falls below 'high', it may be sufficient to operate at reduced sensitivity. • Non-prescribed REFCLs only have a single sensitivity setting group, so AFDRS levels are not applicable. 	<p>As noted, our expectation is that REFCLs should be operated at high sensitivity settings throughout the declared fire danger period (i.e., detects high-impedance faults or fault currents of 1.0 amps or more). This is when there is a heightened risk of bushfires, and bushfires that occur are more likely to spread quickly and become dangerous. We maintain that these expectations are appropriate as they provide a high level of fault protection when it's needed.</p> <p>Differing expectations apply for some non-prescribed REFCLs. Refer to question 12 for further information.</p> <p>We acknowledge distribution businesses' concerns with reliability. As outlined in the consultation paper, there is technology available to help address reliability concerns, including REFCL compatible ACRs and fault locating devices. We expect investment in such devices will diminish adverse supply reliability impacts while ensuring the efficacy of REFCLs. Submissions indicate such investment is already underway (see Table A5).</p>
	<p>Jemena endorsed the suggestion to restrict the use of bypass mode for sustained earth faults during periods of low bushfire risk. However, for this transition to occur, significant investment will be required to implement new advanced earth fault detection systems on the high voltage network. So, a gradual transition is essential.</p>	<p>As previously mentioned, (Question 9 - 'Use of bypass'), there are no direct safety benefits from REFCLs operating in bypass mode. REFCLs must be on and able to detect faults to realise their benefits.</p> <p>The expectations contained in the REFCL Operations Policy apply immediately upon publication, and we expect distribution</p>

		<p>businesses to consider these in the development of their next BMP.</p>
<p>Survey - Do you agree with the way we have applied the TFB and AFDRS levels to decide the minimum REFCL operating settings?</p>	<p>The survey provided the following answers:</p> <p>One respondent strongly agreed with the way we have applied the TFB and AFDRS levels to decide the minimum REFCL operating settings noting that terminology should change from 'may' to 'must' for 'all other times'.</p> <p>Three respondents agreed, outlining that it is a common-sense approach, but reliability cannot be expected. When a REFCL trips it takes hours to restore due to the need to patrol the impacted feeders.</p> <p>One respondent had no opinion.</p> <p>One respondent disagreed noting that high sensitivity settings should be used during declared fire danger period or when AFDRS level is high or above. Often the fire danger rating is 'high' when the risk is not really that high. Using that measure will mean more outages for little value.</p> <p>Two respondents strongly disagreed with the way we have applied the TFB and AFDRS levels to decide the minimum REFCL operating settings, with no comment provided.</p>	<p>As outlined in the consultation paper, there is technology available to help address reliability concerns, including REFCL compatible ACRs and fault locating devices. We expect investment in such devices will diminish adverse supply reliability impacts while ensuring the efficacy of REFCLs. Submissions indicate such investment is already underway (Table A5 refers).</p> <p>We also maintain that high sensitivity is applied when the AFDRS level for the relevant area is 'high' or above. When AFDRS is moderate or lower, REFCLs can operate at lower sensitivity, provided they still prevent risks of electrocution and arcing that could cause serious injury or death (i.e., detecting low-impedance faults or fault currents of 2.0 amps or more).</p>
<p>12 Should different expectations apply to REFCLs that have been installed to meet prescribed requirements under the Act and associated regulations compared with those that have been installed for other reasons?</p>	<p>Jemena outlined that there should be different expectations for non-prescribed REFCLs. Given that the network size on a non-prescribed installation is significantly larger and involves greater capacitive imbalance, only one sensitivity setting is realistically achievable. This will ensure that the operation of REFCLs is optimised according to the specific conditions of each installation, thereby maximising their effectiveness in mitigating risks.</p>	<p>We agree that REFCLs installed for purposes other than bushfire mitigation may need to be operated differently from those specifically installed for bushfire mitigation. For example, there would be no expectation to operate a REFCL that protects powerlines purely in an urban area in a more sensitive manner during the declared fire danger period.</p> <p>Depending on their settings, these REFCLs can still provide safety benefits by reducing the risk of electrocution. It's essential that data on their use and settings be included in or alongside the business's ESMS to demonstrate compliance with their general duties.</p> <p>For non-prescribed REFCLs installed to mitigate bushfire risks, our expectations are the same as for prescribed REFCLs. However, due to the specific nature of the network or other</p>

		factors, there may be valid reasons for different settings from those outlined in our expectations.
13 Are there any other considerations we should have regard to about the operating settings of REFCLs?	<p>CPUE outlined that maintaining high levels of sensitivity for current REFCL networks will come at a significant cost.</p> <p>A strategic review at a regulatory and industry level is required to determine whether investing in “maintaining extremely high sensitivity levels” delivers or maintains a reasonable level of bushfire risk reduction or whether funds are better spent on other bushfire mitigation projects (such as extending coverage areas of REFCLs).</p>	<p>The installation of REFCL-compatible equipment will allow the REFCLs to be operated at a relatively high sensitivity level with reduced reliability impacts.</p> <p>However, in response to the comment, we note that it is not our intention to require high levels of sensitivity year-round.</p> <p>In addition, we do not believe the optimal operation of REFCLs should be considered as a trade-off against other bushfire mitigation projects. REFCLs have successfully responded to over 5,000 faults throughout the declared bushfire season since 2017. In each case, no fire has eventuated, strongly indicating that REFCLs are delivering the intended risk reduction benefits.</p>

Table A4 – Maintaining REFCL performance

Question	Submitter comment	Energy Safe response
14 Do you have any comments in relation to testing and maintenance of REFCLs?	Jemena advised that annual validation testing is not conducted at non-prescribed REFCL sites because they are not mandated to operate at required capacity. Primary earth fault testing is also not conducted at these sites, leaving the sensitivity of these systems generally unknown.	For non-prescribed REFCLs that provide a safety benefit, our expectation is that some form of testing is being done to determine the risk reduction benefit being achieved. The distribution business should keep records of this testing, which can be produced to Energy Safe upon request.
Survey – Do you have any comments in relation to testing and maintenance	Two respondents agreed that regular testing and maintenance is required to ensure safe and reliable operation of REFCLs. Another agreed with increased maintenance as they are unsure whether power lines are being adequately maintained. A further respondent thought that distribution businesses should be required to submit ESMS, BMP and outcomes of testing undertaken in accordance with regulation 7(1)(k) of the Electricity Safety (Bushfire Mitigation) Regulations 2023 to the relevant Municipal Emergency Management Planning Committee.	<p>The survey respondents were supportive of the need for regular testing and maintenance of REFCL systems.</p> <p>This process relates to the operation of REFCLs, we are not considering changes to the legislative requirements about submission of ESMS, BMP and outcomes of testing.</p>

Table A5 – Broadening the use of REFCLs

Question	Submitter comment	Energy Safe response
15 Do you have any comments on the broader installation and use of REFCLs?	<p>Jemena and CPUE support expanding the installation of REFCLs.</p> <p>Jemena agreed that distribution businesses should consider implementing non-prescribed REFCLs. Jemena has initiated plans to expand the deployment of non-prescribed REFCLs where financially viable, including currently at Footscray West (FW) ZSS.</p> <p>CPUE supports an expansion of REFCL protected networks under an appropriate framework and where it can be justified as far as practicable in mitigating the associated bushfire risk. CPUE indicated it is looking to expand its REFCL network where practicable, but notes that mandating proposed operating frequency or mandating legislated REFCL performance requirements to non-legislated REFCLs will make it more difficult to justify expansion of REFCLs on its networks under an as far as practicable basis.</p>	<p>Feedback received generally supports our expectations. As outlined in the consultation paper, we expect distribution businesses to show they have considered the use of REFCLs on additional parts of their supply network to minimise hazards and risks as far as practicable in accordance with their general duties.</p> <p>In response to Jemena’s comment on considering additional REFCLs where financially viable, as noted in section 2.4 cost is a factor in deciding which controls to implement but is only one part of the assessment. Energy Safe’s <i>Energy Infrastructure Safety Case Guidelines</i> require all suitable controls to be implemented unless the cost is grossly disproportionate to the benefit.</p>
Further comment – network switching	<p>CPUE and Ausnet referred to switching as part of their operations in Questions 5 and 6.</p>	<p>We recognise that switching REFCL protection between lines may increase capacitive losses, potentially making it challenging to maintain the required capacity. Given the requirement to operate REFCLs at the required capacity on Total Fire Ban days, it may not be appropriate to extend REFCL protection in this manner on those days. However, where extending REFCL protection has minimal impact on operating settings, this approach may be feasible on high bushfire risk days.</p>
Survey – do you have any comments on the broader installation and use of REFCLs?	<p>The survey provided the following responses:</p> <ul style="list-style-type: none"> • REFCLs should only be installed on feeders with a high fire risk. Do not install at zone substation level and hinder industrial commercial growth in urban areas. • Should be across the board. • Queried whether any amendments were made to line clearance requirements in response to the introduction of REFCLs, i.e. to mitigate sensitivities. 	<p>In 2017 the Victorian Government prescribed requirements for the installation of REFCLs at zone substations supplying the highest bushfire consequence areas. REFCLs are installed at zone substations so that they can cover specified areas of higher risk. The areas where REFCLs are installed may change over time due to varying risks and/or it becomes practicable to do.</p> <p>We are not considering amendment to electric line clearance requirements because of this consultation. Any changes to</p>

	<ul style="list-style-type: none"> Personal experiences with AusNet Services illustrate that they are passing on responsibility to developers for the design and installation of new devices, as well as much of the work. This causes delays. 	<p>minimum line clearance spaces will be reviewed and considered independently. However, as noted in the consultation, we do expect distribution businesses to have robust inspection programs to ensure issues are identified and addresses as quickly as possible.</p> <p>We hold distribution businesses accountable through their BMPs. During the acceptance process we test any commitments made to determine whether they are acting in accordance with applicable general duties.</p>
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Table A6 – Record keeping and reporting

Question	Submitter comment	Energy Safe response
16 Do you have any comments on record keeping and reporting by the distribution businesses?	Jemena advised that reporting requirements should not be extended to non-prescribed REFCLs because it would be a significant burden on distribution businesses as they look to expand the deployment of non-prescribed REFCLs.	<p>We still expect records to be maintained for non-prescribed REFCLs. Non-prescribed REFCLs may be installed by distribution businesses for various reasons, including increasing reliability and/or if it has been deemed practicable to do so in accordance with their general duties. If required, records and reporting will help demonstrate that distribution businesses are following through on their commitments to improve reliability and/or achieve their general duties.</p> <p>We do not agree that record keeping and reporting should pose a significant additional burden on distribution businesses. Record keeping and reporting processes should be considered upon implementation of any REFCL system.</p>
	CPUE indicated that their current use of operating modes (Declared Fire Danger Periods and TFB Days) allows for a relatively simple and manageable deployment of operating modes. If the AFDRS was used instead, operating mode deployment would be difficult to track and monitor and may lead to adverse risks from an operational perspective of ensuring REFCLs are maintained in the required settings at the appropriate times.	Refer to Question 11.

<p>Survey – do you have any comments on record keeping and reporting?</p>	<p>The survey provided the following responses:</p> <ul style="list-style-type: none"> • record keeping and reporting should be mandatory and not optional • major electrical companies lack transparency, and their records must be made available to all customers • provided networks are funded to do so, then they can tolerate the ‘red tape’ associated with monitoring REFCL operation • questions the validity of numbers and records. Holds particular concerns with AusNet Services’ commitment to properly documenting and interpreting numbers. 	<p>Generally, survey responses agree that our record keeping and reporting expectations are suitable.</p>
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Table A7 – General/other comments

Topic	Submitter comment	Energy Safe response
<p>Further time required to develop and implement REFCL technology</p>	<p>CPUE advised that Automatic Circuit Reclosers (ACRs) will be fully deployed on its network by December 2028. They will improve reliability performance by approximately 50 per cent. Further development of other network protection devices is required to improve reliability further. Accordingly, CPUE encouraged us to defer any changes to its BMP until these technology solutions have been developed and fully implemented.</p>	<p>We understand that it will take time to implement further technology solutions to address reliability concerns. Our REFCL operating policy outlines our baseline expectations, and we expect it to be in effect immediately. If our expectations prove impractical at present, evidence can be provided during the BMP/ESMS process for our consideration.</p>
	<p>Jemena advised that although they are supportive of Energy Safe’s vision outlined in the consultation paper, a gradual transition is essential. Distribution businesses require more time to gather and analyse operational data to make informed decisions necessary to align with our vision. They advocate for a phased approach that allows distribution businesses to gradually adopt REFCL technology.</p>	
<p>Principles-based approach in legislation</p>	<p>AusNet Services suggested that a principles-based approach should be implemented in the <i>Electricity Safety Act 1998</i> and subordinate legislation to allow Energy Safe to respond and adapt as REFCL technology increases.</p>	<p>Our intention through this process was not to legislate further requirements for REFCLs. Communicating our expectations through an operations policy rather than amending the</p>

		legislation or regulations achieves a timely and adaptable approach.
Survey responses	One respondent commented that the recommendations must be enforced, and industry cannot be allowed to self-monitor.	The REFCL Operations Policy, together with the Act and regulations, are enforced by Energy Safe. We will only accept an ESMS/BMP if we are satisfied that it is appropriate for the supply network.
	One respondent commented that there needs to be flexibility in the requirements for REFCLs which supports land development.	Supporting land development was not one of the key issues identified by us, nor any of the other submitters, in relation to informing the operation of REFCLs.
	One respondent commented that electricity is required for medical aides and in rural areas to run water pumps.	We acknowledge the identified uses of electricity. The resultant safety benefits of maintaining electricity supply reliability have been considered in developing the REFCL Operations Policy.
	One respondent queried how we arrived at the situation where REFCLs are causing more power outages and raised the need for customers to be compensated for increasing power outages.	We acknowledge concerns held about supply reliability impacts. There is technology available to help address these concerns, such as REFCL compatible ACRs and fault locating devices. We expect the distribution businesses to invest in these devices to reduce supply reliability impacts while ensuring the efficacy of REFCLs.
	A respondent highlighted the ongoing costs of expanding and maintaining a distribution network. They noted that installing isolating transformers to reduce feed capacitance, required for REFCLs to operate effectively at their lowest setting, has become a costly network constraint, limiting network growth and interconnection for reliability. Further development is needed to increase capacitive limits, allowing REFCLs to operate at higher sensitivity. They also noted that feeder-based REFCLs should be developed alongside zone substation REFCLs to extend protection to fire-prone feeders not included in the initial REFCL installations.	We recognise the costs involved, however, distribution businesses have received funding from the Australian Energy Regulator for REFCL installations. Given the potentially catastrophic impact of bushfires, we expect distribution businesses to invest in REFCLs together with devices that reduce their supply reliability impacts.