

Jill Porter

Mr Chris Pattas
General Manager
Australian Energy Regulator
GPO Box 520
Melbourne Vic 3001

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Dear Mr Pattas

Thank you for the opportunity to make a submission on Powercor Australia Contingent Project – Tranche 3 Installation of REFCL. This funding is permitted under Clause 6.6A.2 of the National Electricity Rules. These costs will be “passed through” to customers.

Please redact my address and telephone number when publishing on the AER website.

I am a dairy farmer from The Sisters, in south west Victoria, and am a customer of network distribution business, Powercor Australia.

My community was devastated by a cluster of bushfires all associated with electrical infrastructure on 17 March 2018. These fires destroyed homes, property, livestock, livelihoods and our way of life. They continue to cause ongoing hardship, both physical, mental, emotional and financial. At least two of these fires, Garvoc/The Sisters and Terang were due to ageing and failing infrastructure and poorly maintained and inspected electrical assets. The other four fires occurred as a result of vegetation contact with HV conductors. These fires are collectively known as the “St Patrick’s Day” fires.

The National Electricity Objective as stated in the National Electricity Law (NEL) is:

“to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to:

- price, quality, safety and reliability and security of supply of electricity
- the reliability, safety and security of the national electricity system.”

According to the role of the AER, “network businesses submit proposals to the AER on their required revenues. We review the proposals and make decisions with reference to factors including:

- projected demand for electricity and natural gas
- age of infrastructure
- operating and financial costs
- network reliability and safety standards.” (AER website)

In this submission I wish to highlight that installation of REFCLs (at the exclusion of other bushfire mitigation strategies) is not in the long-term best interests of consumers with respect to price, safety or reliability.

The investment in REFCL technology cannot be viewed by the AER as prudent or efficient.

The AER states that “safety is outside the jurisdiction” of its decision making.

As a community impacted by a bushfire, I ask the AER to act as an independent regulator and exercise its economic expertise and advise Government, ESV and consumers on the excessive costs outweighing benefits.

There is much documentation which highlights the dubious efficacy, negative reliability impacts and inherent dangers of REFCL. This must also be considered against the backdrop of ongoing unresolved technical issues and further unknown costs.

1. Cost

At the 11 June 2019 Powerline Bushfire Safety Committee meeting, the electrical distributors raised the matter of reviewing the legislative requirements in cases where they concluded the cost of compliance was disproportionate to the benefit.

Page 12 of the Powercor contingent project application REFCL tranche 3 states **'we consider the cost estimates set out in the RIS understate the true cost of installing REFCLs.**

This cost was originally budgeted at \$151 million (Acil Allen RIS 2015)

As per previous AER determinations and current applications the costs currently are:

Powercor

Tranche 1 \$77.3million

Tranche 2 \$110.5 million

Tranche 3 \$167.4million (no determination yet)

This does not include the installation of REFCL at either Woodend or Gisborne as this was funded through the regulatory period 16-20.

Ausnet Services

Tranche 1 \$97.4million

Tranche 2. \$123.5 million

Tranche 3 \$106.8million (no determination yet)

Known costs for HV customers for tranches 2 and 3 is expected to be more than \$60million

Metro Trains has asked the Victorian Government for \$45million to harden its 8 affected substations.

Melbourne Water (tranche 2 Ausnet Services) costs are unknown

These costs also do not include the ongoing costs to keep networks “compliant”.

Page 27 of the Powercor contingent project application tranche3 states “ESV has only provided “**conditional acceptance**” that we have met the requirements”.

The costs do not consider the costs of the unresolved technical issues surrounding these conditional approvals:

- Calibration
- Harmonics
- Sampling and admittance values
- Inverter tripping.

Ausnet Services has also identified a further technical issue of

- High network damping

(per Powerline Bushfire safety Committee 11 June 2019 meeting minutes)

This totals \$789.9million and will not be the final cost of REFCL rollout.

The Independent Review into Victoria’s Electricity and Gas Network Safety Framework identified in 2017 “**that the deployment of REFCLs would now have marginally higher estimated costs than estimated benefit**, assuming no changes in any of the other elements of the Acil Allen methodology” (page 188 Final Report).

In its Interim report, the Review indicated **that a measured approach should be adopted to the implementation of REFCLs**, allowing policy settings to be considered with the benefit of greater experience and information. As a draft recommendation, the review proposed that the deployment of REFCL technology be subject to review prior to each tranche by an **independent expert panel appointed by the Minister**. (page 192

Recommendation 27 of the Review.

The mandate of the Powerline Bushfire Safety Committee should be expanded to require it to provide annual implementation reports on the deployment of REFCL technology to satisfy the Electricity Safety (Bushfire Mitigation) Regulations. **The implementation reports should include information on costs and risk reduction benefits in light of actual experience**, and an assessment of emerging issues that may require adjustments to the program timing or technical requirements. The first report should be provided through the Director of Energy Safety to the Minister for Energy, Environment and Climate Change by **May 2018**.

In a report released by DELWP on 25 September 2019, any reporting on REFCL will not commence until mid 2020. (Implementation Progress Update)

This does not allow for careful examination of benefits vs costs and yet the AER continues to allow further contingent projects.

This cannot be deemed to be in the best long-term interest of consumers with respect to price. Nor is it prudent or efficient spending.

2. Efficacy

I wish to highlight the installation of REFCL technology would not have prevented any of the St Patrick's day fires.

Nor would REFCL have prevented the fires on Black Saturday.

The Powerline Bushfire Safety Taskforce (2011) recommended the REFCL technology. This recommendation was based on **assumption**.

REFCL technology can only detect phase to earth faults, not phase to phase faults. The taskforce said:

“The data does not provide a breakdown of the number of fire starts by wire-to-wire faults and wire-to-earth faults. The Taskforce has **estimated** that 70%

of fires are started by wire-to-earth faults and 30% are started by wire-to-wire faults.

The data also **does not** provide a breakdown of fires started by **electric arcs, molten metal particles and electric current flow. The Taskforce has not been able to estimate this breakdown.**”

(Powerline Bushfire Safety Taskforce: Final Report, September 2011).

When applied to the causes of the fires involving electrical infrastructure historically, Ash Wednesday (1983), Black Saturday (2009) and St Patricks Day (2018), these estimates would not appear to be accurate.

The research surrounding **arc ignition** did not seek to model any of the Black Saturday fires, its sole aim was to inform **ACR and REFCL research.**

From a study titled “Assessing the role of electricity networks in bushfire ignitions: estimates of current and prospective performance “ by Huston et al, which uses risk reduction modelling, **it is also now known that on days of catastrophic risk (ie very high wind, high temperature, high KBDI and low relative humidity), REFCLs are least effective.**

Table 2. Ranges of relative ignition rate reduction for various technology options on average across all levels of meteorological conditions

Type	Description of treatment	Expected reduction in ignition likelihood (SWER)	Expected reduction in ignition likelihood (22 kV)
Bare-wire	The base case option is to leave bare-wire powerlines in place.	0%	0%
ACR operating on bare-wire and installation of new ACRs, mainly on SWER lines, that are capable of remotely have operational settings changes on bushfire risk days to reduce the time taken to clear a fault.	The operational changes are in accordance with technical recommendations and are one “fast” trip on a highest fire danger day or two “fast” trips on other bushfire risk days in the highest bushfire start risk areas.	-35% to -40%	-7% to -10%
Insulating bare-wire	Installation with modern HV Aerial Bundled Conductors (ABC) on the 22kV network with insulated equipment connections.	-96% to -98%	-96% to -98%
REFCL	Bare-wire conductor with new ACRs at section level and REFCL protection at feeder level.	0%	-48% to -60%
Undergrounding bare-wire	Replacement of bare overhead conductors with underground cable and insulated equipment connections.	-98% to -99%	-98% to -99%

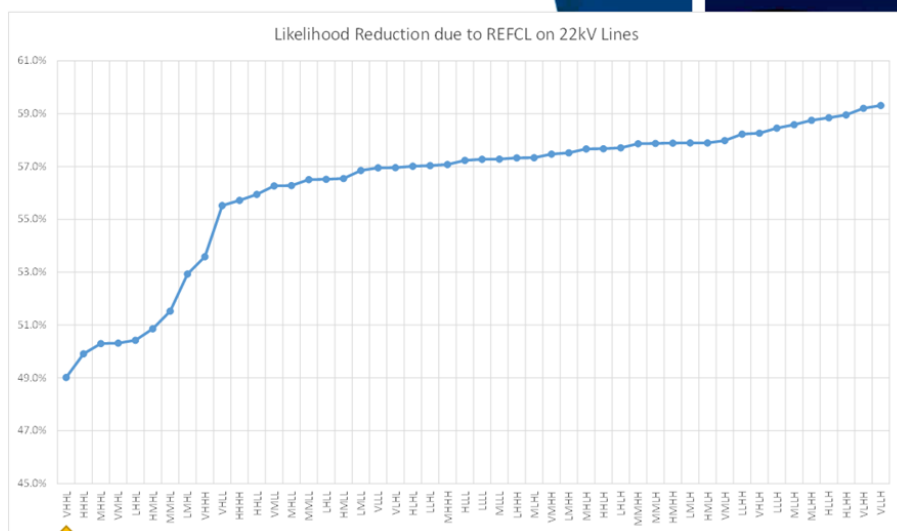
The graph below clearly shows REFCL to be least efficacious on days of catastrophic risk. On such days we are most likely to experience fire from electrical infrastructure.

The combined efficacy of REFCL and ACR on a day of catastrophic risk (code red) is 49%. Alone the efficacy of REFCL is less than 40% (removing the 7-10% benefit of ACR).

40% efficacy applied only to potential fires started on single phase to earth (wire-to-ground) faults only, which at best is estimated to be only two thirds of the faults which may initiate powerline bushfires.

Variation with conditions

This is important because each location varies in its distribution of conditions, and fire consequence varies dramatically with conditions



(Source: Powerline Bushfire Safety, short course by Monash Grid Innovation Hub)

REFCL has zero effect on SWER lines or on phase to phase.

This lack of efficacy must be considered by the AER as without efficacy, the cost cannot be justified.

This is not prudent or efficient spending.

Moreover, it leaves rural communities exposed and vulnerable to fires caused by failing powerlines.

Whilst discussing efficacy, it should also be noted that Powercor Australia has only received from ESV “**conditional acceptance to meet the test performance requirements**” (page 27 Powercor contingent project application REFCL tranche 3)

“ESV noted that the acceptance is subject to Powercor meeting specific conditions by 30 November 2019, or by the time that the Country Fire Authority declares a fire danger period in 2019 for any area that includes any part of the relevant network, whichever is sooner. To meet the specific conditions, Powercor must:

- investigate, pursue resolution of, and provide a report to ESV on the materiality of calibration to achieve the required capacity on the network, or on electricity networks in general
- investigate and demonstrate resolution of the harmonics issue through repeated testing on the network in 2019
- investigate and demonstrate resolution of the issue related to sampling of admittance values through continued and repeated testing of tranche one sites throughout 2019
- investigate and demonstrate resolution of the issue related to inverter trips through continued and repeated testing of tranche one sites throughout 2019. “(

(page 18 Powercor contingent project application REFCL tranche 3)

Therefore in “real life experience” we have yet to have any REFCL which meet the regulatory requirements in operation because of ongoing and unresolved technical issues.

Given the ongoing issues with deployment and operation, lack of evidence of efficacy and no reporting on actual experience, how can the AER deem this expenditure as prudent and efficient or in the best long-term interests of consumers with respect to price or safety?

3. Safety

“When an earth fault occurs on a REFCL protected network, over voltage on un-faulted phases occurs and can lead to failure of equipment installed on the network. Such equipment failure constitutes a second earth fault on the network, termed a **cross country fault**, because it is usually remote from the initial fault and always occurs on one of the un-faulted phases. REFCLs can only deal with multiple faults if they all occur on a single phase. With a cross country fault, the network has two phase-to-phase faults at different locations and high currents will flow in both fault directions.” (page 43 AusNet Services Contingent project application REFCL tranche 3)

The Marxsen Consulting HV Customer report (2017) states “during the 2014 REFCL trial (Test 217) following the applied earth fault, a cable failed on another phase followed by failure of an ACR. High cross country flow was experienced.”

Page 147 of the 20124 REFCL trial refers to it as

8.4.3 Test 217- fulgurite formation due to a cross country fault.

Test 217 resulted in a fire not stopped by REFCL, in fact the arc was much more intense due to higher voltage output.

Fire resulted.

Test 217 has been withheld from public scrutiny.

But the real evidence was always the two videos

[Without a REFCL](#)

[With a REFCL](#)

All the rest was for experts like us.

There's one video we don't often share: [Test 217](#) during a Ministerial/Media event.



(source: Powerline Bushfire safety, short course by Monash Grid Innovation Hub, June 2019).

The Victorian Bushfire Royal Commission identified that network distribution infrastructure was ageing and failing.

REFCL is an electrical protection system. It can only work once a fault has occurred.

REFCL does nothing to improve the robustness of the network. With ageing infrastructure, REFCL poses a very real danger of introducing further risk due to potential cross country faults.

On days of catastrophic risk, when we experience the most powerline initiated bushfires, multiple faults can happen and faults do not happen on a single phase, or clear at one time.

Per Dr Anthony Marxsen, REFCL Trial: Ignition Tests, Marxsen Consulting Pty Ltd, Monday 4 August 2014, page 93 **“when an earth fault occurs, the REFCL response creates voltage stress on network equipment connected to unfaulted phases, which can lead to a second fault.**

Outcomes can be worse than if REFCL were not installed.”

Cross country faults arising with REFCL operation leave rural communities vulnerable to increased risk and harm from powerline initiated bushfires.

Such spending on REFCL deployment cannot be deemed in the best long-term interests of consumers with respect to safety.

4. Reliability

In its tranche 1 application, Powercor stated “the more frequently we operate REFCLs in fire risk mode (ie the greater number of TFB days that occur), the greater the expected detriment to our reliability performance in terms of sustained outages. These negative impacts will be exacerbated for customers on long feeders.”

Page 18 Powercor contingent project application REFCL tranche 3

“Through the tranche one deployment program, we have a greater understanding of the technical challenges associated with the REFCL and interactions with the network and equipment. Key learnings include:

- network augmentation can pose a risk to REFCL sensitivity
- pre-testing of the resilience of assets to withstand the operation of the REFCL is required
- the approach to balancing should be more dynamic to maintain the ability to switch and operate the network in a safe, efficient and reliable manner
- there is a decrease in reliability to customers once the REFCL is in operation.

This has real life experience in Apollo Bay in south west Victoria, where currently Powercor has turned off the REFCL because of a major negative impact on reliability. This in turn has significant implications on community business and lives.

In the most recent Powercor presentation to the Powerline Bushfire Safety committee in August 2019:

“Reliability pressures

- we are seeing a detrimental impact on reliability due to incompatibility with auto-loop schemes and FDIR, our automated switching program.
- We are also seeing increased customer and community awareness of the reliability impact.”

REFCL was promoted and accepted on the basis of its ability to reduce bushfire risk and also a benefit to increase reliability. This is clearly not the case.

From Acil Allen RIS 2015 page 86.

The estimated present value of the costs and the benefits (reduction in bushfire risk

and improvement in reliability) is illustrated in Figure 13. Figure 13 indicates that:

- — the present value of the costs increases as the number of REFCLs installed increases
- — the present value of the benefits associated with a reduction in bushfire risk and with an improvement in reliability increases with each successive option
- — there is a net benefit for each option when only bushfire benefits are considered – the assumption that has been made as to the reliability improvement benefits is therefore not material to the consideration of the preferred option.

Accordingly, the spending on REFCL deployment cannot be deemed in the best long-term interests of consumers with respect to reliability. Nor is it prudent or efficient spending.

I wish to highlight to the AER, the lack of independent or expert oversight of the Powerline Bushfire Safety program and more specifically the implementation of REFCL.

This has led to the deployment of a program which is excessively more costly than anticipated and with fewer risk reduction benefits while also negatively affecting reliability.

This results in rural and regional Victorians at continued risk of powerline initiated bushfires on days of catastrophic risk.

The AER and ESV has a MOU which must be strengthened and used in the best capacity in order to protect communities like mine.

The VBRC called for recommendation 27-34 to be implemented to address the ageing and failing infrastructure of electricity distribution companies.

REFCL does not address this issue, as it cannot have any effect until after a fault has occurred.

All parties should be working collaboratively and transparently to ensure the networks are ROBUST and standards, maintenance and inspections are in place to minimise faults from occurring. Both the economic and safety regulator need to work together to ensure community fears and concerns are heard and acknowledged. We require positive and **SAFE outcomes**.

All possible technologies for reducing bushfire risk from powerlines should be objectively investigated. We must spend our money wisely and with best effect.

As our independent economic Regulator, I ask for economic expertise to inform consumers and strong leadership to guide efficient and prudent spending of consumer money.

REFCLs and ACRs cannot prevent a fault, nor can they be “instantaneous”. They do not fulfil the intent of Recommendation 27 of the VBRC. The intention of the VBRC was “for the horror to never be repeated”.

As my community has learned, once the fault happens, it is too late and the subsequent trauma, damage and harm is immense, we have experienced the horror. This must be recognised by both the AER and ESV.

Yours sincerely

Jill Porter

