



---

# **AusNet Electricity Services Pty Ltd**

**Non-network options to comply with  
Bushfire Mitigation Regulations**

**RIT-D Final Project Assessment Report**

October 2018

**missionzero**



## About AusNet Services

AusNet Services is a major energy network business that owns and operates key regulated electricity transmission and electricity and gas distribution assets located in Victoria, Australia. These assets include:

- A 6,574 kilometre electricity transmission network that services all electricity consumers across Victoria;
- An electricity distribution network delivering electricity to approximately 730,000 customer connection points in an area of more than 80,000 square kilometres of eastern Victoria; and
- A gas distribution network delivering gas to approximately 665,000 customer supply points in an area of more than 60,000 square kilometres in central and western Victoria.

AusNet Services' purpose is 'to provide our customers with superior network and energy solutions.'

For more information visit: [www.ausnetservices.com.au](http://www.ausnetservices.com.au)

Our AusNet Services Values are the foundation  
for how we achieve our objectives



## Contact

This document is the responsibility of the Regulated Energy Services business of AusNet Services. Please contact the indicated owner of the document below with any inquiries.

Charlotte Eddy  
AusNet Services  
Level 31, 2 Southbank Boulevard  
Melbourne Victoria 3006  
Ph: (03) 9695 6000

## Table of Contents

1	Introduction and overview .....	4
2	Requirements of the Final Project Assessment Report.....	4
3	Submissions .....	4
4	Preferred option and proposed expenditure .....	4
5	Technical characteristics and estimated construction timetable .....	5
6	Matters detailed in the DAPR .....	8

## 1 Introduction and overview

AusNet Services is subject to new bushfire mitigation regulations that set highly challenging performance standards at 22 zone substations. These standards can only be met by installing Rapid Earth Fault Current Limiters (REFCLs). In addition, the project is time-critical because the regulations set establishment dates, and the Government has reinforced the importance of timely delivery by introducing significant financial penalties if the regulations are not met.

As a major network augmentation, this project is subject to the regulatory investment test for distribution (RIT-D) in accordance with the National Electricity Rules (NER). Under the RIT-D, all credible options, both network and non-network, are evaluated equally and the preferred option is the one that maximises the economic gain or minimises the economic loss to the electricity market. AusNet Services published a Draft Project Assessment Report (DPAR) in August 2017. In its DPAR AusNet Services identified no credible alternatives to meeting its obligations to install REFCLs at the zone substations identified for tranche 1 of the REFCL program. AusNet Services received no responses in relation to the DPAR. The DPAR can be found here:

<https://www.ausnetservices.com.au/-/media/Files/AusNet/About-Us/Regulatory-Publications/AusNet-Services-RIT-D-Draft-Project-Assesment-Report.ashx?la=en>

The next step in the RIT-D process is to prepare and publish a Final Project Assessment Report. AusNet Services has decided to proceed with the installation of REFCLs at the nine Zone Sub Stations included in Tranche 1 of the REFCL program. This FPAR complies with the requirements of Clause 5.17.4(o) of the NER.

## 2 Requirements of the Final Project Assessment Report

Clause 5.17.4(r) of the NER specifies that the final project assessment report must set out:

- (1) if a draft project assessment report was prepared:
  - (i) the matters detailed in that report as required under paragraph (j); and
  - (ii) a summary of any submissions received on the draft project assessment report and the RIT-D proponent's response to each such submission; and
- (2) if no draft project assessment report was prepared, the matters specified in paragraph (j).

In the clause quoted above, paragraph (j) refers to the part of the NER which sets out the contents of the DPAR, which we published in August 2017. Accordingly, this FPAR sets out the matters detailed in the DPAR.

## 3 Submissions

AusNet Services received no submissions on its DAPR.

## 4 Preferred option and proposed expenditure

As set out in our DPAR and our notice of determination under clause 5.17.4(c) of the National Electricity Rules there are no credible non-network options. Additionally, there is no feasible 'do nothing' option as this would result in AusNet Services not complying with its legislative requirements and incurring substantial penalties.

Accordingly the preferred option (and the only credible option) is to install REFCLs at the specified zone substations and to undertake the necessary complementary work required to

integrate the REFCLs with our network. The necessary work is set out in detail in Appendices 1 to 9 of the DAPR. The tranche 1 zone sub stations at which we will install REFCLs are:

- Kinglake Zone Substation
- Barnawartha Zone Substation
- Rubicon A Zone Substation
- Wangaratta Zone Substation
- Wonthaggi Zone Substation
- Seymour Zone Substation
- Woori Yallock Zone Substation
- Myrtleford Zone Substation
- Kilmore South Zone Substation

Consistent with our decision to proceed with this RIT-D project, in August 2017 the AER approved the majority of required expenditure set out in AusNet Services Contingent Project Application. This contingent project application sought funding for the REFCL installation and associated works through an adjustment of AusNet Services' maximum allowed revenue in accordance with Clause 6.6A.2 of the NER. Further detail on our contingent project application can be found here:

<https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/contingent-projects/ausnet-services-contingent-project-installation-of-rapid-earth-fault-current-limiters-tranche-1>

The AER's decision was to allow AusNet Services to recover the efficient cost of the tranche 1 REFCL installation project during the remainder of the 2016–2020 period. The capex and opex amounts contained in the AER's decision are set out in Table 1 below.

**Table 1 AER decision - capital and incremental operating expenditure that is required to undertake the contingent project**

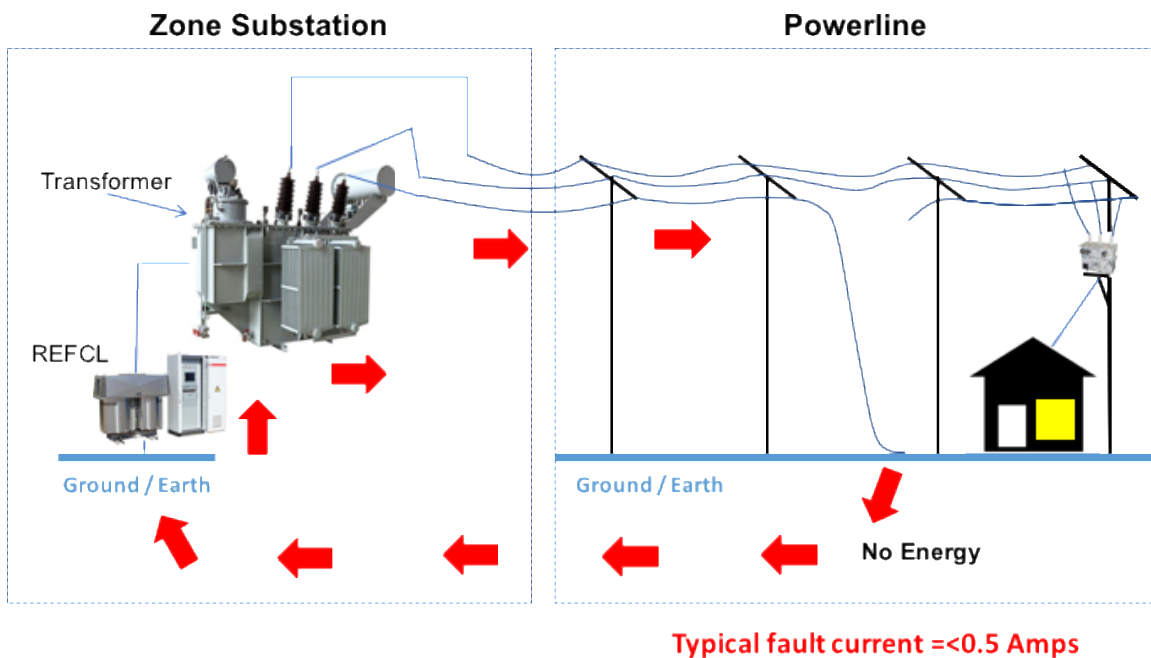
	2016	2017	2018	2019	2020	Total
Incremental capital expenditure	6.94	53.24	39.50	0.12	0.0	99.8
Incremental operating expenditure		0.61	0.71	0.78	0.73	2.83

Source: AER final decision

## 5 Technical characteristics and estimated construction timetable

A REFCL is a type of electricity network protection device, which is designed to minimise the fault current (energy) dissipated from phase to earth (wire to ground) faults on the 22kV network in order to reduce the risk of fire ignition associated with network incidents, as shown below.

Figure 1: How does REFCL technology work?



Source: AusNet Services

There are various types of technology that fall under the REFCL umbrella, however the only type of REFCL currently considered suitable by the Victorian Electric Supply Industry (VESI) for bushfire safety is known as the Ground Fault Neutraliser (GFN), a proprietary product by Swedish Neutral. Presently, the GFN is the only device that can meet the performance criteria of the Regulations.

REFCL technology operating at the required performance standard will minimise the risk of fire ignition associated with phase to ground faults on days of heightened fire danger, such as those experienced on Ash Wednesday and Black Saturday. Based upon a sample period of network fault data, analysis undertaken by the Government and CSIRO predict network fire related incidents associated with the nominated zone substations may be reduced by between 50-55%.

A REFCL operates when a single phase-to-earth fault occurs. Its operation causes the phase to ground voltage of the faulted phase to be reduced to near earth potential (zero volts), thereby working to eliminate the flow of fault current. To achieve this outcome, the REFCL is tuned to the capacitance of the electrical network and a current injected into the transformer neutral that cancels the residual active fault current. This compensation results in phase to ground voltage on the faulted phase reducing to near 0 volts and the fault current being reduced to a very low value. The healthy phases could rise from 12.7kV to 24.2kV, being 22kV plus 10 per cent.

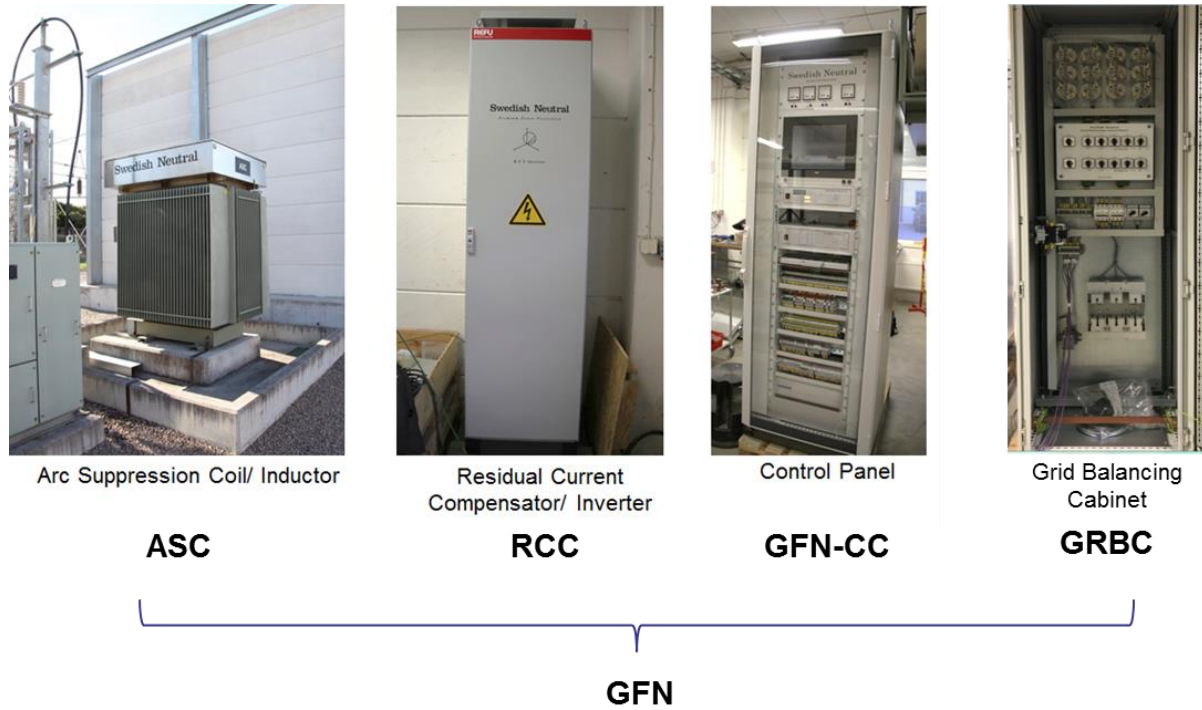
While the REFCL is compensating for a fault, the healthy phases remain energised and customers remain on supply. However, there remains a risk the energised phases may be in an unsafe condition depending on the nature of the network fault. Accordingly, a maximum compensating period will apply, which may be varied subject to a detailed risk assessment.

The REFCL technology is made up of 4 main components:

- Arc Suppression Coil – also known as a large inductor, which compensates for the leakage current during an earth fault.
- Residual Current Compensator – also referred to as the inverter, which is located in the zone substation control building or switchroom. It is used to reduce fault current by compensating for the active current during an earth fault.
- Control Cubicles, which controls the equipment.

- Grid Balancing Cabinet, which fine tunes capacitive imbalance from the zone substation to achieve better detection sensitivity.

Figure 2: Four components to REFCL technology



Source: AusNet Services

A progress and forward plan for all zone substations is presented in Figure 3 below.

Figure 3 Summary of Tranche 1 progress and forward plan

Zone Substation	# of GFN'a	2017				2018				2019		
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Wonthaggi	1	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Myrtleford*	1	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Barnawatha	1	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Kilmore South	1	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Rubicon A	1	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Kinglake*	1	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Wangaratta	2	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Seymour*	2	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		
Woori Yallock	2	Design	Construction	Construction	Construction	Construction	Construction	Construction	Construction	Compliance testing		

\* Associated rebuild activities not included

\*\* Compliance testing is subject to the HV customer solution being in place & completion of line balancing works



Source: AusNet Services

Tranche 1 is currently on track for completion by the mandatory compliance deadline and our latest financial forecasts indicate we will deliver the Tranche 1 Program in line with the AER's approved allowance, notwithstanding unforeseen delivery issues.

Additional details on each site can be found in our Contingent project application here:

<https://www.aer.gov.au/networks-pipelines/determinations-access-arrangements/contingent-projects/ausnet-services-contingent-project-installation-of-rapid-earth-fault-current-limiters-tranche-1>

## 6 Matters detailed in the DAPR

In accordance with clause 5.17.4(j)(11)(iv) of the NER we consider that the proposed option satisfies the regulatory investment test for distribution. The table below shows how each of the requirements of Section 5.17.4(j) were met by the appropriate section of the DPAR.

**Table 2 Regulatory requirements checklist**

Requirement	Section of DPAR
5.17.4(j) The draft project assessment report must include the following:	
(1) a description of the identified need for the investment;	Section 3
(2) the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, reasons that the RIT-D proponent considers reliability corrective action is necessary);	Section 3
(3) if applicable, a summary of, and commentary on, the submissions on the non-network options report;	Not Applicable as none received
(4) a description of each credible option assessed;	Section 5. One credible option identified.
(5) where a Distribution Network Service Provider has quantified market benefits in accordance with clause 5.17.1(d), a quantification of each applicable market benefit for each credible option;	Section 4
(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure;	Section 5
(7) a detailed description of the methodologies used in quantifying each class of cost and market benefit;	Section 4
(8) where relevant, the reasons why the RIT-D proponent has determined that a class or classes of market benefits or costs do not apply to a credible option;	Section 4
(9) the results of a net present value analysis of each credible option and accompanying explanatory statements regarding the results;	Section 5.3
(10) the identification of the proposed preferred option;	Section 5
(11) for the proposed preferred option, the RIT-D proponent must provide:	



(i) details of the technical characteristics;	Section 5 and Appendices 1 to 9
(ii) the estimated construction timetable and commissioning date (where relevant);	Section 5 and Appendices 1 to 9
(iii) the indicative capital and operating cost (where relevant);	Section 5 and Appendices 1 to 9
(iv) a statement and accompanying detailed analysis that the proposed preferred option satisfies the regulatory investment test for distribution; and	Section 6
(v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent; and	Not Applicable
(12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the draft report may be directed.	Section 1.1
<p>5.17.4(k) The RIT-D proponent must publish a request for submissions on the matters set out in the draft project assessment report, including the proposed preferred option, from:</p> <p>(1) Registered Participants, AEMO, non-network providers and interested parties; and</p> <p>(2) if the RIT-D proponent is a Distribution Network Service Provider, persons on its demand side engagement register.</p>	
<p>5.17.4(l) If the proposed preferred option has the potential to, or is likely to, have an adverse impact on the quality of service experienced by consumers of electricity, including:</p> <p>(1) anticipated changes in voluntary load curtailment by consumers of electricity; or</p> <p>(2) anticipated changes in involuntary load shedding and customer interruptions caused by network outages,</p> <p>then the RIT-D proponent must consult directly with those affected customers in accordance with a process reasonably determined by the RIT-D proponent.</p>	
5.17.4(m) The consultation period on the draft project assessment report must not be less than six weeks from the publication of the report.	Section 1.1