
Expulsion Drop Out Fuse Replacement Project

Regulatory Investment Test for Distribution
**Notice of Determination under clause
5.17.4(d) of the National Electricity Rules**



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ISSUE/AMENDMENT STATUS

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Contents

ISSUE/AMENDMENT STATUS	2
1 Introduction	4
2 Background	4
2.1 Asset functions and types	4
2.2 Asset condition	5
3 Identified Need	6
4 Regulatory Obligations	6
5 Screening for Non-network Options	7
6 Next Steps	8

1 Introduction

AusNet Services is a regulated Victorian Distribution Network Service Provider (DNSP) that supplies electrical distribution services to more than 745,000 customers. Our electricity distribution network covers eastern rural Victoria and the fringe of the northern and eastern Melbourne metropolitan area.

As expected by our customers and required by the various regulatory instruments that we operate under, AusNet Services aims to maintain service levels at the lowest possible cost to our customers. To achieve this outcome, we develop forward looking plans that aim to maximise the present value of economic benefit to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

Our approach is to consider network and non-network options on their merits, so that we meet our customers' needs and our compliance obligations at the lowest total cost. Where applicable, we also prepare, publish, and consult on a regulatory investment test for distribution (RIT-D), which further helps ensure all credible options are identified and considered, and the best option is selected.

In relation to the Expulsion Drop Out (EDO) Fuse Replacement project, we have concluded that there are no credible non-network options that are capable of addressing the identified need, which arises from the poor condition of these fuses. In accordance with clause 5.17.4(d) of the National Electricity Rules (NER), therefore, this document is the notification of our determination that there are no credible non-network options in relation to the identified need. Consequently, AusNet Services will not publish a non-network options report as part of the RIT-D for the EDO Fuse Replacement project.

This notice provides contextual background and outlines the reasons for AusNet Services making its determination, along with any methodologies and assumptions used in making that determination. The next stage of the RIT-D process will be the publication of the Draft Project Assessment Report (DPAR), which AusNet Services intends to publish in August 2022.

2 Background

2.1 Asset functions and types

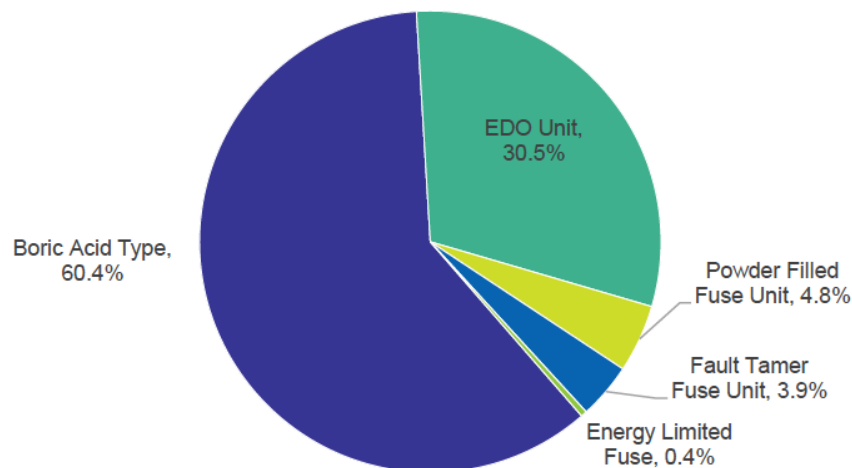
Medium Voltage (MV) Fuse Switch Disconnectors (FSDs) provide the following functions:

- Over-current protection to detect and disconnect faulty electrical equipment or sections of medium voltage line or insulated cable.
- Manual disconnection facilities to isolate electrical equipment and sections of line or cable from voltage sources, which enable the application of protective earth devices. Hence, it provides a safe working condition for line workers.
- In conjunction with “load buster” devices, they provide single-phase switching facilities which enable the manual energisation and de-energisation of electrical equipment or sections of line or cable.

AusNet Services distribution network currently employs several types of MV FSDs. The current type of MV fuses installed on the network are EDO fuses, Boric Acid (**BA**), Energy Limited (**ELF**), Powder Filled (**PF**) and Fault Tamer (**FT**) fuses, where each type of fuse has different characteristics and specific advantages and risks.

Figure 1 shows the population of FSDs on our network by type.

Figure 1: Population of Fuse Switch Disconnectors, by type



EDO FSDs were introduced to the distribution network during the earliest days of electrification of the State. Earlier models of EDOs were of a type referred to as “double vented”, meaning when the fuse operates, the hot material expelled from both top and bottom ends of the fuse carrier. The “double vented” contact and carrier combinations present higher risks of sustained supply outages and fire ignition due to uncontrolled expulsion of arcing products during operation and the relative ease with which birds or animals can short circuit the upper electrical contact to the FSD mounting bracket.

Later models have modified fuse carriers which vent from the bottom end only into a fire choke that catches any molten fuse particles. The single-vented EDOs were introduced around 1985. In operation, the combination of a spring tensioned fuse link and the super-heated gasses created by the arc across the melted fuse link, expel the remnants of the fuse link from the fuse carrier allowing the hinges and trunnions at the base of the carrier to pivot. The pivoting motion releases the top contact of the fuse carrier from its mating contact on the fuse mount and the faulted circuit is thus disconnected.

The performance of all fuse types is assessed in terms of number of failures, number of sustained outages and fire ignition, both in relation to pole and ground. Amongst all types of fuses, the EDO fuse performance is the poorest performing, and hence a proactive replacement program was introduced in 2010 to mitigate the risk of fire ignition and power outage. The failure rate of EDO FSDs is estimated as 0.35% per annum, followed by the Powder Filled FSDs failure rate of 0.32% per annum and Boric Acid FSDs failure rate of 0.03% per annum.

The potential economic impacts of a fuse failure are:

1. Bushfire start;
2. Health and safety impact; and
3. Unserved energy.

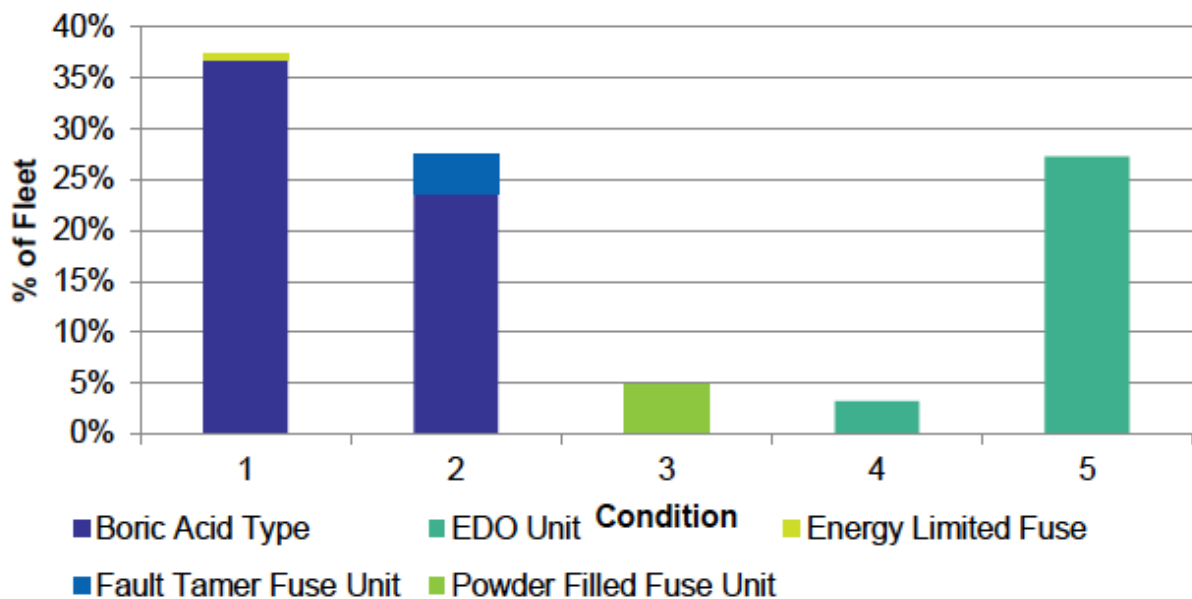
AusNet Services ceased installing new EDO fuse units around the year 2000. The population is reducing as units are progressively removed or replaced from service.

2.2 Asset condition

To provide a consistent assessment of the condition of the whole asset group, a common condition scoring methodology has been developed. This methodology uses the known condition details of each asset and grades that asset against common asset condition criteria.

There are five different condition scores that have been applied to each MV FSD, ranging from “Very Good” (C1) to “Very Poor” (C5). As shown in the figure below, the condition of EDO FSDs are either 4 or 5, which contribute to about 31% of the total MV FSDs’ population.

Figure 2: Condition Profile of MV FSDs



3 Identified Need

There are approximately 5,200 MV FSDs in poor condition across 2,328 sites in High Bushfire Risk Areas and Codified areas in our distribution network. Approximately 98% are EDO FSDs, which are known to perform poorly compared to other MV FSDs. As a consequence, the continued use of MV EDOs on our network exposes customers and the community to a higher likelihood of asset failure leading to bushfire risk, health and safety risk and unserved energy.

4 Regulatory Obligations

In addressing the identified need, we must satisfy our regulatory obligations, which we summarise below.

Clause 6.5.7 of the National Electricity Rules requires AusNet Services to only propose capital expenditure required in order to achieve each of the following:

- (1) *meet or manage the expected demand for standard control services over that period;*
- (2) *comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;*
- (3) *to the extent that there is no applicable regulatory obligation or requirement in relation to:*
 - (i) *quality, reliability or security of supply of standard control services; or*
 - (ii) *the reliability or security of the distribution system through the supply of standard control services**to the relevant extent:*
 - (iii) *maintain the quality, reliability and security of supply of standard control services, and*
 - (iv) *maintain the reliability and security of the distribution system through the supply of standard control services; and*
- (4) *maintain the safety of the distribution system through the supply of standard control services.*

Section 98(a) of the Electricity Safety Act requires AusNet Services to:

design, construct, operate, maintain and decommission its supply network to minimise as far as practicable –

- (a) *the hazards and risks to the safety of any person arising from the supply network; and*
- (b) *the hazards and risks of damage to the property of any person arising from the supply network; and*
- (c) *the bushfire danger arising from the supply network.*

The Electricity Safety act defines 'practicable' to mean having regard to –

- (a) *severity of the hazard or risk in question; and*
- (b) *state of knowledge about the hazard or risk and any ways of removing or mitigating the hazard or risk; and*
- (c) *availability and suitability of ways to remove or mitigate the hazard or risk; and*
- (d) *cost of removing or mitigating the hazard or risk.*

Clause 3.1 of the Electricity Distribution Code requires AusNet Services to:

- (b) *develop and implement plans for the acquisition, creation, maintenance, operation, refurbishment, repair and disposal of its distribution system assets and plans for the establishment and augmentation of transmission connections:*
 - (i) *to comply with the laws and other performance obligations which apply to the provision of distribution services including those contained in this Code;*
 - (ii) *to minimise the risks associated with the failure or reduced performance of assets; and*
 - (iii) *in a way which minimises costs to customers taking into account distribution losses.*

Under clause 5.2 of the Electricity Distribution Code, AusNet Services:

must use best endeavours to meet targets required by the Price Determination and targets published under clause 5.1 and otherwise meet reasonable customer expectations of reliability of supply.

In light of the condition assessment of the EDO FSDs on our network, our assessment is that works are required to address the asset-related risks in accordance with our obligations set out above.

5 Screening for Non-network Options

As detailed in section 3, the identified need in relation to the continued use of EDO FSDs exposes customers and the community to increased risks in relation to:

- Bushfire start;
- Health and safety impact; and
- Unserved energy.

The nature of the above risks are asset-related and cannot be mitigated by a non-network option. Specifically, MV FSDs are an essential component of a safe and reliable distribution network. The need for these assets cannot be addressed by a non-network option. As such, deteriorated and poorly performing assets must be replaced by a modern equivalent asset in order for customers to continue to receive the safe and reliable distribution services that they expect.

For the reasons set out above, our view is that there are no credible non-network options to address the identified need in relation to EDO FSDs. In accordance with the NER requirements, we note that our conclusion is not dependent on any particular assumptions or methodologies.

6 Next Steps

For the reasons set out in Section 3, AusNet Services has determined that there will not be a non-network option that is a credible option, or a non-network component that forms a significant part of a potential credible option in relation to the replacement of EDO FSDs. In accordance with clause 5.17.4(c) of the NER, therefore, AusNet Services will not be publishing a non-network options report as part of the RIT-D for the EDO Fuse Replacement Project.

Any questions on the matters of this determination notice should be submitted by email to ritdconsultations@ausnetservices.com.au.

The next stage of the RIT-D process is the publication of the DPAR, which is required to provide the information set out in clause 5.17.4(j) of the NER, including:

- A description of the identified need for investment.
- The assumptions used in identifying the need for investment, including the reasons why AusNet Services considers the subject of this RIT D requires reliability corrective action.
- A description of each credible option assessed, and their costs, that AusNet Services considers could potentially address the identified need.
- The results of our net present value analysis and accompanying explanatory statements regarding the results.
- Identification of the proposed preferred option that meets the identified need and the RIT-D requirements.
- The contact details for a suitably qualified staff member to whom queries on the draft report may be directed.

AusNet Services intends to publish the DPAR in August 2022.