ElectraNet

MANAGING THE RISK OF TRANSFORMER BUSHING FAILURE

Project Assessment Conclusions Report Summary

11 December 2018

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Executive Summary

This report is the final stage of an investigation of the most economic option to replace transformer bushings at ten substations across South Australia

This Project Assessment Conclusions Report (PACR) is the final consultation report for a Regulatory Investment Test (RIT-T)[1] investigating options to manage the risk of transformer bushing failure in ElectraNet's network.

Specifically, there is a need to replace 101 transformer bushings fitted on 18 power transformers across ElectraNet's transmission network based on their condition. The bushings were installed in the 1960s and 1970s and are now reaching, or past, the end of their technical lives.

The identified transformer bushings are located at the following ten substations:

- Metropolitan substations – Para, Cherry Gardens and LeFevre; and
- Rural substations – Robertstown, Snuggery, Yadnarie, Murray Bridge/ Hahndorf PS1, Murray Bridge/ Hahndorf PS3, Berri and North West Bend.

We assess the condition and required timing of replacement of transformer bushings as part of our ongoing asset management processes. If the identified bushings are not replaced, there is an increased likelihood that a number of these assets will fail within the next 10 years. For example, on 3 August 2018, one of the transformer bushings identified as requiring replacement as part of this assessment suffered an explosive failure.

The potential consequences of transformer bushing failure include oil-fuelled fire with consequential damage to the transformer and other equipment, as well as safety risk to network personnel and the wider community. In a severe scenario, the failed bushing can result in significant unserved energy for electricity customers because of the transformer itself completely failing.

An initial report was released in August 2018 and received no submissions

A Project Specification Consultation Report (PSCR) for this RIT-T published on 22 August 2018 outlined that there is only one feasible option to be considered, which is to replace the end-of-life transformer bushings on a like-for-like basis. This is because bushings play a very specific role in enabling transformers to operate and, without them, transformers, and hence substations, cannot fulfil their role of transforming electrical voltages to higher or lower levels for efficient electrical power transportation to downstream transmission and distribution end-use customers.

The PSCR assessed different timings of this replacement option and concluded that replacing the identified bushings as soon as practicable is the preferred option because of the avoided risk costs of transformer bushing failure and avoided associated corrective maintenance.

The PSCR also outlined why there is not expected to be a feasible role for network support solutions in addressing the identified need because of the specific role that the identified bushings play in the transmission of electricity and their relatively low replacement cost.

[1] The Regulatory Investment Test for Transmission (RIT-T) is the economic cost benefit test that is overseen by the Australian Energy Regulator (AER) and applies to all major network investments in the National Electricity Market.

No submissions were received on the PSCR.

This report maintains the initial conclusion that replacing the identified bushings in the next three years is the preferred option

The preferred option continues to be replacing the identified transformer bushings in the next three years; i.e. as opposed to deferring this expenditure any further. This replacement work is estimated to have a total capital cost of $6.86 million ($2017-18).

We have undertaken a thorough sensitivity testing exercise to investigate the robustness of the RIT-T assessment to underlying assumptions about each of the key variables. For all sensitivity tests undertaken, the preferred option remains replacing the identified bushings in the next three years.

Next steps

ElectraNet intends to commence work on replacing the identified bushings in January 2019.

There are 101 transformer bushings, on 18 power transformers across South Australia that require replacing. We are planning to have all bushings replaced by 2021-22.

Further details in relation to this project can be obtained from:

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