Investment Evaluation Summary (IES)

Project Details:

Project Name:	Replace Regulator Single Phase (Cooper) - Faults / Issues / End of life
Project ID:	00649
Thread:	HV Regulators
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	D
Work Category Code:	REURG
Work Category Description:	Replace Regulator Ground Mtd Single Phase
Preferred Option Description:	Option 1: Replace Regulators Replace regulators or defective components when asset failure occurs or they are in a condition where refurbishment is not a viable solution. Advantages: • Proactive replacements • Less unplanned failures • System performance maintained Disadvantages: • CAPEX required
Preferred Option Estimate (Nominal Dollars):	$200,000

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Unit ($)	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
Volume	1	0	1	0	1	0	1	0	1	0
Estimate ($)	$40,000	$0	$40,000	$0	$40,000	$0	$40,000	$0	$40,000	$0
Total ($)	$40,000	$0	$40,000	$0	$40,000	$0	$40,000	$0	$40,000	$0

Governance:

Project Initiator:	James Goodger	**Date:**	25/03/2015
Thread Approved:	David Ellis	**Date:**	02/11/2015
Project Approver:	David Ellis	**Date:**	02/11/2015

Document Details:

Version Number:	1

Related Documents:

Description	URL
Replace Regulator Single Phase (Cooper) - Faults / Issues / End of life - IES	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/High%20Voltage%20Regulators/DRAFT%20IES%20REURG%20Replace%20Regulator%20Single%20Phase%20(Cooper)%20-%20Faults%20-%20Issues%20-%20End%20of%20Life.docx

Section 1 (Gated Investment Step 1)

1. Background

High voltage (HV) regulators are installed at various locations along high voltage feeders to maintain voltage levels within the distribution network to industry acceptable standards.

HV regulators are generally located on rural 11 kV and 22 kV feeders according to the load and length of these feeders, with several installed in rural zone substations to provide on load tapping.

HV regulators can be split into two groups:

- Single phase units - usually pole mounted in an open-delta configuration (two tanks), but may also be ground mounted; and
- Three phase units - typically older units that are ground mounted within a fenced enclosure.

There are 42 high voltage regulator sites on the network that use single phase regulators.

Figure 2 - Typical pole mounted single phase open-delta voltage regulator

1.1 Investment Need

The HV regulators are a critical installation on the network for ensuring power quality remains with acceptable limits and compliant with regulatory requirements. Routine maintenance and refurbishment of these units is undertaken to maximise their service life.

However historically premature and unforseen failures have occurred on these assets requiring the need for unplanned asset replacement to be undertaken. These failures have occurred as a result on failure within the units or external factors causing a fault within the unit. Historically one failure has occurred every two years. The forecasted future rate of replacement is based on the historical rate of failures.

1.2 Customer Needs or Impact

TasNetworks continues to undertake a consumer engagement as part of business as usual and through the voice of the customer program. This engagement seeks in depth feedback on specific issues relating to:

• how it prices impact on its services

• current and future consumer energy use

• outage experiences (frequency and duration) and expectations

• communication expectations

• STPIS expectations (reliability standards and incentive payments)

• Increase understanding of the electricity industry and TasNetworks

Consumers have identified safety, restoration of faults/emergencies and supply reliability as the highest performing services offered by TasNetworks.

Consumers also identified that into the future they believe that affordability, green, communicative, innovative, efficient and reliable services must be provided by TasNetworks.

This project specifically addresses the requirements of consumers in the areas of;

• safety, restoration of faults/emergencies and supply reliability

• affordability, green, communicative, innovative, efficient and reliable services

Customers will continue to be consulted through routine TasNetworks processes, including the Voice of the customer program, the Annual Planning Review and ongoing regular customer liaison meetings.

1.3 Regulatory Considerations

This project is required to achieve the following capital and operational expenditure objectives as described by the National Electricity Rules section 6.5.7(a)

and 6.5.6(a).

6.5.7 (a) Forecast capital expenditure

(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) the 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.

2. Project Objectives

To provide major (life extending) repair or replacement of single phase regulators (Cooper or equivalent), outside of normal routine mechanical maintenance.

3. Strategic Alignment

3.1 Business Objectives

Strategic and operational performance objectives relevant to this project are derived from TasNetworks 2014 Corporate Plan, approved by the board in 2014. This project is relevant to the following areas of the corporate plan:

• We understand our customers by making them central to all we do.

• We enable our people to deliver value.

• We care for our assets, delivering safe and reliable networks services while transforming our business.

3.2 Business Initiatives

The business initiatives that relate to this project are as follows:

• Safety of our people and the community, while reliably providing network services, is fundamental to the TasNetworks business and remains our immediate priority

• We care for our assets to ensure they deliver safe and reliable network services

• We will transform our business with a focus on:

- an appropriate approach to the management and allocation of risk

- a well run, efficient business, that delivers sustainable returns to the Tasmanian community and is resilient to future challenges.

The strategic key performance indicators that will be impacted through undertaking this project are as follows:

• Price for customers – lowest sustainable prices

• Zero harm – significant and reportable incidents

• Network service performance – outcomes under service target performance incentive schemes

• Sustainable cost reduction – efficient operating and capital expenditure

4. Current Risk Evaluation

If TasNetworks does not proactively refurbish or replace HV regulators when the assets are showing signs of poor health there will be a decrease in both the reliability and quality of customer supply.

When asset failures occur there would be loss of customer supply to those customers downstream of the failed assets. Where supply could be maintained the voltage levels downstream of the failed regulator would be noncompliant regulatory requirements.

The business risk associated with these assets has been evaluated by using the TasNetworks risk framework.

4.1 5x5 Risk Matrix

TasNetworks business risks are analysed utilising the 5x5 corporate risk matrix, as outlined in TasNetworks Risk Management Framework.

Relevant strategic business risk factors that apply are follows:

Risk Category	Risk	Likelihood	Consequence	Risk Rating
Customer	Regulator failure or equivalent asset issue would result in loss of supply to customers.	Possible	Moderate	Medium

	Voltage levels would most likely also be noncompliant with regulatory requirements.			
Network Performance	Regulator failure or equivalent asset issue may result in significant customer disruption, in terms of voltage compliance, downstream of the regulator.	Possible	Moderate	Medium

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	James Goodger	**Date:**	25/03/2015
Line Manager:		**Date:**	
Manager (Network Projects) or Group/Business Manager (Non-network projects):		**Date:**	
[Send this signed and endorsed summary to the Capital Works Program Coordinator.]			

Actions			
CWP Project Manager commenced initiation:		**Assigned CW Project Manager:**	
PI notified project initiation commenced:		**Actioned by:**	

Section 2 (Gated Investment Step 2)

5. Preferred Option:

The preferred solution is to replace the single phase regulator when premature failures occur or when the condition indicates that a failure is likely to occur and refurbishment of the units is not a viable solution.

The forecast rate of replacement is based on historical failures, where units have failed due to rust or insulation failure due to manufacturing defects or harsh environmental factors.

5.1 Scope

Work that may be undertaken:

1. Replacement of the high voltage regulators;
2. Replacement of the perimeter fence; and
3. Replacement of other infrastructure e.g. cables, gantries etc.

5.2 Expected outcomes and benefits

This program allows for major repairs or replacement of single phase regulators, in the event of premature or unexpected failure (for example third party damage, or manufacturing defects that are outside the warranty period). Volumes have been based on historical failures, where units have failed due to rust or insulation failure due to manufacturing defects or harsh environmental factors.

5.3 Regulatory Test

Not applicable.

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Option 0: Do Nothing The regulators run to failure and are replaced under fault. Advantages: • Deferral of CAPEX • Lowest cost solution Disadvantages: • Supply issues downstream from failures • Voltage drops downstream from failures • Noncompliance with regulatory obligations • Increase in OPEX This option does not keep the business risks at an acceptable level.
Option 1 (preferred)	Option 1: Replace Regulators Replace regulators or defective components when asset failure occurs or they are in a condition where refurbishment is not a viable solution. Advantages: • Proactive replacements • Less unplanned failures • System performance maintained Disadvantages: • CAPEX required

6.2 Summary of Drivers

Option	
Option 0	Does not address the risk to power quality / customer impact
Option 1 (preferred)	Ensure regulator site continues to be serviceable and does not present an unacceptable risk of failure (power quality / customer impact).

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$0

Option 1 (preferred)	$200,000

6.4 Summary of Risk

Option 0: Do Nothing

Customer and performance risks will remain at 'Medium', but will increase with time as the regulators condition deteriorates.

Option 1: Replace HV regulator site or major components.

Customer and performance risks will remain constant at a 'Medium' risk.

6.5 Economic analysis

Option	Description	NPV
Option 0	Option 0: Do Nothing The regulators run to failure and are replaced under fault. Advantages: • Deferral of CAPEX • Lowest cost solution Disadvantages: • Supply issues downstream from failures • Voltage drops downstream from failures • Noncompliance with regulatory obligations • Increase in OPEX This option does not keep the business risks at an acceptable level.	$0
Option 1 (preferred)	Option 1: Replace Regulators Replace regulators or defective components when asset failure occurs or they are in a condition where refurbishment is not a viable solution. Advantages: • Proactive replacements • Less unplanned failures • System performance maintained Disadvantages: • CAPEX required	$0

6.5.1 Quantitative Risk Analysis

Not applicable.

6.5.2 Benchmarking

Not applicable.

6.5.3 Expert findings

Not applicable.

6.5.4 Assumptions

This program assumes that major regulator failures will continue at an approximate rate of one tank every two years. This is equivalent to one open delta site every four years, or a closed delta site every six years.

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	James Goodger	**Date:**	25/03/2015
Project Manager:		**Date:**	

Actions			
Submitted for CIRT review:		**Actioned by:**	
CIRT outcome:			