Investment Evaluation Summary (IES)

Project Details:

Project Name:	LV regulation device trial
Project ID:	01001
Thread:	Non Network Solutions
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	NNNOC
Work Category Description:	Non Network Solutions Network Optimisation Capex
Preferred Option Description:	
Preferred Option Estimate (Nominal Dollars):	

	17/18	18/19	19/20
Unit ($)	N/A	N/A	N/A
Volume	2	1	1
Estimate ($)			
Total ($)	$27,600	$34,800	$34,800

Governance:

Project Initiator:	Daniel Capece	**Date:**	04/06/2015
Thread Approved:	Andrew Fraser	**Date:**	19/10/2015
Project Approver:	Stephen Jarvis	**Date:**	19/10/2015

Document Details:

Version Number:	1

Related Documents:

Description	URL
Economic analysis for LV network devices	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Non-Networks%20Solutions/LV%20regulation%20trial/TasNetworks%20NPV%20Template_Engo%20V10.XLSM
LV studies report for 4 trail sites	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Non-Networks%20Solutions/LV%20regulation%20trial/LV_Studies.DOC
estimated costs for LV statcom and Varentec Engo-V10 at trial sites	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Non-Networks%20Solutions/LV%20regulation%20trial/LV%20statcom%20and%20Varentec%20Engo-V10%20estimated%20costs.xlsx

Section 1 (Gated Investment Step 1)

1. Background

Active voltage regulation has been identified by TasNetworks as a vital tool to manage LV voltage. Healthy LV networks provide suitable power quality as well as facilitate greater renewable penetration. Many active regulating devices are now available from multiple vendors. TasNetworks sees value in introducing this technology into the network, but must first prove the value through in field trials.

1.1 Investment Need

The electricity network is evolving rapidly. The rise of distributed generation such as rooftop solar and variable loads such as heat pumps has caused load to be significantly more volatile. This, against the backdrop of rising cost pressures, has casued TasNetworks to seek innotavive solutions to low voltage issues.

The aim of this project is to:

- Determine if LV regulation devices are a solution to low voltage network voltage issues;
- Show how these solutions stack up against traditional solutions such as feeder augmentaton; and
- Determien the domain of problems which can be sovled economically with this solution.

The selected sites for the technology trial have marginal PQ issues, which will be solved using the pole mounted LV capacitor banks.

1.2 Customer Needs or Impact

TasNetworks continues to undertake 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 its prices impact on its services;
- Current and future consumer energy use;
- Communication expectations;
- Increased 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.

Looking forward, consumers believe the electricity network should be affordable, environmentally friendly (green), communicative, innovative, efficient and reliable service provider.

This project specifically addresses the requirements of consumers in the areas of power quality compliance and innovation. Where existing problems can be solved utilising new technologies at a lower cost than augmenting the network.

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 assists in meetng the following capital expenditure objectves:

- Meet or manage the expected demand for standard control services;
- comply with all applicable regulatory obligatons or requirements associated with the provision of standard control services;
- maintain the quality, reliability and security of supply of standard control services; and
- maintain the reliability and security of the distributon system through the supply of standard control services.

The most expensive credible opton is less than $5m and therefore does not require a regulatory investment test.

This project assists TasNetworks to manage the voltage performance on the LV network allowing compliance with the Tasmanian Electricity Code.

2. Project Objectives

The aim of this project is to trial LV voltage regulation technology as a cost-effective alternative to the traditional transformer and LV circuit upgrades used to address LV voltage regulation issues. The proposed trial will:

- Prove the technology for specified voltage regulation problems;
- Provide an understanding of optimum equipment sizes and connection locations in given problematic network areas;
- If the trial is successful, handover of the LV capacitor as a business as usual capability, including documentation for design, installation, operation and maintenance, staff training and support and HSE procedures.

3. Strategic Alignment

3.1 Business Objectives

The 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.:

- Sustainable Cost Reduction -Efficient operating and capital expenditure.Reduce the initial capital cost of providing distribution network services.
- Network Service Performance -Meet TEC standards and Develop a cost effective solution to address the voltage control issues associated with long LV circuits.

3.2 Business Initiatives

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

- Customer engagement and service – customer net promoter score
- Price for customers – lowest sustainable prices
- Network service performance – meet network planning standards
- Sustainable cost reduction – efficient operating and capital expenditure

4. Current Risk Evaluation

The risks identified include voltage non-compliance, customers experience PQ issues and under utilisation of the network.

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	Customers experience poor power quality	Unlikely	Minor	Low
Financial	Excessive operational or network augmentation costs to address non-compliant voltages.	Possible	Negligible	Low
Network Performance	Under-utilisation of the network due to poor power factor	Unlikely	Negligible	Low
Regulatory Compliance	Voltage non-compliance with T.E.C	Rare	Moderate	Low
Reputation	TasNetworks seen as risk averse and not willing to innovate	Unlikely	Minor	Low

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Daniel Capece	**Date:**	04/06/2015
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 option is to trial pole mounted capacitor banks. The product will allow TasNetworks to manage voltage compliance using a more efficient alternative.

This is a lower cost option demonstrating almost twenty percent cost savings compared to the augmentation option. This trial is important to demonstrate options for addressing power quality issues on the network at a lower cost.

Benefits include:

- No network upgrades that are otherwise required at the trial sites due to non-compliant voltage issues and
- The technology proven for future deployments as necessary whilst maintaining the same level of voltage regulation.

5.1 Scope

The proposed trial considers pole-mounted LV capacitors to address the following power quality issues (include under and over-voltage, voltage imbalance between phases and poor power factor).

The technology will be trialled in the following sites that represent a range of network characteristics including:

- A single phase 10 kVAr unit is required for Tinderbox Rd Tinderbox, T620331 25 kVA. The site currently incurs high voltage due to solar energy export. This is a rural area with only four residential loads, low R/X ratio of the conductors(7/4.50AAC_Mercury), and a single 6 kW PV connection.
- A single phase 10 kVAr unit is required for Western Creek Rd Western Creek, T560135 15 kVA. The site currently incurs high voltage due to solar energy export. This is a rural area with only two residential loads, small conductors (7/.064_Cu); and a single 5 kW PV connection.
- Two three-phase 30 kVar unit for Walford Rd, Lower Sandy Bay, T121126 500 kVA. The site incurs low voltage issues during peak demand at Chessington Court. This is an urban network area characterized by evenly allocated residential loads, high R/X ratio of the conductors (19/.064_Cu and 7/3.75AAC_Mars) and very few solar PV connections on the network.
- Two three-phase 30 kVar unit for Fehre Court Sandy Bay, T121201 750 kVA. The site incurs low voltage issues during peak demand. This is an urban network area characterized by evenly allocated residential loads, low R/X ratio of the conductors (19/.083_Cu and 7/4.50AAC_Mercury); and very few solar PV connections.\

THis scope also includes the standard steps requied for introducing new technologies into the network such as:

- Training;
- Testing; and
- Developing documentation such as standards.

5.2 Expected outcomes and benefits

The preferred solution is to fully trial emerging innovations and to introduce it into the business.

5.3 Regulatory Test

The most expensive credible opton is less than $5m and therefore does not require a regulatory investment test.

6. Options Analysis

Each option investigated would address the voltage non-compliance issues experienced by customers connected to the LV network.

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1	Install pole mounted capacitor banks
Option 2	Install an LV statcom
Option 3	Augment the network.

6.2 Summary of Drivers

Option	
Option 0	
Option 1	Correctly sized pole top capacitors can address the voltage compliance issues. This option addresses power factor and voltage control. Overvoltage issues are addressed by reducing the tap at the substation. This option allows the current network to be operated more efficiently.
Option 2	LV statcom will address the non-compliance issue.The devices have power factor control and fine voltage regulation that can address both under and over voltages. This option allows the current network to be operated more efficiently.
Option 3	This addresses the voltage compliance issues and adds additional capacity into the network.

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$0
Option 1	$125,760
Option 2	$360,000
Option 3	$154,144

6.4 Summary of Risk

A trial validating the performance of the LV regulation devices will minimise customer PQ issues and improve the utilisation of the LV network.

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	$0
Option 1	Install pole mounted capacitor banks	$790,647
Option 2	Install an LV statcom	$590,652
Option 3	Augment the network.	$774,961

6.5.1 Quantitative Risk Analysis

6.5.2 Benchmarking

6.5.3 Expert findings

6.5.4 Assumptions

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Daniel Capece	**Date:**	04/06/2015
Project Manager:		**Date:**	

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