Investment Evaluation Summary (IES)

Project Details:

Project Name:	Replace Distribution Substation Battery System
Project ID:	00395
Thread:	Protection and Control
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	D
Work Category Code:	REGAU
Work Category Description:	Replace Ground Mtd Auxiliary Equip
Preferred Option Description:	Option 1 (preferred): Capital-based 5-yearly battery replacements plus 10-yearly battery system replacements (in accordance with manufacturer's recommendation). Replace batteries and chargers on 5-yearly and 10-yearly cycles respectively, removing the need to stage more costly OPEX-based bi-annual battery tests. Advantages: costs in completing this work are sustainable, minimises likelihood of risk exposure due to failure in service. Disadvantages: requires significant spares holdings, and batteries can't be stored long term (due to the battery expiry date).
Preferred Option Estimate (Nominal Dollars):	$1,288,510

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Unit ($)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume	17	17	17	17	17	17	17	17	17	17
Estimate ($)										
Total ($)	$128,851	$128,851	$128,851	$128,851	$128,851	$128,851	$128,851	$128,851	$128,851	$128,851

Governance:

Project Initiator:	Tim Sutton	**Date:**	11/03/2015
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
IES	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Protection%20and%20Control/REGAU%20Replace%20Distribution%20Substation%20Battery%20System.docx
NPV	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Protection%20and%20Control/NPV%20REGAU.xlsm

Section 1 (Gated Investment Step 1)

1. Background

TasNetworks (TN) has a fleet of distribution substations with unit feeder protection schemes (Translay) installed, totalling 161 (2013/14). With an ageing fleet of distribution substations (and associated auxiliary equipment), TN has been incrementally upgrading the battery systems (battery chargers) to new ones to ensure the ongoing reliability of the protection. As these systems are upgraded, TN has been moving away from the historic bi-annual OPEX-based battery testing regime, and transitioning to a five-year Capex-based battery replacement program (no longer requiring battery maintenance). The remaining systems on the original regime have been maintained at the 6-monthly interval to ensure battery failures are kept to a minimum until such time as the battery system is replaced.

Over the forthcoming regulatory period, a schedule has been developed concerning:

- 5-yearly replacement cycles of the batteries; and
- 10-yearly replacement cycles of the battery chargers.

This capital-based replacement program will ensure the protection systems will be in sufficient working order to operate successfully in event of power system faults.

1.1 Investment Need

The distribution substations with Translay protection have an average age of 37.59 years (2013/14). As such the associated battery systems have been upgraded out of necessity to ensure they are in good working order.

Estimations indicate that in 2017/18, all of the associated substations would have transitioned away from the OPEX-based battery inspection regime to the new CAPEX-based replacement program. As such, investment will be required to continue to replace batteries on 5-year cycles and battery chargers on 10-year cycles (in line with manufacturer's recommendations).

The main driver for TN's replacement program is age-based replacement and this is standard practice among DNSPs with assets of this class.

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); and
- 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.

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). (4) maintain the safety of the distribution system through the supply of standard control services.

2. Project Objectives

The objective of this project is to refurbish distribution substation batteries and battery systems on 5-year and 10-year cyclic programs respectively.

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

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
- Sustainable cost reduction – efficient operating and capital expenditure

4. Current Risk Evaluation

Do nothing is not an acceptable option to TN's risk appetite. If the battery system equipment was not systematically replaced, its eventual failure could result in severe damage to plant, equipment and personnel. The level of risk identified is such that a treatment plan is required to reduce the risks to a tolerable level, in line with TasNetworks' Risk Management 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	Outage effects on customer	Unlikely	Major	Medium
Environment and Community	Environmental damage	Rare	Moderate	Low
Financial	Penalties resulting from reliability events in the critical infrastructure area	Possible	Minor	Low

Network Performance	Damage to plant and equipment with asset failure	Possible	Moderate	Medium
Regulatory Compliance	Penalties resulting from reliability events in the critical infrastructure area	Possible	Moderate	Medium
Reputation	Outage effects on customer	Possible	Minor	Low
Safety and People	Damage to personnel and/or the general public	Possible	Minor	Low

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Tim Sutton	**Date:**	11/03/2015
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:

Capital-based 5-yearly battery replacements plus 10-yearly battery system replacements (in accordance with manufacturer's recommendation).

5.1 Scope

The scope of works is as follows:

- Replace distribution substation batteries on 5-year cycles in accordance with manufacturer's recommendation; and
- Replace battery chargers on 10-yearly cycles in accordance with manufacturer's recommendation.

This REPEX project will maintain the integrity of the distribution substation battery systems, keeping the Translay protection systems operational at minimal cost to the customer.

5.2 Expected outcomes and benefits

The expected outcomes and benefits are:

- A reliable DC system is maintained so that protection systems can operate as designed; and
- Lowest possible cost is passed to the customer.

Estimations indicate that in 2017/18, all of the associated substations would have transitioned away from the OPEX-based battery inspection regime to the new CAPEX-based replacement program. As such, investment will be required to continue to replace batteries on 5-year cycles and battery chargers on 10-year cycles (in line with manufacturer's recommendations). The main driver for TN's replacement program is age-based replacement and this is standard practice among DNSPs with assets of this class.

5.3 Regulatory Test

Not applicable.

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Option 0: Do nothing. Let the distribution substation battery systems run to failure. Advantages: lowest cost solution. Disadvantages: does not reduce the risk associated with inoperable protection schemes in the Hobart CBD, puts primary assets, personnel and the general public at risk once protection becomes inoperable.
Option 1 (preferred)	Option 1 (preferred): Capital-based 5-yearly battery replacements plus 10-yearly battery system replacements (in accordance with manufacturer's recommendation). Replace batteries and chargers on 5-yearly and 10-yearly cycles respectively, removing the need to stage more costly OPEX-based bi-annual battery tests. Advantages: costs in completing this work are sustainable, minimises likelihood of risk exposure due to failure in service.

	Disadvantages: requires significant spares holdings, and batteries can't be stored long term (due to the battery expiry date).
Option 2	Option 2: Revert to OPEX-based bi-annual testing regime and hold spare chargers. Use OPEX funding to test battery systems at 6-month intervals and change out faulty cells as required. Advantages: reduces risk of battery failure, less chargers to procure. Disadvantages: more costly than Option 1 (battery replacement), doesn't mitigate the possibility of the charger failing in service, meaning the charger would fail in service before being changed over to the spare, less reliable solution in terms of keeping the protection in acceptable working order.

6.2 Summary of Drivers

Option	
Option 0	Keep a reliable DC supply to the protection system - does not address risk. Minimum cost to the customer - does not address.
Option 1 (preferred)	Keep a reliable DC supply to the protection system - addresses risk. Minimum cost to the customer - addresses.
Option 2	Keep a reliable DC supply to the protection system - partially addresses risk. Minimum cost to the customer - does not address.

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$0
Option 1 (preferred)	$1,288,510
Option 2	$1,675,858

6.4 Summary of Risk

This section outlines an overall residual asset risk level, for each of the options.

Option	Risk Assessment
Option 0	Medium
Option 1 (preferred)	Low
Option 2	Medium

6.5 Economic analysis

Option	Description	NPV
Option 0	Option 0: Do nothing. Let the distribution substation battery systems run to failure. Advantages: lowest cost solution.	$0

	Disadvantages: does not reduce the risk associated with inoperable protection schemes in the Hobart CBD, puts primary assets, personnel and the general public at risk once protection becomes inoperable.	
Option 1 (preferred)	Option 1 (preferred): Capital-based 5-yearly battery replacements plus 10-yearly battery system replacements (in accordance with manufacturer's recommendation). Replace batteries and chargers on 5-yearly and 10-yearly cycles respectively, removing the need to stage more costly OPEX-based bi-annual battery tests. Advantages: costs in completing this work are sustainable, minimises likelihood of risk exposure due to failure in service. Disadvantages: requires significant spares holdings, and batteries can't be stored long term (due to the battery expiry date).	-$896,593
Option 2	Option 2: Revert to OPEX-based bi-annual testing regime and hold spare chargers. Use OPEX funding to test battery systems at 6-month intervals and change out faulty cells as required. Advantages: reduces risk of battery failure, less chargers to procure. Disadvantages: more costly than Option 1 (battery replacement), doesn't mitigate the possibility of the charger failing in service, meaning the charger would fail in service before being changed over to the spare, less reliable solution in terms of keeping the protection in acceptable working order.	-$1,154,677

6.5.1 Quantitative Risk Analysis

Not applicable.

6.5.2 Benchmarking

Similar strategies have been adopted by mainland utilities for their regulatory submissions.

6.5.3 Expert findings

Not applicable.

6.5.4 Assumptions

All costs are in 2014/15 dollars.

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Tim Sutton	**Date:**	11/03/2015
Project Manager:		**Date:**	

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