Investment Evaluation Summary (IES)

Project Details:

Project Name:	Stand Alone Power Systems
Project ID:	02837
Business Segment:	Distribution
Thread:	Innovation
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:	Implement SAPS pilot program to test and prove the use of modal SAPS to supply remote customers, including removal of existing network connection
Preferred Option Estimate (Dollars $2016/2017):	$5,122,000

	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29
Unit ($)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Estimate ($)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total ($)	$550,000	$510,000	$496,000	$516,000	$550,000	$500,000	$500,000	$500,000	$500,000	$500,000

Governance:

Works Initiator:	Andrew Fraser	Date:	02/10/2018
Team Leader Endorsed:	Andrew Fraser	Date:	02/10/2018
Leader Endorsed:	Stephen Jarvis	Date:	26/11/2018
General Manager Approved:	Wayne Tucker	Date:	26/11/2018

Related Documents:

Description	URL

Section 1 (Gated Investment Step 1)

1. Overview

1.1 Background

The distribution network in Tasmania grew dramatically from 1950 to 1990, as the Hydro Electric Commission rolled out electrification across East Coast, West Coast, Central and North parts of the State. During this electrification period, the network was extended to many remote rural sites to facilitate new load connections as required. These practices have resulted in sites where small isolated loads are connected at the end of long distribution spur lines. These spur lines often travel through heavily vegetated areas in mountainous terrain. Issues associated with supplying these small isolated loads include:

1. Ongoing pole inspection and replacement costs relative to the supplied load
2. Ongoing bushfire mitigation and vegetation clearing costs
3. Fault operation cost
4. Supply reliability and quality
5. Revenue collected from these customers.

TasNetworks has experience in the area of generator performance, as a result of assesment of large scale generation. We have applied this expertise to a diesel backup generation system for the Strahan township. The technical performance of the SAPS system provided some valuable learnings on the issues associated with SAPS systems, and forms the basis for further pilot implementation of subsequent sites.

1.2 Investment Need

Many spur distribution lines are approaching the end of the design line. The ongoing maintenance involves bushfire mitigation, vegetation clearing, fault operations, pole inspections and replacement. At the same time, the total load consumption of the connected customers is relatively small.

The ongoing maintenance issue has resulted in the need to implement an alternative solution in order to reduce the related distribution cost.

Renewable energy and battery technology has now created a cost effective alternative to maintaining long rural lines.

1.3 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 prices impact on 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.

Where implemented, the local connected customers will be specifically consulted prior to the project implementation.

1.4 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.

TasNetworks notes the AEMCs Stand Alone Power System consultation process currently underway and supports the move towards network initiated SAPS, as a mechanism to trim the fringes of the grid and save considerable cost in maintaining long rural lines that service few customers.

2. Project Objectives

The high level objective of this project is to reduce the operating cost of the distribution network at a small number of specific locations

The aim of this project is to deploy a standalone power system at a site each year, where necessary and justified as a cost effective alternative to the existing distribution spur line.

Analysis of customer loads and network segments have provided at least 29 sites where SAPS appear viable. The assessment has considered length of line connected, length of vegetation maintenance required, pole and conductor condition assessment, as well as preliminary consideration of SAPS design required to service the load.

However several assumptions are made in this analysis that require a pilot program to explore further. The assumptions include development of a cost effective modular solution that meets the same technical performance as the network, the "grid like" service. This aspect is generally easier for residential loads, however the sites identified as viable also include communications sites and ancillary hydro generation sites, often with difficult load patterns, such as welders and motors.

The communications sites have unique challenges such as 4wd only access and regular snow cover for weeks at a time. Initial customer consultation with a communications site customer have revealed customer concerns for the performance of the SAPS under these extreme weather conditions.

The objective of this pilot program is to test and prove the SAPS technology on a range of different load types. As such 5 sites have been selected to test the range of technical issues across residential, communications and ancillary generation sites.

The standalone power system will be an efficient combination of diesel generators, battery banks and renewable energy sources such as wind or solar. The equipment sizing will mainly be dictated by optimising the implementation cost, but such factors as environment impact will be taken into account. The pilot phase will explore technical and customers challenges to prove the business case for implementing SAPS at further sites across the network.

The project is to achieve the following outcomes:

- Reduce the cost of providing distribution network services, by avoiding distribution line 1. maintenance costs;
- Provide a reliable supply for the connected customers and grid equivalent performance; and

- Reduce the need for fault response in difficult terrains contributing to a safe environment for employees, customers and the general public.

3. Strategic Alignment

3.1 Business Objectives

Strategic and operational performance objectives relevant to this project are derived from TasNetworks 2017-18 to 2021-22 Corporate Plan, approved by the board in 2017. 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; and

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

3.2 Business Initiatives

This is a new program of work and aligns with the following business strategies:

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

The TasNetworks Transformation Roadmap 2025 lists the following for consideration:

- Voice of the customer: We anticipate and respond to your changing needs and market conditions.
- Network and operations productivity: We'll improve how we deliver the field works program, continue to seek cost savings and use productivity targets to drive our business.
- Electricity and telecoms network capability: To meet your energy needs and ensure power system security, we'll invest in the network to make sure it stays in good condition, even while the system grows more complex.
- Predictable and sustainable pricing: To deliver the lowest sustainable prices, we'll transition our pricing to better reflect the way you produce and use electricity.
- Enabling and harnessing new technologies and services: By investing in technology and customer service, we'll be better able to host the technologies you're embracing.

4. Current Risk Evaluation

The risk matrix below has been applied to the current supply situation at sites that may suited to a future SAPS implementation. It illustrates that risk ratings are typically 'high' in relation to 'environment and community' and 'safety and people'. We consider that SAPS implementation provides an opportunity to reduce these risk ratings. A full risk assessment will be undertaken for each site prior to making an implementation decision.

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 as follows:

Risk Category	Risk	Likelihood	Consequence	Risk Rating
Customer	Disruption to customers with declining network reliability	Likely	Minor	Medium
Environment and Community	Vegetation contact and/or asset failure results in a catastrophic bushfire with widespread loss of property	Unlikely	Severe	High
Financial	The business continues to incur the financial burden associated with maintaining the existing feeder	Almost Certain	Minor	Medium
Network Performance	Interruption of supply to customers (and detrimental power quality)	Likely	Minor	Medium
Regulatory Compliance	Increased number of unplanned outage leads to local NCEF breaches	Possible	Minor	Low
Reputation	Bushfire and/or asset failure results in significant media coverage	Unlikely	Moderate	Medium
Safety and People	Bushfire and/or asset failure results in a fatality or permanently impairs a person's life	Unlikely	Severe	High

5. Preferred Option:

The preferred option is to deploy a pilot SAPS program to prove the technical performance and customer The sites have been identified as viable for a SAPS alternative, have mix of different technical challenges and customer loads, and provide cost savings from avoided line maintenance.

The proposed project involves the following principal components:

1. deploy SAPS unit to supply the customers at 5 locations in the pilot phase; and

2. remove the subsequently redundant distribution spur line.

The other options considered are doing nothing (e.g. continuing with the maintenance of the existing distribution lines), and replacing the line with a new underground cable. These options have pros and cons; importantly they incur higher costs than that of the proposed solution. A full cost-benefit assessment will be undertaken prior to an implementation decision at each site.

5.1 Scope

The pilot program will install 5 SAPS across the first five years to develop the modular SAPS solution.

The first five sites identified are:

1. Mt Tim Shea
2. Plimsol Lake
3. Heals Spur
4. Blessington
5. Eddystone Point

The second 5 years beyond 2023 will see a continuation of the program at other sites based upon the learnings developed in the first sites.

The deployed stand alone power systems unit will feature an optimal and efficient combination of diesel generator/s and battery unit/s. Renewable energy will be considered in order to reduce the amount of diesel consumption and the need for regular refuelling. The renewable energy sources could include solar PV and/or wind. There are several factors influencing the renewable selection:

1. Upfront and ongoing costs
2. Impact on the environment
3. Land availability.

The proposed project will involve planning and design, specification, construction and finally performance evaluation of the standalone power system units. Whilst the ongoing running and maintenance tasks are considered in the business case, they will not be covered by the project itself.

The planning and design phases will address the following:

1. Detailed assessment to determine the optimal sizing of standalone power system equipment components (diesel generators, battery banks and renewable energy) in order to minimise the total deployment and operational cost;
2. Engagement with all the individual customers that have physical load connections. The discussions will specifically be to understand customer expectations on the supply reliability.

The specification phase will define the essential performance characteristics that TasNetworks require in order to maintain the supply reliability and quality for the customers. Such specification will facilitate the tendering process for choosing the right vendor to supply equipment (generators, batteries, wind turbines, solar panels).

The construction will involve site preparation, equipment delivery and installation.

The performance evaluation phase will be undertaken for 12 month in order to ensure that the deployed standalone power system technically performs as expected. Upon a positive evaluation result, the distribution spur line will be decommissioned and removed.

5.2 Expected outcomes and benefits

Where implemented, project deliverables are as follows:

1. A complete standalone power system, featuring an optimal combination of diesel generator/s, battery bank/s and renewable energy (solar and/or wind)
2. Removal of the SWER distribution spur line.

Completion of the project will result in the following outcomes:

1. Reduced asset management cost associated with the supplied load, which includes:
2. Improved safety for both staff and the public
3. Reduced risk of bushfire start
4. Improved power supply reliability and quality for the customers.

These outcomes are consistent with the investment needs of TasNetworks.

The benefits in avoided network operation and maintenance are significant. An assessment of the Mt Tim Shea SAPS with only 16km of SWER line supplying a communications site has an NPV of $437,229 for a hybrid SAPS when compared to continuing to maintain the feeder. Any feeder segment with similar vegetation coverage and similar load can be expected to return similar savings.

5.3 Regulatory Test

The Regulatory Test is not applicable for this program

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1 (preferred)	Implement SAPS pilot program to test and prove the use of modal SAPS to supply remote customers, including removal of existing network connection

6.2 Summary of Drivers

Option	
Option 0	
Option 1 (preferred)	The actual savings to be realised by SAPS is yet to be quantified, as it will vary considerably from location to location and each individual site will be investigated to confirm that there are material savings in installing SAPS. As a general rule TasNetworks would be expecting a cost saving from not replacing aged assets which are at the end of life, vegetation management, and the cost of unplanned outages during snow and other wheather events.

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$0

Option 1 (preferred)	$5,122,000

6.4 Summary of Risk

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	$0
Option 1 (preferred)	Implement SAPS pilot program to test and prove the use of modal SAPS to supply remote customers, including removal of existing network connection	$0

6.5.1 Quantitative Risk Analysis

N/A

6.5.2 Benchmarking

TasNetworks continues to work closely with its peers in the SAPS areas. Specifically we have ongoing dialogue with Horizon Power, Western Power and Energy Queensland on stand alone power systems.

6.5.3 Expert findings

N/A

6.5.4 Assumptions

The AEMC Review of the regulatory frameworks for Stand Alone Power System Consultation concludes with TasNetworks able to initiate SAPS.

The first five pilot sites will result in a successful approach that can be applied to the following five sites and expanded further.