TD-0008004 RCTS Transformer Replacement Business Case (BC)

Portfolio Business Line:	Work Category:	Work Code / Name:
Choose an item. % Split: Trans: 100%	Replacement	2002 TCAPEX Station rebuilds
Project Start date:	**Commissioning Readiness Date:**	**Project Completion Date:**
1/04/2020	30/11/2028	1/02/2029

Business case purpose and overview

This business case seeks approval to invest **$59.5 M CAPEX** at Red Cliffs Terminal Station (RCTS). The investment includes replacing four power transformers (1A, 1B, 2A and 2B transformers) with two new 150 MVA 220/66 kV and two new 33 MVA 66/22 kV transformers.

The assets identified for replacement have been assessed to be in poor condition and present a material asset failure risk. Asset failure has the potential to impact electricity supply reliability, generation cost, safety, environment, collateral equipment damage and emergency asset replacement costs.

The estimated project cost during the current TRR period is around $33 M which is about $8.1 M higher than the Capex forecast included in the current TRR ($24.9 M) for the RCTS project. The cost increase is due to increased labour, material, and plant cost as well as a change in scope and deferred target completion date. Project expenditure from April 2027 will form part of the next TRR period (2027-2031). The additional Capex required will be included in the 2027-2031 TRR proposal.

The regulatory investment test – transmission (RIT-T) for this project is well progressed with the publication of the Project Assessment Draft Report (PADR) during May 2023. No non-network options have been identified as feasible alternatives to the proposed asset replacement project. The RIT-T will be concluded before the end of the year.

Planned network outages have been minimised as far as possible in developing the scope of work. Essential outages to allow the selected assets to be replaced is estimated to incur STPIS penalties of about $3 M. The financial impact of this project on our STPIS outcome will be much lower when coordinated with other network outages by targeting a year that requires many network outages across the business and for the penalty to be capped in that year/s. It has been assumed that this strategy will reduce this potential STPIS penalty to less than half of the estimated $3M.

Approval is also sought for $0.16 M relating to existing assets (22 kV circuit breaker and transformer cables) to be written off as they are not suitable for spares. Around $0.13 M worth of items will go to inventory for use as future spares.

Why is this project required? What's the value that this business case will deliver?

RCTS was commissioned in the early 1960's and serves as the main 220/66 kV and 220/22 kV transmission connection point for distribution of electricity via the Powercor distribution network to communities (approximately 27,000 customers) in the towns of Red Cliffs, Colignan, Werrimull, Merbein, Mildura and Robinvale. A total of 202 MW of large-scale embedded generation is installed on the Powercor sub-transmission and distribution systems connected to RCTS 66 kV. This project will replace four transformers posing a failure risk that will impact customers and embedded generation should the project not proceed.

Is this project part of the 5-year Reg Reset submission?	☒ Yes / ☐ No If Yes please select: ☐ EDPR / ☒ TRR / ☐ GAAR Reg Reset Category: Tx - Replacement Major Station Reset Amount: $24.9 M
Is this forecast in the current FY Plan?	☒ Yes / ☐ No
Incremental change in Opex	No change is expected in Opex

Project Expenditure Forecast (CY)

Project Expenditure for approval (nominal)	Calendar year (first 5 years)					Lifecycle Total
	2024	2025	2026	2027	2028	
Direct Capital expenditure	0.4	6.4	19.1	13.5	11.4	50.9
Overheads	0.0	0.5	1.4	1.0	0.8	3.7
Capitalised Finance Charges	0.0	0.2	0.7	0.3	0.5	1.6
Project Delivery Budget (SAP Capex budget)	**0.5**	**7.0**	**21.2**	**14.8**	**12.7**	56.2
Management Reserve	-	-	0.4	0.8	1.9	3.1
Total CAPEX for Approval (incl risk, CFCs & OHs)	**0.5**	**7.0**	**21.6**	**15.6**	**14.6**	59.3
Operating Expenditure for approval (Project Opex)	-	-	-	-	-	-
Written down value of assets retired/sold	-	-	0.2	-	-	0.2
Total Estimated expenditure for approval (nominal)	**0.5**	**7.0**	**21.7**	**15.6**	**14.6**	**59.5**

Analysis of investment options

Analysis of investment options ($m - Present Value)	Capex	Opex	Total Financial Costs	Potential Costs	Other Economic Costs & (Benefits)	Total PV Cost	PV Cost Ratio (compared to BAU)	Financial outcome (in present value terms) - compared to BAU - excl non cash costs and benefits
BAU	-	-	-	-	115.6	115.6	1.00	
Option 1	50.1	-	50.1	-	15.4	**65.5**	**0.57**	***Excluding Economic costs and benefits, this Option spends $m more Capex compared to BAU*** ✓
Option 2	46.9	-	46.9	-	61.6	108.5	0.94	***Excluding Economic costs and benefits, this Option spends $m more Capex compared to BAU*** ✗

Options considered	• BAU: Highest present value cost due to increasing asset failure risk • Option 1 (Recommended): Integrated replacement. • Option 2: Deferred replacement.	
Preferred option	Option 1 has the highest net benefits for all scenarios and sensitivity studies. It presents a robust investment decision to reduce the asset failure risk at RCTS.	
Key benefit	**Total value**	**Overview**
	$4 M pa	Avoided market impact cost of more than $4 M pa once the assets that present a high failure risk have been replaced
Key implementation/ delivery risks	• Availability of planned outages impacting project delivery • Human eror incidents (HEI) impacting customers during the delivery of the project	

Project Sponsor	Project Initiator & Dept.	Prepared by:	Date BC submitted:
[C.I.C], Manager Network Planning Distribution Network Strategy & Planning	[C.I.C], Transmission Network Planning	[C.I.C], Transmission Network Planning	15/08/2023

Business Case e-sign-off

Project # / Title / Version	TD-0008004 RCTS Transformer Replacement			
Name	**Title**	**Signature**	**Date Approved**	**Comments**
ENDORSEMENTS				
[C.I.C]	Sponsor / Manager Network Planning	Via NEC		
[C.I.C]	GM Engineering & Projects	Via NEC		
[C.I.C]	GM Network Strategy & Planning	Via NEC		
[C.I.C]	GM Capital Investments	Via NEC		
[C.I.C]	EGM Digital & Network Management	Via IC		
DoA APPROVALS				
[C.I.C]	Chief Financial Officer / Investment Committee Chair	Via Docusign		
[C.I.C]	Chief Executive Officer	Via Docusign		

1.PROJECT BACKGROUND

RCTS is in Red Cliffs northern Victoria. Since it was commissioned in the early 1960's, RCTS served as the main 220/66 kV and 220/22 kV transmission connection point for distribution of electricity via the Powercor distribution network to communities in the towns of Red Cliffs, Colignan, Werrimull, Merbein, Mildura and Robinvale. A total of 202 MW capacity of large-scale embedded generation is installed on the Powercor sub-transmission and distribution systems connected to RCTS 66 kV[1].

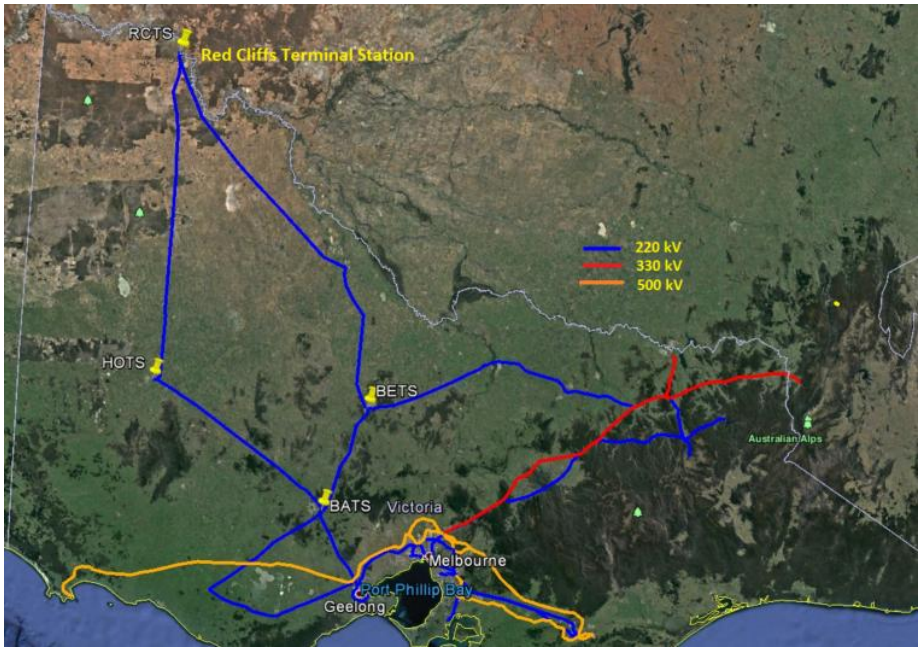

Figure 1 - Transmission network supplying RCTS

Electricity demand

Approximately 27,000 customers depend on RCTS for their electricity supply. The majority of the total annual energy at RCTS 66 kV is consumed by commercial customers (45.6%) and residential customers (30.3%) with the remainder consumed by industrial and agricultural customers as illustrated in Table 1.

Customer type	Share of 66 kV load consumption (%)	Share of 22 kV load consumption (%)
Commercial	45.6%	44.1%
Residential	30.3%	22.6%
Industrial	21.2%	14.9%
Agricultural	2.9%	18.4%

Table 1 - RCTS 66 kV and 22 kV load composition

[1] 2022 Transmission Connection Planning Report

Peak demand during summer 2021/22 reached 120 MW at RCTS 66 kV and 37 MW at RCTS 22 kV. Powercor forecasts that peak demand at RCTS 66 kV and RCTS 22 kV will grow slightly over the next ten years. Figure 2 and Figure 3 show the 10% probability of exceedance (POE10)[2] and the 50% probability of exceedance (POE50)[3] forecasts for peak demand during summer and winter periods[4] for the RCTS 66 kV and 22 kV networks respectively.

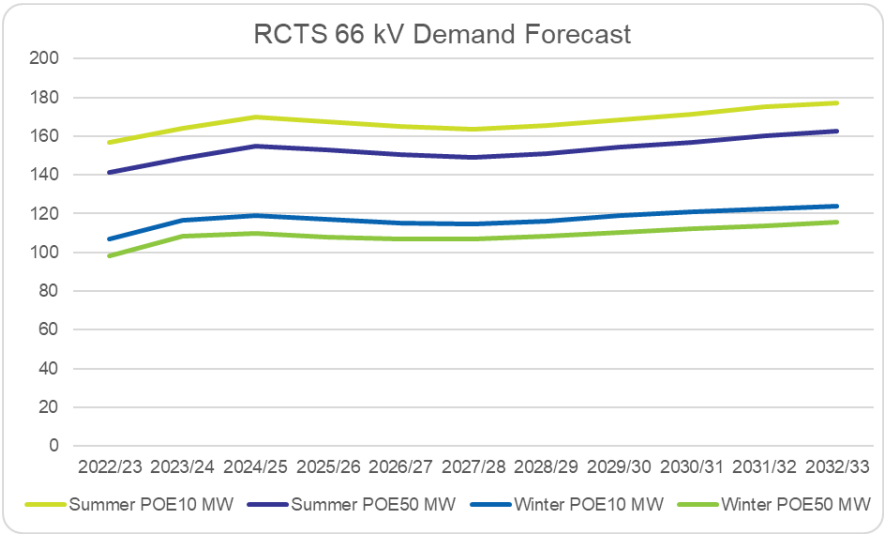

Figure 2 - Demand forecasts for RCTS 66 kV network

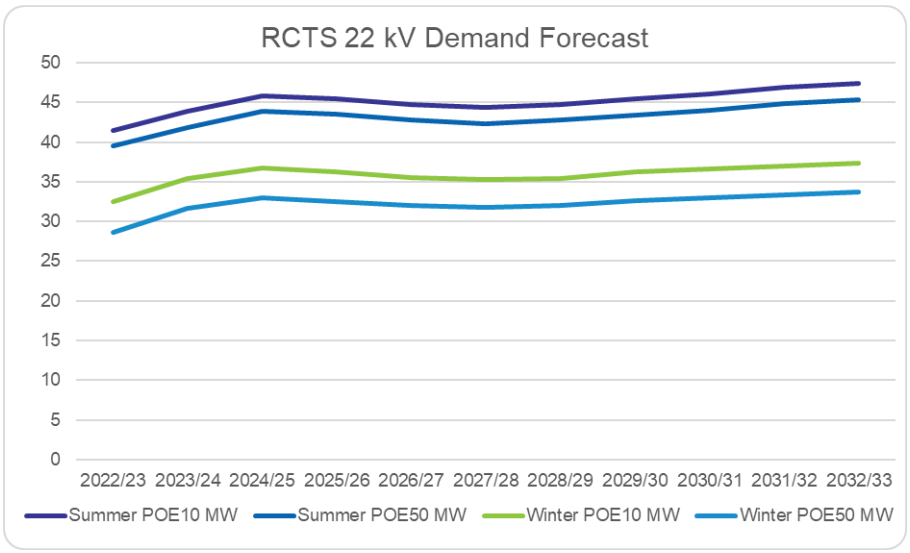

Figure 3 - Demand forecasts for RCTS 22 kV network

The Powercor forecast confirms there is an ongoing need for electricity supply services to communities in Red Cliffs and the surrounding area as reflected in the official demand forecast for RCTS.

[2] A POE10 forecast indicates a level where there is 10 % likelihood that actual peak demand will be greater.
[3] A POE50 forecast indicates a level where there is 50 % likelihood that actual peak demand will be greater.
[4] Victorian electricity demand is sensitive to ambient temperature. Peak demand forecasts are therefore based on expected demand during extreme temperature that could occur once every ten years (POE10) and during average summer condition that could occur every second year (POE50).

Embedded generation

There are two major embedded generators – the Karadoc Solar Farm (90 MW) and the Yatpool Solar Farm (81 MW) - connected at RCTS 66 kV.

Asset condition

There are five 220/66/22 kV transformers (named B1, B2, B3, L1 and L2) at RCTS. The B1 and B2 transformers are rated 70 MVA each, and with the B3 (140 MVA) transformer supply the 66 kV load at RCTS. The B1 and B2 transformers are in poor condition. The B2 transformer was commissioned in 1974 and is approaching the end of its economic life with no suitable spare transformer of similar size to replace it following an unplanned outage. The B1 transformer has been commissioned in 1987 and does not have a suitable spare transformer. The B3 transformer was commissioned in 2006 and its condition is managed by asset works.

The smaller L1 and L2 transformers are providing a 22 kV supply. They are in poor condition and require remedial action within the next five years. Both 220/22 kV transformers have been in service since 1962 and are approaching the end of their economic life. The probability of a 220/66 kV or 220/22 kV transformer failure is forecast to increase over time as the condition of these transformers deteriorates further.

1.1.1 Rationale for choosing Option 1

The poor condition of the transformers increases the likelihood of asset failures. Such failures would result in prolonged outages impacting users of the transmission network. Investment to selectively replace assets that are in poor or very poor condition is economically justified and will address the following asset failure risks at RCTS:

- Supply risk to customers supplied from RCTS
- Market impact risk as result of non-optimal generation dispatch when low-cost renewable generation has to be constrained due to unplanned outages
- Safety risk for assets that could fail explosively
- Environmental risk
- Financial risk when emergency replacements or reactive repairs are needed
- Collateral damage risk for asset that could fail explosively

Timely investment in asset replacements at RCTS will ensure that AusNet will be able to maintain reliable transmission network services at RCTS and mitigate safety and environmental risks as required by the NER and Electricity Safety Act 1998[5].

1.1.2 Rationale for why Option 2 was not chosen

Option 2 defers the replacement of assets that are in poor condition. Without remedial action, other than ongoing maintenance practice (business-as-usual), affected assets are expected to deteriorate further and more rapidly. Further increase in the probability of failure will result in a higher likelihood of electricity supply interruptions and increased costs resulting from the need for emergency asset replacements and reactive repairs.

2.PROJECT SCOPE

2.1 In Scope

Item No.	In Scope
IS-1	Retirement of the 1A, 1B, 2A and 2B transformers
IS-2	Installation of two new 150MVA 220/66kV and two new 33MVA 66/22kV transformers to replace the retired transformers

[5] Victorian State Government, Victorian Legislation and Parliamentary Documents, *"Energy Safe Act 1998"*

2.2 Dependencies

Item No.	Project Dependency Details and Description
D-1	N/A
D-2	

3.KEY BENEFIT AND ASSUMPTIONS

Incentives and Customer: These are projects which are justified using external incentive schemes such as STPIS, F-Factor, CSIS, DMIS, etc
- Example: Improvements to reliability. A program of replacing fuses to prevent candling fuses and improve F-factor performance

Efficiency: These are projects where the expenditure will result in efficiency gains
- Example: Replacing a transformer to avoid additional maintenance costs incurred in the future

Safety Risk and Compliance: These are projects aimed at managing safety risk or compliance issues
- Example: ESV Commitments, environment and safety

Savings to existing cost base: These are reductions to the existing cost base **(not avoided costs)**
- Example: Relocating an overhead feeder section with high vegetation maintenance costs to reduce **current** vegetation opex

Option	Benefit Detail	Key Benefit Category	Key Benefit Value ($)	Key Benefit Assumptions (Baseline and Measurement)	Benefit Start to Full Realisation Date
Option 1	Is there a direct bottom line budget impact? ☐ Yes / ☒ No Cost Centre: CPX: $ OPX (per annum): $	**Incentives & Customer**	The avoided market impact risk is around $4 M pa and presents the economic benefits that could be achieved by the project	Asset failures could impact customers supplied from RCTS or result in non-optimal dispatch of generation due to generation constraints. This will result in increased wholesale market cost, which can be avoided by asset replacement to improve the reliability of the terminal station.	Benefit start 31/12/28 Full Realisation 31/12/28
Option 1	Is there a direct bottom line budget impact? ☐ Yes / ☒ No Cost Centre: CPX: $ OPX (per annum): $	**Safety, Risk & Compliance**	Not material and has not been quantified	The project will reduce the likelihood of asset failure risks, including for assets that could fail explosively and thus present a safety risk. The avoided safety risk has not been quantified in direct financial savings for the business and is not considered to be material based on the low probability of occurrence of an event that involves explosion and fire.	Benefit start 31/12/28 Full Realisation 31/12/28

4.FINANCIALS

4.1 Opex Breakdown

Opex excl Project implementation (nominal)	Calendar year (first 5 years)					Lifecycle Total
	2024	2025	2026	2027	2028	
BAU Total Opex	-	-	-	-	-	-
Incremental Opex Costs - Option 1	-	-	-	-	-	-
Opex Savings - Option 1	-	-	-	-	-	-
Net Budget impact (split by division below)	-	-	-	-	-	-
New Cost profile	-	-	-	-	-	-

4.2 Capex Breakdown

Capex Breakdown (incl mngt reserve - nominal)	Calendar year (first 5 years)					Lifecycle Total
	2024	2025	2026	2027	2028	
Design	-	2.3	-	-	0.1	2.4
Internal Labour	0.4	0.5	0.5	0.6	0.6	2.7
Materials	-	3.6	13.4	2.5	-	19.5
Plant & Equipment	-	-	0.2	0.5	0.5	1.1
Contracts	-	-	4.9	10.0	10.3	25.1
Meter Costs	-	-	-	-	-	-
Other	-	-	-	-	-	-
Management Reserve (incl Risk)	-	-	0.4	0.8	1.9	3.1
Total Capex	0.4	6.4	19.5	14.3	13.3	54.0

5.SCHEDULE

Key Milestone and Deliverables (Waterfall)	Planned Completion Date
Approval of Stage Gate 2	1/04/2020
Approval of Business Case	31/08/2023
Approval of RIT ☐ N/A	30/09/2023
Construction Commencement	1/07/2024
Commissioning Readiness Complete	30/11/2028
Project Completion - Stage Gate 6 Approval	1/02/2029

6.RISK IDENTIFICATION

Risk Description	Potential unmitigated Risk consequence	Mitigations	Potential mitigated risk consequence	Likelihood of Impact
Availability of planned outages impacting	Delays to project delivery may occur if planned outages are not	Planned outages have been minimised as far as possible for the planned scope and the project target completion date allows for project time delays.	Delays to project delivery may still occur if planned outages are not possible or deferred	Low

Risk Description	Potential unmitigated Risk consequence	Mitigations	Potential mitigated risk consequence	Likelihood of Impact
project delivery	possible or deferred.		resulting in a later in-service date	
Human Error Incident (HEI)	HEI resulting in an outage impacting customers connected to RCTS	Detailed outage plans and schedules. Project staging plans. Ensuring that planned outage of long duration does not impact customers when an unplanned outage occurs	Impact on customer supplies	Low given our experience with brown field rebuilds

7.SUSTAINABILITY

List the changes to sustainability this project will deliver in the table below.

Sustainability Consideration	Impact from this project	Comments
Greenhouse gas emissions ☐ N/A	☐ Increase ☒ Neutral ☐ Decrease	
Waste ☒ N/A	☐ Waste reduction strategies to be implemented	
Social procurement ☒ N/A	☐ Purchases from social enterprises [6] ☐ Purchases from Aboriginal and Torres Strait Islander-owned businesses [7] ☐ Purchases from Australian Disability Enterprises [8] ☐ Purchases from local suppliers [9]	
Community ☒ N/A	☐ Community consultation required ☐ Community benefits actions	

[6] See The Loop for access to potential supplier lists from social enterprises on the "Suppliers" tab How to purchase (sharepoint.com).

[7] See The Loop for access to potential supplier lists from Aboriginal and Torres Strait Islander businesses on the "Suppliers" tab How to purchase (sharepoint.com).

[8] Australian Disability Enterprises ADE

[9] Local suppliers, as defined by the State government for the purchase. See Local Jobs First - Glossary for Victorian Government definition of "local"

8.CORPORATE ACCOUNTING CONSIDERATIONS

Capex profit centre	13260
Propex profit centre	N/A
Opex (BAU) owner & cost centre	[C.I.C] 12060
Transmission Regulatory Key	Prescribed Shared and Prescribed Connection

8.1 Asset Retirements

The total asset write down amount is $0.159 M. It includes a 22 kV circuit breaker and transformer cables as per the fixed assets report attached. These assets are not suitable for spares.

Finance introduced a service life review process to allow for changes to be made to an asset's financial life and to apply accelerate depreciation over a shorter timeframe once it has been confirmed that an asset is not going to reach its expected life. This may be due to planned replacements, technology improvements, or site / industry decisions such as site closures. Assets adjusted this way will depreciate to zero by the project end date, resulting in a favourable financial outcome compared with not making the adjustment.

8.2 Contributed (Gifted) Assets

N/A

8.3 Assets to be created

This project will replace the existing assets in a like-for-like manner with details provided in the attached scope of work document. The table below provides a high-level breakdown of the cost of the replacement assets.

Description of Asset	Quantity	Estimated Cost (total)	Expected Asset Life
150 MVA 220/66 kV transformers	2	$39 M	45 years
33 MVA 66/22 kV transformers	2	$17.2 M	45 years
Totals		$56.2 M	

Note: Total Estimated Cost must match the Delivery Budget (+CFC & O/H) on page 1.

9.CHECKLIST

For transmission network projects, is there a market impact in the delivery of the project?	☐ N/A / ☒ Yes / ☐ It is estimated that a 220 kV line outage will cost approximately $500 k per day. As there is 6 days of outages, it is estimated that the total cost will be $3M.
Has a Value Engineering Workshop been conducted?	☐ N/A / ☐ Yes / ☒ No
For the purposes of RIT, have you considered all credible options including non-network options?	☐ N/A / ☒ Yes / ☐ No

Appendix A ATTACHMENTS

Document Title	Attachment (Embedded document)
Scope of Works / Initiative Brief *	Direct Cost Summary - TD-0008004 RCTS Tı
Financial Model with NPV*	RCTS NPV Model.xlsm
Detailed Cost Estimate and Benefit Assumptions*	File is too large and can be provided separately
Write Down Value (WDV) details	WDV RCTS TD-8004 Revised.xlsx
Gifted Assets details	N/A

Attach files as objects. Asterisks (*) are mandatory documents.