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AusNet

Board Paper:	South Morang Terminal Station 330/220 kV Transformer Replacement - Regulated Expenditure
Meeting Date:	25 March 2025
For:	Decision
Sponsor:	[C.I.C], Executive General Manager, Transmission
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SMTS Transformer Replacement - Regulated Expenditure

1. Executive Summary

This paper seeks Board approval to invest **$167.6 M CAPEX** (nominal terms) at South Morang Terminal Station (SMTS). The investment includes replacing two 700 MVA 330/220 kV transformers (H1 and H2) with their associated protection and control systems. The two transformers are in poor condition and have reached the end of their technical life. The assets present an increased risk of failure and replacement is proposed by December 2028, with both VicGrid and AEMO requesting that AusNet advance this project given its importance to the broader transmission network and security of Victoria's electricity supply.

The timing is supported by an economic cost benefit analysis and completion of the Regulatory Investment Test for Transmission (RIT-T) is imminent. It is expected that most of the forecast capex will be funded from the RY27 to RY32 TRR Capex Allowance, with the remainder covered in the current regulatory period.

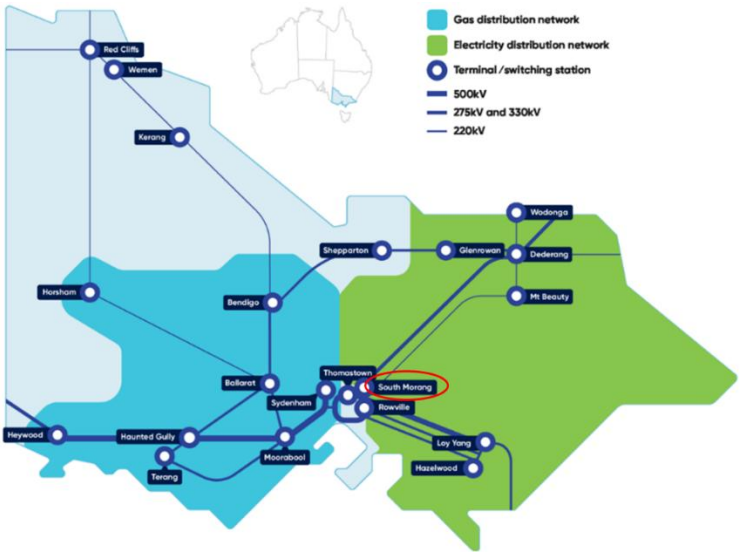
2. Draft Resolution

The following resolution is requested of the Board: **Approve investment of $167.6 M CAPEX** (in nominal terms) **and $12 K assets written down for the South Morang 330/220 kV Transformer Replacement Project.**

3. Background

SMTS is a critical terminal station to the Victorian network, situated between the 330 kV interconnection to NSW and the Victorian 500 kV generation. The 330/220 kV transformers are key to facilitating flows from NSW to the metro load centre and will become increasingly critical as Yallourn Power Station retires and Victoria becomes more reliant on New South Wales.

Figure 1: SMTS and main transmission network



AusNet engages with the Australian Energy Market Operator (AEMO) to assess and plan the asset replacement program, ensuring ongoing needs are met with efficient augmentation opportunities. In 2018, AusNet installed a 700 MVA H3 transformer as the first stage of the SMTS H transformers asset replacement program. This transformer reduced reliance on the original H1 and H2 transformers, with H2 serving as a hot spare. The H3 transformer was specified with a 30-minute overload capability of 1000 MVA, aligning with the long-term plan for shared network transformers to have adequate overload capability.

This project represents the second stage of the transformer replacement program at SMTS. The replacement of the H1 and H2 transformers will match the capability of the existing H3 transformer, unlocking the overload capability already invested in H3, which cannot currently be used. AEMO has confirmed the ongoing need for these transformers and requested that the new transformers match the capability of the existing H3 transformer to remove transmission network constraints. AEMO has also requested expedited delivery, if possible, to leverage the overload capability. The future Victorian planner, VicGrid, has also highlighted the need for increased transformation capability at SMTS by 2029 to address risks associated with the Yallourn retirement.

Additionally, a major project to replace the 500 kV gas insulated station (GIS) and F2 transformer is planned at SMTS, with the RIT-T commencing in June 2024. Board approval for this project will be sought by mid-2025, for a target completion date around 2031.

4. KEY INVESTMENT DRIVERS

4.1. Asset Condition

The H1 and H2 **transformers are in poor condition,** with H1 transformer having the highest likelihood of failure on our transmission network. This is expected of assets that have been in service since 1967 / 1968.

Key condition issues include loose windings and core laminations, high moisture content in insulation, deteriorated oil, outdated cooling systems, and unique, unsupported tap changers and bushings, without spares. These problems increase the risk of dielectric failure, oil leaks (and environmental risks), winding insulation deterioration and component failure leading to mechanical and corrosion problems.

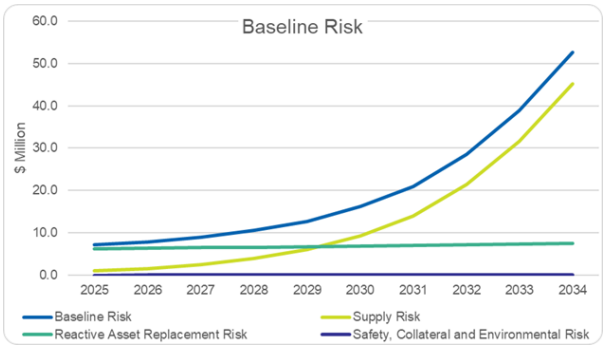
Without remedial action, these transformers are expected to deteriorate further and more rapidly. This will increase the likelihood of asset failure and consequent asset failure risks such as market impact on transmission network users, environmental risk and the risk of increased costs resulting from the need for emergency asset replacements and reactive repairs.

No viable maintenance strategies have been identified to address failure risk or the lack of manufacturer support for these two transformers. making replacement essential for network reliability and safety.

4.2. Market Impact of an asset failure at SMTS

A risk analysis shows that it is no longer economical to continue to provide transmission network services with the existing transformers, as the asset failure risk has increased to a level where investment to replace the selected assets presents a more economical option. A transformer failure or simultaneous failure of more than one transformer would constrain generation and result in involuntary load curtailment impacting network users. The present value of the **baseline risk cost has been calculated to be more than $700 million** over the forty-five-year period from 2025. The largest component of the baseline risk costs is the supply interruption risk, which is borne by electricity consumers. The key risk costs are shown in Figure 2.

Figure 2: Baseline risk



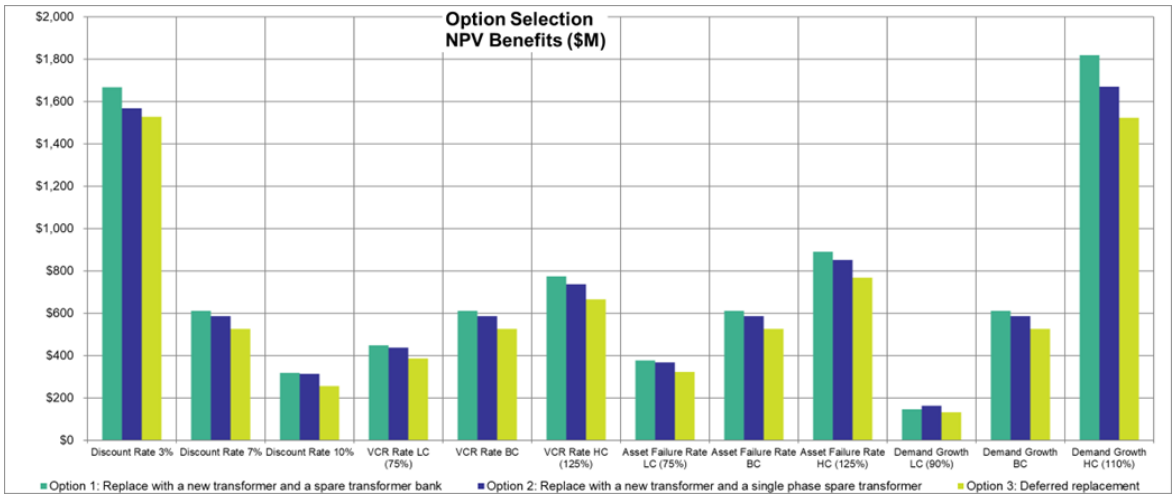
The economic timing of the investment is 2028 - 2029 when the project annual benefits exceed the annualised cost. Further information on the economic assessment of options and sensitivities is available in the Project Assessment Draft Report (PADR), published on 25 February 2025.

5. Recommendation / Discussion

It is recommended to approve the project to replace both transformers. **The preferred option is to replace with an in-service and a hot spare transformer (Option 1) by December 2028 as it delivers the highest net economic benefits** of the following three options:

- Option 1 – Replace the H1 and H2 transformers with an in-service and a hot spare transformer
- Option 2 – Replace the H1 and H2 transformers with an in-service and a cold spare single-phase transformer
- Option 3 – Deferred replacement with a new transformer and a single-phase spare transformer

Figure 3: Option selection (NPV benefits for range of input assumptions)



6. Key Implications

6.1. Strategy implications

Proactive asset renewal is a core regulatory expectation, aligning with AER-approved capital expenditure plans and ensuring reliable and safe transmission services as required by the National Electricity Rules. The SMTS transformer replacement, outlined in AusNet's 2023-27 TRR, meets the RIT-T's 'identified need' to maintain a reliable 330/220 kV transmission service. Failure to invest could result in extended unplanned outages, higher wholesale electricity costs, and instability in Victoria's power supply.

The project is crucial to the upcoming TRR capex strategy, forming a significant part of the core station rebuild program, which constitutes the largest component of the overall allowance. Initiating work in the current period smooths the regulatory allowance approval pathway for the project and enhances the credibility of the forecast station rebuild program's costs, timings, and deliverability.

6.2. Financial implications

The total estimated expenditure for approval is $167.6 M and includes $12 K for asset write downs. A summary of costs is provided below.

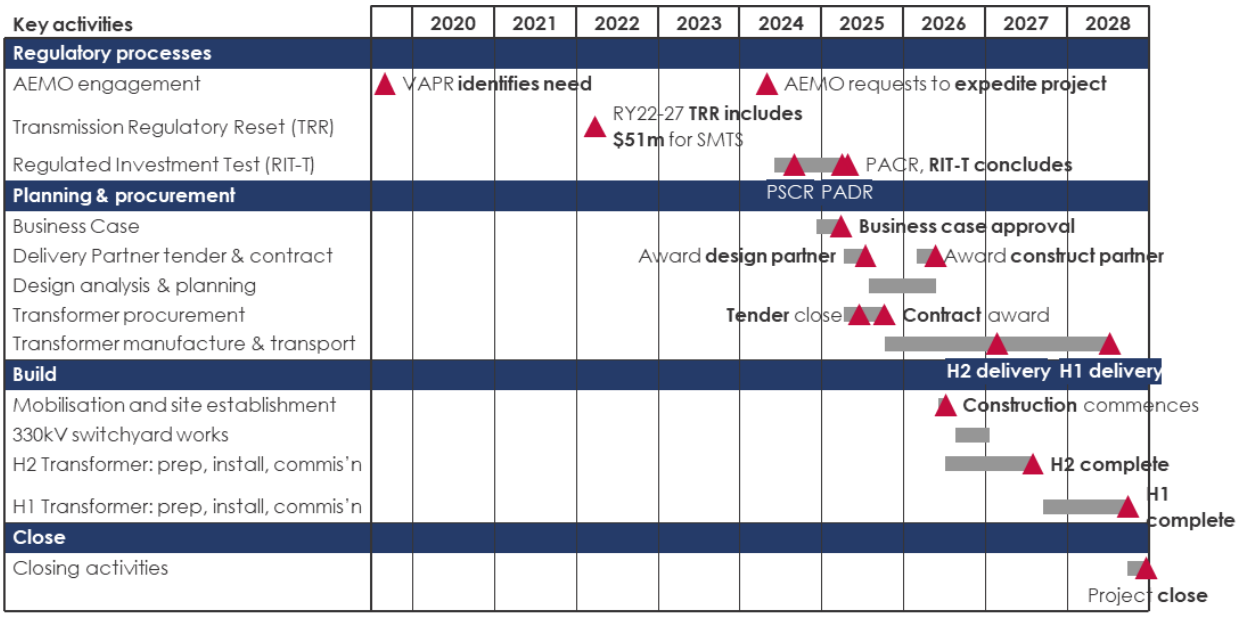
Figure 4: Cost summary

Project Expenditure for approval (nominal)	Calendar year (first 5 years)					Lifecycle Total
	2025	2026	2027	2028	2029	
Design	1.6	1.1	-	-	-	2.7
Internal Labour	0.5	1.8	2.7	2.7	-	7.7
Materials	2.6	8.2	47.0	17.2	-	75.0
Plant & Equipment	-	0.0	0.0	0.0	-	0.1
Contracts	-	5.0	28.2	21.7	-	54.9
Overheads	0.4	1.2	5.8	3.1	-	10.5
Capitalised Finance Charges	0.1	0.6	2.0	4.3	-	7.0
Project Delivery Budget (SAP Capex budget)	**5.2**	**17.9**	**85.8**	**49.1**	**-**	**157.9**
Management Reserve	-	-	-	9.8	-	9.8
Total CAPEX for Approval (incl risk, CFCs & OHs)	**5.2**	**17.9**	**85.8**	**58.8**	**-**	167.6
Operating Expenditure for approval (Project Opex)	-	-	-	-	-	-
Written down value of assets retired/sold	0.0	-	-	-	-	0.0
Total Estimated expenditure for approval (nominal)	**5.2**	**17.9**	**85.8**	**58.8**	**-**	**167.6**

6.3. Project Timeline

Figure 5 below provides a high-level summary of the project plan developed by the Project Development team. More detailed planning, including the design basis and construction plan, will follow once the business case is approved. **The project is scheduled to be completed by the end of 2028,** and key milestones include the execution of transformer contracts by 08/10/2025, delivery of the H2 transformer to the site by 24/02/2027, and delivery of the H1 transformer to the site by 12/07/2028. Given the critical role of the 330/220 kV transmission service at SMTS and the significant load it supplies, it is essential to keep two of the three H transformers operational during the works. Consequently, each transformer replacement will involve an outage lasting approximately ten to twelve months, with the replacements carried out sequentially.

Figure 5: Summary Project Plan



7. Risk

A preliminary risk assessment has been completed, with further detailed review and planning to follow. The assessment identified planned outage cancellations and supply chain constraints as the highest residual risks, potentially causing delays and cost overruns. **Transformer procurement is a critical path activity, with potential to delay the project.** The market for suitable high voltage (HV) transformers is particularly tight, with rising demand for specialized components (e.g. tap changers) extending lead times and adding uncertainty. To manage this risk, early discussions with suppliers are underway, and a single-source model is

being considered to expedite the process. While it is possible to pre-book transformer manufacturing slots, shortages of essential components in the supply chain, and competition from larger global customers with higher value liquidated damages clauses, can result in commitments not being honoured.

Environmental and safety risks are manageable, and Utility Risk Management (URM) principles will be applied to identify critical safety hazards and validate that effective barriers are in place. AusNet's experience with similar projects gives the delivery team confidence that, with diligent planning, project management, and safety controls, the risks can be managed within AusNet's risk appetite and the requested budget which includes a management reserve of $9.8 million.

8. Conclusion / Next Steps

Following approval of this Board Paper:

- The business will proceed with the delivery of the asset replacement project
- The forecast CAPEX will be included in AusNet's transmission revenue application for the period starting April 2027