AusNet

Tower replacement on the Heywood to Alcoa Portland 500kV line

Regulatory Investment Test for Transmission

Project Assessment Draft Report

Friday, 23 August 2024

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1. Executive summary

AusNet owns and operates the electricity transmission network in Victoria, which transports electricity from large coal, gas and renewable generators across Victoria and interstate, to terminal stations that supply large customers and the distribution networks.

The Regulatory Investment Test for transmission (**RIT-T**) is an economic cost-benefit test used to assess and rank potential investments capable of meeting an 'identified need'. The purpose of the RIT-T is to identify the credible option that maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the National Electricity Market (**the preferred option**).

This Project Assessment Draft Report (PADR) follows the the first step in the RIT-T process, which is the publication of the Project Specification Consultation Report (PSCR). As explained in the PSCR, this project is concerned with AusNet's plans to replace towers on the Heywood Terminal Station to Alcoa Portland 500 kV Nos. 1 and 2 lines (**HYTS- APD**), which are at risk of failure if no remediation actions are performed. As explained in the PSCR, there are no non-network options that could address the identified need. We did not receive any submissions to the PSCR.

In accordance with the Rules and the AER RIT-T guidelines, the purpose of this PADR is to set out the detailed cost-benefit analysis of the credible options for addressing the identified need. Our preferred option (Option 1) is to replace the existing corroding transmission towers with painted steel lattice towers that comply with current design standard AS/NZS 7000. This option entails replacement in a staged approach, starting with the most corroded structures in the circuit, which involves the replacement of nine towers. This option:

- Maintains the reliability of supply to the Alcoa smelter at Portland Victoria, a major customer of AusNet.
- Reduces the safety risks to the public and the environment.
- Helps provide clarity on the timeframes to rectify corroded members and bolts on the towers. This will address the major non-conformance finding of ESV in their most recent audit.

In accordance with the RIT-T, this option is expected to maximise the present value of the net economic benefit to all those who produce, consume and transport electricity in the NEM.

Submissions should be emailed to rittconsultations@ausnetservices.com.au by Friday 11 October 2024. In the subject field, please reference 'RIT-T PADR Tower Replacement HYTS-APD'. AusNet's preference is that any submissions would be published on its website and AEMO's website. If you do not want your submission to be made public, please clearly stipulate this at the time of lodgement.

2. Background

Heywood Terminal Station (**HYTS**) is located in south western Victoria and is the main terminal station interconnecting the Victorian 500 kV transmission back bone with the South Australian transmission network via a double circuit 275 kV line. HYTS also supplies the Portland aluminium smelter via a double circuit 500 kV line as shown in Figure 1.

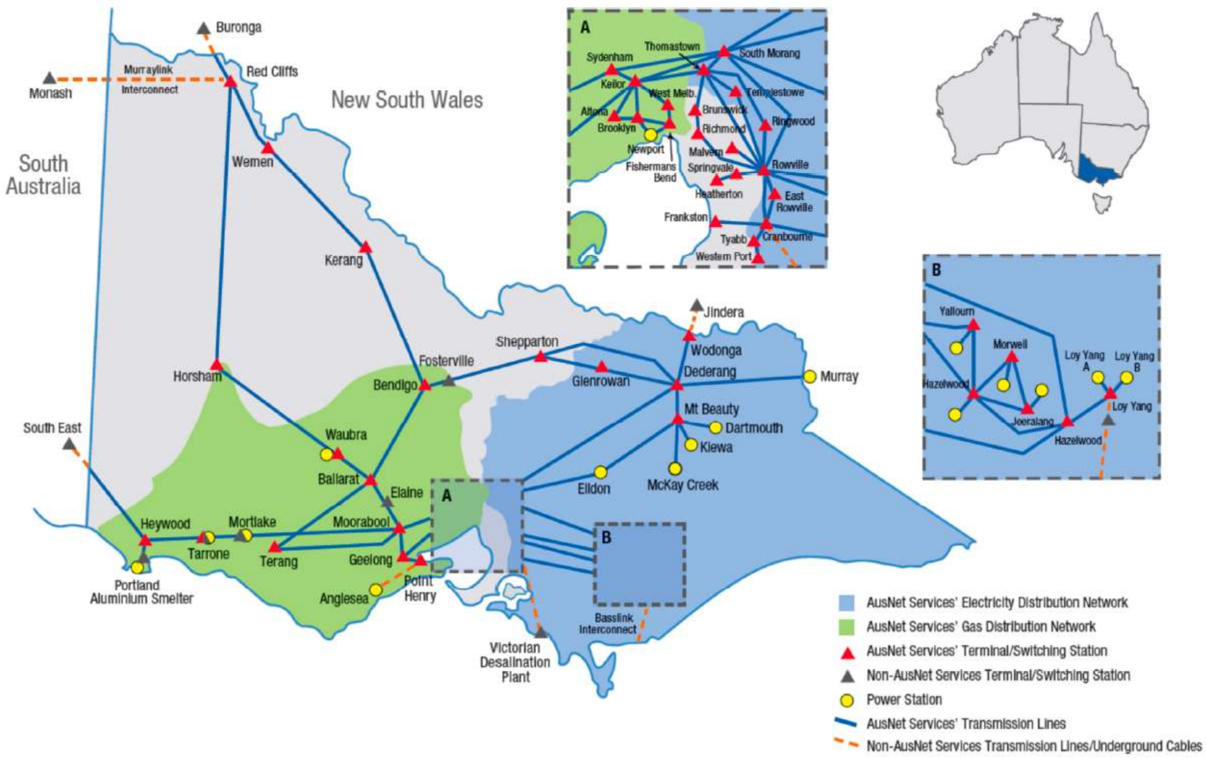

Figure 1: AusNet's transmission network, including the Heywood to Portland Aluminium Smelter

The main load supplied from HYTS is the Portland Aluminium smelter. A reliable and secure supply to the Portland Aluminium smelter is of high importance as significant cost impacts could result if the supply is interrupted.

Twenty-five towers (i.e., T605 to T628B) along the Heywood Terminal Station to Alcoa Portland 500 kV Nos. 1 and 2 lines (**HYTS- APD**) have been identified as being in need of corrosion management including member and bolt replacement works. The coating systems on these structures have deteriorated to a point where section loss has occurred due to the severe corrosivity of the environment.

AusNet must ensure that it complies with its regulatory obligations, which include the Electricity Safety Act 1998. This Act requires AusNet to minimise hazards and risks to the safety of any person as far as reasonably practicable.

AusNet has developed risk-based models to assist with the application of formal risk assessments as required by the Electrical Safety (Management) Regulations 2019 (the **Regulations**). Implementation of AusNet's selective replacement strategy, addressing both failure frequency and consequences, is necessary to maintain public safety in accordance with the Regulations, and to assist in meeting the safety objectives set out in AusNet's MissionZero strategy.

3. Identified need

3.1. Description

Twenty-five towers on the HYTS-APD line are currently exhibiting an increased risk of failure as a result of corrosion from the coastal environment in which the line is situated. A failure of any of these towers could potentially lead to a catastrophic safety incident and almost certainly would impact the ability of the Portland aluminium smelter to operate.

A staged replacement program is envisaged as the best way to mitigate the increasing risk of asset failure. The program will start at the end of the circuit (i.e., closest to the coast), and then progressively move inland.

The first phase of the program will replace nine towers - starting with six structures from T628B to T624, including three towers (T609, T618, and T621). A recent condition assessment survey found that these assets need ‘urgent replacement’. After completion of the first phase, the second phase of the replacement program will commence, starting from T623 to T605.

In 2001 and 2002, towers on the HYTS-APD line were painted to reduce the effects of corrosion and have since been maintained through member and bolt replacements on an as-needed basis. From an asset management perspective, it is no longer practical to repaint or replace corroded members and bolts. The location and function of corroded members and bolts means that replacement has a high probability of scope creep and cost blow-outs, as the interconnected members are also likely to require replacement.

In its most recent annual audit, **Energy Safe** conducted a review of the maintenance associated with the towers on the HYTS-APD line. As a result of this review, AusNet is required to progress a project to address the identified tower condition issues.

The figure below shows examples of corrosion of tower members on the HYTS-APD line.

Figure 2: Examples of corroded tower members on the HYTS-APD line

In addition to the need for remedial action to mitigate the risks and consequences of tower failure on the HYTS-APD line, AusNet must also ensure that it complies with its regulatory obligations, which include the Electricity Safety Act 1998. This Act requires AusNet to minimise hazards and risks to the safety of any person as far as reasonably practicable. In relation to the towers on the HYTS-APD line, compliance obligations under this Act (and other regulations) contribute to the identified need.

3.2. Assumptions

In assessing the identified need, AusNet must consider the risk of asset failure and the likelihood of potential adverse consequences eventuating. In addition to undertaking this analysis, AusNet has adopted the following further assumptions to quantify the potential costs of tower failure.

3.2.1. Supply risk costs

In the event of a tower failure on the HYTS-APD line, customers will experience a loss of supply event. The supply risk costs are the probability of an event occurring multiplied by the cost of the unserved energy that would result from that event. The cost of unserved energy is determined by the Value of Customer Reliability (**VCR**), which is estimated by the AER and depends on the customers supplied by the HYTS-APD line, which notably includes the Portland aluminium smelter. AusNet notes that the AER's RIT-T application guideline requires a RIT–T proponent to use the VCR estimates that the AER publishes and updates annually. AusNet notes that the Portland aluminium smelter may be significantly impacted commercially if there is a sustained outage.

The VCR estimate for an industrial load is estimated by the AER to be $138.34 per kWh for industrial customers.[1] However, it is important to note that the AER's VCR estimates represent the aggregate value which customers place on standard outages. This encompasses outages which are relatively localised and last up to twelve hours in duration. The VCRs factor in the additional value (if any) a customer may place on an outage occurring in peak times (defined as occurring between 7-10 am and 5-8 pm) or during a particular season (summer or winter). Standard outages are the outages customers are most likely to experience and can be caused by issues relating to distribution, transmission and/or generation.

As a tower failure on the HYTS-APD line may lead to an extended outage for the Portland aluminium smelter, care must be taken in applying the VCR for industrial load as this may substantially overstate the value of the unserved energy. We have addressed this issue by adopting the transmission-connected very large business VCR of $31 per kWh.

3.2.2. Health and safety risks

The Electricity Safety Act 1998 requires AusNet to design, construct, operate, maintain, and decommission its network to minimise hazards and risks to the safety of any person as far as reasonably practicable or until the costs become disproportionate to the benefits from managing those risks. By implementing this principle for assessing safety risks from asset failures, AusNet uses:

- a value of statistical life to estimate the benefits of reducing the risk of death;[2]
- a value of lost time injury;[3] and
- a disproportionality factor.[4]

AusNet's approach to assessing the risk and consequence of asset failure, including the use of a disproportionality factor, is consistent with the guidance provided by the AER.[5]

3.2.3. Asset reinstatement costs

In the event of a tower failure, costs will be incurred in replacing the failed assets (and any consequential damage to other assets). The risk of this impact may vary for different credible options and, therefore, should be factored into the cost-benefit assessment.

1 AER, 2023 Values of Customer Reliability Annual Adjustment.

2 Department of the Prime Minister and Cabinet, Australian Government, "Best Practice Regulation Guidance Note: Value of statistical life," available at https://www.pmc.gov.au/resource-centre/regulation/best-practice-regulation-guidance-note-value-statistical-life.

3 Safe Work Australia, "The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community: 2012-13," available at https://www.safeworkaustralia.gov.au/system/files/documents/1702/cost-of-work-related-injury-and-disease-2012-13.docx.pdf.

4 Health and Safety Executive's submission to the1987 Sizewell B Inquiry suggesting that a factor of up to 3 (i.e. costs three times larger than benefits) would apply for risks to workers; for low risks to members of the public a factor of 2, for high risks a factor of 10. The Sizewell B Inquiry was a public inquiry conducted between January 1983 and March 1985 into a proposal to construct a nuclear power station in the UK.

5 Australian Energy Regulator, "Industry practice application note for asset replacement planning," available at https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning.

4. Potential Credible Options

This section describes the credible options that have been considered to address the identified need, including:

- the technical characteristics of each option;
- the estimated construction timetable and commissioning date; and
- the total indicative capital and operating and maintenance costs.

The purpose of the RIT-T is to identify the credible option for addressing an identified need that maximises the net market benefit. An important aspect of this task is to consider non-network and network options on an equal footing, so that the optimal solution can be identified.

As the identified need in this case arises from the condition of towers on the HYTS-APD line, there are no credible non-network options that could address the identified need. The HYTS-APD line is critical in providing supply to the Portland Smelter. In addition, the HYTS-APD line is an important component of the transmission network that may be required to support offshore wind projects. For these reasons, it is essential to maintain the existing service capability provided by the HYTS-APD line.

Figure 3 provides an aerial view of the proposed project.

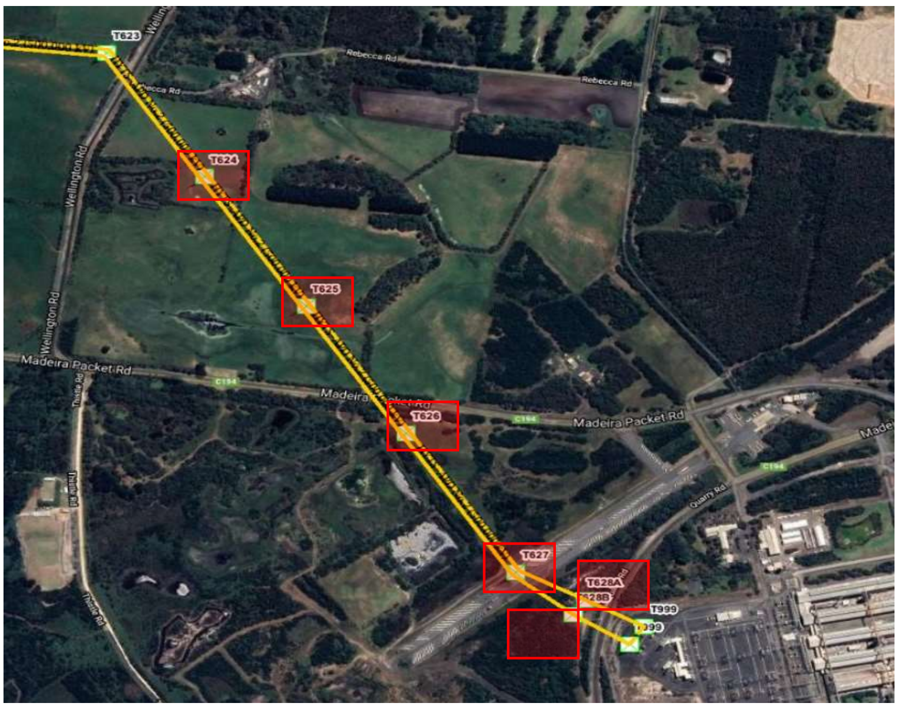

Figure 3: Aerial view of project sites

The credible options are:

- Option 1: Replace the corroded towers with new steel lattice towers, including all line components in a staged manner.
- Option 2: Replace towers with steel transmission poles.

Neither credible option is expected to have an inter-regional impact. Each credible option is discussed in further detail below.

4.1. Option 0: Do Nothing/BAU

The Do Nothing/BAU option assumes that AusNet would not undertake any investment, outside of the normal operational and maintenance processes. The Do Nothing/BAU option establishes the base level of risk and provides a benchmark for comparing other credible options. Whilst the direct capital cost of this option is zero, the continued exposure to residual risks means that this option has significant costs associated with it. In relation to this project, 'do nothing' or 'BAU' is not a credible option.

4.2. Option 1: Replace the corroded towers with new steel lattice towers

This option would replace the transmission towers with painted steel lattice towers that comply with current design standard AS/NZS 7000. This option entails replacement of nine towers in a staged approach, starting with the most corroded structures in the circuit.

The key benefit associated with this option is that it removes all risks associated with the failure of degraded assets, as well as reducing the risks associated with a failure from a high intensity wind event.

By eliminating the risk of a tower and line failure due to corrosion, AusNet also reduces the risk of a public health and safety incident occurring, noting that there are two road crossings along this section of the line. At this stage, the direct capital cost of this option is approximately $38.9 million in present value terms. The operating expenditure arising from this option is not expected to be materially different to the BAU option.

4.3. Option 2: Replace towers with steel transmission poles

Option 2 would involve replacing the existing transmission towers with painted steel transmission poles. The existing towers would be retired and replaced with AS/NZS7000-2016 compliant steel poles. The key benefit of this option is that it would eliminate the risk of a tower collapse event due to corrosion. However, it would not eliminate the risk of in-service failure of the other line elements, i.e., insulator, conductor, groundwire.

This option has the following disadvantages compared to option 1:

- This option would require redesign and construction of new footings, causing increased disruption to the local community and landowners, without additional benefits.
- Additional planning permits would be required to build this option, potentially introducing delays into the project.
- This option does not include the replacement of conductor or other line hardware, so would require revisiting towers T624 to T628B to replace these at some point in the next 15 years, also leading to increased disruption.

While the direct capital costs of this option are approximately $19.1 million lower in present value terms, the additional indirect costs described above are expected to result in total costs that substantially exceed those for Option 1. As noted in relation to option 1, the operating expenditure arising from this option is not expected to be materially different to the BAU option.

5. Economic assessment of the credible options

5.1. Market benefits

Clause 5.16.4 (b)(6)(iii) of the NER requires the RIT-T proponent to consider whether each credible option provides the classes of market benefits described in clause 5.15A.2(b)(4). To address this requirement, the table below discusses our approach to each of the market benefits listed in that clause for both credible options.

Table 1: Analysis of Market Benefits

Class of Market Benefit	Analysis
(i) changes in fuel consumption arising through different patterns of generation dispatch;	The credible options will not have any impact on fuel consumption.
(ii) changes in voluntary load curtailment;	The credible options are not expected to lead to changes in voluntary load curtailment.
(iii) changes in involuntary load shedding with the market benefit to be considered using a reasonable forecast of the value of electricity to consumers;	The credible options are expected to have an impact on involuntary load shedding, by affecting the risk of asset failure. The cost benefit analysis will therefore consider the impact of each option on load shedding. AusNet applies probabilistic planning techniques to assess the expected cost of unserved energy for each option.
(iv) changes in costs for parties, other than the RIT-T proponent, due to differences in: *(A) the timing of new plant;* *(B) capital costs; and* *(C) the operating and maintenance costs;*	There is not expected to be any difference between the credible options.
(v) differences in the timing of expenditure;	There is not expected to be any difference between the credible options.
(vi) changes in network losses;	The credible options will not result in changes to electrical energy losses.
(vii) changes in ancillary services costs	The credible options will not have any impact on ancillary service costs.
(viii) competition benefits	The credible options will not provide any competition benefits.
(ix) any additional option value (where this value has not already been included in the other classes of market benefits) gained or foregone from implementing the credible option with respect to the likely future investment needs of the National Electricity Market;	There will be no impact on the option value in respect of the likely future investment needs of the NEM.
(x) any other class of market benefit determined to be relevant by the AER.	There are no other classes of market benefit that are relevant to the credible options.

5.2. Methodology

The purpose of this section is to provide a high-level explanation of our methodology for identifying the preferred option. As a general principle, it is important that the methodology takes account of the identified need and the factors that are likely to influence the choice of the preferred option. As such, the methodology is not a 'one size fits all' approach, but one that is tailored to the particular circumstances under consideration.

In general, the identified need for a project can be described in terms of two types of risk:

- supply risk, where an asset failure may lead to a loss of supply to customers; and
- non-supply risk, which captures the potential consequences of an asset failure, which include safety risk and damage to adjacent assets or property, as discussed in sections 3.2.2 and 3.2.3.

In relation to supply risk, we adopt a probabilistic planning methodology which considers the likelihood and severity of critical network conditions and outages. As explained in section 3.2.1of this PADR, the expected annual cost to customers associated with supply risk is calculated by multiplying the expected unserved energy (the expected energy not supplied based on the probability of the supply constraint occurring in a year) by the value of customer reliability (VCR).

In relation to non-supply risks, our approach monetises this risk by multiplying the following parameter estimates:

- the probability of asset failure;
- the cost of consequence of the asset failure;
- the likelihood of the consequence given the failure has occurred; and
- the number of assets to which the analysis relates.

For this project, the cost benefit analysis that underpins the RIT-T assessment identifies the most cost-effective option to mitigate the sum of the supply and non-supply risks (the aggregate 'risk-cost').

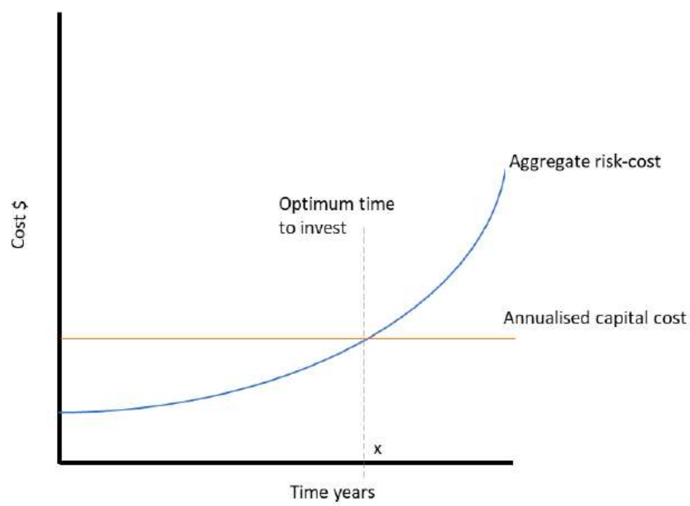

Figure 4: Increasing risk-cost over time and optimal project timing[6]

In the absence of remedial action, the above figure shows how the aggregate risk-cost will typically increase as the risk of asset failure increases over time. The optimal timing of the preferred option occurs when the annualised capital cost of that option (or the operating cost for a non-network option) is equal to the aggregate risk-cost.

The preferred option delivers the lowest total cost to customers, which is the sum of the cost of implementing that option and any residual risk-cost. The identification of the preferred option is complicated by the fact that the future is uncertain and that various input parameters are 'best estimates' rather than known values. Therefore, the RIT-T analysis must be conducted in the face of uncertainty.

To address uncertainty in our cost benefit assessment of the credible options, we use sensitivity analysis and scenario analysis. In accordance with the AER's application guidelines, we use sensitivity analysis to assist in determining a set

[6] This figure is reproduced from the AER's Industry practice application note, Asset replacement planning, January 2019, figure 8. This figure assumes that the option eliminates the aggregate risk-cost in full, which may not be the case.

of reasonable scenarios.[7] The relationship between sensitivity analysis and scenarios is best explained by the AER's practice note as follows:[8]

> *Scenarios should be constructed to express a reasonable set of internally consistent possible future states of the world. Each scenario enables consideration of the prudent and efficient investment option (or set of options) that deliver the service levels required in that scenario at the most efficient long run service cost consistent with the National Electricity Objective (NEO).*
>
> *Sensitivity analysis enables understanding of which input values (variables) are the most determinant in selecting the preferred option (or set of options). By understanding the sensitivity of the options model to the input values a greater focus can be placed on refining and evidencing the key input values. Generally the more sensitive the model output is to a key input value, the more value there is in refining and evidencing the associated assumptions and choice of value.*
>
> *Scenario and sensitivity analyses should be used to demonstrate that the proposed solution is robust for a reasonable range of futures and for a reasonable range of positive and negative variations in key input assumptions. NSPs should explain the rationale for the selection of the key input assumptions and the variations applied to the analysis.*

In applying sensitivities and scenarios to our cost benefit assessment, we have regard to the different circumstances that may eventuate that would affect the choice of the preferred option. Where our analysis shows that an option is clearly preferred, we will not undertake further testing. This approach is consistent with clause 5.15A.2(b)(2) of the Rules, which states that the RIT–T must not require a level of analysis that is disproportionate to the scale and likely impact of each credible option considered.

In preparing this RIT-T, we have also had regard to AEMO's 2023 Inputs, Assumptions and Scenarios Report (IASR) and its 2024 Integrated System Plan (ISP), being the latest ISP. We note that the scenarios adopted by AEMO in its 2023 IASR are focused particularly on the matters that are relevant to major transmission investments, rather than smaller transmission investments of the type considered in this report. Accordingly, we have adopted an approach that is appropriate to the specific circumstances described in this report relating to the identified need and the credible options.

5.3. Key variables and assumptions

Table 2~~Table 2~~ below lists the key variables and assumptions applied in the economic assessment, which are essential inputs to our methodology for the purpose of this PADR. The table also sets out the upper and lower bounds of the range of forecasts adopted for each of these variables. The lower bound and upper bound estimates are used to undertake sensitivity testing and scenario analysis. The detailed results of this modelling are provided in section 5.4.

In relation to the discount rate, we have adopted central, upper and lower bound estimates that are consistent with AEMO's IASR. We note that discount rates are subject to change, particularly in the current economic climate. As such, the rates employed in this PADR are considered reasonable in exploring the impact of different rates on the cost-benefit assessment of the competing options to address the identified need.

In relation to the supply risk costs, the expected costs could be affected by a combination of changes in the probability and consequences of asset failure, which in turn are affected by estimates of the VCR and expected unserved energy. Similarly, the cost parameter description recognises that different aspects of the risk-cost could be varied to deliver a higher or lower expected cost. For example, an increase in the risk-cost could reflect an increased risk of asset failure or an increase in the consequence of an asset failure, or a combination of the two. The same observation applies to a reduction in the risk-cost, which is also considered in the sensitivity testing.

7 AER, Application guidelines, Regulatory investment test for transmission, October 2023, page 44.
8 AER, Asset replacement planning, January 2019, page 36.

Table 2: Key variables and assumptions

Variable / assumption	Lower bound	Central estimate	Upper bound
Cost of involuntary supply interruption	15% reduction in central estimate	VCR for transmission-connected very large business load as determined by the AER	15% increase in central estimate
Safety cost	Central Estimate	Value of statistical life of $4.5 million[9]	Central estimate
Safety cost Disproportionate Factor	Central estimate	Factor of 3	Central estimate
Option cost	15% reduction in central estimate	In-house cost estimates using detailed and high-level project scopes	15% increase in central estimate
Real pre-tax discount rates	3.0%[10]	7.0%[11]	10.5%[12]
Probability or consequence of asset failure	15% reduction in central estimate	Historical asset performance data, plus forecasts based on condition monitoring and CBRM modelling	15% increase in central estimate

5.4. Cost benefit analysis

The economic analysis allows comparison of the economic costs and benefits of each option to rank the options and to determine the optimal timing of the preferred option. It quantifies the capital costs and the cost of the residual risk for each option, to determine a total cost for each option. The net economic benefit for each credible option is the total cost associated with that option minus the costs of the Do Nothing/BAU option.

Section 5.4.1 presents the NPV analysis using central estimates, while Section 5.4.2 presents the sensitivity testing and scenarios analysis.

5.4.1. Net present value analysis- central estimates

The table below sets out the present value net economic benefit of each credible option, being:

- Option 1: Replace the corroded towers with new steel lattice towers; and
- Option 2:. Replace towers with steel transmission poles

Table 3: Costs and net economic benefit for each option in present value terms ($M, real 2022)[13]

	Option 0 – Do Nothing/BAU	Option 1 – New steel lattice towers	Option 2 – steel transmission poles
Capital expenditure	$0m	$38.9m	$18.4m
Operating expenditure	N/A	N/A	N/A
Unserved energy, safety and collateral damage	$146m	$0	$85.2m
Replacement costs	$27.1m	$0	$8.0m
Total costs	**$173.9m**	**$38.9m**	**$111.7m**
Net benefit compared to BAU	N/A	$135.0m	$62.2m

9 Best Practice Regulation Guidance Note Value of statistical life, December 2014, escalated.
10 AEMO, Inputs, Assumptions and Scenario Report 2023, July 2023, page 123.
11 Ibid.
12 Ibid.
13 Totals may not add due to rounding.

The replacement cost in the above table accounts for the expected costs of replacing towers in the event of an asset failure. The analysis shows that Options 1 and 2 deliver significant net benefits compared to the BAU option. The primary difference between Options 1 and 2 is that the latter has lower capital expenditure, but much higher residual risk-related costs which more than offsets these savings. As a consequence, Option 1 is expected to provide a substantially higher net benefit than Option 2, being $135.0 million compared to $62.2 million in present value terms.

5.4.2. Sensitivity analysis and scenario testing

The table below shows the net economic benefit for each credible option applying sensitivity analysis. We note that low or high risk of asset failure has a similar effect to varying the VCR.

Table 4: Net economic benefit for each option in present value terms ($M, real 2022)[14]

	Central Case	High failure risk or consequence	Low failure risk or consequence	High option cost	Low option cost	High discount rate	Low discount rate
Option 1	$135.0m	$157.0m	$121.9m	$129.1m	$140.8m	$108.9m	$180.5m
Option 2	$62.2m	$71.4m	$53.0m	$59.6m	$65.0m	$51.4m	$79.5m

Source: AusNet

The sensitivity analysis shows that Option 1 is preferred to Option 2 for each sensitivity. The magnitude of the net benefit is also material, especially compared to the project costs. This analysis provides very strong evidence to support Option 1 being the preferred option.

For completeness, we have considered whether scenario analysis is required to further test this proposition. The current IASR scenarios – which relate principally to changes in the wholesale generation market – are not relevant to this investment decision. Specifically, the IASR scenarios – progressive change, step change and green energy exports – are expressed in terms of their respective contributions to Australia's possible decarbonisation future, as depicted in the figure below. While critical to ISP projects, these dimensions have no practical bearing on the asset replacement decision that is being considered in this RIT-T.

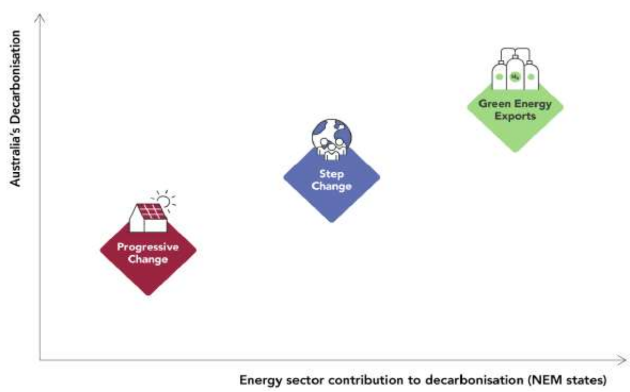

Figure 5: AEMO's scenarios for its 2023 IASR[15]

In our view, the scenarios described below comply with the requirements of the RIT-T application guidelines, noting that they describe different sets of states of the world that are relevant to the investment decision that is being addressed in this PADR. In reaching this conclusion, we note that the AER's RIT-T Application Guidelines explains:[16]

> Under the RIT–T instrument, the number and choice of reasonable scenarios must be appropriate to the credible options under consideration. Specifically, the choice of reasonable scenarios must reflect any variables or parameters that are likely to affect:
>
> – the ranking of the credible options, where the identified need is for reliability corrective action, inertia network services or system strength services. In these cases, only the ranking (as opposed to the sign) of credible options' net economic benefits is important; and

14 Totals may not add due to rounding.
15 AEMO, Inputs, Assumptions and Scenario Report 2023, July 2023, page 4.
16 Australian Energy Regulator, Application guidelines – Regulatory investment test for transmission, August 2020, page 41.

– the ranking or sign of the net economic benefit of any credible option where the identified need is not for reliability corrective action, inertia network services or system strength services. In these cases, the preferred option must have a positive net economic benefit.

The appropriate number and choice of reasonable scenarios could vary depending on the credible options under consideration. This recognises that NER clause 5.15A.2(b)(2) requires RIT–T proponents to apply the RIT–T to a level of analysis that is proportionate to the scale and likely impact of each credible option.

Table 5 below defines the scenarios that we have adopted for the purpose of this PADR. In the scenario analysis, we have varied the VCR by +/-15% in the upper and lower bound cases.

Table 5: Definition of reasonable scenarios

Scenario	Failure risk or consequence	Value of customer reliability	Option Cost	Discount rate
Central Case	Central estimate	Central	Central estimate	Central estimate
Weak economic growth	Central estimate	Lower bound	Lower bound	Lower bound
High delivery costs	Central estimate	Upper bound	Upper bound	Upper bound

Table 6 below provides a brief description of each scenario.

Table 6: Guide to scenarios

Scenario	Description
Central Case	This scenario adopts the central estimate for each variable in the economic assessment. It represents the most likely outcome.
Weak economic growth	This scenario reflects weak economic growth, following a period of higher interest rates compared to those during and immediately prior to the Covid-19 pandemic. It has lower costs of delivering the option, a low VCR and a lower discount rate.
High delivery costs	This scenario represents an economic rebound and continuing supply side issues. It is characterised by higher costs of delivering the option, a high VCR and an upper bound discount rate.

The table below shows the NPV of the options for each scenario. Scenarios may incorporate variations in multiple input factors to the NPV.

Table 7: Net benefit for each scenario in present value terms ($M, real 2022)

	Central case	Weak economic growth	High delivery costs
Option 1	$135.0m	$162.5m	$118.6m
Option 2	$62.2m	$71.4m	$56.2m

Source: AusNet

The scenario analysis confirms the findings from our sensitivity analysis, which is that Option 1 is strongly preferred for each scenario.

5.5. Preferred option

Our preferred option (Option 1) is to replace the existing corroding transmission towers with painted steel lattice towers that comply with current design standard AS/NZS 7000. This option entails replacement of nine towers in a staged approach, starting with the most corroded structures in the circuit.

This option:

- Maintains the reliability of supply to the Alcoa smelter at Portland Victoria, a major customer of AusNet.
- Reduces the safety risks to the public and the environment.

- Helps provide clarity on the timeframes to rectify corroded members and bolts on the towers. This will address the major non-conformance finding of Energy Safe in their most recent audit.

In accordance with the RIT-T, this option is expected to maximise the present value of the net economic benefit to all those who produce, consume and transport electricity in the NEM.

5.6. Capital and operating costs of the preferred option

The incremental change in Opex between the preferred option (Option 1) and BAU is expected to be zero.

The direct total capital expenditure of Option 1 is approximately $40 million ($, nominal), which is slightly above the costs expressed in present value terms. The principal capital expenditure elements, expressed in nominal terms, are:

- Design, $1.76 million;
- Internal labour, $1.0 million;
- Materials, $17.98 million;
- Plant and equipment, $2.88 million;
- Contracts, $16.0 million; and
- Other, $0.37 million.

6. Satisfaction of the RIT-T

In accordance with clause 5.16.4(k)(9)(iv) of the Rules, we certify that the proposed option satisfies the regulatory investment test for transmission. The table below shows how each of these requirements have been met by the relevant section of this report.

Table 8: Compliance with regulatory requirements

Requirement			Section
5.16.4(k) The project assessment draft report must include:			Noted. See details below.
(1)		a description of each credible option assessed;	Section 4.
(2)		a summary of, and commentary on, the submissions to the project specification consultation report	No submissions were received.
(3)		a quantification of the costs, including a breakdown of operating and capital expenditure, and classes of material market benefit for each credible option;	Section 4
(4)		a detailed description of the methodologies used in quantifying each class of material market benefit and cost;	Sections 5.1 and 5.2
(5)		reasons why the RIT-T proponent has determined that a class or classes of market benefit are not material;	Section 5.1
(6)		the identification of any class of market benefit estimated to arise outside the region of the Transmission Network Service Provider affected by the RIT-T project, and quantification of the value of such market benefits (in aggregate across all regions);	Not applicable
(7)		the results of a net present value analysis of each credible option and accompanying explanatory statements regarding the results);	Section 5.4.
(8)		the identification of the proposed preferred option;	Section 5.5
(9)		For the proposed preferred option identified under subparagraph (8), the RIT-T proponent must provide:	
	(i)	details of the technical characteristics;	Section 4.2 and Appendix
	(ii)	the estimated construction timetable and commissioning date;	Appendix
	(iii)	if the proposed preferred option is likely to have a material inter-network impact and if the Transmission Network Service Provider affected by the RIT-T project has received an augmentation technical report, that report; and	Not applicable
	(iv)	a statement and the accompanying detailed analysis that the preferred option satisfies the regulatory investment test for transmission	Section 5.5
(10)		if each of the following apply to the RIT-T project:	
		(i) the estimated capital cost of the proposed preferred option is greater than $100 million (as varied in accordance with a cost threshold determination); and (ii) AEMO is not the sole RIT-T proponent, the RIT reopening triggers applying to the RIT-T project.	Not applicable

Appendix – Technical characteristics

Project description

The project involces the replacement of the last strain section of the 500 kV overhead line from Heywood Terminal Station to Alcoa Smelter in Portland, Victoria (Towers T624 – T628B). This includes the replacement of all elements of the overhead lines and towers, designed to the current Australian and New Zealand Standard, AS/NZS 7000.

The existing footings will be retained based on the design investigations completed as part of the tower resilience study conduceted over the last three years, indicating that these are appropriate for the higher reliability design. Three additional towers (T609, T618, T621) have also been assessed as requiring replacement and this work will be included in the project.

The planned commencement date of the works is January 2025, for completion and commissioning by February 2026.

Key risks and constraints

Replacing towers which have the highest risk of failure due to corrosion in the transmission network will alleviate risks such as line outages, third party damage for the Alcoa's ingot stock yard, health and safety risks for motorists and members of the public, as well as potential fire starts which may result in a bushfire.

The Emergency Restoration System (ERS) masts will be used at the site for approximately 24 months, which is beyond the recommended design life of temporary structures. Consequently, strengthening and monitoring will be required during the project, to ensure the safety and structural integrity of the by-pass.

The full set of risks and mitigation measures are described in AusNet's business case for this project.

Scope inclusions

The scope includes the following:

- Site establishment which includes vegetation removal where needed, and creation of access tracks.
- Erection of Emergency Restoration Structures (ERS) on both sides of the existing 500 kV HYTS-APD circuit.
- String the ERS with phase conductors and groundwire, one ERS by-pass will support OPGW.
- Remove the existing phase conductors, groundwire, OPGW and insulators from the corroded towers.
- Dismantle existing lattice towers, and if needed strengthen the existing foundations.
- Install new painted towers on the reinforced foundations (T609, T618, T621, T624, T625, T626, T627, T628A, T628B).
- Install new conductors, groundwires, OPGW and insulators on the new towers (T624-T628B).
- Establish connection between existing tower T623 and new tower T624, and between new towers T628A & T628B and APDs rack/gantry structures.
- Dismantle the ERS structures.
- Re-establish the site.

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