1 APRIL 2026

# Maintaining Reliability of Supply at Tennyson

## Project Specification Consultation Report

# Preface

Powerlink Queensland is a Transmission Network Service Provider (TNSP) that owns, develops, operates and maintains Queensland's high-voltage electricity transmission network. The network transfers bulk power from Queensland generators to electricity distributors Energex and Ergon Energy (part of the Energy Queensland Group), and to a range of directly connected large industrial customers.

This Project Specification Consultation Report has been prepared in accordance with version 243 of the National Electricity Rules (NER), the Regulatory Investment Test for Transmission (RIT-T) Instrument (November 2024) and RIT-T Application Guidelines (November 2024). The RIT-T Instrument and Application Guidelines are made and administered by the Australian Energy Regulator.

The NER requires Powerlink to carry out forward planning to identify future reliability of supply requirements, which may include replacement of network assets or augmentations of the transmission network. Powerlink must then identify, evaluate and compare network and non-network options (including, but not limited to, generation and demand side management) to identify the preferred option which can address future network requirements at the lowest net cost to electricity customers.

Powerlink also has obligations under the NER to address power system security requirements identified by the Australian Energy Market Operator in its annual System Security Reports.

This document provides details of the identified risks and needs associated with this project. It provides information on credible options, technical characteristics of non-network options, and categories of market benefits likely to impact selection of a preferred option. It then provides a recommendation on a preferred option. The document encourages submissions from potential proponents of feasible non-network options to address the identified need. It also invites comment from customers, stakeholders and communities on the options presented.

More information on how Powerlink applies the RIT-T process is available on Powerlink's website.

A copy of this report will be made available to any person within three business days of a request being made. Requests should be directed to the Manager Network and Alternate Solutions by phone ((07) 3860 2111) or email (networkassessments@powerlink.com.au).

**Disclaimer**

While care was taken in preparation of the information in this document, and it is provided in good faith, Powerlink accepts no responsibility or liability (including without limitation, liability to any person by reason of negligence or negligent misstatement) for any loss or damage that may be incurred by any person acting in reliance on this information or assumptions drawn from it, except to the extent that liability under any applicable Queensland or Commonwealth of Australia statute cannot be excluded. Powerlink makes no representation or warranty as to the accuracy, reliability, completeness or suitability for particular purposes, of the information in this document.

*Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular, the lands on which we operate. We pay our respect to their Ancestors, Elders and knowledge holders and recognise their deep history and ongoing connection to Country.*

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# Executive Summary

*The condition of Transformer 3 at Tennyson Substation requires Powerlink to take action*

The Tennyson Substation, established in 2001, is located approximately 6 kilometres south of the Brisbane central business district (CBD) and is a major injection point into the Energex distribution network for the southern Brisbane and CBD area. The condition of one of its three transformers (Transformer 3) could place the network at risk of operating with load at risk or not meeting all supply needs.

The preferred option is to replace Transformer 3 with a similar one. The alternate option of more regular maintenance where possible is not considered credible. This is because some critical activities (e.g. winding insulation refurbishment) are now no longer viable in Australia with very limited and costly capability.

*Powerlink is required to apply the Regulatory Investment Test for Transmission (RIT-T)*

The estimated capital cost of the most expensive credible option to address primary plant risks at Tennyson Substation exceeds the minimum threshold (currently $8 million) to apply the RIT-T. As the identified need for the proposed investment is to meet reliability and service standards specified within Powerlink's Transmission Authority, guidelines and standards published by the Australian Energy Market Operator (AEMO), and Powerlink's ongoing compliance with Schedule 5.1 of the National Electricity Rules (NER), it is classified as a reliability corrective action under the NER. The preferred option may therefore have a net economic cost.

Powerlink will adopt the expedited process for this RIT-T, as the estimated capital cost of the preferred option is below $54 million – the upper threshold for applying the expedited process. The credible options are unlikely to result in any material market benefits other than those arising from a reduction in involuntary load shedding. This is included in the monetised risk modelling and represented in the economic analysis of the options.

*Powerlink has developed a non-credible base case against which to compare credible options*

Powerlink has modelled a non-credible option where the transformer condition issues are managed via operational maintenance or operational measures only. This would result in an increase in overall risk levels due to continuing deterioration of its condition and increasing failure rectification timeframes. In addition, some faults may be terminal as the viable capability for repair is scarce or no longer available in Australia. This means a repair option involves an extended repair time, exposing the network to the reliability risk for this period. These increasing risk levels are assigned a monetary value and added to the ongoing maintenance costs to form the base case.

*Powerlink has developed one credible network option to address the identified need*

The table below details the credible network option and shows that this option has a positive Net Present Value (NPV) relative to the base case.

**Summary of Credible Option**

| Option | Description | Total Costs ($m, 2025) | NPV relative to non-credible base case ($m) | Ranking |
|---|---|---|---|---|
| 1 | Like for like replacement of 110/33kV 80MVA Transformer 3 by October 2027. | 9.69 | 7.24 | 1 |

*Note: Total costs exclude risk and contingency.*

### *Powerlink welcomes the potential for non-network options to form part or all of the solution*

To enhance engagement outcomes, Powerlink proactively applies an engagement strategy to each RIT-T consultation. The scope of engagement activities undertaken is dependent upon various considerations, such as the characteristics and complexity of the identified need and potential credible options outlined in the RIT-T stakeholder engagement matrix.

Powerlink welcomes submissions from proponents who consider they could offer a potential non-network option that is both economically and technically feasible, on an ongoing basis. To mitigate the impact of a Transformer 3 outage, a non-network solution would need to provide supply to the Energex system and load up to a peak of 190 megawatts (MW), and up to a peak of 2,000 megawatt hours (MWh) per day on a continuous basis.

### *Lodging a submission with Powerlink*

Powerlink seeks written submissions on this Project Specification Consultation Report (PSCR), on or before **30 June 2026**, particularly on the credible options presented in this PSCR. Submissions should be addressed to:

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# 1. Introduction

## 1.1. Powerlink asset management and obligations

Powerlink's approach to asset management delivers value to customers and stakeholders by optimising whole of life cycle costs, benefits and risks, while ensuring compliance with relevant legislation, regulations and standards. This is underpinned by Powerlink's corporate risk management framework, risk assessment guidelines and methodologies.

## 1.2. Overview of the Regulatory Investment Test for Transmission

The purpose of a Regulatory Investment Test for Transmission (RIT-T) is to identify the preferred investment option that meets the identified network need. The preferred option maximises the present value of economic benefits. If the identified need is for a reliability corrective action, the preferred option may have a net economic cost.[1]

Powerlink applies the RIT-T to potential prescribed (regulated) investments in the transmission network where the estimated capital cost of the most expensive option exceeds $8 million.[2]

This Project Specification Consultation Report (PSCR) is the first step in the RIT-T process.[3] The PSCR:

- describes the reasons why Powerlink has determined that investment is necessary (the identified need), together with the assumptions used in identifying this need, including whether the need is as an actionable project in AEMO's latest Integrated System Plan (ISP);
- provides potential proponents of non-network options with information on the technical characteristics that a non-network solution would need to deliver, in order to assist proponents to consider whether they could offer an alternative solution;
- describes the credible option(s) that Powerlink currently considers may address the identified need and the preferred option with its technical detail, estimated construction completion date;
- explains which (if any) categories of market benefit Powerlink expects to be material, or not material, for this RIT-T including a breakdown of operating and capital expenditure;
- describes how customers and stakeholders have been engaged with regarding the identified need; and
- provides stakeholders with the opportunity to comment on the credible option(s) presented.[4]

More information on the RIT-T process is provided in Appendix 1. Powerlink's compliance with RIT-T requirements in the National Electricity Rules (NER) and the RIT-T Application Guidelines is set out in Appendix 5.

## 1.3. Customer and Non-network engagement

Powerlink undertakes a considered and consistent approach to ensure an appropriate level of stakeholder engagement is undertaken for each individual RIT-T consultation. The scope of engagement activities is

[1] National Electricity Rules (NER), clause 5.15A.1(c) and chapter 10, glossary ('net economic benefit').
[2] NER, clauses 5.15.3(a) and (b)(2) set the threshold at $5 million. The Australian Energy Regulator's (AER) latest cost threshold review increased the value to $8 million for three years from 1 January 2025.
[3] This RIT-T consultation process has been prepared in accordance with clauses 5.16.4(b) to (g) of the NER and AER, *Regulatory Investment Test for Transmission Application Guidelines*, November 2024.
[4] NER, clause 5.16.4(b).

dependent upon various considerations, such as the characteristics and complexity of the identified need and potential credible options.

For all RIT-Ts, members of Powerlink's Non-network Engagement Stakeholder Register receive email notifications of publication of RIT-T reports. For projects where Powerlink identifies material or significant market benefits, additional activities such as webinars or dedicated engagement forums may be appropriate. For more information, see Powerlink's RIT-T stakeholder engagement matrix.

Additionally, Powerlink takes a proactive approach to engagement generally. This includes:

- The Transmission Network Forum – Powerlink's annual customer engagement event.
- Collaboratively working with Powerlink's customers, including regular consultation on RIT-Ts with our Customer Panel (Powerlink Customer Panel | Powerlink).
- Transparency on future networks, such as our Transmission Annual Planning Report.

Appendix 2 provides more detail on Powerlink's engagement approach.

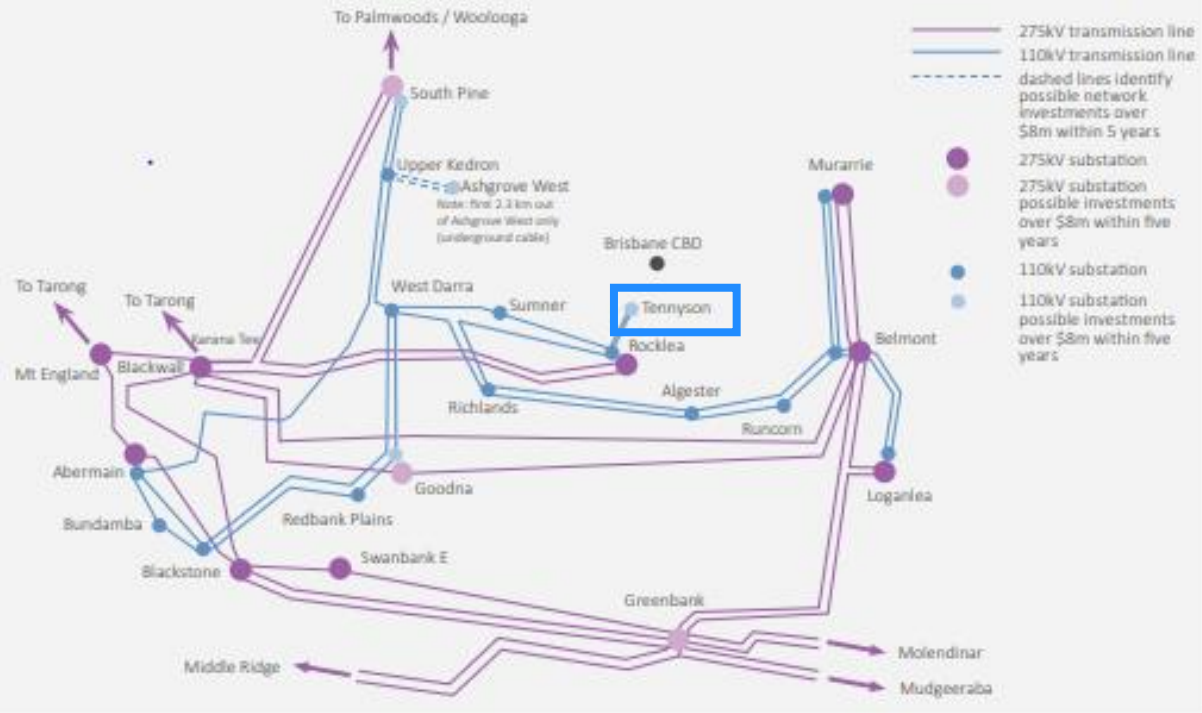
# 2. Identified need

In a RIT-T, the identified need is the objective the RIT-T proponent seeks to achieve by investing in the network.[5] The primary driver for reinvestment at Tennyson is the reliability of Transformer 3 leading to the need to replace the transformer under emergency conditions and could result in a loss of supply to the customers connected to the substation and community and staff safety risks in the unlikely event of a catastrophic failure.

## 2.1. Geographical and network need

Tennyson Substation was established 6km south of Brisbane in 2001 as a bulk supply point for Energex to provide ongoing load needs in the area to the south of Brisbane. Figure 2.1 shows the supply area for Tennyson Substation.

**Figure 2.1: Greater Brisbane Transmission Network**




## 2.2. Description of identified need

Powerlink's Transmission Authority requires it to plan and develop the transmission network in accordance with good electricity industry practice, having regard to the value that end users of electricity place on the quality and reliability of electricity services. It allows load to be interrupted during a critical single network contingency, provided the maximum load and energy will not exceed 50 megawatts (MW) at any one time, or will not be more than 600 megawatt hours (MWh) in aggregate.[6] The Transmission Authority is also subject to a broader obligation under the *Electricity Act 1994* (Qld) (the Electricity Act) that Powerlink operate, maintain (including repair and

[5] NER, chapter 10 (definition of 'identified need').
[6] Transmission Authority No. T01/98, section 6.2(c).

replace if necessary) and protect its transmission grid to ensure the adequate, economic, reliable and safe transmission of electricity.[7]

Planning studies have confirmed that, in order to continue to meet the reliability standard in Powerlink's Transmission Authority, the services currently provided by Tennyson Substation are required into the foreseeable future to meet ongoing customer requirements.

Transformer 3, one of the three 110/33/11kV 80 MVA transformers at Tennyson Substation – the equipment which transforms high transmission voltages to lower distribution voltages – has been identified as approaching end of life with winding insulation and On-Load Tap Changer (which is the equipment that continuously monitors and adjusts the voltage to ensure compliance with the standard voltage range) in a degraded state. In addition, there are oil leaks and corrosion on the transformer casing. Its porcelain bushings are also approaching end of life and pose a safety risk. These factors increase the risk to supply in the southern Brisbane area.

Powerlink must therefore take action to avoid the increasing likelihood of in-service failure resulting in the need to replace the transformer under emergency conditions, as well as the risk of having supply interruptions to Powerlink's customers.

Removing Transformer 3 from service will, in most cases, eliminate the risk of breaching these safety obligations. However, removing it from the Powerlink network without a suitable network or non-network alternative would result in Powerlink not complying with the NER or its Transmission Authority requirements. This could result in the need for load shedding to ensure that the system is able to be operated without breaching the satisfactory operating state provisions in clause 4.2.2(d) of the NER.

As a result, the proposed investment is for meeting reliability and service standards. These standards are set through Powerlink's Transmission Authority requirements and Schedule 5.1 of the NER. Because of this it is classed as a reliability corrective action under the NER.[8] A reliability corrective action differs from that of an increase in producer and consumer surplus (market benefit) driven need in that the preferred option may have a negative net economic outcome. The NER allows this to meet an externally imposed obligation on the network business.[9]

## 2.3. Description of asset condition and risks

Powerlink has undertaken a detailed condition assessment of Transformer 3 at Tennyson Substation identifying a range of age-related deterioration issues with it reaching the end of its technical service life and with an increasing risk of failure. Without corrective action, the consequence of the deteriorated transformer remaining in service beyond October 2027 would result in Powerlink being exposed to potential risk of failure.

Powerlink has experienced increased maintenance costs on the On-Load Tap Changer and a breakdown of internal winding insulation which increases the risk of its failure.

## 2.4. Consequences of failure of Transformer 3

Poor asset condition increases the risk and frequency of faults. In the case of Transformer 3, a failure mode could be an insulation failure in the windings often causing considerable internal damage. There is little or no cost-

[7] *Electricity Act 1994* (Qld), section 34(1)(a).
[8] NER, clause 5.10.2 (definition of 'reliability corrective action').
[9] NER, clause 5.15A.1(c).

effective repair capability in Australia, so this would require a replacement transformer to be installed under emergency conditions, resulting in a prolonged return to service time.

The condition and consequences of failure of the main at-risk items of equipment is summarised in the table below.

**Table 2.1: Summary of primary plant condition issues and potential consequences of failure**

| Equipment | Condition / Issue | Potential Consequences of Failure |
|---|---|---|
| Power Transformer | • Degraded oil and paper insulation<br>• Oil leaks | • Significant financial, environmental and loss of supply risks<br>• Loss of supply |
| On Load Tap Changer | • Complex mechanism with regular maintenance callouts | • Inability to supply regulated electricity within required voltage limits resulting in trips and loss of supply.<br>• Long repair or service time<br>• Multiple planned maintenance outages |
| Transformer bushings | • Degraded insulation inside porcelain housings | • Significant safety, financial, environmental and loss of supply risks<br>• Potential for failure modes leading to damage of other equipment and extended loss of supply |

# 3. Required technical characteristics for non-network options

The information provided in this section is intended to enable interested parties to formulate and propose genuine and practicable non-network solutions.

Powerlink welcomes submissions from proponents who consider that they could offer a non-network solution in full by 2027 on an ongoing basis and will investigate the feasibility of any potential non-network option proposed or otherwise identified.

## 3.1. Criteria for proposed non-network options

Powerlink has identified that a potential non-network solution would need to provide up to 190MW and 2,000MWh per day on a continuous basis by October 2027.

Powerlink is not aware of any significant Demand Side Management (DSM) in the Tennyson load centre. However, Powerlink will consider any proposed solution that can contribute significantly to the requirements of ensuring that Powerlink continues to meet its required reliability of supply obligations as part of the formal RIT-T consultation process.

Powerlink has identified the following common criteria that must be satisfied if proposed network support services are to meet supply requirements.[10]

### Size, Location and Operation

- Such a non-network option would need to be capable of operating on a continuous basis over a period of years and would be required to provide notice of cessation of network support services several years in advance to allow Powerlink to address the identified need in time to meet its reliability of supply obligations.
- If a generation service is proposed (either standalone or in conjunction with other services), such operation will be required regardless of the market price.
- Due to the bulk nature of the transmission network, aggregation of smaller sub 10MW non-network solutions will be the sole responsibility of the non-network provider.
- Notwithstanding the location of any solution, each proposal would require assessment in relation to technical constraints pertinent to the network connection, such as impacts on intra-regional transfer limits, fault level, system strength, maintaining network operability and quality of supply.
- Proponents of generation services are advised that network support payments are intended for output that can be demonstrated to be additional to the plant's normal operation in the NEM.
- Where there are network costs associated with a proposed non-network option, including asset decommissioning, these costs form part of the scope of a non-network option and will be included in the overall cost of a non-network option as part of the RIT-T cost-benefit analysis.

### Reliability

- Proposed services must be capable of reliably meeting electricity demand under a range of conditions and, if a generator, must meet all relevant NER requirements related to grid connection.
- Powerlink has obligations under the NER, its Transmission Authority and connection agreements to ensure supply reliability is maintained to its customers. Failure to meet these obligations may give rise to liability.

[10] Powerlink's Network Support Contracting Framework provides a general guide to assist potential non-network solution providers. This framework outlines the key contracting principles that are likely to appear in any network support agreement.

Proponents of non-network options must also be willing to accept any liability that may arise from its contribution to a reliability of supply failure.

### Timeframe and certainty

- Proposed services must be able to be implemented in sufficient time to meet the identified need, using proven technology and, where not already in operation, provision of information in relation to development status such as financial funding and development timeline to support delivery within the required timeframe must be provided.

### Duration

- The agreement duration for any proposed service will provide sufficient flexibility to ensure that Powerlink is pursuing the most economic long run investment to address its condition risks arising from Transformer 3 at Tennyson Substation.

# 4. Potential Credible Network Options to Address the Identified Need

## 4.1. Credible network option

Powerlink has developed one credible network option to maintain reliability of supply and to address condition risks at Tennyson Substation.

Option 1 seeks to address the risks associated with Transformer 3 at Tennyson by a like for like replacement and commissioned by October 2027.

A summary of this option is shown in Table 4.1.

**Table 4.1: Summary of credible options**

| Option | Description | Total costs ($m, 2025) | Indicative annual O&M costs ($m, 2025) |
|---|---|---|---|
| 1 | Replace Transformer 3 with like for like replacement by October 2027. | 9.69 | 0.33 |

*Note: O&M denotes operations and maintenance.*

The credible option addresses the risks resulting from Transformer 3 at Tennyson Substation. This allows Powerlink to meet its reliability of supply and safety obligations under its Transmission Authority, the Electricity Act and Schedule 5.1 of the NER, by the replacement of the deteriorated equipment.

Powerlink does not consider that any of the credible options being considered will have a material inter-network impact, based on AEMO's screening criteria.[11]

## 4.2. Options considered but not progressed

**Table 4.2: Options considered but not progressed**

| Option | Description |
|---|---|
| Transformer 3 Refurbishment by October 2027 | Full refurbishment of transformer requiring it to be offsite for the duration typically greater than six months if a viable supplier was available |

[11] NER, clause 5.16.4(b)(6)(ii). AEMO has published guidelines for assessing whether a credible option is expected to have a material inter-network impact.

# 5. Economic Analysis of the Base Case

Powerlink has developed a monetised risk modelling framework consistent with the RIT-T Application Guidelines. An overview of the framework is available on Powerlink's website and the principles of the framework have been used to calculate the monetised risk, termed risk costs, in the National Electricity Market context for the Tennyson base case. The framework includes the modelling methodology and general assumptions underpinning the analysis.

## 5.1. Modelling a base case under the RIT-T

The base case is the situation in which the RIT-T proponent does not implement a credible option to meet the identified need and continues with business-as-usual (BAU) activities.[12]

The assessment undertaken in this PSCR compares the costs and benefits of credible options to address the risks arising from this need with a base case. As characterised in the RIT-T Application Guidelines, the base case reflects a situation in which the condition and obsolescence issues arising from the condition of the assets are only addressed through standard operational activities, with escalating safety, financial and network risks.[13]

To develop the base case, the existing condition and obsolescence issues are managed by undertaking operational maintenance or operational measures only. This results in increasing levels of risk as the condition and availability of the asset deteriorates over time. These increasing risk levels are assigned a monetary value that is used to evaluate the credible options designed to offset or mitigate these risk costs.

The base case therefore includes the costs of work associated with operational maintenance and the risk costs associated with the failure of the assets. The costs associated with equipment failures are modelled in the risk cost analysis and are not included in the operational maintenance costs.

The base case acts as a benchmark and provides a clear reference point in the cost-benefit analysis to compare and rank the credible options against each other over the same timeframe.

## 5.2. Quantifiable Risk Costs for Tennyson Base Case

The NER requires RIT-T proponents to quantify a number of classes of market benefits for each credible option, unless the proponent can demonstrate that a specific category(ies) is/are unlikely to materially affect the outcome of the assessment of credible options.[14] In line with Powerlink's framework, three key risk costs have been quantified in the cost benefit analysis in response to the identified need:

- **Network risk cost** – this is the cost of loss of supply that results from an in-service failure of the identified equipment and is typically known as unserved energy. This generally accrues under concurrent failure events, and consideration has been given to potential feeder trip events within the wider area at the same time as the failure of an element of the identified equipment. Tennyson Substation supplies a mixture of residential, industrial and agricultural load types. Historical load data has been analysed to approximate the ratio of the load types, resulting in a Value of Customer Reliability (VCR) of $36,598/MWh, published within the 'Value of customer reliability – Final report on VCR values' by the AER (updated in December 2024).

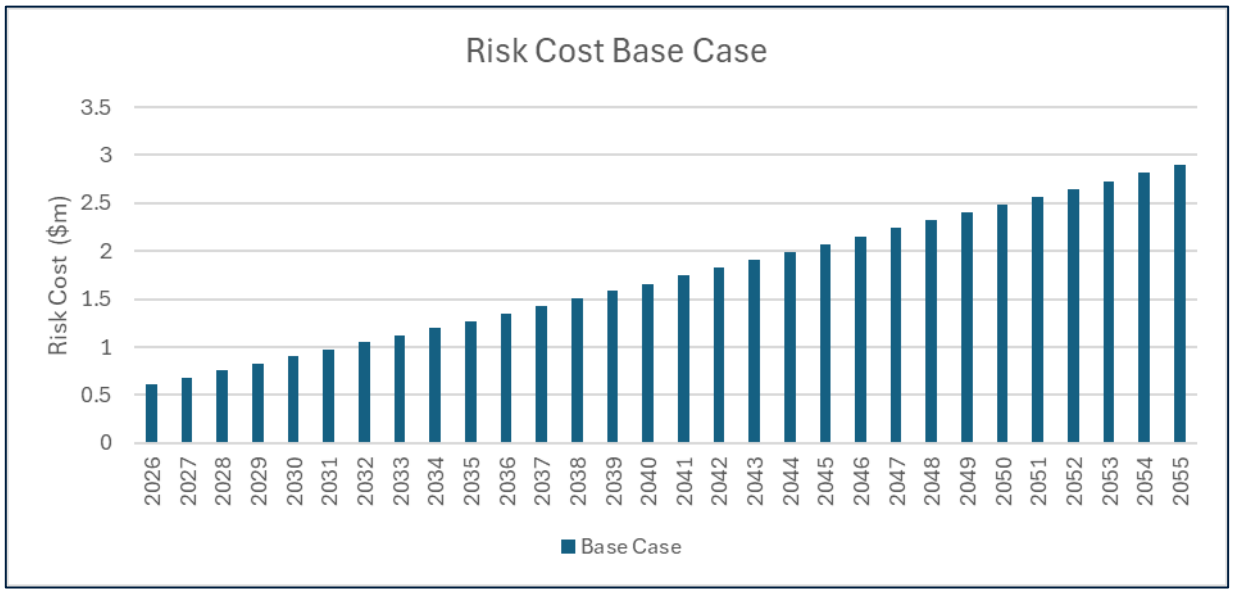
[12] AER, *Regulatory Investment Test for Transmission*, November 2024, glossary ('base case').
[13] AER, *Application Guidelines, Regulatory Investment Test for Transmission*, November 2024, page 21.
[14] NER, clauses 5.15A.2(b)(4), (5) and (6). See also AER, *Regulatory Investment Test for Transmission*, November 2024, paragraphs 10 to 13.

- **Financial risk cost** – this is the cost associated with rectifying an in-service failure of the identified equipment. Spares for secondary system equipment items are assumed available prior to the point of expected spares depletion (at around 2032), and after this point the cost and time to return the secondary system back to service increases significantly.
- **Safety risk cost** – this is the assessed safety impact that may result from the unlikely event of a catastrophic in-service failure of the identified equipment. Powerlink utilises guidance from the Department of Prime Minister and Cabinet to assess and quantify this risk.

Appendix 3 outlines the market benefits that Powerlink has assessed as not having a material impact on the options analysis.

The 30-year forecast of risk costs for the base case is shown in Figure 5.1.

**Figure 5.1: Modelled base case risk costs**




Based upon the assessed condition Transformer 3 at Tennyson, the total risk costs are projected to increase from $0.61 million in 2026 to $2.89 million in 2055.

The main areas of risk costs for Transformer 3 network risks that involve the reliability of supply through the failure of deteriorated equipment modelled as probability weighted USE[15] and financial risk costs associated with the replacement of failed assets in an emergency.

These risks increase over time as the condition of Transformer 3 deteriorates and the likelihood of failure rises.

[15] USE is modelled using a VCR consistent with that published by the AER in its *Values of Customer Reliability, Final Report and Appendices A-D*, 2024.

# 6. Cost-benefit Analysis and Identification of Preferred Option

## 6.1. Cost Estimation

### Basis of Estimation

The basis for the estimation for the credible option presented in Table 4.1 of this PSCR is outlined in the methodologies and processes used to derive cost estimates as described in Powerlink's Cost Estimation Methodology. The estimates are informed by the level of specific project information available at the time of PSCR preparation. Powerlink's Cost Estimation Methodology also provides context to the classes of estimate discussed in this section.[16]

### Key inputs and assumptions

*Option 1: Like for like Replacement of Transformer 3 by October 2027*

A Class 3 Estimate has been produced for Option 1 (see Table 4.1) with an accuracy range of -20% to +30%.

Powerlink has made the following scope assumptions in producing this estimate:

- All existing equipment is in good condition and working order, the site is accessible and there are no Restricted Access Zones;
- All resources will be available including necessary resources to complete construction, testing and commissioning activities;
- Availability of site access for works as required;
- Existing ground conditions are suitable for the construction of standard foundations;
- Laydown area is located within the substation yard;
- Outages will be available, based on appropriate contingency arrangements being put in place to ensure Return to Service requirements are met.

## 6.2. Modelling assumptions

This option has been scoped to manage the major risks arising in the base case and to maintain compliance with all statutory requirements, the NER and AEMO standards. The residual risk is calculated for each option based upon the individual implementation strategy of the option. This is included with the capital and operational maintenance cost of each option to develop the Net Present Value (NPV) inputs.

Powerlink has undertaken the RIT-T analysis over a 30-year period, from 2026 to 2055. A 30-year period takes into account the size and complexity of the replacement of Transformer 3. Where there may be remaining asset life by 2055, a terminal value is calculated to account for capital costs under each credible option.

Powerlink has adopted a real, pre-tax commercial discount rate of 7.0% as the central assumption for the NPV analysis.[17] Powerlink has tested the sensitivity of the results to changes in this discount rate assumption, and

[16] The methodology is available on the RIT-T Consultations page of Powerlink's website.
[17] This indicative commercial discount rate of 7.0% is based on AEMO, *2025 Inputs, Assumptions and Scenarios Report*, August 2025, page 158.

specifically to the adoption of a lower bound discount rate of 3.00% and an upper bound discount rate of 10.00% (i.e. a symmetrical upwards adjustment).[18]

## 6.3. Sensitivity Analysis

Powerlink has chosen to present a single reasonable scenario for comparison purposes and has considered capital cost, discount rate and risk cost sensitivities individually and in combination and found that none of the parameters has an impact on ranking of results. Hence, Powerlink has chosen to present a 'central scenario' illustrated in Table 6.1.

**Table 6.1: Reasonable scenario parameters**

| Key parameter | Central Scenario |
|---|---|
| Capital cost | 100% of base capital cost estimate |
| Maintenance cost | 100% of base maintenance cost estimate |
| Discount rate | 7.0% |
| Risk cost | 100% of base risk cost forecast |

## 6.4. NPV analysis

Table 6.2 outlines the NPV and the corresponding ranking of each credible option relative to the base case.

**Table 6.2: NPV of credible options relative to the base case**

| Option | Description | NPV relative to non-credible base case ($m) | Ranking |
|---|---|---|---|
| 1 | Like for like replacement of Transformer 3 by October 2027. | 7.24 | 1 |

Option 1 will address the identified need on an enduring basis.

Figure 6.1 sets out the breakdown of capital cost, operational maintenance cost and total risk cost for base case and Option 1 in NPV terms under the central scenario. Note that the non-credible base case consists of operational maintenance and total risk costs and does not include any capital expenditure.

[18] An upper and lower bound discount rate of 10.0% and 3.0% is based on AEMO, *2025 Inputs, Assumptions and Scenarios Report*, August 2025, page 158.

**Figure 6.1: NPV of the base case and each credible option (NPV $m)**

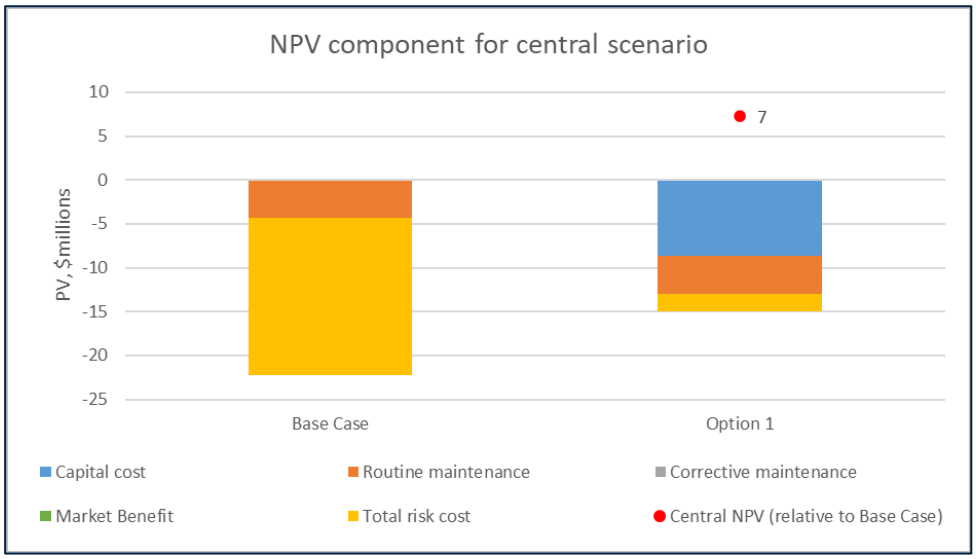



Figure 6.1 illustrates that Option 1 will reduce the risk cost compared to the base case and results in a positive NPV outcome relative to the base case. Sensitivity analysis also concluded that the NPV outcome relative to the base case will remain positive for varying levels of discount rate, capital expenditure, operation maintenance expenditure and risk cost.

### 6.5. Conclusion

The result of the cost-benefit analysis indicates that Option 1 provides the highest net economic benefit (lowest cost in NPV terms) over the 30-year analysis period. Sensitivity testing shows the analysis is robust to variations in the capital cost, risk cost and discount rate assumptions. Powerlink therefore considers that Option 1 satisfies the requirements of the RIT-T and is the proposed preferred option.

## 7. Draft Recommendation

Based on the conclusions drawn from the NPV analysis and regulatory requirements relating to the proposed replacement of transmission network assets, Powerlink's draft recommendation is that Option 1 be implemented to address the risks associated with the aging Transformer 3 at Tennyson Substation. Implementing this option will also ensure ongoing compliance with relevant standards, applicable regulatory instruments and the NER.

Option 1 replaces Transformer 3 at Tennyson substation by October 2027 with indicative capital costs of $9.69 million in 2025/26 prices.

## 8. Submission requirements and next steps

Powerlink invites submissions and comments in response to this PSCR from Registered Participants, AEMO, potential non-network providers and any other interested parties.

This is not a tender process – submissions are requested so that Powerlink can fulfil its regulatory obligations to analyse non-network options. In the event that a non-network option appears to be a genuine and practicable alternative that could satisfy the RIT-T, Powerlink will engage with that proponent or proponents to confirm cost inputs and commercial terms.

## 8.1. Submissions from non-network providers

Submissions should be presented in a written form and should clearly identify the author of the submission, including contact details for subsequent follow-up if required. If parties prefer, they may request to meet with Powerlink ahead of providing a written response.

Submissions from potential non-network providers should contain the following information:

- details of the party making the submission (or proposing the service);
- technical details of the project (capacity, proposed connection point if relevant, etc.) to allow an assessment of the likely impacts on future supply capability;
- sufficient information to allow the costs and benefits of the proposed service to be incorporated in a comparison in accordance with AER's RIT-T Application Guidelines;
- an assessment of the ability of the proposed service to meet the technical requirements of the NER;
- timing of the availability of the proposed service; and
- other material that would be relevant in the assessment of the proposed service.

Powerlink will publish a Project Assessment Draft Report (PADR) if submissions to this PSCR identify other credible options not yet considered, and which could provide a more cost-efficient outcome for customers. The PADR will also summarise and provide comment on any submissions received in response to the PSCR.[19]

Powerlink will publish submissions on the PSCR, subject to any claim of confidentiality by the person making the submission. Where confidentiality over part or all of a submission is made, this should be clearly identified. Powerlink may also explore whether a redacted or non-confidential version of the submission can be made available.[20]

Powerlink is required to use all reasonable endeavours not to disclose any confidential information it receives. The obligation is subject to a number of exceptions, including that disclosure may be made:

- with the consent of the person providing the information; or
- to the AER, Australian Energy Market Commission or any other regulator having jurisdiction over Powerlink under the NER or otherwise.[21]

It should be noted that Powerlink is required to publish the outcomes of the RIT-T analysis. If parties making submissions elect not to provide specific project cost data for commercial-in-confidence reasons, Powerlink may rely on cost estimates from independent specialist sources.

[19] NER, clause 5.16.4(k)(2).
[20] AER, *Application Guidelines, Regulatory Investment Test for Transmission*, November 2024, page 70.
[21] NER, rule 8.6.

## 8.2. Next steps

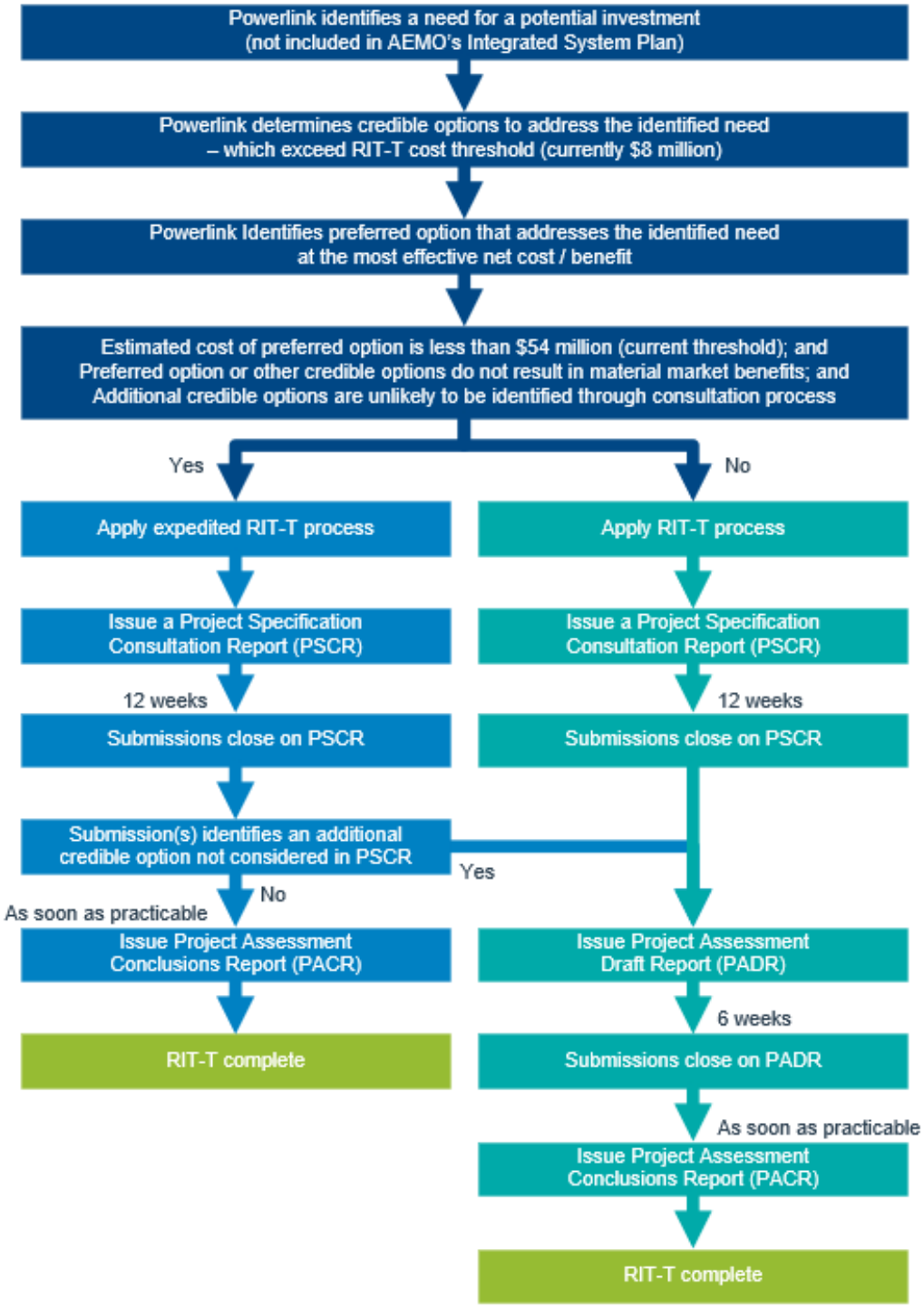
Powerlink intends to carry out the following process to assess what action, if any, should be taken to address future supply requirements.

| | | |
|---|---|---|
| Part 1 | PSCR Publication | April 2026 |
| Part 2 | Submissions due on PSCR<br>Have your say on the credible options and propose non-network options | 30 June 2026 |
| Part 3 | Publication of PACR<br>Powerlink's response to any submissions received and final recommendation on the preferred option for implementation | August 2026 |

Powerlink reserves the right to amend the timetable at any time. Amendments to the timetable will be made available on the Powerlink website (www.powerlink.com.au/rit-t-consultations).

## Appendix 1: RIT-T process

The flow chart below illustrates the RIT-T process where the need is not an actionable project in AEMO's ISP.



# Appendix 2: Powerlink's Approach to Engagement

More than five million Queenslanders and 241,000 Queensland businesses depend on Powerlink's performance. Powerlink recognises the importance of engaging with a diverse range of customers and stakeholders who have the potential to affect, or be affected by, Powerlink activities and/or investments.

Together with our industry counterparts from across the electricity and gas supply chain, Powerlink has committed to the Energy Charter. The charter is a national CEO-led collaboration that supports the energy sector towards a customer-centric future. Powerlink joins other signatories in committing to progress the culture and solutions needed to deliver more affordable, reliable and sustainable energy systems. Powerlink's Energy Charter Disclosure Statement for 2023/24 shows Powerlink's achievements against the principles of the Energy Charter.

## Powerlink takes a proactive approach to engagement

Powerlink regularly hosts a range of activities to provide timely and transparent information to customers and stakeholders within the broader community.

Powerlink's annual Transmission Network Forum (TNF) is a primary vehicle used to engage with the community, understand broader customer and industry views and obtain feedback on key topics. It also provides Powerlink with an opportunity to further inform its business network and non-network planning objectives. TNF participants include customers, landholders, environmental groups, Traditional Owners, government agencies, and industry bodies.

Engagement activities such as the TNF help inform the future development of the transmission network and assist Powerlink in providing services that align with the long-term interests of customers. Powerlink also incorporates feedback from these activities into a number of publicly available reports.

## Working collaboratively with Powerlink's Customer Panel

Powerlink's Customer Panel provides a face-to-face opportunity for customers and consumer representatives to give their input and feedback about Powerlink's decision-making, processes and methodologies. The panel also provides Powerlink with a valuable avenue to keep customers and stakeholders better informed, and to receive feedback about topics of relevance, including RIT-Ts.

The Customer Panel is regularly advised on the publication of Powerlink's RIT-T documents and is briefed quarterly on the status of current RIT-T consultations as well as upcoming RIT-Ts. This provides an ongoing opportunity for the Customer Panel to ask questions and provide feedback to further inform RIT-Ts, and for Powerlink to better understand the views of customers when undertaking the RIT-T consultation process.

Powerlink will continue to provide updates to and request input from the Customer Panel throughout the RIT-T consultation process.

## Transparency on future network requirements

Powerlink's annual planning review findings are published in the Transmission Annual Planning Report (TAPR) and TAPR templates (available via the TAPR portal). It provides early information and technical data to customers and stakeholders on potential transmission network needs over a 10-year outlook period. The TAPR plays an important part in planning Queensland's transmission network and helping to ensure it continues to meet the needs of Queensland electricity customers and participants in the National Electricity Market (NEM).

Powerlink's 2025 TAPR identified a need to address reliability, capability and compliance risks to the 110/33/11kV Transformer 3 at Tennyson Substation. The 2025 TAPR confirms the need for the full replacement of the transformer, for an estimated cost of $11 million as the proposed network solution.[22]

## Community engagement

Powerlink recognises the importance of engaging with stakeholders who may reasonably be expected to be affected by the works required to meet the identified need described in this PACR.

The engagement frameworks and strategies that underpin Powerlink's engagement approach include:

The International Association for Public Participation (IAP2) spectrum[23], noting each stakeholder group has unique needs and requires an individual assessment on the spectrum;

Powerlink's Community Engagement Approach and Reflect Reconciliation Action Plan; and

the Energy Charter Landholder and Community Better Practice Engagement Guide; and Better Practice Social Licence Guideline.

## Powerlink assesses the requirement for community engagement based on the identified need

Powerlink undertakes an assessment of the potential for social and environmental impacts of anticipated replacement or augmentation projects well in advance of the identified need timing. Understanding if and when community engagement may be required, as well as the appropriate engagement approach, is an integral component of the early planning analysis needed to inform option identification, consideration of statutory processes (e.g. Ministerial Infrastructure Designation if required) and subsequent project development strategy and engagement plans.

Powerlink's engagement approach is tailored to maximise the accessibility of the proposed project's information to the stakeholder groups and/or communities affected by the project once the need to undertake community engagement is identified. Key stakeholders may include, but are not limited to, directly impacted and adjacent landholders, Traditional Owner groups, local residents, businesses and other organisations such as schools, community organisations and environmental groups, local government authorities and elected representatives within local and state governments.

## Assessment and basis of assessment on the need for community engagement

Powerlink has assessed that minimal community engagement is required given the scope of works under consideration for any proposed network options to meet the identified need. This is due to all network options including replacement of equipment within the existing Tennyson substation. Powerlink will provide notifications to nearby residents to ensure all affected parties are appropriately informed of project activities.

[22] Powerlink, *2025 Transmission Annual Planning Report*, October 2025, pages 80 and 173.
[23] Refer to IAP2's website.

# Appendix 3: Market benefits that are not material for this RIT-T assessment

A discussion of each market benefit under the RIT-T that Powerlink considers not to be material is presented below.

- **Changes in patterns of generation dispatch**: replacement of ageing assets under the credible options by itself does not affect transmission network constraints or affect transmission flows that would change patterns of generation dispatch. It follows that changes through different patterns of generation dispatch are not material to the outcome of the RIT-T assessment.
- **Changes in voluntary load curtailment**: replacement of ageing assets under the credible options by itself does not affect prices in the wholesale electricity market. It follows that changes in voluntary load curtailment will not be material for the purposes of this RIT-T.
- **Changes in costs for other parties**: the effect of replacement of ageing assets under the credible options considered are localised to the substation they are located at and do not affect the capacity of transmission network assets and therefore are unlikely to change generation investment patterns (which are captured under the RIT-T category of 'costs for other parties')
- **Differences in the timing of expenditure**: credible options for asset replacement do not affect the capacity of transmission network assets, the way they operate, or transmission flows. Accordingly, differences in the timing of expenditure of unrelated transmission investments are unlikely to be affected.
- **Changes in network losses**: credible options are not expected to provide any changes in network losses as replacing secondary systems does not affect the characteristics of primary transmission assets.
- **Changes in ancillary services cost**: there is no expected change to the costs of Frequency Control Ancillary Services (FCAS), Network Control Ancillary Services (NCAS), or System Restart Ancillary Services (SRAS) due to credible options under consideration. These costs are therefore not material to the outcome of the RIT-T assessment.
- **Changes in Australia's greenhouse gas emissions**: Powerlink does not consider that any of the credible options will materially affect Australia's greenhouse gas emissions, and the cost of quantifying any greenhouse gas emission benefits would involve a disproportionate level of effort compared to the additional insight it would provide.
- **Competition benefits:** Powerlink does not consider that any of the credible options will materially affect competition between generators, and generators' bidding behaviour and, consequently, considers that the techniques required to capture any changes in such behaviour would involve a disproportionate level of effort compared to the additional insight it would provide.
- **Option value**: Powerlink does not consider that the identified need for the options considered in this RIT-T is affected by uncertain factors about which there may be more clarity in future. As a consequence, option value is not a relevant consideration for this RIT-T.
- **Costs associated with social licence activities:** Powerlink does not consider that the cost of social licence activities is materially different between the credible options under consideration in this RIT-T. These costs are therefore not material to the outcome of the RIT-T assessment.

## Consideration of market benefits for non-network options

Powerlink notes that non-network options may impact the wholesale electricity market (for example by displacing generation output). Accordingly, it is possible that several of the above classes of market benefits will be material where there are credible non-network options, depending on the specific form of the option.

# Appendix 4: Sensitivity analysis

Powerlink has investigated the following sensitivities on key assumptions:

- a range from 3.00% to 10.00% discount rate;
- a range from 75% to 125% of base capital expenditure estimates;
- a range from 75% to 125% of base risk cost estimates; and

As illustrated in Figures A4.1 – A4.3, sensitivity analysis for the NPV relative to the base case shows that varying the discount rate, capital expenditure, operational maintenance expenditure and total risk costs has no impact on the sign of the Option 1 NPV relative to the Base Case. Option 1 has a positive NPV relative to the Base Case under all scenarios tested.

**Figure A4.1: Discount rate sensitivity**

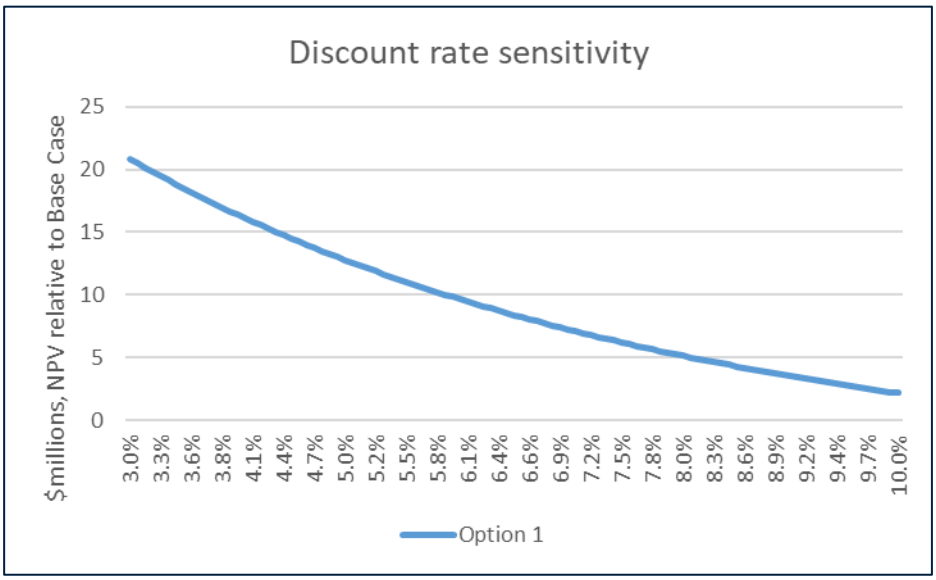



**Figure A4.2: Capital cost sensitivity**

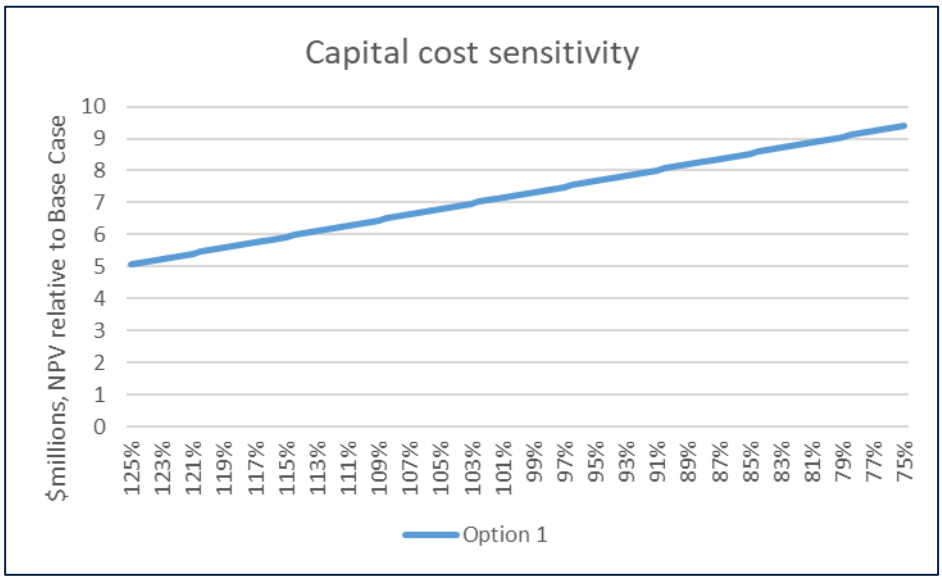
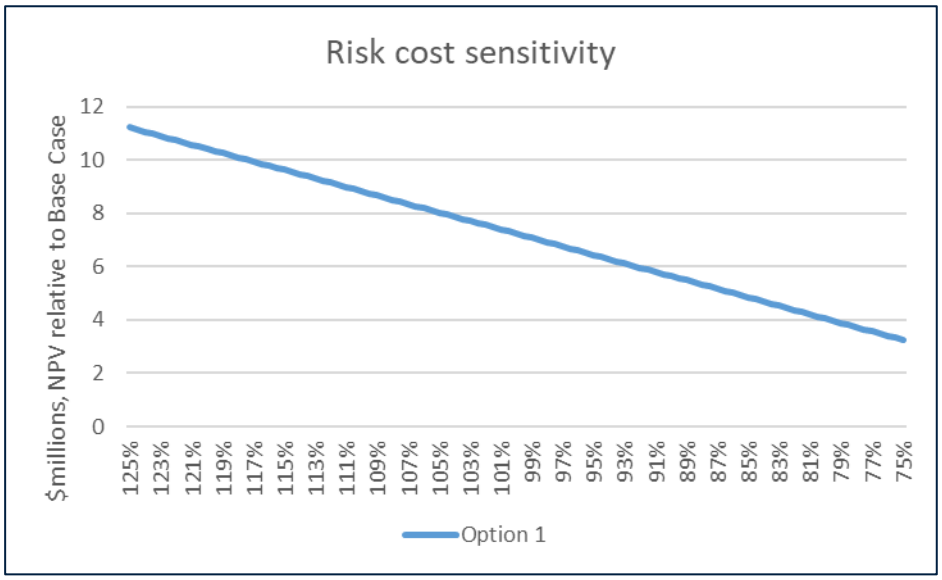
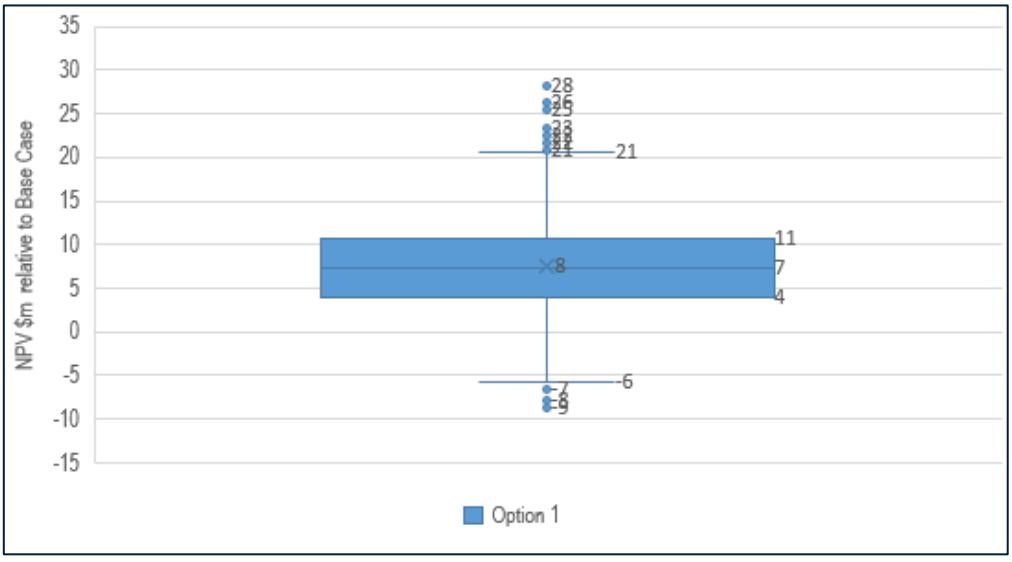


**Figure A4.3: Risk cost sensitivity**




Powerlink also performed a Monte Carlo simulation with multiple input parameters (including capital cost, discount rate and total risk cost) generated for the calculation of the NPV for each option. This process was repeated over 5,000 iterations, each time using a different set of random variables from the probability function. The sensitivity analysis output is presented as a distribution of possible NPVs for each option, as illustrated in Figure A4.4.

**Figure A4.4: NPV sensitivity analysis of multiple key assumptions relative to the base case**




*Note: The box represents the interquartile interval, where 50% of the data is found. The horizontal line through the box is the median and the mean is represented by the cross (X). The two lines outside the box extend to 1.5 times the interquartile range. Data points that are outside of this interval are shown as dots on the graph.*

The Monte Carlo simulation shows that the sign of the NPV relative to the non-credible Base Case does not change with variations in input parameters.

# Appendix 5: Compliance checklists

## NER requirements for RIT-T

Table A5.1 outlines Powerlink's compliance with PSCR content requirements set out in sub-paragraphs (1) to (6) of clause 5.16.4(b) of the NER.

**Table A5.1: NER Compliance Checklist**

| Sub-para | Requirement | Section of PSCR |
|---|---|---|
| (1) | Description of identified need | 2 |
| (2) | Assumptions used to identify the identified need | 2 |
| (3) | Technical characteristics of the identified need that a non-network option would be required to deliver | 3 |
| (4) | Discussion of identified need or credible options to meet the identified need in most recent ISP | N/A |
| (5) | Description of credible options | 4.1 |
| (6) | For each credible option, information about:<br>(i) technical characteristics of the option;<br>(ii) whether the option is reasonably likely to have a material inter-network impact;<br>(iii) the classes of market benefit that are likely / not likely to be material<br>(iv) estimated construction timetable and commissioning date<br>(v) indicative capital and operating and maintenance costs | <br>4.1<br>N/A<br>5<br>4<br>6.1 |

*N/A denotes not applicable.*

## RIT-T Application Guidelines

Table A5.2 outlines Powerlink's compliance with binding requirements included in the RIT-T Application Guidelines.

**Table A5.2: RIT-T Application Guidelines Compliance Checklist**

| Section of Guidelines | Topic | Requirements | Section of PSCR |
|---|---|---|---|
| 3.2.5 | Social licence principles | Consider social licence issues in the identification of credible options, and include information about when and how social licence considerations have affected the identification and selection of credible options. | Appendix 3 |
| 3.4.3 | Value of emissions reduction | The VER, reported in dollars per tonne of emissions (CO2 equivalent), is used to value emissions within a state of the world. A RIT-T proponent is required to use the then prevailing VER under relevant legislation or, otherwise, in any administrative guidance. | N/A |
| 3.5 | Valuing costs | Costs are the present value of the following direct costs:<br>• Constructing or providing the credible option;<br>• Operating and maintenance costs;<br>• Costs of complying with relevant laws, regulations and administrative requirements; and<br>Costs of removing and disposing of existing assets (particularly for asset replacement programs). | 4, 5, 6.1 |
| 3.5.3 | Social licence costs | Provide the basis for any social licence costs, including any reference to best practice | N/A |
| 3.5A.1 | Cost estimation accuracy | Outline cost estimation process (as applicable to stage of the RIT-T) | 6.1 |
| 3.5A.2 | Cost estimation information | Details of inputs, assumptions and methodologies for each credible option (as applicable to the stage of the RIT-T)[24] | 6.1 |
| 3.6 | Market benefit classes | Apply market benefit classes consistently across all credible options | 5.2 |
| 3.7.3 | Market benefits | Calculation of changes in Australia's greenhouse gases | N/A |
| 3.8.2 | Sensitivities | Sensitivity analysis on all credible options | Appendix 4 |

[24] Although the provisions in section 3.5A.2 of the RIT-T Application Guidelines are not included in the table of binding requirements at Appendix C of the Guidelines, Powerlink has added them to the compliance checklist as the provisions are expressed as being binding in section 3.5A.2 of the Guidelines.

| Section of Guidelines | Topic | Requirements | Section of PSCR |
|---|---|---|---|
| 3.9.4 | Contingency allowance | Details of any contingency allowance included in a cost estimate for a credible option | N/A |
| 3.11.2 | Concessional finance | Provide sufficient detail about a concessional finance agreement | N/A |
| 4.1 | Community engagement | Description of assessment of requirement for community engagement and, as applicable, how engagement has been undertaken and any relevant concerns sought to be addressed, and how the proponent plans to engage with stakeholder groups. | 1.3, Appendix 2 |

*Notes:*

*N/A denotes not applicable.*

# Contact us


| | |
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