



## CHAPTER 1

# Introduction

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# I Introduction

## Key highlights

- The purpose of Powerlink's Transmission Annual Planning Report (TAPR) under the National Electricity Rules (NER) is to provide information about the Queensland transmission network.
- Powerlink is responsible for planning the shared transmission network within Queensland, including the development of all new connections to the network.
- Since publication of the 2021 TAPR, Powerlink has continued to proactively engage with customers, communities and other stakeholders, in particular seeking their input into Powerlink's network development, ongoing operations and new investment decisions.
- Given the scale and pace of the transformation of Queensland's energy system, Powerlink is implementing an integrated approach to future network planning to ensure the transmission network is developed in a reliable, secure and cost-effective manner while enabling the shift to a lower carbon future.
- Powerlink has collaborated with the Queensland Government in the development of the Queensland Energy and Jobs Plan (QEJP), including establishment of new Renewable Energy Zones, energy storage and firming requirements, and broader technical aspects associated with the energy transformation.
- The 2022 TAPR identifies key areas of the Queensland transmission network forecast to require expenditure in the 10-year outlook period and considers matters relevant to the Queensland transmission network highlighted in the Australian Energy Market Operator's (AEMO) 2022 Integrated System Plan (ISP).
- Based on Powerlink's most recent planning review and information currently available, the 2022 TAPR also provides substantial detailed technical data (TAPR templates), available within Powerlink's TAPR portal, to further inform stakeholders and customers on potential transmission network developments within the next 10 years.

## 1.1 Introduction

Powerlink Queensland is a Transmission Network Service Provider (TNSP) in the National Electricity Market (NEM) and owns, develops, operates and maintains Queensland's high voltage (HV) transmission network. It has also been appointed by the Queensland Government as the Jurisdictional Planning Body (JPB) responsible for transmission network planning within the State.

As part of its planning responsibilities, Powerlink undertakes an annual planning review in accordance with the requirements of the NER and publishes the findings of this review in its TAPR, and associated templates and [portal](#).

The 2022 TAPR includes information on energy and demand forecasts, the existing electricity supply system, including existing and committed generation and transmission network developments and reinvestments, and forecasts of network capability. Risks arising from the condition and performance of existing assets, as well as emerging limitations in the capability of the network, are identified and possible solutions to address these are discussed. Interested parties are encouraged to provide input to identify the most economic solution (including non-network solutions provided by others) that satisfies the required reliability standard for customers into the future. As in previous years, and through the information and context provided, the 2022 TAPR continues to support the connection of variable renewable energy (VRE) generation to Powerlink's transmission network, enabling the transformation to a lower carbon future (refer to Section 2.3).

Powerlink's annual planning review and TAPR play an important role helping to ensure the transmission network continues to meet the needs of Queensland customers and participants in the NEM into the future.

## 1.2 Context of the TAPR

All bodies with jurisdictional planning responsibilities in the NEM are required to undertake the annual planning review and reporting process prescribed in the NER<sup>1</sup>.

Information from this process is also provided to AEMO to assist in the preparation of its ISP. The ISP sets out a roadmap for the eastern and south-eastern seaboard's energy system over the next two decades. It establishes a whole of system plan for an efficient transformation by identifying the optimal development path over this planning horizon for the strategic and long-term development of the national transmission system. The ISP identifies actionable and future projects requiring regulatory consultation, and informs market participants, investors, policy decision makers and customers on a range of potential development opportunities.

The 2022 TAPR incorporates AEMO's demand and energy forecasts, consistent with those published for the 2022 Electricity Statement of Opportunity (ESOO). The ESOO examines electricity supply and demand issues across all regions in the NEM.

The primary purpose of the TAPR is to provide information on the short-term to medium-term planning activities of TNSPs, whereas the focus of the ISP is more strategic and longer term. Further, the ISP, Network Support and Control Ancillary Service (NSCAS), Inertia and System Strength Reports (System Security Reports) and TAPR are intended to complement each other in informing stakeholders and promoting efficient investment decisions. In supporting this complementary approach, the current published versions of these documents and reports are considered in this TAPR and more generally in Powerlink's planning activities.

Interested parties may benefit from reviewing Powerlink's 2022 TAPR in conjunction with AEMO's [2022 ESOO](#) which was published in August 2022. The most recent [ISP](#) was released on 30 June 2022 and NSCAS and System Security Report and Update on 17 December 2021 and 11 May 2022 respectively.

## 1.3 Purpose of the TAPR

The purpose of Powerlink's TAPR under the NER is to provide information about the Queensland transmission network to those interested or involved in the NEM including AEMO, Registered Participants and interested parties. The TAPR also provides customers, stakeholders and communities with an overview of Powerlink's planning processes and decision-making on future investment.

It aims to provide information that assists to:

- identify locations that would benefit from significant electricity supply capability or demand side management (DSM) initiatives
- identify locations where major industrial loads could be connected
- identify locations where capacity for new generation developments exist (in particular VRE generation)
- understand how the electricity supply system affects customers, stakeholders and communities
- understand the transmission network's capability to transfer quantities of bulk electrical energy
- provide input into the future development of the transmission network.

Readers should note this document and supporting TAPR templates and TAPR portal are not intended to be relied upon explicitly for the evaluation of participants' investment decisions. Interested parties are encouraged to contact Powerlink directly for more detailed information.

<sup>1</sup> For the purposes of Powerlink's 2022 TAPR, Version 186 of the NER in place from August 2022.

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## I.4 Role of Powerlink Queensland

Powerlink has been nominated by the Queensland Government as the entity with transmission network planning responsibility in Queensland, known as the JPB as outlined in Clause 5.22.17 of the NER.

As the owner and operator of the transmission network in Queensland, Powerlink is registered with AEMO as a TNSP under the NER. In this role, and in the context of this TAPR, Powerlink's transmission network planning and development responsibilities include:

- ensuring the network is able to operate with sufficient capability and if necessary, is augmented to provide network services to customers in accordance with Powerlink's Transmission Authority and associated reliability standard
- ensuring the risks arising from the condition and performance of existing assets are appropriately managed
- ensuring the network complies with technical and reliability standards contained in the NER and jurisdictional instruments including the requirement to maintain minimum fault levels as prescribed by AEMO
- conducting annual planning reviews with Distribution Network Service Providers (DNSPs) and other TNSPs whose networks are connected to Powerlink's transmission network, that is Energex and Ergon Energy (part of the Energy Queensland Group), Essential Energy and Transgrid
- advising AEMO, Registered Participants and interested parties of asset reinvestment needs within the time required for action
- developing recommendations to address emerging network limitations or the need to address the risks arising from ageing network assets remaining in-service through joint planning with DNSPs and TNSPs, and consultation with AEMO, Registered Participants and interested parties, with potential solutions including network upgrades or non-network options such as local generation (including battery installation) and DSM initiatives
- examining options and developing recommendations to address transmission constraints and economic limitations across intra-regional grid sections and interconnectors through joint planning with other Network Service Providers (NSP), and consultation with AEMO, Registered Participants and interested parties
- assessing whether a proposed transmission network augmentation has a material impact on networks owned by other TNSPs, and in assessing this impact Powerlink must have regard to the objective set of criteria published by AEMO in accordance with Clause 5.21 of the NER
- undertaking the role of the proponent for regulated or funded<sup>2</sup> transmission augmentations and the replacement of transmission network assets in Queensland.

In addition, Powerlink participates in inter-regional system tests associated with new or augmented interconnections. Commissioning of the Transgrid augmentations associated with the minor upgrade of the Queensland to New South Wales Interconnector (QNI) was completed in July 2022. Inter-regional system tests, in accordance with 5.7.7 of NER, have commenced to release additional power transfer capacity to the NEM. These tests are expected to continue until mid-2023.

## I.5 Opportunities arising from the energy system transformation

The pace and scale of change to Australia's energy system is one of the fastest in the world and it is widely recognised that the transmission network will play a key role in enabling the transformation to a lower carbon future. Moving the energy system to much greater levels of VRE generation will present new opportunities for communities and local businesses throughout the State. This shift also brings technical challenges for transmission networks, as well as other parts of the electricity supply chain.

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<sup>2</sup> Where applicable, in accordance with Clause 5.18 of the NER.

Broadly these challenges include:

- System strength (refer to chapters 2, 6, 7, 8 and 10)
- Minimum demand (refer to chapters 2, 3,4 and 6)
- Marginal Loss factors (MLF) (refer to Chapter 10)
- Network congestion on the transmission network and the impact of future load developments as generation patterns change (refer to chapters 2, 6, 7, 8 and 9)
- Requirements for energy storage (refer to Chapter 2).

Powerlink has continued working with the Queensland Government to support the transformation to a new energy system underpinned by renewable energy. Powerlink has provided significant input to the QEJP and advised on key matters. This includes the establishment of additional Renewable Energy Zones (REZs), large-scale energy storage and firming requirements including Pumped Hydro Energy Storage (PHES), and a range of broader technical issues to enable the transformation of Queensland's energy system.

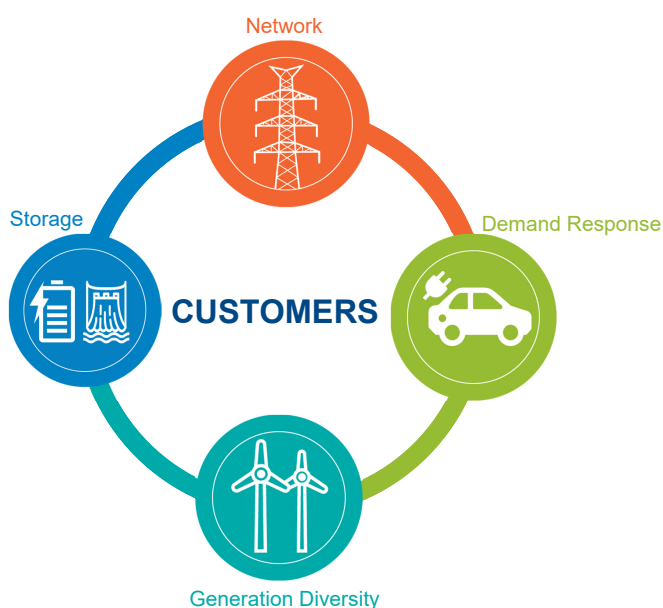
There has also been significant interest from large industrial customers looking to decarbonise their operations through electrification, and the emergence of new hydrogen-based facilities and industries. Powerlink has been supporting the Queensland Government and relevant customers in progressing these developments.

Powerlink will continue to deliver safe, reliable and cost-effective transmission services to Queenslanders while strategically planning, guiding and enabling opportunities for the development of Queensland's future energy system.

### 1.5.1 Balancing the energy system transformation

Powerlink has actively engaged with key stakeholders exploring new and alternate technologies, Distributed Energy Resources (DER), and opportunities for energy storage to develop strategies which identify optimal electricity supply development pathways. This will help deliver Queensland's untapped renewable energy potential as well as enable a balanced approach to the broader energy transformation with customers at the centre (refer to Figure 1.1).

**Figure 1.1** Balancing the energy system transformation



Further information on the energy transformation is provided in Chapter 2.

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## I.6 Connecting Queenslanders to a world-class energy future

Powerlink is undertaking long-term network planning to ensure a staged and least regret development of the transmission network in the State. As well as responding safely to the ongoing impacts of the COVID-19 pandemic and unprecedented flood events, Powerlink is continuing to:

- provide guidance to enable the energy transformation, including support for the QEJP
- undertake ongoing active community, customer and stakeholder engagement for informed decision-making and planning
- engage and influence various NEM rule changes and guideline reviews and then adopt and implement the recommendations
- place considerable emphasis on an integrated, flexible and holistic analysis of future investment needs
- support diverse generation connections
- ensure its approach to investment decisions delivers positive outcomes for customers
- adapt to changes in customer behaviour and economic outlook
- ensure compliance with changes in legislation, regulations and operating standards
- focus on developing options that deliver safe, reliable and cost-effective transmission services.

## I.7 Overview of approach to asset management

Powerlink is committed to sustainable asset management practices that consider and recognise customer and stakeholder requirements, ensuring assets are managed consistent with overall corporate objectives to deliver cost-effective and efficient services. Powerlink's asset management system captures significant internal and external drivers in the business and sets out initiatives to be adopted. The Asset Management Policy, Strategic Asset Management Plan and related processes guide Powerlink's network asset planning and reinvestment decisions. Information on the principles and approach which guide Powerlink's analysis of future network investment needs and key investment drivers is provided in Chapter 5.

## I.8 Overview of planning responsibilities and processes

### I.8.1 Planning criteria and processes

Powerlink has obligations that govern how it should address forecast network limitations. These obligations are prescribed by Queensland's Electricity Act 1994 (the Act), the NER and Powerlink's Transmission Authority.

The Act requires that Powerlink 'ensure as far as technically and economically practicable, that the transmission grid is operated with enough capacity (and if necessary, augmented or extended to provide enough capacity) to provide network services to persons authorised to connect to the grid or take electricity from the grid'.

It is a condition of Powerlink's Transmission Authority that it meets licence and NER requirements relating to technical performance standards during intact and contingency conditions. The NER sets out minimum performance requirements of the network and connections, and requires that reliability standards at each connection point be included in the relevant connection agreement.

The requirements for initiating solutions to meet forecast network limitations or the need to address the risks arising from ageing network assets remaining in-service, including new regulated network developments or non-network solutions, are set down in clauses 5.14.1, 5.16.4, 5.16A, 5.20B, 5.20C and 5.22.14 of the NER.

New network developments and reinvestments are proposed to meet these legislative and NER obligations. Each of these clauses prescribes a slightly different consultation process<sup>3</sup>.

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<sup>3</sup> Powerlink's power system security consultations which include system strength requirements are currently undertaken through an Expression of interest (EOI) process.

The Regulatory Investment Test for Transmission (RIT-T) is the most frequent NER consultation process undertaken by Powerlink. The main steps in network planning for transmission investments subject to the RIT-T can be summarised as follows:

- Publication of information regarding the nature of network limitations, the risks related to ageing network assets remaining in-service and the need for action which includes an examination of demand growth and its forecast exceedance of the network capability (where relevant)
- Consideration of generation and network capability to determine when additional capability is required.

Consultation on assumptions made and credible options may include:

- non-network solutions including local generation or DSM initiatives
- network augmentation
- asset replacement
- asset retirement
- network reconfiguration
- classes of market benefits considered to be material which should be taken into account in the comparison of options
- analysis and assessment of credible options, which include costs, market benefits, material inter-network impact and material impact on network users<sup>4</sup> (where relevant)
- identification of the preferred option that satisfies the RIT-T, which maximises the present value of the net economic benefit to all those who produce, consume and transport electricity in the market
- consultation and publication of a recommended course of action to address the identified future network limitation or the risks arising from ageing network assets remaining in-service.

Powerlink may also propose transmission investments that deliver a net market benefit when assessed in accordance with the RIT-T.

### 1.8.2 Integrated planning of the shared network

Powerlink is responsible for planning the shared transmission network within Queensland, and inter-regionally. The NER sets out the planning process and requires Powerlink to apply the RIT-T to transmission investment proposals for augmentations to the transmission network and the replacement of network assets over \$7 million. Powerlink continues to publish information and consult with potential providers of non-network solutions for the provision of network support control and ancillary services (NSCAS)<sup>5</sup>, system strength and inertia network services as notified by AEMO. Planning processes require consultation with AEMO, Registered Participants and interested parties, including customers, generators, DNSPs and other TNSPs. Section 6.6 discusses current consultations, as well as anticipated future consultations, that will be conducted in line with the relevant processes prescribed in the NER.

Significant inputs to the network planning process are the:

- forecast of customer electricity demand (including DSM) and its location
- location, capacity and arrangement of existing, new and retiring generation (including embedded generation)
- condition and performance of assets and an assessment of risks arising from ageing network assets remaining in-service
- assessment of future network capacity to meet the required planning criteria and efficient market outcomes, including limiting transmission losses, system strength and the potential to facilitate future storage requirements to firm intermittent renewable generation and help address minimum demand.

<sup>4</sup> NER Clause 5.16.3 (a)(5).

<sup>5</sup> NER Clause 5.20.3(b).

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The 10-year forecasts of electrical demand and energy across Queensland are used, together with forecast generation patterns, to determine potential flows on transmission network elements. The location and capacity of existing and committed generation in Queensland is sourced from AEMO, unless modified following advice from relevant participants and is provided in tables 8.1 and 8.2. Information about existing and committed embedded generation and demand management within distribution networks is provided by DNSPs and AEMO.

Powerlink examines the capability of its existing network and the future capability following any changes resulting from:

- committed network projects (for both augmentation and to address the risks arising from ageing network assets remaining in-service)
- the impact of coal-fired generation retirements on transmission network power flows, system strength and reactive power capability
- existing and future renewable developments including REZ
- anomalies in Powerlink's operating environment or changes in technical characteristics such as minimum demand, inertia and system strength as the power system continues to evolve.

This includes consultation with the relevant Distribution Network Service Provider (DNSP) in situations where the performance of the transmission network may impact on, or be impacted by, the distribution network, for example where the two networks operate in parallel.

Where potential flows could exceed network capability, Powerlink notifies market participants of these forecast emerging network limitations. If the capability violation exceeds the required reliability standard, joint planning investigations are carried out with DNSPs (or other TNSPs if relevant) in accordance with Clause 5.14.1 of the NER. The objective of this joint planning is to identify the most cost-effective solution, regardless of asset boundaries, including potential non-network solutions (refer to Chapter 4).

Powerlink must maintain its current network so that the risks arising from the condition and performance of existing assets are appropriately managed. Powerlink undertakes a program of asset condition assessments to identify emerging asset condition related risks.

As assets approach the end of their technical service life, Powerlink examines a range of options to determine the most appropriate reinvestment strategy, applying a flexible and integrated approach which takes into account multiple factors. Consideration is given to optimising the topography and capacity of the network, taking into account current and future network needs, including future renewable generation and other developments associated with the transforming energy system such as decarbonisation through electrification and emerging industries relating to hydrogen.

In many cases, power system flows and patterns have changed over time. As a result, the ongoing network capacity requirements need to be re-evaluated. Individual asset reinvestment decisions are not made in isolation, and reinvestment in assets is not necessarily undertaken on a like-for-like basis. Rather, asset reinvestment strategies and decisions are made taking into account enduring need, the role that transmission needs to play in the energy transformation and the inter-related connectivity and characteristics of the HV system, and are considered across an area or transmission corridor. The consideration of potential non-network solutions forms an important part of this flexible and integrated planning approach.

The integration of condition, demand based limitations and energy transformation objectives delivers cost-effective solutions that address both reliability of supply and risks arising from assets approaching end of technical service life.



Powerlink considers a range of strategies and options to address emerging asset related condition and performance issues. These strategies include:

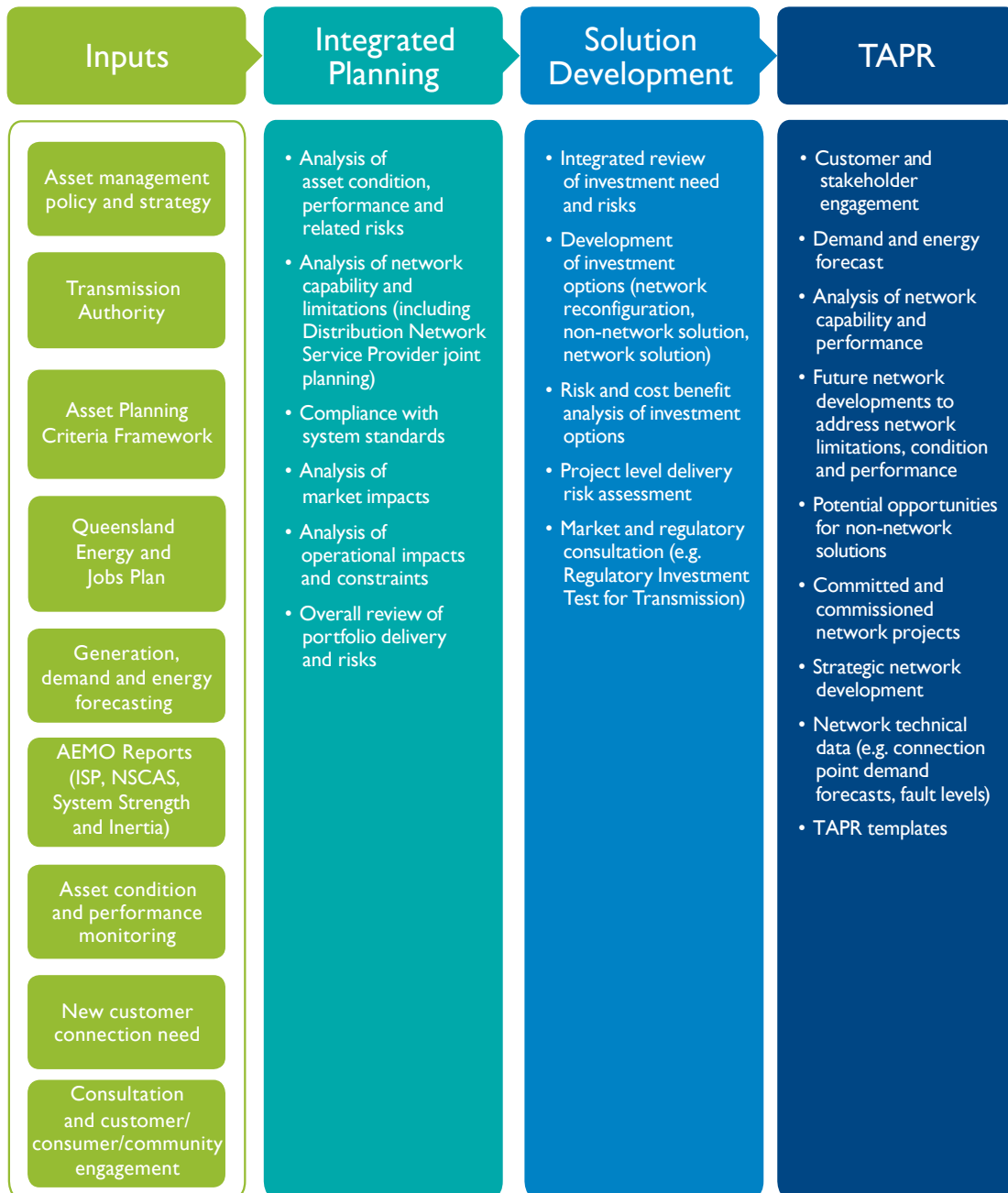
- retiring or decommissioning assets where there is unlikely to be an ongoing future need
- implementing non-network solutions
- reinvesting to extend the service life of assets
- replacing assets of different capacity or type
- changing the topography of the network.

Each of these options is considered in the context of future capacity. In accordance with the NER, information regarding proposed transmission reinvestments within the 10-year outlook period must be published in the TAPR and TAPR templates. More broadly, this provides information to the NEM, including AEMO, Registered Participants and interested parties (including non-network providers) on Powerlink's planning processes, anticipated public consultations, and decision-making relating to potential future investments and reinvestments. Further information is provided in Section 6.7, Chapter 7 and Appendix B.

A summary of Powerlink's integrated planning approach that takes into account both network capacity needs and end of technical service life related issues is presented in Figure 1.2.

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Figure I.2 Overview of Powerlink's TAPR planning process



### 1.8.3 Joint planning

Powerlink undertakes joint planning with other NSPs to collaboratively identify network and non-network solutions, which best serve the long-term interests of customers. This process provides a mechanism to discuss and identify technically feasible network and non-network options that provide lowest cost solutions across the network as a whole, regardless of asset ownership or jurisdictional boundaries.

Powerlink's joint planning, while traditionally focused on the DNSPs (Energex, Ergon Energy and Essential Energy) and Transgrid, also includes consultation with AEMO, other Registered Participants, load aggregators and other interested parties.

Joint planning with AEMO is critical to ensure the best possible jurisdictional inputs are provided to the ISP process in the long-term interests of customers. These inputs include condition drivers for significant intra-regional infrastructure, possible development options and cost of options that increase capacity of critical intra and inter-regional grid sections, together with the associated capacity improvement.

Also, Powerlink undertakes joint planning with AEMO to periodically assess the minimum fault level, system strength and inertia requirements for the Queensland jurisdiction. In May 2022 Powerlink published an Expression of interest (EOI), [Request for power system security services in central, southern and broader Queensland regions](#) to address the requirements of AEMO's 2021 System Security Reports: System Strength, Inertia and NSCAS published in December 2021 and Update to 2021 System Security Reports published in May 2022<sup>6</sup>. The Reports declared an NSCAS gap in South Queensland of up to 250MVA<sub>r</sub> to be addressed immediately and an immediate system strength shortfall of up to 90MVA at the Gin Gin fault level node to be addressed by March 2023. Submissions to the EOI closed on 24 June 2022.

Discussion with proponents to address the system strength declared shortfalls are continuing as at the publication of the 2022 TAPR and further information will be published in early 2023 once all offers have been fully evaluated and discussed in the 2023 TAPR. The EOI process is discussed further in sections 6.8 and 10.4.1.

Information on Powerlink's joint planning framework, and the joint planning activities that Powerlink has undertaken with other NSPs and AEMO since publication of the 2021 TAPR is provided in Chapter 4.

### 1.8.4 Potential future projects

As outlined in Section 1.2, the purpose of the ISP is to establish a strategic whole of system plan for a 20-year planning horizon for efficient power system development in the long-term interests of customers. The ISP also serves the regulatory purpose of identifying actionable projects to meet power system needs. These projects may relate to the potential development of new interconnectors or expanding the capacity of existing interconnectors or intra-regional grid sections. For actionable projects the responsible TNSPs are required to undertake a Regulatory Investment Test for Transmission (RIT-T) and publish a Project Assessment Draft Report (PADR) by a specified date. Under the NER, TNSPs also retain the ability to conduct RIT-Ts outside the ISP framework.

The 2022 ISP did not identify any actionable projects within Queensland. However, the 2022 ISP did identify several projects that may become actionable in future ISPs including potential REZ expansion to assist the development and co-ordination of generation and transmission infrastructure<sup>7</sup>. Projects identified as part of the optimal development path nominated in the 2022 ISP which relate to Powerlink's transmission network, include:

- Central to Southern Queensland
- Darling Downs REZ Expansion
- Gladstone Grid Reinforcement
- QNI Connect

<sup>6</sup> Refer to [AEMO's website](#).

<sup>7</sup> Refer to the 2022 ISP Appendix 3 Renewable energy zones.

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- Facilitating Power to Central Queensland
- Far North Queensland REZ Expansion.

Darling Downs REZ Expansion and QNI Connect (500kV option) have been nominated for preparatory activities by 30 June 2023<sup>8</sup>.

Given the energy transformation, there is the potential for significant expansion of the transmission network over the next 10 years and beyond. While not included in the 2022 TAPR analysis, this work is well underway and insights are provided in Powerlink's 'Actioning the Queensland Energy and Jobs Plan'. The 2023 TAPR will incorporate the QEJP in conjunction with the ISP to inform Powerlink's planning activities.

As part of this, Powerlink is committed to early engagement and working in partnership with communities, local government and other stakeholders to deliver the new energy future. This includes working together to identify opportunities which deliver positive outcomes and long-term benefits as the energy system evolves, particularly in developing new transmission infrastructure in key parts of the State.

## I.9 Connections

Participants wishing to connect to the Queensland transmission network include new and existing generators, storage, major loads and other NSPs. New connections or alterations to existing connections involves consultation in accordance with the NER Chapter 5 connection process between Powerlink and the connecting party to negotiate an Offer to Connect and Connection and Access Agreement (CAA). Negotiation of the CAA requires the specification and then compliance by the generator or load to the required technical standards. The process of agreeing to technical standards also involves AEMO. The services provided can be prescribed for DNSPs (regulated), negotiated or non-regulated services in accordance with the definitions in the NER or the framework for provision of such services.

From July 2018 new categories of connection assets were defined, namely Identified User Shared Assets (IUSA) and Dedicated Connection Assets (DCA). All new DCA services, including design, construction, ownership and operation and maintenance are non-regulated services. IUSA assets with capital costs less than \$10 million are negotiated services that can only be provided by Powerlink. IUSA assets with capital costs above \$10 million are non-regulated services. Powerlink remains accountable for operation of all IUSAs and any above \$10 million must enter into a Network Operating Agreement to provide operations and maintenance services.

From July 2021 Large Dedicated Connection Assets were replaced with Designated Network Assets (DNA). A DNA is a radial transmission extension greater than 30km in length. DCAs remain for connections less than 30km. A DNA is not a connection asset, but rather a transmission network. It differs to the shared transmission network as the design, construction and ownership of the DNA are non-regulated services. As for IUSAs, Powerlink remains accountable for operation and maintenance of all DNAs. A special access framework for DNAs is set out in the NER Chapter 5. Further information in relation to the connection process is available on Powerlink's website (refer to Section 10.5).

### I.9.1 Overview of the status of connection projects

Interest remains high from VRE generation and storage projects aspiring to connect in Queensland and Powerlink is progressing a significant number of connection applications which are well advanced (refer to Section 6.6.3). Table I.1 provides an overview of the development of connection projects undertaken or being undertaken by Powerlink since 2018 (refer to Section 10.1).

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<sup>8</sup> Preparatory Activities reports for Central to Southern Queensland, Gladstone Grid Reinforcement and QNI connect were provided to AEMO by 30 June 2021.

**Table I.1** Overview of connection projects

Solar/Wind Projects	2022 TAPR status	
Total completed to date	21	3,030MW
Committed	2	565MW
Under construction (1)	2	1,025MW
<b>Existing, committed and under construction</b>		<b>4,620MW</b>
Connection Applications	32	11,000MW

Notes:

- (1) Early works under construction at the time of 2022 TAPR publication.
- (2) A 250MW committed pumped hydro storage project is underway at the time of 2022 TAPR publication.
- (3) To date Powerlink has completed a 100MW storage project and a 50MW storage project is committed and under construction.

## 1.10 Powerlink's asset planning criteria

The Queensland Government amended Powerlink's N-1 criterion in 2014 to allow for increased flexibility. The planning standard permits Powerlink to plan and develop the transmission network on the basis that load may be interrupted during a single network contingency event. The following limits are placed on the maximum load and energy that may be at risk of not being supplied during a critical contingency:

- will not exceed 50MW at any one time
- will not be more than 600MWh in aggregate.

The risk limits can be varied by:

- a connection or other agreement made by the transmission entity with a person who receives or wishes to receive transmission services, in relation to those services, or
- agreement with the Queensland Energy Regulator (QER).

Powerlink is required to implement appropriate network or non-network solutions in circumstances where the limits set out above are exceeded or when the probability weighted economic cost of load at risk of not being supplied justifies the cost of the investment. Therefore, the planning standard has the effect of deferring or reducing the extent of investment in network or non-network solutions required. Powerlink will continue to maintain and operate its transmission network to maximise reliability to customers.

As mentioned, Powerlink's transmission network planning and development responsibilities include developing recommendations to address emerging network limitations, or the need to address the risks arising from ageing network assets remaining in-service, through joint planning (refer to Section 1.8.3)

Energex and Ergon Energy were issued amended Distribution Authorities from July 2014. The service levels defined in their respective Distribution Authority differ to that of Powerlink's authority. Joint planning accommodates these different planning standards by applying the planning standard consistently with the owner of the asset which places load at risk during a contingency event.

Powerlink has established policy frameworks and methodologies to support the implementation of this standard. These are being applied in various parts of the Powerlink network where possible emerging limitations are being monitored.

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## 1.11 Powerlink's reinvestment criteria

Powerlink is committed to ensuring the sustainable long-term performance of its assets to deliver safe, reliable and cost-effective transmission services to customers, stakeholders and communities across Queensland. Powerlink demonstrates this by adopting a proactive approach to asset management that optimises whole of life cycle costs, benefits and risks, while ensuring compliance with applicable legislation, regulations, standards, statutory requirements, and other relevant instruments.

### 1.11.1 The reinvestment criteria framework

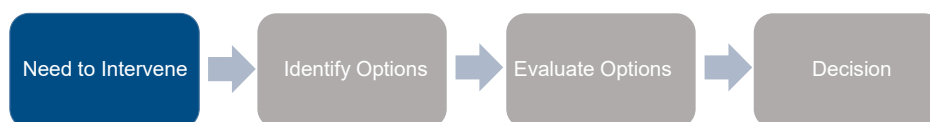
The reinvestment criteria framework defines the methodology that Powerlink uses to assess the need and timing for intervention on network assets to ensure that industry compliance obligations are met. The methodology aims to improve transparency and consistency within the asset reinvestment process, enabling Powerlink's customers and stakeholders to better understand the criteria to determine the need and timing for asset intervention.

The reinvestment criteria framework is relevant where the asset condition changes so it no longer meets its level of service or complies with a regulatory requirement. This category of reinvestment is triggered when the existing asset has degraded over time and no longer provides the required standard of service as prescribed within applicable legislation, regulations and standards.

The trigger to intervene needs to be identified early enough to provide an appropriate lead time for the asset reinvestment planning and assessment process. The need and timing for intervention is defined when business as usual activities (including routine inspections, minor condition based and corrective maintenance and operational refurbishment projects) no longer enable the network asset to meet prescribed standards of service due to deteriorated asset condition.

Powerlink's asset reinvestment process (refer to Figure 1.3) enables timely, informed and prudent investment decisions to be made that consider all economic and technically feasible options including non-network alternatives or opportunities to remove assets where they are no longer required. An assessment of the need and timing for intervention is the first stage of this process.

Figure 1.3 Asset Reinvestment Process



### 1.11.2 Asset reinvestment review

Powerlink is undertaking a review of its asset reinvestment approach and criteria to ensure consistency with contemporary asset management and risk-based decision frameworks and to further support the Australian Energy Regulator's (AER's) 2023-27 Revenue Determination. The review focuses on transmission line reinvestment and provides an opportunity to identify improvements which will ultimately benefit customers as the complexities and challenges of maintaining the network continue to grow.

The Asset Reinvestment Review (ARR) Working Group has been established to ensure customers and the AER are actively involved in the review and its recommendations. The aim of the review is to consider the prudence and efficiency of network reinvestment and the associated risk-based economic assessments<sup>9</sup>.

The review deliverables include:

- a report prepared in conjunction with all ARR Working Group members that provides clear recommendations for improvements to Powerlink's asset management approach and criteria to guide successful implementation of the report's recommendations
- a 12-month post-review report to outline how the recommendations have been implemented and the resultant benefits.

<sup>9</sup> Refer to the [AER's Industry practice application note for asset replacement planning](#).

While the focus of the review is to further improve Powerlink's approach to asset management practices for transmission line reinvestment, where appropriate Powerlink will apply any improvement identified to other areas of asset reinvestment planning to ensure positive outcomes for customers.

## 1.12 External economic factors and transmission network investments

The external environment in which Powerlink operates is becoming more complex with many factors such as rising inflation, increasing interest rates, and an ongoing disruption to supply chains and materials shortages due to COVID-19 and geopolitical impacts. Cost increases occurring across labour, fuel, logistics, steel, cement, copper, aluminium, and other key commodities are affecting the supply chains across many sectors globally (refer to Section 6.4.1). While recognising these complexities, Powerlink is focused on identifying supply risks and delivering solutions to ensure customers continue to receive cost-effective and efficient services in this uncertain environment.

## 1.13 Stakeholder engagement

Powerlink shares targeted, timely and transparent information with its customers, communities, First Nations Peoples and other stakeholders using a range of engagement methods. Customers are defined as those who are directly connected to Powerlink's network, and electricity customers, such as households and businesses, who are supplied via the distribution network. There are also stakeholders who can provide Powerlink with non-network solutions. These stakeholders may either connect directly to Powerlink's network, or connect to the distribution network. As an example, during 2022 Powerlink continued the approach to ongoing discussions with multiple potential non-network solution providers in relation to the progress of the EOI for the Request for power system security services in central, southern and broader Queensland regions.

The TAPR is just one avenue that Powerlink uses to communicate information about transmission planning in the NEM. Through the TAPR, Powerlink aims to increase stakeholder and customer understanding and awareness of its business practices, including load forecasting, transmission network planning and energy transformation.

### 1.13.1 Customer, stakeholder and community engagement

Powerlink is committed to proactively engaging with customers, communities, First Nations Peoples and other stakeholders in seeking their input into Powerlink's business processes and decision-making. All engagement activities are undertaken in accordance with our Stakeholder Engagement Framework and Community Engagement Strategy, which set out the principles, objectives and outcomes Powerlink seeks to achieve in its interactions with stakeholders and the broader communities in which we operate. A number of key performance indicators are used to monitor progress towards achieving Powerlink's stakeholder engagement performance goals. In particular, Powerlink undertakes a comprehensive biennial stakeholder survey to gain insights about stakeholder perceptions of Powerlink, its social licence to operate and reputation. Most recently completed in November 2021, it provides comparisons between baseline research undertaken in 2012 and year-on-year trends to inform engagement strategies with individual stakeholders.

# I Introduction

Engaging with communities is an important part of providing electricity transmission services that are safe, reliable and cost-effective. Transmission network infrastructure stays in-service for up to 50 years and Powerlink is focused on building positive relationships and partnering with local communities to deliver benefits for the longer term. In 2021, a new Community Engagement Strategy was developed and implemented to support delivery of the energy transformation and ensure Powerlink was focused on driving mutually beneficial outcomes for impacted communities. We also undertook targeted community engagement research in south-western Queensland to gauge community acceptability of renewable development and transmission infrastructure. The research findings support our engagement going forward and ensure we are focused on key factors that are important to communities. We are now undertaking similar sentiment research in North and Central Queensland. As Powerlink continues to operate and maintain the existing network through to embarking on planning and building the transformational network of the future, local communities will be front and centre in our planning and decision-making.

## ***2021/22 Community engagement activities***

In 2021, Powerlink developed a Community Engagement Strategy to guide its engagement activities across the state and set the tone for how we want to proactively engage to drive a positive social licence to operate in key communities. The strategy is now embedded and driving the business focus on engaging early and often, particularly with communities where we are building new infrastructure and connecting renewable development projects. This early engagement approach includes seeking feedback and input earlier in the project development process and incorporating these insights into our planning and decision-making. To date, this approach has supported a positive social licence to operate for Powerlink in key communities.

## ***2021/22 Stakeholder engagement activities***

Since the publication of the 2021 TAPR, Powerlink has engaged with stakeholders and customers in various ways through a range of activities as outlined below.

## ***2023-27 Revenue Proposal***

The AER released its Final Decision on Powerlink's Revenue Proposal in April 2022, following an extensive two year engagement program. The engagement approach delivered a Revenue Proposal that was 'capable of acceptance' by Powerlink's customers, the AER and Powerlink itself.

## ***Customer Panel***

Powerlink hosts a Customer Panel that provides an interactive forum for its stakeholders and customers to give input and feedback to Powerlink regarding decision-making, processes and methodologies. Comprised of members from a range of sectors including industry associations, resources, community advocacy groups, directly connected customers and distribution representatives, the panel provides an important avenue to keep our stakeholders better informed about operational and strategic topics of relevance. The panel met in June and October 2021, and during 2022 met in March and June. Key topics for discussion included co-designing new customer metrics, a strategic review of the Energy Charter, demand management innovation and enterprise resilience review engagement.

## ***Asset Reinvestment Review Working Group***

As part of its commitment to customer engagement, during 2022 Powerlink established an Asset Reinvestment Review (ARR) Working Group to shape and participate in a review of its asset reinvestment approach. The ARR Working Group is comprised of representatives from the AER, key customer advocates and members of Powerlink's Customer Panel. A co-designed scope for the review was developed with the ARR Working Group to guide discussions. The scope focuses on both the prudence and efficiency elements of reinvestment capital expenditure, with a focus on Powerlink's approach to transmission line refit projects. The review is still currently underway with a formal report due in early 2023.



### **2021 Transmission Network Forum**

In November 2021, more than 200 customers attended (in person and virtually) Powerlink's annual Transmission Network Forum. The forum provided updates on the state of the network and 2021 TAPR highlights, followed by interactive breakout sessions on creating a robust Renewable Energy Zone (REZ) framework for Queensland and navigating the industry's pathway to electrification and decarbonisation. The live stream recording, presentation and questions raised and answers discussed are available on Powerlink's [website](#).

### **Stakeholder engagement for RIT-Ts**

Powerlink recognises the importance of transparency for stakeholders and customers, particularly when undertaking transmission network planning and engaging in public consultation under the RIT-T process.

In relation to engagement activities for RIT-Ts, Powerlink is committed to a balanced approach in the public consultation process as determined with its Customer Panel. In addition, Powerlink will utilise and be guided by the AER Stakeholder Engagement Framework and Consumer Engagement Guideline for Network Service Providers as the benchmarks when consulting as part of the RIT-T process.

Taking this into account, the appropriate level of engagement for RIT-Ts may most easily be identified through feedback received from stakeholders on proposed investments identified in the TAPR, discussion and consideration of the context of the proposed investment. Engagement activities for RIT-Ts are assessed on a case by case basis. This includes consideration of the:

- potential impacts on stakeholders
- opportunities for network reconfiguration or asset retirement
- estimated capital cost
- type of RIT-T process being undertaken (refer to Section 6.6.1).

Detailed information on proposed engagement activities for RIT-Ts can be found on Powerlink's website.

More information on Powerlink's engagement activities is available on our website.

### **1.13.2 Non-network solutions**

Powerlink has established processes for engaging with stakeholders for the provision of non-network services in accordance with the requirements of the NER. These engagement processes centre on publishing relevant information on the need and scope of viable non-network solutions to emerging network limitations and in relation to the replacement of network assets. For a given network limitation or potential asset replacement, the viability and an indicative specification of non-network solutions are first introduced in the TAPR and TAPR templates. As the identified need date approaches detailed planning analysis is undertaken, and further opportunities are explored in the consultation and stakeholder engagement processes undertaken as part of any subsequent RIT-T.

In the past, these processes have been successful in delivering non-network solutions to emerging network limitations. More recently in 2022, Powerlink is in discussions with proponents of non-network solutions to assist in a short-term solution to address an NSCAS gap in southern Queensland until a longer term solution can be assessed and implemented.

Non-network solutions such as DSM will be essential in future years to avoid or delay the need to augment the transmission network in response to any increase in maximum demand.

Powerlink is committed to the ongoing development of its non-network engagement processes to facilitate the identification of optimal non-network solutions:

- to address future network limitations or address the risks arising from ageing assets remaining in-service within the transmission network
- more broadly, in combination with network developments as part of an integrated solution to complement an overall network reconfiguration strategy
- to address voltage instability, inertia and system strength requirements, ensuring the secure operation of the transmission network
- to provide demand management and load balancing.

# I Introduction

Powerlink's 2022 TAPR includes information for non-network providers that highlights possible future non-network opportunities in key areas of the transmission network in Queensland forecast to require expenditure in the next five years (refer to Chapter 7). In addition, the TAPR templates data contained within the TAPR portal published in conjunction with the 2022 TAPR, provide detailed technical data on Powerlink's transmission connection points and line segments. This data may be of value to non-network providers when considering opportunities for the development of potential non-network solutions (refer to Appendix B). Powerlink will continue to engage and work collaboratively with non-network providers during the RIT-T or other consultation processes to arrive at the optimal solution for customers.

Since publication of the 2021 TAPR, Powerlink has continued its collaboration with Energy Networks Australia (ENA) and the Institute for Sustainable Futures<sup>10</sup> regarding the Network Opportunity Mapping project. This project aims to provide enhanced information to market participants on network constraints and the opportunities for demand side solutions. These collaborations further demonstrate Powerlink's commitment to using a variety of platforms to broaden stakeholder awareness regarding possible commercial opportunities for non-network solutions.

## **Non-network Engagement Stakeholder Register**

Powerlink has a non-network Engagement Stakeholder Register (NNE SR) to inform non-network providers of the details of emerging network limitations and other future transmission network needs, such as the replacement of network assets, which may have the potential for non-network solutions. The NNE SR is comprised of a variety of interested stakeholders who have the potential to offer network support through advancement in technologies, existing and/or new generation or DSM initiatives (either as individual providers or aggregators).

Potential non-network providers are encouraged to register their interest in writing to [networkassessments@powerlink.com.au](mailto:networkassessments@powerlink.com.au) to become a member of Powerlink's NNE SR.

## 1.14 Focus on continuous improvement

As part of Powerlink's commitment to continuous improvement, the 2022 TAPR focuses on an integrated approach to future network development, including the development of REZ, and contains detailed discussion on key areas of the transmission network forecast to require expenditure.

In conjunction with condition assessments and risk identification, as assets approach their anticipated replacement dates, possible reinvestment alternatives undergo detailed planning studies to confirm alignment with future reinvestment, optimisation and delivery strategies. These studies have the potential to deliver new information and may provide Powerlink with an opportunity to:

- improve and further refine options under consideration
- consider other options from those originally identified delivering positive outcomes for customers.

Information regarding possible reinvestment alternatives is updated annually within the TAPR and includes discussion on the latest information available as planning studies mature.

The 2022 TAPR:

- discusses emerging challenges as the power system transforms to much greater levels of VRE generation (refer to chapters 2, 3, 6, 9 and 10)
- provides information in relation to joint planning and Powerlink's approach to asset management (refer to chapters 4 and 5)
- discusses possible future network asset investments for the 10-year outlook period (refer to Chapter 6)
- includes the most recent information for the proposed replacement of network assets which are anticipated to be subject to the RIT-T in the next five years (refer to Chapter 6)
- discusses the potential for generation developments (in particular VRE generation) and the challenges related to the management of system strength (refer to chapters 2 and 10)

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<sup>10</sup> Information available at [Network Opportunity Mapping](#).

- contains information on potential non-network opportunities in the next five years, grouped by investment type (refer to Chapter 7) and discusses Powerlink's approach to assisting the development of non-network solutions – specifically, through the ongoing improvement of engagement practices for non-network solution providers and provision of information (refer to sections 1.12.2 and 6.7)
- links to Powerlink's recently improved [TAPR portal](#) website incorporating the 2022 TAPR templates and discusses the context, methodology and principles applied for the development of the Queensland transmission network data (refer to Appendix B)
- provides new and additional information in relation to transmission lines approaching end of technical life which require potential reinvestment or consideration for retirement in the next 10 to 15 years (refer to Section 6.14).

