

Executive summary

Planning and development of the transmission network is integral to Powerlink Queensland meeting its obligations under the National Electricity Rules (NER), Queensland's Electricity Act 1994 and its Transmission Authority.

The Transmission Annual Planning Report (TAPR) is a key part of the planning process and provides stakeholders and customers with important information about the existing and future transmission network in Queensland. The report is targeted at everyone interested or involved in the National Electricity Market (NEM) including the Australian Energy Market Operator (AEMO), Registered Participants and interested parties. The TAPR also provides stakeholders with an overview of Powerlink's planning processes and decision making on potential future investments.

The TAPR includes information on electricity energy and demand forecasts, committed generation and network developments. It also provides estimates of transmission grid capability and potential network and non-network developments required in the future to continue to meet electricity demand in a timely manner and provide a valued service to our customers.

Overview

The 2019 TAPR outlines the key factors impacting Powerlink's transmission network development and operations and discusses how Powerlink continues to adapt and respond to dynamic changes in the external environment.

The forecasts presented in this TAPR indicate low growth for summer and winter maximum demand and a decline in delivered energy for the transmission network over the 10-year outlook period.

The Queensland transmission network experienced significant growth in the period from the 1960s to the 1980s. The capital expenditure required to manage emerging risks related to assets now reaching the end of technical service life represents the majority of Powerlink's program of work over the outlook period. In line with customer and stakeholder expectations, emphasis will be placed on ensuring that asset reinvestment considers the enduring need and most cost effective option. Network planning studies have focussed on evaluating the enduring need for existing assets in the context of increasing diversity of generation, a relatively flat demand growth outlook and the potential for network reconfiguration, coupled with alternative non-network solutions.

Powerlink's focus on customer and stakeholder engagement has continued over the last year, with a range of activities undertaken to seek feedback and input into our network investment decision making and planning. This included holding the Powerlink Queensland Transmission Network Forum, incorporating related interactive feedback sessions on managing peaks and hollows to improve network utilisation and customer outcomes, navigating the renewable connection process and creating a Transmission Network Vision.

Since the 2018 TAPR, Powerlink as a founding participant, has committed to the industry-led and world-first whole-of-sector initiative, the Energy Charter. The Charter is focussed on driving customer-centric culture and conduct in energy businesses to create price and service delivery improvements for the benefit of customers.

Electricity energy and demand forecasts

The 2018/19 summer in Queensland set a new record demand at 6:00pm on 13 February, when 8,969MW was delivered from the transmission grid. Operational 'as generated' and native demand records were recorded at 5:30pm on 13 February, with operational 'as generated' reaching 10,044MW, passing the previous record of 9,796MW set last summer. After temperature correction, the 2018/19 summer demand aligned with the 2018 TAPR forecast.

Powerlink has incorporated AEMO forecasts into its demand and energy forecasts and planning processes. This will avoid duplication of effort and deliver better value to our customers. It also presents an opportunity for Powerlink to work even closer with AEMO and bring specific jurisdictional knowledge to the development of these load forecasts.

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Electricity energy forecast

Based on the medium economic outlook, Queensland's delivered energy consumption is forecast to decrease at an average of 0.7% per annum over the next 10 years from 48,886GWh in 2018/19 to 45,421GWh in 2028/29. The reduction is due to anticipated increases in the capacity of distribution connected renewable generation.

Electricity demand forecast

Based on the medium economic outlook, Queensland's transmission delivered summer maximum demand is forecast to increase at an average rate of 0.5% per annum over the next 10 years, from 8,467MW (weather corrected) in 2018/19 to 8,874MW in 2028/29.

The transmission delivered maximum demand for summer 2018/19 of 8,969MW was a new record for Queensland. Operational 'as generated' and native demand in summer 2018/19 were also new records, with operational 'as generated' reaching 10,044MW, passing the previous record of 9,796MW set last summer.

Future network development

Shifts in customer expectation and dynamic changes in the external environment including the upturn in variable renewable energy (VRE) developments in Queensland, are reshaping the operating environment in which Powerlink delivers its transmission services. In addition, market initiatives such as the Integrated System Plan (ISP) have the potential to influence the future development of the power system and the associated network topography of the transmission network in Queensland and the NEM over the 10-year outlook period.

Powerlink continues to adopt and respond to these changes by:

- committing to the industry-led and world first whole-of-sector initiative – The Energy Charter
- ongoing active customer and stakeholder engagement for informed decision making and planning
- implementing and adopting the recommendations of various reviews
- adapting to changes in electricity customer behaviour and economic outlook
- continuing to adapt its approach to investment decisions
- placing considerable emphasis on an integrated and flexible analysis of future reinvestment needs
- supporting diverse generation connection
- continuing to focus on developing options that deliver a secure, safe, reliable and cost effective transmission network.

Based on the medium economic forecast outlook, the planning standard and committed network solutions, significant network augmentations to meet load growth are not forecast to occur within the 10-year outlook period of this TAPR.

There are proposals for large mining, metal processing and other industrial loads that have not reached a committed development status. These new large loads are within the resource rich areas of Queensland and associated coastal port facilities. These loads have the potential to significantly impact the performance of the transmission network supplying, and within, these areas. Within this TAPR, Powerlink has outlined the potential network investment required in response to these loads emerging in line with the high economic outlook forecast.

Since January 2016, Queensland has seen an unprecedented level of renewable energy investment activity in north and central Queensland. These investments in VRE generation are expected to increase the utilisation of the Central West to Gladstone and Central Queensland to Southern Queensland (CQ-SQ) grid sections. Depending on the emergence of network limitations it may become economically viable to increase the power transfer capacity to alleviate constraints across these grid sections. Feasible network solutions are outlined within the TAPR.

The Queensland transmission network experienced significant growth in the period from the 1960s to the 1980s. The capital expenditure needed to manage the condition risks related to this asset base, which is now reaching end of technical service life, represents the bulk of Powerlink's program of work within the outlook period.

Considerable emphasis has been given to an integrated approach to the analysis of future reinvestment needs and options. Powerlink has systematically assessed the enduring need for assets at the end of their technical service life taking into account future renewable generation and considered a broad range of options including network reconfiguration, asset retirement, non-network solutions or replacement with an asset of lower capacity. This incremental development approach potentially defers large capital investment and has the benefit of maintaining the existing topography, transfer capability and operability of the transmission network.

Renewable energy and generation capacity

To date Powerlink has completed connection of 11 large-scale solar and wind farm projects in Queensland, adding 1,423MW of generation capacity to the grid. An additional two projects are fully operational, and 40 connection applications, totalling about 8,000MW of new generation capacity, have been received and are at varying stages of progress¹.

To ensure that any adverse system strength impact is adequately addressed, Powerlink is working with proponents, suppliers and AEMO enhance its integrated system strength model for the Queensland network. This work has provided important insights into the extreme complexity of system strength and how it impacts on managing asynchronous connections and the network in general.

Powerlink will apply this integrated system strength model to existing and new connection applications and engage with renewables sector customers to better understand the potential for additional VRE generation in Queensland.

Grid section and zone performance

During 2018/19, the Powerlink transmission network supported the delivery of a record summer maximum demand of 8,969MW, 127MW higher than that recorded in summer 2017/18. Record transmission delivered demand was recorded for Far North, South West, Moreton and Gold Coast zones.

The CQ-SQ grid section showed greater levels of utilisation during 2018/19, reflecting higher generation levels in North Queensland as a result of recently commissioned VRE generators.

The transmission network in the Queensland region performed reliably during the 2018/19 year, including during the record summer maximum demand.

Consultation on network reinvestments

Powerlink is committed to regularly reviewing and developing its transmission network in a timely manner to meet the required levels of reliability and manage the risks arising from aged assets remaining in-service.

Following the Replacement Expenditure Planning Arrangements Rule, which commenced in September 2017, Powerlink has made considerable progress in its Regulatory Investment Test for Transmission (RIT-T) program in relation to the replacement of network assets, finalising 13 RIT-Ts since the publication of the 2018 TAPR (refer to Chapter 9).

In addition, during 2018/19, Powerlink also commenced a further four RIT-Ts to consider opportunities for non-network solutions to resolve the following network reinvestment requirements, where technically and economically feasible:

- maintaining reliability of supply at Kamerunga Substation
- maintaining reliability of supply between Clare South and Townsville South
- maintaining power transfer capability and reliability of supply at Lilyvale
- maintaining reliability of supply in the Blackwater area.

¹ For the purposes of customer connection statistics, Powerlink defines:

- 'completed projects' as those for which Powerlink's scope of works has been completed. However generation may not be at full capacity as remaining works associated with generation connection may not yet be complete (e.g. construction and/or commissioning)
- 'fully operational' as customer connections where all works are complete, commissioned and capable of delivering to full generation potential.

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The TAPR also highlights anticipated upcoming RIT-Ts for which Powerlink intends to seek solutions and/or initiate consultation with AEMO, Registered Participants and interested parties in the near future (refer to Section 5.6.2). To enhance the value and outcomes of the RIT-T process to customers, Powerlink undertakes a range of engagement activities for each RIT-T, determined on a case-by-case basis. This engagement matrix for RIT-Ts was developed in consultation with Powerlink's Customer Panel.

Expanding New South Wales to Queensland transmission transfer capacity

Preliminary assessment of the impact of dynamic changes in the external environment, including the upturn in VRE developments, has indicated that it could be technically and economically justified to expand the New South Wales (NSW) to Queensland transmission transfer capacity. TransGrid and Powerlink are undertaking joint planning relating to existing and forecast network congestion between Queensland and NSW. A RIT-T process to consider investment options on the Queensland/New South Wales Interconnector (QNI) has now commenced. This process includes consideration of the ISP recommended Group 1 and Group 2 investments.

In November 2018, Powerlink and TransGrid released a Project Specification Consultation Report (PSCR) on '[Expanding NSW-Queensland transmission transfer capacity](#)', as the first step in the RIT-T. This RIT-T is investigating options to increase overall net market benefits in the NEM through relieving congestion on the transmission network between NSW and Queensland. The PSCR outlines a range of credible options to meet the identified network need.

Powerlink and TransGrid are currently performing power system analysis and market modelling to assess various network and non-network options. Findings will be published in the Project Assessment Draft Report (PADR) anticipated later in 2019.

Committed and commissioned projects

During 2018/19, having finalised the necessary regulatory processes for the proposed replacement of network assets, the committed projects for reinvestment across Powerlink's network include:

- Woree secondary systems and Static VAr Compensator (SVC) secondary systems replacement
- Ingham South transformers replacement
- Ross 275/132kV primary plant replacement
- Dan Gleeson secondary systems replacement
- Townsville South primary plant replacement
- Egan's Hill to Rockhampton transmission line refit
- Bouldercombe primary plant and transformer replacement
- Baralaba secondary systems replacement
- Palmwoods secondary systems replacement
- Tarong secondary systems replacement
- Belmont secondary systems replacement
- Abermain secondary systems replacement
- Line refit works in the Brisbane metropolitan area between South Pine and Upper Kedron, West Darra to Sumner and Rocklea to Sumner.

Projects completed in 2018/19 include reinvestment works at:

- Turkinje Substation
- Ross Substation
- Nebo Substation
- Stanwell Substation
- Broadsound Substation
- Tennyson Substation
- Line refit works on the 132kV transmission lines between Calliope River and Boyne Island.

Stakeholder consultation for non-network solutions

Powerlink engages with non-network providers to expand the potential use of non-network solutions, addressing the future needs of the transmission network, where technically and economically feasible. These may be in the form of an alternative option to like-for-like replacements, as a partial solution in conjunction with a network solution, or to complement an overall network reconfiguration strategy. Non-network solutions such as demand side management (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.

Since the publication of the 2018 TAPR, Powerlink has continued to hold webinars with non-network providers, customers and other stakeholders. The webinars inform and discuss relevant and topical matters impacting potential future non-network opportunities and more broadly, the future regulated development of the transmission network. Webinars during 2018/19 focussed on:

- the content of the 2018 TAPR
- Expanding NSW-Queensland transmission transfer capacity RIT-T (in conjunction with TransGrid)
- Maintaining reliability of supply between Clare South and Townsville South RIT-T.

Sharing information and seeking customer input through activities such as the Transmission Network Forum and webinars assists in broadening customer and stakeholder understanding of our business and provides additional opportunities to seek input on potential non-network solutions.

Customer and stakeholder engagement

Powerlink has embedded its Stakeholder Engagement Framework, which focuses on engaging with customers and stakeholders and seeking their input into Powerlink's business focus and objectives.

The framework aims to promote more effective stakeholder engagement, better inform customers and encourage feedback, and appropriately incorporate that input into Powerlink's business decision making to improve our planning. A primary aim is to ensure Powerlink's services better reflect customer values, priorities and expectations.

Powerlink surveys its key stakeholder groups, including customers, consumer advocates, government, regulators and industry, to gain a stronger understanding of stakeholder perceptions of performance. The survey completed in 2018 sought views from almost 100 key stakeholders and highlighted improvements in reputation and social licence to operate for Powerlink. The latest survey also sought specific insights from existing directly-connected customers and renewable proponents on aspects of customer service and delivery, and Powerlink's responsiveness.

Powerlink's Customer Panel met throughout the year, with panel members providing input and feedback on Powerlink's decision making processes and methodologies. This has included discussions on the active RIT-T consultations. Composed of members from a range of sectors including energy industry, resources, community advocacy groups, consumers and research organisations, the panel provides an important channel to keep our stakeholders better informed about operational activities and strategic topics of interest to them.

Since 2018, Powerlink has engaged with key stakeholders in a number of ways, including its Transmission Network Forum, and various webinars – all proving to be valuable avenues to exchange information and receive stakeholder input on a range of investment and forecasting considerations.

Focus on continuous improvement in the TAPR

As part of Powerlink's commitment to continuous improvement, the 2019 TAPR continues to focus on an integrated approach to future network development and contains detailed discussion on key areas of future expenditure.

The 2019 TAPR:

- provides information in relation to joint planning and Powerlink's approach to asset management (refer to chapters 3 and 4)
- discusses possible future network asset reinvestments for the 10-year outlook period (refer to Chapter 5)
- 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 5)
- continues the discussion on the potential for generation developments (in particular VRE generation) first introduced in 2016 (refer to Chapter 8)
- contains a quick reference guide on where to locate information on potential non-network opportunities in the TAPR, grouped by investment type (refer to Appendix F) 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 1.9.2 and 5.7)
- introduces the TAPR templates and discusses the context, methodology and principles applied for the development of the Queensland transmission network data (refer to Appendix B).