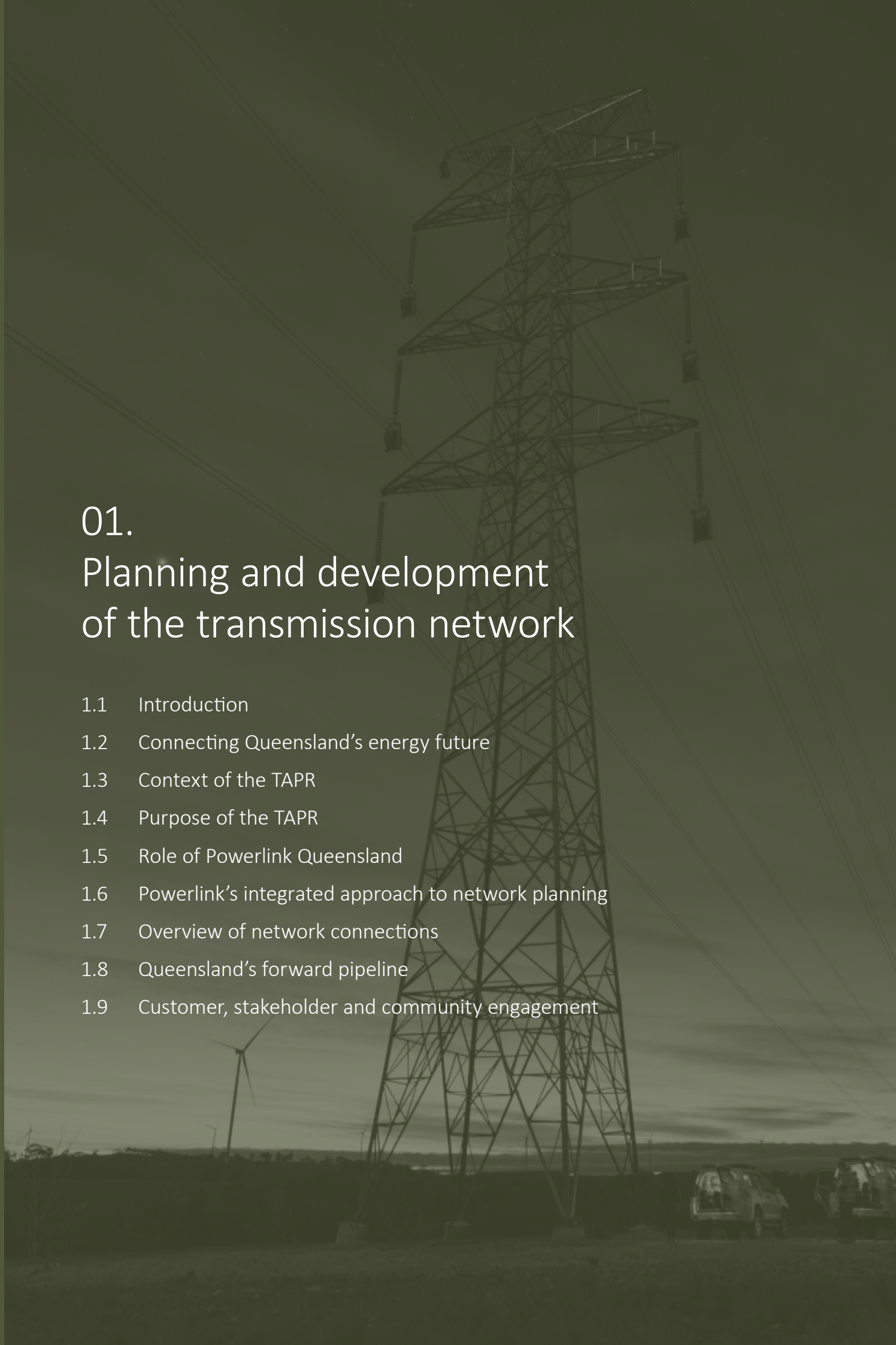


01.
Planning and development of the transmission network

Powerlink Queensland's (Powerlink) annual planning review and Transmission Annual Planning Report (TAPR) play an important role helping to ensure the transmission network continues to meet the needs of Queensland customers and National Electricity Market (NEM) participants into the future. This chapter discusses Powerlink's planning obligations and role in supporting the energy transformation in Queensland, an update on the development of connection projects currently underway and Powerlink's most recent stakeholder engagement activities.

Key highlights

- The purpose of Powerlink's TAPR under the National Electricity Rules (NER) is to provide information about the Queensland transmission network, including key areas forecast to require expenditure in the 10-year outlook period.
- Powerlink is responsible for planning the shared transmission network within Queensland, including the development of new connections to the network.
- Local communities are front and centre in Powerlink's planning and decision making as Powerlink continues to operate and maintain the existing network as well as planning and building the transformational network of the future.
- Powerlink has developed demand and energy forecasts for the 2024 TAPR. The load forecast takes into consideration AEMO's demand and energy forecasts, published for the 2024 Electricity Statement of Opportunities (ESOO), and allows a more granular focus on potential load developments in the Queensland region.
- Powerlink has a central role in enabling the connection of variable renewable energy (VRE) in Queensland and continues to actively collaborate with solar and wind farm, and Battery Energy Storage System (BESS) proponents, who will help provide the firming services that are integral to the future mix of technologies in Queensland.
- As the REZ Delivery Body (RDB) for Queensland, Powerlink is working closely with the Queensland Government to establish Renewable Energy Zones (REZs) and deliver major projects referenced in the Queensland Energy and Jobs Plan (QEJP).
- Powerlink continues to proactively engage with communities, customers and other stakeholders, seeking their input into Powerlink's network development, on-going operations and new investment decisions.

1.1 Introduction

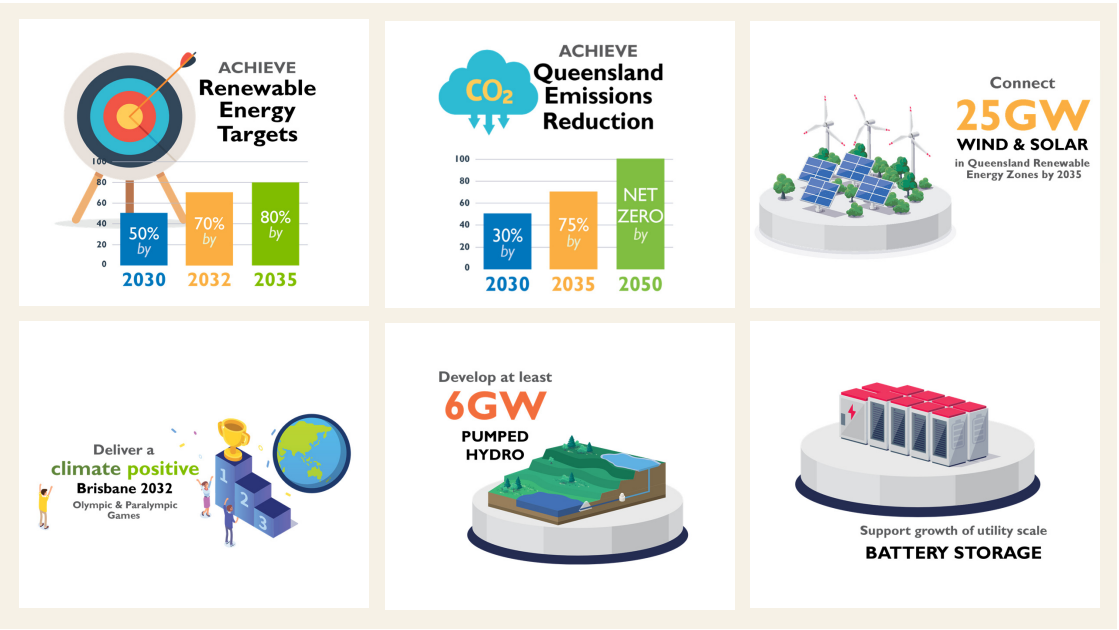
Powerlink is a Transmission Network Service Provider (TNSP) in the NEM and owns, develops, operates and maintains Queensland's high voltage (HV) transmission network. It has been appointed by the Queensland Government as the Jurisdictional Planning Body (JPB) and RDB responsible for transmission network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

1.2 Connecting Queensland's energy future

The pace and scale of change in Australia's power system is one of the fastest in the world. Powerlink's transmission network plays a critical role in connecting Queenslanders to a world-class energy future and supporting key Government targets including new Renewable Energy Targets (RET) and net zero emissions by 2050.

Powerlink is pursuing a reliable, least-cost power system transformation for customers and driving the coordinated and efficient development of REZs, while working positively with communities to achieve the objectives and goals set out in the QEJP (refer to Figure 1.1 and Chapter 2).

Figure 1.1 QEJP Targets



1.3 Context of the TAPR

As part of its planning responsibilities, Powerlink undertakes an annual planning review in accordance with the requirements of the NER[1] and publishes the findings of this review in its TAPR, and associated templates made available in the TAPR portal.

Information from this process is provided to Australian Energy Market Operator (AEMO) to assist in the preparation of its Integrated System Plan (ISP). The ISP sets out a roadmap for the eastern and south-eastern seaboard's power 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 NEM. The ISP identifies actionable and future projects requiring regulatory consultation, and informs market participants, investors, policy makers and customers about a range of potential future development opportunities. Queensland to New South Wales Interconnector (QNI) Connect has been identified as an actionable project in the most recent ISP released in July 2024, with a Project Assessment Draft Report to be published by Powerlink and Transgrid by 25 June 2026 (refer to Section 6.17.3). The ISP noted the Queensland Government had passed the Energy (Renewable Transformation and Jobs) Act 2024 (ERTJ Act) and that the Gladstone Grid Reinforcement[2] (refer to Section 1.5.2) and Queensland SuperGrid South projects will progress under the State framework rather than the ISP framework[3].

Powerlink has developed demand and energy forecasts for the 2024 TAPR. While this load forecast takes into consideration AEMO's demand and energy forecasts, published for the 2024 ESOO it allows a more granular focus on potential load developments within Queensland. With market engagement data, sourced from Powerlink's business development activities and Energy Queensland, Powerlink is well placed to forecast future load (new and/or as a result of decarbonisation) in the Central load forecast scenario. Powerlink's forecast also includes sub-regional areas, otherwise known as TAPR zones (refer to Appendix F) and delivers the added benefit of forecasts at all levels of the transmission network in the state.

1 For the purposes of Powerlink's 2024 TAPR, Version 214 of the NER in place from July 2024.
2 The scope of works for Gladstone Grid Reinforcement is captured within the Gladstone Project in the QEJP.
3 2024 Integrated System Plan for the National Electricity Market, page 63.

The primary purpose of the TAPR is to provide information on the short to medium-term planning activities of TNSPs, whereas the focus of the ISP is more strategic and longer term. Further, the ISP, System Strength, Inertia and Network Support and Control Ancillary Service (NSCAS) Reports and the 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 2024 TAPR in conjunction with 2024 ESOO. The most recent ISP was released on 30 June 2024 and the 2023 System Strength, Inertia and NSCAS Reports were published on 1 December 2023.

1.4 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, communities and other stakeholders 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 and REZs
- 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[4].

1.5 Role of Powerlink Queensland

1.5.1 Jurisdictional network planning and development in the NEM

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:

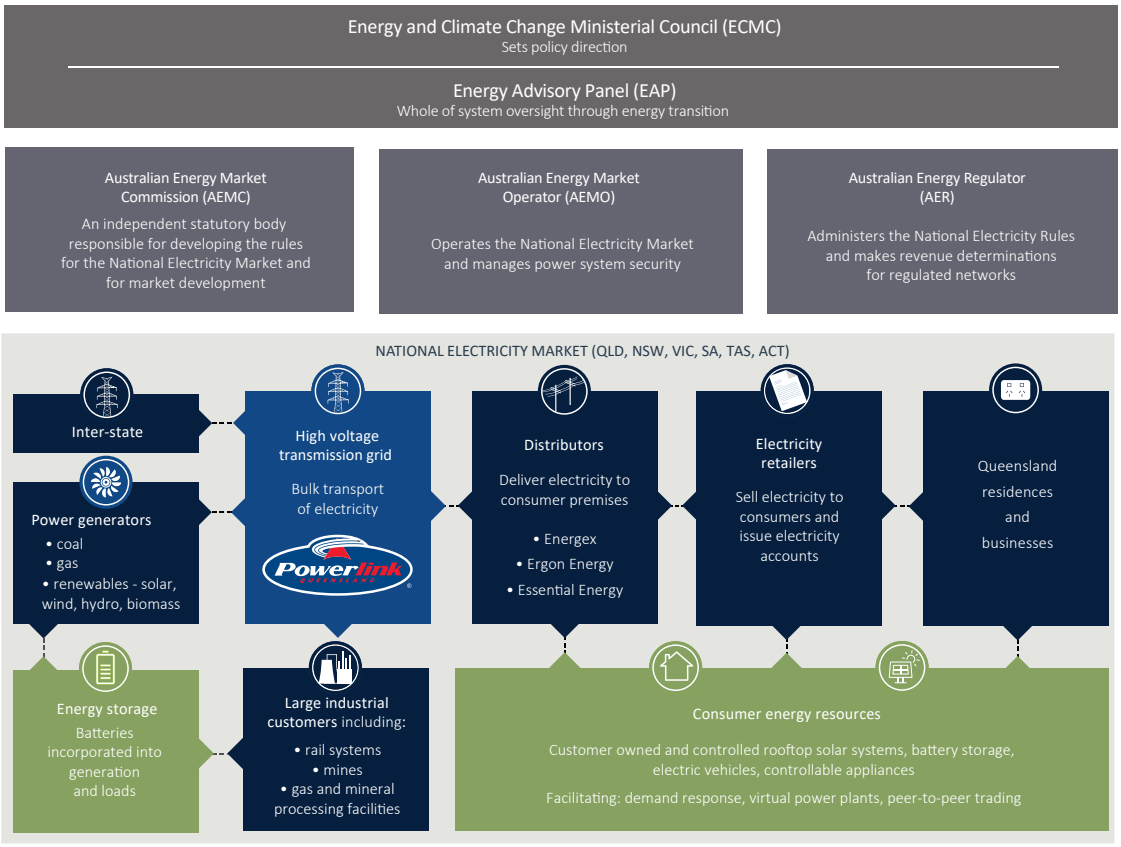
- ensuring the network is able to operate with sufficient capability and if necessary, is augmented to provide network services to customers in accordance with Powerlink's Transmission Authority and associated reliability standard
- ensuring the risks arising from the condition and performance of existing 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

[4] Unless stated otherwise, the information published within the 2024 TAPR is current as at 30 September 2024.

- developing recommendations to address emerging network limitations or the need to address the risks arising from ageing network assets remaining inservice 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[5] transmission augmentations and the replacement of transmission network assets in Queensland
- undertaking the role of System Strength and Inertia Service Provider in Queensland, providing the services required to meet system strength and inertia requirements.

Powerlink's role in the Queensland power system is shown in Figure 1.2.

Figure 1.2 Powerlink's role in the Queensland power supply industry



1.5.2 State-based planning and development under the ERTJ Act

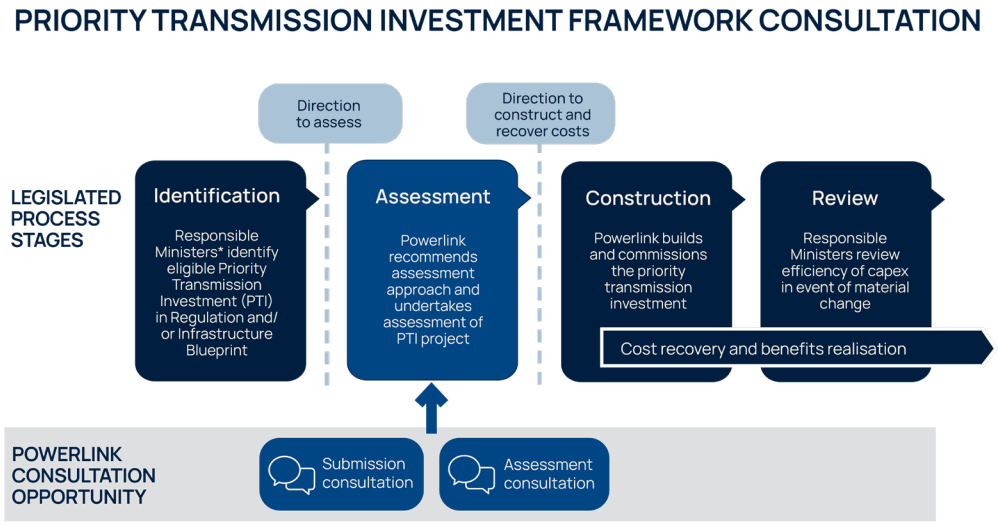
The ERTJ Act was passed in April 2024 and is a key enabler of the transformation, placing the Queensland Renewable Energy Targets into law and establishing new arrangements to deliver major transmission investments in Queensland (Refer to Section 2.3).

[5] Where applicable, in accordance with NER, Clause 5.18.

The ERTJ Act sets out the process to allow the Queensland Government to identify and assess Priority Transmission Investment (PTI) projects within a new State-based planning and investment framework. As directed by the Queensland Government, Powerlink is required to carry out the public consultation and assessment process for candidate PTIs and the subsequent construction and commissioning of PTI projects, including contracting for non-network solutions where technically and economically feasible. In July 2024, Powerlink commenced the first PTI public consultation under the new framework for the Gladstone Project (refer to Section 8.2.5).

Powerlink's role in the PTI process is shown in Figure 1.3.

Figure 1.3 Powerlink's role in the PTI process



More information on the PTI process is available on Powerlink's website.

RDB and REZ TNSP roles

Powerlink has been appointed to undertake two distinct roles within the ERTJ ACT that are responsible for Queensland REZs, being:

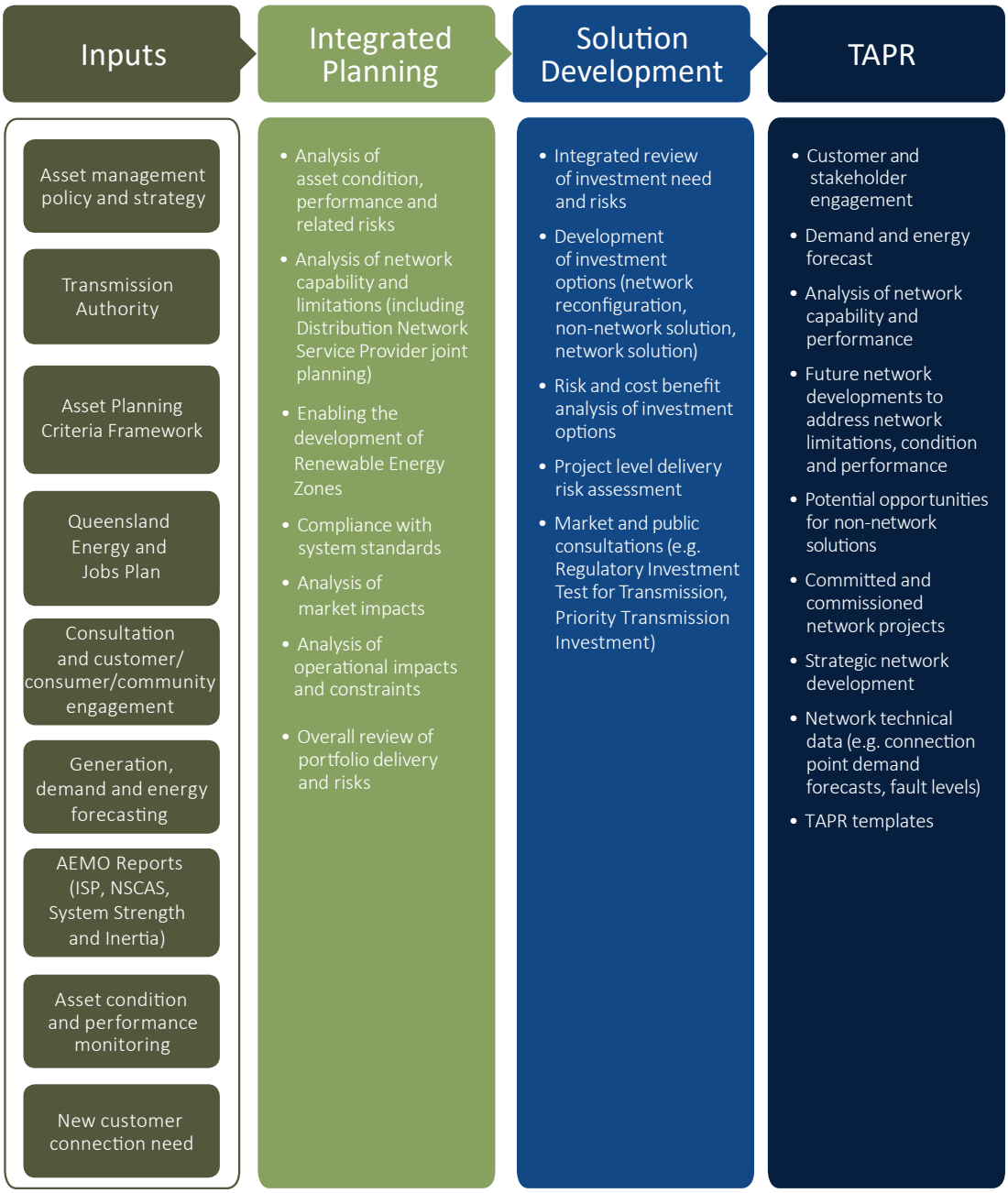
- RDB, with the responsibility of identifying areas suitable to be a REZ, developing draft and final REZ Management Plans (RMP) to enable the declaration of the REZ, and consulting with communities and stakeholders and
- REZ TNSP, with the responsibility of planning, design, owning, constructing, operating and maintaining REZ transmission infrastructure and undertaking processes for the connection of renewable generation.

Further information on the development of REZ in Queensland is available in Section 2.5.

1.6 Powerlink's integrated approach to network planning

An overview of Powerlink's integrated planning approach, taking into account the energy transformation, network capacity needs and end of technical service life related issues is presented in Figure 1.4.

Figure 1.4 Overview of Powerlink's TAPR planning process



Further information on Powerlink's planning responsibilities and processes as well as information on the principles and approach which guide Powerlink's analysis of future network investment needs and key investment drivers is available in Chapter 6 and Appendix A.

1.7 Overview of network connections

1.7.1 Summary of connection projects

Interest remains high from VRE generation and storage projects connecting in Queensland and Powerlink is progressing a significant pipeline of connections (refer to Section 6.6.3). Table 1.1 provides an overview of the development of connection projects undertaken or being undertaken by Powerlink since 2018.

Table 1.1 Summary of connection projects

Solar/Wind Projects	2024 TAPR status	
Total completed to date	22	3,155MW
Under construction	7	2,615MW
Connection Applications to date	66	16,846MW

Notes:

(1) A 250MW committed pumped hydro storage project is underway at the time of 2024 TAPR publication.

(2) To date Powerlink has completed two storage projects, totalling 250MW and a further 755MW of storage projects are under construction.

1.7.2 Status of connection projects

To date Powerlink has completed connection of 25 (22 VRE + 3 BESS) large-scale solar, wind farm and BESS projects in Queensland, adding 3,405MW of generation capacity to the grid. A significant number of formal connection applications, totalling 16,846MW of new generation capacity, have been received and are at varying stages of progress.

During 2023/24, 1,930MW[6] of semi-scheduled VRE generation capacity has been committed in the Queensland region, taking the total VRE generation capacity to 7,261MW[7] that is connected, or committed to connect, to the Queensland transmission and distribution networks.

Approximately 1,491MW of embedded semi-scheduled renewable energy projects exist or are committed to Energy Queensland's network. In addition to the large-scale VRE generation development projects, rooftop photovoltaic (PV) in Queensland exceeded 6,400MW in June 2024.

Figure 1.5 shows the location and type of generators connected and committed to connect to Powerlink's network. The Department of Energy and Climate (DEC) also provides mapping information on proposed (future) VRE projects, together with existing generation facilities (and other information) on its website. For the latest information on proposed VRE projects and locations in Queensland, refer to the DEC website.

[6] Comprised of MacIntyre Wind Farm, Lotus Creek Wind Farm, Boulder Creek Wind Farm, Broadsound Solar Farm and Wambo 2 Wind Farm (Powerlink).

[7] Comprised of Powerlink and Energy Queensland Group committed and completed solar and wind projects. There are a number of projects under construction that have not yet reached committed status.

Figure 1.5 Existing, Committed, and under construction connection projects since 2018

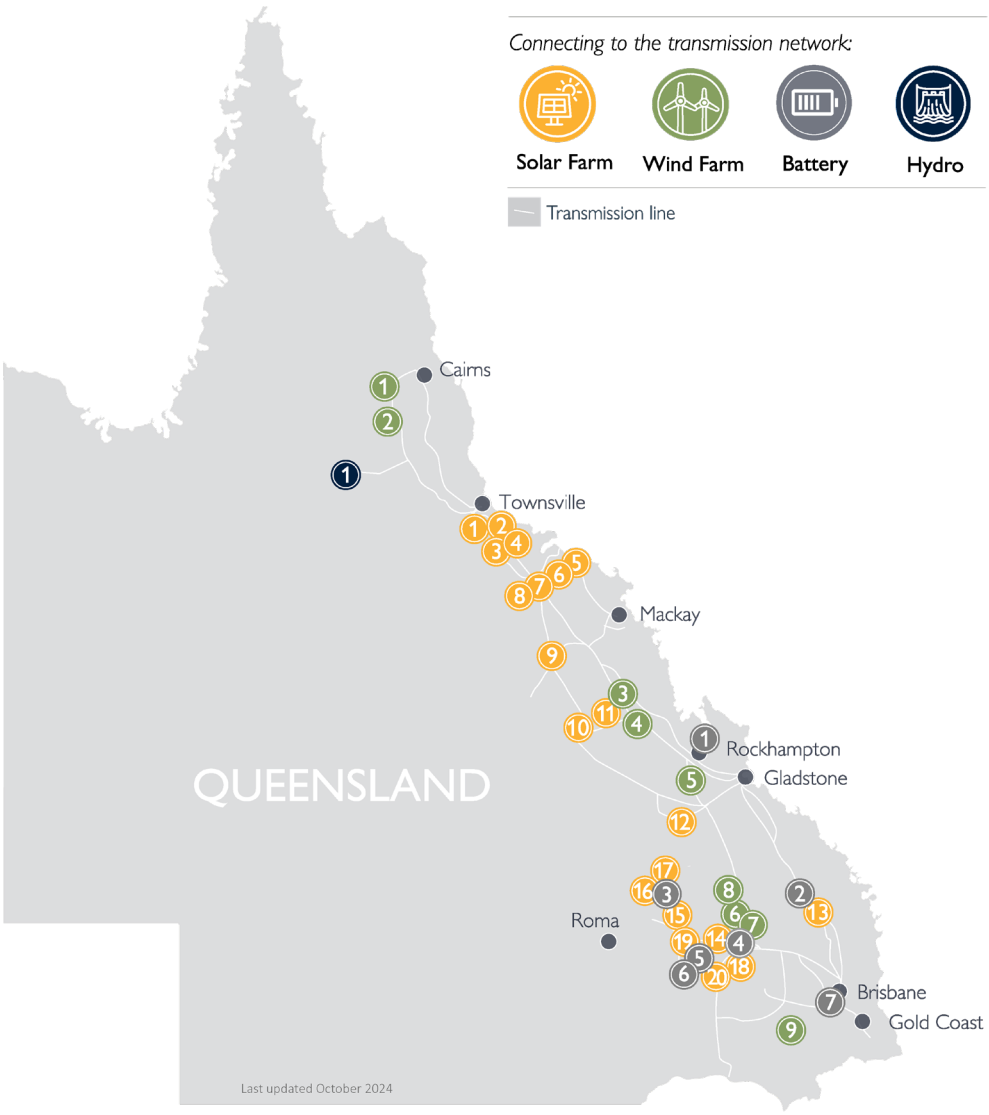


Table 1.2 Existing, Committed and under construction connection projects since 2018

Map ID	Generator	Location	Available capacity MW generated
Hydro-electric (1)			
1	Kidston Pumped Hydro Storage (2)	Kidston	250
Solar PV (3)			
1	Ross River	Ross	116
2	Sun Metals	Townsville Zinc	121
3	Haughton	Haughton River	100
4	Clare	Clare South	100
5	Whitsunday	Strathmore	57
6	Hamilton	Strathmore	57
7	Daydream	Strathmore	150
8	Hayman	Strathmore	50
9	Rugby Run	Moranbah	65
10	Lilyvale	Lilyvale	100
11	Broadsound (2)	Broadsound	296
12	Moura	Moura	82
13	Woolooga Energy Park	Woolooga	176
14	Blue grass	Chinchilla	148
15	Columboola	Columboola	162
16	Gangarri	Wandoan South	120
17	Wandoan	Wandoan South	125
18	Edenvale Solar Park	Orana	146
19	Western Downs Green Power Hub	Western Downs	400
20	Darling Downs	Braemar	108
Wind (3)			
1	Mt Emerald	Walkamin	180
2	Kaban	Tumoulin	152
3	Lotus Creek (2)	Nebo-Broadsound	276
4	Clarke Creek (2)	Broadsound	440
5	Boulder Creek (2)	Stanwell-Calvale	221
6	Wambo (2)	Halys	245
7	Wambo 2 (2)	Halys	247
8	Coopers Gap	Coopers Gap	440
9	MacIntyre (2)	Tummaville	890
Battery (3)			
1	Bouldercombe 2h BESS	Bouldercombe	50
2	Woolooga 2h BESS (2)	Woolooga	200
3	Wandoan 1.5h BESS	Wandoan South	100
4	Chinchilla 2h BESS (2)	Western Downs	100
5	Western Downs 2h BESS (2)	Western Downs	200
6	Ulinda Park 2h BESS (2)	Western Downs	155
7	Greenbank 2h BESS (2)	Greenbank	200

Notes:

(1) Shown at full capacity. However, output can be limited depending on water storage levels.

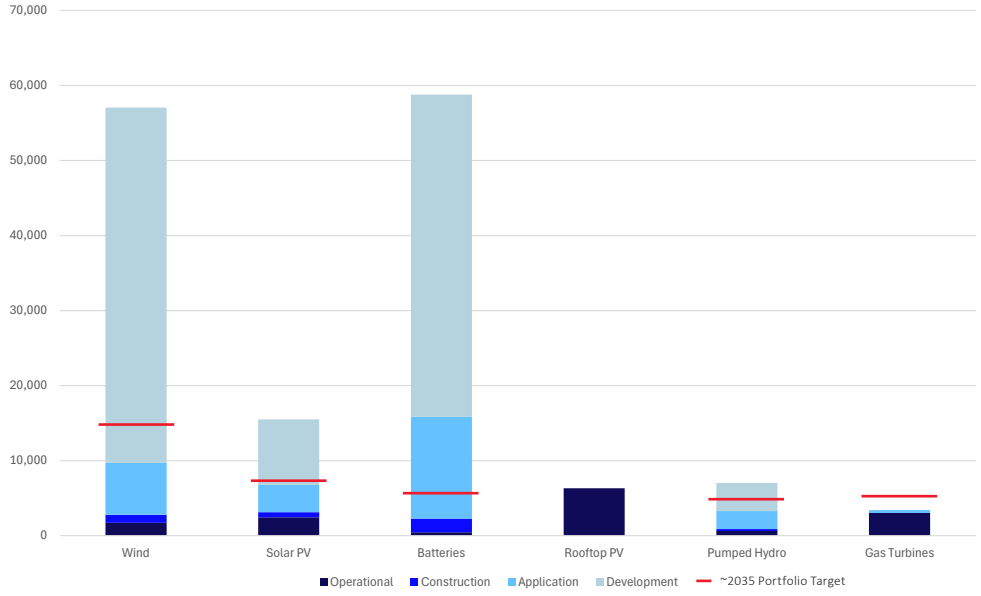
(2) Generators that are committed or undergoing construction are shown at future maximum expected capacity at the point of connection. Actual available generating capacity will vary over the course of the commissioning program.

(3) VRE generators and batteries shown at maximum capacity at the point of connection. The capacities are nominal as the generator rating depends on ambient conditions.

1.8 Queensland's forward pipeline

Queensland has experienced strong interest in the development of generation, firming and storage projects needed to enable the energy transformation. The forward pipeline of projects in various stages of development by technology are shown in Figure 1.6. The Infrastructure Blueprint outlines targets for each of the technologies to meet 80% renewable energy by 2035.

Figure 1.6 Powerlink's forward pipeline of projects by development stage (1)



Note:

(1) Forward pipeline of projects and anticipated capacity as of 1 October 2024.

1.8.1 The connections process

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.

Categories of Connection Assets

Dedicated Connection Assets (DCA)

All new Dedicated Connection Asset services, including design, construction, ownership, and operation and maintenance are non-regulated services.

Identified User Shared Assets (IUSA)

Identified User Shared Asset services are either negotiated or non-regulated services, depending on specific requirements set out in Chapter 5 of the NER. Powerlink remains accountable for operation and maintenance of all IUSAs as part of the transmission network.

Designated Network Assets (DNA)

Designated Network Assets (DNA) include radial transmission extensions greater than 30km in length. Unlike DCAs, DNAs are part of the transmission network, with design, construction, and ownership as non-regulated services. Powerlink remains accountable for the operation and maintenance of all DNAs.

Powerlink remains committed to transparent and efficient connection services and will continue to work collaboratively with market participants and interested parties across the renewables sector to better understand the potential for VRE generation, and to identify opportunities and emerging limitations as they occur. The NER (Clause 5.3) prescribes procedures and processes that NSPs must apply when dealing with connection enquiries.

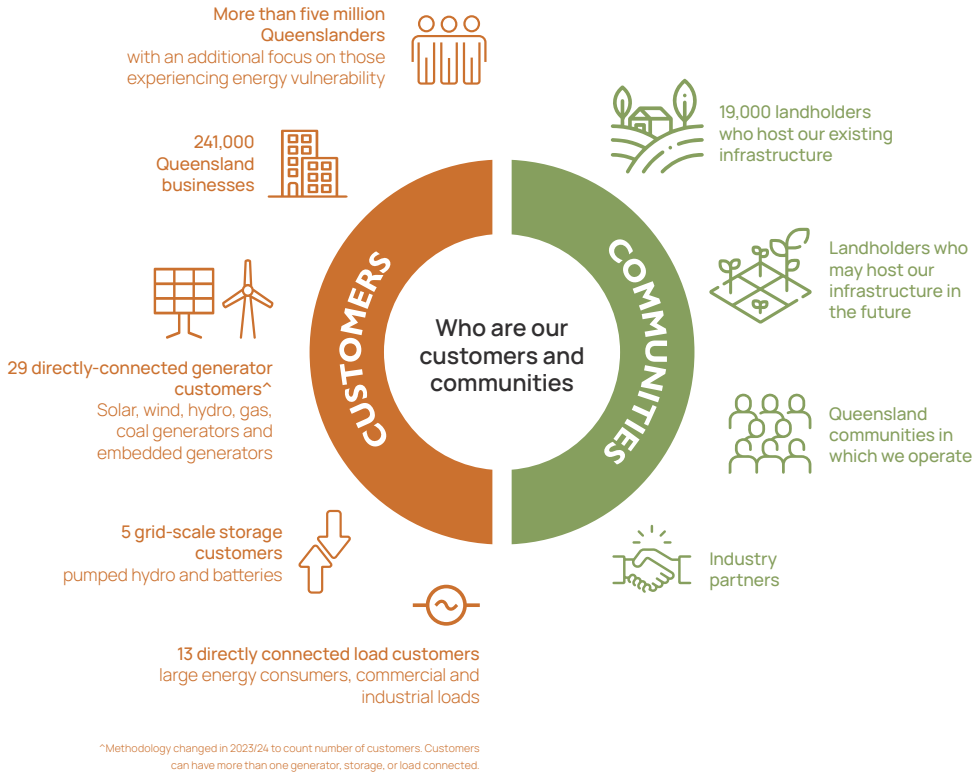
Figure 1.7 Overview of Powerlink's existing network connection process

Proponents who wish to connect to Powerlink's transmission network are encouraged to contact BusinessDevelopment@powerlink.com.au. For further information on Powerlink's network connection process please refer to Powerlink's website.

1.9 Customer, stakeholder and community engagement

Powerlink shares targeted, timely and transparent information with its customers, communities, First Nations Peoples and other stakeholders using a range of engagement approaches. Powerlink customers include more than five million Queenslanders and 241,000 businesses who receive electricity through the energy network. Directly-connected customers include Queensland's generators and storage proponents and large industrial energy users (refer to Figure 1.8).

Figure 1.8 Powerlink's customers and communities



There are also stakeholders who provide Powerlink with non-network solutions that can either connect directly to Powerlink's transmission network, or to the distribution network (refer to Chapter 5).

The TAPR is an important tool Powerlink uses to communicate information about transmission planning in the NEM. Through the TAPR, Powerlink aims to increase stakeholder and customer, stakeholder and community understanding and awareness of key updates and external shifts, including load forecasting, transmission network planning and the energy transformation.

1.9.1 Engagement activities

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 it operates. A number of key performance indicators are used to monitor progress towards achieving Powerlink's stakeholder engagement goals. In particular, Powerlink undertakes a comprehensive stakeholder survey to gain insights about stakeholder perceptions of Powerlink, including key factors driving trust and reputation. Most recently completed in August 2024, it provides comparisons and year-on-year trends to inform engagement strategies with stakeholders. More detailed information on Powerlink's engagement activities is available on the Powerlink website.

Engagement activities Powerlink has undertaken since the publication of the 2023 TAPR are outlined in the remainder of this section.

Community engagement

Engaging with communities is essential to providing transmission services that are safe, reliable and cost effective. Transmission infrastructure stays inservice for up to 50 years and Powerlink is focussed on building positive relationships and partnering with local communities to deliver benefits for the longer term. The dedicated Community Engagement Strategy developed in 2021 continues to support delivery of the energy transformation and ensure Powerlink is focussed on driving mutually beneficial outcomes for communities. The strategy is driving the business focus on engaging early and often, particularly with communities where Powerlink is 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 Powerlink's planning and decision making. The strategy is currently being reviewed and refreshed to ensure our approach meets community expectations going forward.

Targeted research

Powerlink also undertook targeted community engagement research across the state to gauge community acceptability of renewable development and related transmission infrastructure. The research findings support Powerlink's future engagement and ensures a focus on key factors that are important to communities. 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 remain front and centre in our planning and decision making.

Powerlink supported the University of Queensland and Curtin University to undertake independent desktop reviews of global studies on the social, economic and technical aspects of underground and overheard transmission infrastructure. A comprehensive report was released in November 2023 to inform a clear and consistent approach.

In addition, Powerlink played a key role in the development of the Energy Charter Better Practice Social Licence Guideline released in May 2023. In June 2024, a 12-month Independent Review of the guideline was completed to test the progress of transmission businesses against the priority actions. The review found there was notable progress and also identified areas for on-going improvement.

Powerlink was also part of the Stakeholder Reference Group that worked with the Commonwealth Government to develop the national guidelines for community engagement and benefits for transmission.

2023 Transmission Network Forum

In November 2023, more than 450 customers attended (in person and virtually) Powerlink's annual Transmission Network Forum. The forum provided updates on the state of the network, an industry panel discussion on social licence, an interactive workshop on delivering REZ's and a technical session on the 2023 TAPR. The live stream recordings, presentations and questions raised, and answers discussed are available on Powerlink's website.

Review of Network Development Process

Powerlink launched the new Transmission Easement Engagement Process (TEEP) in August 2023. The TEEP outlines how we engage with communities and other stakeholders as we develop, operate and maintain the transmission network. It is the result of a co-design process with stakeholders – including the Local Government Association of Queensland, and Queensland Farmers' Federation – based on a 2023 review of corridor selection processes from study area phase through to securing final easements.

The engagement process is built on early and meaningful engagement practices with landholders, Traditional Owner groups, the community and other stakeholders. Once a project is identified, we will engage through a number of stages and work collaboratively to carefully assess locations for a new transmission line easement, with the potential social, environmental and economic considerations in mind.

As part of this review, Powerlink also launched a new SuperGrid Landholder Payment Framework that significantly boosted payments to landholders hosting new transmission infrastructure. The increase in payments is based on property-specific values and impacts, as opposed to a flat rate used previously. Under this framework, Powerlink was the first transmission company in Australia to offer payments to landholders on neighbouring properties adjacent to transmission infrastructure.

In addition to this, in February 2024 Powerlink renewed its commitment to landholders by launching its new Project Participation and Access Allowance. It allows eligible landholders to apply for a $5,000 payment to recognise their participation if Powerlink needs to access their land for on-ground information as part of project development.

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 Powerlink's stakeholders better informed about operational and strategic topics of relevance. The panel met in March, May and September 2024. Key topics for discussion included Powerlink's activities relating to the QEJP, in particular REZs and PTI, changing network operating conditions, Powerlink's work as part of the Energy Charter and an update on Powerlink's progress in implementing the recommendations of the Asset Reinvestment Review Working Group Report.

Stakeholder engagement for public consultation processes

Powerlink recognises the importance of transparency for stakeholders and customers, particularly when undertaking transmission network planning and engaging in public consultation processes, such as the Regulatory Investment Test for Transmission (RIT-T), PTI, an Expression of Interest or Funded Augmentation.

Powerlink is guided by the Australian Energy Regulator (AER) Stakeholder Engagement Framework and Consumer Engagement Guideline for Network Service Providers as the benchmarks when undertaking public consultations.

Since publication of the 2023 TAPR, to ensure transparency and that customers remain up to date with the most recent developments, Powerlink has held webinars on the Gladstone Project and Queensland's SuperGrid Planning Update. The webinars and presentations are available on Powerlink's website.

The most frequent public consultation process undertaken by Powerlink is the RIT-T and further information on the proposed engagement activities for RIT-Ts is published on Powerlink's website.