CHAPTER 3

Joint planning

3 Joint planning

Key highlights

- Joint planning provides a mechanism for Network Service Providers (NSPs) to discuss and identify technically feasible, cost effective network or non-network options that address identified network needs regardless of asset ownership or jurisdictional boundaries.
- Key joint planning focus areas since the publication of the 2019 Transmission Annual Planning Report (TAPR) include:
  - the Integrated System Plan (ISP), Power System Frequency Risk Review (PSFRR) and Notice of Queensland System Strength Requirements and Ross Fault Level Shortfall with the Australian Energy Market Operator (AEMO)
  - publication of the Project Assessment Conclusion Report (PACR) recommending expanding the transmission transfer capacity between New South Wales (NSW) and Queensland with TransGrid
  - the analysis of options to address condition driven reinvestments with Energex and Ergon Energy (part of the Energy Queensland Group).

3.1 Introduction

Powerlink's joint planning framework with AEMO and other NSPs is in accordance with the requirements set out in Clause 5.14.3 and 5.14.4 of National Electricity Rules (NER).

Joint planning begins several years in advance of an investment decision. The nature and timing of future investment needs are reviewed at least on an annual basis utilising an interactive joint planning approach.

The objective of joint planning is to collaboratively identify network and non-network solutions to limitations which best serve the long-term interests of customers, irrespective of the asset boundaries (including those between jurisdictions).

The joint planning process results in integrated area and inter-regional strategies which optimise asset investment needs and decisions consistent with whole of life asset planning.

The joint planning process is intrinsically iterative. The extent to which this occurs will depend upon the nature of the limitation or asset condition driver to be addressed and the complexity of the proposed corrective action. In general, joint planning seeks to:

- understand the issues collectively faced by the different network owners and operators
- understand existing and forecast congestion on power transfers between neighbouring regions
- help identify the most efficient options to address these issues, irrespective of the asset boundaries (including those between jurisdictions)
- influence how networks are managed, and what network changes are required.

Projects where a feasible network option exists which is greater than $6 million are subject to a formal consultation process under the applicable regulatory investment test mechanism. The owner of the asset where the limitation emerges will determine whether a Regulatory Investment Test for Transmission (RIT-T) or Regulatory Investment Test for Distribution (RIT-D) is used as the regulatory instrument to progress the investment recommendation under the joint planning framework. This provides customers, stakeholders and interested parties the opportunity to provide feedback and discuss alternative solutions to address network needs. Ultimately, this process results in investment decisions which are prudent, transparent and aligned with stakeholder expectations.

3.2 Working groups and regular engagement

Powerlink collaborates with the other National Electricity Market (NEM) jurisdictional planners through a range of committees and groups.

3.2.1 Regular joint planning meetings

For the purpose of effective network planning, Powerlink has collaborated in regular joint planning meetings with:

- AEMO on the 2020 PSFRR (refer to Section 6.3)
- AEMO on the Network Support and Control Anciliary Service (refer to Section 5.5.1)
- AEMO and other jurisdictional planners in the development of the 2020 ISP published in July 2020 (refer to Section 7.4)
- AEMO National Planning to determine the minimum system strength requirements in the Queensland region and the subsequent notification of a fault level shortfall at the new Ross node
- TransGrid for the assessment of the economic benefits of expanding the transmission transfer capacity between Queensland and NSW (refer to Section 5.7.14)
- Energex and Ergon Energy for the purposes of efficiently planning developments and project delivery in the transmission and sub-transmission network.

3.3 AEMO ISP

Powerlink worked closely with AEMO to support the development of the 2020 ISP, published in July 2020. The ISP sets out a roadmap for the eastern seaboard's power system over the next two decades by establishing a whole of system plan for efficient development that achieves system needs through a period of 'transformational' change. 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.

Process

Powerlink continues to provide a range of network planning inputs to AEMO's ISP consultation and modelling processes, through joint planning processes and regular engagement, workshops and various formal consultations. This engagement helps underpin the inputs, assumptions and methodology for the ISP.

Powerlink provided feedback on the inputs and assumptions and reviewed the long-term network development strategy and findings of the 2020 Draft ISP (published in December 2019). This feedback and input included information on condition drivers for significant intra-regional infrastructure and possible network development options that increase capacity of critical intra and inter-regional grid sections, together with the associated capacity improvement.

AEMO's ISP continues to investigate opportunities for expansion of interconnector capacity. In the 2020 ISP, AEMO identified Queensland/New South Wales Interconnector (QNI) Medium and Large projects as future ISP projects, requiring Powerlink and TransGrid to undertake preparatory activities. These preparatory works are to be completed by 30 June 2021 such that the best possible inputs to the 2022 ISP are available (refer to Section 7.4).

Aligned with the findings from the Draft 2020 ISP, in December 2019, Powerlink and TransGrid released a PACR on 'Expanding NSW-Queensland transmission transfer capacity'. This is now an approved project (refer to Section 5.7.14).

Methodology

More information on the 2020 ISP including methodology and assumptions is available on AEMO's website.

Outcomes

The ISP attempts to identify a long-term plan for the efficient development of the NEM transmission network, and the connection of Renewable Energy Zones (REZ) over the coming 20 years. It is based on a set of assumptions and a range of scenarios.

3.4 AEMO National Planning – Fault Level Shortfall

System strength is a critical requirement for a stable and secure power system. A minimum level of system strength is required for the power system to remain stable under normal conditions and to return to a steady state condition following a system disturbance.

Under the NER there is a responsibility on Powerlink to maintain a minimum level of fault level at key nodes. These key nodes, and prescribed minimum fault levels, are defined by AEMO in consultation with the respective Transmission Network Service Provider (TNSP).

During 2020 Powerlink worked closely with AEMO to review the Queensland fault level nodes and their minimum three phase fault levels. These replace the 2018 system strength requirements for Queensland and are defined in Section 8.4. Powerlink has also worked with AEMO to assess whether there is or is likely to be a fault level shortfall in the Queensland region, and a forecast of the period over which any fault level shortfall might exist.

Process

Powerlink and AEMO carried out detailed Electromagnetic Transient-type (EMT-type) analysis to determine the system strength requirements for the Queensland region. Using the outcomes from these studies (for example, minimum required synchronous generator combinations), minimum three phase fault levels at the fault level nodes are defined.

Methodology

AEMO applies the System Strength Requirements Methodology[1] to determine the Queensland fault level nodes and their minimum three phase fault levels for 2020.

More information on the System Strength Requirements Methodology, System Strength Requirements and Fault Level Shortfalls is available on AEMO's website.

Outcomes

AEMO published a Notice of Queensland System Strength Requirements and Ross Fault Level Shortfall in April 2020. There were two significant changes since their initial report in 2018:

- The replacement of the Nebo 275kV fault level node with the Ross 275kV node. In consultation with Powerlink, AEMO determined that the Ross 275kV node is a better representation for system strength conditions in North Queensland (NQ) compared to Nebo 275kV node.
- AEMO declared an immediate fault level shortfall of 90MVA at the Ross 275kV fault level node. AEMO forecast that, if not addressed, this fault level shortfall will continue beyond 2024-25. Under the NER, the responsibility to ensure that system strength services are available to address the fault level shortfall lies with Powerlink as the TNSP and Jurisdictional Planning Body (JPB) for the region.

These outcomes and Powerlink's proposed responses are discussed in Section 8.4.1.

3.5 Power System Frequency Risk Review (PSFRR)

The PSFRR is an integrated, periodic review of power system frequency risks associated with non-credible contingency events in the NEM.

Process

In accordance with Clause 5.20A.1 of the NER, AEMO in consultation with TNSPs prepares a PSFRR for the NEM, considering:

- Non-credible contingency events which AEMO expects could likely involve uncontrolled frequency changes leading to cascading outages or major supply disruption.
- Current arrangements for managing such non-credible contingency events.
- Options for future management of such events.
- The performance of existing Emergency Frequency Control Schemes (EFCS).

[1] AEMO, System Strength Requirements Methodology and System Strength Requirements and Shortfalls, July 2018.

For 2020, AEMO is undertaking the PSFRR in two stages. Stage 1 reviews the status of actions recommended in the 2018 PSFRR, reviews power system events and identifies non-credible contingency events and associated management arrangements to be prioritised. Stage 2 includes more detailed assessment and option analysis and is to be published in December 2020.

Methodology

With support from Powerlink, AEMO assessed the performance of existing EFCS. AEMO also assessed high priority non-credible contingency events identified in consultation with Powerlink.

From these assessments AEMO determined whether further action may be justified to manage frequency risks.

Outcomes

The Final 2020 PSFRR – Stage 1 Report recommended:

- Expansion of Powerlink's Central Queensland to South Queensland (CQ-SQ) Special Protection Scheme (SPS). The existing scheme is limited to transfers lower than 1,700MW and relies on the ability to disconnect, up to two, high output generating units at Callide Power Stations for the unplanned trip of both Calvale to Halys 275kV feeders. Powerlink has initiated a project to implement new Wide area monitoring protection and control (WAMPAC) architecture into CQ-SQ SPS by mid-2021. The scheme is expected to include approximately 600MW of renewable generators and operate in parallel with the existing SPS (refer to Section 6.3).
- There are increasing risks associated with the existing CQ–SQ SPS. Higher southerly flows are becoming increasingly frequent as new generation projects come online in NQ. Powerlink will continue to work with AEMO and review the emerging risks to determine whether a protected event should be recommended to allow AEMO to manage the risk through operational measures ahead of changes to the SPS. Investigating the cost-benefit of this proposal will be completed in Stage 2 of the 2020 PSFRR due by the end of 2020.
- Stage 2 of the 2020 PSFRR will also review the requirement for an Over Frequency Generation Shedding (OFGS) scheme as a result of the QNI Minor upgrade.

3.6 Joint planning with TransGrid – Expanding the transmission transfer capacity between New South Wales and Queensland

In December 2019, Powerlink and TransGrid released a PACR on 'Expanding NSW-Queensland transmission transfer capacity'. The recommended option includes uprating the 330kV Liddell to Tamworth 330kV lines, and installing Static VAr Compensators (SVCs) at Tamworth and Dumaresq substations and static capacitor banks at Tamworth, Armidale and Dumaresq substations. The project is expected to be completed by June 2022 at a cost of $217 million. All material works associated with this upgrade are within TransGrid's network.

AEMO's ISP continues to investigate opportunities for expansion of interconnector capacity. In the 2020 ISP, AEMO identified QNI Medium and Large projects as future ISP projects, requiring Powerlink and TransGrid to undertake preparatory activities by 30 June 2021 (refer to Section 5.7.14).

AEMO also flagged in the 2020 ISP that it will work with Powerlink and TransGrid to explore further options in relation to Virtual transmission lines (VTLs). The 2020 ISP outlined that VTLs, coupled with suitable wide area protection systems, could provide a technically feasible solution to increase the capacity of QNI.

3 Joint planning

3.7 Joint planning with Energex and Ergon Energy

Queensland's Distribution Network Service Providers (DNSPs) Energex and Ergon Energy (part of the Energy Queensland group) participate in regular joint planning and coordination meetings with Powerlink to assess emerging limitations, including asset condition drivers, to ensure the recommended solution is optimised for efficient expenditure outcomes[2]. These meetings are held regularly to assess, in advance of any requirement for an investment decision by either NSP, matters that are likely to impact on the other NSP. Powerlink and the DNSPs then initiate detailed discussions around addressing emerging limitations as required. Joint planning also ensures that interface works are planned to ensure efficient delivery.

Table 3.1 provides a summary of activities that are utilised in joint planning. During preparation of respective regulatory submissions, the requirement for joint planning increases significantly and the frequency of some activities reflect this.

Table 3.1 Joint planning activities

Activity	Frequency		
	Week-to-week	Monthly	Annual
Sharing and validating information covering specific issues	Y	Y	
Sharing updates to network data and models	Y	Y	
Identifying emerging limitations	Y		
Developing potential credible solutions	Y		
Estimating respective network cost estimates	Y		
Developing business cases	Y		
Preparing relevant regulatory documents	Y		
Sharing information for joint planning analysis	Y	Y	
Sharing information for respective works plans			Y
Sharing planning and fault level reports			Y
Sharing information for Regulatory Information Notices			Y
Sharing updates to demand forecasts			Y
Joint planning workshops			Y

3.7.1 Matters requiring joint planning

The following is a summary of projects where detailed joint planning with Energex and Ergon Energy (and other NSPs as required) has occurred since the publication of the 2019 TAPR (refer to Table 3.2). There are a number of projects where Powerlink, Energex and Ergon Energy interface on delivery, changes to secondary systems or metering, and other relevant matters which are not covered in this Chapter. Further information on these projects, including timing and alternative options is discussed in Chapter 5.

Table 3.2 Joint planning project references

Project	Reference
Cairns 132/22kV transformer replacement/retirement	Section 5.7.1
Redbank Plains transformer and primary plant replacement	Section 5.7.10
Mudgeeraba 275/110kV transformer replacement/retirement	Section 5.7.11
SEQ reactive power and voltage control	Section 5.7.10

[2] Where applicable to inform and in conjunction with the appropriate RIT-T consultation process.