



CHAPTER 4

Joint planning

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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 2021 Transmission Annual Planning Report (TAPR) include:
 - Australian Energy Market Operator (AEMO) declared an immediate need for additional reactive power absorption capability in Southern Queensland and a system strength shortfall at the Gin Gin 275kV fault level node. Powerlink is working with AEMO and market participants to address these gaps.
 - AEMO and Network Service Providers (NSP) have worked together on the development of the System Strength Impact Assessment Guidelines and Methodology following the Australian Energy Market Commission's (AEMC) Efficient management of system strength on the power system Rule change.
 - AEMO, Transgrid and Powerlink have collaborated on model development, model management and test activities to facilitate the safe and expeditious release of additional capacity on the Queensland to New South Wales interconnector (QNI).
 - The changing nature of load with embedded rooftop photovoltaic (PV), improved load power factors and reducing minimum demand. This includes the challenges of managing high voltages associated with minimum demand.
 - Deferment of transformer augmentation projects at Kamerunga in FNQ and Goodna in the Moreton zone, by Energy Queensland (EQL) load transfers – either as part of an over load management system (OLMS) or permanent transfers.
 - Potential line refit works in North Queensland and the possible retirement of 110kV lines in the Moreton zone.

4.1 Introduction

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).

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

Projects where a feasible network option exists which is greater than \$7 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 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.

4.2 Working groups and regular engagement

Powerlink regularly undertakes joint planning meetings with AEMO, Energy Queensland and Jurisdictional Planning Bodies (JPB) from across the National Electricity Market (NEM). There are a number of working groups and reference groups which Powerlink contributes to:

- Executive Joint Planning Committee
- Joint Planning Committee
- Regulatory Working Group
- Forecasting Reference Group
- Power System Modelling Reference Group
- NEM Working Groups of the Energy Networks Association (ENA)
- 2021 Power System Frequency Risk Review (PSFRR) (refer to Section 8.3)
- 2022 General Power System Risk Review (GPSRR)
- AEMO's 2021 System Security Reports
- Network Support and Control Ancillary Service (NSCAS)
- System Strength and Inertia requirements
- AEMO's 2022 Integrated System Plan (ISP) including joint planning and submissions to the ISP Input Assumptions and Scenarios, ISP Methodology and development of ISP Preparatory Activity reports (refer to sections 9.1 and 9.3)
- AEMO's System Strength Impact Assessment Guidelines and Methodology following the AEMC Efficient management of system strength on the power system Rule change
- AEMO and jurisdictional planners to support and promote collaboration and coordination of model development, model management and test activities to facilitate the safe and expeditious release of inter-network capacity
- Transgrid when assessing the economic benefits of expanding the power transfer capability between Queensland and NSW
- Energex and Ergon Energy (as part of the Energy Queensland Group) for the purposes of efficiently planning developments and project delivery in the transmission and sub-transmission network.

4.2.1 Executive Joint Planning Committee

The Executive Joint Planning Committee (EJPC) coordinates effective collaboration and consultation between JPBs and AEMO on electricity transmission network planning issues. The EJPC directs and coordinates the activities of the Forecasting Reference Group, and the Regulatory Working Group. These activities ensure effective consultation and coordination between JPB, Transmission System Operators and AEMO on a broad spectrum of perspectives on network planning, forecasting, market modelling, and market regulatory matters in order to deal with the challenges of a rapidly changing energy industry.

4.2.2 Joint Planning Committee

The Joint Planning Committee (JPC) is a working committee supporting the EJPC in achieving effective collaboration, consultation and coordination between JPB, Transmission System Operators and AEMO on electricity transmission network planning issues.

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4.2.3 Forecasting Reference Group

The Forecasting Reference Group (FRG) is a monthly forum with AEMO and industry forecasting specialists. The forum seeks to facilitate constructive discussion on matters relating to gas and electricity forecasting and market modelling. It is an opportunity to share expertise and explore new approaches to addressing the challenges of forecasting in a rapidly changing energy industry.

4.2.4 Regulatory Reference Group

The Regulatory Working Group (RWG) is a working group to support the EJPC in achieving effective collaboration, consultation and coordination between JPBs, Transmission System Operators and AEMO on key areas related to the application of the regulatory transmission framework and suggestions for improvement.

4.2.5 Power System Modelling Reference Group

This is a technical expert reference group which focuses on power system modelling and analysis techniques to ensure an accurate power system model is maintained for power system planning and operational analysis, establishing procedures and methodologies for power system analysis, plant commissioning and model validation.

4.3 AEMO Integrated System Plan (ISP)

Powerlink worked closely with AEMO to support the development of the 2022 ISP. 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.

During 2021 and 2022 Powerlink provided feedback on the proposed ISP methodology and inputs, assumptions and scenarios. As requested in AEMO's 2020 ISP (published in July 2020) Powerlink also prepared Preparatory Activity reports for two intra-regional projects and for an interconnector upgrade (refer to Section 9.3). This involvement was 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, regular engagement, workshops and various formal consultations. This engagement helps underpin the inputs, assumptions and methodology for the ISP.

Methodology

More information on the 2022 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.

4.4 AEMO national planning – System strength, inertia and NSCAS reports

AEMO has identified system security needs across the NEM for the coming five-year period as the energy transformation continues at pace. Declining minimum operational demand, changing synchronous generator behaviour and rapid uptake of variable renewable energy (VRE) resources combine to present opportunities in each region for delivery of innovative and essential power system security services.

The 2021 System Security Report and 2022 Update are part of the NER framework intended to plan for the security of the power system under these changing operating conditions. The unprecedented nature and pace of change in the NEM means more shortfalls and gaps in requirements for system strength, inertia and Network Support and Control Ancillary Services (NSCAS) are anticipated during this transformational period. The identification of actual or emerging shortfalls and gaps is a natural step to facilitate the necessary services and investment to address these essential system security needs.

Process

Powerlink has worked closely with AEMO to determine the system strength, inertia and NSCAS requirements for the Queensland region. Powerlink and AEMO reviewed the Queensland fault level nodes and their minimum three phase fault levels and assessed the reactive power absorption requirements.

Methodology

AEMO applied the System Strength Requirements Methodology¹ to determine the Queensland fault level nodes and their minimum three phase fault levels for 2022. More information on the System Strength Requirements Methodology, System Strength Requirements and Fault Level Shortfalls is available on AEMO's website.

AEMO applied the Network Support and Control Ancillary Service Description and Quantity Procedure² to identify whether there are reactive power capability gaps.

Outcomes

AEMO published a Notice of Queensland System Strength Requirements and Gin Gin Fault Level Shortfall in May 2022. AEMO declared a fault level shortfall ranging from 33 to 90MVA over the five-year outlook. AEMO requested that services be available from 31 March 2023 (refer to sections 6.8 and 10.4).

AEMO published the System Strength, Inertia, and Network Support and Control Ancillary Services Report in December 2021. AEMO declared an immediate gap of 120 MVAR reactive power absorption in Southern Queensland, rising to 250 MVAR by 2026 (refer to sections 6.8 and 6.11.4).

4.5 General Power System Risk Review (GPSRR) and Power System Frequency Risk Review (PSFRR)

In accordance with rule 5.20A of the NER, AEMO is now required to undertake a General Power System Risk Review (GPSRR) and prepare a GPSRR report for the NEM at least annually. From 2023, the GPSRR replaces and expands on the scope of the previous biennial PSFRR. Consultation and collaboration has commenced for the 2023 GPSRR. AEMO plans to publish the 2023 GPSRR report by 31 July 2023.

The methodology and key outcomes from the 2022 PSFRR are described below. The PSFRR scope was limited to review of power system frequency risks associated with non-credible contingency events in the NEM. AEMO published the 2022 PSFRR in July 2022.

Process

In accordance with Clause 5.20A of the NER, AEMO in consultation with TNSPs is now required to prepare a GPSRR for the NEM. The purpose of the GPSRR is to review:

- A prioritised set of risks comprising contingency events and other events and conditions that could lead to cascading outages or major supply disruptions
- The current arrangements for managing the identified priority risks and options for their future management

¹ System Security Market Frameworks Review, [System Strength Requirements Methodology and System Strength Requirements and Shortfalls](#), July 2018.

² [Network Support and Control Ancillary Service Description and Quantity Procedure](#).

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- The arrangements for management of existing protected events and consideration of any changes or revocation
- The performance of existing Emergency Frequency Control Schemes (EFCS) and the need for any modifications.

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 determines whether further action may be justified to manage frequency risks.

Outcomes

The Final 2022 PSFRR report recommended:

- Establishment of an Over Frequency Generation Shedding (OFGS) scheme. Studies show that if Queensland is exporting to NSW, frequency in Queensland could rise above 52Hz following loss of both QNI circuits.
- Implementation of a Special Protection Scheme (SPS) for the loss of both Columboola to Western Downs 275kV lines. The loss of both of these lines, which supply the Surat zone, is non-credible but could cause QNI to lose stability.
- Assessment of the risk and solution options to further mitigate instability for the non-credible loss of both Calvale to Halys 275kV lines following the commencement of QNI minor commissioning.

Refer to Section 8.3.

4.6 Joint planning with Transgrid – Expanding the transmission transfer capacity between New South Wales and Queensland

In December 2019, Powerlink and Transgrid finalised a Project Assessment Conclusions Report (PACR) on 'Expanding NSW-Queensland transmission transfer capacity'. The recommended option includes upgrading 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. All material works associated with this upgrade are within Transgrid's network. Transgrid has now commissioned these works and Powerlink is working with Transgrid and AEMO on QNI tests to facilitate the safe and expeditious release of additional capacity.

AEMO's ISP continues to investigate opportunities for expansion of interconnector capacity. In the 2022 ISP, QNI Connect (500kV option) and Darling Downs REZ Expansion as future ISP projects, have been nominated for Preparatory Activities by 30 June 2023 (refer to sections 9.3.1 and 9.3.4).

4.7 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 outcomes³. 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 4.1 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.

³ Where applicable to inform and in conjunction with the appropriate RIT-T consultation process.

Table 4.1 Joint planning activities

Activity	Frequency	
	As required	Annual
Sharing and validating information covering specific issues	Y	
Sharing updates to network data and models	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	
Sharing information for respective works plans	Y	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	Y

4.7.1 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 2021 TAPR (refer to Table 4.2). 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 6.

Table 4.2 Joint planning project references

Project	Reference
Kamerunga 132/22kV transformer replacement	Section 6.9.1
Line refit works between Ross and Alan Sheriff substations	Section 6.9.2
Goodna 110/33kV transformer load management scheme (1)	Section 6.11.4
SEQ reactive power and voltage control	Section 6.11.4
Possible retirement of Richlands to Algester 110kV lines	Section 6.11.4

Notes:

(1) Operational works, such as OLMS, do not form part of Powerlink's capital expenditure budget.

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