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POWERLINK QUEENSLAND REVENUE PROPOSAL

Supporting Document – PUBLIC

Joint Planning Framework

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Powerlink – Joint Planning Framework

Policy stream	Asset Management		
Authored by	██████████	Team Leader Grid Planning	
Checked by	██████████	Manager Network Planning	
Checked by	██████████	General Manager Asset Strategies and Planning	
Approved by:	██████████	Executive General Manager Strategy and Business Development	



Version history

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1.0	16/07/2010	Initial	Initial release
2.0	17/09/2015	All	Review and update of document.
3.0	23/12/2020	All	Review and update of document.



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1. Introduction

1.1 Purpose

The purpose of this document is to provide an overview of the joint planning framework adopted by Powerlink in relation to its interactions with other network service providers (NSPs) in accordance with the requirements set out in the National Electricity Rules (NER) and with the Australian Energy Market Operator (AEMO) in relation to national planning and the Integrated System Plan (ISP). The objective of joint planning is to collaboratively identify solutions to identified network limitations, which best serve the long term interests of consumers.

1.2 Defined terms

Terms	Definition
NER	National Electricity Rules (The Rules)
RIT-T	Regulatory Investment Test for Transmission
RIT-D	Regulatory Investment Test for Distribution
TAPR	Transmission Annual Planning Report
DAPR	Distribution Annual Planning Report
TNSP	Transmission Network Service Provider
DNSP	Distribution Network Service Provider
NSP	Network Service Provider
AER	Australian Energy Regulator
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
NEM	National Electricity Market
PSCR	Project Specification Consultation Report
PADR	Project Assessment Draft Report
PACR	Project Assessment Conclusion Report
ISP	Integrated System Plan



2. Framework

2.1 Regulatory Obligations

Powerlink is a Transmission Network Service Provider (TNSP) in the Australian National Electricity Market (NEM) that owns, develops, operates and maintains Queensland's high voltage electricity transmission network.

As a TNSP, Powerlink has specific mandatory obligations under its Transmission Authority, the National Electricity Rules (NER) and the Electricity Act 1994 (Qld) (the Act). In addition, Powerlink is committed to delivering electricity transmission services that are valued by our shareholders, customers and the market.

Powerlink's joint planning framework with AEMO and other NSPs is in accordance with the requirements set out in clauses 5.4.3 to 5.4.4 and 5.14.2 to 5.14.4 of the NER.

In relation to joint planning with Distribution Network Service Providers (DNSP), clause 5.14.2 provides that:

Each Transmission Network Service Provider must conduct joint planning with each Distribution Network Service Provider of the distribution networks to which the Transmission Network Service Provider's networks are connected.

The relevant Transmission Network Service Provider and Distribution Network Service Provider must:

- *assess the adequacy of existing transmission and distribution networks and the assets associated with transmission-distribution connection points over the next five years*
- *identify any limitations or constraints:*
- *use best endeavours to work together to ensure efficient planning outcomes and to identify the most efficient options to address the needs identified;*
- *jointly determine plans that can be considered by relevant Registered Participants, AEMO, interested parties, and parties registered on the demand side engagement register of each Distribution Network Service Provider involved in joint planning;*
- *undertake the regulatory investment test for transmission or the regulatory investment test for distribution (as the case may be) in respect of a joint planning project.*

In relation to joint planning with other TNSPs, clause 5.4.3 provides that joint planning occurs if a possible credible option to address a constraint in a transmission network is an augmentation to the transmission network of another Transmission Network Service Provider.

In relation to joint planning with other AEMO clause 5.4.4 requires that reasonable steps are taken to cooperate and consult with each other to enable preparation of a draft or final Integrated System Plan (ISP) or an ISP update.

2.2 Joint Planning Engagement

In a 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 networks
- understand asset condition based drivers in neighbouring networks
- help identify the most efficient options to address these issues, irrespective of the asset boundaries
- influence how the networks are managed and what network changes are required, and
- help clarify the investment decisions which are likely to be progressed.

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Powerlink's Asset Planning Criteria applies when assessing the need for investment in new network or non-network services due to changes in the demand forecast and from the potential removal from service of an asset at the end of its technical service life.

Where relevant, Powerlink undertakes joint planning with other NSPs to collaboratively identify network and non-network solutions to the identified needs, which best serve the long-term interests of consumers irrespective of asset boundaries. 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 focussed on the DNSPs (Energex, Ergon Energy and Essential Energy), also includes consultation with TransGrid and AEMO as required under the NER.

Consistent with the National Electricity Objective, joint planning seeks to ensure the most efficient outcomes for consumers are implemented, which is often a combination of TNSP and DNSP investments. 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.

Joint planning with AEMO is also critical to ensure the best possible jurisdictional inputs are provided to the Integrated System Plan (ISP) process in the long-term interests of consumers. Powerlink also undertakes joint planning with AEMO to periodically assess the minimum fault level and system strength requirements for the Queensland jurisdiction.

Joint planning begins many years in advance of an investment decision being made. The nature and possible timing of investment needs are reviewed on an annual basis utilising an interactive joint planning approach. The frequency of interactions in relation to particular needs increases as the time for action approaches.

The joint planning process is intrinsically iterative. The extent to which this occurs will depend upon the nature of the network limitation and complexity of the proposed corrective action. The information flow diagram in Appendix A illustrates the various inputs and considerations associated with the joint planning process.

2.3 Consultation

The early identification of emerging network limitations, asset reinvestment triggers and prospective network developments, including easement acquisition, is important to ensure that the appropriate consultations can occur within the relevant timeframes. This information is currently made available to stakeholders via the NSP's Annual Planning Reports and AEMOs ISP.

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. The RIT provides customers, stakeholders and interested parties opportunity to provide feedback and discuss alternative solutions to address the network needs. Ultimately, the process results in investment decisions which are efficient, transparent and aligned with stakeholder expectations.

3. Working groups and industry engagement

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

- AEMO Integrated System Planning and other jurisdictional planners in the development of the Integrated System Plan (ISP)
- AEMO Network Planning in planning the operability of the power system. This includes the development of System Strength and Inertia reports and the Network Support Control and Ancillary Services (NSCAS) report

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- AEMO Grid Performance and Integration in the development of the Power System Frequency Risk Review report
- TransGrid for the assessment of the economic benefits of expanding the transmission transfer capability between Queensland and NSW
- Energex, Ergon Energy and Essential Energy for the purposes of efficiently planning developments and project delivery in the transmission and sub-transmission network.

3.1 AEMO - Integrated System Plan (ISP)

The ISP is a whole-of-system plan that provides an integrated roadmap for the efficient development of the National Electricity market (NEM) over the next 20-years and beyond. Its primary objective is to maximise value to end consumers by designing the lowest cost, secure and reliable energy system capable of meeting any emissions trajectory determined by policy makers at an acceptable level of risk.

The ISP signals priority development paths in the near to short-term, along with an overarching long-term strategy. It fully utilises the opportunities provided from existing technologies and anticipated innovations in Distributed Energy Resources (DER), large-scale generation, networks and coupled sectors such as gas and transport. AEMO prepared the inaugural ISP for the NEM in 2018, and it is updated every two years.

Powerlink works closely with AEMO to support the development of the ISP. The ISP reflects the dynamic nature of the power system and the need to continually innovate and evolve inputs, analysis methodologies and development strategies for the future transmission network. Powerlink provides a range of network planning inputs to the ISP consultation and modelling processes, through regular engagement and workshops. Powerlink also reviews the outcomes of the ISP modelling and provides jurisdictional advice on:

- capacity and limitations of inter and intra-regional grid sections
- network options to augment power transfer capability (including project scope and estimated cost)
- Renewable Energy Zone capacity and system strength limitations.

3.2 AEMO - System Strength and Inertia

AEMO publishes the System Strength Report and Inertia Report under clauses 5.20.7 and 5.20.5 of the NER.

System strength and inertia are critical requirements for a secure power system. AEMO is required to determine the minimum system strength and inertia requirements in the NEM and assess whether, in AEMO's reasonable opinion, there are or are likely to be any shortfalls within the next five years.

The NER places responsibility to ensure that system strength and/or inertia services are available to address any forecast shortfall on the TNSP or jurisdictional planning body for the region. Powerlink has this role in Queensland. As such the assumptions and analysis that underpins this assessment is done in consultation with the TNSPs responsible.

The TNSP must make these services available by the date specified by AEMO and must identify the least cost option or combination of options that will satisfy its obligation within the time required. The TNSP is also required to prepare and submit to AEMO for approval details for each system strength and inertia service.

3.3 AEMO - Network Support Control and Ancillary Services (NSCAS)

AEMO is responsible for managing power system security and reliability of supply in the NEM. The NSCAS framework is one of the last-resort tools in place for AEMO to manage power system security and reliability of supply, and is part of the broader joint system planning process between AEMO and TNSPs who are Jurisdictional Planning Bodies.

As required by clause 5.20.3, AEMO must publish annually the NSCAS Report for the following year which must include an assessment that identifies any NSCAS gap, the relevant NSCAS trigger date and associated tender date. The assumptions and analysis that underpins this NSCAS report is done jointly with the TNSPs.

3.4 AEMO – Power System Frequency Risk Review (PSFRR)

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

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

- non-credible contingency events which AEMO expects could involve uncontrolled frequency changes leading to cascading outages or major supply disruption
- current arrangements for managing such non-credible contingency events, including the performance of existing emergency frequency control schemes (EFCSs), and
- options for future management of such events.

The assumptions and analysis that underpins the PSFRR report is done jointly with the TNSPs.

3.5 Joint planning with Energex and Ergon Energy

Queensland’s Distribution Network Service Providers (DNSPs) Energex and Ergon Energy 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. 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 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 1. Joint Planning Activities with DNSPs

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

3.6 Connections

Participants wishing to connect to the Queensland transmission network include new and existing generators, major loads and other NSPs. New connections or alterations to existing connections involves consultation between Powerlink and the connecting party to negotiate a 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 agreeing technical standards also involves AEMO.

4. Stakeholder engagement

Powerlink shares effective, timely and transparent information with its customers and stakeholders using a range of engagement methods. Customers are considered to be those who are directly connected to Powerlink’s network as well as electricity end-users, such as households and businesses, who receive electricity from the distribution network. There are also other stakeholders who can provide Powerlink with non-network solutions. These stakeholders may either connect directly to Powerlink’s network, or connect to the distribution networks. 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 our business practices, including load forecasting and transmission network planning.

4.1 Transmission and Distribution Annual Planning Reports

The Rules requires that TNSPs and DNSPs publish information on forecast loads, planning proposals for future connection points, forecast constraints as well as specific information in relation to all proposed augmentations to the network. This information is released annually, with an outlook of 10-years.

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

The early provision of this information to the market is specifically aimed at providing appropriate lead times for proponents of alternative solutions (including non-network) to develop proposals. Among other things, Annual Planning Reports are aimed at providing information to inform and assist interested parties to:

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

5. The Joint Planning Process

The joint planning process comprises four discrete phases, with each phase progressively narrowing in scope but becoming more detailed. The individual phases of the process are identified below.

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Figure 1: Overview of the Joint Planning Process

5.1 Identification of Network Needs and Development of Initial Options

Routine network analysis is undertaken by Powerlink (and other NSPs) to identify system limitations and congestion as part of the normal planning cycle. These studies consider changes in network topology which may be driven by load or asset condition based triggers. Initial solutions are developed in preparation for sharing during the joint planning sessions.

Screening studies may be done at this stage using conservative assumptions (e.g. load growth and or asset condition timing triggers) such that limitations and issues can be identified early for joint planning. This preserves lead time and time for the detailed joint planning stages.

Screening studies identify emerging limitations by assessing network performance against power system security and technical performance standards and reliability obligations (refer to Asset Planning Criteria Framework). AEMO’s ISP will provide input to identification of emerging congestion that may warrant joint planning with neighbouring TNSPs and/or consideration of the performance and adequacy of major intra-regional flow paths.

5.2 Joint Planning Engagement and Detailed Option Development

Joint planning focuses on network capability, congestion, asset condition drivers and future network needs. The key activities undertaken during these sessions include:

- understanding and alignment on energy and demand forecasts
- integrating asset management strategies into the planning process, including analysis of asset condition, performance and related risks
- compliance with system standards
- analysis of transmission and distribution network capability and limitations against respective Asset Planning Criteria and Authorities
- consideration of ongoing and new customer connection enquiries and applications
- establishment of long-term network development strategies.

Joint planning focuses on optimising the network topology, regardless of asset ownership boundaries, based on consideration of existing and future network needs. This is driven by forecast demand, new customer supply requirements, existing network configuration and asset condition based risks. The integration of both asset condition and demand based limitations into the assessment facilitates the identification and delivery of cost effective solutions.

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

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



Each of these options is considered in the context of future capacity needs.

Once an initial high level suite of options has been developed to address any emerging network limitations, workshops/discussions are held to identify and develop the most feasible options to address the needs. Options are assessed and ranked on merit based on deliverability, economic, technical, environmental, etc. This is an iterative process and data is frequently updated and modified as system conditions and understanding develop.

For each technically and economically feasible option a high-level cost estimate and the likely lead time to implement is estimated. For each viable network and non-network option, the various classes of (material) market benefits must be assessed such that the option recommended is one that maximises the net present value.

Due to the uncertainties surrounding demand growth and generation investment, the detailed analysis required for transmission investment decision making is not undertaken significantly in advance of an emerging need.

5.3 Joint Delivery of Final Options, Costing, Sequence and Timing

Having undertaken the iterative process, a smaller number of technically viable options emerge. These have consideration of implementation and coordination of stages sequencing and associated network impacts. These are required to develop more detailed estimates of these options for use in the final economic analysis.

5.3.1 Modelled Projects

The joint planning process will also identify a number of anticipated and modelled projects associated with each of these options which are expected to be required to continue to meet reliability obligations during the forecast planning horizon. Further analysis is undertaken to determine the timing and sequence of these model projects and cost estimates for these future works. This is required for the final economic analysis and ranking of the possible development paths.

5.4 Compliance with Statutory Governance

As a regulated network business, Powerlink is obliged (under the Electricity Act 1994 (Qld), National Electricity Law and the National Electricity Rules) to ensure its network can reliably and economically meet forecast electricity demand (within the required reliability standard) whilst managing the risks arising from the condition and compliance of its assets.

The outcomes of the joint planning process forms the basis upon which public consultation under the AER's Regulatory Test is conducted. Where material issues arise during the consultation process, further joint planning discussions/analysis may be undertaken prior to finalising and publishing the Project Assessment Conclusion Report.

All Regulatory Test public documents are reviewed, agreed and branded by all parties to the joint planning framework.

- Stage one involves preparing a Project Specification Consultation Report (PSCR). The PSCR informs the market of the upcoming network needs and potential solutions, with a focus on providing information to proponents of non-network solutions.
- Stage two involves preparing a Project Assessment Draft Report (PADR). The PADR presents the results of the economic cost-benefit test and identifies the preferred investment option for consultation.
- Stage three involves preparing a Project Assessment Conclusions Report (PACR). The PACR recommends an investment.

The application of the Regulatory Investment Test for Transmission (RIT-T) ensures the recommended solution is the most economic option to meet the required need across the majority of market development scenarios.

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5.4.1 Final Project Approval and Implementation

Final project approval and implementation is undertaken consistent with Powerlink's capital project approval process.

6. Distribution list

Internal	Contact details
<input type="checkbox"/> Finance and Governance	
<input checked="" type="checkbox"/> Asset Strategies and Planning	General Manager Asset Strategies and Planning
<input checked="" type="checkbox"/> Network Portfolio	General Manager Network Portfolio
<input type="checkbox"/> Business Development	
<input type="checkbox"/> Operations and Service Delivery	
<input type="checkbox"/> People and Corporate Services	

Appendix A – The Joint Planning Process Information Flow

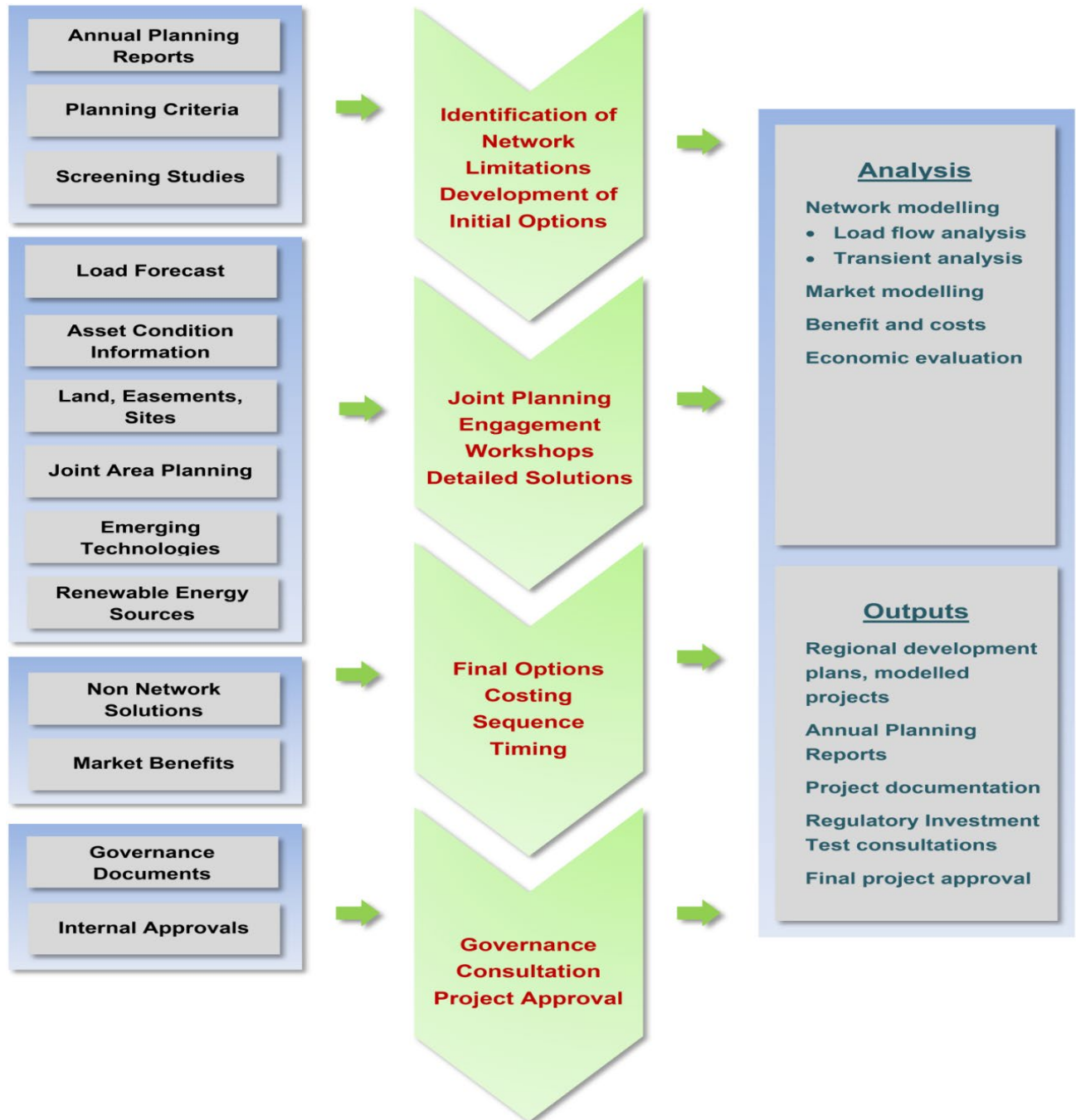


Figure 2: Overview of Joint Planning Process Information Flow Diagram