Electricity System Security and Reliability Environmental Assessment Requirement

May 2018

Guidance for proponents of State significant electricity generation projects

The NSW Government is working towards a reliable, affordable and modern energy future for NSW households and businesses. To support this future, the government is encouraging State significant development (SSD) and State significant infrastructure (SSI) electricity generation project proponents to support electricity system security and reliability through their project design. Proponents may now be required in Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the Department of Planning and Environment, to include in their Environmental Impact Statement (EIS):

> A detailed consideration of the capability of the project to contribute to the security and reliability of the electricity system, having regard to local system conditions and the Department's guidance on the matter.

This factsheet provides further information about the requirement, including:

1. Describing the strategic context, objectives and scope of the requirement
2. Providing guidance on how proponents can effectively address the requirement in their EIS
3. Confirming that the requirement does not affect any existing regulatory or contractual obligations
4. Outlining examples of capabilities that proponents could consider including in their project design to contribute to system security and reliability

1. Strategic context

The National Electricity Market (NEM) is undergoing a period of unprecedented change with traditional energy generators retiring and new variable energy technologies such as wind and solar farms coming online to replace them. This transition has led to emerging challenges for the energy system in terms of security and reliability.

The Independent Review into the Future Security of the National Electricity Market (the Finkel Review) made a number of recommendations to address system security and reliability. Following these recommendations, the Australian Energy Market Operator (AEMO), the Australian Energy Market Commission (AEMC) and the Energy Security Board are working to find ways to meet these challenges. At the same time, proponents of new electricity generation projects are seeking ways to anticipate changes in the technology, market and regulatory environments.

The NSW Government is working through the Council of Australian Governments (COAG) Energy Council to support implementation of the Finkel Review's recommendations.

In addition to this national reform program, the government is also responding to the Final Report from the NSW Energy Security Taskforce. The report recommended that the NSW Government monitor the energy generation investment pipeline and look at where it can take action that will support the market to manage demand better. The report also identified the importance of capitalising on advances in technology which can help ensure that new generation has the right technical characteristics to support system security and reliability.

1.1. Objective

To complement those efforts, it is appropriate that proponents of new electricity generation projects in NSW consider system security and reliability at the planning stage. This will:

- Encourage upfront consideration of the energy security and reliability capabilities that a project proponent could include in their project design. This could potentially reduce the need for future modification applications.
- Support a smooth and orderly transition to a secure, reliable and modern energy system.

1.2 Scope

The Secretary of the Department of Planning and Environment is able to issue SEARs, including requirements relating to system security and reliability, in relation to SSD and SSI electricity generation projects that require an EIS (including solar, wind, hydro, bioenergy, gas and coal projects), recognising that different technologies inherently provide different system security and reliability capabilities. The requirement may be applied by the Secretary to State significant projects which make an initial request for SEARs.

2. Department's guidance on system security and reliability requirement

2.1 If issued, the requirement will be assessed in accordance with the SSD/SSI framework

The SEARs specify the matters to be addressed by proponents in their EIS. However, they do not set standards for proponents to meet to obtain development approval.

The consent authority will assess whether the proponent has provided an appropriate consideration in their EIS of the capability of the project to contribute to system security and reliability. This consideration should include sufficient detail to allow for assessment of any proposed elements of the project's design, such as inclusion of storage equipment, but does not require detailed technical analysis of the nature of the system security and reliability capabilities of the project. Further, the requirement does not prescribe that projects must deliver particular security and reliability capabilities or outcomes.

If proponents intend to include storage or other grid support equipment in the scope of their project, they should include detailed information about this in their EIS. This could potentially avoid the need to lodge a future modification application, where no significant changes are subsequently made to plans for installing this equipment.

2.2 Factors to consider in addressing the requirement

In preparing an EIS, proponents should consider the capability of their project to contribute to the security and reliability of the electricity system. To do this, proponents should consult with the relevant transmission or distribution Network Service Provider (NSP) to consider the following:

- **Local system conditions in their area of the network -** This is because local network conditions in the project area may limit or increase the need for particular capabilities.
- **Capabilities that contribute to system security -** Generally, the electricity system is considered secure when it is able to operate within defined technical characteristics such as voltage and frequency levels. Operating within these technical parameters may allow the system to remain operational during or following an 'event' (e.g. damage from a storm).

- **Capabilities that contribute to system reliability -** Generally, the electricity system is considered reliable when it has sufficient electricity generation and network capacity to supply customers. This includes having sufficient dispatchable capacity to maintain a balance of supply and demand.[1]

These broad definitions of system security and reliability are reflected in national and state regulation of the electricity system such as the National Electricity Law (NEL), National Electricity Rules (NER), and the reliability standard recommended by the NSW Independent Pricing and Regulatory Tribunal.

However, the requirement does not adopt or enforce specific definitions or standards in existing regulatory instruments. Rather, the emphasis of the requirement is on proponents considering technical capabilities that can help support the implementation of these overarching concepts of system security and reliability.

2.3 Capabilities that can contribute to electricity system security and reliability

Table 1 outlines examples of different capabilities and associated technologies or market solutions that proponents could choose to consider including in their project design as methods to improve their project's contribution to electricity system security and reliability. The table does not prescribe any capabilities or technologies to be considered by proponents, but is intended to serve as guidance.

3. Existing regulatory and contractual obligations unaffected

The new requirement does not affect the proponent's obligations to comply with existing regulatory or contractual requirements.

- **The NEL and the NER -** The NEL and the NER set out existing requirements for NEM participants relating to both system security and reliability. Any requirement to consider electricity system security and reliability in an EIS is not contingent upon these existing national regulatory requirements. However, proponents should be aware of their obligations under the NEL and the NER and the potential for these to change in future. In particular, AEMO has proposed changes to the Generator Technical Performance Standards and a final AEMC decision is expected by 31 July 2018.
- **Connection agreements with NSPs -** Contractual obligations with a proponent's NSP are not affected by the planning process. Development approval for storage or other grid support equipment does not override existing obligations under network connection agreements. Proponents will need to engage with their NSP to confirm their ability to install new equipment after connecting to the network, at the planned time of installation.

4. Further guidance

Proponents seeking further guidance on the planning assessment process, including any SEAR in relation to electricity system security and reliability should contact the relevant planner for their project.

Proponents of State significant wind and solar projects can find additional guidance on the planning framework for these projects on the Department's website at www.planning.nsw.gov.au/Policy-and-Legislation/Renewable-Energy.

[1] Definitions of System Security and System Reliability are from Australian Energy Market Commission, Reliability Frameworks Review Interim Report.

Table 1 – Examples of system security and reliability capabilities that proponents may consider in meeting the requirement

	Capability	How this helps the electricity system	How a generator might deliver this
SECURITY	Inject active or reactive power quickly when required by the system during normal operations and contingency events	Help control the frequency and voltage of the system, and therefore its ability to remain operational when a surge in demand or a disturbance (e.g. generator withdrawal or a transmission line fault) cause disturbances to the electricity system resulting in fluctuations of voltage, power flows, frequency and rate of change of frequency.	• Investigate opportunity, feasibility, benefits and risks of participating in frequency and voltage ancillary services markets • Consider the benefits of extra communications infrastructure and engage with NSPs to identify requirements • Demonstrate that plant selection and design have adequately considered functionality such as Automatic Generation Control, Active Power Control, Active Power ramp-rate limits etc. • Demonstrate awareness of the financial and plant sizing impacts of the service (e.g. permanently spilling wind to provide on-demand frequency raise)
	Ensure adequate 'disturbance ride-through' capability	Ensure stable operation of the generator and prevent widespread blackouts of grid connected renewables by 'holding in' and continuing to operate during network disturbances.	• Select turbine/inverter to ensure it has appropriate power delivery capability and electrical performance to operate in the required conditions • Identify any additional Balance of Plant (BoP) requirements to enable disturbance ride-through, and their cost • Develop a plan to ensure the original equipment manufacturer (OEM) provided plant models are reflective of what will be constructed to avoid delays in the commissioning process
	Ensure adequate 'system strength ride-through' capability	Avoid an asynchronous generator's control systems becoming unstable at low short circuit ratios (SCR), which could result in generators losing the ability to regulate voltage, uncontrolled power swings and, ultimately, disconnection.	• Consider SCR specification in selection of turbines/inverters and confirm plant is capable of operation at an SCR level that is appropriate for the proposed location • Consider the need for any additional BoP in consultation with the turbine/inverter OEM
	Facilitate real-time remote monitoring and control capability to facilitate AEMO oversight and control	Enhanced automation and coordination, as well as increased visibility, of energy resources allows for power system security and reliability to be maintained more precisely. A real-time data driven approach to power system operation facilitates potential removal of conservative margins which are presently applied to manage risk due to lack of information.	• Identify and cost communications requirements with AEMO and networks (availability, latency, protocols, etc.) • Demonstrate that the connection point has the required communications bearers to provide this functionality and, if not, estimate the cost of establishing the necessary communications capability
RELIABILITY	Dispatch additional supply	Increase the generation or demand-side capacity in NSW that would assist with smoothing the impact of variable generation, responding to sudden increases in peak demand or non-scheduled outages.	• Consider incorporating (on-site, off-site or via a contractual agreement) additional dispatchable generation, e.g. a battery, pumped hydro scheme, solar thermal plant, biomass generator or gas plant • Identify and contract new demand response opportunities • Create the option to add a dispatchable generator at a later point in time (e.g. a gas turbine or battery) on-site or on adjacent land, which could utilise the existing plant's grid connection