

1 PURPOSE AND SCOPE

The huge number of renewable energy connections to the Ergon Energy and Energex networks presents a challenge to the management of multiple generator connections in the same geographic area, particularly where those connecting generators can impact on each other's operation. This document is intended to apply to all generators applying under chapter 5.3 of the National Electricity Rules (**NER**) for a *connection* (which typically includes generators that are 5 MW and larger).

In particular, this queuing policy is intended to clarify how multiple generator connections in the same area will be handled, catering for the fact that different *connections* progress at different rates, while still ensuring that adequate due diligence is undertaken and while treating each proposed *connection* in an equitable manner.

2 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

acceptable model: a site-specific model which complies with AEMO's [Power System Model Guidelines](#).

committed: refers to a generator for which:

- AEMO has issued a letter to the connecting NSP under rule 5.3.4A of the NER indicating that AEMO is satisfied that each specified proposed *access standard* meets the requirements applicable to the relevant *negotiated access standard* under the NER;
- AEMO and the connecting NSP for that proposed *connection* have accepted a detailed PSCAD™/EMTDC™ model of that proposed *connection* provided by or on behalf of the *Connection Applicant* as meeting the requirements of AEMO's [Power System Model Guidelines](#);
- any proposed *system strength remediation schemes* or *system strength connection works* in respect of that proposed connection have been agreed between the relevant parties, or determined by a *dispute resolution panel*; and
- an offer to *connect* has been issued by the connecting NSP in accordance with rule 5.3.6 of the NER; and
- there is no reasonable basis to conclude that the model previously provided is materially inaccurate, including following commissioning of the connection.

contractually committed: refers to where a contract that has been entered into between the relevant NSP and a proponent for the proposed *connection*. This contract will include clauses and stipulations around timeframes for various project milestones and may include milestones for provision of PSCAD™/EMTDC™ models.

detailed response to enquiry (DER): means a detailed, in-depth analysis with considerations for the particular proposed project, which enables the Proponent to move towards submitting an *application to connect*.

electrically close: up to 200 km away (as measured through the electrical system).

exempt generating system: A *generating system* where the Proponent is either not required to be registered with AEMO as a *Generator* or the Proponent has obtained an exemption from the requirement to register. There is a standing exemption for certain generating systems under 5 MW, and specific exemptions may be obtained for generating systems under 30 MW that have annual exports below 20 GWh.

NSP: has the meaning given to the term *Network Service Provider* under the NER. In this document, the NSP is either Ergon Energy or Energex.

3 REFERENCES

[National Electricity Rules](#)

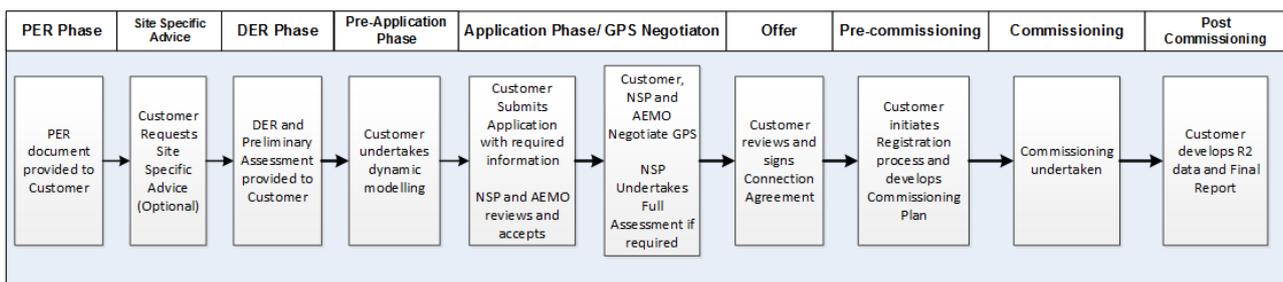
[AEMO NEM Generator Registration Guide](#)

[Power System Model Guidelines and System Strength Impact Assessment Guidelines](#)

4 CONNECTION PROCESS

Ideally, a generator *connection* would follow the process below (note that this is a simple schematic of the process which does not show each step in detail).

Figure 1 – Overview of connection process



However, such connections are often complicated by changes to the specifics of the generator itself, the configuration of the connection, the impacts of the *connection* on system strength in the relevant area and the interaction of the generator with other existing and new generators. These factors can all affect the tuning of the generator and what mechanisms need to be put in place to maintain system strength.

5 MODELLING REQUIREMENTS

During the detailed response to enquiry (**DER**) phase, the NSP must perform a preliminary *system strength impact assessment (Preliminary Assessment)* of the proposed generator connection, as described in AEMO’s [System Strength Impact Assessment Guidelines](#). The outcome of this assessment will indicate whether a full *system strength impact assessment (Full Assessment)* is required.

Note that AEMO’s [Power System Model Guidelines](#) apply to both synchronous and asynchronous generators, although it is anticipated that Preliminary Assessment for synchronous generators will typically show a positive available fault level. As such, system stability is less of a concern for synchronous generators than for asynchronous generators; however, proponents of synchronous generators will still need to ensure that the governor’s control systems do not interfere with the operation of other generators.

For the NSP to carry out appropriate due diligence of the proposed generator *connection*, the Proponent must give the NSP a site-specific tuned SMIB PSCAD™/EMTDC™ model with the *application to connect* (regardless of whether or not a Full Assessment is required). This model must comply with AEMO’s [Power System Model Guidelines](#). It is also expected that the Proponent will complete a test of the model using a lumped network model with progressively reducing system strength before submitting this model to the NSP.

Generators that are electrically close to each other can impact on each other’s performance. As such, it is difficult to adequately tune generators in the absence of a larger network model that includes all of the generation in the area. We encourage Proponent-led sharing of generator models to ensure that the Proponent can optimally tune the generator before the Full Assessment is done. This will lead to the most efficient cost and time outcomes for the Proponent.

Upon receiving the *application to connect*, the NSP will test the model to determine if it exhibits stable and expected performance, before accepting the *application to connect*.

Note that if the model does not demonstrate stable and expected performance at any stage during the Full Assessment process, the NSP may suspend this process pending further discussions with the Proponent.

6 FULL ASSESSMENT

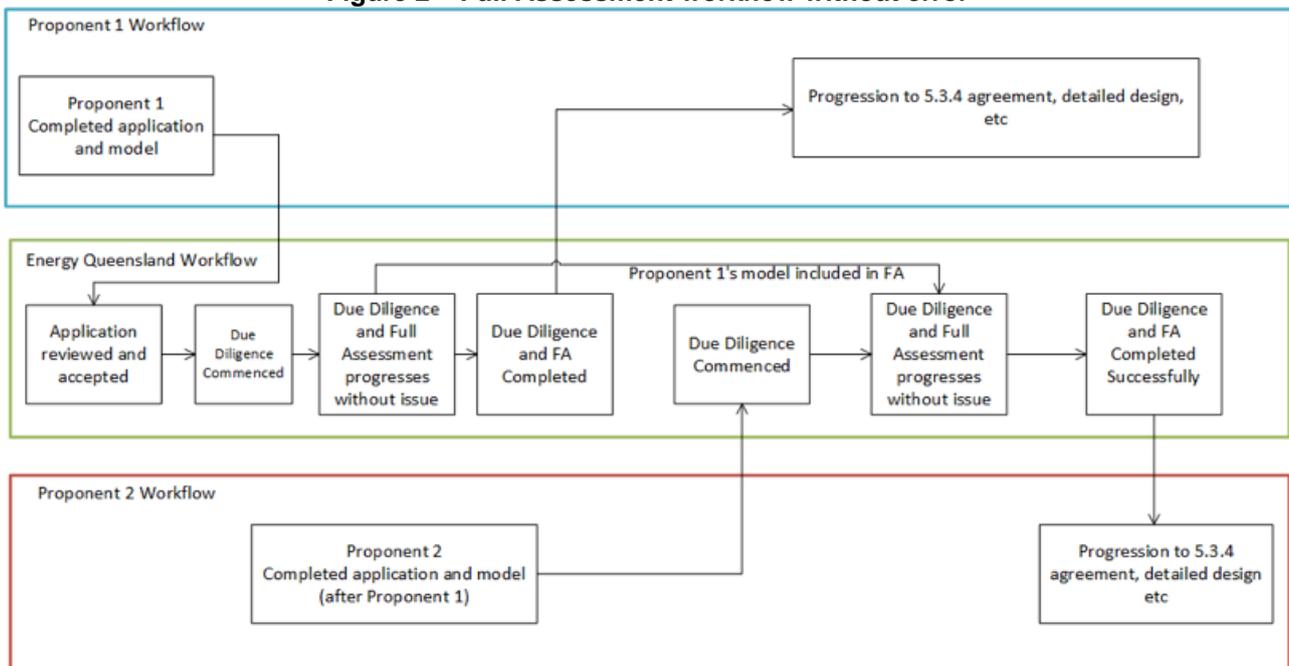
Once the NSP has an acceptable model and has accepted the *application to connect*, it will carry out a Full Assessment if required, using that model and the models of any other “committed generators” that are electrically close to the relevant generator.

A committed generator is a generator for which:

- AEMO has issued a letter to the connecting NSP under rule 5.3.4A of the NER indicating that AEMO is satisfied that each specified proposed *access standard* meets the requirements applicable to the relevant *negotiated access standard* under the NER;
- AEMO and the connecting NSP for that proposed *connection* have accepted a detailed PSCAD™/EMTDC™ model of that proposed *connection* provided by or on behalf of the *Connection Applicant* as meeting the requirements of AEMO’s [Power System Model Guidelines](#);
- any proposed *system strength remediation schemes* or *system strength connection works* in respect of that proposed connection have been agreed between the relevant parties, or determined by a *dispute resolution panel*; and
- an offer to *connect* has been issued by the connecting NSP in accordance with rule 5.3.6 of the NER; and
- there is no reasonable basis to conclude that the model previously provided is materially inaccurate, including following commissioning of the connection.

Where the provided model is of sufficient quality and free from error, the workflow is expected to function as set out below in Figure 2.

Figure 2 – Full Assessment workflow without error

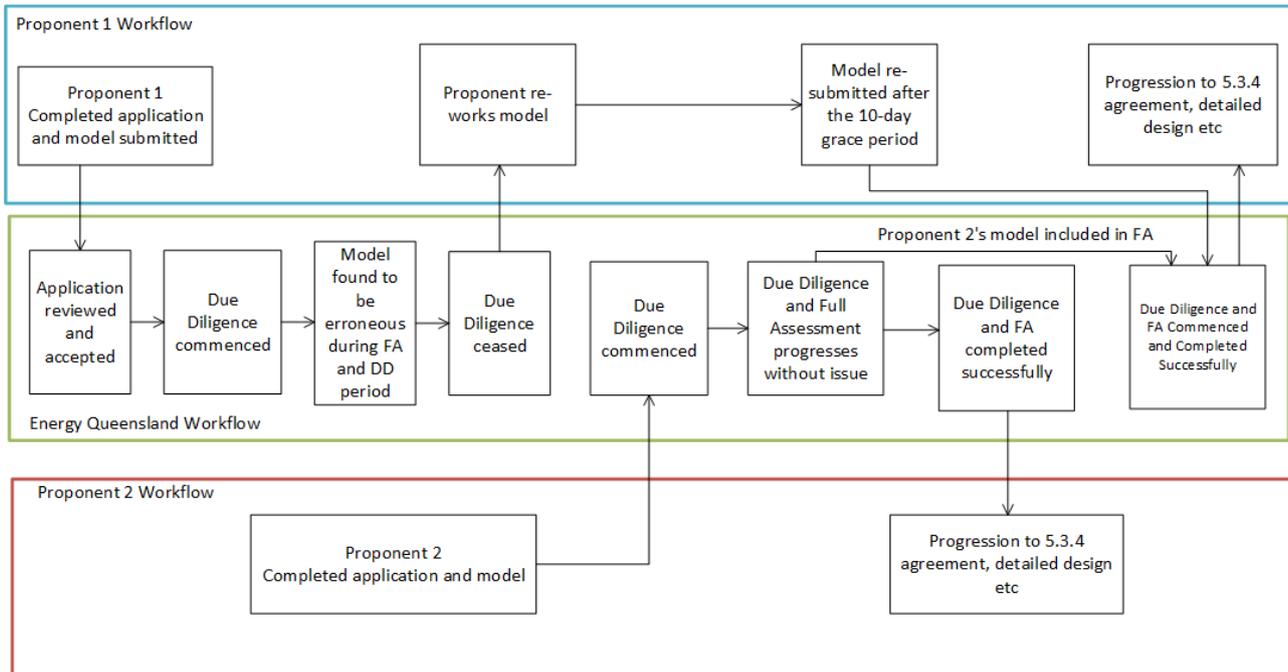


The Full Assessment will identify if any mitigation measures (*system strength remediation schemes*) are required to ensure stable operation of the *power system*, and indicate whether the proposed generator may be able to meet the proposed performance standards.

If the provided model is inadequate for use in the Full Assessment, the NSP will cease the Full Assessment process and use their best endeavours to advise the Proponent about all of the identified issues with the model. Ergon Energy and Energex will each give the Proponent 10 business days to present a revised model that addresses these issues. Failure to comply with this timeframe will result in the Proponent losing its place in the connection “queue”. This is illustrated in the diagram below.

Naturally, the connection will not be able to proceed to the offer to *connect* stage until the modelling issues have been resolved and the Full Assessment has been completed.

Figure 3 – Workflow where an error is present in the model



Where the model is adequate, but the impacts of the proposed generator connection on the *power system* are unacceptable, either the NSP may specify, suggest or require the development of a *system strength remediation scheme*, or the Proponent can opt to conduct additional tuning. The Proponent will again have 10 *business days* to supply a re-tuned model before losing their place in the queue.

In either case, a maximum of two revised models is permitted before the relevant timeframes for the proposed connection will need to be negotiated.

Models of other generators in the area as well as the wider network model may be required in order to carry out additional tuning. The NSP can facilitate discussion between all of the involved parties (subject to the confidentiality provisions of the NER) and encourages this practice.

While this is occurring, it may be that another proponent progresses through the Full Assessment process for their generator and achieves “committed generator” status. In this case, the new “committed generator” will need to be included in the Full Assessment once the Proponent resubmits their tuned model. Where modelling issues are present, new timeframes may need to be negotiated.

6.1 Multiple Full Assessments in the same area

In some cases, there is more than one generator in the same area proceeding through the connection process at a similar time. In this case, it would be more efficient to conduct one *full assessment* for all of these connections, provided that all of the Proponents agreed to the sharing of any *confidential information* and also to share the costs of any proposed mitigation measures. However, experience has shown that this is often problematic and may prove to be a complicated and difficult agreement to reach.

As such, the NSP will not recommend that multiple parties be included in a single Full Assessment unless there is strong buy-in from all of the involved parties. In this situation, the Project Sponsor and the Network Connections team will liaise with all of the involved parties to facilitate agreement.

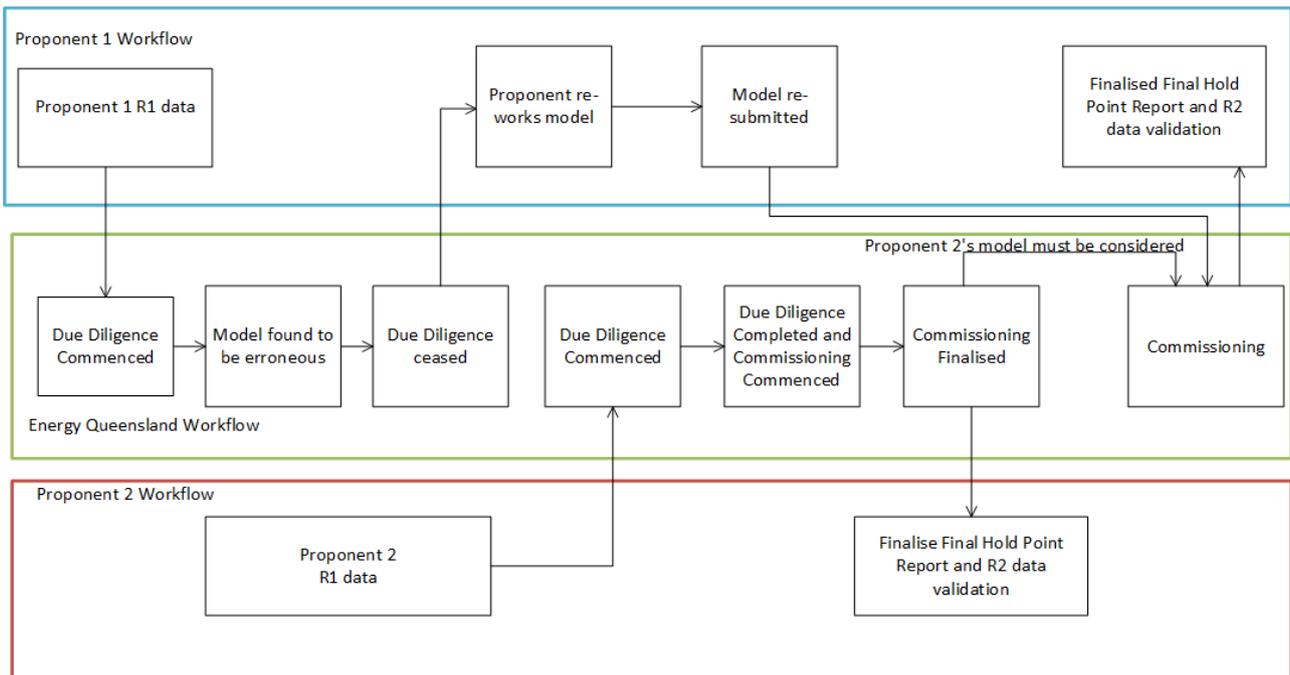
In this case, if one of the models is found to be deficient, the relevant Proponent will have 10 business days to supply an updated model, otherwise it will be excluded from the Full Assessment and placed behind the other connections in the area.

7 POST-FA MODELLING

The NSPs acknowledge that some minor model changes (such as protection system details) may occur with updates that arise until the model is finalised post-commissioning. R1 data must be submitted prior to commissioning so that it can be assessed. Where these changes do not impact the stability or performance of the proposed generator, there will be no effect on that generator's place in the queue and, as such, it is unlikely that the progression to commissioning and finalisation will be affected.

If the change modifies the system performance or affects the model's stability, some reassessment may need to occur. The Proponent is responsible for ensuring that the changes will not adversely affect stability or other committed generators (even if those generators were committed later). In this case, if the change means that the previously-agreed mitigation measures are inadequate, additional costs will be borne by that Proponent. In some cases, another Full Assessment may be required.

Figure 4 – Where an error is found leading up to commissioning



After (or in some cases, during) commissioning, the usual clause [5.3.9](#) process will apply in consultation with AEMO and the relevant NSP.

8 APPENDIX A – DRAFT LETTER EXAMPLE

Ref: XXXX

Date

Proponent

Address

By email: john.smith@company.com.au

Dear [insert name],

As part of the generator connection process under rule 5.3A of the National Electricity Rules (NER), the relevant NSP (in this case, [Ergon Energy/Energex]) may need to carry out a full *system strength impact assessment* under clause 5.3.4B, as identified in your preliminary *system strength impact assessment* dated [day month year].

The site-specific model of your *generating system*, provided to us as part of the *application to connect* package on [day month year], has been assessed as part of the full *system strength impact assessment*.

Unfortunately, this model does not comply with AEMO's [Power System Model Guidelines](#). Specifically, we have identified the following issues to date:

[Drafting note: These are examples only.]

- [PLL (phased locked loop) exhibits instability under the credible N-1 contingency of the XYZ subtransmission line out of service, as shown in the attached plots]
- [The system does not demonstrate the stated performance for clause S5.2.5.5, as shown in the attached plots]
- [The provided model settings do not match those provided in the RUG (version 1.2.3)]

As the proponent of this *generating system*, you have 10 business days from the receipt of this letter to do one of the following:

[Drafting note: Select the appropriate option(s) and modify to suit.]

- [provide an updated model of your *generating system*;
- provide an updated set of proposed generator performance standards;
- agree to remediation works (which in this case is proposed to involve the establishment of a synchronous condenser of X size);
- provide advice that you will conduct further tuning of your model, in which case we will proceed with conducting a full *system strength impact assessment* on Proponent B's system, excluding your *generating system*.]

Yours sincerely,

[insert name]

Project Sponsor

[Ergon Energy/Energex]

[Attachments: Due Diligence Initial Report, including specific details of model performance and plots demonstrating the identified issue]