Registering a Hybrid Generating System in the NEM

Fact Sheet

This fact sheet provides a simplified explanation of potential approaches to registering multiple technology generating systems—hybrids—in the National Electricity Market (NEM) as at July 2019. It looks at how the different classification types are managed within hybrid generating system requirements, and it covers situations where multiple Financially Responsible Market Participants (FRMPs) are required.

While AEMO has taken all reasonable care in the preparation of this document, the information should not be construed as advice, and you should consult your Network Service Provider (NSP) and AEMO regarding individual proposals.

Over time, AEMO may adapt its approach to the registration of hybrid generating systems as new technology and configurations emerge, and as market rules and technology regulations change.

If you intend to operate a generating system within the NEM, you will need to read and understand the National Electricity Rules (NER) and associated procedures, guidelines and standards relevant to your connection, registration and ongoing operational requirements.

This fact sheet will not give you all the information you need to register successfully. You can get more information on registration from the AEMO Generator Exemptions and Classification Guide, Registering a Battery System in the NEM and Interim Arrangements - Utility Scale Battery Technology.

Generating Unit Classification

Unless an exemption applies, anyone who owns, operates or controls a generating system connected to the NEM grid must register as a generator and 'classify' each generating unit in that system. Classification is required for both dispatch (scheduling) and energy market settlement.

Each NEM generating unit must be classified as either scheduled, semi-scheduled or non-scheduled based on its size and technical characteristics.

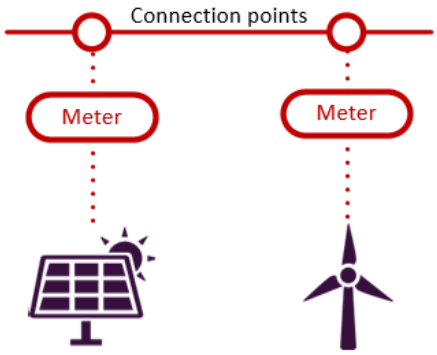
Each generating unit must also be classified as market or non-market, depending on whether its generation is exported to the grid. Non-market generation must be sold either to a customer that is co-located behind the same meter or (until 6 February 2022) to the Local Retailer.

This fact sheet does not cover non-market generation.

Single Technology Market Generating Systems

Before considering hybrid systems, it is useful to explain the classifications as they apply to non-exempt single technology generating systems. Each 'generating unit' making up a system connected to the grid through a single connection point is classified as either semi-scheduled (SS), scheduled (S) or non-scheduled (NS):

Semi-Scheduled



A solar or wind farm with a nameplate capacity of ≥30 MW would be classified as semi-scheduled (due to its intermittent nature) and be connected to the NEM via a single connection point with its own metering installation represented by a NMI (National Metering Identifier). Generators <30 MW may also be required to register as semi-scheduled and/or be subject to central dispatch processes in some circumstances. Prior to registration, wind and solar farms need to provide an Energy Conversion Model (ECM); more detail can be found via the AEMO Solar and Wind Energy Forecasting webpage. Units within a semi-scheduled generating system are typically aggregated for dispatch under NER 2.2.7. Appropriate SCADA metering is required.

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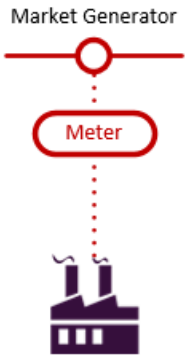
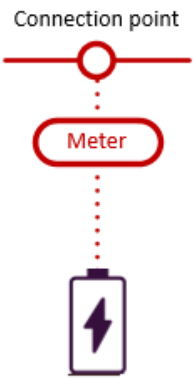
Scheduled



A synchronous generating system, for example, open cycle or combined cycle gas turbines, hydro or coal-fired power stations, would be classified as scheduled and be connected to the NEM via a single connection point with its own metering installation represented by a NMI.

These can be generating units dispatched individually, or multiple generating units aggregated for dispatch under NER 3.8.3. Appropriate SCADA metering is required.

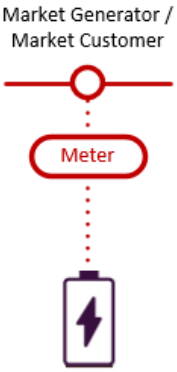
Battery



A battery would be classified as a scheduled generating unit, and also a scheduled load (requiring Market Customer registration) if it intends to charge from the grid. It would be connected to the NEM via a single connection point with its own metering installation represented by a NMI.

Multiple battery storage units are typically aggregated for dispatch under NER 3.8.3. Appropriate SCADA metering is required.

Non-Scheduled



A battery <5 MW is typically exempt from registration but can be classified as a non-scheduled generating unit. This is the case if a <5 MW battery is part of a hybrid system which is ≥5 MW. Other generating technologies (including wind, solar and synchronous) are usually classified as non-scheduled if the system is <30 MW.

Registration Scenarios – Hybrid

When a hybrid generating system is proposed, the aggregate value of the generating system determines the classification of the component generating units. For example, a 20 MW wind farm and a 20 MW solar farm connected at the same point will be registered as a semi-scheduled unit because in aggregate, they are ≥30 MW. A 20 MW gas fired turbine and a 20 MW solar farm will require registration under the scheduled and semi-scheduled classifications respectively.

However, AEMO will allow a battery <5 MW, within a hybrid system which in aggregate is ≥5 MW, to be registered as a non-scheduled generating unit with its charging load treated as auxiliary load.

Hybrid generating systems can be registered under a single application but will incur higher registration fees due to the additional assessment required.

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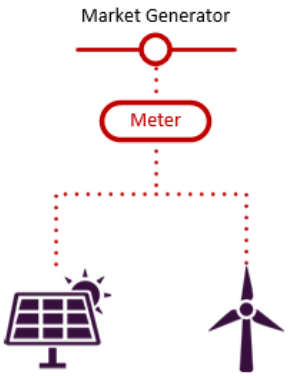
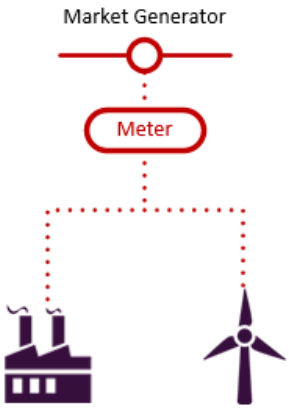
a) **Scenario: Two semi-scheduled generating units (≥30 MW in aggregate).**



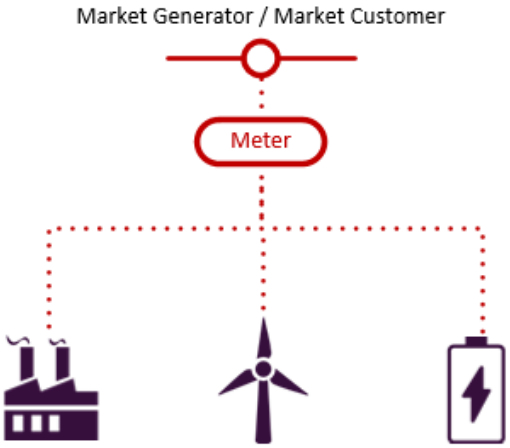
A common hybrid registration involves two semi-scheduled generating units; one wind and one solar (each aggregated under NER 2.2.7). Both the wind farm and solar farm require an independent ECM, and separate dispatchable units each with a dispatchable unit identifier (DUID) and appropriate SCADA metering. A single generator performance standard (GPS) would be established at the connection point Auxiliary load, when the generators are not running, is settled as negative generation energy. The combined facility is settled under a single FRMP.

b) **Scenario: A scheduled generator and a semi-scheduled generator (≥30 MW in aggregate).**



This scenario includes a scheduled generator and a semi-scheduled generator: one gas fired turbine and one wind farm. The wind farm requires an ECM, there would be separate dispatchable units each with a DUID and appropriate SCADA metering. A single GPS would be established at the connection point. The scheduled unit would be required to follow dispatch instructions. A single conformance cap would be applicable to the wind farm. Auxiliary load, when the generators are not running, is settled as negative generation.

c) **Scenario: Two scheduled generators and a semi-scheduled generator (≥30 MW in aggregate)**



This scenario includes a semi-scheduled generating unit and two scheduled generating units: one gas fired turbine, one wind farm and one battery that charges from the grid. In this case, the wind farm requires an ECM, there would be four separate dispatchable units each with a DUID (three for the generating units and one additional DUID for the battery scheduled load) and appropriate SCADA metering. A single GPS would be established at the connection point (covering both generation and load). The scheduled units would be required to follow dispatch instructions. A single conformance cap would be applicable to the wind farm.

The requirement for the battery load DUID applies whether or not the battery charges from the grid. However, if the battery charges from the grid, a Market Customer registration is required at the connection point.

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Registration Scenarios - Multiple Financially Responsible Market Participants (FRMPs)

All the scenarios above assume a single connection point to the grid and a single hybrid generating system. There are occasions, for commercial reasons, where participants may want to establish separate responsibilities across what AEMO would normally consider to be a single generating system (typically identified by a single point of connection into the grid). This can only be supported with an appropriate technical and metering configuration.

Each market connection point may only have a single FRMP. If the financial responsibilities need to be split between multiple parties then multiple connection points are required. At each connection point there will be a separately registered generating system, Market Participant, metering installation, GPS, ECM as applicable, etc.

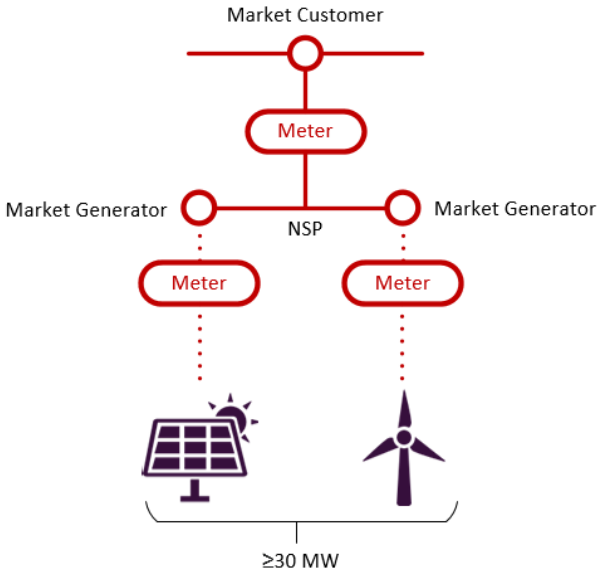
In order to create multiple connection points behind the grid connection point, it is necessary to establish a private network with a network connection to the grid or have the existing Network Service Provider (NSP) own the connection point transformer. One person must be registered as the NSP for this network (this may be the same entity as one of the established FRMPs). The private network cannot be exempt from Chapter 5 of the NER due to the need for a GPS to be enforceable at each connection point into the private network.

The private network's connection point to the grid will be established as a parent connection point. This connection point will have an NSP-to-NSP connection agreement which will reflect the performance of all assets connected to the private network.

The connection points into the private network will require NSP-to-Generator connection agreements which will reflect the performance standard of the connecting asset. These connection points will be child connection points for the purpose of settlement. This means there must be a Market Customer registered at the parent connection point to allow settlement of losses from the network. The child metering installations are also required to differentiate each generating system's load and generation and allow the calculation of marginal loss factors (MLFs).

The nameplate rating of each of the individual generators will be aggregated for technical and classification purposes at the parent connection point. This means that if any of the generating systems at the child connection point could normally be granted exemption (<5 MW generating system) or (<30 MW and <20 GW/h generating system), it will instead be required to be classified and registered with AEMO as if it were part of a generating system at a single connection point.

a) **Scenario: Two semi-scheduled generating units (≥30 MW in aggregate)**

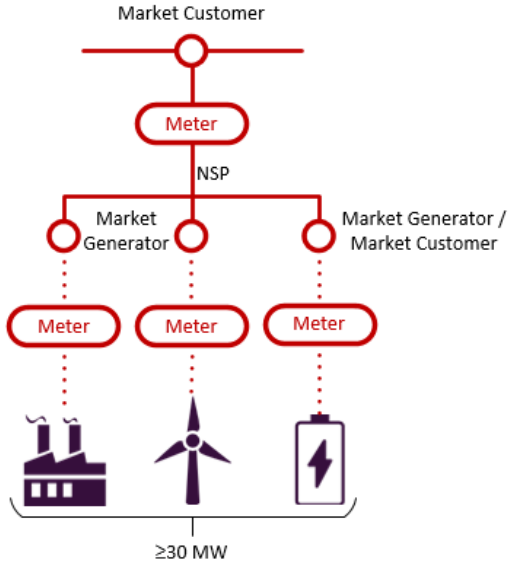


This registration would involve two semi-scheduled generating units; one wind and one solar (each aggregated under NER 2.2.7). The two systems are connected into the private network and operate independently of each other with individual registration, conformance cap, GPS (which need to consider each other in the modelling), dispatch, SCADA and ECM.

There are three metering installations for this configuration, one parent at the grid connection point and two children at the private network connection points. A Market Customer will need to be registered at the parent connection point to allow for the settlement of losses. Each metering installation will also have its own MLF.

The private network between the child and the parent NMIs will need to be registered to an NSP.

b) **Scenario: Two scheduled generators and a semi-scheduled generator (≥30 MW in aggregate)**



This scenario includes a semi-scheduled generating unit and two scheduled generating units: one wind farm, one gas fired turbine, and one battery that charges from the grid. The three systems are connected into a private network and operate independently of each other with individual registration, conformance cap for wind farm, GPS (which need to consider each other in the modelling), dispatch, SCADA and ECM for the wind farm.

There are four metering installations for this configuration, one parent at the grid connection point and three children at the private network connection points. A Market Customer will need to be registered at the parent connection point to allow for the settlement of losses. Each metering installation will also have its own MLF.

A Market Customer registration will be required at the connection point into the private network for the battery. If the battery is <5 MW it may be non-scheduled but not exempt as the aggregate at the parent connection point is ≥5 MW.

The private network between the child and the parent NMIs will need to be registered to an NSP.

Applicants are advised to contact AEMO early in the design phase of their project to confirm the latest registration and technical requirements.

Where can I find more information?

For any further enquiries, please contact AEMO's Information and Support Hub via

- supporthub@aemo.com.au or
- call 1300 236 600