

# DER REGISTER INFORMATION GUIDELINES

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## 1. INTRODUCTION

### 1.1. Purpose and scope

These are the *DER register information guidelines* (**Guidelines**) made under rule 3.7E of the National Electricity Rules (**NER**).

These Guidelines have effect only for the purposes set out in the NER. The NER and the National Electricity Law prevail over these Guidelines to the extent of any inconsistency.

These Guidelines specify:

- The details of the *DER generation information Network Service Providers (NSPs)* must provide to AEMO for inclusion in the *DER register*.
- Any *demand side participation information* that AEMO will include in the *DER register*.
- When NSPs must provide or update *DER generation information*.
- How NSPs must provide or update *DER generation information*.
- How AEMO will store the information in the *DER register*.
- The manner and form in which AEMO will publish details in a report on the extent to which that information informed its *load* forecasts or the performance of its *power system security responsibilities*.
- How AEMO will provide NSPs with access to the *DER register information*.
- The contents, form, timing and methodology for constructing the *DER register report* to be published by AEMO.
- AEMO's approach to the protection of any *confidential information* or personal information in the *DER register*.

### 1.2. Definitions and interpretation

#### 1.2.1. Glossary

Terms defined in the National Electricity Law and the NER have the same meanings in these Guidelines unless otherwise specified in this clause.

Defined terms in the NER are intended to be identified in these Guidelines by italicising them, but failure to italicise a defined term does not affect its meaning.

The words, phrases and abbreviations in the table below have the meanings set out opposite them when used in these Guidelines.

Term	Definition
API	Application Programming Interface
NER	National Electricity Rules
NSP	Network Services Provider
MSATS	Market Settlement and Transfer Solution

### 1.2.2. Interpretation

The following principles of interpretation apply to these Guidelines unless otherwise expressly indicated:

- (a) These Guidelines are subject to the principles of interpretation set out in Schedule 2 of the National Electricity Law.
- (b) References to time are references to Australian Eastern Standard Time.
- (c) A reference to a clause is a reference to a clause of the NER.
- (d) A reference to a section is a reference to a section of this Guideline.

### 1.3. Related documents

Title	Location
Demand side participation information guidelines	<a href="https://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2017/DSPIG/Demand-Side-Participation-Information-Guidelines.pdf">https://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2017/DSPIG/Demand-Side-Participation-Information-Guidelines.pdf</a>

## 2. REGISTER

Clause 3.7E(b) requires AEMO to establish, maintain and update a *DER register*.

The *DER register*:

- (a) must include *DER generation information* reported to AEMO by NSPs (in accordance with clause 3.7E(d));
- (b) must include any *demand side participation information* provided to AEMO by *Registered Participants* (in accordance with clause 3.7D(b)) which in AEMO's reasonable opinion will assist NSPs to meet their *regulatory obligations or requirements* and/or assist AEMO in the exercise of its statutory functions under the NER; and
- (c) may include other information of a type similar to the information referred to above provided to AEMO by any person in connection with the performance of AEMO's statutory functions and which in AEMO's reasonable opinion will assist NSPs to meet their *regulatory obligations or requirements*.

## 3. INFORMATION IN THE DER REGISTER

### 3.1. DER generation information

The *DER register* must include *DER generation information* reported to AEMO by NSPs (clause 3.7E(d)).

*DER generation information* is defined in NER Chapter 10 as standing data in relation to a *small generating unit*. A *small generating unit* is a *generating unit*:

- with a *nameplate rating* less than 30 MW; and
- which is owned, controlled or operated by a person that AEMO has exempted from the requirement to register as a *Generator* in respect of that *generating unit* in accordance with clause 2.2.1(c).

### 3.1.1. Minimum size of small generating units

Clause 3.7E(g)(1) of the NER requires these Guidelines to specify any minimum size of *small generating unit* for which an NSP is required to provide *DER generation information*.

The minimum size is 0 kW.

### 3.2. Demand Side Participation Information

*Demand side participation information* is defined in the NER as any information referred to in clause 3.7D(e)(1). At a high level, this includes:

- contracted demand side participation; and
- the curtailment of non-scheduled load or the provision of unscheduled generation in response to the demand for, or price of, electricity.

These Guidelines do not require the inclusion of any *demand side participation information*. AEMO's assessment is that access to the *demand side participation information* in its current formats through the *DER register* would not assist NSPs to meet their *regulatory obligations or requirements* due to:

- differences between the data format of *demand side participation information* and the *DER generation information*;
- restrictions on AEMO's ability to provide the *demand side participation information* to NSPs due to information confidentiality concerns; and
- misalignment between the data types, as the *demand side participation information* is not site-specific, in contrast to the *DER generation information*.

### 3.3. Other data

The *DER register* may also include other information similar to the *DER generation information* that is provided by any person to AEMO, including information provided by the Clean Energy Regulator or one or more standards bodies.

AEMO will determine whether or not to include such additional information having regard to:

- whether in AEMO's reasonable opinion the information would assist the NSPs meet their *regulatory obligations or requirements*;
- the availability of data similar to the *DER generation information* from third parties;
- any deficiencies in the completeness or accuracy of the data received by NSPs including under section 4.2; and
- the issues raised in clause 3.7E(h)(1) and (2).

### 3.4. Information requirements

*DER generation information* is provided in a 3-level database structure (as shown in Appendix A), and includes information that is:

- Aggregated at the NMI level to provide total capacity and export capacity for the site
- Aggregated at the AC Connection level, where devices are linked together to form a DER Installation, and can provide separation of device types and technologies
- At a device level, where technical details and capacities of individual devices are recorded.

## 4. RESPONSIBILITIES

### 4.1. DER generation information

- (a) This section 4.1 sets out the details of the *DER generation information* that apply with respect to the installation of a new *small generating unit*, or a modification, replacement or removal of an existing *small generating unit*. For the avoidance of doubt, this section 4.1 does not apply if section 4.2 applies.
- (b) NSPs must provide to AEMO the *DER generation information* in relation to *connection points* on their network that they are entitled to collect under the NER in accordance with this Guideline on and from 1 December 2019.
- (c) The details of the *DER generation information* that NSPs must provide to AEMO under these Guidelines is specified in Appendix A.
- (d) An NSP must provide all of the information as specified in Appendix A that is relevant to a *small generating unit* at a *connection point* on the NSP's network.

### 4.2. Existing DER generation information

- (a) This section 4.2 sets out the details of the existing *DER generation information* that NSPs must provide under clause 11.108.3, and how the existing *DER generation information* must be provided.
- (b) An NSP must provide to AEMO all *DER generation information* that the NSP holds in relation to the *connection points* on its network by no later than 1 December 2019 in accordance with this section 4.2.
- (c) An NSP must provide AEMO with a written proposal setting out the manner and form in which the NSP will provide the existing *DER generation information* to AEMO on or before 2 September 2019.
- (d) AEMO will notify the NSP in writing if the NSP has not provided a written proposal under paragraph (c), or if AEMO (in its complete discretion) forms a view that it is unable to accept the *DER generation information* in the manner and form proposed by the NSP.
- (e) If AEMO notifies the NSP under paragraph (d), AEMO and the NSP will agree an alternative approach to the provision of the existing *DER generation information* prior to 1 December 2019.

### 4.3. Data submission timing and frequency

- (a) *DER generation information* (other than existing *DER generation information*) must be submitted electronically to AEMO's digital platform via either Application Programming Interface (**API**) link with application or web interface. Further technical details on the use of the API and web interface will be set out in a technical user guide.
- (b) An NSP must ensure that all *DER generation information* (other than the existing *DER generation information*) is submitted to the *DER register* by no later than 20 business days following the date of commissioning of a new or modified *small generating unit*, or the decommissioning of an existing *small generating unit*.
- (c) For the purposes of this section 4.3, *DER generation information* is submitted when it is in a confirmed state in the *DER register*.

#### 4.4. Assessing the accuracy of information

- (a) The Guidelines require information to be provided by NSPs including information at the National Metering Identifier (NMI) level. This is to enable AEMO to reconcile the *DER generation information* provided in accordance with these Guidelines with other data sources, such as the *metering database*, to assess the accuracy of the data provided.
- (b) AEMO may also use the following information to assess the accuracy of the *DER generation information* provided by NSPs under the Guidelines:
  - information previously submitted to the *DER register*;
  - information referred to in section 3.3; and
  - information referred to in paragraph (a).

#### 5. STORAGE

- (a) The *DER register* will be stored in an AEMO-managed database with data encrypted at rest and access protected with appropriate authentication and authorisation. The data will be stored with respect to the grid connected site identified by the NMI.
- (b) MSATS will be used for validation, lookups and reporting. The *DER register information* is intended to be identified by NMI and is tightly coupled to *NMI Standing Data*.

#### 6. ACCESS TO DER GENERATION INFORMATION

- (a) AEMO will provide access for NSPs to obtain the *DER register information* that they are entitled to via an API and web digital platform interface. This will be limited to *DER register information* that relates to NMIs within the network of the relevant NSP.
- (b) Information on the use of the API and web interface will be set out in a technical user guide.

##### 6.1. Access to DER Generation Information for Emergency Services

Emergency service agencies may receive *DER register information* on request to AEMO.

#### 7. REPORTING

The NER requires AEMO to publish a regular *DER register report*.

Clause 3.7E(m) requires that the information in the *DER register report* must be aggregated such that it does not:

- directly or indirectly disclose *confidential information*; or
- result in a breach of applicable privacy legislation.

##### 7.1. DER register report

The *DER register report* will comprise aggregated data that will be published to the AEMO website, no less than quarterly. AEMO will publish the *DER register report* in the following formats:

- interactive visualisation on aggregated data on the web page; and
- aggregated data that will be able to be downloaded in a csv format.

The variables available for analysis in the *DER register report* are detailed in **Appendix B**. The *DER register report* will contain *DER register information* on region, installed capacity (MW, MWh) and fuel type, aggregated at a postcode level and state level. AEMO will only publish data where there



are sufficient numbers in the aggregation group (postcode or state) that such publication is appropriate in the context of privacy and confidentiality requirements.

## 7.2. Load Forecasting

Clause 4.9.1(c)(6a) provides that AEMO must take into account *DER register information* it receives in the development of *load* forecasts, to the extent that it is relevant to the forecasts.

AEMO publishes an Electricity Statement of Opportunities (ESOO) report on an annual basis. A discussion on the extent to which *DER generation information* informed AEMO's *load* forecasts will be included in the ESOO supplementary material.

If this report is not available or published in a particular year, AEMO will publish a report on the extent to which *DER generation information* informed AEMO's *load* forecasts as supplementary material in a different report.

## 8. PROTECTION OF INFORMATION

The *DER register* has been developed using a 'privacy by design' approach, including in the design and development of authentication and verification processes to support access to the *DER register*.

The end-to-end process has been designed around robust cyber security principles, and leverages off existing secure data interchange arrangements that AEMO uses with Participants.

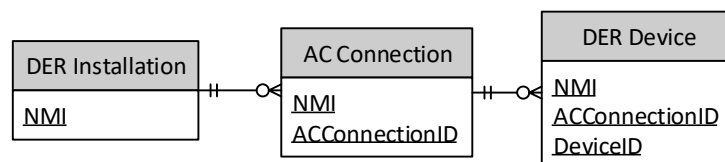
AEMO's approach to reporting will ensure that data is aggregated to a level that avoids disclosure of any *confidential information* and will not result in a breach of applicable privacy legislation.

## APPENDIX A. DATA MODEL

The data model will be split into three levels, as described in the table below. Figure 1 depicts the relationships between the three levels.

	Description
<b>Level 1: DER Installation</b>	<ul style="list-style-type: none"> <li>This level applies to a DER at a NMI – it is the DER installation in aggregate.</li> <li>Records the Master NMI record information as per the MSATS Procedures.</li> <li>Each NMI may have many AC Connections referenced to it.</li> <li>Each DER Installation may only be associated with one NMI.</li> <li>Each DER installation may have many AC Connections (e.g. inverters) related to it.</li> <li>A DER installation comprises AC Connection/s and the DER Devices connection to it/them.</li> </ul>
<b>Level 2: AC Connection</b>	<ul style="list-style-type: none"> <li>Each Inverter is uniquely identified by NMI and ACconnectionID.</li> <li>Each DER Installation can be associated with many AC Connections (e.g. inverters).</li> <li>Each AC Connection may have many DER devices related to it.</li> <li>An AC Connection may be one or many devices that have the same attributes (manufacturer, model, commissioning date)</li> </ul>
<b>Level 3: DER Devices</b>	<ul style="list-style-type: none"> <li>Each DER Device is uniquely identified by NMI, ACconnectionID and DeviceID.</li> <li>Contains information relating to the DER Device specifications (e.g. solar panel, battery cell, etc), including device type, nominal capacity, etc.</li> <li>A DER device may be one or many devices that have exactly the same attributes (manufacturer, model, commissioning date).</li> <li>Each DER Device is related to a single AC Connection.</li> </ul>

**Figure 1 Relationships between levels**



This appendix provides a description of the data model, followed by four examples of how the DER Register might be populated for different DER system scenarios.

### Data Model Level 1 – CATS\_NMI\_DATA table and DER Installation

Level 1 applies to DER installed at a NMI in aggregate. Each DER installation is uniquely identified (in level 2) by NMI and ACconnectionID. All fields are mandatory, where relevant.

Interpretation of Data Model level 1:

- Where a field type of 'pick list' is indicated, one of the listed options must be selected. A field type of 'Multi-select' indicates that one or more options must be selected.
- Where relevant, the provision of a 'null' value indicates that the settings are not enabled.

Category of data	Sub-category of data	Applies to category	Description	Field type/validation	Other comments
NMI	N/A	N/A	Unique identifier for each connection point where DER installation is.	Alpha-numeric	
Approved capacity	N/A	N/A	Approved small generating unit capacity as agreed with NSP in the connection agreement, expressed in kVA.	Numeric	Can be distinct or equal to an export limitation.
Installer identification	N/A	N/A	Unique identifier for the DER installer accountable for the installation, modification or removal of the small generating unit in accordance with this NMI and Connection Agreement 'Job number'.	Alpha-numeric	This identifier should be the installer's unique qualification number (e.g. electrical tradespersons licence or similar accreditation number).
Connection Agreement 'Job number'	N/A	N/A	Unique identifier associated with the NSP's connection offer/agreement for the approved DER works.	Alpha-numeric	This identifier is specified by the NSP as per its connection process.
Number of phases available	N/A	N/A	The number of phases available for the installation of DER.	Pick list (1, 2, 3)	

Category of data	Sub-category of data	Applies to category	Description	Field type/validation	Other comments
<b>Number of phases with DER installed</b>	N/A	N/A	The number of phases that DER is installed on.	Pick list (1, 2, 3)	
<b>Central protection and control</b>	N/A	N/A	For DER installations where NSPs specify the need for additional forms of protection above those inbuilt in an inverter.	Pick list (yes/no)	Used to describe the type(s) of central protection to be applied to the DER system.
<b>Islandable Installation</b>	N/A	N/A	For identification of small generating units designed with the ability to operate in an islanded mode.	Pick list (yes/no)	
<b>Protection and control modes</b>		If 'Central Protection and Control' = yes	Protection settings		These fields are expected to capture all forms of central protection in use for all forms of DER. Only relevant fields should be filled.
	Export limitation		Export limit (kVA)	Numeric	Maximum amount of power (kVA) that may be exported from a connection point to the grid, as monitored by a control / relay function. A null value indicates no limit.
	Under-frequency protection (F<)		Protective function limit	Frequency (Hz)	Default values AS4777-2: 2015 section 7.4.
	Under-frequency protection delay (F<)		Trip delay time	Time (s)	
	Over-frequency protection (F>)		Protective function limit	Numeric	
	Undervoltage protection (V<)		Protective function limit	Numeric	
	Undervoltage protection delay (V<)		Trip delay time	Time (s)	
	Overvoltage protection 1 (V>)		Protective function limit	Numeric	

Category of data	Sub-category of data	Applies to category	Description	Field type/validation	Other comments
	Overvoltage protection 1 delay (V>)		Trip delay time	Time (s)	
	Overvoltage protection 2 (V>>)		Protective function limit	Numeric	
	Rate of Change of Frequency (RoCoF)		Rate of change of frequency trip point (Hz/s).	Numeric	If these schemes are applied as forms of central protection.
	Voltage Vector Shift		Trip angle (Deg.)	Numeric	
	Inter-trip scheme		Description of the form of inter-trip (e.g. "from local substation").	Text	
	Neutral voltage displacement		Trip voltage (V)	Numeric	

### Data Model Level 2 – AC Connection

Level 2 applies to the AC grid connection source of a DER installation (e.g. inverter). In the case of AC sources (e.g. rotating machines) that are connected to a DER installation, only the AC Connection ID and AC equipment type need to be populated. All fields are mandatory, where relevant. A DER installation comprises one or more AC Connections and the DER Devices (level 3) connected to it.

Interpretation of level 2:

- Where AC Connections have the same attributes, they can form a Group, with a single AC Connection ID. The attributes considered for grouping are Manufacturer, Model, and Commissioning Date. It then follows that all data fields apart from Serial Number are common.
- Some categories of data have sub-categories that only apply under certain conditions. For example, when filling in data for underfrequency protection settings, specific information on setting limits are only required if underfrequency protection settings are enabled.
- Categories that are parent to sub-categories are shown in orange, alongside the options that may be selected for that category. Sub-categories are listed underneath, alongside the categories that they apply to.
- Where a field type of 'pick list' is indicated, one of the listed options must be selected. A field type of 'Multi-select' indicates that one or more options must be selected.

Category of data	Sub-category of data	Applies to category	Description	Field type/ validation	Other comments
AC Connection ID		All	Unique identifier for each AC Connection or Group in a DER installation.	15 digit numeric	System generated.
Number of AC Connections			Number of AC Connections in the group. For the suite of AC Connections to be considered as a group , all of the AC Connections included must have the same attributes.	Numeric	
AC equipment type		All	Indicates whether the DER device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine).	Pick list {Inverter, other}	
Inverter/ small generating unit Manufacturer		If AC equipment type = inverter	The name of the inverter manufacturer.	Codified or pick-list	Data field aligned to available product data sets.
Inverter Series		If AC equipment type = inverter	The inverter series.	Codified or pick-list	Data field aligned to available product data sets.
Inverter Model Number		If AC equipment type = inverter	The model number of the inverter.	Codified or pick-list	Definitions align to the accredited inverters list.
Inverter serial number		If AC equipment type = inverter	The serial number of the device(s).	Alpha-numeric	Primary generation device serial number(s).
Commissioning date			The date that the DER installation is commissioned.	Date	Needed to monitor / manage obligation on timeframe to complete submission of record.

Category of data	Sub-category of data	Applies to category	Description	Field type/ validation	Other comments
Status			Code used to indicate the status of the Inverter. This will be used to identify if an inverter is active or inactive or decommissioned.	Pick list (active, inactive decommissioned)	<p>This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated.</p> <p>This is not a duplicate of the NMI level status, as inverters may become active or inactive without a change of status to the overall system.</p>
Inverter device capacity (kVA)		If AC equipment type = inverter	The rated AC output power that is listed in the product specified by the manufacturer.	Numeric	This value refers to a single device.
What standard(s) apply to the inverter?		If AC equipment type = inverter	What standard/s is the inverter manufactured, tested and installed to?	Text	Examples include AS4777.2:2015, IEC 62109-1 and -IEC 62019-2.
V <sub>nom-max</sub> (sustained operation overvoltage limit)		If AC equipment type = inverter	Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the V <sub>nom-max</sub>	Numeric	
F <sub>stop</sub> (over-frequency)		If AC equipment type = inverter	Frequency (stop)	Numeric	
F <sub>stop-CH</sub> (under frequency)		If AC equipment type = inverter	Frequency (stop)	Numeric	
Inverter – DRED interaction		If AC equipment type = inverter		Pick list {yes, no}	

Category of data	Sub-category of data	Applies to category	Description	Field type/ validation	Other comments
Inverter power quality response modes - Voltage response modes – volt-watt response		If AC equipment type = inverter	.	Enabled / Not Enabled	This mode is described in AS4777.2:2015, section 6.3.2.1.
	V1	If Inverter power quality response modes - Voltage response modes – volt-watt response = Enabled		Numeric	These settings are described in AS4777.2:2015, section 6.3.2.1.
	V2			Numeric	
	V3			Numeric	
	V4			Numeric	
	P at V1			Numeric	
	P at V2			Numeric	
	P at V3			Numeric	
	P at V4			Numeric	
Inverter power quality response modes - Voltage response modes – volt-var response		If AC equipment type = inverter	.	Enabled / Not Enabled	This mode is described in AS4777.2:2015, section 6.3.2.1.
	V1	If Inverter power quality response modes - Voltage response modes – volt-var response = Enabled		Numeric	These settings are described in AS4777.2:2015, section 6.3.2.1.
	V2			Numeric	
	V3			Numeric	
	V4			Numeric	
	Q at V1			Numeric	
	Q at V2			Numeric	
	Q at V3			Numeric	
	Q at V4			Numeric	



Category of data	Sub-category of data	Applies to category	Description	Field type/ validation	Other comments
<b>Inverter power quality response modes - Reactive power mode</b>		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter.	Enabled / Not Enabled	Should be locked to Not Enabled if either of the voltage response modes are enabled.
	Fixed reactive power	If Inverter power quality response modes - Reactive power mode = Enabled	Reactive Power. Specified in % output of the system.	Numeric	
<b>Inverter power quality response modes - Fixed power factor mode</b>		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter.	Enabled / Not Enabled	Should be locked to Not Enabled if either of the voltage response modes are enabled.
	Fixed power factor	If Inverter power quality response modes - Fixed power factor mode = Enabled	Power factor	Numeric	To be populated if mode enabled.
	Fixed power factor quadrant		Power factor quadrant	Pick List {source, sink}	Expected to be between 0.8 source and 0.8 sink..
<b>Inverter power quality response modes - Power factor curve / power response mode</b>		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter.	Enabled / Not Enabled	Should be locked to Not Enabled if either of the voltage response modes are enabled.
	P1	Inverter power quality response modes - Power factor curve / power response mode = Enabled	Reference point for P1	Numeric	To be populated if mode enabled. The curve is described in AS4777.2:2015, section 6.3.4. Needs to be defined by NSP and provided to installation.
	P2		Reference point for P2	Numeric	
	Power factor at P1		Power factor	Numeric	
	Power factor quadrant at P1		Power factor quadrant	Pick List {source, sink}	
	Power factor at P2		Power factor	Numeric	
	Power factor quadrant at P2		Power factor quadrant	Pick List {source, sink}	

Category of data	Sub-category of data	Applies to category	Description	Field type/ validation	Other comments
<b>Inverter power quality response modes - Power rate limit mode – AC operation and control change</b>		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter.	Enabled / Not Enabled	This mode is described in AS4777.2:2015, section 6.3.5.3.3.
	Power ramp gradient (Wgra)	Inverter power quality response modes - Power rate limit mode – AC operation and control change = Enabled	Power ramp rate	Numeric	As described in AS4777.2:2015, section 6.3.5.1.
<b>Non-inverter generator – voltage/reactive power regulation</b>		If AC equipment type NOT inverter		Pick list (None/ Voltage droop/ fixed power factor)	
	Voltage set point	If generator voltage/reactive power regulation mode = voltage droop	Only to be populated if mode enabled.	Numeric	% Nominal voltage, or V
	Deadband			Numeric	± x%
	Droop			Numeric	In %
	Base for droop			Numeric	In kVA
	Reactive power source limit			Numeric	
	Reactive power sink limit			Numeric	
	Fixed power factor	If generator voltage/reactive power regulation mode = fixed power factor	Power factor	Numeric	To be populated if mode enabled. Expected to be between 0.8 source and 0.8 sink.
	Fixed power factor quadrant		Power factor quadrant	Pick List (source, sink)	
<b>Non-inverter Generator ramp rate</b>		If AC equipment type NOT inverter	Generator ramp rate	Enabled/ Not Enabled	A generator may have a ramp rate applied.

Category of data	Sub-category of data	Applies to category	Description	Field type/ validation	Other comments
	Power ramp gradient	If generator ramp rate = Enabled	Power ramp rate (%/min)	Numeric	
<b>Non-inverter Generator frequency response mode</b>		If AC equipment type NOT inverter	Frequency sensitive mode	Enabled/ Not Enabled	A generator may operate in a frequency sensitive mode whereby it adjusts output to help support frequency control.
	Frequency deadband	If frequency sensitive mode = Enabled		Numeric	In Hz
	Frequency droop			Numeric	In %
<b>Protection and control modes</b>			Protection settings		These fields are to capture any additional protection requirement if used.
	Rate of Change of Frequency (RoCoF)		Rate of change of frequency (Hz/s )	Numeric	If these schemes are applied in central protection.
	Voltage Vector Shift		Trip angle (Deg.)	Numeric	
	Inter-trip scheme		Description of the form of inter-trip (e.g. "from local substation").	Text	
	Neutral voltage displacement		Trip voltage (V)	Numeric	

### Data Model Level 3 – DER Device

Level 3 applies to DER energy sources (e.g. battery modules, solar panels, tri/co-generation units, micro wind turbines, etc). These energy sources may or may not be inverter-connected. All fields are required to be completed, where data is available.

Interpretation of level 3:

- Where multiple devices have the same attributes, they can make up a Group, with a single Device ID. The attributes considered for grouping are Manufacturer, Model, and Commissioning Date. It then follows that all attributes are common.
- Categories that have sub-categories are shown in orange, alongside the options that may be selected for that category.

- Sub-categories are listed underneath, alongside the categories that they apply to.
- Where a field type of 'Pick List' is indicated, one of the listed options must be selected.

Category of data	Sub-category of data	Applies to category	Description	Field type/validation	Other comments
Device ID			Unique identifier for a single DER device or a group of DER devices with the same attributes.	15 digit numeric	System generated.
Number of devices			Number of devices in the group of DER devices..	Numeric	
Manufacturer			The name of the device manufacturer.	Pick list	Definitions align to the approved modules list.
Model Number			The model number of the device.	Pick list	Definitions align to the approved modules list.
Status			Code used to indicate the status of the device. This will be used to identify if the device is active or inactive or decommissioned.	Pick list {active, inactive, decommissioned }	This status will also track commissioning and decommissioning date. When a new record is inserted in the database, the installation date/ start date is defined by the user and may be backdated. This is not a duplicate of the NMI level or AC Connection level status, as devices may become active or inactive without a change of status to the overall system.
Device Type			Used to indicate the primary technology used in the DER device.	Pick list {Fossil, Hydro, Wind, Solar PV, Renewable/Biomass/Waste, Geothermal, Storage. Other}	
	Device sub-type		Used to indicate the primary technology used in the DER device.	Pick list {list is dependent on the device type selection}	This field is also used to record for example the battery chemistry, or the type of PV panel. It is also used to record if a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.

Category of data	Sub-category of data	Applies to category	Description	Field type/validation	Other comments
Nominal rated capacity (kVA)			Maximum output in kVA that is listed in the product specification by the manufacturer. This refers to the capacity of each unit within the device group.	Numeric	
Nominal storage capacity (kVAh)		If device type = battery storage	Maximum storage capacity in kVAh. This refers to the capacity of each storage module within the device group.	Numeric	

## APPENDIX B. DER REGISTER REPORT

The standard set of variables for the published DER Register report is contained in the table below. These variables will also be available for the interactive visualisation reporting. Details on how to use the interactive reporting will be specified in associated user information for NSPs and other users.

Variable	Unit	Definition
Postcode		Aggregator variable
State		{NSW1, VIC1, QLD1, SA1, TAS1}
Total installed DER capacity	kVA	
Number of DER installations	Numeric	
Installed capacity of solar	kVA	
Number of solar installations	Numeric	
Installed capacity of batteries	kVA	
Installed storage capacity of batteries	kVAh	
Number of battery installations	Numeric	
Installed capacity of other DER	kVA	
Building type	String	{residential, commercial, industrial}