

DER REGISTER INFORMATION PROCEDURE (WEM)

PREPARED BY: AEMO | Western Australia
VERSION: 1.0
EFFECTIVE DATE: 1 July 2020
STATUS: FINAL

Approved for distribution and use by:

APPROVED BY: Cameron Parrotte
TITLE: Executive General Manager, Western Australia

VERSION RELEASE HISTORY

Version	Effective Date	Summary of Changes
1.0	1 July 2020	First Issue

CONTENTS

1.	INTRODUCTION	4
1.1.	Purpose and scope	4
1.2.	Definitions and interpretation	4
1.3.	Related documents	5
2.	DER REGISTER	5
3.	INFORMATION IN THE DER REGISTER	6
3.1.	DER Generation Information	6
3.2.	Additional information	6
3.3.	Minimum size of Small Generating Units or Storage Works	6
4.	SUBMISSION AND REVIEW OF DER REGISTER INFORMATION	6
4.1.	New or Modified DER Generation Information	6
4.2.	Existing DER Generation Information	7
4.3.	Assessing the accuracy of information	7
5.	STORAGE	8
6.	ACCESS TO DER GENERATION INFORMATION	8
7.	REPORTING	8
7.1.	DER Register Report	8
7.2.	Load forecasting and other processes	9
APPENDIX A.	DER REGISTER DATA MODEL	10
APPENDIX B.	EXISTING DER GENERATION INFORMATION	21
APPENDIX C.	DER REGISTER REPORT	26

1. INTRODUCTION

1.1. Purpose and scope

- 1.1.1. This DER Register Information Procedure (**Procedure**) is made in accordance with AEMO's functions under clause 2.1A.2(h) of the Wholesale Electricity Market Rules (**WEM Rules**). This Procedure is also made under clause 3.24.8 of the WEM Rules.
- 1.1.2. This purpose of this Procedure is to specify **[clause 3.24.8]**:
- details of the DER Generation Information that Network Operators must provide to AEMO for inclusion in the DER Register;
 - when Network Operators must provide and update DER Generation Information;
 - how DER Generation Information should be provided to AEMO by Network Operators, including, for example, the format in which the information must be provided;
 - how the information in the DER Register is stored by AEMO;
 - the manner and form in which AEMO will publish details on the extent to which DER Register Information has informed its load forecasts or its function for ensuring that the SWIS operates in a secure and reliable manner;
 - details of how AEMO will provide Network Operators with access to DER Register Information; and
 - the contents, form and timing of the DER Register Report to be published by AEMO and how the DER Register Information to be included in that report will be aggregated.
- 1.1.3. In this Procedure, where obligations are conferred on a Rule Participant, that Rule Participant must comply with the relevant obligations in accordance with clauses 2.9.7, 2.9.7A and 2.9.8 of the WEM Rules, as applicable.
- 1.1.4. References to WEM Rules within this Procedure in bold and square brackets **[clause XX]** are included for convenience only and are not part of this Procedure.

1.2. Definitions and interpretation

- 1.2.1. Terms defined in the WEM Rules have the same meanings in this Procedure unless otherwise specified in this clause. The words, phrases and abbreviations in the table below have the meanings set out opposite them when used in this Procedure.

Table 1 Defined Terms

Term	Definition
API	Application Programming Interface
Connection Point	For Small Generating Units or Storage Works that are the subject of an Arrangement for Access, the agreed point of supply established between the Network Operator and another person in the Arrangement for Access. For Small Generating Units or Storage Works that are not the subject of an Arrangement for Access, the point at which electricity transfers into or out of the network are metered.

DER Register Commencement Day	The day on which the DER Register is to commence, which is specified in a notice published by AEMO under clause 3.24.16 of the WEM Rules
kW	Kilowatt
NMI	National Meter Identifier

- 1.2.2. The following principles of interpretation apply to this Procedure unless otherwise expressly indicated:
- (a) references to time are references to Australian Western Standard Time;
 - (b) terms that are capitalised, but not defined in this Procedure, have the meaning given in the WEM Rules;
 - (c) the WEM Rules prevail to the extent of any inconsistency with this Procedure;
 - (d) a reference to the WEM Rules or Market Procedures includes any associated forms required or contemplated by the WEM Rules or Market Procedures;
 - (e) a reference to a clause is a reference to a clause of the WEM Rules;
 - (f) a reference to a section or a step is a reference to a section or a step of this Procedure;
 - (g) a reference to an appendix is a reference to an appendix of this Procedure;
 - (h) words expressed in the singular include the plural and vice versa; and
 - (i) the conventions specified in sections 1.3 to 1.5 of the WEM Rules apply.

1.3. Related documents

- 1.3.1. The following Market Procedures, Power System Operation Procedures (PSOPs), market documents and user guides (available on the Market Web Site) are associated with this Procedure:
- (a) Market Procedure: Undertaking the Long Term PASA and Conducting a Review of the Planning Criterion; and
 - (b) WEM DER Register API Technical Specifications and Guides.

2. DER REGISTER

- 2.1.1. On and from the DER Register Commencement Day, AEMO must establish, maintain and update a DER Register **[clause 3.24.1]**, which:
- (a) must include DER Generation Information reported to AEMO by Network Operators in accordance with clause 3.24.5 of the WEM Rules **[clause 3.24.2]**; and
 - (b) may include information of a type similar to the information referred to in paragraph (a) provided to AEMO by any person in connection with the performance of AEMO's functions under the WEM Rules, the Regulations or the Electricity Industry Act **[clause 3.24.2]**.
- 2.1.2. AEMO will provide access for Network Operators to electronically submit and access DER Register Information through AEMO's digital platform, via an Application Programming Interface (API) link. Further technical details on the use of the API will be set out in applicable DER Register API Technical Specifications and Guides.

3. INFORMATION IN THE DER REGISTER

3.1. DER Generation Information

- 3.1.1. The DER Register must include DER Generation Information reported to AEMO by Network Operators.
- 3.1.2. DER Generation Information is defined in the WEM Rules as Standing Data in relation to:
- (a) a Small Generating Unit, being a generation system which has a rated capacity of less than 10 MW; or
 - (b) Storage Works with an export capacity of less than 5 MW.
- 3.1.3. The DER Generation Information that Network Operators must provide to AEMO on and from the DER Register Commencement Day, in accordance with section 4.1, is specified in Appendix A.
- 3.1.4. The DER Generation Information that Network Operators must provide to AEMO before the DER Register Commencement Day, in accordance with section 4.2, is specified in Appendix B.

3.2. Additional information

- 3.2.1. When determining whether to include additional information referred to in step 2.1.1(b) in the DER Register, AEMO may have regard to:
- (a) whether in AEMO's reasonable opinion the information would assist AEMO or Rule Participants to meet their regulatory obligations or requirements;
 - (b) the availability of data similar to the DER Generation Information from third parties;
 - (c) any deficiencies in the completeness or accuracy of the data received by Network Operators under sections 4.1 and 4.2; and
 - (d) the matters specified in clauses 3.24.9(a) and (b) of the WEM Rules.

3.3. Minimum size of Small Generating Units or Storage Works

- 3.3.1. The minimum size of Small Generating Units or Storage Works for which a Network Operator is required to provide DER Generation Information is 0 kW.

4. SUBMISSION AND REVIEW OF DER REGISTER INFORMATION

4.1. New or Modified DER Generation Information

- 4.1.1. This section 4.1 applies with respect to the submission of DER Generation Information after a Network Operator becomes aware of:
- (a) the commissioning of a new Small Generating Unit or Storage Works;
 - (b) the commissioning of a modification to, or replacement of, an existing Small Generating Unit or Storage Works;
 - (c) the decommissioning of an existing Small Generating Unit or Storage Works; or
 - (d) a permanent change to any of the data specified in Appendix A in respect of a Small Generating Unit or Storage Works,

where that event occurs on or after the DER Register Commencement Day. For the avoidance of doubt, this section 4.1 does not apply if section 4.2 applies.

- 4.1.2. On and from the DER Register Commencement Day, a Network Operator that receives DER Generation Information relating to a Connection Point on its network must provide that information to AEMO [clause 3.24.5].
- 4.1.3. To satisfy the obligation in step 4.1.2, a Network Operator must submit to AEMO the DER Generation Information specified in Appendix A that is relevant to that Connection Point by no later than 20 Business Days following one of the events detailed in step 4.1.1.
- 4.1.4. Network Operators must submit DER Generation Information electronically to AEMO's digital platform referred to in step 2.1.2.
- 4.1.5. For the purposes of this section 4.1, DER Generation Information is submitted when it has passed the validation checks described in the WEM DER Register API Technical Specifications and Guides.

4.2. Existing DER Generation Information

- 4.2.1. By no later than 30 September 2020, a Network Operator must provide AEMO with all DER Generation Information that it holds in relation to the Connection Points on its network in accordance with this section 4.2 [clause 3.24.3].
- 4.2.2. To satisfy the obligation in step 4.2.1, a Network Operator must submit to AEMO the DER Generation Information specified in Appendix B that it holds for each Connection Point. The method and format for this submission must be as agreed by the Network Operator and AEMO.
- 4.2.3. AEMO and a Network Operator may agree upon additional data submissions between 30 September 2020 and the DER Register Commencement Date, in order to maintain data currency and accuracy during that time, in accordance with the data specified in Appendix B.

4.3. Assessing the accuracy of information

- 4.3.1. AEMO may use the following information to assess the accuracy of DER Generation Information provided by Network Operators:
 - (a) information previously submitted to the DER Register;
 - (b) information referred to in step 2.1.1(b) and section 3.2;
 - (c) other information held by AEMO, including Meter Data Submissions; and
 - (d) other information provided by a Network Operator upon request by AEMO.
- 4.3.2. If AEMO considers DER Generation Information provided by a Network Operator under section 4.1 to be inaccurate or no longer accurate, AEMO must notify the relevant Network Operator as soon as practicable.

- 4.3.3. Within 20 Business Days of receiving a notification under step 4.3.2, or an alternative timeframe agreed with AEMO, a Network Operator must either:
- (a) confirm the accuracy of the DER Generation Information previously provided; or
 - (b) submit updated DER Generation Information.

5. STORAGE

- 5.1.1. 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.

6. ACCESS TO DER GENERATION INFORMATION

- 6.1.1. AEMO must provide or give access to DER Register Information to each Network Operator in relation to that Network Operator's network **[clause 3.24.14]**.
- 6.1.2. AEMO will provide access to DER Register Information in accordance with step 6.1.1 via the digital platform described in step 2.1.2.

7. REPORTING

7.1. DER Register Report

- 7.1.1. AEMO must prepare and publish on its website a DER Register Report **[clause 3.24.12]**.
- 7.1.2. AEMO will publish the DER Register Report within three months after the DER Register Commencement Day and update it no less than quarterly.
- 7.1.3. AEMO will publish the DER Register Report in the following formats:
- (a) aggregated data displayed on a web page; and
 - (a) aggregated data that can be downloaded in a csv format.
- 7.1.4. The variables available for analysis in the DER Register Report are detailed in Appendix C.
- 7.1.5. AEMO must ensure that information in the DER Register Report is aggregated such that it does not **[clause 3.24.13]**:
- (a) directly or indirectly disclose confidential information; or
 - (b) result in a breach of applicable privacy legislation.
- 7.1.6. AEMO will only publish data in the DER Register Report where there are sufficient numbers in the aggregation group that such publication is appropriate in the context of privacy and confidentiality requirements.

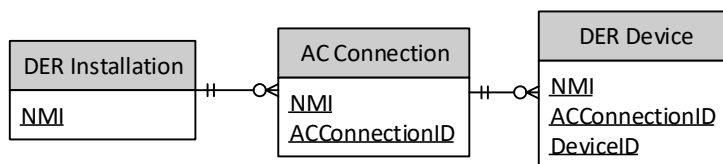
7.2. Load forecasting and other processes

- 7.2.1. AEMO must publish details on the extent to which, in general terms, DER Register Information has informed AEMO's development or use of load forecasts, or the performance of its functions referred to in clause 3.24.6 of the WEM Rules and AEMO may, for this purpose, include such details as part of existing Market Procedures or other publications produced by AEMO, or by publishing details on the Market Web Site **[clause 3.24.7]**.
- 7.2.2. AEMO will include a discussion on the extent to which DER Generation Information informed the Long Term PASA load forecasts in the Statement of Opportunities Report published under clause 4.5.11 of the WEM Rules.
- 7.2.3. Where AEMO uses DER Register Information in the development or use of other load forecasts or performance of other functions, it will document this in a relevant Market Procedure or other document, or on its website.

APPENDIX A. DER REGISTER DATA MODEL

This appendix specifies the DER Generation Information to be provided on and from the DER Register Commencement Day. The data model for DER Generation Information will be provided in a three-level database structure that aligns to device installation characteristics. Figure 1 depicts the relationships between the three levels.

Figure 1 Relationships between levels



Data Model Level 1 – DER Installation

Level 1 applies to Small Generating Units and Storage Works installed at a NMI in aggregate. Each DER Installation is uniquely identified (in level 2) by NMI and ACconnectionID. All fields are mandatory, where applicable to any given DER Installation.

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	Other comments
NMI	N/A	N/A	Unique identifier for each Connection Point where DER Installation is.	Alpha-numeric	
	NMI TNI	NMI	Transmission Node Identifier	Alpha-numeric	
	NMI status	NMI	Status of the NMI (Either 'Active', 'Inactive' or 'Extinct')	Text	Active, Inactive, Extinct
	NMI zoneSubstation	NMI	ID of Zone Substation to which the NMI is connected	Alpha-numeric	

DER REGISTER INFORMATION PROCEDURE (WEM)

	NMI postcode	NMI	Postcode where the NMI is installed	Alpha-numeric	
Approved capacity	N/A	N/A	Approved Small Generating Unit and/or Storage Works capacity as agreed with Network Operator in the connection agreement (kVA).	Numeric	Can be distinct or equal to an export limitation.
Installer identification	N/A	N/A	Unique identifier for the installer accountable for the installation, modification or removal of the Small Generating Unit and/or Storage Works 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 Network Operator's connection offer/agreement for the approved works.	Alpha-numeric	This identifier is specified by the Network Operator as per its connection process.
Number of phases available	N/A	N/A	The number of phases available for the installation of Small Generating Units and Storage Works (Either 1, 2 or 3).	Numeric integer	
Number of phases with DER installed	N/A	N/A	The number of phases that the Small Generating Unit and/or Storage Works is installed on (Either 1, 2 or 3).	Numeric integer	
Islandable Installation	N/A	N/A	For identification of Small Generating Units and/or Storage Works designed with the ability to operate in an islanded mode. (Either 'Yes' or 'No').	Text	If a value of 'No' is provided, this can mean 'No' or 'Unknown'
Central protection and control	N/A	N/A	For installations where Network Operators specify the need for additional forms of protection above those inbuilt in an inverter. (Either 'Yes' or 'No').	Text	Used to describe the type(s) of central protection to be applied to the DER Installation as below.

Protection and control modes		If 'Central Protection and Control' = yes	Protection settings		These fields are expected to capture all forms of central protection in use for Small Generating Units and Storage Works. Only relevant fields should be filled, but only one field (any) is required if 'Central Protection and Control' = yes.
	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 frequency trigger (Hz).	Numeric	As described in AS4777-1: 2016 section 3.4.4.3.
	Under-frequency protection delay (F<)		Trip delay time (s).	Numeric	As described in AS4777-1: 2016 section 3.4.4.3.
	Over-frequency protection (F>)		Protective function frequency trigger (Hz).	Numeric	If these schemes are applied as forms of central protection.
	Over-frequency protection delay (F>)		Trip delay time (s).	Numeric	
	Undervoltage protection (V<)		Protective function voltage trigger (V).	Numeric	
	Undervoltage protection delay (V<)		Trip delay time (s).	Numeric	
	Overvoltage protection (V>)		Protective function voltage trigger (V).	Numeric	
	Overvoltage protection delay (V>)		Trip delay time (s).	Numeric	
	Rate of Change of Frequency (RoCoF)		Rate of change of frequency trip point (Hz/s).	Numeric	
	Voltage vector shift		Trip angle (Deg.)	Numeric	
	Inter-trip scheme		Description of the form of inter-trip (e.g. "from local substation").	Text	
	Sustained over voltage		Protective function voltage trigger (V).	Numeric	

DER REGISTER INFORMATION PROCEDURE (WEM)

	Sustained over voltage delay		Trip delay time (s).	Numeric	
	Neutral voltage displacement		Trip voltage (V)	Numeric	
Comments					
	Comments		Comments text.	Text	Additional free text area for comments (max. 2000 characters).

Data Model Level 2 – AC Connection

Level 2 applies to the AC grid connection source of a DER Installation in Level 1 (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 applicable to any given DER Installation. 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 make up 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 under-frequency protection settings, specific information on setting limits are only required if under-frequency 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 integer	System generated identifier.
NSP Connection ID		All	An AC Connection identifier used by the Network Operator internally, Network Operators can use this field to link their internal ID with AEMO’s generated AC Connection ID.	Text	Optional field that can be used to support Network Operator business processes.

DER REGISTER INFORMATION PROCEDURE (WEM)

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 integer	
AC equipment type		All	Indicates whether the device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine). (Either 'Inverter' or 'Other').	Text	
Inverter / Small Generating Unit Manufacturer		If AC equipment type = inverter	The name of the inverter manufacturer.	Text	May be aligned to available product databases, or entered as free text. Note: These fields are reviewed against industry standard product databases, with discrepancies treated as acknowledgeable but not preventing compliance.
Inverter Series		If AC equipment type = inverter	The inverter series.	Text	
Inverter Model Number		If AC equipment type = inverter	The model number of the inverter.	Text	
Inverter serial number		If AC equipment type = inverter	The serial number of the device(s).	Alpha-numeric	
Commissioning date			The date that the DER Installation is commissioned.	Date	Needed to monitor / manage obligation on timeframe to complete submission of record.
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. (Either 'Active', 'Inactive' or 'Decommissioned')	Text	Changes to this status will be used to track activation/deactivation and decommissioning dates.
Inverter device capacity		If AC equipment type = inverter	The rated AC output power that is listed in the product specified by the manufacturer. (kVA).	Numeric	This value refers to a single inverter rated capacity, the Number of AC Connection Fields multiplies this to calculate total AC Connection Capacity.
What standard(s) apply to the inverter?		If AC equipment type = inverter	The standard the inverter is manufactured, tested and installed to.	Text	Examples include AS4777.2:2015, IEC 62109-1 and -IEC 62019-2.

V_{nom-max} (sustained operation overvoltage limit)		If AC equipment type = inverter	Indicates the sustained operation overvoltage limit (V)	Numeric	
F_{stop} (over-frequency)		If AC equipment type = inverter	Frequency (Hz)	Numeric	
F_{stop-CH} (under frequency)		If AC equipment type = inverter	Frequency (Hz)	Numeric	
Inverter – DRED interaction		If AC equipment type = inverter	(Either 'Yes' or 'No')	Text	
Inverter power quality response modes - Voltage response modes – volt-watt response		If AC equipment type = inverter	Selection	Enabled / Not Enabled	As described in AS4777.2:2015, section 6.3.2.2.
	V1	If Inverter power quality response modes - Voltage response modes – volt-watt response = Enabled	V1 to V4 in V P-at-V1 to P-at-V4 in %	Numeric	To be populated if mode enabled.
	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	(Selection).	Enabled / Not Enabled	As described in AS4777.2:2015, section 6.3.2.3.
	V1	If Inverter power quality response modes - Voltage response modes – volt-var response = Enabled	V1 to V4 in V Q-at-V1 to Q-at-V4 in %	Numeric	To be populated if mode enabled.
	V2			Numeric	
	V3			Numeric	
	V4			Numeric	
	Q at V1			Numeric	
	Q at V2			Numeric	

DER REGISTER INFORMATION PROCEDURE (WEM)

	Q at V3			Numeric	
	Q at V4			Numeric	
Inverter power quality response modes - Reactive power mode		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter. (Selection).	Enabled / Not Enabled	As described in AS4777.2:2015, section 6.3.3. Fixed 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	To be populated if mode enabled.
Inverter power quality response modes - Fixed power factor mode		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter. (Selection).	Enabled / Not Enabled	As described in AS4777.2:2015, section 6.3.3. Fixed 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. (Either 'Source' or 'Sink').	Text	Power factor expected to be between 0.8 source and 0.8 sink.
Inverter power quality response modes - Power factor curve / power response mode		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter. (Selection)	Enabled / Not Enabled	As described in AS4777.2:2015, section 6.3.4. Fixed 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 (kW)	Numeric	To be populated if mode enabled.
	P2		Reference point for P2 (kW)	Numeric	
	Power factor at P1		Power factor	Numeric	
	Power factor quadrant at P1		Power factor quadrant. (Either 'Source' or 'Sink').	Pick List {source, sink}	
	Power factor at P2		Power factor	Numeric	
	Power factor quadrant at P2		Power factor quadrant. (Either 'Source' or 'Sink').	Pick List {source, sink}	

DER REGISTER INFORMATION PROCEDURE (WEM)

Inverter power quality response modes - Power rate limit mode – AC operation and control change		If AC equipment type = inverter	Select which power quality response modes are enabled on the inverter. (Selection)	Enabled / Not Enabled	This mode is described in AS4777.2:2015, section 6.3.5.1.
	Power Ramp Rate	Inverter power quality response modes - Power rate limit mode – AC operation and control change = Enabled	Power ramp rate (%/minute) Unit in WGra	Numeric	To be populated if mode enabled.
Non-inverter generator – voltage/reactive power regulation		If AC equipment type NOT inverter	(Either 'None', 'Voltage droop' or 'Fixed power factor')	Text	Only populate below fields if selection is 'Voltage droop' or 'fixed power factor'.
If 'Voltage droop' selected	Voltage set point	If generator voltage/reactive power regulation mode = voltage droop	(Either % Nominal voltage, or V)	Numeric	
	Voltage set point unit		(Either % or V)	Text	
	Deadband		(± x%)	Numeric	
	Droop		(%)	Numeric	
	Base for droop		(kVA)	Numeric	
	Reactive power source limit		(KVAr)	Numeric	
	Reactive power sink limit		(KVAr)	Numeric	
If 'Fixed power factor' selected	Fixed power factor	If generator voltage/reactive power regulation mode = fixed power factor	Power factor	Numeric	Expected to be between 0.8 source and 0.8 sink.
	Fixed power factor quadrant		Power factor quadrant. (Either 'Source' or 'Sink').	Text	
Non-inverter Generator ramp rate		If AC equipment type NOT inverter	Generator ramp rate. (Selection).	Enabled / Not Enabled	A generator may have a ramp rate applied. Only populate below fields if selection is 'Enabled'.
	Power Ramp Gradient	If generator ramp rate = Enabled	Power ramp rate (%/min)	Numeric	

Non-inverter Generator frequency response mode		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. Only populate below fields if selection is 'Enabled'.
	Frequency deadband		(Hz)	Numeric	
	Frequency droop		(%)	Numeric	
Protection and control modes			Protection settings		Available fields to capture settings for any additional independent protection relays if used at the AC Connection level.
	Rate of Change of Frequency (RoCoF)		Rate of change of frequency (Hz/s)	Numeric	
	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 Small Generating Units and Storage Works (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 mandatory, where applicable to any given DER Installation.

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.

DER REGISTER INFORMATION PROCEDURE (WEM)

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 integer	System generated unique Device identifier.
NSP Device ID			A DER Device identifier that can be used by Network Operators.	Text	Optional field that can be used to support Network Operator business processes.
Number of devices			Number of devices in the group of DER Devices.	Numeric integer	
Device Manufacturer			The name of the device manufacturer.	Text	May be aligned to available product databases, or entered as free text.
Device Model Number			The model number of the device.	Text	Note: These fields are reviewed against industry standard product databases, with discrepancies treated as acknowledgeable but not preventing compliance.
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. (Either 'Active', 'Inactive' or 'Decommissioned')	Text	Changes to this status will also be used to track activation/deactivation and decommissioning dates.
Device Type			Used to indicate the primary technology used in the DER Device. (Either 'Fossil', 'Hydro', 'Wind', 'Solar PV', 'Renewable/Biomass/Waste', 'Geothermal', 'Storage', 'Other')	Text	Free text field is provided if 'Other' is selected.
	Device sub-type		Used to indicate the primary technology used in the DER Device. (One of a selection dependent on device type).	Text	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.
Nominal rated capacity			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. (kVA)	Numeric	

DER REGISTER INFORMATION PROCEDURE (WEM)



Nominal storage capacity		If device type = battery storage	Maximum storage capacity in kVAh. This refers to the capacity of each storage module within the device group. (kVAh)	Numeric	.
---------------------------------	--	----------------------------------	--	---------	---

APPENDIX B. EXISTING DER GENERATION INFORMATION

This appendix defines the DER Generation Information to be provided no later than 30 September 2020. The data for existing DER Generation Information provided no later than 30 September 2020 is to be delivered in the same three-level database structure defined in Appendix A.

Data Model Level 1 – DER Installation

Level 1 applies to Small Generating Units and Storage Works installed at a NMI in aggregate. Each DER Installation is uniquely identified (in level 2) by NMI and ACconnectionID. All fields are mandatory, where applicable to any given DER Installation.

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	
	NMI TNI	NMI	Transmission Node Identifier	Alpha-numeric	
	NMI status	NMI	Status of the NMI (Either 'Active', 'Inactive' or 'Extinct')	Text	For bulk upload, if not provided, default value = Active
	NMI zoneSubstation	NMI	ID of Zone Substation to which the NMI is connected	Alpha-numeric	
	NMI postcode	NMI	Postcode where the NMI is installed	Alpha-numeric	
Connection Agreement 'Job number'	N/A	N/A	Unique identifier associated with the Network Operator's connection offer/agreement for the approved works.	Alpha-numeric	This identifier is specified by the Network Operator as per its connection process. For bulk upload, if not provided, default value = last 5 digits of NMI

DER REGISTER INFORMATION PROCEDURE (WEM)

Approved capacity	N/A	N/A	Approved Small Generating Unit and/or Storage Works capacity as agreed with Network Operator in the connection agreement (kVA).	Numeric	Can be distinct or equal to an export limitation. For bulk upload, if not provided, default value = sum of nominal rated and storage capacity of the devices
Number of phases available	N/A	N/A	The number of phases available for the installation of Small Generating Units and Storage Works (Either 1, 2 or 3).	Numeric integer	For bulk upload, if not provided, default value = 1
Number of phases with DER installed	N/A	N/A	The number of phases that the Small Generating Unit and/or Storage Works is installed on (Either 1, 2 or 3).	Numeric integer	For bulk upload, if not provided, default value = 1
Islandable Installation	N/A	N/A	For identification of Small Generating Units and/or Storage Works designed with the ability to operate in an islanded mode. (Either 'Yes' or 'No').	Text	If value of 'No' is provided, this can mean 'No' or 'Unknown' For bulk upload, if not provided, default value = No
Central protection and control	N/A	N/A	For installations where Network Operators specify the need for additional forms of protection above those inbuilt in an inverter. (Either 'Yes' or 'No').	Text	Used to describe the type(s) of central protection to be applied to the DER Installation as below. For bulk upload, if not provided, default value = No

Data Model Level 2 – AC Connection

Level 2 applies to the AC grid connection source of a DER Installation in Level 1 (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 applicable to any given DER Installation. 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 make up 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.

DER REGISTER INFORMATION PROCEDURE (WEM)

- Some categories of data have sub-categories that only apply under certain conditions. For example, when filling in data for under-frequency protection settings, specific information on setting limits are only required if under-frequency 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 integer	System generated identifier.
NSP Connection ID		All	An AC Connection identifier used by the Network Operator internally, Network Operators can use this field to link their internal ID with AEMO's generated AC Connection ID.	Text	Optional field that can be used to support Network Operator business processes.
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 integer	For bulk upload, if not provided, default value = 1
AC equipment type		All	Indicates whether the device is connected via an inverter (and what category of inverter it is) or not (e.g. rotating machine). (Either 'Inverter' or 'Other').	Text	For bulk upload, if not provided, default value = Unknown Equipment
Commissioning date			The date that the DER Installation is commissioned.	Date	Needed to monitor / manage obligation on timeframe to complete submission of record.

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. (Either 'Active', 'Inactive' or 'Decommissioned')	Text	Changes to this status will be used to track activation/deactivation and decommissioning dates. For bulk upload, if not provided, default value = Active
Inverter device capacity		If AC equipment type = inverter	The rated AC output power that is listed in the product specified by the manufacturer. (kVA).	Numeric	This value refers to a single inverter rated capacity, the Number of AC Connection Fields multiplies this to calculate total AC Connection Capacity.

Data Model Level 3 – DER Device

Level 3 applies to Small Generating Units and Storage Works (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 mandatory, where applicable to any given DER installation.

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 integer	System generated unique Device identifier.
Number of devices			Number of devices in the group of DER Devices.	Numeric integer	

DER REGISTER INFORMATION PROCEDURE (WEM)

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. (Either 'Active', 'Inactive' or 'Decommissioned')	Text	Changes to this status will also be used to track activation/deactivation and decommissioning dates.
Device Type			Used to indicate the primary technology used in the DER Device. (Either 'Fossil', 'Hydro', 'Wind', 'Solar PV', 'Renewable/Biomass/Waste', 'Geothermal', 'Storage', 'Other')	Text	Free text field is provided if 'Other' is selected. For bulk upload, if not provided, default value = Unknown Device
Nominal rated capacity	Device sub-type		Used to indicate the primary technology used in the DER Device. (One of a selection dependent on device type). 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. (kVA)	Text Numeric	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. For bulk upload, if not provided, default value = Unknown Subtype
Nominal storage capacity		If device type = battery storage	Maximum storage capacity in kVAh. This refers to the capacity of each storage module within the device group. (kVAh)	Numeric	.

APPENDIX C. DER REGISTER REPORT

The standard set of variables to be considered in the DER Register Report is contained in, but not limited to, the data in the table below.

Variable (SWIS only)
Total installed DER capacity by postcode and AC Connection Type
Number of DER installations by AC Connection Type or Device Type
Installed DER capacity by AC Connection Type or Device Type
Average capacity of DER by AC Connection Type or Device Type
Installation rates (by Commissioning Date)
Completeness and/or accuracy of data provided