



~~DER REGISTER~~ ~~INFORMATION PROCEDURE~~ ~~(WEM) WEM Procedure:~~ Distributed Energy Resource (DER) Register Information

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<u>2.0</u>	<u>2 October 2023</u>	<u>Amendments to reflect changes in Procedure Change Proposal: AEPC_2022_02</u>

IMPORTANT NOTICE – EXPLANATORY NOTES

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Contents

1. Introduction	5
1.1. Purpose and scope	5
1.2. Definitions	5
1.3. Interpretation	6
1.4. Related documents	87
2. DER Register	87
3. Information held in the DER Register	87
3.1. DER Generation Information	87
3.2. Additional Information	98
Submissions and review of	108
4. DER Register Information	108
4.1. New or Modified DER Generation Information	108
4.2. Variations to Australian Standard As/NZS.4777.2:2020	119
4.3. Historical DER Generation Information	129
4.4. Assessing the accuracy of information	129
5. Storage	1310
6. Access to DER Register Information	1310
7. Reporting	1310
7.1. DER Register Report	1340
7.2. Load forecasting and other processes	1444
Appendix A. DER Register Data Model	1512
Appendix B. Historical DER Generation Information	3630
Appendix C. DER Register Report	4134
Appendix D. Measurements Abbreviations Table	4235
Appendix E. Relevant clauses of the WEM Rules	4336

Tables

Table 1. Definitions	6
Table 2. Related documents	87
Table 3. Level 1 – DER Installation Data Requirements	1743
Table 4. Level 2 – AC Connection Data Requirements	2248
Table 5. Level 2 – Historical AC Connection Data Requirements	3327
Table 6. Level 2 – Historical AC Connection Data Requirements	3630
Table 7. Level 2 – Historical AC Connection Data Requirements	3834
Table 8. Level 3 – Historical DER Device Data Requirements	3932
Table 9. DER Register Standard Set of Variables	4134
Table 10. Measurement abbreviations and definitions	4235

Table 11. Relevant clauses of the WEM Rules 4336

Figures

Figure 1 Relationships between levels1514
Figure 1 Depicts the DER Register data model levels. 1544

1. Introduction

1.1. Purpose and scope

1.1.1. This WEM Procedure: Distributed Energy Resource (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. The *Electricity Industry Act 2004*, the WEM Regulations and the WEM Rules prevail over this Procedure to the extent of any inconsistency.

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 clause 2.9.7A or 2.9.8 of the WEM Rules, as applicable.

~~1.1.2.1.1.4. This~~The purpose of this Procedure is to specify ~~[clause 3.24.8]:~~

- (a) details of the DER Generation Information that Network Operators must provide to AEMO ~~for inclusion in the~~ under clause 3.24.3 and 3.24.5, including any minimum size of Small Generating Units or Storage Works for which a Network Operator is required to provide DER Register Generation Information;
- (b) when Network Operators must provide and update DER Generation Information;
- (c) how DER Generation Information should be provided to AEMO by Network Operators, including, for example, the format in which the information must be provided;
- (d) how the information in the DER Register is stored by AEMO;
- (e) the manner and form in which AEMO will publish details, in accordance with clause 3.24.7, 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;
- (f) details of how AEMO will provide Network Operators with access to DER Register Information under clause 3.24.14; and
- (g) the contents, form and timing of the DER Register Report to be published by AEMO in accordance with clause 3.24.12 and how the DER Register Information to be included in that report will be aggregated. ~~[clause 3.24.8].~~

~~1.1.3. 1.1.5. In Appendix E of this Procedure, where~~ outlines the head of power clauses that this Procedure is made under, as well as other 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 in 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~~ covered by this Procedure.

1.2. Definitions and interpretation

1.2.1. Terms defined in the *Electricity Industry Act 2004*, the WEM Regulations and 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.~~

1.2.2. The following definitions apply in this Procedure unless the context requires otherwise.

Table 1 Definitions

Term	Definition
<u>API</u> <u>Application Programming Interface (API)</u>	<u>Application Programming Interface</u> is a software interface that allows applications to interact with each other.
<u>Connection Agreement</u>	<u>The technical installation requirements associated with the Network Operator's terms and conditions to connect DER equipment.</u>
<u>Connection Point</u>	<u>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.</u> <u>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.</u> <u>A point on a covered network identified in a contract for services as an entry point or exit point.</u> <u>In effect, the Connection Point is where electricity is delivered to or sent out from a point on the network. Metering infrastructure is located at the Connection Point and identified via a National Meter Identifier (NMI).</u>
<u>DER Register Commencement Day</u>	<u>The day on which the DER Register is to commencecommenced, which iswas specified in a notice published by AEMO under clause 3.24.16 of the WEM Rules.</u>
<u>Electrical Requirements</u>	<u>The WA Electrical Requirements described in regulation 49(1)(b) of the Electricity (Licensing) Regulations 1991.</u>
<u>kW</u>	<u>Kilowatt</u>
<u>Electric Vehicle Supply Equipment (EVSE)</u>	<u>The stationary equipment that withdraws energy from an electricity network to charge an electric vehicle battery.</u>
<u>NMI</u>	<u>A National Meter Identifier, which is a unique identifier assigned to a Connection Point.</u>
<u>Standards</u>	<u>The relevant technical standard or specification as published by Standards Australia or a relevant standards body.</u>
<u>Vehicle to Grid (V2G)</u>	<u>An electric vehicle and its associated Electric Vehicle Supply Equipment and/or other DER equipment which enables energy to be withdrawn from and injected to an electricity network.</u>

1.3. Interpretation

~~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.~~

~~1.3.1. The following principles of interpretation apply in this Procedure unless the context requires otherwise.~~

- ~~(a) Clauses 1.3 to 1.5 of the WEM Rules apply in this Procedure.~~
- ~~(b) References to time are references to Australian Western Standard Time.~~
- ~~(c) Terms that are capitalised, but not defined in this Procedure, have the meaning given in the WEM Rules.~~
- ~~(d) A reference to the WEM Rules or WEM Procedures includes any associated forms required or contemplated by the WEM Rules or WEM Procedures.~~
- ~~(e) Words expressed in the singular include the plural and vice versa.~~
- ~~(f) A reference to a paragraph refers to a paragraph of this Procedure.~~
- ~~(g) A reference to a clause refers to a clause or section of the WEM Rules.~~
- ~~(h) References to WEM Rules in this Procedure in bold and square brackets **[Clause XXX]** are included for convenience only, and do not form part of this Procedure.~~
- ~~(i) Text located in boxes and headed as Explanatory Note X in this Procedure is included by way of explanation only and does not form part of this Procedure. The Procedure prevails to the extent of any inconsistency with the explanatory notes contained within it.~~
- ~~(j) The body of this Procedure prevails to the extent of any inconsistency with the figures, diagrams, appendices, schedules, annexures or attachments contained within this document.~~

~~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.~~

1.4. Related documents

1.4.1. The documents in Table 2 are associated with this Procedure.

Table 2 Related documents

<u>Reference</u>	<u>Title</u>	<u>Location</u>
<u>WEM Distributed Energy Resource (DER) Register Technical Specification</u>	<u>WEM Distributed Energy Resource (DER) Register Technical Specification</u>	<u>WEM Website</u>

2. DER Register

~~1.4.2.2.1.1.~~ 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 and this Procedure **[clause 3.24.2];(a)**; and
- (b) may also include information of a type similar to the information referred to in paragraph ~~(a)2.1.1(a) which is~~ 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 2004* **[clause 3.24.2];(b)** and which AEMO has determined to include in the DER Register having regard to the matters described in paragraph 3.2.1.

~~2.1.2.~~ AEMO will provide access for Network Operators to electronically must submit and access DER Register Generation Information through via AEMO's digital platform, via an Application Programming Interface (API) link. Further specified in the WEM Distributed Energy Resource (DER) Register Technical Specification.

~~2.1.3.~~ AEMO will document further technical details on the use of the API will be set out in applicable in a WEM Distributed Energy Resource (DER) Register API Technical Specifications and Guides Technical Specification to assist Network Operators in creating, updating and retrieving DER Generation Information consistent with the requirements of this Procedure.

~~2.1.4.~~ AEMO will publish the WEM Distributed Energy Resource (DER) Register Technical Specification specified under paragraph 2.1.3 on the WEM Website.

3. Information held 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.~~

~~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.~~

~~3.1.3.3.1.1. The DER Generation Information that~~ Network Operators must provide the DER Generation Information specified in Appendix A to AEMO ~~on and from the DER Register Commencement Day~~, in accordance with section 4.1, paragraph 4.1.

~~3.1.2.~~ The minimum size of Small Generating Units of Storage Works for which a Network Operator is required to provide DER Generation Information is specified in Appendix A.0 kW.

~~3.1.4.3.1.3.~~ The DER Generation Information that Network Operators ~~must were required to~~ provide to AEMO before the DER Register Commencement Day, in accordance with section 4.2, paragraph 4.3. is specified in Appendix B-Appendix B.

3.2. Additional Information

3.2.1. When determining whether to include the additional information referred to in ~~step 2.1.1(b) paragraph 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; paragraphs 4.1 and 4.3; and
- (d) ~~the~~ matters specified in ~~clauses clause~~ 3.24.9(a) and 3.24.9(b) of the WEM Rules.

~~3.3. Minimum size Submissions and review of Small Generating Units or Storage Works~~

- ~~4. 3.1.1. The minimum size of Small Generating Units or Storage Works for which a Network Operator is required to provide DER Generation Register Information is 0 kW.~~

~~SUBMISSION AND REVIEW OF DER REGISTER INFORMATION~~

~~4.1. New or Modified DER Generation Information~~

E[A] Explanatory Note - Identification of the requirement to submit DER Generation Information

For the avoidance of doubt, AEMO expects that a Network Operator's awareness of requirements included in 4.1.1 can be triggered by the Network Operator's internal processes such as (but not limited to) when it collects information from electrical contractors, the involvement of its technicians in DER commissioning processes or by the identification of the injection of power (i.e. export) through an electricity meter as recorded under the Network Operator's retailer settlement function. Alternatively, the Network Operator's awareness may be triggered by an external process such as (but not limited to) receiving information from a retailer via installation completion notices or other advice from electrical contractors.

- ~~4.1.1. Within This section 4.1 applies with respect to the submission of DER Generation Information 20 Business Days 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 (e) or otherwise receives DER Generation Information relating to a Connection Point on its network must provide that information to AEMO [clause 3.24.5].~~

~~To satisfy, the obligation in step 4.1.2, a Network Operator_s 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. Appendix A to AEMO [clause 3.24.5].~~

4.1.3.4.1.2. Network Operators must submit DER Generation Information electronically to AEMO via AEMO's ~~digital platform~~Application Programming Interface (API) referred to in ~~step 2.1.2~~paragraph 2.1.2 and in accordance with this Procedure and the WEM Distributed Energy Resource (DER) Register Technical Specification.

4.1.3. Where a Network Operator receives an exception notification in accordance with the WEM Distributed Energy Resource (DER) Register Technical Specification, the DER Generation Information is not considered submitted for the purposes of this paragraph 4.1.

4.1.4. Network Operators must review and resolve the relevant exception notifications in accordance with the WEM Distributed Energy Resource (DER) Register Technical Specification.

4.1.4.4.1.5. For the purposes of this ~~section 4.1~~,paragraph 4.1, DER Generation Information is deemed to have been submitted ~~when~~after it has passed the validation checks and met the criteria to be in a confirmed state as described in the WEM Distributed Energy Resource (DER) Register API-Technical Specifications and GuidesSpecification.

4.2. Variations to Australian Standard AS/NZS.4777.2:2020

4.2.1. If the Electrical Requirements prevail over any requirement in Australian Standard AS/NZS 4777.2:2020 applicable to the DER Generation Information, then the Network Operator must provide details of the prevailing Electrical Requirement to AEMO in accordance with paragraph 4.2.2.

4.2.2. Network Operators must inform AEMO and provide details of any prevailing Electrical Requirement within 20 Business Days of the Electrical Requirements being applied and otherwise in accordance with this Procedure.

4.2.3. Other DER Generation Information as set out in Appendix A must be submitted in accordance with paragraph 4.1. For the purposes of paragraph 4.2.1.

4.3. Historical Existing DER Generation Information

4.3.1. ~~By not later than Prior to 30 September 2020, a~~ Network Operators ~~must were required to~~ provide AEMO with all DER Generation Information that ~~it holds~~ they held in relation to the Connection Points on their network in accordance with this section 4.3 **[clause 3.24.3]**.

4.1.5.4.3.2. ~~_____~~ To satisfy the obligation in paragraph ~~4.2.4, 4.3.1, a~~ Network Operators ~~must submit~~ submitted to AEMO the DER Generation Information specified in Appendix B that ~~it holds held~~ for each Connection Point. The method and format for this submission ~~must be was~~ as agreed by the Network Operator and AEMO.

4.1.6.4.3.3. ~~_____~~ AEMO and a Network Operator ~~may could~~ 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.

4.2.4.4. Assessing the accuracy of information

4.2.4.4.4.1. ~~_____~~ AEMO may use any or all of the following ~~information to~~ assess verify 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), paragraphs 2.1.1(b) and section 3.2; 3.2;~~
- (c) other information received and/or held by AEMO, including for example Meter Data Submissions; and
- (d) other information provided by a Network Operator upon request by AEMO.

4.4.2. ~~If AEMO will notify the relevant Network Operator as soon as practicable if~~ AEMO considers:

- (a) any DER Generation Information provided by a Network Operator ~~under section 4.1 to be~~ is incomplete or inaccurate, ~~or no longer accurate AEMO must notify the relevant~~ Network Operator as soon as practicable and;
- (b) a Network Operator has failed to submit DER Generation Information under paragraph 4.1.

4.4.3. Within 20 Business Days of receiving a notification under paragraph ~~step 04.3.2,~~ or within 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.

4.4.4. If at any time a Network Operator becomes aware that DER Generation Information required from it under paragraph 4.1 or paragraph 4.2 has failed to be submitted, is incomplete, inaccurate or no longer accurate and it has not received a notification under paragraph 4.4.3, the 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. Storage

- 5.1.1. The DER Register will be stored in an AEMO managed database with data encrypted at the representational state transfer API architecture (rest) API architecture and access protected with appropriate user authentication and authorisation requirements. The data will be stored with respect to the grid-connected site identified by the NMI each Connection Point.

6. Access to DER ~~Generation~~ Register Information

- 6.1.1. Network Operators must register with AEMO to use the API in accordance with the WEM Distributed Energy Resource (DER) Register Technical Specification. ~~AEMO must provide or give access to DER Generation 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 API described in ~~step 2.1.2 paragraph 2.1.2~~ and in the manner set out in the WEM Distributed Energy Resource (DER) Register Technical Specification.

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
 - (b) aggregated data that can be downloaded in a csv format.
- 7.1.4. The ~~variables available for analysis in the~~ DER Register Report contains information related to the variables are detailed in **Error! Reference source not found.** ~~Appendix C~~.
- 7.1.5. Where appropriate, AEMO ~~must ensure that information will aggregate~~ DER Register Information such that in the DER Register Report ~~is aggregated such that it~~ does not **[clause 3.24.13]**:
- (c) directly or indirectly disclose confidential information; or
 - (d) 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 will document and~~ publish on the WEM Website details ~~on~~of the extent to which, ~~in general terms,~~ DER Register Information has informed ~~AEMO's~~AEMO's development or use of load forecasts, or the performance of its functions ~~referred to in clause 3.24.6 of for ensuring~~ 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 SWIS operates in a secure and reliable manner [clause 3.24.7].

7.2.2. ~~For the purposes of paragraph 7.2.1, AEMO will~~may include ~~a discussion on the extent to which DER Generation Information informed the Long Term PASA load forecasts~~relevant DER Generation Information in the~~AEMO's~~ Statement of Opportunities ~~Report published under clause 4.5.11 of the WEM Rules~~or other forecast publications.

~~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.~~

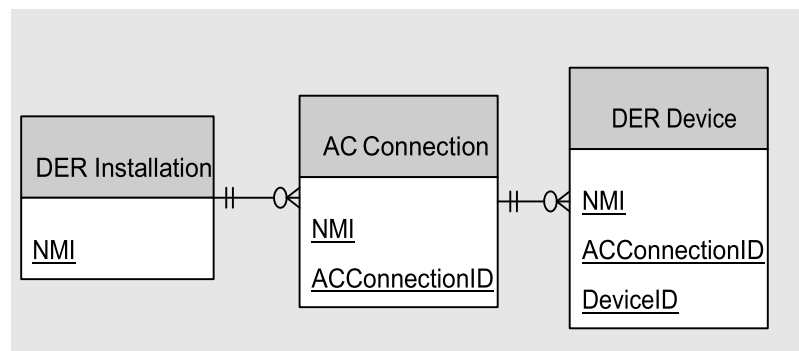
Appendix A. DER Register Data Model

This appendix specifies the DER Generation Information ~~to that must 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 submitted to AEMO in accordance with paragraph 4.1.~~

~~Installed DER Equipment and characteristics. Figure 1 depicts the relationships between the three~~ are diverse so the DER Register is structured with ~~three data levels~~, such that it can receive and store DER Generation Information consistently whilst allowing for this diversity:

- **Information in Level 1** reflects the characteristics of the whole installation and any requirements imposed by the Network Operator in relation to the Connection Point. Each record held in the DER Register is identified by the NMI and a single set of Level 1 information must be provided for each record.
- **Information in Level 2** describes the equipment that interacts with the AC electrical system. As 'AC Connection' equipment can be of varied technologies Level 2 specifies the information to be provided based on the selection of the technology, activated operating modes, the Network Operator's connection requirements and (where relevant) Standards. As any Connection Point may have multiple forms of DER, the DER Register allows many AC Connections to be associated with the Connection Point.
- **Information in Level 3** describes the primary energy equipment or 'Devices' used by the Small Generating Unit or Storage Works. As each AC Connection is unique to its primary energy equipment the DER Register requires Level 3 information to be associated with its respective Level 2 information. This association is made via the AC Connection ID field which is generated by the DER Register when the record is created.

Figure 1 ~~Relationships between data model levels~~ Depicts the DER Register data model levels.



The following general rules are to be used to support the interpretation of the data model.

- All data fields are mandatory to the category they are outlined to apply to and are to be submitted and/or updated in accordance with paragraph 4.1.
- Data fields categorised as optional should be provided where this information is relevant and available.
- Data field categories that are parent to sub-categories are shown in yellow with the sub-categories of data listed underneath.
- Where data fields list options, for example 'Enabled' or 'Not Enabled' or 'Yes' or 'No', a valid option must be provided.
- Where a permitted data value is not outlined in this Procedure, for example a data value range of $0 < \text{value} < 0.999$, it is detailed in the WEM Distributed Energy Resource (DER) Register Technical Specification.

Data Model Level 1 – DER Installation

Level 1 applies to all Small Generating Units and Storage Works installed at a NMI-single Connection Point in aggregate. Each DER Installation is uniquely identified (in level 2) by the NMI and ACconnectionID. All fields are mandatory, where applicable to any given DER at the Connection Point. A 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 (Level 1) can comprise one or more options must be selected. AC Connections (Level 2) with one or more DER Devices (Level 3) associated with each AC Connection (noting the associations per Figure 1).

- Where relevant, the provision of a 'null' value indicates that the settings are not enabled.

Table 3 Level 1 – DER Installation Data Requirements

Data Field Category of data	Sub-category of data	Applies to category	Description	Field typeType	Mandatory (M) Optional (O)	Other comments
NMI	<u>N/A</u> This is a parent category to the sub-category fields listed underneath it.	N/A	Unique identifierNational Metering Identifier allocated by the Network Operator for each Connection Point where the DER Installation is. Installation has been installed.	Alpha-numeric	<u>M</u>	
	NMI TNI	NMI	The code identifying the Transmission Node Identifier.	Alpha-numeric	<u>M</u>	To align with the code allocated by the Network Operator.
	NMI Status	NMI	The status of the NMI. (Either 'Active', 'Inactive' or 'Extinct')	Text	<u>M</u>	Active, Inactive, Extinct The status of either Active or Extinct must be provided. <ul style="list-style-type: none"> Active: Applies when an NMI is energised. Extinct: Applies when the Connection Point has been permanently removed. To maintain data integrity, where an NMI becomes Extinct, the Network Operator must submit a change record to change the NMI Status to Extinct.
	NMI Zzone Substation	NMI	The name ID of the Zone Substation to which the NMI is connected.	Alpha-numeric	<u>M</u>	To align with the name ID allocated by the Network Operator.
	NMI postcodePostcode	NMI	Postcode where the NMI is installed.	Alpha-numeric	<u>M</u>	
Approved DER Generation Capacity	<u>N/A</u>	<u>All</u>	Approved DER generation capacity as approved by the Network Operator and as stated in the associated Connection Agreement (kVA).	<u>Numeric</u>	<u>M</u>	
DER Load Capacity	<u>N/A</u>	<u>All</u>	The DER Load Capacity (kVA). (e.g., the total load capacity of EVSE or a controllable loads).	<u>Numeric</u>	<u>M</u>	



Data Field Category of data	Sub-category of data	Applies to category	Description	Field typeType	Mandatory (M) Optional (O)	Other comments
Approved capacity Export Limit	N/A	<u>N/AAll</u>	<u>Approved-The maximum amount of power that can be exported (sent out) from the Small Generating Unit and/or Storage Works capacity as agreed with Network Operator in the connection agreement (kVA)-, through the Connection Point (kW).</u>	Numeric	<u>M</u>	<u>Can be distinct or equal to an export limitation-Where an export limit is applied, the Export Limit provided must be equal to or smaller than the Approved DER Generation Capacity.</u> <u>Where there is no export limit applied the Approved DER Generation Capacity is to be provided.-.</u>
Import Limit	<u>N/A</u>	<u>All</u>	<u>The maximum amount of power that can be imported (drawn) from the load, through the Connection Point (kW).</u>	<u>Numeric</u>	<u>M</u>	<u>Where an import limit is applied, the Import Limit provided must be equal to or smaller than the DER Load Capacity.</u> <u>Where there is no import limit applied, the DER Load Capacity is to be provided.</u>
Installer Identification	N/A	<u>N/AAll</u>	Unique identifier for the installer accountable for the installation, modification or removal of the Small Generating Unit and/or Storage Works in accordance with <u>this</u> the NMI and <u>the associated</u> Connection agreement <u>Agreement</u> 'Job number'-.'	Alpha-numeric	<u>M</u>	This identifier should be <u>must match</u> the installer's unique qualification number (e.g. which is the electrical tradespersons/contractor's licence or similar accreditation number)-.
Connection Agreement 'Job number'	N/A	<u>N/AAll</u>	Unique identifier associated with the Network Operator's <u>C</u> onnection offer/ <u>A</u> greement for the approved works.	Alpha-numeric	<u>M</u>	This identifier is specified by the Network Operator as per its connection process. <u>The Job Number must be unique for a NMI, it must not have been submitted before for a different NMI.</u>
Number of Phases Available	N/A	<u>N/AAll</u>	The number of phases available for the installation of Small Generating Units and Storage Works (Either 1, 2 or 3)-as <u>approved in the associated Connection Agreement.</u>	Numeric integer	<u>M</u>	<u>Either 1, 2 or 3 phases must be provided.</u>
Number of Phases with DER Installed	N/A	<u>N/AAll</u>	The number of phases that the Small Generating Unit and/or Storage Works is installed on (Either 1, 2 or 3)-, consistent with the Network Operator's technical requirements.	Numeric integer	<u>M</u>	<u>Either 1, 2 or 3 phases must be provided.</u>



Data Field Category of data	Sub-category of data	Applies to category	Description	Field typeType	Mandatory (M) Optional (O)	Other comments
Islandable Installation	N/A	<u>N/AAll</u>	For identification of Small Generating Units and/or Storage Works designed with the ability to operate in an islanded mode. (Either 'Yes' or 'No'), or as an uninterruptible power supply.	Text	<u>M</u>	If a value of 'No' is <u>Either Yes or No must be</u> provided, this can mean 'No' or 'Unknown'.
Central Protection and Control	<u>N/AThis is a parent category to the sub-category fields listed underneath it.</u>	<u>N/AAll</u>	For DER installations where the Network Operators specify Operator specifies the need for additional forms of protection above those inbuilt in an inverter. (Either 'Yes' or 'No').	Text	<u>M</u>	Used to describe/identify the type(s) installation of central protection to be applied to the DER Installation where additional forms of protection are required as per the sub category's fields below. Either Yes or No must be provided. Note: This selection and subsequent information should be consistent with the Network Operator's technical requirements for connection as applied at the Connection Point (for example, for Small Generating Units greater than 30 kVA).
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.
<p>The below protection and control sub-category data fields are to capture the different categories of central protection in use for Small Generating Units and Storage Works. Where the Network Operator has required the Small Generating Unit or Storage Works to install central protection equipment, and subsequently provided "Yes" for Central protection and control, the relevant protection and control sub-category data field(s) must be provided.</p> <p>Note that where "Yes" is provided for Central protection and Control at least one sub-category must be provided.</p>						
	Export limitation	If 'Central Protection and Control' = Yes, the relevant protection sub-category field(s) must be provided.	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	<u>M</u>	As described in AS4777-1: 2016 section 3.4.4.3 As described in the Network Operator's technical specifications, or as otherwise applied by the Network Operator to the Small Generating Unit or Storage Works.
	Under-Frequency Protection Delay (F<)		Trip delay time (seconds).	Numeric	<u>M</u>	
	Over-Frequency Protection (F>)	Protective function frequency trigger (Hz).	Numeric	<u>M</u>		



Data Field Category of data	Sub-category of data	Applies to category	Description	Field typeType	Mandatory (M) Optional (O)	Other comments
	Over-Frequency Protection Delay (F>)		Trip delay time (seconds).	Numeric	M	If these schemes are applied as forms of central protection
	Undervoltage Protection (V<)		Protective function voltage trigger (Volts).	Numeric	M	
	Undervoltage Protection Delay (V<)		Trip delay time (seconds).	Numeric	M	
	Overvoltage Protection (V>)		Protective function voltage trigger (Volts).	Numeric	M	
	Overvoltage Protection Delay (V>)		Trip delay time (seconds).	Numeric	M	
	Rate of Change of Frequency (RoCoF)		Rate of change of frequency trip point (Hz/s).	Numeric	M	
	Voltage Vector Shift		Trip angle (Deg.)	Numeric	M	
	Inter-Trip Scheme		Description of the form of inter-trip (e.g.e.g., "from local substation").	Text	M	
	Sustained Over Voltage		Protective function voltage trigger (Volts).	Numeric	M	
	Sustained Over Voltage Delay		Trip delay time (seconds).	Numeric	M	
	Neutral Voltage Displacement		Trip voltage (Volts)	Numeric	M	
	Other		Other protection settings	Text	M	Where relevant, the details which describe other types of protection settings applied by the Network Operator to the Small Generating Unit or Storage Works that are not listed in the above sub-categories are to be provided.
Comments	comments	All	Comments text.	Text	O	Additional free text area for to provide any relevant comments (max. 2000 characters)-in relation to the DER Installation Level 1 information.

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.

Level 2 applies to the DER Equipment that interacts with the AC electrical system at each Connection Point (identified by the NMI) as described by the Level 1 information. Many 'AC Connections' can be recorded in association with each NMI and each AC Connection record must have at least one DER Device (Level 3) associated with it.

Where more than one unit of DER Equipment is installed and each unit has identical attributes, most of the Level 2 information can be provided once, with the DER Equipment Unit Count used provided to describe the combined installation. The only exception to this is the Serial Number which must be provided for each individual DER Equipment Unit. Alternatively, a unique AC Connection record can be provided for each unit of DER Equipment.

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.

Table 4. Level 2 – AC Connection Data Requirements

Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) / Optional (O)	Other comments/Comments
AC Connection ID	<u>N/A</u>	All	Unique identifier for each AC Connection, or Group in a DER Installation (15-digit).	Numeric integer	<u>System Generated</u>	<u>System</u> AEMO system generated identifier.
NSP Connection ID/Network Operator Asset Identifier	<u>N/A</u>	All	An AC Connection Unique DER asset identifier used by the Network Operator to identify the DER Equipment described by the respective Level 2 information internally; Network Operators can use this field to link their internal ID with AEMO's generated AC Connection ID.	Text	<u>M</u>	Optional field that can be used to support Network Operator business processes. The Asset Identifier provided by the Network Operator to AEMO must align to the Asset Identifier that is used in other operational processes (for example, identifiers provided to an electricity retailer to identify DER Equipment).
DER Equipment Type/Number of AC Connections	<u>N/A</u>	<u>All</u>	Identifies the type of DER Equipment interacting with the AC electrical system. 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.	Text Numeric integer	<u>M</u>	Used to multiply capacities to comprise the total device capacity. The DER Equipment Type must be provided as either: <ol style="list-style-type: none"> 1. <u>Battery Storage Inverter</u> 2. <u>Controllable Load (e.g., hot water tanks, pool pumps, heating ventilation and air-conditioning)</u> 3. <u>Hybrid Inverter (e.g., DC-Coupled, Solar PV & Battery Storage/Electric Vehicle)</u> 4. <u>Electric Vehicle Supply Equipment (EVSE) V2G (Vehicle to Grid enabled)</u> 5. <u>Electric Vehicle Supply Equipment (EVSE) (no V2G capability)</u> 6. <u>Rotating Machine</u> 7. <u>Solar PV Inverter</u>
AC equipment type/DER Equipment Unit Count	<u>N/A</u>	All DER Equipment Types	The number of DER Equipment units with identical attributes. 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').	Numeric integer Text	<u>M</u>	
Inverter Equipment Manufacturer	<u>N/A</u>	If AC equipment type = inverter All DER Equipment Types	The name of the inverter Equipment Manufacturer.	Text	<u>M</u>	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 Equipment Series	<u>N/A</u>	If AC equipment type = inverter All DER Equipment Types	The Equipment inverter Sseries.	Text	<u>M</u>	



Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other comments/Comments
<u>Inverter Equipment Model Number</u>	<u>N/A</u>	If AC equipment type = inverter <u>All DER Equipment Types</u>	The <u>Equipment Model Number</u> of the inverter.	Text	<u>M</u>	
<u>Equipment Inverter Serial Number</u>	<u>N/A</u>	If AC equipment type = inverter <u>All DER Equipment Types</u>	The <u>Equipment Serial Number</u> of the device(s).	Alpha-numeric	<u>M</u>	Primary-generation device serial-number(s) <u>A serial number must be provided for each individual DER Equipment unit.</u>
<u>Commissioning Date</u>	<u>N/A</u>	<u>All DER Equipment Types</u>	The date that the <u>Installer-DER Equipment</u> is commissioned.	Date	<u>M</u>	<u>Needed to monitor / manage obligation on timeframe to complete submission of record.</u>
<u>DER Equipment Status</u>	<u>N/A</u>	<u>All DER Equipment Types</u>	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') <u>The DER Equipment's operating status.</u>	Text	<u>M</u>	Changes to this status will be used to track activation/deactivation and decommissioning dates <u>The status of Active or Decommissioned must be provided:</u> <ul style="list-style-type: none"> <u>Active: DER Equipment that is physically installed and operating.</u> <u>Decommissioned: DER Equipment that is no longer operating.</u> <u>To maintain data integrity, when DER Equipment is Decommissioned, the Network Operator must submit a record update to change the DER Equipment Status to Decommissioned.</u>
<u>Inverter device Equipment Injection Capacity</u>	<u>N/A</u>	If DER Equipment Type = 1. <u>Battery Storage Inverter</u> or 3. <u>Hybrid Inverter</u> or 4. <u>EVSE V2G</u> or 6. <u>Rotating Machine</u> or 7. <u>Solar PV Inverter</u>	The rated AC-output power that is listed on each unit in the product on each unit as specified by the manufacturer (kVA) that can be sent out into the AC electrical system.	Numeric	<u>M</u>	This value refers to <u>the injection capacity of a single inverteunit, a single generation rated capacity</u> , the Number of AC-Connection Fields multiplies this to calculate total AC-Connection Capacity of each unique DER generation equipment.

Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
Equipment Withdrawal Capacity	N/A	If DER Equipment Type = 1.Battery Storage Inverter or 2.Controllable Load or 3.Hybrid Inverter or 4.EVSE V2G or 5. EVSE no V2G	The rated consumption power that is listed on each unit as specified by the manufacturer (kW) that can be taken from the AC electrical system.	Numeric	M	This value refers to the withdrawal capacity of a single unit, a single load rated capacity of each unique DER load equipment.
Electric Vehicle Supply Equipment (EVSE) Ownership Status	N/AN/A	If DER Equipment Type = 4.EVSE V2G or 5.EVSE no V2G	The ownership status is used to identify if the Electric Vehicle Supply Equipment (EVSE) is owned for private, public or fleet use.	Text	M	The ownership status is to be provided as either: <ul style="list-style-type: none"> Private Public Fleet
Authorised Agent	N/A	All DER Equipment Types	Where enabled, the name of the entity responsible for facilitating the control of the DER Equipment.	TextText	MM	As defined in the Network Operator's connection and DER management requirements.
DER Management Method	N/AN/A	All DER Equipment Types	Where required by the Network Operator, the method of control of the DER Equipment used by the Authorised Agent.	Text	M	Where installed, the DER Management Method applied to the DER Equipment (e.g., meter-based isolation, internet based).
What The Standard(s) which apply to the DER inverter? Equipment	This is a parent category to the data sub-category field listed underneath it.	If AC equipment type = inverter All DER Equipment Types	The Standard(s) the inverter- <u>DER Equipment</u> is manufactured, tested and installed to- comply with in accordance with the Standards in effect on the commissioning date of the equipment (e.g.e.g., communication standards, grid connection standards, supply equipment standards, inverter standards).	Text	M	Examples include AS4777.2:2015, IEC 62109-1 and IEC 62019-2. The applicable Standard(s) relevant to the DER Equipment must be provided. Examples include: <ul style="list-style-type: none"> AS/NZS.4777.2:2015 Or AS/NZS.4777.2:2020, (Grid connection of energy systems via inverters, inverter requirements). IEC 62109-1, and IEC 62019-2,- (Safety of power converters for use in PV systems). IEC 61851-25:2020 – (DC EV supply equipment for charging electric vehicles). IEC 62196-6:20202 – (Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles).



Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
<p><u>The Australian Standard AS/NZS.4777.2:2020 - Grid Connection of Energy Systems via Inverters came into effect from 18 December 2021 and introduced regional settings for inverter-based resources, with a requirement that all new inverter-based resources connected to the South West Interconnected System and commissioned from that date apply region 'Australia B' settings.</u></p> <p><u>Where the Network Operator provides the Region Setting as 'Australia B,' AEMO will interpret the 'Australia B' settings as set and published in the Australian Standard AS/NZS.4777 applicable at the commissioning date of the equipment. If the Electrical Requirements prevail over any requirement in Australian Standard AS/NZS 4777.2:2020 applicable to the DER Generation Information, then the Network Operator must provide details of the prevailing Electrical Requirement to AEMO in accordance with paragraph 4.2.2.</u></p>						
	Region Setting	If DER Equipment Type = 1. <u>Battery Storage Inverter</u> or 3. <u>Hybrid Inverter</u> or 4. <u>EVSE V2G</u> or 7. <u>Solar PV Inverter</u>	Per the Australian Standard <u>AS/NZS.4777.2:2020 'Australia B' is the applicable Region Setting for the South West Interconnected System.</u>	Text	M	Australia B is to be provided as the Region Setting applicable for the <u>South West Interconnected System.</u>
	<u>Additional Network Operator Requirements</u>	<u>Where the 'Region Setting' is provided and additional or alterations of prescribed settings in the relevant Standard have been imposed on the AC Connection equipment.</u>	<u>Provide additional information to describe any Network Operator requirements that are in addition to or in alteration of prescribed settings in the relevant Standard, details must be provided.</u>	Text	M	Requirement descriptions must include the <u>Standard name, version, paragraph reference number, setpoint naming as referenced in the relevant Standard and the divergent set point values.</u> <u>Examples of variations and the level of information to be provided:</u> <ul style="list-style-type: none"> • <u>Example 1: AS/NZS4777.2:2020, 3.3.2.3 Volt-var response mode, Vv1 = 210 V, Q at Vv1 = 20 %, Vv2 = 215 V, Q at Vv2).</u> • <u>Example 2: AS/NZS4777.2:2020, 4.5.3 Sustained operation for frequency variations, Fllco = 49.8 Hz, Fpmax = 48.3 Hz).</u>
<p><u>The following data field categories and sub-categories are as described in the Australian Standard AS/NZS4777.2:2015 – 'Grid Connection of Energy Systems via Inverter' must be provided where this Standard is relevant to the AC Connection equipment (for example for equipment commissioned prior to 18 December 2021).</u></p>						



Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
V _{nom-max} (sustained Operation Overvoltage Limit)	N/A	If AC equipment type = inverter If DER Equipment Type = 1. Battery Storage Inverter or 3. Hybrid Inverter or 7. Solar PV Inverter	indicates the sustained operation overvoltage limit (V). <u>Indicates the sustained operation overvoltage limit, when the average voltage for a 10-minute period exceeds the V_{nom-max}.</u>	Numeric	M	<u>As described in AS4777.2:2015, section 7.5.2.</u>
F _{stop} (over-frequency)	N/A		Frequency (Hz) where power output is zero.	Numeric	M	<u>As described in AS4777.2:2015, section 7.5.3.</u>
F _{stop-CH} (under frequency)	N/A	If AC equipment type = inverter	Frequency (Hz) power input.	Numeric	M	
Inverter / DRED interaction	N/A		(Either 'Yes' or 'No') <u>Indicates if the inverter is interacting with a demand response enabling device (DRED).</u>	Text	M	<u>Either Yes or No must be provided.</u>
Inverter power quality response modes – Voltage Response Modes – volt-watt response	<u>This is a parent category to the data sub-category fields listed underneath it.</u>	If AC equipment type = inverter If DER Equipment Type = 1. Battery Storage Inverter or 3. Hybrid Inverter or 7. Solar PV Inverter	<u>Selection</u> <u>Indicates if the operating mode is enabled or not.</u>	Enabled/ Not Enabled Text	M	<u>As described in AS4777.2:2015, section 6.3.2.2.</u> <u>Either Enabled or Not Enabled must be provided.</u>
	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	M	<u>To be populated if mode enabled.</u> <u>To be provided where volt-watt response mode is Enabled.</u>
	V2			Numeric		
	V3			Numeric		
	V4			Numeric		
	P at V1			Numeric		
	P at V2			Numeric		

Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
	P at V3			Numeric		
	P at V4			Numeric		
Inverter power quality response modes – Voltage Rresponse modes – volt-var response	This is a parent category to the data sub-category fields listed underneath it.	If AC equipment type = inverter If DER Equipment Type = 1. Battery Storage Inverter or 3. Hybrid Inverter or 7. Solar PV Inverter	(Selection). Indicates if the operating mode is enabled or not.	Enabled / Not Enabled Text	<u>M</u>	As described in AS4777.2:2015, section 6.3.2.3. <u>Either Enabled or Not Enabled must be provided.</u>
	V1	If Inverter power quality response modes – Voltage Rresponse modes – volt-var response = Enabled	V1 to V4 in V Q-at-V1 to Q-at-V4 in %	Numeric	<u>M</u>	To be populated if mode enabled. To be provided where the volt-var response mode is Enabled
	V2			Numeric		
	V3			Numeric		
	V4			Numeric		
	Q at V1			Numeric		
	Q at V2			Numeric		
	Q at V3			Numeric		
	Q at V4			Numeric		
Inverter power quality response modes – Reactive Ppower Mmode	This is a parent category to the data sub-category fields listed underneath it.	If AC equipment type = inverter If DER Equipment Type = 1. Battery Storage Inverter or 3. Hybrid Inverter or	Select which power quality response modes are enabled on the inverter. (Selection). Indicates if the operating mode is enabled or not.	Enabled / Not Enabled Text	<u>M</u>	As described in AS4777.2:2015, section 6.3.3. Fixed to 'Not Enabled' if either of the voltage response modes are Enabled. <u>Either Enabled or Not Enabled must be provided.</u>

Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
		<u>7. Solar PV Inverter</u>				
	Fixed <u>R</u> reactive <u>P</u> power	If <u>Inverter power quality response modes</u> —Reactive <u>P</u> power <u>M</u> mode = Enabled	Reactive <u>P</u> power. Specified in % output of the system.	Numeric	<u>M</u>	To be populated if mode enabled. <u>To be provided where the Reactive Power Mode is Enabled.</u>
<u>Inverter power quality response modes</u> — <u>Fixed P</u> power <u>F</u> factor <u>M</u> mode	<u>This is a parent category to the data sub-category fields listed underneath it.</u>	If AC equipment type = inverter If DER Equipment Type = <u>1. Battery Storage Inverter</u> or <u>3. Hybrid Inverter</u> or <u>7. Solar PV Inverter</u>	Select which power quality response modes are enabled on the inverter. (Selection). <u>Indicates if the operating mode is enabled or not.</u>	Enabled/ Not Enabled Text	<u>M</u>	As described in AS4777.2:2015, section 6.3.3. Fixed to 'Not Enabled' if either of the voltage response modes are Enabled. <u>Either Enabled or Not Enabled must be provided.</u>
	Fixed <u>P</u> power <u>F</u> factor	If <u>Inverter power quality response modes</u> —Fixed <u>P</u> power <u>F</u> factor <u>M</u> mode = Enabled	Power <u>F</u> factor	Numeric	<u>M</u>	To be populated if mode enabled. <u>Power factor expected to be between 0.8 source and 0.8 sink.</u> <u>To be provided where the Fixed Power Factor Mode is Enabled.</u>
	Fixed <u>P</u> power <u>F</u> factor <u>Q</u> quadrant		Power <u>F</u> factor <u>Q</u> quadrant. (Either 'Source' or 'Sink').	Text	<u>M</u>	
<u>Inverter power quality response modes</u> — <u>Power F</u> factor <u>C</u> urve / <u>P</u> power <u>R</u> esponse <u>M</u> mode	<u>This is a parent category to the data sub-category fields listed underneath it.</u>	If AC equipment type = inverter If DER Equipment Type = <u>1. Battery Storage Inverter</u> or <u>3. Hybrid Inverter</u> or <u>7. Solar PV Inverter</u>	Select which power quality response modes are enabled on the inverter. (Selection). <u>Indicates if the operating mode is enabled or not.</u>	Enabled/ Not Enabled Text	<u>M</u>	As described in AS4777.2:2015, section 6.3.4. Fixed to 'Not Enabled' if either of the voltage response modes are Enabled. <u>Either Enabled or Not Enabled must be provided.</u>
	P1		Reference <u>P</u> point for P1 (kW)	Numeric	<u>M</u>	To be populated if mode enabled

Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) / Optional (O)	Other comments/Comments
	P2	Inverter power quality response modes— If Power Ffactor Curve / Ppower Rresponse Mmode = Enabled	Reference Ppoint for P2 (kW)	Numeric		To be provided where the Power Factor Curve / Power Response Mode is Enabled—.
	Power Ffactor at P1		Power Ffactor	Numeric		
	Power Ffactor Qquadrant at P1		Power Ffactor Qquadrant. (Either 'Source' or 'Sink').	Pick List {source, sink} Text		
	Power Ffactor at P2		Power Ffactor	Numeric		
	Power Ffactor qQuadrant at P2		Power Ffactor Qquadrant. (Either 'Source' or 'Sink').	Pick List {source, sink} Text		
Inverter power quality response modes— Power Rrate Llimit / Changes mode— AC Ooperation and Ccontrol change	This is a parent category to the data sub-category fields listed underneath it.	If AC equipment type = inverter If DER Equipment Type = 1. Battery Storage Inverter or 3. Hybrid Inverter or 7. Solar PV Inverter	Select which power quality response modes are enabled on the inverter. (Selection) Indicates if the operating mode is enabled or not.	Enabled / Not Enabled Text	M	This mode is described in AS4777.2:2015, section 6.3.5.1. Either Enabled or Not Enabled must be provided.
	Power Ramp Rate	If Inverter power quality response modes—Power Rrate Llimit / Changes mode— AC Ooperation and Ccontrol change = Enabled	Power Rramp Rrate (%/minute) Unit in WGra	Numeric	M	To be provided where the Power Rate Limit Mode / Changes in AC Operation and Control is Enabled—. To be populated if mode enabled
The following data field categories and sub-categories must be provided where relevant for rotating machines.						



Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
Non-inverter generator – voltage/reactive power regulation Rotating Machine Voltage / Reactive Power Regulation	This is a parent category to the data sub-category fields listed underneath it.	If AC equipment type NOT inverter If DER Equipment Type = 6. Rotating Machine.	(Either 'None', 'Voltage droop' or 'Fixed power factor') Indicates if the operating mode is enabled or not.	Text	M	Only populate below fields if selection is 'Voltage droop' or 'fixed power factor'. Either None, Voltage Droop or Fixed Power Factor must be provided.
If 'Voltage droop' selected	Voltage Sset Ppoint	If generator voltage/reactive power regulation mode = voltage droop If Rotating Machine Voltage / Reactive Power Regulation = Voltage Droop	(Either % Nominal Vvoltage, or V)	Numeric	M	To be provided where the Rotating Machine Voltage / Reactive Power Regulation is provided as Voltage Droop.
	Voltage Sset Ppoint Uunit		(Either % or V)	Text		
	Dead-Bband		(± x%)	Numeric		
	Droop		(%)	Numeric		
	Base for Ddroop		(kVA)	Numeric		
	Reactive Ppower Ssource Llimit		(KVAr)	Numeric		
	Reactive Ppower Ssink Llimit		(KVAr)	Numeric		
If 'Fixed power factor' selected	Fixed Ppower Ffactor	If generator voltage/reactive power regulation mode = fixed power factor If Rotating Machine Voltage / Reactive Power Regulation = Fixed Power Factor	Power Ffactor	Numeric	M	Expected to be between 0.8 source and 0.8 sink. To be provided where the Rotating Machine Voltage / Reactive Power Regulation mode is provided as Fixed Ppower Factor.— A value of either Source or Sink is to be provided where the Rotating Machine Voltage / Reactive Power Regulation is provided as Fixed Power Factor.—
	Fixed Ppower Ffactor Qquadrant	Power Ffactor Qquadrant. (Either 'Source' or 'Sink').	Text			
Non-inverter Generator	This is a parent category to the data sub-category fields	If AC equipment type NOT inverter	Generator ramp rate. (Selection). Indicates if the operating mode is enabled or not.	Enabled/ Not Enabled Text	M	Either Enabled or Not Enabled must be provided.

Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
Rotating Machine Ramp Rate	listed underneath it.					
	Power Ramp Gradient	If generator ramp rate = Enabled If Rotating Machine Ramp Rate = Enabled	Power Ramp Rate (%/min)	Numeric	M	To be provided where the Rotating Machine Ramp Rate is Enabled.
Rotating Machine Non-inverter Generator Frequency Response Mode	This is a parent category to the data sub-category fields listed underneath it.	If AC equipment type NOT inverter If DER Equipment Type = 6. Rotating Machine	Frequency sensitive mode Indicates if the operating mode is enabled or not.	Enabled/ Not Enabled Text	M	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'. Either Enabled or Not Enabled must be provided.
	Frequency Dead-band	If Rotating Machine Frequency Response Mode = Enabled	(Hz)	Numeric	M	To be provided where the Rotating Machine Frequency Response Mode is Enabled.
	Frequency Droop		(%)	Numeric	M	
Protection and control modes			Protection settings			Available fields to capture settings for any additional independent protection relays if used at the AC Connection level.
<p>The below data categories are to provide additional information for protection equipment the Network Operator may require for the AC Connection equipment, where these are not described by other Level 1 data fields.</p>						
Rate of Change of Frequency (RoCoF)	Rate of Change of Frequency (RoCoF)		Rate of change of frequency (Hz/s)	Numeric	M	To be provided where these schemes are applied as additional forms of protection.
Voltage Vector Shift	Voltage Vector Shift		Trip angle (Deg.)	Numeric		



Data Category of data	Data Sub-category of data	Applies to category	Description	Field type / validation Type	Mandatory (M) Optional (O)	Other commentsComments
Inter-trip Scheme	Inter-trip scheme		Description of the form of inter-trip (e.g.e.g., "from local substation").	Text		
Neutral Voltage Displacement	Neutral voltage displacement		Trip voltage (Volts)	Numeric		

Data Model Level 3 – DER Device

Level 3 applies to the DER Equipment that generates, stores and/or consumes energy in relation to the Small Generating Unit or Storage Works.

As each AC Connection is unique to its primary energy equipment the DER Register requires Level 3 information to be associated with its respective Level 2 information. Many 'Devices' can be recorded in association with each AC Connection, reflecting the reality that DER Installations are generally dependent on numerous smaller units combined into a single primary energy system (e.g., a number of identical solar panels forming an array), or for the case of a hybrid inverter recorded in Level 2, different devices would be provided.

Where multiple Devices are installed with identical attributes, most of the Level 3 information can be provided once, with the number of Devices provided to describe the combined installation. In this case, device attributes only need to reflect a single unit (e.g., a single solar panel), with the total system described by multiplying this data by the number of devices.

~~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.~~

Table 5 Level 3 – DER Device Data Requirements

Data Category	Data Sub-category	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other Comments
<u>AEMO Device Identifier ID</u>	<u>N/A</u>	<u>All</u>	Unique identifier for a single DER Device or a group of DER Devices with the same attributes. (15 digit). <u>The unique identifier for a single DER Device.</u>	Numeric integer	<u>M</u>	System-generated unique Device identifier. <u>AEMO system generated unique DER Device identifier.</u>
<u>NSP Device ID</u> <u>Network Operator Asset Device Identifier</u>	<u>N/A</u>	<u>All</u>	DER Device identifier that can be used by Network Operators. <u>The unique DER Asset Device Identifier that is used by the Network Operator.</u>	Text	<u>O</u>	Optional field that can be used to support Network Operator business processes. <u>Optional field that can be provided to AEMO to align the Asset Device Identifier used to support the Network Operator's business processes (e.g., the Asset Device Identifier that is provided to an electricity retailer to identify the DER Device).</u>
<u>DER Device Type</u>	<u>This is a parent category to the sub-category field listed underneath it.</u>	<u>All</u>	Used to indicate the primary technology used in the DER Device. (Either 'Fossil', 'Hydro', 'Wind', 'Solar PV', 'Renewable/Biomass/Waste', 'Geothermal', 'Storage', 'Other')	Text	<u>M</u>	Free text field is provided if 'Other' is selected. <u>The relevant DER Device Type must be provided as either:</u> <ol style="list-style-type: none"> 1. <u>Solar PV panels</u> 2. <u>Storage (including vehicle to grid electric vehicle)</u> 3. <u>Controlled load (including EVSE)</u> 4. <u>Co- / Tri-generation</u> 5. <u>Liquid fuel / Gas</u> 6. <u>Small hydro</u> 7. <u>Small wind</u> 8. <u>Waste to energy</u>
	Device-sub-type		Used to indicate the primary technology used in the DER	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

Data Category	Data Sub-category	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other Comments
			Device. (One of a selection dependent on device type).			a battery is contained in an electric vehicle connected in a vehicle-to-grid arrangement.
	<u>Comments</u>	<u>All</u>		<u>Text</u>	<u>O</u>	<u>The comments field can be used to provide details of other types of DER Devices which are not described in the above listing of DER Device Types or to provide additional comments.</u>
Number of DER Devices	<u>N/A</u>	<u>All DER Device Types</u>	Number of devices in the group of DER Devices. <u>The number of DER Devices with identical attributes provided as Level 3 information.</u>	Numeric integer	<u>M</u>	<u>Used to multiply capacities to comprise the total DER Device capacity.</u>
Manufacturer	<u>N/A</u>	<u>All DER Device Types</u>	The name of the <u>DER Device</u> manufacturer.	Text	<u>M</u>	May be aligned to available product databases or entered as free text. <u>Note: These fields are reviewed against industry standard product databases, with discrepancies treated as acknowledgeable but not preventing compliance.</u>
Model Number	<u>N/A</u>	<u>All DER Device Types</u>	The model number of the <u>DER Device</u> .	Text	<u>M</u>	
DER Device Status	<u>N/A</u>	<u>All DER Device Types</u>	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') <u>Code used to indicate the status of the DER Device.</u>	Text	<u>M</u>	Changes to this status will also be used to track activation/deactivation and decommissioning dates. <u>The status of: Active or Decommissioned must be provided:</u> <ul style="list-style-type: none"> <u>Active means a DER Device that is physically installed and operating.</u> <u>Decommissioned means a DER Device that is no longer actively operating.</u> <u>To maintain data integrity, when a device is Decommissioned the Network Operator must submit a record update to change the Device Status to Decommissioned.</u> <u>The Device Status must be updated to Decommissioned if DER Equipment Status at the AC Connection Level 2 linked to it has been Decommissioned.</u>

Data Category	Data Sub-category	Applies to category	Description	Field Type	Mandatory (M) Optional (O)	Other Comments
Nominal Rated Generation Capacity	<u>N/A</u>	If DER Device Type = <u>1.Solar PV</u> or <u>2. Storage</u> <u>4.Co / Tri-generation</u> or <u>5.Liquid fuel / Gas</u> or <u>6.Small hydro</u> or <u>7.Small wind</u> or <u>8.Waste to energy.</u>	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) <u>Maximum generation capacity in kVA that is listed in the product specification by the manufacturer. This refers to the generation or injection capacity of each generation unit or battery within the DER Device group.</u>	Numeric	<u>M</u>	<u>This value refers to the injection capacity of a single DE Device, with the total DER Device capacity derived by multiplying this figure by the number of DER Devices.</u>
Nominal Rated Load Capacity	<u>N/A</u>	If DER Device Type = <u>2. Storage</u> or <u>3.Controlled load.</u>	Maximum load capacity in kW that is listed in the product specification by the manufacturer. This refers to the load or withdrawal of each load within the DER Device group.	Numeric	<u>M</u>	<u>This value refers to the load capacity of a single DER Device, with the total DER Device capacity derived by multiplying this figure by the number of DER Devices.</u>
Nominal Storage Capacity	<u>N/A</u>	If device type = battery storage If DER Device Type = <u>2.Storage</u>	Maximum storage capacity in kVAh. This refers to the capacity of each storage module within the device group. (kVAh) <u>Maximum storage capacity in kWh that is listed in the product specification by the manufacturer. This refers to the capacity of each storage module within the DER Device group.</u>	Numeric	<u>M</u>	<u>This value refers to the storage capacity of a single battery, with the total DER Device storage capacity derived by multiplying this value by the number of DER Devices.</u>

Appendix B. ~~Existing~~ Historical DER Generation Information

~~In accordance with paragraph 4.3, this appendix defines~~ describes the DER Generation Information which was required to be provided ~~no later than by~~ 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.~~

Table 6 Level 1 – Historical DER Installation Data Requirements

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	

Category of data	Sub-category of data	Applies to category	Description	Field type / validation	Other comments
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
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.~~
- ~~• 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.~~

Table 7 Level 2 – Historical AC Connection Data Requirements

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

Category of data	Sub-category of data	Applies to category	Description	Field type / validation	Other comments
AC equipment type		All	Indicates whether the device is connected via an inverter (and what category of inverter it is) or not (e.g.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

Table 8 Level 3 – Historical DER Device Data Requirements

Category of data	Sub-category of data	Applies to category	Description	Field Type	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	
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.



Category of data	Sub-category of data	Applies to category	Description	Field Type	Other Comments
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
	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. For bulk upload, if not provided, default value = Unknown Subtype
Nominal rated capacity		If device type = battery storage	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	
Nominal storage capacity		If device type = battery storage	Maximum storage capacity in kWh. This refers to the capacity of each storage module within the device group (kWh).	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~~[Table 3](#) below.

Table 9. DER Register Standard Set of Variables

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

Appendix D. Measurements Abbreviations Table

Table 10. Measurement abbreviations and definitions

<u>Abbreviation</u>	<u>Definition</u>
<u>kVA</u>	<u>Kilovolt-amp</u>
<u>kVAr</u>	<u>Kilovolt-amp Reactive</u>
<u>kW</u>	<u>Kilowatt</u>
<u>kWh</u>	<u>Kilowatt-hour</u>
<u>MW</u>	<u>Mega-watt</u>

Appendix E. Relevant clauses of the WEM Rules

Table 10 details:

- (a) the head of power clauses in the WEM Rules under which the Procedure has been developed; and
- (b) each clause in the WEM Rules requiring an obligation, process or requirement be documented in a WEM Procedure, where the obligation, process or requirement has been documented in this Procedure.

Table 11. Relevant clauses of the WEM Rules

Clause
1.3 to 1.5
2.1A.2 (h)
2.1A.2 (IC)
2.9.7A
2.9.8
3.24.1
3.24.2
3.24.3
3.24.5
3.24.6
3.24.7
3.24.8
3.24.9 (a) and (b)
3.24.12
3.24.13
3.24.14
3.24.16
4.5.11