Basic Micro Embedded Generation Technical Requirements Specification – less than or equal to 30kVA

June 2023

PowerWater

Contents

1 Introduction

1.1 Purpose

This Basic Micro Embedded Generation Technical Requirements Specification document provides proponents of basic micro embedded generation (EG) connections information about their obligations for connection to and interfacing with the Power and Water Corporation (Power and Water) network.

1.2 Background

Power and Water's EG connection technical requirements specifications divide EG systems into three different types of connections which apply to all customers, both residential and commercial.

- Basic
- Negotiated
- Large Embedded Generation

This technical requirements document applies to the 'basic' category.

1.3 Scope

This Basic Micro EG Technical Requirements Specification document applies to new connections of basic micro EG systems or modifications to existing basic micro EG systems, where the basic micro EG system consists of an inverter energy system (IES), energy storage system (ESS) or a combination of both.

A basic micro EG system has a total system capacity less than or equal to 10 kVA for a single-phase IES network connection, or a total system capacity less than or equal to 30 kVA for a three-phase IES network connection that:

a. Intends to be connected to and capable of operating in parallel with the Darwin, Alice Springs, Katherine, and Tennant Creek networks.[1]
b. Involves no network augmentation, no high voltage network extension, and limited low voltage network extension.[2]
c. Meets all other technical requirements set out in this document. [3] [4]

The scope of this technical specification document does not include:

a. EG units covered by Power and Water's Negotiated EG Technical Requirements Specification document (>30 kVA to <200 kVA in Darwin and >30 kVA to <100 kVA in Alice Springs, Katherine and Tennant Creek) (Negotiated EG Connection Technical Requirements).

[1] For connections to other parts of the network (e.g. remote networks and minor centres) please contact Power and Water as bespoke requirements will apply.
[2] Refer to the Power and Water Customer Connection Services Policy for the span of overhead or underground cable for a limited network extension.
[3] Note that ESS are permitted within basic micro EG connections. The total system capacity definition of the basic micro EG connection includes the IES and the AC-coupled ESS battery capacity or battery-inverter capacity.
[4] For connections ≤ 30 kVA that do not meet the requirements of this Basic Micro EG Technical Requirements document, the connection shall comply with the technical requirements of the Negotiated EG Connection Technical Requirements document.

b. EG units covered by Power and Water's *Large EG Technical Requirements Specification* document (>200 kVA in Darwin and >100 kVA in Alice Springs, Katherine and Tennant Creek) (Large EG Connection Technical Requirements).
c. Non-IES systems.
d. Electric vehicles, unless the on-board battery storage is capable of exporting to the network (in which case the requirements shall apply).
e. Distributed energy resource (DER) systems that do not generate electricity, including demand response/demand management systems, unless they impact on the ability of the basic micro EG system to meet the technical requirements.
f. Back-up generation that does not operate in parallel with the distribution network.

This technical requirements specification document complies with the National DER Connection Guidelines for Basic Micro EG Connections as published by Energy Networks Australia (ENA), with the exception of the deviations presented in Appendix A: Deviations from the National DER Connection Guidelines.[5]

1.4 Obligations of proponent

Proponents shall comply with all of the applicable requirements of this document.

The general obligations of proponents include:

a. The obligation to comply with the technical requirements as well as relevant national standards, industry codes, legislation, and regulations. In the event of inconsistency, an indication of which instrument shall prevail, being legislation and regulations, followed by the technical requirements, followed by national standards and industry codes.
a. The obligation to not connect additional inverters, make modifications or install additional micro EG units, with ESS, without prior written agreement from Power and Water.
b. The obligation to comply with Power and Water's model standing offer.
c. The obligation to meet the requirements in the design, installation, and operation of the basic micro EG system.
d. The obligation to meet the connection and commissioning requirements to the distribution network.

[5] Refer to https://www.energynetworks.com.au/projects/national-grid-connection-guidelines/

2 Definitions and abbreviations

2.1 Definitions

Term	Definition
Basic micro embedded generation connection	A connection between a distribution network and a retail customer's premises for a micro embedded generating unit, for which a model standing offer is in place.
Central protection	Central protection is the protection contemplated by AS/NZS 4777 (grid connection of energy systems via inverters) installed to perform the functions of: • coordinating multiple inverter energy system installations at one site • providing protection for the entire inverter energy system installation and islanding protection to the connected grid • preserving safety of grid personnel and the general public.
Connection point	An agreed point of supply[6] established between the distribution network service provider and the proponent.
Embedded generating unit	A generating unit connected within a distribution network and not having direct access to the transmission network.
Embedded generating system	A system comprising of multiple embedded generating units.
Energy storage system	A system or systems that store electricity generated by distributed energy resources or directly from the network, and that can discharge the electricity to loads.
Distributed energy resources	Power generation or storage units that are connected directly to the distribution network.
Generating unit	The plant used in the production of electricity and all related equipment essential to its functioning as a single entity.
Generation	The production of electrical power by converting another form of energy through a generating unit.
Generator	A person or entity who owns, operates, or controls a generating unit.
Inverter energy system	A system comprising one or more inverters that convert direct current to alternating current. For the purposes of maximum system capacity in this document, the term inverter energy system includes the capacity of the sum of the inverter energy system capacity, AC-coupled battery energy storage system capacity, or battery-inverter capacity.
Lot	A recognised subdivision of land with an owner.
Low voltage	The mains voltages as most commonly used in any given network by domestic and light industrial and commercial consumers (typically 230 V).

[6] Point of supply has the definition contemplated by the Power and Water Network Policy NP 003 Installation Rules, available from https://www.powerwater.com.au/developers/power/design-and-construction-guidelines

Term	Definition
Medium voltage / High voltage	Any voltage greater than 1 kVAC.
Micro embedded generation connection	A connection between an embedded generating unit and a distribution network of the kind contemplated by Australian Standard AS/NZS 4777 (Grid connection of energy systems via inverters) currently up to 200 kVA.
Model standing offer	A document approved by the Australian Energy Regulator as a model standing offer to provide basic micro embedded generation connection services or standard connection services which contains (amongst other things) the safety and technical requirements to be complied with by the proponent.
Proponent	A customer proposing to become a generator (the relevant owner, operator, or controller of the generating unit or their agent).
Site export limit	The export threshold that the embedded generation system cannot exceed, measured downstream of the connection point.
Standard connection	A connection service (other than a basic micro embedded generation connection service) for a particular class (or sub-class) of connection applicant and for which an Australian Energy Regulator approved model standing offer is in place or for which an equivalent model offer is in place in jurisdictions not subject to Chapter 5A of the National Electricity Rules.
Technical requirements document	This document, which sets out requirements for proponents to enable a grid connection.

Table 1: Definitions

2.2 Abbreviations

Abbreviation	Definition
AC	Alternating Current
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
API	Application Programming Interface
AS/NZS	A jointly developed Australian and New Zealand Standard
ESS	Energy Storage System
CEC	Clean Energy Council
DER	Distributed Energy Resources
DNSP	Distribution Network Service Provider

Abbreviation	Definition
EG	Embedded Generation or Embedded Generating
HV	High Voltage
IEC	International Electrotechnical Commission
IES	Inverter Energy System
LV	Low Voltage
MV	Medium Voltage
NEM	National Electricity Market
NER	National Electricity Rules
NMI	National Metering Identifier
NT	Northern Territory
NT NER	National Electricity Rules (Northern Territory)

Table 2: Abbreviations

2.3 Terminology

Instructional terms are to be interpreted in the following way:

- The words 'shall' or 'must' indicate a mandatory requirement.
- The word 'may' indicates a requirement that could be mandatorily imposed on the proponent.
- The word 'should' indicates a recommendation that will not be mandatorily imposed on the proponent.

2.3.1 Sub-categories

The technical requirements set out in this document shall apply to the following subcategories of basic micro EG systems:

1. **Single-phase basic micro EG connection –** Any basic micro EG system with a system capacity less than or equal to 10 kVA for a single-phase IES (with or without ESS) network connection to a standard part of the network meeting all technical requirements for basic micro EG connections set out in this technical requirements document.
2. **Three-phase basic micro EG connection –** Any basic micro EG system with a system capacity less than or equal to 30 kVA for a three-phase IES (with or without ESS) network connection to a standard part of the network meeting all technical requirements for basic micro EG connections set out in this technical requirements document.

3. **Non-standard basic micro EG connection –** Any basic micro EG system connecting to a non-standard[7] part of the network.

The technical requirements set out in this document should be interpreted as applying to all sub-categories of basic micro EG connections unless otherwise specified.

For all enquiries, Power and Water can be contacted via email at: EGApplications.PWC@powerwater.com.au.

3 Relevant rules, regulations, standards and codes

3.1 Standards and codes

There are a range of applicable standards and industry codes that define connection types and requirements, and network standards as set out below.

In the event of any inconsistency between an applicable Australian/international standard or industry code (except for legislated industry codes) and these technical requirements, these technical requirements will prevail.

3.1.1 Australian and international standards and industry codes

The Australian and international standards and industry codes listed in Table 3 shall apply to the design, manufacture, installation, testing and commissioning, and operation and maintenance of all plant and equipment for basic micro EG connections to the distribution network.

Document number	Document name	Document type
AS/NZS 3000	Electrical Installations – Wiring Rules	AU/NZ Joint Standard
AS/NZS 4777	Grid connection of energy systems via inverters (multiple parts)	AU/NZ Joint Standard
AS/NZS 5033	Installation and safety requirements for photovoltaic (PV) arrays	AU/NZ Joint Standard
AS/NZS 5139	Electrical installations - Safety of battery systems for use with power conversion equipment	AU/NZ Joint Standard
AS/NZS 61000	Electromagnetic compatibility (EMC) (multiple parts)	AU/NZ Joint Standard

[7] From time to time, Power and Water may nominate non-standard parts of the Darwin, Alice Springs, Katherine, and Tennant Creek networks on its website. For connection to these parts of the network, the non-standard technical requirements of this document will apply. For connections to other parts of the network (e.g. remote networks and minor centres), this technical requirements document will NOT apply (please contact Power and Water for more information).

Document number	Document name	Document type
AS/NZS IES 62116	Utility-interconnected photovoltaic inverters – Test procedure of islanding prevention measures	Australian Standard

Table 3: Applicable Standards

3.1.2 Internal references and related documents

Document Title	Record Number
Embedded Generation Connection Guideline specification	CONTROL0639
Installation rules[8]	NP003
Power networks service rules[9]	NP007
Meter manual[10]	NP010

Table 4: Internal references and documents

3.2 Legislation and regulation

The relevant legislation and regulations listed in Table 5 shall apply to the design, manufacture, installation, testing and commissioning, and operations and maintenance of all plant and equipment for basic micro EG connections to the network. In the event where there is any inconsistency between legislation and regulations and these technical requirements, the legislation and regulations shall prevail.

Document Title	Record Number
National Electricity (NT) Rules	Regulation
Electricity Reform (Safety and Technical) Regulations 2000	Regulation
Network Technical Code	Code produced under Electricity Reform (Administration) Regulations
System Control Technical Code	Code produced under Electricity Reform (Administration) Regulations

Table 5: Regulations and Legislation

[8] Power and Water, NP003 Installation Rules, available from https://www.powerwater.com.au/developers/power/design-and-construction-guidelines
[9] Power and Water, NP007 Power networks service rules, available from https://www.powerwater.com.au/developers/power/design-and-construction-guidelines
[10] Power and Water, NP010 Meter manual, available from https://www.powerwater.com.au/developers/power/design-and-construction-guidelines

4 Technical requirements

4.1 Labelling and signage

Labels and signs on the installation, including cables, shall meet the requirements of AS/NZS 4777.1, AS/NZS 3000, AS/NZS 5033 and AS/NZS 5139 as appropriate.

The IES must include warning signage to clearly indicate that the electrical installation has multiple supplies and identify which circuits these supplies affect.

Signage shall as a minimum be placed:

a. On the switchboard that has the inverter energy system directly connected to it.
b. On all switchboards including main switchboard and distribution board(s) between the main switchboard and the board that has the inverter energy system directly connected to it.
c. In all meter boxes containing the distributor's metering equipment.

Signage should describe the actual type of generation source installed.

4.2 Maximum system capacity

The maximum aggregate system capacity for basic micro EG connections for each subcategory shall be as per Table 6.

Sub-Category	Maximum System Capacity
Single-phase basic micro EG connection	For single-phase basic micro EG connections of IES, the maximum inverter capacity (including ESS) shall be 10 kVA*
Three-phase basic micro EG connection	For three-phase basic micro EG connections of IES, the maximum inverter capacity (including ESS) shall be 30 kVA*
Non-standard basic micro EG connection	For non-standard basic micro EG connections, the maximum system capacity shall be determined at the time of application.

Table 6: Maximum system capacity

* Note that additional export limits will also apply as set out in 7.

In circumstances where there are multiple connection points on a single lot, the system shall be treated as a negotiated contract and this standard shall not apply.

System capacity for multiple systems behind a single connection point (such as strata title lots e.g. retirement villages) are aggregated at the connection point and the values above apply on the aggregate value. The proponent is responsible for compliance with the requirements set out in this standard, including, but not limited to, phase balancing.

4.3 Generation control

Basic micro EG connections require generation control as specified in the following subsections.

4.3.1 Export limits at connection point

The export limits at the connection point of basic micro EG connections for each subcategory shall be as per Table 7.

Sub-Category	Export limit description
Single-phase basic micro EG connection	For single-phase basic micro EG connections of IES (with or without ESS), the export limit shall be 5 kW at the connection point.
Three-phase basic micro EG connection	For three-phase basic micro EG connections of IES (with or without ESS), the export limit shall be 7 kW with a balanced output from the IES with respect to its rating.
Non-standard basic micro EG connection	For non-standard basic micro EG connections, the export limit shall be determined at the time of application. Power and Water may apply a zero export limit.

Table 7: Export Limits

The export limit is to be interpreted as 'soft', consistent with the definition of soft export limits within AS/NZS 4777.1.

This export limit is to be interpreted by the proponent as a maximum. The ability of the proponent's basic micro EG system to export at the export limit is not guaranteed, rather it will depend upon network characteristics which change over time. The output of a basic micro EG system may need to be constrained for various scenarios including, but not limited to scenarios where power quality response modes are in operation.

4.3.2 Additional export limit requirements

The following are additional export limit requirements that shall apply to basic EG connections:

a. The proponent shall ensure the EG system is technically capable of achieving the export limit requirements above at all times through the inverter(s), ESS and/or other export limiting device.
b. Certification from the inverter manufacturer shall be provided to Power and Water upon request to confirm that the export limit requirements in this document have been incorporated as part of the design prior to approval (where applicable). [11] [12]
c. In the event of network or contractual constraints, the proponent or Power and Water may nominate that the EG connection must not export any energy.

4.3.3 Additional ESS requirements

The following are additional ESS requirements that shall apply to basic EG connections:

[11] The certification issued by the inverter manufacturer must be an electronic document that includes the following elements as a minimum; the relevant manufacturer's company name and logo, date, confirmation that the inverter has export limitation functionality and any associated equipment that must also be installed for its operation.
[12] Additionally, export limit details are required to be provided by the installer via the Power and Water Embedded generation commissioning form (as per Section 6).

a. The proponent shall ensure the ESS is configured to achieve a maximum charge rate from the network of no more than 1 kVA (single phase), or no more than 3 kVA (three phase) at all times through the ESS inverter(s) or ESS. [13]

4.4 Inverter energy system

The following requirements apply to IES comprising of basic micro EG inverters:

a. IES shall be tested by an authorised testing laboratory and be certified as being compliant with AS/NZS 4777.2 with an accreditation number.
b. IES shall comprise of inverters that are registered with the Clean Energy Council (CEC) as approved grid connect inverters.
c. IES shall comprise of inverters that are tested by an authorised testing laboratory and certified as being compliant with IEC 62116 for active anti-islanding protection, as per AS/NZS 4777.2.
d. IES shall comprise of inverters installed in compliance with AS/NZS 4777.1.
e. IES shall comprise of inverters that have both volt-var and volt-watt response modes available.
f. The IES shall be set to the regional setting 'Australia A' as per AS/NZS 4777.2.

The following requirements apply to IES with ESS:

a. ESS shall comprise of batteries that are be listed in the Clean Energy Council (CEC) approved batteries list.

4.5 Network connection and isolation

Network connection and isolation requirements shall be as per AS/NZS 4777.1.

In addition, the following requirements shall apply:

a. Mechanical isolation shall be as per AS/NZS 3000 in that the isolator must always be readily accessible.
b. Any means of isolation (where lockable) shall be able to be locked in the open position only.

4.5.1 Changeover switches

Any Small IES Unit connected behind a Break-before-make switch, that is, it isolates the changeover circuit when transferring between grid supply to Generation supply, will be considered as an Off-grid inverter.

The following shall be considered as Grid Connected Small IES Units and will be required to comply with the requirements of this standard:

a. A Small IES Unit connected behind a Make-before-break switch that results in a momentary, or longer, connection between grid supply and Generation supply circuits when performing a changeover.
b. A multiple mode inverter with uninterruptible power supply (UPS) mode functionality that is Grid Connected but also supplies an Off-grid circuit.

4.6 Earthing

The earthing requirements shall include:

a. For IES, earthing requirements shall be as per AS/NZS 4777.1 and AS/NZS 3000.

[13] Rate of charge from the network must have a variable set point commencing at 1 kVA to allow for future changes in this specification.

b. For IES with ESS, earthing requirements shall be as per AS/NZS 5139.

4.7 Protection

4.7.1 Inverter integrated protection

The inverter integrated protection requirements for inverters connected to the network shall comply with AS/NZS 4777.1 and AS/NZS 4777.2.

Active anti-islanding requirements shall apply as per AS/NZS 4777.2.

Other inverter settings including passive anti-islanding settings shall be as per Table 4.1 and Table 4.2 from AS/NZS 4777.2, without variation, as shown below in Table 8.

Parameter	Settings	Trip delay time	Maximum disconnection time
Undervoltage 2 (V<<)	70 V	1 s	2 s
Undervoltage 1 (V<)	180 V	10 s	11 s
Overvoltage 1 (V>)	265 V	1 s	2 s
Overvoltage 2 (V>>)	275 V	—	0.2 s
Under-frequency (F<)	47 Hz	1 s	2 s
Over-frequency (F>)	52 Hz	—	0.2 s
Reconnect time	60 seconds	N/A	N/A

Table 85: Inverter integrated passive anti-islanding protection settings

4.7.2 Central protection

Central protection is not required for Small IES Fixed EG Connections complying with AS/NZS 4777.1.

4.7.3 Interlocking

Single-phase inverters installed in a three-phase system are to be interlocked and configured to operate as an integrated multi-phase inverter providing a balanced output that is no more than 5 kVA between any phases as per AS/NZS 4777.1.

Installations at a three-phase supplied site with over 5 kVA of IES shall be configured as a three-phase IES only.

4.8 Operating voltage and frequency

The inverter and customer installation must be designed, installed, and maintained in a manner that ensures that the maximum steady state voltage at any socket outlet or fixed equipment (other than the inverter) within the installation complies at all times with the requirements of AS/NZS 4777.1 and AS/NZS 4777.2.

4.8.1 Voltage rise

The proposed basic micro EG unit installation shall not cause more than 2% voltage rise at the point of supply. Voltage rise is calculated from the AC terminals of the inverter(s) to the point of supply as per AS/NZS 4777.1.

From Appendix C2 of AS/NZS 4777.1, the following shall be considered:

a. An assessment of the consumer mains is required to ensure that the 2% voltage rise requirements of clause 3.3.3 are able to be met with the intended IES rating.
a. It can be assumed that sizing an IES larger than the existing site load or energy use is likely to require additional work and costs to upgrade switchboards and possibly even the local grid.

Refer to Figure C1 of AS/NZS 4777.1 for an example of application of voltage rise requirements for a typical basic micro EG installation.

4.8.2 Voltage

For sustained operation[14] for voltage variations, the maximum voltage set point shall be set as per the AS/NZS 4777.2 Region A setting, without any variations to AS/NZS 4777.2 Region A as shown below in Table 9.

Reference	Settings
Sustained operation over-voltage limit (V_{nom_max})	258 V

Table 96: Limit for sustained operation for voltage variations

4.8.3 Frequency

For a grid disturbance that causes an increase in grid frequency (above the upper limit of continuous operation), the inverter(s) shall respond as per AS/NZS 4777.2 Region A settings without any variations.

4.9 Metering

The installation shall meet metering requirements as per NT NER Chapter 7A and Power and Water NP010 Meter Manual[15], including replacement or re-configuration of existing meter(s) to bi-directional meter(s).

4.10 Power quality

4.10.1 IES power quality response modes

The volt–var and volt–watt response modes specified in Clause 3.3.2.2 and Clause 3.3.2.3 of AS/NZS 4777.2 shall both be enabled and shall respond as per AS/NZS 4777.2 default settings for Region A, without any variations as shown below in Table 10 and Table 11.

[14] Sustained operation refers to a 10 minute average value which needs to be calculated for the preceding 10 minutes at least every 3 seconds based on measurements at the inverter's terminals or another external measurement position for comparison with the V_{nom_max} to determine when to disconnect.
[15] Power and Water Metering Manual NP010, available from https://www.powerwater.com.au/developers/power/design-and-construction-guidelines

Reference	Voltage	Inverter reactive power level (Var % rate VA)
Volt-var 1 (Vv1)	207 V	44% leading
Volt-var 2 (Vv2)	220 V	0%
Volt-var 3 (Vv3)	240 V	0%
Volt-var 4 (Vv4)	258 V	60% lagging

Table 10: Volt-var response mode settings

Note: Lagging is when the EG unit absorbs reactive power from the network, and leading is when the EG unit acts as a source of reactive power into the network.

Reference	Voltage	Inverter maximum active power output level (P/ Prated, %)
Volt-watt 1 (Vw1)	253 V	100%
Volt-watt 2 (Vw2)	260 V	20%

Table 11: Volt-watt response mode setting

Note: Where P is the output power of the inverter and Prated is the rated output power of the inverter.

4.10.2 Ramping requirements

Ramping requirements and settings shall be as per AS/NZS 4777.2 default settings, without any variations as shown below in Table 12 for inverters capable of use with energy storage (multiple mode operation).

Reference	Ramp rate	Nominal ramp time (Tn)
Rate limit for an increase in power (W_{GRA}+)	16.67 % per minute	6 minutes
Rate limit for a decrease in power (W_{GRA}-)	16.67 % per minute	6 minutes

Table 12: Ramping settings for inverters capable of use with energy storage

4.11 Communications systems

There are no requirements for communications systems for solar only IES.

For IES with ESS, the following virtual power plant (VPP) capable requirements shall be adopted:

a. Physical communications interface including an ethernet port or Wi-Fi connection capable of being used for communications with the system by authorised parties.
b. Internet accessibility through at least one method for forming a reliable internet connection accessible by authorised parties.
c. Remote registration capability to remote services (e.g. retailer, equipment manufacturer, aggregator)

d. Remote monitoring communication function that is capable of reporting data.
e. Remote control capability to respond to remotely-provided commands from authorised parties to charge or discharge the battery.

4.12 Data and information

4.12.1 Static data and information

Static data and information that is required to be provided by the proponent to Power and Water is set out within Appendix D: Static Data and Information.

4.12.1 Dynamic data and information

There are no requirements for dynamic data and information.

4.13 Cybersecurity

The cybersecurity requirements for VPP-ready basic micro EG systems shall ensure security against electronic intrusion and tampering by unauthorised parties through provisions, including:

a. monitoring and communications devices shall be in screw sealed or lockable enclosures
b. protection and control from network systems (e.g. firewalls)
c. privilege settings and password protection
d. limiting access to only that which is required to monitor the generating unit.

Power and Water is required to comply with the Australian Energy Sector Cyber Security Framework (AESCSF), which is expected to be legislated by the Australian Government as part of the upcoming Critical Infrastructure Act (currently in Parliament at the time of publication).

At the time of publication, Power and Water is in the process of developing compliance requirements for AESCSF and document as they apply to the Energy Generators. Items expected to be included are:

- Approved network equipment and configurations that must be used to interface to the Power and Water network equipment.
- Encryption is likely to be required for 3rd party network connections originating from untrusted/uncontrolled security zones.
- If encryption is required, compatibility of the 3rd party boarder device with Power and Water boarder device (e.g.; Firewall) will be critical and some interoperability testing will be required for previously untested boarder devices.

Power and Water and the proponent will comply with the Power and Water Cyber Security Management Standard CONTROL Document 0871.

4.14 Technical studies

There are no technical studies required to be carried out by the proponent or at the proponent's expense to enable connection to the distribution network.

Technical studies may be performed by Power and Water at its own cost, however the outcomes of the technical studies shall not result in any change to the technical requirements for basic micro EG connections set out in this document.

5 Fees and charges

Information regarding fees and charges applicable to proponents is available at the following link:

https://www.powerwater.com.au/customers/moving-and-building/power-connections

6 Testing and commissioning

Testing and commissioning requirements for basic micro EG connections include:

a. On-site testing and commissioning shall be undertaken in accordance with AS/NZS 4777.1, AS/NZS 3000, AS/NZS 5033 (where applicable) and AS/NZS 5139 (where applicable), the equipment manufacturer's specifications, and this document to demonstrate that the basic micro EG system meets the requirements of the connection agreement, including:
    i. Operate the main switch (inverter supply) and verify the connection time is greater than 60 seconds.
    ii. Isolate the main switch (mains supply) and verify the disconnect time is less than 2 seconds.
    iii. Where Site Export Limiting operation is required, disconnect a sufficient quantity of the proponent's load to create a condition where excess energy is generated, and confirm Export to the grid does not exceed approved limits.
b. The tests shall be installation tests, not type tests.

Refer to the Power and Water embedded generation commissioning form, available at the following link:

https://www.powerwater.com.au/customers/moving-and-building/power-connections

7 Operations and maintenance

Operations and maintenance requirements for basic micro EG connections include:

a. The basic micro EG system shall be operated and maintained to ensure compliance with their connection agreement and all legislation, codes, and/or other regulatory instruments at all times.
b. Power and Water may inspect and test the proponent's basic micro EG system at any time at Power and Water's cost. Should the inspection identify non-compliance with this technical requirements document, the EG system may be disconnected from Power and Water's network. The EG system will not be reconnected to the network until Power and Water is satisfied that the non-compliance has been resolved. Rectification of non-compliance issues shall be at the proponent's cost.

The general expectations for operating and maintaining the basic micro EG systems shall include:

a. Maintaining the electrical installation at the supply address in a safe condition.
b. Ensuring that any changes to the electrical installation at the supply address are performed by an electrician lawfully permitted to do the work and that the proponent holds a Certificate of Compliance issued in respect of any of the changes.
c. The proponent shall seek Power and Water's approval prior to altering the connection in terms of an addition, upgrade, extension, expansion, augmentation, or any other kind of alteration, including changing inverter settings.

Appendix A: Deviations from the National DER connection guidelines

Section	ENA National DER Connection Guidelines for Basic Micro EG Connections requirements	Description of deviation	Type of deviation	Justification
2.3.1	Requires the DNSP to provide a hyperlink or website reference to a map, list of postcodes, or equivalent, which allows proponents to geographically identify whether their connection is to a non-standard network	Hyperlink for website reference to a map, list of postcodes, or equivalent, which allows proponents to geographically identify whether their connection is to a non-standard network is deferred	Jurisdictional requirement	Future improvement opportunity
4.1	Labelling and Signage requirements	Addition of AS/NZS 5139	Compliance with relevant standards	The new standard AS 5139 is directly applicable for use of IES with ESS
4.2, 4.3	Applies at the connection point only	In circumstances where there are multiple connection points on a single lot, the system be considered a negotiated contract	Jurisdictional requirement	Consistency with Power and Water requirements
4.3.2	Requires a subsection heading to be retained for Site Generation Limit Downstream of Connection Point	Removal of site generation limits and insertion of new clause detailing additional export reuirements	N/A	Consistency with Power and Water requirements
4.3.3	There are no requirements specified for ESS maximum charge rate from the network	Maximum charge rate from the network of no more than 1 kVA (single phase), or no more than 3 kVA (three phase) are added	Jurisdictional requirement	Consistency with Power and Water requirements

Section	ENA National DER Connection Guidelines for Basic Micro EG Connections requirements	Description of deviation	Type of deviation	Justification
4.4	There is no specification of Inverter Region Settings	Inclusion or 'Australia A' region settings for IES	Compliance with relevant standards	Simplify compliance by aligning with Region A settings
4.4	There are no requirements specified for ESS	Compliance requirements for IES with ESS	Promote improved benefits to the electricity system	Increasing the flexibility for customer choice of batteries
4.6	For ESS, earthing requirements shall be as per AS/NZS 3011	For ESS, earthing requirements shall be as per AS/NZS 5139	Compliance with relevant standards	The new standard AS 5139 is directly applicable for use of IES with ESS
4.11	Communications systems requirements may be recommended	Communications systems requirements (for VPP capable) shall be adopted for IES with ESS	Promote improved benefits to the electricity system	Provide for system security benefits

Table 13: Table of deviations from national der connection guidelines

Appendix B: Connection arrangement requirements

B1 Single Line Diagram

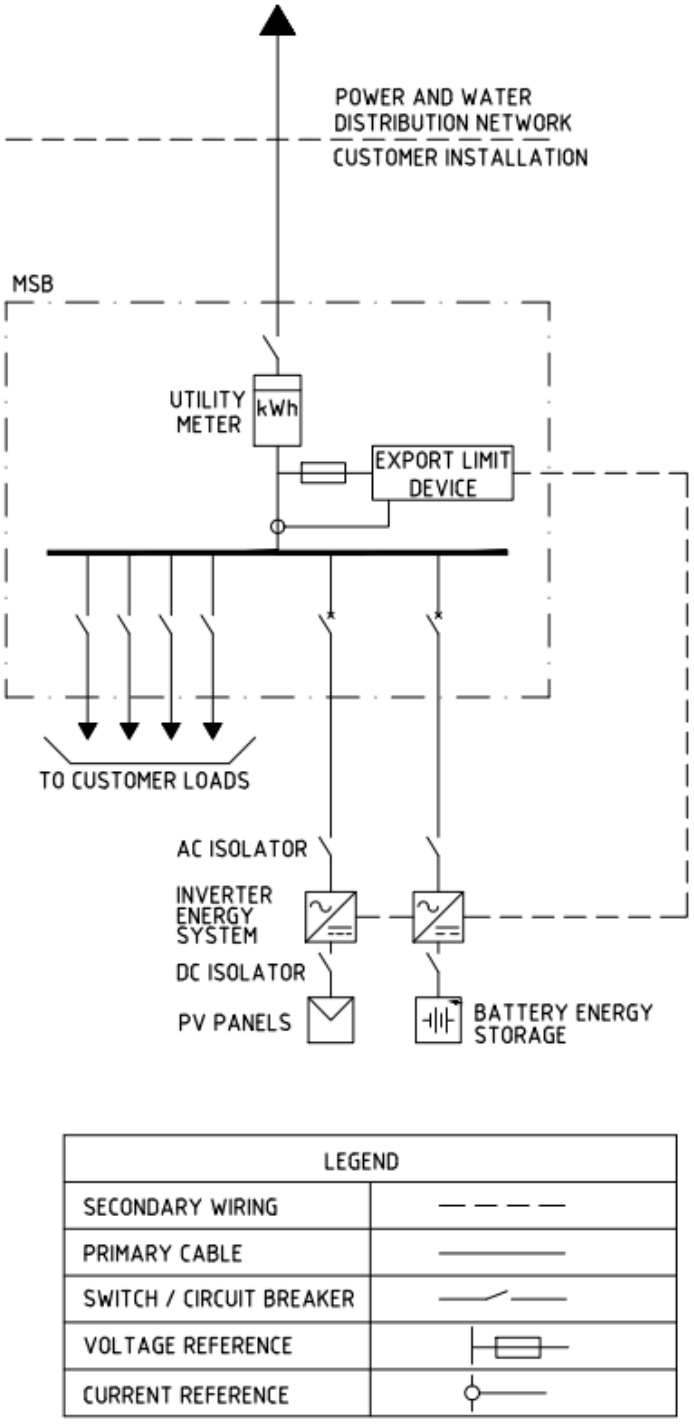

Figure 1: Typical single line diagram for a basic micro EG system

Appendix C: Model standing offer

The model standing offer, Micro-Embedded Generator (including PV) Basic Connection Agreement is available at the following link:

https://www.powerwater.com.au/customers/moving-and-building/power-connections

Appendix D: Static data and information

The static data and information that is required to be provided by the proponent to Power and Water is to be provided via the Power and Water embedded generation commissioning form, available at the following link:

https://www.powerwater.com.au/customers/moving-and-building/power-connections

Contact

Power and Water Corporation
Phone 1800 245 092
powerwater.com.au

PowerWater