PowerWater

Embedded generation commissioning sheet

Technical data and certification for connection of embedded generation systems.

This form is to be completed by a licensed and Clean Energy Council (CEC) accredited installer on behalf of a customer requesting an embedded generation connection to the Power and Water network. Once the installation has been completed, please submit this form along with the Certificate of Compliance (CoC) to the Power Services Connections Office via connect.me@powerwater.com.au. If at any point there is not enough space provided in this form please use the 'additional notes' section on page 5.

Section 1: Installer and site details

Applicant name

Accredited installer's company name

Site address

Lot No. | Unit No. | Street No. | Street name

Suburb

Section 2: System details

Embedded generator system details

Inverter make and model* | Inverter rating (kVA)* | Total no. of inverters | Export limiting device+

PV panel make and model* | PV panel rating (W) | No. of panels | Total array rating (kW)

Battery energy system (BES) details

BES inverter make and model (if applicable)* | BES inverter rating (kVA)* | Total no. of BES inverters

Battery pack make and model | Battery pack rating (kWh) | Total no. of battery packs

Battery control system make and model* | Maximum discharge rate (kW) | Maximum charge rate (kW)

*Enter **specific model details** as on the CEC approved lists[1] +Enter **specific model details** as on Power and Water Corporation's approved list.[1]

Battery energy system operation configuration

☐ Load shifting ☐ Backup ☐ Ramping / smoothing ☐ Other

Section 3: System details for generating systems greater than 200kW

Technology and number of additional (e.g. 2x diesel genset) | Generating unit make and model | Maximum power generation capacity of additional embedded generating units (kVA) | Additional generation operation configuration

Contribution to fault levels (kA) | Relevant transformer voltages (e.g. 11/0.4kV) | Rating of relevant transformers (kVA)

Protection system and communications systems

Voltage control and reactive power capability

☐ Additional System Control requirements are imposed on this connection.

☐ System is an island-capable microgrid which meets all requirements under 3.4 of the NTC.

Section 4: Export limits at connection point

Table: Export limits

Single-phase basic micro EG connection	For single-phase basic micro EG connections of IES with BESS, 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 BESS, the export limit shall be 7 kW with a balanced output 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 and may apply a zero export limit	☐

Section 5: Inverter integrated protection

Table: Inverter integrated passive anti-Islanding protection settings

Undervoltage (V<)	180 V		1 s		2 s	
Overvoltage 1 (V>)	260 V		1 s		2 s	
Overvoltage 2 (V>>)	265 V		-		0.2 s	
Under- frequency (F<)	47 Hz		1 s		2 s	
Over-frequency (F>)	54 Hz*		-		0.2 s	

Section 6: Voltage

For sustained operation for voltage variations, the maximum voltage set point shall be set as per the AS/NZS 4777.2 default setting, with any variation to AS/NZS 477.2 marked with an asterisk (*) in Table below.

Table: Limits for sustained operation for voltage variations

Sustained operation over-voltage limit (Vnom_max)	258 V*	

Section 7: 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 default settings as set in Table below, with any variations to AS/NZS 4777.2 marked with an asterisk (*).

Table: Limits for sustained operation for frequency variations (increase in grid frequency), applicable to all inverter

Lower limit of continuous operation for supplying rated power	47 Hz	
Upper limit of continuous operation for supplying rated power (above which power output is reduced linearly with an increase in frequency until f_{stop} is reached)	50.2 Hz	
F_{stop} (above which power output level is 0 W)	54 Hz*	
Frequency value within continuous operation range which must be achieved (for the minimum elapsed time) before power operation may recommence at the nominated ramp rate (W_{GRA}+) as set out in section 7 (Table 7)	49.85 Hz	
Minimum elapsed time	60 s	

For a grid disturbance that causes a decrease in grid frequency (below the lower limit of continuous operation), the inverter(s) with energy storage shall respond as per AS/NZS 4777.2 default settings as set out in Table below, with any variations to AS/NZS 4777.2 marked with an asterisk (*).

Table: Limits for sustained operation for frequency variations (decrease in grid frequency), applicable to inverters with energy storage

Lower limit of continuous operation for charging of energy storage (below which charging of energy storage by the inverter is reduced linearly with a decreases in frequency until $f_{stop\text{-}CH}$ is reached)	49.75 Hz	
Upper limit of continuous operation for charging of energy storage	54 Hz*	
F_{stop}-CH (below which power input for charging of energy storage is 0 W)	49 Hz	
Frequency value within continuous operation range which must be achieved (for the minimum elapsed time) before power input may recommence for charging of energy storage at the nominated ramp rate (W_{GRA}+) as set out in section 7 (Table 7)	49.85 Hz	
Minimum elapsed time	60 s	
The inverter shall maintain continuous operation for frequency excursions with a rate of change of frequency (ROCOF) that does not exceed the following:	± 4.0Hz/s for a duration of 0.25s	

Section 8: IES Power quality response modes

Table: Volt_var repsose mode settings

Volt-var 1 (V_{v1})	207 V		☐	44 % leading*		☐
Volt-var 2 (V_{v2})	220 V		☐	0%		☐
Volt-var 3 (V_{v3})	220 V		☐	0%		☐
Volt-var 4 (V_{v4})	258 V*		☐	60% lagging*		☐

For a grid disturbance that causes a rapid change in frequency.
Table: Limits for rate of change of frequency (ROCOF).

Table: Volt_watt response mode settings

Volt-watt 1 (V_{w1})	207 V		☐	100%		☐
Volt-watt 2 (V_{w2})	220 V		☐	100%		☐
Volt-watt 3 (V_{w3})	253 V*		☐	100%		☐
Volt-watt 4 (V_{w4})	260 V*		☐	20%		☐

Note: P is the output power of the inverter and P_{rated} is the rated output power of the inverter.

Section 9: Ramping requirements

TABLE: Ramping settings for inverters capable of use with energy storage

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	

I, the accredited installer named in Section 1, certify that the above detailed embedded generation (PV or battery) system installed at the address in section 1 has been installed and commissioned in accordance with Power and Water Corporation's 'Technical Requirements for Grid Connection of Photovoltaic Systems via Inverters', Network Technical Code, all Power and Water Corporation approval letters and agreements as well as all relevant standards and statutory requirements. I further certify that the embedded generation unit has been installed in accordance with good electricity industry practice and is ready for operation. In particular the following have been verified:

- The embedded generation unit is within Power and Water's approved size limits
- The schematic diagram has been submitted and accurately reflects the installed electrical system
- All required switches and protection devices are present and operate correctly
- Signage and labelling complies with Power and Water's 'Technical Requirements for Grid Connection of Photovoltaic Systems via Inverters' and AS4777.1
- The embedded generation has been installed correctly and is fit for purpose
- All protection settings are within requirements.

Installer's signature	Installer's name	Date
	Electrical contractor license number	CEC accreditation number

Additional notes

This page is for additional information if there is not enough room on a previous page (e.g. multiple inverter types).