

# Basic EG and LV EG Technical Requirements Industry Presentation

Biennial review including AS4777.2 2020 updates

4 November 2021

# Acknowledgement of Country

**Ngala kaaditj Whadjuk Noongar moort keyen kaadak nidja boodja**

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**We acknowledge the Whadjuk Noongar people as the original custodians of the lands where our Bentley office is located and extend that respect to all First Nations people across our service area**

# Agenda

- Welcome
- Purpose
- Basic EG Technical Requirements
- LV EG Technical Requirements
- Dates, Transition Arrangements
- Question time



## **New DER Technical Requirements**

We're working hard to fix the hosting capacity constraints and make solar available to more of our communities. The good news is, we're planning to release more capacity across many of our currently constrained towns over the next 12 months.

To facilitate hosting capacity increases, and to accommodate the transition to the new Australian Standard AS4777.2:2020, Horizon Power is updating its Technical Requirements for the connection of DER systems. The updated technical requirements will take effect on 18 December 2021.

Connection Type	Connection Voltage	Technology Type	Capacity	Relevant Standard
Basic EG connection	Up to 1kV	IES without ESS	≤30kVA three-phase ≤10kVA single-phase	<b>Basic EG Connection Technical Requirements</b>
		IES with DC Coupled ESS	≤30kVA three-phase ≤10kVA single-phase	
		IES with AC Coupled ESS	≤60kVA three-phase (IES ≤30kVA, ESS ≤30kVA) ≤10kVA single-phase (IES ≤10kVA, ESS ≤10kVA)	
Low Voltage EG Connection	Up to 1kV	Inverter-based	>30kVA and ≤1MVA three-phase <sup>2</sup>	<b>Low Voltage EG Connection Technical Requirements</b>
		Non-inverter based	>30kVA and ≤1MVA three-phase ≤10kVA single-phase	
Medium Voltage Connection	1kV to 35kV	Any	Any size up to 10MW	Horizon Power Technical Rules
High Voltage Connection	>35kV	Any	Any size up to 10MW	Horizon Power Technical Rules
Registered Generator Connection <sup>3</sup>	>35kV	Any	>10MW	Horizon Power Technical Rules

# Basic EG – Key Changes (1)

- Requirement to apply region “Australia C” settings
- Additional post commissioning requirements
  - Evidence of install is in accordance with requirements (photographs etc)
  - Evidence of region “Australia C” setting applied
- Updated Requirements for DER Management (*was called Feed in Management*)
  - DERMS- Enabled and DERMS-Connected
  - All new Basic EG connections required to be DERMS-Enabled (including NWIS)
  - Basic EG connections in Onslow required to be DERMS-Connected
- Provided a connection option when Hosting Capacity is exhausted
- Clarified requirements for changeover switches
  - Break before make
  - Make before break
- Removal of non standard network area sub category

## Basic EG – Key Changes (2)

- Clarification of allowable capacity for IES when coupled with ESS
- Export Limits
  - Now in kW (not kVA) – improves export when volt-var control is managing voltage
  - Clarified “soft limit” requirements
- Removed limitation on installing inverters on different phases that differ in rating by more than 2.5 kVA
- Phase balancing requirements and need for central protection clarified
- Main switch compatibility check added (ensure service connection allows export)
- Clarified situations where ESS is allowed to charge from the grid

## AS4777.2:2020 and selection of Region C

- AS4777.2020 introduces default regions for numerous inverter settings
  - **Australia A:** For large interconnected power systems, e.g. the [National Energy Market \(NEM\)](#).
  - **Australia B:** For small interconnected power systems, e.g. [the South West Interconnected System \(SWIS\)](#) in Western Australia.
  - **Australia C:** For isolated or remote power systems (e.g. [Horizon Power](#) in Western Australia).
  - **New Zealand:** All systems in New Zealand.
- Selection of Region “Australia C” is essential for all connections to Horizon Power’s network and significantly simplifies setup and configuration. E.g:
  - Volt-Var response mode, Volt-Watt response mode, sustained overvoltage
  - Frequency variations withstand limits, frequency response limits etc
- Horizon Power requires evidence that “Australia C” has been applied on completion of commissioning



# DER Management for Basic EG Connections

- Simplified approach to DER communications
- Introduced updated terminology of DERMS-Enabled and DERMS-Connected
  - DERMS – Horizon Power’s Distributed Energy Management System
- DERMS-Enabled
  - All new Basic EG connections required to be DERMS-Enabled (including NWIS)
    - Must have active internet connection to the inverter and manufacturer portal
    - Provision of GPO and enclosure for Secure Gateway Device (SGD)
    - Permission for Horizon to connect, monitor, and remote control
- DERMS-Connected
  - Only required where specifically requested by Horizon Power to manage system constraints and or Hosting Capacity issues (eg Onslow)
    - Requires installation of SGD (supplied by Horizon Power) and integration with Horizon Power DERMS for monitoring and control

# Options where Hosting Capacity is Exhausted

- Where Hosting Capacity is exhausted proponents may now connect under the following conditions:
  - The rated capacity of the new Basic EG connection is less than 5 kVA
  - An Energy Storage System (ESS) is installed with kVA and kWh capacity  $\geq$  IES capacity
  - A zero-export limit is applied

## Changeover switches

- New requirements to assist with managing step change in demand
  - Make before break
    - Treated as Basic EG Connection
    - Must limit the ramp rate in the change in demand supplied to the Premise (60s) on changeover (e.g using ESS etc)
  - Break before make
    - Must be manual changeover
    - Must submit application, despite being Off-Grid EG

# Basic EG – Summary

Technical Requirement	All Network Areas			
<b>Basic EG Connection Subcategory</b>	Single Phase		Three Phase	
<b>Maximum Aggregate System Capacity</b>	IES without ESS	≤10 kVA	IES without ESS	≤10 kVA per phase
	IES with DC Coupled ESS		IES with DC Coupled ESS	
	IES with AC Coupled ESS	IES ≤10 kVA ESS ≤10 kVA	IES with AC Coupled ESS	IES ≤ 10 kVA per phase ESS ≤ 10 kVA per phase
<b>Hosting Capacity Required?</b>	Hosting Capacity is required in all cases, subject to provisions in Section 1.6			
<b>DERMS-Enabled?</b>	Yes (Refer to Section 4.3.4.1)			
<b>ESS Required?</b>	Only if Hosting Capacity is exhausted (Refer Section 1.6)			
<b>Maximum Aggregate Export Limit at the Connection Point</b>	5 kW		5 kW per phase	
<b>Additional Export Limit Control Requirements at the Connection Point</b>	Under certain circumstances only, as determined by Horizon Power (Refer to Section 1.6 and Section 4.3.2)			

# Basic EG – Summary

Technical Requirement	All Network Areas
<b>Phase Balancing Requirements</b>	Where a multiple-phase IES is used and comprised of individual single-phase inverters: <ul style="list-style-type: none"><li>• the difference in current injected into any two phases shall not exceed 6.03 amps for more than 15 <u>seconds</u>; and</li><li>• where the nameplate rating of any two individual IES differs by more than 2.5 kVA Central Protection shall be installed in accordance with Section 4.7.2. Refer to Section 4.3.5.1)</li></ul>
<b>Network Impact Assessment</b>	A Network Impact Assessment will be performed by Horizon Power
<b>System Impact Study</b>	A System Impact Study is generally not required but may be necessary in areas with limited Hosting Capacity or local network constraints

# LV EG – Key Changes (1)

- Requirement to apply region “Australia C” settings
  - All inverters must be AS4777.2:2020 compliant, even if aggregate size above 200 kVA.
- Additional post commissioning requirements
  - Evidence of install is in accordance with requirements (photographs etc)
  - Evidence of region “Australia C” setting applied.
- All LV EG applications to be assessed, regardless of Hosting Capacity
- Definition of Smoothing as a Service
- Renewable Smoothing compliance to be assessed as ‘soft’ limit, and on P99 basis
- Extended ramp rate smoothing where advised by Horizon Power
- Communications and control updated
  - All new LV EG to be DERMS-Connected (including NWIS)
- Changeover switches – same requirements as Basic EG

## LV EG – Key Changes (2)

- Clarification of allowable capacity for IES when coupled with ESS
- Export Limits (where relevant)
  - Now in kW (not kVA) – improves export when volt-var control is managing voltage
  - Clarified “soft limit” requirement
- Main switch compatibility check added
- Removed limitation on installing inverters on different phases that differ in rating by more than 5 kVA
- Phase balancing requirements and need for central protection clarified
- Clarified situations where ESS is allowed to charge from the grid
- Bumpless transfer requirements for non-IES may be incorporated

# LV EG – Summary

Technical Requirements – LV EG connections						
LV EG Connection Subcategory	LV EG IES (excluding ESS) connection ≤200 kVA		LV EG IES (excluding ESS) connection >200 kVA		LV EG non-IES connection	
<b>Maximum Aggregate System Capacity</b>	IES without ESS (three-phase)	200 kVA	IES without ESS (three-phase)	Determined at time of connection. Limited to 1000 kVA	Single-phase	≤10 kVA
	IES with DC Coupled ESS (three-phase)		IES with DC Coupled ESS (three-phase)			
	IES with AC Coupled ESS (three-phase)	IES ≤ 200 kVA, ESS ≤ 200 kVA	IES with AC Coupled ESS (three-phase)	Determined at time of connection. Limited to IES ≤ 1000 kVA, ESS ≤ 1000 kVA	Three-phase	>30 kVA and ≤1 MVA three-phase Determined at time of connection.
<b>Hosting Capacity Required?</b>	Applications considered on a case by case basis, noting that Extended Ramp Rate may be required (Refer Section 1.6).					
<b>DER Management (DERMS-Connected)</b>	DER Management (DERMS-Connected) is a requirement for all LV EG connections (Refer to Section 4.3.4).					
<b>Renewable Smoothing</b>	In non-standard network areas only					
<b>Extended Ramp Rate</b>	May be required in circumstances where there is no Hosting Capacity (Refer Section 1.6 and Section 4.3.5.4)					
<b>Maximum Aggregate Export Limit at the Connection Point</b>	To be determined by Horizon Power at the time of application					
<b>Additional Export Limit Control Requirements at the Connection Point</b>	Under certain circumstances only, as determined by Horizon Power (Refer to Section 4.3.2)					

# LV EG – Summary

Technical Requirements – LV EG connections	
<b>Phase Balancing Requirements</b>	<p>Phase balancing control does not apply to single-phase LV EG systems</p> <p>Where a multiple-phase IES is used and comprised of individual single-phase inverters, or single-phase-inverters in combination with three-phase inverters:</p> <ul style="list-style-type: none"> <li>the difference in current injected into any two phases shall not exceed 12.06 amps (being 5 kVA at 240 V) for more than 15 seconds; and</li> <li>Where the nameplate rating of any two individual inverters differs by more than 5 kVA Central Protection shall be installed in accordance with Section 4.3.5.1 and Section 4.7.2.2.</li> </ul>
<b>Central Protection</b>	Central Protection is required. Refer to Section 4.7.2
<b>Network Impact Assessment</b>	A Network Impact Assessment will be performed by Horizon Power
<b>System Impact Study</b>	A System Impact Study will be performed by Horizon Power. Refer to APPENDIX H
<b>System Diagram</b>	Refer to APPENDIX B



## Immediate Requirements for all Renewable Energy systems

- As part of the installation of a Renewable Energy system, the inverter firmware shall be updated to latest available firmware.
- For inverters which are compliant with the new AS4777.2:2020 standard, these inverters must be configured to '**Australia Region C**' settings.
- For inverters which may be brought up to the new AS4777.2:2020 standard by updating the firmware, these inverters must be configured to '**Australia Region C**' settings.
- Updates to the latest firmware, and the use of the '**Australia Region C**' settings will simplify the process of entering the required inverter settings.

## **Approvals for Renewable Energy systems from 18 December 2021**

- As of **18 December 2021**, Horizon Power will only accept applications for systems compliant to the new Technical Requirements, and AS4777.2:2020 (for Basic EG and LV EG connections).
- Horizon Power uses the CEC inverter list and inverters must be accredited with the CEC.
- These inverters must be configured to 'Australia Region C' settings.
- To facilitate the transition and processing of applications, Horizon Power will cease accepting applications with AS4777.2:2015 inverters from **10 December 2021**.

## **Requirements for Approvals prior to 10 December 2021**

- Any applications approved before 10 December 2021 with older AS4777.2:2015 compliant inverters will be able to be installed after 10 December 2021 but must be installed and commissioned within three months of the date of application.
- Any installation of an approved AS/NZS 4777.2:2015 inverter after 18 December must be compliant with the inverter settings in the new Technical Requirements ('Australia Region C' settings).

## Next Steps

- The draft documents are available at:  
<https://www.horizonpower.com.au/solar/technical-requirements/>
- Please email any feedback to: [renewables@horizonpower.com.au](mailto:renewables@horizonpower.com.au)
- Closing date for feedback is Monday 15 November.
- Technical Requirements will go live on 18 December

Please note the items discussed in this presentation are subject to change prior to the finalisation of the Technical Requirements.

# Questions?

- Thank you