

# TECHBRIEF

## G100 Export Limitation Configuration & Witness Testing UK & Northern Ireland Only

June 2020

## Introduction

This document provides guidance to correctly install and configure Enphase equipment for Power Export Limitation (PEL) to meet the requirements of EREC G100. This is for both single and three phase sites where aggregate Generating Unit capacity exceeds 16A (3.68kW) per phase. Aggregate generation capacity would include the output from any AC coupled storage such as the Enphase AC Batteries. This document also provides information needed to perform the on-site witness testing procedure that may be required by a DNO.

The Enphase PEL function can be configured to operate at different power export limits to suit the site, as is required by the local DNO. The value for power export limit is defined within a specific Enphase grid profile, with a different grid profile for each PEL value.

## Configuration Requirements

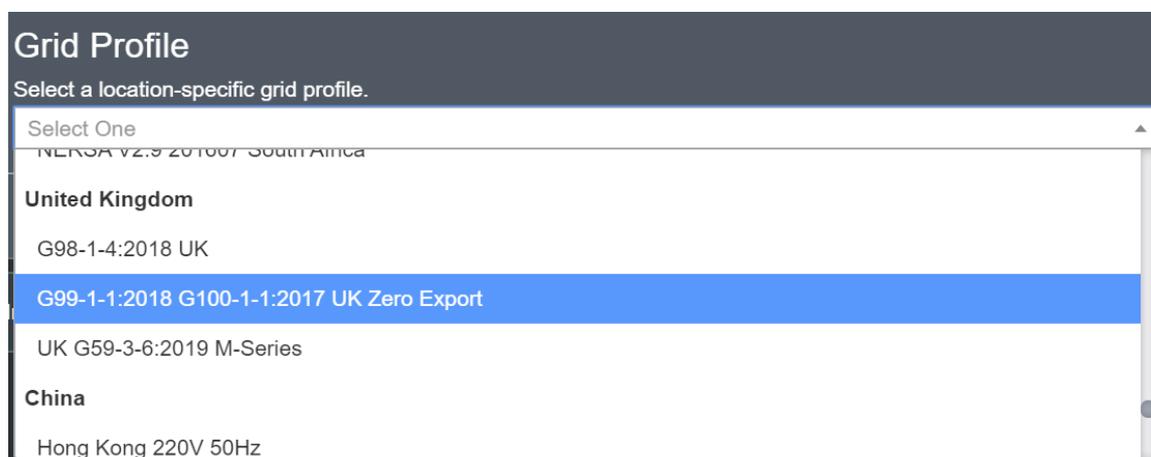
To apply PEL the following are required:

- Envoy S Metered. **Note that a site must have only a single Envoy-S Metered installed to be PEL capable. Sites with multiple Envoys cannot currently perform PEL.**
- Production and Consumption current transformers (CTs) fitted and activated via the Installer Toolkit.
- CTs must be installed to operate in ‘Load with Solar Production’ configuration.
- CTs must be correctly installed:
  - With the correct CT orientation.
  - At three phase sites, without mixing the phases at the CT terminals.
- IQ-Series Microinverters. **Note: M-Series product are NOT PEL capable.**
- Adequate power line communication between Envoy and Microinverters – showing three bars or more in the Installer Toolkit for all installed Microinverters.
- A grid profile for the site which includes PEL set to the export limit required.

## On-Site Configuration

Commission your system via the Installer Toolkit App on your smart phone or tablet as normal, ensure the Envoy has detected all Microinverters with at least three bars communication level for all devices. Also, confirm CTs have been correctly oriented, wired and activated.

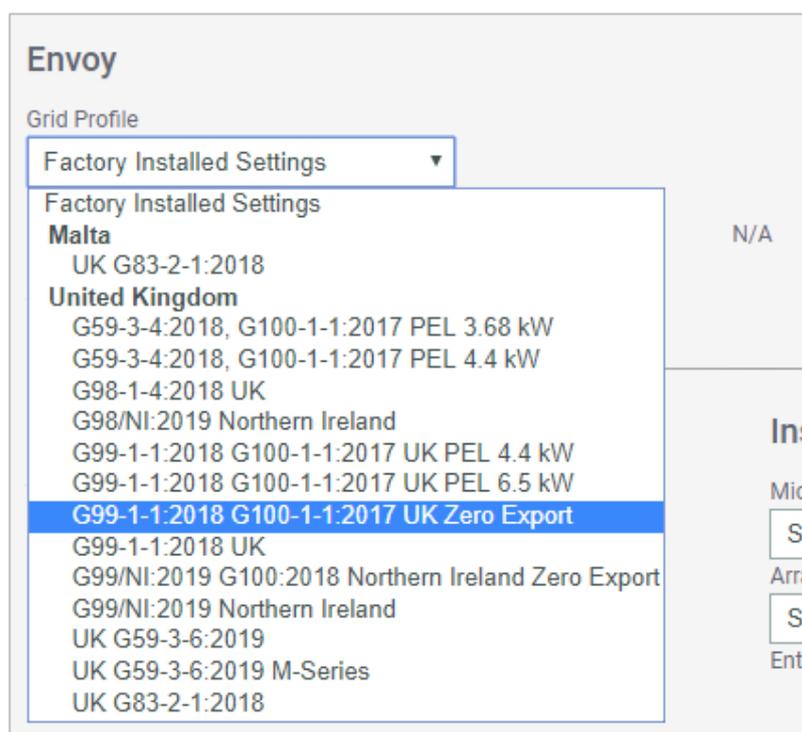
PEL is applied to the system using the grid profile. Within the Installer Toolkit you will see grid profiles are available showing ‘G99-1-1:2018 G100-1-1:2017 UK PEL X kW’ or ‘G99/NI:2019 G100:2018 Northern Ireland PEL X kW’ where ‘X’ is the power export limit required for the site.



If there is no pre-existing grid profile for the export limit required, contact Enphase Customer Support to request a new custom grid profile. Customer support will need to know what export limit should be applied. When the new custom profile is available this can be remotely applied to the site via Enlighten. If required, the site can be temporarily set to zero export (0W export limit) using 'G99-1-1:2018 G100-1-1:2017 UK Zero Export' or 'G99/NI:2019 G100:2018 Northern Ireland Zero Export' until the required new profile is available.

To contact Enphase Customer Support, please call us on 01908 828928.

These same PEL enabled grid profiles are also available via the Enlighten Activation form.



### Generator Commissioning & Fail-Safe Testing

The DNO may request to visit site to witness commissioning and testing of the new installation and confirm correct operation of the PEL arrangement. This requires the installer to perform the witness testing steps as set out in [EREC G100](#) Section 7.

The DNO witnessing engineer will require the prevention of the required export limit being exceeded during setup and testing. To ensure this we recommend the site is temporarily set to zero export (0W export limit) for demonstration purposes. To do this apply the 'G99-1-1:2018 G100-1-1:2017 UK Zero Export' or 'G99/NI:2019 G100:2018 Northern Ireland Zero Export' grid profile using the Installer Toolkit App.

This enables the ability to show the PEL in operation without having to wait for higher PV production from the solar to show the impact of the export settings applied.

To activate PEL you must ensure that: **'Site demand' is less than 'PV production'**.

With the zero-export grid profile applied, Production readings can be seen to follow Consumption via the Installer Toolkit App. As loads are turned off to reduce demand the production will also fall accordingly, within 5 seconds as is defined EREC G100. Similar behaviour is seen as loads are turned on, demand increases, and production will then increase accordingly to match.

The DNO witnessing engineer may now want to perform generation commissioning. Once this is completed, they may then need to review a series of fail-safe tests to show the reliability of the PEL functionality. The following tests can be performed:

Component		Test
<b>Control Unit (CU)</b>	Envoy-S	To simulate Envoy failure or loss of communication between Envoy and IQ7 Microinverters, with the system operating isolate the power supply to the Envoy. PV production will stop within 5 seconds due to the loss of communication with the Envoy gateway. Restore power once test completed. Power generation may need few minutes after envoy has rebooted to resume at 100%.
<b>Power Monitoring Unit (PMU)</b>	L1 Consumption CT	Disconnect L1 Consumption CT wires from the Envoy or remove L1 CT, <ul style="list-style-type: none"> <li>○ With single phase, PV production will stop within 5 seconds.</li> <li>○ With three phases, the aggregate PV production across all three phases will reduce to match the aggregate demand on the remaining two consumption phases within 5 seconds.</li> </ul> Restore CT connections / replace CT once test completed.
	L2 Consumption CT (Three phase only)	Disconnect L2 Consumption CT wires from the Envoy or remove L2 CT, then as above for L1.
	L3 Consumption CT (Three phase only)	Disconnect L3 Consumption CT wires from the Envoy or remove L3 CT, then as above for L1.
	L1 Production CT	Disconnect L1 Production CT wires from the Envoy or remove L1 CT: <ul style="list-style-type: none"> <li>○ If demand is higher than production then nothing will happen, PV production continues.</li> <li>○ If production is higher than demand, then this will be measured by the Consumption CT with a negative value, PV production will stop within 5 seconds.</li> </ul> Restore CT connections / replace CT once test completed.
	L2 Production CT (Three phase only)	Disconnect L2 Production CT wires from the Envoy or remove L2 CT, then as above for L1.
	L3 Production CT (Three phase only)	Disconnect L3 Production CT wires from the Envoy or remove L3 CT, then as above for L1.
<b>Generating Units</b>	Single AC Branch Circuit (of one or more IQ7 Microinverters)	Where there is a single AC branch circuit, isolate the supply to the microinverter circuit and the system will cease production immediately. Restore power to circuit once test completed.
	Multiple AC Branch Circuits (of one or more IQ7 Microinverters)	Where there are multiple AC branch circuits each with dedicated isolation, isolate the supply to one AC branch circuit. The remaining Microinverters will continue operation and, if power is available, will adjust output to match demand on the consumption circuits. Restore power to circuit once test completed.

<b>Generator Interface Units (GIU)</b>	Phase coupler (Three phases only)	Where there is a phase coupler, isolate the power supply to the phase coupler. Communication between the Envoy and the Microinverters on L2 & L3 will stop and PV production will stop within 5 seconds. Microinverters on L1 (or the same phase as the Envoy) will continue operation and, if power is available, will adjust output to match demand on the consumption circuits. Restore power to circuit once test completed.
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• <b>DANGER!</b> Risk of electric shock! Always de-energise circuits before wiring CTs.</li> <li>• <b>DANGER!</b> Risk of electric shock! Do not install CTs when current is flowing in the sensed circuit. Always install CT wires in the terminal blocks before energising the sensed circuit.</li> <li>• <b>DANGER!</b> If working with live CT is unavoidable during testing, take full precautions for live working when disconnecting CT wiring/removing CTs to avoid risk of electric shock.</li> <li>• <b>WARNING!</b> Do not remove power from the Envoy-S if the LEDs are flashing green. This indicates that a software upgrade is in progress.</li> <li>• These fail-safe tests have been documented based on using the 'Zero Export' configuration. If a non-zero export limit is applied results will differ and export up to the limit set will be observed.</li> <li>• It is not possible to disrupt the powerline communication between the Envoy and Microinverters without also disconnecting the AC circuit, so it is not possible to exclusively test loss of powerline communication.</li> <li>• PV production will continue without the Envoy being internet connected or communicating with Enphase Enlighten servers.</li> </ul>		

### Final Setup for System Operation

Once all tests have been successfully performed the correct profile should be applied to the site. The selected profile should match the required export limit as per guidance in the On-site Configuration section earlier in this document. This grid profile can be applied directly on-site using the Installer Toolkit or applied later via Enlighten as required.