

Guide to Hawaii NEM Plus-Compliant Enphase Systems

Background

On Friday October 12, 2018 the Hawaiian Public Utilities Commission approved the addition of a new program called Net Energy Metering Plus (NEM Plus). This program is available only to customers with solar energy systems operating under the existing Net Energy Metering (NEM) agreements.

The NEM Plus program allows customers to install additional non-export capacity without impacting the existing system's NEM status. There are no capacity limits or deadlines for this new program. Applications for the new program are available since October 22, 2018.

The NEM Plus program benefits those existing NEM customers who have increased their energy consumption or have a current NEM system that does not offset all of their consumption needs, by allowing the addition of a non-exporting system to offset their consumption via self supply operation. This means that the new NEM Plus system will be configured with a self supply profile that will only produce power when there are loads to consume the power.

Existing NEM customers interested in applying for NEM Plus should note that the program does not allow energy from the new equipment to be exported to the grid. This document describes how to install a new Enphase System with zero export functionality to meet the NEM Plus non-export requirements.

For more information on NEM Plus from Hawaiian Electric, go to:
www.hawaiianelectric.com/nemplus.

Non-Export system requirements

Hawaii Electric allows non-export qualified systems to operate within a limited duration and the cumulative amount of exported energy over a given period as defined below. Inverters that have been certified under a prior Customer Self Supply program have demonstrated that they are capable of complying with the following inadvertent export rules.

Inadvertent Export Rules

Event Duration Limit	Systems may export power for a duration of less than 30 seconds for any single event.
Event Frequency	There are no limits on the frequency of exports in any given period.
Net Export Limit	Systems shall not export more than the generating facility's nameplate rating (kW gross) multiplied by 1 hour per customer billing cycle. <i>For example:</i> the inadvertently exported energy of a 5 kW system shall not exceed 5 kWh per billing cycle
Control System Failure	In the event that a system exports real power to the grid for longer than the acceptable duration of 30 seconds, the system shall cease to energize within 2 seconds and will enter a safe operating mode until real power output control has been re-established.

Enphase export limiting (and zero export) capability

Enphase systems support the above non-export requirements using a special Customer Self Supply (CSS) grid profile and additional monitoring hardware installed at or near the utility service location.

When configured for zero export, an Enphase system automatically limits PV generation so that no energy is exported to the grid.

The Enphase Energy Management System uses data collected by the IQ Envoy Consumption and Production meters to automatically adjust the microinverter output when the output of the PV system is likely to exceed the site's consumption needs. This power curtailment functionality is essential to maximize the system output while limiting the export of power to the grid.

The microinverter power output adjustments are sent from the IQ Envoy over the powerline, without requiring external communications wires to be installed between the IQ Envoy and the microinverters.

Pulling data from the consumption meter every 500ms and making adjustments to microinverter output at 1.5s intervals, an IQ Envoy with zero export enabled will consistently react to inadvertent export events within 2 to 4 seconds—well within the 30-second limit allowed by the utility non-export rules.

Sometimes, drastic power fluctuations in loads at a site may result in inadvertent export of power. Since the IQ Envoy samples the site's net consumption every 500ms, the system quickly reacts to these inadvertent export events within an average of 2 seconds; well within the 30-second duration limit imposed by the utility.

NEM Plus system with existing NEM system line-side of the main service panel

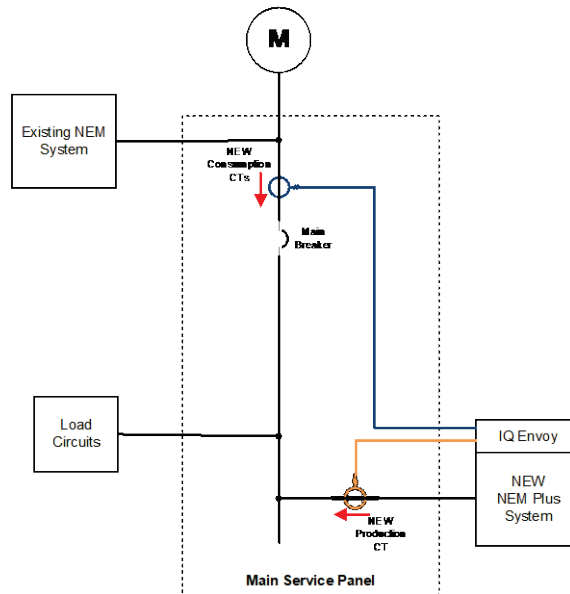
When installing a new NEM Plus system at a site with the existing NEM system interconnected on the line-side of the main service panel, follow these configuration instructions.

Parts needed

1. IQ Envoy (incl. one Production CT)
2. IQ Microinverters (IQ 6 or IQ 7 series)
3. Optional Enphase Energy Storage Systems (IQ Battery)
4. Two (one pair) Consumption CTs

Steps for installation

1. Follow the microinverter installation recommendations provided in the Installation and Operation manual found here:
<https://enphase.com/sites/default/files/downloads/support/IQ7-7plus-7X-Micro-Manual-EN-US.pdf>
2. Wire the IQ Envoy with the Consumption and Production CTs as shown in the image below.



3. Update the Envoy software if needed and apply one of the following Customer Self Supply Grid profiles¹:
 - a. HEI SRD V1.1 O+M+H CSS no VW
 - b. HEI SRD V1.1 O+M+H CSS w/VW
 - c. HEI SRD V1.1 L+M CSS no VW
 - d. HEI SRD V1.1 L+M CSS w/VW
4. Apply the Grid profile during the commissioning process.
5. Generate the Grid Profile Settings Report through Enlighten Manager
6. Submit the Grid Profile Report to DER-SelfCertification@hawaiianelectric.com

¹ Key: O+M+H = Oahu+Maui+Hawaii, L+M = Lanai+Molokai, CSS = Customer Self Supply, w/VW = Volt-Watt function enabled, no VW = Volt-Watt function disabled

NEM Plus system with existing NEM system on breaker in main service panel

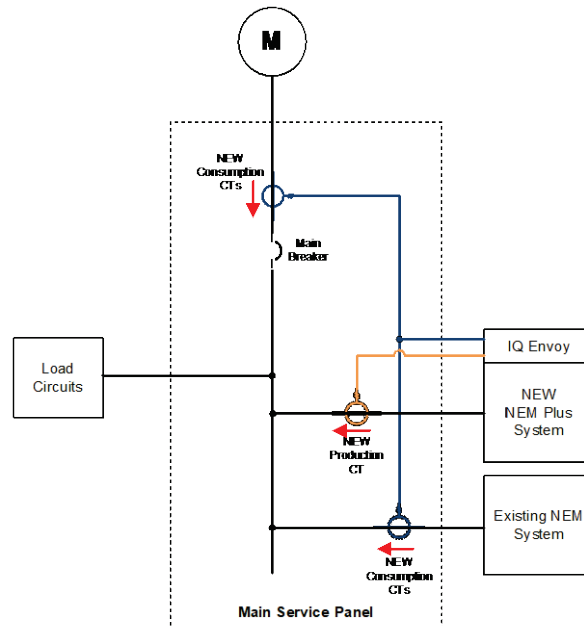
When installing a new NEM Plus system at a site with the existing NEM system interconnected on the load-side in the main service panel, follow these configuration instructions.

Parts needed

1. IQ Envoy (incl. one Production CT)
2. IQ Microinverters (IQ 6 or IQ 7 Series)
3. Optional Enphase Energy Storage Systems (IQ Battery)
4. Four (two pairs) Consumption CTs

Steps for installation

1. Follow the microinverter installation recommendations provided in the Installation and Operation manual found here:
<https://enphase.com/sites/default/files/downloads/support/IQ7-7plus-7X-Micro-Manual-EN-US.pdf>
2. Two pairs of Consumption CTs will be required for this installation.
 - One pair of Consumption CTs is installed on line 1 and line 2 of the existing NEM system. This prevents the need to move electrical components of the existing system.
 - The second pair of Consumption CTs is located on the busbars or wires coming from the utility meter.
 - Additional information for installing consumption CTs can be found here:
https://enphase.com/sites/default/files/downloads/support/Installing_Consumptions_CT_Tech_Brief_EN_NA_1.pdf
 - The arrows on both consumption CTs should point towards the load.



3. Update the Envoy software if needed and apply one of the following Customer Self Supply Grid profiles²:
 - HEI SRD V1.1 O+M+H CSS no VW
 - HEI SRD V1.1 O+M+H CSS w/VW
 - HEI SRD V1.1 L+M CSS no VW
 - HEI SRD V1.1 L+M CSS w/VW
4. Apply the Grid profile during the commissioning process.
5. Generate the Grid Profile Settings Report through Enlighten Manager
6. Submit the Grid Profile Report to DER-SelfCertification@hawaiianelectric.com

The second pair of Consumption CTs are used to measure the existing NEM generation to subtract any existing NEM generation from the load calculation. This is used for zero export control. The results are the actual loads that can be offset by the new NEM Plus capacity using zero export functionality. The same results can be achieved by running the existing NEM generation conductor through a single pair of Consumption CTs. This may help illustrate the concept best.

NOTE: Using an additional pair of Consumption CTs achieves the same results and provides a way to capture the existing NEM generation without modifying the existing installation.

Conclusion

An Enphase Smart Inverter system has the functionality required to comply with the NEM Plus requirements. The process for setting the grid profile can be found in the Getting Started Guide: <https://enphase.com/sites/default/files/downloads/support/Quick-Guide-Upgrade-For-Hawaii-HEI-EN-US.pdf>.

For more information, please contact Enphase customer support at <https://enphase.com/support> or (877) 797-4743.

² Key: O+M+H = Oahu+Maui+Hawaii, L+M = Lanai+Molokai, CSS = Customer Self Supply, w/VW = Volt-Watt function enabled, no VW = Volt-Watt function disabled