

## Network Inverter-based Micro-generation Design Requirements:

Designed to prevent export into EPC's secondary Network system, a customer's protection and control (P&C) system must be designed to sense the power flow at the customers' main service Point of Common Coupling and trip out the generator's main breaker or trip out the Customer's main breaker at a pre-determined minimum import level or during P&C alarm conditions.

Customers connected to a secondary Network service must have a P&C system design which meets the following requirements:

1. Single Line Diagram and Protection Schematic: A single line diagram of existing Customer service and the new requested Micro-generation service. In addition, a protection schematic showing all protection devices and elements enabled.
2. Protection device specifications and test reports: Protection device specifications, coordination curves of the customer's protection device and the first upstream protection device owned by ENMAX, as well as the commissioning test reports once the system is installed.
3. Minimum Import Relay & Level:
  - i. The minimum import level is building dependant and is to be provided by the customer and is then to be reviewed & accepted by EPC. The minimum import level must be designed and set above zero kW to ensure a net import of power at all times.
  - ii. Suggested types of Minimum Import protection relays include the directional over-current 67/67N or a power flow relay (Device 32). Whichever relay is chosen will be referred to as the minimum import relay in this document. Note that a device 32 is preferred.
  - iii. Directional Control: The minimum import relay is required to be able to directionally monitor power flow *into the building* to ensure there is always a set amount of power flow into the customer's building from the utility. The minimum import relay needs to distinguish forward power from reverse power.
  - iv. The minimum import relay is required to monitor 3-Phase power flow of the Customer's main panel at the point of common coupling with the Utility.
4. Generator Isolation Conditions: Customer's generation interrupting device must isolate the generator or trip the customer's main (all phases) service from the Point of Common Coupling between the customer and the utility in any of the following conditions:
  - i. When the importing power level to the customer's main panel drops below the set minimum amount of import power flow.
  - ii. A customer relay alarm system activated due to failure of customer key relays.
  - iii. During Relay maintenance or relay removal from system.
  - iv. Power is lost to the minimum import relay.
5. Interlocking: Customer's generation interrupting device is to be interlocked to the customer's minimum import relay when the relay is removed from the circuit. A minimum requirement is that the customer's main breaker should be tripped when the relay is removed. This is to prevent generation into the utility system.
6. Trip Time: Generation interrupting device needs to disconnect the MG system from the customer's electrical system within 250 milliseconds total. This total operating time includes the time for both the relay and circuit breaker to operate.
7. The design, procurement, installation, operations, maintenance and ownership of the protection and control system and associated equipment is the sole responsibility of the customer.
8. The protection and control system must physically be located on customer property.
9. The final P&C design and all associated documents are required to be provided by a Professional Engineer in good standing with APEGGA, for review by ENMAX Power Corporation.