REQUIREMENTS FOR GRID INTERCONNECTION OF MEDIUM-SCALE GENERATION RENEWABLE (MSGR) ENERGY SYSTEMS >100KW and <=500KW

1 Purpose

This document describes the general provisions and technical requirements for connecting Medium Scale Generation Renewable ("MSGR") systems to BPL's power system, inclusive of transmission and distribution, ('the Grid'). These requirements ensure:

1. The compatibility of the MSGR system with the Grid
2. The safety of the MSGR system operating in parallel with the Grid
3. The safety of BPL's employees, agents, customers and the public; and
4. High standards of power quality.

This program falls within the URCA guidelines for RESG systems of capacity >100KW to a maximum of 500KW.

This document sets out the:

- Capacity limits for MSGR systems (Section 2)
- Application and interconnection process for MSGR systems (Section 3)
- General conditions for connecting an MSGR system to the Grid (Section 4)
- Grid operating conditions (Section 5)
- Technical interconnection requirements (Section 6)
- Glossary (Appendix A).

2 Capacity Limits

Due to the difference in the distribution networks across the islands of The Bahamas there must be different capacity limitations on each island. Due to the potential size of MSGR systems applications, Family Islands (islands other than New Providence) are subject to the ability of local conditions to support such a system. All applications are subject to local grid conditions and the requirements of these guidelines.

Capacity limits do not apply to fully off-grid MSGR systems, however, these systems require the approval of both URCA and BPL. Application for such a system must be made through URCA.

2.1 New Providence

Commercial customer applications for the MSGR must be made through URCA under their RESG program. Please see URCA's website for details on this process. All applications are subject to BPL's approval based upon factors including but not limited to installation size, location and configuration.

Residential applications for the MSGR are not being accepted at this time.

2.2 Family Islands

Commercial customer applications for the MSGR must be made through URCA under their RESG program. Please see URCA's website for details on this process. All applications are subject to BPL's approval based upon factors including but not limited to installation size, location and configuration

Residential applications for the MSGR are not being accepted at this time.

The capacity limit for any application is calculated based upon the following formula

3 year average annual historical consumption/Peak system output x 6 x 365 >= 1

Example: If the annual consumption of the location was as follows

Year 1 = 270,000 kWh
Year 2 = 295,000 kWh
Year 3 = 265,000 kWh

The maximum system size that should be applied for is

$$= \frac{((270{,}000+295{,}000+265{,}000)/3)}{6\text{x}365} = \frac{276{,}667}{2{,}190} = \textbf{126.33 KW}$$

2.3 Summary Table

The following table summarizes the capacity limits for Residential and Commercial MSGR systems, as well as the overarching limit that applies to all types of MSGR systems.

	Residential Maximum System Size	Commercial Maximum System Size	No MSGR system may exceed this size
New Providence & Paradise Island	Not Applicable	Site Specific	500kW
All other Family Islands	Not Applicable	Site Specific	500kW

Application and Interconnection Process for Commercial MSGR Systems

This section describes the application and interconnection processes for Commercial customers.

Commercial and Off Grid Residential customers should apply through URCA in accordance with URCA's application process for RESG systems, which will be available from URCA's website at www.urcabahamas.bs .

Though application is made for these systems through URCA after URCA's review applications are forwarded to BPL and must meet the application and technical requirements established under BPLs MSGR program. Applications

must be reviewed and approved by BPL **BEFORE acquiring the MSGR system**. BPL is not obligated to approve or allow the connection to the Grid of any installation that is non-compliant, unsafe, or unfit for purpose.

BPL requirements are included in its MSRG Requirements for Grid Interconnection document (this document) which can be downloaded at www.bplco.com.

To be reviewed under the BPL MSGR program the commercial applicant must supply through URCA in addition to the completed URCA application form the following :-

DOCUMENTS

1. Electrical Schematics and a Riser Diagrams specifying all the components of the MSGR system stamped by a local licensed three phase electrical contractor.

2. Copies of the operation and installation manuals for all system components.

3. Though not required by BPL applicants must be aware other approving agencies may require structural and mechanical design information stamped by local licensed professionals.

FEES

4. A non-refundable application fee component equal to peak installed system capacity in KW x $1 (URCA may have additional fees).

5. If the installation does not have battery storage configured, in addition to other functions, that will automatically offset the variability of the solar resource, a variability charge is also added to the application fee. This fee is $25 per KW of peak capacity above 100KW.

   Example: A 134KW system without suitable storage, would have a variability charge of (134-100) x 25 = $850 in addition to it application fee of $134 for a total of $984 (plus VAT). This total amount must be paid to BPL in addition to any applicable URCA fees.

INTERCONNECTION STUDIES

If is it determined upon initial review of the application that an interconnection study is required to determine the impact of the installation on the BPL grid the customer will be advised of this. The customer will also be advised of the estimated cost of having this study conducted and given the option of having the study done by an engineering firm of their choice and approved by BPL. The full cost of the interconnection study must be born by the customer. Approval in Principe will not be granted until after the results of the study are reviewed and it is determined that there are no identifiable issues. The customer is again advised not to acquire or install the system until Approval in Principle is issued by BPL. BPL will not be liable for any cost incurred if an application is denied.

Customers with existing MSGR systems who wish to or are connect to the grid must also apply for an MSGR Permit and submit the documents and fees listed above. **It should be noted that penalties exist for the operation of unauthorized systems.**

BPL will review the application and provide its response, either approving or denying the application, within 21 days of receipt of a completed application, inclusive of the interconnection study report if required.

After receiving written approval from BPL to acquire the specified system, the customer must apply to the Ministry of Works for the required electrical and building permits. In the application to the Ministry of Works, the customer must include a copy of its MSGR Approval in Principle from BPL.

After receiving any required electrical and building permits from the Ministry of Works, the customer may install the approved MSGR system. The MSGR system must be installed according to the technical specifications in the customer's submission to URCA, BPL and the Ministry of Works.

Once all approvals have been obtained and inspections passed, BPL may perform inspection and functionality tests to ensure the safety of the system. The tests must be performed no later than 21 calendar days after BPL receives written notice from the customer that the Ministry of Works has approved all relevant electrical and building permits. In the written notice, the customer must include approved copies of the relevant permits and inspection certificates.

BPL will carry out inspections and tests in accordance with Section 6 of this document, and will advise the applicant in writing whether the MSGR system qualifies for interconnection to the Grid. BPL may, if deemed necessary, apply additional labelling and markers to identify the site as an approved MSGR system.

No MSGR system should be connected to the grid for any purpose without the written approval of BPL, this is inclusive of testing. Connecting a system without BPL's written approval to do so can result in penalties and other actions against the owner, installer and electrical contractor.

NOTE BPL's application approval in principle does not constitute and approval to make a connection to the grid for any purpose.

BPL may reject the request to connect an MSGR system to the Grid, or may disconnect an interconnected MSGR system, if the system is found to be unsafe during the inspection or the verification test results. The customer should take corrective measures to ensure its system complies with the requirements. BPL will perform a second inspection and functionality test to ensure the safety of the system no later than 21 calendar days after the customer requests a second inspection.

When BPL approves an MSGR system, the customer is required to execute an MSGR Interconnection Agreement with BPL to authorize the connection with the Grid and provide for the export of energy to the Grid under the terms defined in the MSGR Interconnection Agreement.

4 General Conditions

This section sets out the general conditions that apply to all customers with grid-tied MSGR systems.

4.1 Customers Must Be in Good Standing

Persons seeking to acquire and connect MSGR systems to the Grid must be BPL customers in good standing. The MSGR system must be located at the customer's owned or rented property.

For rented properties, the applicant must obtain and provide to BPL written approval from the property owner authorizing the MSGR installation and fully indemnifying BPL with respect to damages from the installation, maintenance, operation, or removal of the MSGR installation.

Grid-tied MSGR systems must be capable of operating in parallel with the Grid (in accordance with the stipulated technical requirements) with the intent to offset some or all of the customer's own electricity usage.

4.2 Types of Grid-tied MSGR Systems Allowed

Unless otherwise approved by BPL, to be eligible to connect and operate in parallel with the Grid, grid-tied MSGR systems must be wind and/or solar powered. Section 2 of this document describes the limits of the nameplate capacity of grid-tied MSGR systems.

The MSGR system may only be three-phase. Additionally, its rated size is limited to 80 percent of the size of the main breaker servicing the system or the capacity of the service originally approved at the location, whichever is the lesser. All other capacity limitations of the MSGR Program also apply.

4.3 MSGR Interconnection Agreement

Where the MSGR system has been approved, and passes all required inspections, the customer is required to execute a MSGR Interconnection Agreement with BPL prior to beginning operations. The MSGR Interconnection Agreement contains the terms and conditions for operating a grid-tied MSGR system, including the rate that BPL will pay for electricity sold to the Grid.

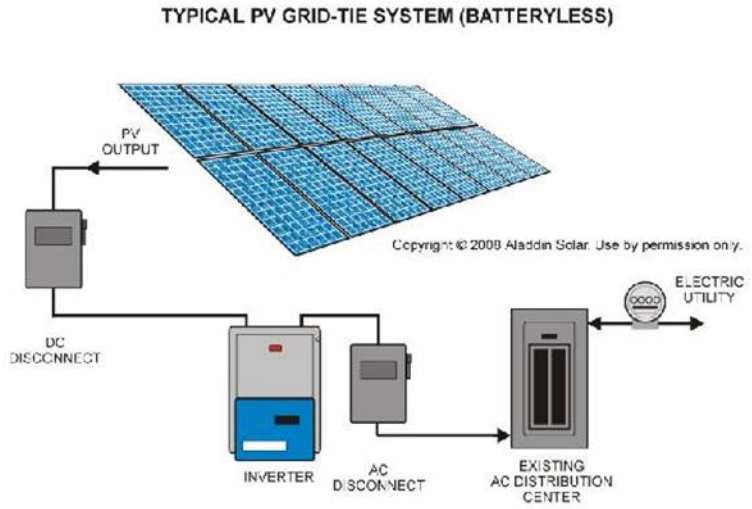
4.4 Unauthorized Connections

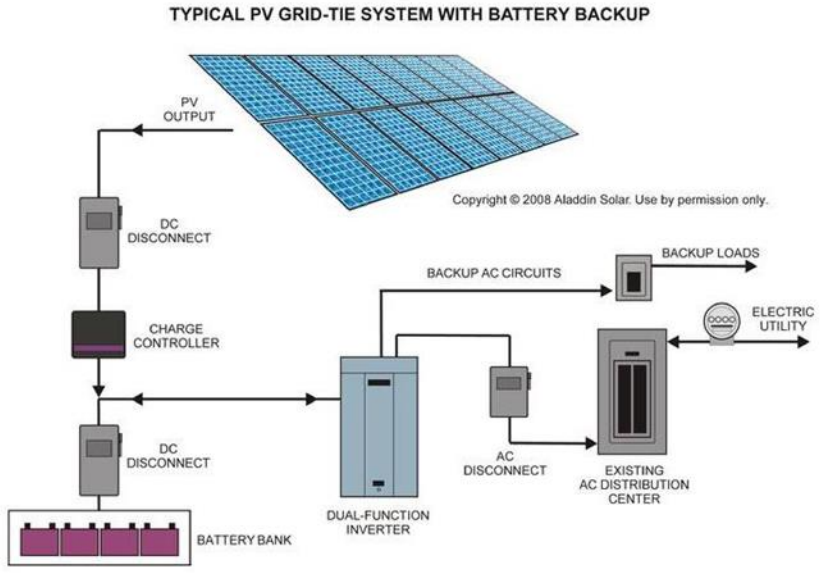
BPL and URCA must grant approval in writing, and the customer must have executed a MSRG Interconnection Agreement with BPL, before any MSRG system is connected to the Grid. For the purposes of public and utility personal safety, BPL reserves the right to disconnect any customer who connects or has connected a MSRG system to the Grid without written authorization from BPL. If BPL decides to disconnect a MSRG system from the Grid, it shall notify URCA within two (2) days of doing so, giving reasons for the disconnection. A customer whose system has been disconnected pursuant to this power may have the matter reviewed by URCA by making a written complaint to URCA.

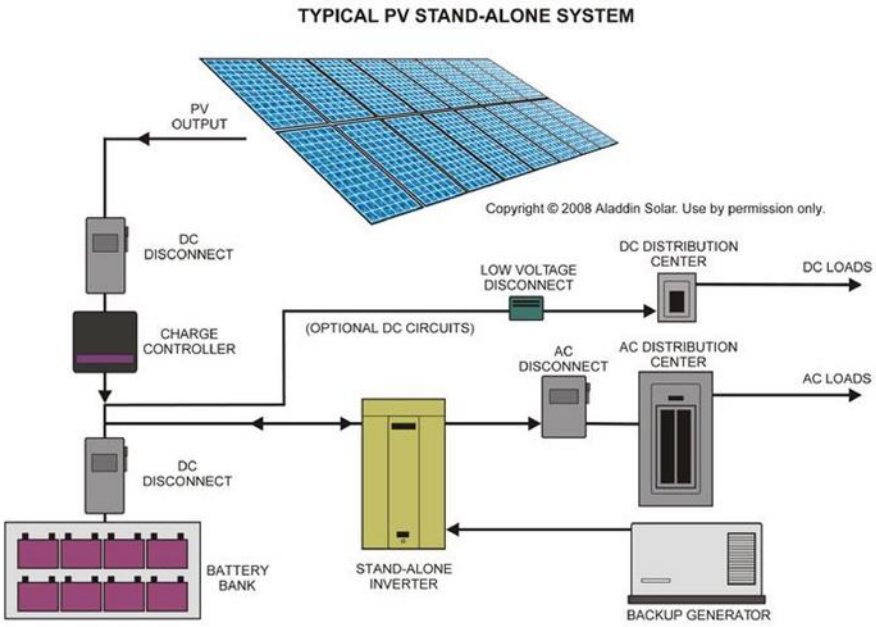
4.5 Metering

BPL will furnish metering to measure the energy supplied from the Grid to the customer and the energy supplied to the Grid by the owner of a MSRG system. A diagram showing simplified typical metering configurations are provided in Figure 4.1.

Figure 4.1: Sample Metering Configuration







Images courtesy of Aladdin Solar

4.6 Labelling

Buildings and structures with a grid-tied MSGR system must, where practicable, have the disconnecting means grouped (in accordance with BPL's Grid Code). Where such an arrangement is not practicable, there must be a permanent plaque posted on or near each disconnecting means, indicating the location of all other service boxes supplying power to the building.

Grid-tied MSGR systems that store electrical energy shall be labelled in a conspicuous, legible, and permanent manner with a suitable warning sign at the location of the service disconnecting means of the premises.

4.7 Insurance

The owner of a MSGR system must maintain general liability insurance in amounts not less than:

- $1,000,000 for MSGR systems with capacity greater than 100kW, but less than or equal to 500kW.

An endorsement on a property owner policy providing the required amount of coverage is acceptable to meet this insurance requirement. Failure to maintain the insurance coverage will render the MSGR Interconnection Agreement invalid. BLP does not accept responsibility for the failure of the customer to obtain or renew its insurance policy.

Proof of coverage must be provided prior to an installation being authorized for connection to the grid. This coverage is to provide, at a minimum, protection in the event of electrical or mechanical failure or malfunction of the installation that causes loss, damage injury or death to persons or property. BPL may from time to time require the home owner to verify the existence of valid insurance coverage.

4.8 Indemnification

The owner of a grid-tied MSGR system must indemnify BPL, its agents, and third parties for losses and damages resulting from the operation of the MSGR system, except when the loss or damage occurs due to the negligent actions of BPL, its agents, or third parties. BPL and its agents will indemnify the customer for all loss to third parties resulting from the operation of the Grid except where BPL and its agents have used reasonable care in the exercise of their functions or when the loss occurs due to the negligent actions of the customer.

4.9 Future Modifications and Expansion

The customer must obtain written approval from BPL and the Ministry of Works Electrical Inspection Department, prior to modifying, expanding, or altering the approved MSGR system. The customer must present an approved Electrical Inspection Certificate to BPL, and must obtain written approval from BPL, before interconnecting the modified MSGR system to the Grid. Dependent on the nature or extent of the modification the customer may be required to execute a new MSGR Interconnection Agreement.

4.10 Customer-owned Equipment Protection

The protection of the facility loads and generation equipment owned by the customer and ensuring compliance with all standards, codes and requirements of local authorities is solely the responsibility of the customer.

4.11 Additional Fees

Customers may be required to pay BPL additional fees for services related to the installation of the MSGR system.

5 Grid Operating Conditions

This section describes the typical distribution operating and power quality conditions within which the MSGR system should operate. These are representative values that BPL attempts to maintain and includes some abnormal conditions that the MSGR system should be designed to withstand. It is the customer's responsibility to ensure that all equipment operates correctly in this environment.

5.1 System Frequency

The Grid operates at 60Hz. Frequency typically ranges from 58.5 to 61.5 Hz for small contingencies resulting in modest disturbance where the MSGR system is expected to remain connected to the Grid. For larger contingencies, broader frequency variations may occur such as when major generation or transmission is lost and load shedding occurs. The MSGR system protective systems are expected to operate as outlined in the Technical Interconnection Requirements section below.

5.2 System Voltage

The LV distribution Grid typically operates at voltages of 120/240V single phase and 120/208V or 277/480V three phase. Voltage typically ranges from 112.8V to 127.2V (L-N on 120V base, 6%) for small contingencies resulting in modest disturbance where the MSGR system is expected to remain connected to the Grid. For larger contingencies, broader voltage variations may occur such as when major generation or transmission is lost and load shedding occurs. The MSGR system's protective systems are expected to operate as outlined in the Technical Interconnection Requirements section below.

6 Technical Interconnection Requirements

Due to their potential impact on the electrical grid all inverters used in this program must be classified as grid support inverters and comply with UL standard 1741 SA.

This section provides the technical requirements to be met by the MSGR system to qualify for interconnection to the Grid and lists typical conditions and response to abnormal conditions that the system is required to meet. Except as modified herein, the MSGR System must confirm to IEEE Standard 1547 – 2018 "Standard for Interconnecting Distributed Resources with Electric Power Systems". Internal wiring must conform with national standards, as set by the ministry responsible for Building Regulation under Buildings Regulations (Chapter 200).

All components, inclusive of but not limited to inverters, panels, charge controllers and batteries, must be accompanied by the manufacturers' specifications sheets, installation/operation manuals, and other details relevant to the inverters function. These documents must be available at the time of application, initial installation inspection, and all subsequent inspections/reviews. Voltage, current and power limits, and operating points are key parameter sets must also be available for review. To maintain system safety and compliance, Underwriters Laboratories (UL) listing is required for all electrical components UL 1741SA is required for all inverters, converters, controllers and Interconnection System Equipment and all Solar Modules are required to be listed under UL 1703

All small wind turbine systems must meet UL 6142 requirements as well as any applicable local code requirements.

6.1 Over Current Protection

The MSGR system must detect and promptly cease to energize for over-current fault conditions within its system.

6.2 AC Disconnect

Ensure a visible and lockable AC disconnect is in an accessible location at or near BPL's meter and required signage and notices are posted.

6.3 Anti-Islanding

For an unintentional island condition, where the MSGR system energizes a portion of the Grid, the MSGR system shall detect the island condition and cease to energize the Grid within a maximum of two seconds after the formation of the island.

6.4 Voltage Flicker

Voltage flicker is an increase or decrease in voltage over a short period of time and is normally associated with fluctuating loads or motor starting. A flicker problem is site-specific and depends on the characteristics of the changes in load. A flicker is considered objectionable when it either causes a modulation of lighting levels sufficient to be irritating to humans or it causes equipment to malfunction. The MSGR system shall not cause objectionable flicker for other customers on the Grid.

6.5 Harmonic Distortion

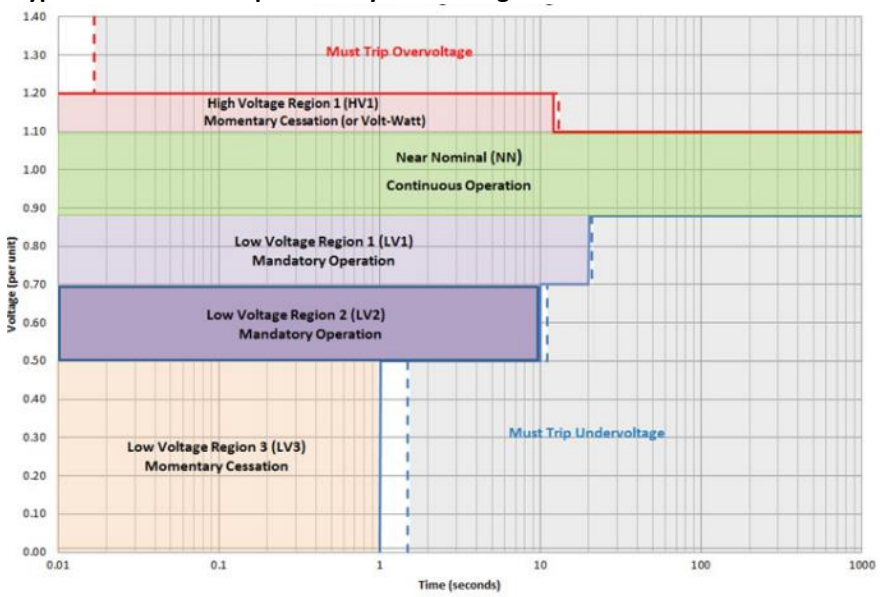
MSGR systems are to employ pure sine wave inverters and are expected to comply with IEEE Standard 519 current distortion limits with regard to harmonic current injection into the Grid. The harmonic current injection arising from the MSGR system shall not exceed the values listed in the table below – (excluding any harmonic currents associated with harmonic voltage distortion present on the Grid without the MSGR system connected). Total current harmonic distortion shall not exceed 5% of rated current.

Total Harmonic Distortion Limit		5.0%
	Maximum Distortion	
Harmonic Numbers	Even Harmonics	Odd Harmonics
h < 11	1.0%	4.0%
10 < h < 17	0.5%	2.0%
18 < h < 23	0.4%	1.5%
24 < h < 35	0.2%	0.6%
H > 35	0.1%	0.3%

6.6 Inverter Response to Abnormal Voltages and Frequencies (Ride Through)

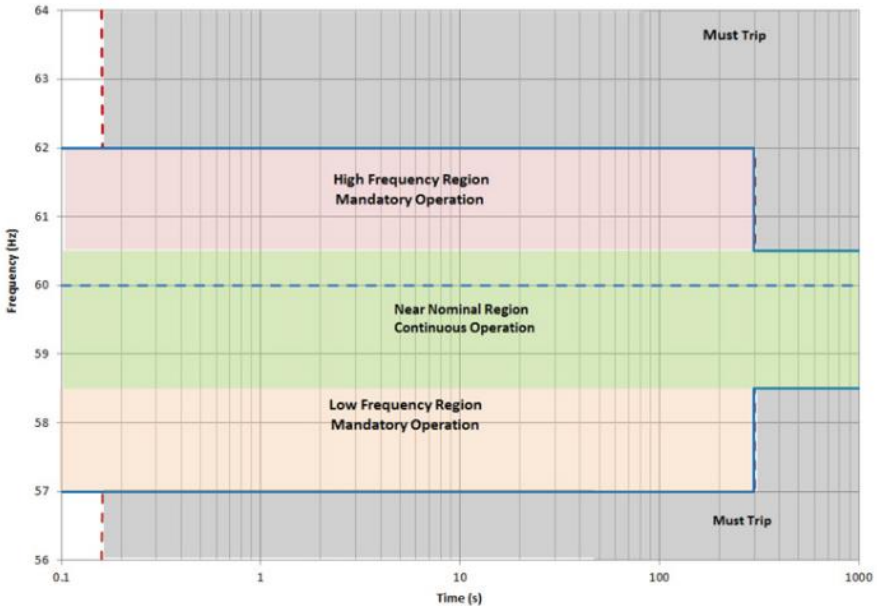
The MSGR inverter must be able to meet the UL 1741 SA disconnection and ride through criteria. Typical values shown below.

Typical UL1741 SA response to system voltage levels



Region	Voltage at Point of Common Coupling (% Nominal Voltage)	Ride-Through Until	Operating Mode	Maximum Trip Time
High Voltage 2 (HV2)	V ≥120			0.16 sec.
High Voltage 1 (HV1)	110 < V < 120	12 sec.	Momentary Cessation	13 sec.
Near Nominal (NN)	88 ≤ V ≤ 110	Indefinite	Continuous Operation	Not Applicable
Low Voltage 1 (LV1)	70 ≤ V < 88	20 sec.	Mandatory Operation	21 sec.
Low Voltage 2 (LV2)	50 ≤ V < 70	10 sec.	Mandatory Operation	11 sec.
Low Voltage 3 (LV3)	V < 50	1 sec	Momentary Cessation	1.5 sec.

Typical UL1741 SA response to system voltage levels



System Frequency Default Settings (Hz)	Minimum Range of Adjustability (Hz)	Ride-Through Until	Ride-Through Operational Mode	MaximumTrip Time
f > 62	62 - 64	No Ride Through	Not Applicable	0.16 seconds
60.5 < f ≤ 62	60.1 - 62	299 seconds	Mandatory Operation	300 seconds
58.5 ≤ f ≤ 60.5	Not Applicable	Indefinite	Continuous Operation	Not Applicable
57.0 ≤ f < 58.5	57 - 59.9	299 seconds	Mandatory Operation	300 seconds
f < 57.0	53 - 57	No Ride Through	Not Applicable	0.16 seconds

6.7 Voltage Imbalance

Only three-phase MSGR systems may be grid-tied to incoming three-phase services. In these cases, approximately equal amounts of generation capacity should be applied to each phase of the three-phase circuit.

6.8 DC Injection

The MSGR system shall not inject a DC current greater than 0.5% of the unit's rated output current at the Point of Delivery after a period of 6 cycles following connection to the Grid.

6.9 Synchronization

MSGR systems that can generate an AC Voltage Waveform independent of the Grid shall be connected in parallel only in combination with its synchronizing capabilities. The MSGR system shall synchronize to the Grid while meeting the Flicker requirements previously indicated and causing no greater than a 5% voltage variation at the Point of Delivery. Synchronization may occur once the Grid has stabilized following an outage or another disturbance event.

6.10 Soft Start/Stop Ramp Rates

Soft start and stop ramp rates must be implemented in the MSGR inverter for systems operating under this program. A soft start/stop ramp rate of 1 kW per second must be implemented in the inverter.

6.11 Remote Monitoring

Remote monitoring must be implemented for the MSGR system and BPL provided with access that will allow

- Real-time monitoring of the system
- The ability to view configuration parameters
- The Ability to download historical performance and log data form the system

6.12 Interconnection Protection Function Requirements

The system shall incorporate the following protective functions:

- AC disconnecting;
- Anti-Islanding;
- Automatic synchronizing (inverters with stand-alone capability);
- Under-voltage trip (on each phase for 3-phase equipment);
- Over-voltage trip (on each phase for 3-phase equipment);
- Instantaneous over-current trip (on each phase for 3-phase equipment);
- Timed over-current trip (on each phase for 3-phase equipment);
- Under-frequency trip;
- Over-frequency trip.

Appendix A: Glossary

Alternating Current (AC): An electric current that reverses its direction at regularly occurring intervals, known as the frequency which, in the case of The Bahamas, is 60 times per second.

Automatic Reclosing: This refers to the automatic restoration of power by devices following a fault. It may involve a sequence of short interruptions before permanent restoration or cessation of power.

Capacity (gross): The full-load continuous rating of the Renewable Generation System, under specified conditions, as designated by the manufacturer. It is usually indicated on the nameplate attached to the equipment.

Customer-Generator: The person or entity accepting responsibility for the electricity account associated with the Small-Scale Renewable Generation (MSGR) system.

Delta (Δ) connection: A method for connecting three phase supply where each phase is connected in series with the next, separated by a phase rotation of 120 degrees. Compare with Wye (Y) (star) connection.

Direct Current (DC): An electric current that flows in a constant direction. The magnitude of the current does not vary or has a very slight variation.

Distribution System: The local poles, wires, transformers, substations, and other equipment used to deliver electricity to consumers. (See Grid also)

Flicker: Flicker (voltage) is an unsteady visual sensation associated with changing lighting luminance caused by sudden and repetitive increases or decreases in voltage over a short period of time. It is normally associated with fluctuating loads or motor starting.

Frequency Protection (over/under): Use of relays or other devices to protect lines or equipment by causing circuits to open based on the degree by which the measured frequency varies from a set value.

Generation (Electricity): The process of producing electrical energy from other forms of energy; also, the amount of electrical energy produced, is expressed in Watt hours (Wh) for small amounts or kilowatt hours (kWh) for larger amounts.

Grid: A network for the transmission of electricity throughout a region. The term is also used to refer to the layout of an electric distribution system.

Grounding: An electrical connection to the earth or a body that extends from an earth connection for the purposes of safety and voltage reference.

Harmonics: Distortions in the sinusoidal voltage and current waveforms caused by the overlapping of the fundamental waveform at 60 Hz with other waveforms of integral multiple frequencies of the fundamental waveform. Total harmonic distortion (THD) is summation of all the distortions at the various harmonic frequencies.

Hybrid System: A self-generation system that combines multiple power sources (such as solar and wind) and is located behind a single electric utility service meter. Energy storage systems such as batteries do not constitute a power source for the purpose of this definition.

MSGR Interconnection Agreement: The legal document authorizing the flow of electricity between the facilities of BPL and a Customer-Generator. MSGR systems must be permanently interconnected and operating in parallel to the electrical distribution grid of the utility serving the customer's electrical load.

Interrupting Device Rating: The highest current that a device is intended to interrupt safely at rated voltage.

Inverter: A device that converts direct current (dc) electricity into alternating current (ac) electricity. Some types are used for stand-alone systems (not connected to the grid, or 'off-grid') and others are designed as utility-interactive (grid-tied) systems to operate in parallel with the utility to supply common loads and may deliver power to the utility.

Islanding: Islanding is a condition which occurs when an interconnected Renewable Generation System continues to energize the facility (and the Grid) after a utility power interruption. Industry practice requires that the Renewable Generation System be disconnected promptly according to applicable standards to avoid equipment damage and safety hazards to personnel.

Overcurrent Protection: Use of a device or relay to protect the system by tripping it offline based on the degree by which the measured current varies from a set value. The trip may be instantaneous or after a pre-set time.

Kilowatt (kW): A measure of instantaneous power equal to one thousand Watts of electricity (See Watt).

Kilowatt hour (kWh): A quantity of electricity usage equal to one thousand Watthours.

Manual Disconnect switch: A manual switch required for interconnection to disconnect the renewable generation source from the utility line.

Net Metering: An arrangement that permits a facility to offset its electrical consumption against energy delivered by the Grid at the retail value and sell power more than its local consumption.

Net billing: Arrangement that permits the utility (using two meters or one meter that separately measures inflows and outflows of electricity) to sell power delivered to the customer at the prevailing tariff, and buy excess power from the customer's MSGR at a rate contracted by the utility. The utility issues a net bill for each billing period.

Peak Watt: A manufacturer's unit indicating the amount of power a photovoltaic cell or module will produce at standard test conditions (normally 1,000 watts per square meter and 25 degrees Celsius).

Photovoltaic (PV) Cell: An electronic device capable of converting incident light directly into electricity (direct current).

Photovoltaic (PV) Module: An integrated assembly of interconnected photovoltaic cells designed to deliver a selected level of working voltage and current at its output terminals, packaged for protection against environment degradation, and suited for incorporation in photovoltaic power systems.

Point of Common Coupling: The point where the electrical conductors of the utility's distribution system are connected to the customer's conductors and where any transfer of electric power between the customer and the distribution system takes place.

Point of Delivery: The point where the Renewable Generation System is electrically connected to the electric utility for metering purposes.

Point of Disconnection: The point at an accessible location where the disconnect switch used to isolate the Renewable Generation System from the utility is located.

MSGR System: Medium Scale Generation – Renewable System. These are systems with the ability to generate their own energy from acceptable renewable acceptable sources using approved technologies.

Renewable Energy: Energy flows that occur naturally and repeatedly in the environment (such as solar, wind, biomass) and can be harnessed for human benefit.

Residential: Electrical Service category of dwellings single or multi-unit, low rise, not being operated as a resort, townhouse, hotel or condominium with each unit having its own metered supply.

Root Mean Square (RMS): Used for AC voltage and current, this quantity equals the square root of the average of the squares of all the instantaneous values occurring during one cycle. It is considered as the effective value of AC because, for a fixed resistive load, the AC RMS voltage will produce the same heating effect as a DC voltage of equivalent value.

Small Commercial: A commercial business customer, which has a peak demand less or equal to50kW.

Solar Energy: The radiant energy of the sun, which can be converted into other forms of energy, such as heat or electricity. Sunlight can be converted to electricity directly, as in the case of photovoltaic (PV) applications or indirectly as in the case of solar thermal applications.

Synchronization: The process of connecting two previously separated ac sources such as the customer's private generation system and the Grid, to allow them to operate in parallel (after matching frequency, voltage, phase angles etc.).

Total Harmonic Distortion (voltage and current): This is a single number representation of the amount of distortion of a voltage or current electrical waveform from a true sine wave.

Voltage protection (over/under): Use of relays or other devices to protect lines or equipment by causing circuits to open based on the degree by which the measured voltage varies from a set value.

Voltage (current) Waveform: The variation of voltage (current) over one cycle indicated by the pattern which results when the instantaneous value of voltage (current) is plotted with respect to time over a cycle. Ideally, AC waveforms are represented by sinusoids and DC waveforms are constant over time.

Watt (Electric): The electrical unit of power represented by the rate of energy transfer of 1 Ampere of electric current flowing under a pressure of 1 Volt at unity Power Factor.

Watthour (Wh): The electrical unit of energy represented by 1 Watt of power supplied to, or taken from, an electric circuit steadily for 1 hour.

Wind energy: Energy present in wind motion that can be converted to mechanical energy for driving pumps, mills, and electric power generators.

Wye (Y, star) Connection: A method for connecting three phase supply where each individual conductor is connected to a common point, which may be grounded or ungrounded. Compare with delta (Δ) connection.