

ST GEORGE'S CAY POWER COMPANY
RENEWABLE ENERGY PLAN (REP)
FOR REVIEW – 28 March 2024



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1.0 Definitions

- 1.1 Power is defined as the rate of doing work. For general understanding, it is equivalent to the speedometer of a car and is measured in kilowatts, kW, or megawatts, MW. There is no factor of time in the measurement of power.
- 1.2 Energy is defined as the capacity to do work. For general understanding, it is equivalent to the odometer of a car and is measured in kilowatts-hours (kWh) or megawatts-hours (MWh). Energy is the application of power capacity over time.
- 1.3 Levelized Cost of Energy (LCOE) means the total cost of ownership divided by total life-cycle energy production, where the total cost of ownership is equal to the first capital cost of diesel generation, PV, and ESS, plus the annual operating cost for each year discounted to year zero.
- 1.4 Lowest Levelized Cost of Energy (LLCOE) means the lowest LCOE for any system configuration scenario.
- 1.5 Photovoltaic (PV) means the process and the equipment capable of converting sunlight to electricity.
- 1.6 PV System means a photovoltaic electricity generating system consisting of PV modules (or “panels”), PV inverters, and the associated electrical components for safety, interconnection, and monitoring.
- 1.7 Energy Storage System (ESS) means a battery plant including batteries and associated safety and isolation components, and power electronics.
- 1.8 PV Microgrid means a PV System with an ESS integrated capable of making electricity without being connected to a grid source.
- 1.9 Regulation means a rule or directive made and maintained by an authority, which must be followed by persons or entities that fall within its jurisdiction.

2.0 Background

- 2.1 The Utilities Regulation and Competition Authority (URCA) is The Bahamas' independent regulatory authority with responsibility for and authority over all entities that generate, transmit, distribute, or supply electricity to, from, or within The Bahamas.
- 2.2 Except for Grand Bahama Power Company, all electrical utility companies and persons whose power generating capacity exceeds 100 kW are regulated by URCA.
- 2.3 St George's Cay Power Company Limited (SGCPC) was formed in 1982 and has 150 local shareholders. SGCPC was granted License APESL-18-0003 by URCA in 2018 to generate, distribute, and sell electricity in its service area. SGCPC is a Licensee and is required to follow all applicable policy and regulation.
- 2.4 SGCPC serves Spanish Wells and Russell Island. SGCPC has approximately 1500 customers.
- 2.5 Until now, 100% of electricity has been from diesel-fueled gensets with no other generating sources. SGCPC is burning approximately 1,000,000 gallons of diesel a year and releasing 14,000 tons of CO₂ to the atmosphere every year.
- 2.6 SGCPC enjoys exceptional reliability due to its construction, maintenance, and operational standards and controls. The last unplanned outage was Nov 2022, previously was in 2021.
- 2.7 Outages in other geographical regions of the Bahamas are far more frequent averaging as high as one outage per week or sometimes as frequently as 1-2 times a day.
- 2.8 SGCPC customers expect that SGCPC will maintain our record for the best reliability in the Bahamas. This requires ongoing management and control of the network.



- 2.9 Compared to New Providence, SGPC power grid is 1/100 the size, with roughly 1% of the peak power capacity and annual energy production. As such, limits and sizing of renewable-energy capacities and total allowances are generally scaled to 1% of the relevant metrics applied to New Providence Island.
- A. For example, a solar-energy system operating on Spanish Wells with a power capacity of 100 kW would be equivalent to a system on New Providence with a power capacity of 10,000 kW (10 MW) with respect to its impact to the grid and its electrical and financial stability.
- 2.10 URCA is required to follow the Electricity Act 2015. (EA 2015). The EA 2015 mandates the following.
- A. Encouragement of competition in the generation of renewable electricity.
- B. Plans that favor and promote the use of renewable energy “in the absence of competing reliability or cost considerations”.
- 2.11 URCA is therefore obligated to ensure that entities with licenses from URCA (its Licensees) incorporate renewable energy in their generation portfolio and allow others to install renewable-energy systems provided that those systems do not compromise the safety of the Licensee’s system or network.
- 2.12 This mandate requires Licensees to employ the least-cost options, or options that do not represent an additional financial burden on the Licensee.
- 2.13 Pursuant to EA 2015 Section 26, SGPC will ongoing monitor its generating capacity and loads, determine the need for additional generating capacity and whether that should be accomplished using renewable sources.
- A. Should SGPC decide that there is a need for additional renewable-energy generating capacity, SGPC will notify URCA and provide justification for its decisions.
- B. Should SGPC decide to solicit competitive bids for electricity from Independent Power Providers, SGPC will follow the requirements of Section 26 of the EA 2015.

3.0 Outlook

- 3.1 SGPCS is mandated by EA-2015 and the terms of its License to maximize the amount of renewable generating sources used to supply electricity to its service area in alignment with national goals included in the Bahamas National Energy Policy.
- 3.2 SGPC faces the same challenge as utility companies and communities around the world: manage costs, remain financially sustainable, reduce use of fossil fuels to make electricity, reduce environmental risk and impacts.
- 3.3 SGPC and all utility companies need to maintain reliability and affordability when customers have the ability to generate solar electricity themselves.
- 3.4 SGPC will update this Renewable Energy Plan (REP) annually. SGPC will submit the updated REP to URCA on an advisory basis.
- 3.5 Every three years, URCA is required to conduct a formal review of the REP.

4.0 Energy Consumption and Expected Load Growth

- 4.1 The 2022 energy consumption for the service area was approximately 15,000 MWh, or approximately 40 MWh a day average.
- 4.2 Peak power demand is approximately 3 MW.
- 4.3 These statistics represent approximately 1% of the size of the New Providence service area.



- 4.4 Service-area consumption has been growing at 3% per year. This trend is expected to continue.
- 4.5 SGPCPC is planning to implement PV and ESS to achieve a minimum of 30% grid penetration before 2030. The annual consumption and resulting 30% Renewable Energy offset totals by year are listed in Table 1.

Table 1: SGPCPC & 30% Targets

Calendar Year	2023	2024	2025	2026	2027	2028	2029	2030
Consumption [MWh]	15,300	15,800	16,300	16,700	17,200	17,800	18,300	18,800
30% Offset Target [MWh]	4,600	4,700	4,900	5,000	5,200	5,300	5,500	5,600

5.0 Renewable Technology Options and Selection

- 5.1 Preamble. The Definitions section of EA 2015 defines “Renewable Electricity Resources” as resources that derive electricity from sources that are naturally replenished. This includes but is not limited to solar energy, wind, hydro-power, geothermal, biomass, wave power, ocean thermal power and waste-to-energy technologies.
- 5.2 Of these technologies the most appropriate for an electricity utility of the size and character of SGPCPC are solar (“PV”) and wind.
- 5.3 Photovoltaic (PV)
 - A. PV is the only technology considered to be viable and practical at the scale needed by SGPCPC and the community.
 - B. PV can be engineered and constructed to survive 180 mph winds with excellent corrosion resistance for a 30-year warranted service life.
 - C. There is no resource study required to deploy PV, since the solar resource is uniform across the Service Area and indeed the entire Bahamas.
 - D. There is no noise or other disturbance associated with a PV system.
- 5.4 Small wind turbines
 - A. Wind turbines could be used for small-scale, residential-sized capacity, although there are several drawbacks that would preclude this application.
 - B. There are no large-scale turbines on the market that have sufficient wind rating for this locale.
 - C. Turbines would have to be the type that can be lowered, secured, and protected during a hurricane, such as the Bergey 15 kW system.
 - D. Lowering a turbine requires additional ground space for the turbine in its horizontal orientation.
 - E. Wind turbines do produce a sound pattern and shadow pattern that are distasteful to some people.
 - F. The wind resource is not continuous across the Service Area, and a wind-resource study would be required before deciding to deploy wind turbines. This would further delay use of wind turbines for meeting the 2030 goals.
 - G. SGPCPC does not consider wind energy as a viable resource for our Service Area.
- 5.5 Marine-based energy production
 - A. SGPCPC considers these systems to not be commercially viable for the Bahamas. This includes tidal, wave, or thermal-energy conversion cycle systems.



- B. SGPCPC does not consider marine-based energy as a resource for our Service Area.

6.0 Structure of the SGPCPC Renewable Energy Plan

- 6.1 Preamble: SGPCPC considers that there are several implementation pathways to achieve the 30% National Integration Target mandated by the National Energy Policy of the Bahamas. These include the following options. The pros and cons of each are discussed in the following paragraphs.
 - A. Large-scale PV constructed, installed, and operated by SGPCPC.
 - B. Small-scale PV installed by individual Customers.
 - C. Private microgrids.
 - D. A combination of the above options.
- 6.2 In addition to offsetting 30% of diesel generation by 2030, the goals of this REP are to reduce energy costs to the community, improve grid reliability, reduce carbon emissions, reduce environmental risk, reduce air and noise pollution, provide frequency stability, and provide black-start capability.
- 6.3 Table 2 represents the SGPCPC plan for PV and ESS deployment.
- 6.4 SGPCPC intends to deploy as much PV as possible without the added investment of ESS. This limit is approximately 15% of annual energy production or 50% of instantaneous power demand. The Phase-1 PV Farm will get the grid as close as possible to this limit. Significant further growth of PV will require ESS installations.
- 6.5 Phase-1 PV Farm
 - A. SGPCPC has aggregated and purchased outright sufficient land adjacent to the Powerplant for the Phase-1 PV Farm.
 - B. This will offset approximately 13-15% of the annual energy consumption and about 1/3 of the demand power capacity.
 - C. The Phase-1 PV Farm will reduce the effective LCOE by approximately 4% compared to diesel generation alone.
 - D. The diesel powerplant will continue to run continuously with the Phase-1 PV Farm operating.
- 6.6 Phase 2 of the REP; SGPCPC-owned Distributed Energy Resources (DER) on customer-owned premises.
 - A. Land is limited for generating resource siting, and land costs are high on Spanish Wells and Russell Island.
 - B. Because of this land shortfall, SGPCPC intends to install and operate PV systems on the roofs of commercial (and possibly also residential) buildings.
 - C. SGPCPC will pay an annual lease payment to the building owner.
 - D. SGPCPC will pay all capital investment and operational expenses for the PV system(s) including liability insurance.
 - E. The lease rate will be based on the power capacity of the PV system and the expected financial performance of the installation. The financial performance will be evaluated on the ability to maintain or reduce SGPCPC operating expenses and ultimately continue to be able to reduce customer rates.
- 6.7 Phase-3 PV Farm.
 - A. SGPCPC has identified other suitable land for expansion of the SGPCPC-owned, ground-based PV array approach. This REP anticipates that phase could have a Commercial Operations Date (COD) in 2026.



7.0 Analysis of the SGCPC Renewable Energy Plan

- 7.1 The annual energy consumption, fossil-fuel and expected PV energy production are depicted in Figure 1. This graph also includes the ESS power required as noted below.
- 7.2 The existing diesel powerplant is operating very efficiently, producing approximately 15 kWh per gallon of diesel fuel. The LCOE from diesel fuel alone is approximately \$0.76/kWh (\$760/MWh) in 2023 dollars including a minimal allowance for operation, maintenance, replacement, and repairs.
- 7.3 Adding PV to the grid will lower the energy generating cost because the LCOE for PV alone is much lower than the LCOE for diesel-fueled electricity.
- 7.4 Once a PV power penetration approaches 50% of demand, reports from similar small utilities indicate that grid instability may result.
- 7.5 Adding ESS to the SGCPC grid will improve stability, enable adding more PV capacity, and allow SGCPC to shut off the diesel powerplant for part of the day depending on load and weather conditions.
- 7.6 The LCOE falls as more PV and ESS are added to the grid. Typically, the Lowest LCOE (LLCOE) is realized when PV is offsetting 85 to 95% of diesel consumption. This LLCOE typically is less than half the cost of diesel generation including the capitalization of all generating assets.
- 7.7 There are many options of combining PV and ESS to achieve different operational profiles and performance metrics. Below are three points of consideration for this REP.
- 7.8 Achieving the 30% National target (consumption adjusted for annual load growth) with minimum ESS for grid stability.
 - A. This will require approximately 2.5 MW-AC of PV capacity and 1 to 2 MWh of ESS energy storage. This is the minimum ESS size considered for grid stability with the diesel powerplant still always operational.
 - B. This 30% configuration would reduce the LCOE by approximately 15% compared to diesel generation alone and based on the expected consumption growth.
 - C. It is possible this system would allow the diesel plant to be turned off for short periods during periods of low demand, but SGCPC is not anticipating this outcome.

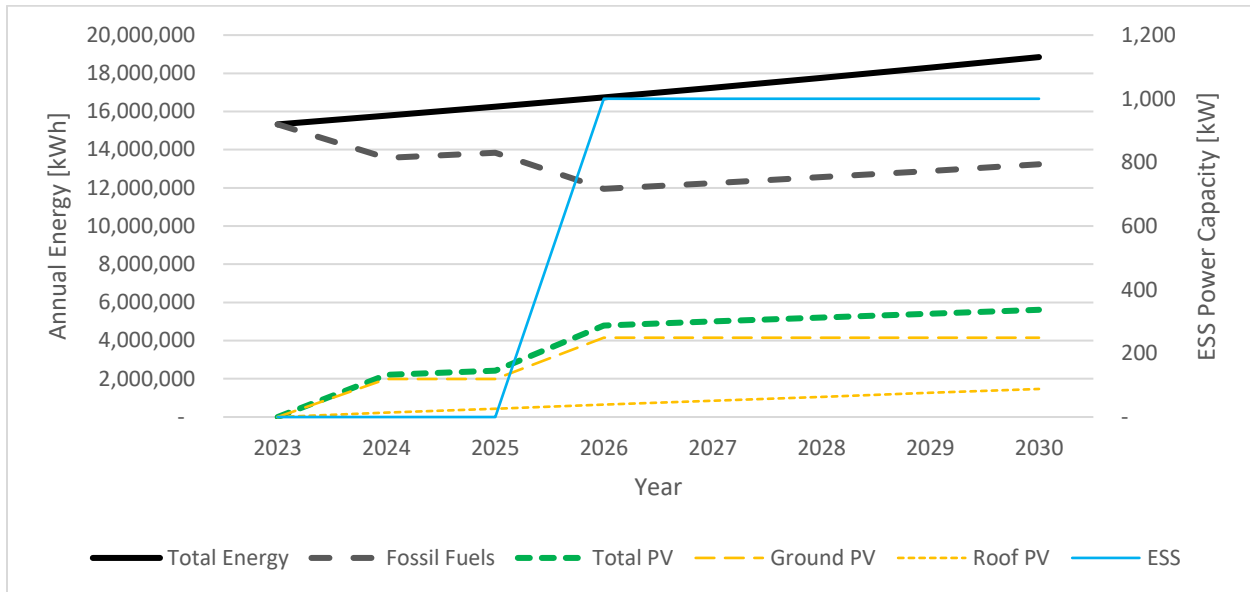


Figure 1: SGCPC Energy Consumption & Sources

- 7.9 Achieving the 30% National target (consumption adjusted for annual load growth) and LCOE with a larger ESS.
- This will require approximately 2.5 MW-AC of PV capacity and 5 to 6 MWh of ESS energy storage.
 - This ESS size is estimated to provide LCOE at the 30% target offset. This configuration would reduce the LCOE by approximately 20% compared to diesel generation alone and based on the expected consumption growth.
 - This would allow the diesel plant to be turned off for about 15% of the year, predominantly when load is lower, and weather is favorable with bright sunshine.
- 7.10 Achieving the Lowest LCOE, or “LLCOE” (consumption adjusted for annual load growth), exceeding the 30% National target.
- This will require approximately 10 MW-AC of PV capacity and 35 to 40 MWh of ESS energy storage.
 - This would be a practical goal only if the PV System was located on North Eleuthera with a submarine cable interconnection, due to the land space required.
 - The LLCOE for this optimal configuration is approximately 1/3 of the cost of traditional diesel generation. That includes the operating cost for the existing genset plant.
 - This LLCOE system would displace approximately 92% of the diesel fuel with solar electricity and would enable shutting down the diesel powerplant for approximately 85% of the year, reducing from 8,760 hours to approximately 1,000 hours a year.
 - This would allow a significant reduction in the cost of energy for our customers.
- 7.11 Ground-based PV Systems typically require 4 to 5 acres per MW-AC of power capacity. The land area required to build the LLCOE system referenced above would be approximately 40 to 50 acres. The land for the 2030 target options would be significantly less.



- 7.12 SGCPC will install a fiber-optic network with a control platform for monitoring grid loads and PV production from SGCPC- and privately-owned PV Systems. This system will allow SGCPC to turn down or off various PV Systems as needed to maintain grid stability.

8.0 Perspective on Privately Owned PV Systems

- 8.1 Provided residential customers abide by all SGCPC requirements and adequately engineer their projects and install them under a permit and approval from Ministry of Works and SGCPC, SGCPC encourages residential customer PV System or PV Microgrids installations that comply with the requirements of this REP and the Interconnection Requirements. These installations adversely impact other Customers that do not own their own system, but they do help The Bahamas in a small way toward achieving its 2030 renewable energy goal.
- A. System capacities and total allowable grid limitations of Customer-owned systems are as prescribed in the SGCPC Interconnection Requirements. As of this release of the REP, those limits are as follows.
1. Residential: 5 kW-AC or lesser power capacity based on trailing year usage statistics.
 2. Commercial: 10 kW-AC or lesser power capacity based on trailing year usage statistics.
 3. A total power capacity cap of 125 kW-AC for the entire SGCPC service area.
- B. These numbers are correspondingly equivalent to the capacities issued by BPL and approved by URCA for New Providence and other Family Islands. Customers can review those documents for comparison metrics.
- C. In the interest of safety and grid stability for all Customers, SGCPC is the final authority on matters related to the approval and operation of Customer-owned PV Systems and PV Microgrids. URCA reserves the right to turn off or disconnect any Customer system if SGCPC determines it is adversely impacting the safety or stability of the grid.
- 8.2 Customers wishing to build their own PV Systems or PV Microgrids are encouraged to thoroughly assess the URCA website in advance of signing contracts or paying deposits. The relevant documents include the following.
- A. Interconnection Application.
- B. Interconnection Requirements.
- C. Fee Structure Addendum.
- 8.3 In addition to SGCPC documents, Customers are required to comply with the Canadian Electrical Code (version as specified by Ministry of Works) and the ASCE 7-22 standard for wind forces on PV systems.
- 8.4 Customers are allowed to install a PV System or PV Microgrid on their own property and have three options to do so.
- A. Buy a PV System, own and operate it themselves.
- B. Buy a PV Microgrid, own and operate it themselves.
- C. SGCPC ownership of a PV System on their property, with SGCPC taking responsibility for operation, maintenance, and performance, with a recurring lease payment from SGCPC to the property owner.
- 8.5 Privately owned PV Systems, with or without ESS, are not cost effective on a community scale and result in higher electricity prices for other grid customers that cannot afford their own PV System.



- A. Smaller systems are less cost effective overall because they lose the economy of scale that is inherent in larger purchases of equipment and installation services. SGCPC will be able to build PV Systems at lower unit cost because SGCPC will buy equipment in bulk quantities at lower cost for high-quality products.
 - B. SGCPC has fixed overhead and asset costs that are amortized across all electricity sales. Private PV Systems result in lower electricity sales. When less electricity is purchased, SGCPC revenue goes down, and fixed costs are paid by a smaller customer base.
- 8.6 Pursuant to EA 2015 Section 28, SGCPC will support the installation of solar-energy systems to supply energy for Government entities and also for small-scale business or commercial enterprises, provided those systems comply with the SGCPC Interconnection Requirements.
- 8.7 Poorly engineered or installed private PV & ESS represent possible hazards and problems for the SGCPC grid.
- A. The potential is higher for small, privately owned systems to be installed incorrectly or possibly be non-compliant with electrical safety standards. This is due to potentially unlicensed or untrained installation personnel, and/or power electronics that are not certified to IEEE-1547 standard or listed under UL-1741. Failure of isolation from the grid could result in death to SGCPC technicians that might be servicing or repairing grid components.
 - B. Poorly engineered private systems may damage the SGCPC generating plant and other customers' electronics resulting from signal distortion, uncontrolled variability, and exceeding power capacity stability limits.
 - C. As PV electricity on our grid increases, it is necessary to be able to control the output of PV Systems to avoid causing stability problems on the grid. Unapproved PV Systems that are connected to the grid can cause rapid power fluctuations during cloudy conditions. All PV Systems installed by SGCPC will have curtailment controls installed to allow this remote management.
- 8.8 Privately owned systems are more prone to be designed without proper regard and engineering oversight related to hurricane wind forces and effects. These pose a danger to neighbors during hurricanes resulting from failure of improperly engineered or installed racking and attachment systems and PV modules that are not designed for the possible wind forces in the region.
- A. SGCPC has already observed roof PV systems in our service area that are not in compliance with wind codes and standards with a high likelihood of failure during a strong hurricane.
 - B. To protect the public welfare and minimize the chance that privately owned systems will result in injury to persons or damage to private property during a high-wind event, SGCPC will require that Ministry of Works assess the structural stability and compliance with ASCE 7-22 as part of the permitting process and before grid interconnection.

9.0 Procedure for Customer-Owned PV Systems

- 9.1 Customers should refer to the SGCPC Interconnection Requirements document prior to paying deposits or signing contracts for installation of PV Systems or PV Microgrids. Compliance is required and non-compliant systems will not be allowed to operate without the proper approvals.
- 9.2 Customer-owned PV Systems may operate in parallel with the grid once fully authorized and approved.
- 9.3 Residential PV Systems smaller than 5 kW-AC power capacity shall be submitted directly to SGCPC for processing. Approval from the Ministry of Works is required prior to SGCPC approval.
- 9.4 All commercial PV Systems will require more review.



- A. Customer shall submit an application to URCA. SGPCPC suggests submitting ICA to SGPCPC at the same time.
 - B. Once approved by URCA, Customer shall submit application and secure approval from Ministry of Works.
 - C. After URCA and Ministry of Works approvals, Customer shall secure approval from SGPCPC.
 - D. Please refer to the URCA and Ministry of Works websites for documentation. The SGPCPC Interconnection Application and Interconnection Requirements are included in Appendix A.
- 9.5 This will be a clear and straightforward process to ensure safety for grid technicians.
- 9.6 Installing electrician.
- A. Installation by a licensed electrician is required. A copy of the electrician's license shall be included in the application package.
 - B. All commercial systems and residential systems sized 5 kW-AC or larger require a three-phase electrical license.
 - C. Residential systems smaller than 5 kW-AC that are connected to a single-phase service may be installed by a single-phase electrician.
- 9.7 Installation must comply with industry Codes and Standards.
- A. While not required for submittal to SGPCPC or URCA, by submitting an application the Customer acknowledges that their engineer has evaluated the structural integrity of the roof (if roof mounted), the foundations (if ground mounted), the racking and module attachment components, and the modules themselves for compliance with ASCE 7-22 and a design wind speed of 180 mph.
- 9.8 PV inverters shall be "anti-islanding" UL-1741 listed and IEEE-1547 certified.
- 9.9 Approval to operate PV in parallel with the grid requires that SGPCPC can remotely turn on or off the Customer-owned PV System based on grid loading and condition.
- 9.10 SGPCPC is not offering to buy any electricity more than onsite usage that a Customer may export to the grid.
- A. Export of excess energy is allowed, and Customers do not need to install a reverse-current relay or other measure to restrict flow of electricity back through the Customer meter to the grid.
 - B. There are several reasons SGPCPC will not buy excess electricity.
 - 1. The SGPCPC grid provides a valuable benefit that allows a grid-tied PV System to function at all. International safety standards require that grid-tied PV Systems do not produce power at all if they do not sense a grid voltage signal coming from the utility company. This is a sufficient benefit to Customers that own grid-tied PV Systems and no other payments will be offered.
 - 2. Customer-owned PV Systems will increase the monitoring and capital investments required to keep the grid performing in top condition. That cost should not be borne by customers without PV Systems since they are already paying higher electricity prices because of customer-owned PV Systems and PV Microgrids.
- 9.11 The alternative is for Customers to buy their own ESS that will enable the PV System to operate. That, however, makes the project a PV Microgrid and operating in parallel in that case is not permitted and no power can be exported to the grid.
- A. Should a Customer with a PV System not want to export power to the grid, the PV System should be sized during the engineering process to not produce more power than is used on the premises.



- 9.12 Customer application requires agreement to conduct annual safety inspection of wiring and compliance with anti-islanding criteria for PV systems.
- 9.13 Customer accepts the risk for installation, operation, performance.
- 9.14 Customers must have a liability insurance policy for the PV System as described in the SGCPC Interconnection Requirements.

10.0 Procedure for Customer-Owned PV Microgrids

- 10.1 Customers should refer to the SGCPC Interconnection Requirements document prior to paying deposits or signing contracts for installation of PV Systems or PV Microgrids. Compliance is required and non-compliant systems will not be allowed to operate without the proper approvals.
- 10.2 PV Microgrids shall always be isolated from the grid, in the same way as a backup generator must be isolated from the grid. This requires an Automatic or Manual Transfer Switch (ATS or MTS) for positive isolation to ensure the PV Microgrid and the SGCPC grid are never connected to each other.
 - A. Customers operating PV Microgrids will be able to manually or automatically switch between using the grid or using their PV Microgrid to power the loads on their premises.
 - B. The electrical interconnection will have to be made so that the PV System and/or ESS are not connected to the premise electrical system at the same time as the PV System and/or ESS are connected to the grid.
 - C. If the Customer wants to not connect to the grid, then a backup generator on the Customer's premises will be required to power loads when the sun is not providing sufficient irradiation and their ESS is depleted.
- 10.3 All PV Microgrids require these approval steps.
 - A. Customer shall submit a permit application first to URCA.
 - B. Once approved by URCA, the Customer shall secure approval from the Ministry of Works.
 - C. After URCA and Ministry of Works approvals, Customer shall submit the application to SGCPC.
 - D. Please refer to the URCA and Ministry of Works websites for documentation. The SGCPC Interconnection Application and Interconnection Requirements are included in Appendix A.
 - E. This will be a clear and straightforward process to ensure safety for grid technicians.
- 10.4 Installing electrician.
 - A. Installation by a licensed electrician is required. A copy of the electrician's license shall be included in the application package.
 - B. All commercial systems and residential systems sized 5 kW-AC or larger require a three-phase electrical license.
 - C. Residential systems smaller than 5 kW-AC that are connected to a single-phase service may be installed by a single-phase electrician.
- 10.5 Installation must comply with industry Codes and Standards.
- 10.6 PV inverters must be "anti-islanding" UL-1741 listed and IEEE-1547 certified.
- 10.7 Customer application requires agreement to conduct annual safety inspection of wiring and disconnecting means.
- 10.8 Customer accepts the risk for installation, operation, performance.



10.9 Customers must have a \$100,000 liability insurance policy for the PV Microgrid.

11.0 Documentation requirements for PV Systems or PV Microgrids

- 11.1 These same requirements apply whether the system is owned by a Customer or SGPCPC directly. Except SGPCPC-owned systems will always be certified and sealed by a licensed Engineer.
- 11.2 It is highly recommended, but not required, that drawings be sealed by a licensed Engineer.
- 11.3 Drawings shall include a site plan showing location and connection(s) among all components.
- 11.4 Data sheets for PV modules, PV inverters, and other major equipment. The PV inverters shall be IEEE-1547 certified and UL-1741 listed.
- 11.5 Racking plan showing all roof attachments and waterproof flashings for roof-mounted arrays, or foundation designs for ground-mounted arrays.
- 11.6 Single-line electrical diagram showing all components and electrical their interconnection including grid isolation devices for PV Microgrids.
 - A. All systems shall have a separate, lockable, lever-operated disconnect safety switch that SGPCPC can access and lock out if necessary for safety purposes.
- 11.7 Wind analysis for module frames, racking, roof attachment (for roof-mounted PV) or foundations (for ground-mounted PV) showing compliance with the ASCE 7–22 standard, 180 mph wind speed, and the applicable Wind Exposure Category.
- 11.8 Certificate of Insurance documenting a \$100,000 liability insurance policy for the PV System.
- 11.9 Copy of the installing electrician's license, whether single-phase or three-phase as applicable and noted above.

12.0 System Capacity and Fee Structure for Customer-Owned Systems

- 12.1 Customers wishing to build their own PV Systems or PV Microgrids are encouraged to thoroughly assess the URCA website in advance of signing contracts or paying deposits.
- 12.2 PV System capacity (those systems intending to interconnect to the SGPCPC grid) shall be limited as described in the SGPCPC Interconnection Requirements.
 - A. These limitations are equivalent to system limitations on New Providence with corresponding reducing adjustments for the smaller size of the SGPCPC grid, peak power demand, and annual energy consumption. The SGPCPC grid, demand, and consumption are a small fraction of the magnitude of those criteria on New Providence Island.
- 12.3 Feed-In Tariff (FIT) Systems
 - A. PV Systems engineered and/or installed with an inverter output capacity above the listed Upper Limit capacity in the SGPCPC Interconnection Requirements shall sell 100% of their energy production to SGPCPC and the PV System shall be interconnected on the grid side of the Customer meter with a separate revenue meter installed by SGPCPC to meter the electricity flow to SGPCPC's grid.
 - B. Customers owning FIT Systems will still be required to pay the retail rate for electricity used on their premises. The FIT buy rate will always be less than the retail rate.
 - C. SGPCPC will pay a premium for the solar electricity produced by a Customer-owned FIT System. This premium is based on the added value of solar energy to our Bahamian National Goals in lieu of a "value of solar" consultation.



D. Details for the FIT System program are included in the SGPC Interconnection Requirements.

12.4 Additional fees apply to Customers for customer-owned Renewable-Energy systems.

- A. Customers applying for approval of PV System or PV Microgrid (whether Transfer-Switch or Off-Grid configurations) will be required to pay additional fees on both a one-time, non-recurring basis and on a recurring monthly basis.
- B. These fees are necessary to ensure grid reliability as non-SGPC-owned systems are added to the SGPC grid as described herein.
- C. The various fees do not result in any added distributions or profits to SGPC or its shareholders. Customers should refer to the Renewable-Energy Fee Structure Addendum for more details. Please note that fees are subject to change.

13.0 Disposition of Unpermitted Customer-Owned Systems

- 13.1 The safety and stability of the SGPC grid may be adversely impacted by privately owned PV Systems and PV Microgrids not inspected or approved by URCA or SGPC.
- 13.2 SGPC will conduct a survey of the service area to identify unpermitted or unauthorized PV installations. The interconnection of those installations will be inspected to ensure they are not able to operate in parallel with the grid.
- 13.3 Unauthorized or unpermitted installations will result in a written warning and may be followed, at SGPC discretion, by the premises being disconnection from the grid by SGPC until (1) authorization is secured as described herein; or (2) Customer authorizes SGPC to positively and securely lock out the PV System or PV Microgrid to preclude it from operating in parallel with the grid, the cost to do so borne by the Customer.
- 13.4 Unauthorized or unpermitted installations that remain unauthorized after warning shall be subject to enforcement action by URCA.



APPENDICES

1. Solar Energy Interconnection Application (ICA)
2. Interconnection Requirements for Renewable Energy Generation, Residential and Commercial (SSRG) and Off-Grid (RESG)
3. Renewable-Energy Fee Structure Addendum

UNDER REVIEW