Suggestions for SGCPC Customers When Considering the Purchase of a Residential Solar-Energy System

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A Customer-owned solar-energy system will help the Bahamas and our Community to reach our future energy goals. SGCPC supports your efforts in compliance with the Electricity Act of 2024.

We do require that your project comply with our Grid Interconnection Requirements (GIR). You also must have a permit from Ministry of Works and approval from Town Council. Once those items are complied with, you will be able to operate your solar-energy system.

This is a significant investment, and it is important to understand what you are buying. Only you can decide whether solar energy is "worth it" based on your personal, financial, and environmental priorities. The goals of these suggestions are to help you become an informed buyer and find a solar installation company that will meet your needs. The installer you choose should deliver high-quality installation standards, employ fully trained and qualified staff, follow safe work practices, and prioritize their responsibility and accountability to their customers.

Before getting more technical, answer this question: if you are considering a roof-mounted solar array, is your roof in good condition and does it have at least 15 years of life left in it? If not, or if you have leaks in your roof, it is a good idea to get those problems fixed before you invest in a roof system that has a 25-30 year life expectancy. Fixing roof problems after the solar installation will be much more costly.

Next, a few quick definitions and acronyms to add clarity and make things easier.

A solar-energy system that produces electricity from the sun is a photovoltaic, or **"PV" system**. This PV system consists of the PV modules ("panels") in an "array" usually on your roof, plus the power electronics necessary for safety and to convert the electricity to use in your home. The power electronics usually are called an "inverter".

The system using batteries to store energy is an **Energy Storage System, or "ESS"**. That can be integrated into the PV system as one energy system or it can be a separate component by itself. The ESS has a number of placement and sizing requirements for fire safety and it will be important to comply with those requirements.

Power is measured in kilowatts (kW) and is like the **speedometer** of a car. **Energy** is measured in kilowatt-hours (kWh) and is like the **odometer** of a car. For your home, the utility company sells you energy in kWh.

The PV system is sized by its power capacity in kW. That is measured in DC power or AC power. When you buy a PV System usually it is based on the DC capacity. You calculate that by adding up the power rating of the PV module multiplied by the number of PV modules. If you have 10 PV modules and they are 440 W each you have a 4.4 kW-DC (10 x 440 / 1000) PV System. The kW-AC usually is lower. The AC power is calculated by the output power of the PV inverters. If you have one 3.5 kW inverter for those 10 PV modules, it is a 3.5 kW-AC system size.

4.4 kW-**DC** is essentially the same thing in this example as 3.5 kW-**AC**. A salesperson usually sells based on the DC capacity since it sounds larger and sounds cheaper on a "per Watt" basis. But it is the same amount of energy from both systems. And energy is what matters.

STEP 1: Education

Learn and advocate for yourself as you would if you were buying a car or remodeling your kitchen. Here are two free online courses that will provide an introduction and get you thinking more about renewable energy and energy efficiency.

Solar Energy International www.solarenergy.org – search for RE100, "Introduction to Renewable Energy"

Heatspring www.heatspring.com – search for "Solar Power 101"

You can find others by searching online for free solar energy courses. There are lots of training courses on YouTube, although you will have to be careful of the source and what they might be "selling".

Lastly, please don't hesitate to call us! We will help you with questions about the approval process and correct sizing of your new PV System.

Fact check the installer's claims and promises. For instance, some companies or salespeople may promise that a residential solar-energy system will make your electricity bill disappear or "liberate you from the grid" or that the utility company will pay you back at your retail rate for electricity you sell back to the grid. These are common exaggerations and are not true.

Although off-grid systems are still common in remote areas and are allowed by SGCPC, most PV systems here will want to retain their grid connection. Your new PV + ESS system may be sized to provide all your energy over the course of a year, but there probably will still be times when it has been cloudy for a few days and you need to use the grid to power your home.

Remember that a backup generator is for emergency use only. According to URCA you can only run a backup generator when the grid fails or there is some other emergency. Cloudy weather is not an emergency from URCA's point of view!

STEP 2: Financing

You will have to decide if you will buy the system outright with cash, get a loan, or have the installer provide financing for you. This is like when you buy the car mentioned earlier. You can pay cash, you can go to your bank and get a loan, or maybe you can have the installer arrange financing.

If you can't afford to buy it with cash, talk with your bank about a loan to allow you to buy the system with cash directly from the installation company. A cash purchase, or "owner financed" purchase, is typically a better deal compared to a third-party financing through the installer. Owner financing puts you in a better position to negotiate and structure your payment schedule with the bank. Loans from your bank or credit union often are at a lower interest rate than the financing offered by the installation company.

If you arrange financing through the installation company, that usually is a lease arrangement. In that case, you will have additional challenges if you ever want to sell your home before the financing is paid off. The lease usually runs with the house, and the buyer of your house will have to accept those terms before you can close your house sale deal. Much more complicated.

STEP 3: Research the Solar Installation Companies

Interview, rank, and select a solar company. You will be "married" to this company for a while, so don't feel the pressure to jump at the first deal offered by a solar salesperson. This process takes time but is worth the investment of time to make the right decision. Remember you will be living with this system for decades if you keep that home. Take your time and don't rush the process. Decide what characteristics are important to you and rank the companies so your decisions are not based on price alone. Since every use case is unique, you can adapt the scoring system to your unique circumstances.

Almost anyone with a pickup truck can tell you they are a solar installer. That means it is up to you to evaluate the competency of your solar contractor. The Bahamas and SGCPC require that the installing electrician be a licensed three-phase electrician. But even that still doesn't guarantee the company is qualified. Asking the right questions will help weed out the fly-by-night companies or are "brokers" for someone else.

This process may involve several conversations with the solar company's salesperson. There are no shortcuts, and remember … if it isn't in writing, it didn't happen. Talk with the salesperson about these details and then send the details and your agreed solutions to the salesperson by email afterwards. This is to leave a paper trail of your conversations and avoid situations later where the parties might disagree about what they talked about.

STEP 4: The Interview

Here are questions to discuss with the companies you are considering.

1. Are they licensed, do they employ a licensed three-phase electrician, and have a physical office nearby?

Ask to see the installer's current business license and the electrician's license certificate. The licensing is required by URCA, SGCPC, and Ministry of Works. Having a nearby office makes them more likely to be able to quickly respond to problems or warranty issues. If you want to be thorough, go visit their office and decide if they look like a legitimate business.

2. Do they have adequate insurance?

Ask for their Certificate of Insurance (COI) and make sure they have General Commercial Liability, Professional Liability, and pay their NIB insurance at a minimum. We are not recommending how much insurance is appropriate for you, and you should ask your insurance agent for their thoughts on this topic given your personal circumstances.

3. Who on their team is NABCEP certified?

NABCEP® is the North American Board of Certified Energy Professionals, and their certification is the "gold standard" for installation training, quality, and ethics. www.NABCEP.org It is a major professional calling card.

Make sure to get the employee names and you can look them up on the NABCEP® website member directory to see if they truly are employees of that company and not listed under some other company name. There are NABCEP® certifications for Technical Sales, Design, Installation, and a few other specialties. If the person is on the NABCEP® directory but has the wrong company name, ask your installer about the reason for the discrepancy. Maybe they forgot to update their directory listing.

4. How much energy will the system produce monthly and annually? How do they make that energy production estimate, how does that compare to your usage, and how is it factored into the proposal financial model?

There are several industry standard software platforms that installers use (or should use) to estimate energy production. You can use a free tool yourself if you search online for "PVWatts" and then enter your project information. Make sure the salesperson provides you with a computer-generated energy production estimate. If there is shading where you hope to install the solar array, make sure the shading is factored into the production estimate. Make sure the orientation direction (azimuth) and pitch (tilt angle) of the array or subarrays are correct based on your roof or ground dimensions.

Make sure you understand the energy produced, how much energy you expect you will use, how much you will sell back to the grid, and what are the costs associated with that energy. If you don't understand the first time, ask the salesperson to explain it again. The salesperson might get frustrated, but this is important and you deserve to understand the details.

The energy you consume in a month is billed at the current SGCPC energy rate. At the time of this writing that is about $0.40 per kWh of energy. The rate SGCPC will buy back energy is lower and corresponds to the cost for SGCPC to make its own solar electricity. That value is published on the SGCPC website as a solar tariff. The balance is calculated every month and a Customer cannot end up with a credit for any month. In other words, all Customers have to be "net consumers" and not "net producers".

5. How does the company generate their design and engineering and will the drawings be sealed by a licensed professional or certified engineer?

Ideally, the person designing your system should have verifiable credentials such as being a licensed Professional Engineer and/or a NABCEP®-Certified Designer. Most big companies have their own in-house engineering resources, but that isn't essential.

There are some very proficient and professional plan-set companies across the country that provide out-sourced designs. If your prospective installer uses an outside company, ask for the company name and check their website. Do they provide engineer-sealed plan sets, or are they affiliated with a legitimate professional engineering firm?

Can they send you a redacted plan set from some other similar project so you can see what sort of design they produce? That plan set should include these points.

- A site plan view showing the array and dimensions on the roof as well as all the equipment locations.
- An electrical diagram showing the PV modules, inverters, wiring, electrical panels, disconnect and rapid shutdown switches (if needed), and the Point of Interconnection to the existing electrical system.
- A racking diagram, roof attachment details, and the wind and snow load design values.
- List the major equipment brands and models: PV modules, inverters, and racking.

Confirm they will send you your plan set and review it with you and get your approval before they start construction. Also make sure they will have the necessary approvals and permit before starting work.

When you get the plan set for your home, make sure the major equipment matches your proposal. Ask the salesperson what code requirements apply for where the array may and may not be located. For a roof array, the modules should never extend over the edge of any roof face. If a ground array, make sure it complies with property line setbacks.

These are only two examples. This article cannot cover all the codes, best practices, and standards involved in your project.

6. How does the installer work with you to ensure quality control?

You can call this, “Quality Control” (QC) in its basic form through these steps.

- Do not sign anything on a screen. Once you put your signature on a pad or phone, someone can do what they want with your signature. If the salesperson tells you they only sign documents on a screen, suggest to them that you will do business with them only if they give you paper documents. It may take more time, but you probably realize at this point that the whole process takes time.
- Confirm information in the proposal is the same as agreed with the salesperson.
- Confirm your plan set matches your notes and expectations for equipment details and location.
- Monitor the installation every day to verify the work done matches your plan set. If not, stop the work and get the discrepancy resolved before allowing the work crew to proceed.
- Ensure the system is working properly and producing the AC power as contracted. This will require the installer to measure the sunlight and temperature and calculate the power production under those conditions. Witness the testing and measurements to ensure it is accurate.
- Before making your final payment, make sure that you have all your owner’s documentation, SGCPC permission to operate, and a final permit approval from Ministry of Works.

If you want to witness SGCPC’s final assessment of your installation, please let us know and we will notify you before we go out to your home.

7. Who does their installation?

Do they have in-house installation teams, or do they subcontract this work? An in-house team usually is better. This helps ensure you are dealing with a reputable and committed company and trained personnel.

Check if their team leaders are NABCEP® Certified. Ask if everyone has safety training. Ask if they will use fall protection on your roof.

8. Will your installer provide nearby references for similar projects completed in the last year?

Call their references and ask if you can go visit and look at the system. When you are onsite, ask the owner if they are happy with the performance, with the installation, if they have any complaints, etc. Use your imagination in this chat and try to get some unbiased or unscripted responses.

9. What is the contract payment schedule?

Make sure you always have payment leverage. Ideally something like paying 10% on signing a contract, 25% on completion of the design, 25% on starting the installation and delivery of the equipment, 30% on completion and performance demonstration, and the last 10% upon delivery of your owner's documentation and final permit signoff.

10. Review the contract and understand what you are signing.

You might consider paying an attorney to review your contract. It is cheap insurance. If the salesperson won't allow you to make any edits that your attorney suggests, then consider doing business with a different installer. No company wants to edit their standard agreement, but if they are so big that they won't consider it, maybe they're not a good fit for you.

11. Ask your insurance company if they have experience with solar energy systems and have any suggestions.

You may need to get a "rider" for the PV system for your homeowner's insurance policy. You may not need a rider, but it worth asking. Don't wait until after the job is done to get unwelcome insurance surprises.

12. What equipment are they proposing to use?

There are many good products on the market. Here it is important to focus on products that have warranties that apply to the salt air on our islands. Just like the rest of the recommendations in this article, this isn't a complete list, but just some things to start your discussion with the installer.

PV INVERTER / POWER ELECTRONICS

The inverter may be more important than the PV modules. That is because the inverter has a shorter warranty period, and when they fail, the system will produce less or maybe no energy at all.

Ask for the inverter model number and data sheet. Or you can search for the literature online. Make sure the installation has the required clearance around the inverter for ventilation and warranty. Confirm there is a mobile app so you can see the performance on your mobile device or desktop computer.

Rapid-shutdown capability is required in the Bahamas for fire safety for all PV arrays installed on roofs. This is part of the Canadian Electrical Code (CEC) and it ensures the voltage is below safe levels in the wiring that is further away from the array than 3 feet. There are two most common ways that rapid shutdown is accomplished – with rapid shutdown devices (RSD's) installed in the DC wiring on the roof, or using microinverters that convert DC to AC at each PV module. The salesperson should be able to explain this in detail.

We will need to see the Installation Manual for the inverter. You can save time if you ask the Installer for that document and submit it with your Grid Interconnection Application (GIA).

RACKING SYSTEM

The racking system has to hold the PV modules securely for many years with high levels of salt-air corrosion and the potential for hurricane winds. The best solution will be an engineered racking system from a manufacturing company that makes solar racking systems.

The reason for this is wind resistance. To comply with the ASCE-7 standard for wind strength, the racking has to either meet the requirements of formulas in the standard or else be wind-tunnel tested. The wind-tunnel testing allows much smaller racking members to be used than if the engineer follows the ASCE calculations. For that reason, all commercial racking companies use wind-tunnel testing that results in lighter and less costly racking.

A racking system that is put together with pipe sections or wood members probably doesn't have any wind-tunnel testing. It may not even comply with the ASCE standard, which makes it difficult to get a permit from Ministry of Works. There are no wood racking systems that are pre-manufactured or have industry certifications.

Metal-frame racking usually is steel or aluminum. If you are selecting steel racking, it should be hot-dipped galvanized to comply with the galvanizing standard ASTM A123. Aluminum racking is also common, and has less corrosion potential than steel. However, aluminum usually is more expensive and the components are larger.

It is an industry best practice to use all 316 stainless steel for racking hardware.

Probably the most important QC question is how the installer intends to attach the PV array to your roof. Ask how they will ensure the attachments are done correctly, and how would they correct mistakes before installing the rails and PV modules.

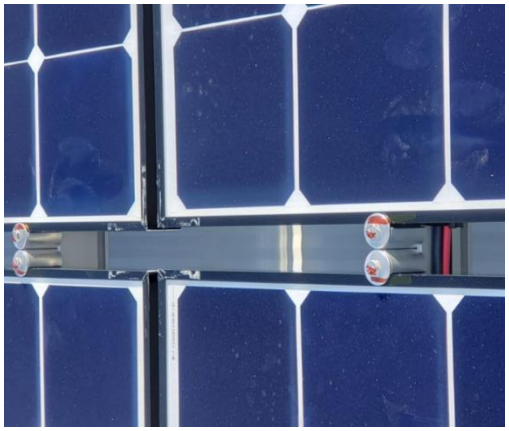
Roof damage or leaks can be costly problems, so don't settle for "we do it right". Get specifics. Usually, a salesperson won't have all the answers, and you might need to be patient while they ask their technical team.

For example: if your roof is wood frame with composite/asphalt shingles, then the attachment probably is a 5-inch stainless steel lag bolt that is supposed to go through the decking and into your wood framing (usually trusses or rafters). There should be a manufactured "foot" and "flashing" assembly that is UL-listed and makes sense to you for how it keeps water out of your attic. The flashing should go under one full course of shingles and protect the foot attachment from water. The lag bolt should be installed with a roofing sealant. That is just one example, for one kind of roof.

Ask the installer how they will find the roof structural members. Insist that you and their team inspect those attachments during the installation and before attaching the module rails; and get that agreement in writing. Ask how they would correct it if one of the attachments missed the joist – because attaching to your roof sheathing isn't strong enough for a hurricane. If they are using those long lag bolts and you go up in the attic and you see any of them poking down through the sheathing next to a joist, then you know they missed the joist. The easiest fix probably is to remove the screw, repair the hole, measure it correctly, and do it again. But make sure you understand that in advance and have it in writing. The attachments must be installed like the detail in your plan set.

Any conduits going across the roof should have a flashing suitable for use as a conduit mount. Make sure these details are shown in their plan set. These are just a couple of QC notes for roof attachment to keep water out of your house.

Attaching the PV modules to the racking is an important step toward hurricane resiliency. It is best to individually bolt the modules to the racking rails or use individual top-down clamps that do not hold two adjacent modules with the same clamp. This will end up costing a little more, but it will avoid what is called a "zipper failure".



PV modules with dual individual midclamps

"Zipper" failure of PV modules using common midclamps

During a hurricane, there is a lot of flying debris and sometimes hail. When the glass of a PV module is broken, the frame loses all its strength and usually will blow away. When an array uses top-down clamps that hold two modules next to each other, and one of those modules is pulled out of the clamps, then the one next to it has nothing holding it on that side and it blows away. And so on down the row until all the modules are gone even though they were undamaged by the debris or hail. Sort of the way a zipper opens when pulled. When the modules are individually bolted or have individual clamps holding each module and not two adjacent modules, this sort of failure is averted.

PV MODULES

Every company tells you how great their solar panels (PV modules) are, and the PV Modules are the flashy part of the sale. Yes, they are important and certainly the most expensive part of the project.

There are dozens of manufacturers that sell residential-grade PV modules. You can ask if the manufacturer is on the Bloomberg New Energy Finance "tier one" list. Being on the list is no guarantee, but it may help in your information gathering stage to verify if the module is a known product.

Maybe the most important factor is the wind strength of the module. The wind requirement is 180 mph in the Bahamas. There are different forces on the module depending on the mounting style, location, wind exposure, and tilt. A good rule of thumb is that the modules are listed in the Installation Manual to "4,000 pascals" of uplift force using the attachment method specified in your drawings, that more or less might be appropriate for your installation. Modules that have a 2,400 pascal uplift force rating usually are not strong enough for a 180-mph wind speed. Your engineering package should include a wind analysis completed by a licensed engineer. This should be supplied with your permit application to Ministry of Works.

There are a few differentiators in PV modules. Consider insisting on an "n-type" module that will produce more energy than a "p-type" module. Insist on a 12-year workmanship warranty and linear 25-year power production guarantee. Some manufacturers are now offering 30-year power production guarantees, but that extra 5 years doesn't make a lot of "today" difference.

Ask for the PV module model number and data sheet. Look it up online and make sure it is a currently manufactured product. The data sheet will list several power ratings for one product. For instance, the data sheet for a Brand ABC n-type module might list a 430W, 435W, 440W, 445W, and 450W (2025 numbers). That is because when the modules are manufactured, they do not always produce the same power when tested in the factory. The modules that produce between 440W and 445W are sold as 440W, and so on.

Some unethical installers will sell modules that are outdated because they need to get them out of inventory. Every year the power rating of the modules goes up by 1-2% and you want to make sure you are getting current products that haven't already lost years on their warranty. If you find it is an old module (10 or 20 watts lower dating than current market) you should scrutinize the proposal and ask more questions. The modules may be several years old. That would mean your product warranty is shortened by those years.

Once the installation starts, verify that the installation team has the correct module when they show up at your home. Look at the nameplate sticker on the back of the module for the manufacturer, model number, and power rating.

ENERGY STORAGE SYSTEM, ESS

Most installers are using lithium-ion (Li-Ion) batteries and these are superior to lead-acid or other technologies (at least for now). There are different chemistries available for Li-Ion batteries, and they all have pros and cons. We are using lithium-iron-phosphate ($LiFePO_4$) batteries because of their higher fire safety rating.

The ESS should be UL-9540 certified if it is permanently connected to your home's electrical system. It should be sized to store the energy you need for the time you want to use it. Every home is different, and we cannot offer recommendations for sizing.

The most important thing from our perspective is that the ESS is electrically installed exactly according to the Installation Manual and the standards published by the National Fire Protection Association (NFPA) in their standard 855. We will check these requirements when we assess your installation. That is a critical requirement for the safety of our grid technicians and the public.

There are a variety of placement and spacing requirements to comply with the electrical code and SGCPC requirements. Ask your prospective installer to explain these limitations to you. It is costly to move an ESS once it is installed. If there is any doubt, please contact us and ask about these requirements that will come up when we assess your installation.

If you are including ESS in your PV System, the ESS probably is the most costly equipment in the proposal. It is not a good idea to select the ESS based on price alone. There are many instances of cheap ESS installations causing fires – as with everything in this equipment selection, you usually get what you pay for and long-lasting quality usually isn't the cheapest proposal.

STEP 5: Comparing Proposals and Choosing the Best Fit

Lastly, make sure as much as possible that you are comparing apples to apples. Every company may propose a different number of modules and sometimes different inverters. One way to get comparable proposals is to review the different proposals you get from the different companies, compare the placement of modules on your roof, decide which is best, and then go back to each company and ask them to re-write their proposal all using the same layout and system sizing.

If the modules are all the same wattage, the energy production from all three proposals should be almost the same. Or you can adjust by the power rating of the modules in each proposal. Once you have comparable proposals, it will be easier to make a pricing comparison.

Sometimes a solar company will also offer energy efficiency improvements or recommendations. Improving your energy efficiency is always a good idea, as it will further stretch your investment in solar energy, reduce your utility bill, and provide more environmental benefits.

There is a lot here to unpack. This will take some time, between the training and the interviews. But consider how much money you are investing (whether you are a cash buyer or a lease) and invest your time up front to get the best value for these investments. It is easiest to make beneficial changes at the beginning of the process and the project when all the opportunities for improvement are on the table.

SGCPC does not endorse any installation company or specific products. Please do your research, learn about what you are buying, and become an informed consumer about the product and the process.