STRENGTHENING ENERGY SECTOR RESILIENCE IN JAMAICA:

FREQUENTLY ASKED QUESTIONS

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Do you represent a Jamaican business that is interested in going solar? Strengthening Energy Sector Resilience in Jamaica (SESR-Jamaica) is a three-year programme designed to help Jamaican businesses access the many benefits of solar power. A collaborative effort between the United States Agency for International Development (USAID) and the Jamaica Energy Resilience Alliance (JERA), SESR-Jamaica offers specialized support to Jamaican businesses seeking to reduce electricity costs and green their operations with clean energy. These FAQs are designed to give you an overview of technology, benefits, and financing options to help your business go solar.

JAMAICA ENERGY RESILIENCE ALLIANCE (JERA)

1. What is JERA and who are the JERA partners?

The Jamaica Energy Resilience Alliance (JERA) is an alliance of private, public, and nonprofit organizations collaborating to strengthen Jamaica's energy sector. JERA is led by The Cadmus Group in partnership with LASCO, UWI-Mona, Green Solutions International, RMI, Wigton Windfarm, Xergy, and WRB Energy. Together with the support of the United States Agency for International Development (USAID), JERA is offering specialized advisory services to Jamaican businesses seeking to reduce power costs, increase reliability of supply, and "go green" in their operations in an effort to strengthen Jamaica's energy sector. See our program brief for more information.

2. Does JERA provide any financing to support a solar project at my business?

JERA will work with each participating business to identify the best options for financing a solar system based on each business's unique needs. In some cases, financing solutions may be offered by JERA's solar energy developer partners (WRB Energy and Wigton Windfarm/Xergy). In other cases, JERA will provide information on financing offerings from local financial institutions and will facilitate technical assessments between businesses and qualified installers.

3. How do I access financing available from JERA partners?

After signing up for the program, we will schedule an introductory meeting to find out more about the energy needs of your business and walk you through the next steps. Additional information will be requested including your business's most recent electricity bills. A preliminary analysis will be done to determine the solar PV system type and size best suited for your facility before you are connected with a JERA partner or installer.

JERA partners and/or qualified installers will review your information and contact you for a follow-up conversation to discuss your options for PV and PV+.[1] If your project is eligible for investment from JERA partners, they will work with you through financing and installation options. If not, we will provide information on alternative financing options that may better suit your needs.

If you are interested in learning more about your options for PV and PV+, sign up on the JERA website: www.cadmusgroup.com/go-solar.

[1] JERA will not sell any personal information collected to any third party. Information will only be collected for the purpose of assessing eligibility for PV or PV+ financing and installation.

SOLAR PV AND HOW IT WORKS

1. What is solar photovoltaic (PV) technology?

Solar photovoltaics (PV), commonly referred to as solar panels, convert the sun's energy into electricity. There are two main types of solar PV:

- Utility-scale projects require large, open spaces and produce a lot of electricity, like a standard power plant.
- Distributed solar projects are smaller and are often found on-site at homes or businesses. These projects help customers (like you) produce their own electricity and secure more reliable power.

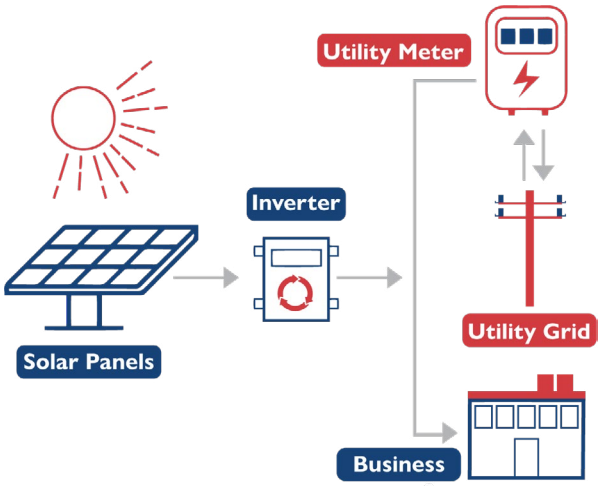


Figure 1: Solar PV System

Often, distributed solar is connected to the electricity grid. The solar panels provide some of the required electricity and the grid provides the rest. In other cases, when more electricity is produced than consumed, the excess can be sold back to the grid through Jamaica's net billing program (see below).

Distributed solar can also include battery systems to store excess power for use when the sun isn't shining. With enough batteries, these systems can power homes and businesses by themselves, but most often they are also connected to the grid to ensure that power supply is reliable.

2. How do solar PV panels work?

Solar PV panels are made up of cells that convert the sun's energy into direct current (DC) electricity. DC electricity is sent to an inverter that converts it into alternating current (AC) electricity, which can be used on-site, stored, or sent to the grid.

3. What are the benefits of installing solar PV for my business?

Solar PV systems can provide many benefits to Jamaican businesses, from improving your bottom line to reducing your business's environmental impact. These benefits include:

- Cutting your overhead costs: PV electricity will offset the amount of electricity you purchase from the grid, reducing your electricity bill even while paying off the cost of the system.
- Greening your business operations: Powering your business with clean, renewable electricity can help you reduce your environmental impact, achieve sustainability goals, and earn various sustainable business certifications.
- Attracting customers and investors: Consumers and investors around the world have growing preferences for businesses that take efforts to reduce their environmental impact.
- Reducing the risk of energy market volatility: Electricity prices in Jamaica are subject to sudden rate increases. Generating your own electricity with PV protects you from this risk.

4. Is solar PV reliable?

Solar power systems are incredibly reliable. In 2017, the National Renewable Energy Laboratory (NREL) at the U.S. Department of Energy released a report detailing that the percentage of panel replacements was less than 0.05% annually for 54,000 PV systems installed in the U.S. between 2000 and 2015.

Of course, the reliability of PV systems depends on the equipment installed, the quality of the installation, and the operation and maintenance of the system throughout its lifetime.

5. Do my solar panels produce power when the sun isn't shining?

Your solar panels will produce energy even on cloudy days, though the amount generated will be lower. However, given Jamaica's geographic location, with ample sunshine, PV is an efficient and cost-effective power source.

Your solar energy system will not produce energy at night. A battery connected to your solar system will allow you to store energy for use when the sun isn't shining.

6. How long will my PV system last?

While some components may need to be replaced during the lifetime of the system, typical solar energy systems are capable of generating electricity for 25 to 35 years. The useful life of a battery ranges from 5 to 15 years.

7. What happens at the end of a PV system's life?

At the end of a PV system's life, it will need to be uninstalled by a team of professionals. The landscape on recycling and repurposing solar panels is currently evolving.

PV PLUS BATTERY STORAGE (PV+)

1. What is PV plus battery storage (PV+)?

PV+ refers to a PV system with a combined battery storage system. Common battery technologies include lead acid and lithium ion. In general, lead acid batteries are cheaper but have shorter lifespans and are less efficient than lithium ion. In either case, batteries can be charged both from your solar panels or from the grid (based on some hybrid designs).

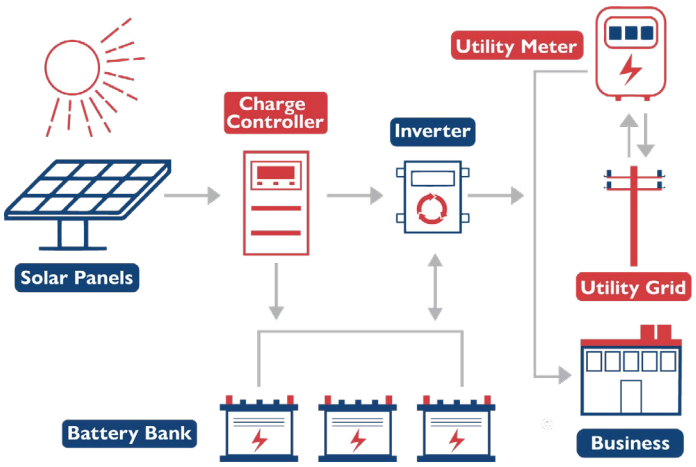


Figure 2: Solar PV plus battery storage (PV+) system

2. What are the benefits of adding battery storage to my PV system?

Battery storage can add several benefits to your PV system by allowing you to:

- Increase PV Utilization: Excess electricity sold to the grid is compensated at a lower rate than energy consumed from the grid, meaning customers in Jamaica benefit by maximizing their own consumption of the PV electricity they produce. Storing excess electricity in batteries allows businesses to maximize the value of their PV systems.
- Improve Business Resilience: Batteries offer resilience benefits by providing backup power during outages, including from extreme weather events, allowing you to continue operating critical equipment.
- Manage peak electricity demand: Batteries can be used during periods of peak electricity demand to reduce associated demand charges.

3. How long do battery storage systems last?

Batteries degrade over time, like those in your cell phones do. Depending on the size and type of battery you are installing with your PV system, the useful life of a battery ranges from 5-15 years. It is likely that over the course of your PV system's life (25 to 35 years) you will need to replace the battery at least once.

4. Can I go off-grid with a PV system?

Installing a solar photovoltaic system does not change an existing connection to the grid. With a grid-tied system, businesses can continue to draw power from or send power back into the grid, depending on how much power is used (see: Can I sell the excess electricity generated by my PV system?).

It is possible for solar energy systems that include battery storage to allow businesses or homes to go off-grid. An off-grid system would require enough solar panels to generate a full day's worth of power during the daylight hours and ample battery storage capacity to store and release that power during periods of no or limited sunshine.

5. Do I need batteries to continue operating a PV system during grid outages?

Yes. In the event of a power outage or blackout, a grid-tied solar system will automatically shut off to prevent injury to emergency responders and utility repair workers. However, with batteries, a system could continue to operate and provide backup power when the grid is down.

6. How do batteries affect the cost and financial returns of a PV system?

There are additional costs associated with a battery storage system; however, like a normal PV system, these costs can be paid back over time through electricity bill savings and avoiding other losses associated with loss of power. Battery storage can provide added financial benefits by allowing you to continue business operations during grid outages, consume more of the cheaper electricity generated by the PV system, and reduce the demand charge on your electricity bill.

7. Will PV+ systems withstand severe weather events such as hurricanes?

Yes, if your system is installed to meet hurricane standards. Systems can be designed or installed such that they are more likely to withstand extreme weather events up to a point (see this NREL report). Check with installers ahead of time to see how they follow resilience standards.

8. What happens at the end of a PV+ system's life?

At the end of a PV+ system's life, it will need to be uninstalled by a team of professionals. The landscape for recycling and repurposing solar panels is currently evolving.

$ COSTS, INCENTIVES, AND FINANCING OPTIONS FOR PV AND PV+

1. How much does a solar PV system cost?

The costs of a PV or PV+ system, associated payback periods, and financial returns will vary from project to project. After you sign up, our team will help you connect with a suitable installer or developer who will provide a quote based on an analysis of: electricity usage; available and suitable space for installation (ground, roof, parking lot, etc.); desired use of the system (resilience, demand management, maximizing financial returns); whether the system is grid-tied or off-grid; whether the system includes battery storage or not; and your preferences around ownership and financing, including your credit.

2. How much will PV system maintenance cost?

Solar panels require minimal maintenance, including cleaning, throughout their 25- to 35-year lifetime. Most component parts include manufacturers warranties. Most installers, including JERA developer partners, provide warranties on labor and operations & maintenance services.

3. Will I still receive an electric bill if I have a PV system?

You will still receive a bill from your utility if your solar energy system is connected to the grid, but depending on the size of your solar PV system compared to your energy use, you can dramatically reduce the amount you are paying. See also the question below on net billing.

4. How do I find out how much I pay for electricity?

Viewing your electricity bill from your utility is an easy way to find out how much you pay for electricity, and how much electricity you use per month.

5. What are my PV financing options?

There are two ways you can go solar:

- With direct ownership, you purchase the system from an installer who will be responsible for installing, operating, maintaining, and decommissioning services.
- With third-party ownership (TPO), another company builds, owns, operates and maintains the system.

Lease financing is the TPO option offered by JERA developer partners. Like operating leases for other equipment, lease financing allows customers to lease PV or PV+ systems over time through predictable monthly payments. Leases can be from 5 to 12 years or more, depending on the wishes of the client.

Loan financing from financial institutions is another financing option available in Jamaica. After receiving a quote from an installer, you can present it to a bank, along with other requirements in their evaluation process. Once approved, you will make monthly payments to the bank over the course of the loan repayment period. At the end of this period, which varies by bank, you will own your solar system.

JERA maintains a catalogue of financial institutions offering renewable energy loan financing, available to customers who sign up on the website. After reviewing your energy needs and financing preferences, JERA will provide information to help you choose the most suitable financing vehicle and institution.

6. How much will I save on my electricity bill with a PV+ system?

It is possible to save up to 30 percent on your electricity bill under the right conditions. However, savings depends on several factors. The first is the term of your loan or lease—a shorter term will mean faster payoff when the power the system produces will be nearly free, but the monthly payments will be higher. A solar system can also help to reduce your peak demand, and therefore your demand charge.

7. Should I buy or lease my PV system?

The answer to this question is particular to your circumstances, which JERA partners can help you assess. Buying upfront, if you have the capital, can maximize your financial returns since you will not have to pay interest on the cost of the system. There are opportunity costs for that money though, as you may have other needs like extending or renovating your facilities. Leasing gives you access to more capital, so you don't have to use your own lines of credit, while helping you to generate your own power at a potentially reduced cost and with no up-front investment.

8. Can I sell the excess electricity generated by my PV system?

Net billing is a mechanism that allows you to sell excess power generated by your PV system back to the electric utility (JPS). Jamaica's Net Billing Program is run by the Ministry of Science, Energy, and Technology (MSET). Bi-directional meters installed by JPS measure electricity consumed by the customer from the grid and electricity exported to the grid from the PV system.

Each month, customers are credited for electricity exported to the grid at a rate based on the avoided cost of generation (approved by OUR), at a net billing rate lower than the retail rate of electricity. If the amount owed to the customer is greater than the amount due for electricity consumed, the credits carry over to the next billing period. At the end of June and December each year, credits owed to the customer are paid in full by JPS. Visit the Net Billing website for updated information on program details and eligibility requirements, or contact the JERA team with questions (jamaicaenergy@cadmusgroup.com).

INSTALLING SOLAR

1. How do I choose a solar installer?

There are a few criteria that everyone should use when choosing a solar installer: confirm that they are certified, licensed and insured; have relevant experience; and can provide references. To simplify this process, JERA has worked to pre-qualify two investor partner teams (WRB Energy and Wigton Windfarm/Xergy) that can support you through the installation process, including system design and sizing, financing, permitting, equipment procurement, construction, and maintenance.

JERA has also developed a list of pre-qualified installers that will provide the same services except for financing. This list will be made available once you sign up on the project website. We will help you identify a suitable installer that can meet your needs.

2. What happens during the PV+ installation process?

The major components (solar PV array, inverters, charge controllers and batteries) will be mobilized and stored onsite to facilitate quick and efficient installation once the installation team is onsite. The installation team is usually split into two teams: one team installing the solar PV panels and supporting hardware and accessories, and one team in the utility room installing the inverters, batteries and supporting hardware and accessories. Once the system is installed with all connections made, it will be taken through a commissioning process that will involve tests and checks to ensure the system is safe and operating as expected. Installation may take several weeks to several months depending on the size of the system being installed. You will experience only a brief disruption in power to facilitate the connection of the system into your main electrical panel.

3. What will the installer need access to at my facility?

During system design and installation, the installer will need to access your main electrical panel and major sub-panels, generator (if you have one), a single line diagram (for more complex cases), and rooftops or land where solar panels and batteries could be located. They will also need space to stage the installation.

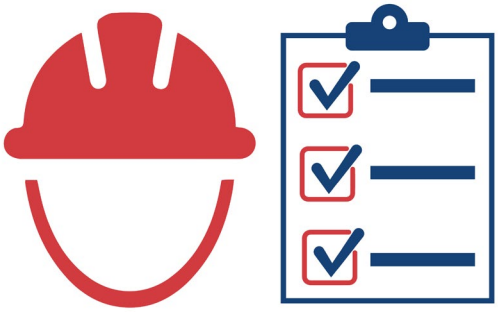
AM I READY FOR SOLAR?

1. Is my property suitable for a solar PV system?

PV systems can be roof-mounted, ground-mounted, or building-integrated. Roofs should be in good condition to withstand the weight of the system. The best sites are south facing for maximum exposure to the sun. Suitable sites should be free of shading from trees or buildings. JERA partners can help you determine if your site is suitable for solar and design a custom system that meets your needs.

2. What size solar PV system do I need?

The size of your system depends on your energy consumption, the amount of energy you want to offset with the solar PV system, and the space available to install the system. After you sign up indicating your interest in installing a PV or PV+ system, one of JERA's solar developer partners will review your business's energy consumption and suitability for solar. They will work with you to design a custom system for your site. They will also talk through the options of grid-tied versus off-grid and adding battery storage. If you choose to install a PV+ system, the battery size will depend on the benefits you hope to ultimately achieve from your system (e.g., electricity demand management, backup power during outages, etc.).



3. Should I install batteries with my PV system?

Not every PV system will benefit from the addition of battery storage. This will depend in part on your electricity consumption profile and the availability of space for batteries and a large enough PV system to generate excess electricity. For example, if your business consumes the bulk of its energy throughout the day while your PV system is most productive, battery storage may not provide any additional benefits. However, if most of your consumption is outside this solar window and you can install a PV system large enough to generate electricity that can be stored and consumed during evening peak hours, you may be able to achieve greater financial benefits by adding battery storage.

4. What size battery storage system do I need?

The presence and size of battery storage will depend on your use and the benefits you hope to achieve:

- Batteries sized to critical load can offer resilience benefits by providing backup power during outages and continuing operations of critical equipment.
- Batteries sized based on peak demand can be used during periods when electricity consumption is highest to reduce peak demand (and associated demand charges).
- Batteries sized relative to the size of the PV system allow customers to benefit more by maximizing consumption of PV electricity generated than by exporting to the grid because net billing rates in Jamaica are lower than the retail rate.

5. How do I get started?

Sign up today to speak with JERA experts and take the next steps in going solar. Signing up is no cost and no commitment.