



**District of Columbia Renewable Energy Incentive Program  
Guide to Solar Photovoltaic Incentives**

DISTRICT  
DEPARTMENT  
OF THE  
ENVIRONMENT



**District Department of the Environment**

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## **1. Introduction & Program Background**

The District Department of the Environment (DDOE) offers financial incentives to support the installation of renewable energy systems in the District of Columbia. The Renewable Energy Incentive Program (REIP) is supported through the Sustainable Energy Trust Fund (SETF), which is funded via a public benefits charge supported by Pepco and Washington Gas. The Fund is administered by the District Department of the Environment, with allocations of \$2 million per year continuing to September 30, 2012. The REIP is authorized by the Clean and Affordable Energy Act of 2008 and covers a range of renewable energy technologies. The program has been designed to spur market development and increase local demand for affordable, high quality clean energy systems.

The incentives outlined in this guide cover systems that use solar energy to produce grid-interconnected electricity. Through the use of renewable energy to meet a growing portion of our energy needs, District residents, businesses and institutions can play a role in reducing greenhouse gas emissions, improving air quality, lowering energy costs, meeting increasing energy demands and supporting local job creation.

Solar photovoltaic incentives offered through the REIP are intended to improve the quality, reliability and cost effectiveness of photovoltaic systems installed in the District of Columbia. A major goal of this program is to drive innovation and lower costs by providing incentives for the installation of photovoltaic systems that support the city's sustainability goals and reduce demand for conventional polluting fuel sources.

Past experiences with renewable energy systems of the last two decades have shown the need for clear standards on system performance, installation, and operations & maintenance protocols. A listing of REIP technical requirements and program checklist follow in the appendices of this document.

## **2. Eligibility Criteria and Requirements**

All criteria and requirements listed in the following sections must be met for an application to be deemed eligible. Case-by-case assessments can be discussed in consultation with REIP program staff if projects do not meet published requirements.

### **2.1. Participant Eligibility**

To be eligible to receive rebates for photovoltaic installations, incentive applicants must present a Pepco retail bill for the site where the generating equipment will be located. Both residential and commercial customer classes are eligible for the incentive.

The project site must be within the District of Columbia. Applicants are required to provide proof of electric distribution services through the inclusion of the most recent utility bill. Additionally, applicants must consent to being surveyed by DDOE and/or an independent program evaluator, and must sign and date all program application forms and related documents as requested.

Applicants must meet all minimum equipment and performance requirements and solar energy system design and installation standards prior to receiving an incentive.

All solar electric systems receiving incentives under the REIP must be connected to Pepco's electricity distribution system. The interconnection, operation, and metering requirements for

photovoltaic systems shall be in accordance with Pepco and DC Public Service Commission rules for customer generating facility interconnections.

### **2.1.1. Applicants/Customer-Generators**

The Applicant/Customer-Generator is the system owner of the photovoltaic system at the time the incentive is paid.

### **Eligible Organizations/Entities**

The following organizations/entities are eligible to apply for DC Renewable Energy Incentive Program rebates:

- Individual residents
- Non-governmental organizations
- Businesses
- Schools (private educational institutions)
- Individual condominium owners, with documentation and approval from the condo association.
- Condo associations - system must be connected to a commercial meter.
- Apartments - when applied for by the building owner. The entire project must be under a single rebate application.
- Renewable energy cooperatives - Each individual resident or business owner participating in the cooperative must provide a separate application to include project details unique to his/her site.
- Third party owners. A third party owner is a system owner who does not own the qualifying building located in the District of Columbia. Third party owners must be registered with the District of Columbia and/or be a Certified Business Enterprise as certified by the Department of Small and Local Business Development.

### **Non-Eligible Organizations/Entities**

The following entities are not eligible to apply for DC Renewable Energy Incentive Program rebates:

- United States Federal government
- Electricity utilities
- Electricity suppliers
- Natural gas utilities
- Natural gas suppliers
- Heating oil suppliers
- District of Columbia government agencies

### **2.1.2. Installers**

All systems supported through the REIP must be installed by an appropriately licensed contractor in accordance with District of Columbia law. Self-installers are not eligible to receive rebates under this program at this time. Equipment Sellers may also be the same as the Contractor. If the Equipment Seller is not the Contractor, indicate information for the Seller on the Program Application.

Installers seeking to be identified on the REIP List of Contractors and Installers must submit a Contractor Participation Application, along with insurance documentation.

Although not required, installation contractors are encouraged to become certified by the North American Board of Certified Energy Practitioners (NABCEP). For additional information on NABCEP, visit [www.nabcep.org](http://www.nabcep.org).

## **2.2. Equipment Eligibility & Technical Requirements**

### **2.2.1. Eligible Equipment and System Applications**

All major system components (panels and inverters) must be new and not previously placed in service in any other location or for any other application. Rebuilt, refurbished, or relocated equipment is not eligible for a photovoltaic incentive. Performance meters are also required. Meters are required to have a  $\pm 5$  percent or greater accuracy. All meters shall measure and display output in kilowatts and kilowatt hours, retain production data during power outages, and have a communication port capable of enabling remote performance monitoring and reporting service.

### **2.2.2. Shade**

A system is considered to have minimal shading if no obstruction is closer than a distance of twice its height. Obstructions include any roof equipment, neighboring trees, poles, buildings, or other objects. Landscaping should be evaluated at the expected mature height.

If there are obstructions that will interfere with full solar access between the hours of 9am and 3pm at any time of year, a shading analysis is required. Submittals may include a table showing distance to height ratios per orientation, photo of a Solar Pathfinder, or printouts from the Pathfinder Assistant or Solmetric SunEye. Shading results shall be used to assist in estimating the system's annual energy production.

### **2.2.3. System Sizing**

Eligible systems must be at least 1,000 Watts<sub>DC</sub>. The Applicant must show evidence of the system sizing with the submittal of the full REIP application.

In the case of Applicants with new or expanded sites where no electric bill has been accrued or where the existing electric bill does not reflect the Applicant's expected expanded consumption, the Applicant must include an engineering estimate. The engineering estimate must include the appropriate substantiation of the forecast of the customer-generator site's annual energy use (in kWh) if the generating system size is based on future load growth, including new construction, load growth due to site expansion, or other load growth circumstances. Suggested methods of demonstrating load growth include building simulation program reports such as eQUEST, EnergyPro, DOE-2, and VisualDOE, or detailed engineering calculations.

### **2.2.4. Energy Efficiency**

For residential sites, DDOE offers free high quality energy audits through the Energy Office's Home Energy Rating System (HERS) Program. It is recommended that households implement efficiency measures where appropriate. For nonresidential sites, the customer-generator should consider scheduling a comprehensive commercial energy efficiency study prior to installing any renewable energy system.

### 2.2.5. Roof Loading

District of Columbia code requires structural drawings and roof load calculations to ensure the structure where the module will be mounted meets a 30 lbs/ft<sup>2</sup> snow load rating. This load limit is typically not a factor for photovoltaic systems where only the collectors and mounting hardware are mounted on the roof.

### 2.2.6. Metering

Accurate solar production metering is required for all projects that receive incentives. These meters are separate from the billing meter used for net energy metering. For systems less than 100 kW<sub>DC</sub>, meter accuracy of ±5% is required. Some inverters have a performance meter included which meets this requirement. If not, a separate meter is required to measure PV energy production.

For systems 100 kW<sub>DC</sub> and larger, a revenue grade meter (±2%) is required with remote communications capability. The meter shall be tested to all applicable ANSI C-12 testing protocols and shall have Interval Data Recording (15 minutes or less). The system seller and/or installer must retain and provide the system owner and DDOE with remote access to 15 minute average data for a minimum of one year. A remote performance monitoring and reporting service is required. Monthly system energy production data shall be reported to DDOE for calculation of the performance based incentive. All program participants must allow access to the photovoltaic production meter for testing, inspection, or data collection when given proper notice. Installers are encouraged to locate PV production meters in an easily accessible area.

### 2.2.7. Owner's manual

A manual or manuals must be provided with each photovoltaic system and balance-of-system, including the inverter.

### 2.2.8. Warranty Requirements

To protect the purchaser against defective workmanship, system or component breakdown, or severe degradation, all systems must carry the original manufacturer's warranty of one year or greater, and all installation workmanship must be guaranteed for a minimum of one year. The entire solar generating system must carry a warranty, including PV modules (panels) and inverters, and warranties should provide for no-cost repair or replacement of the system or system components, including any associated labor during the warranty period.

Meters must have a five-year warranty to protect against defective workmanship, system or component breakdown, or degradation in electrical output of more than fifteen percent from their originally rated electrical output during the warranty period.

## 3. Incentive Structure

**Photovoltaic incentives are based on the combined system rating in kilowatt<sub>DC</sub> output.**

- \$1.50 for each of the first 3,000 installed watts of capacity;
- \$1.00 for each of the next 7,000 installed watts of capacity;
- \$0.50 for each of the next 10,000 installed watts of capacity

Rebates for photovoltaic systems are capped at a maximum of \$16,500 (for 20 kilowatts) for each applicant site per program year.

## 4. Incentive Application Process

### 4.1. Prequalification and Reservations

All applicants must review all program checklist and guidelines. Before proceeding with an installation, applicants must schedule a site assessment with an installer. Please see the list of registered equipment and service providers in Appendix 3.

After configuring a system to meet your needs, your contractor will assist you in completing the Prequalification Application. Upon receipt the Prequalification Application, REIP staff will send you a reservation number which reserves the project in a queue should all funds be expended for the program year. **The Program operates on a first-come, first-served basis and incentive requests are dependent on funding availability.** Reserved applications will be placed on a waitlist for funding in the next available fiscal year.

### 4.2. Reservation Approval

The applicant will be notified via email when the Prequalification Application is approved. **When the Prequalification Application is approved, applicant may then submit a full application. DDOE will only consider for review and approval projects that have submitted a complete application.**

### 4.3. Full Application Submission

The application packet must contain:

- Completed REIP Photovoltaic Application
- Signed cost estimate or purchase order
- Letter of intent indicating equipment purchase and proof of deposit/payment
- System schematic or line drawing
- Site plan (photos, an aerial map or renderings identifying the location of collectors or modules, their orientation and tilt)
- Shading analysis (if shading exists between 9am and 3pm any time of the year); a PV Watts output calculation printout will be accepted if shading is not an issue.
- District of Columbia Master Supplier Form
- Form W-9 Federal Tax Identification
- Pepco Bill for address of installation location

### 4.4. Payment Approval

The incentive will be paid within 30-45 days upon receipt by DDOE of all required project documentation including a signed invoice or system contract indicating system equipment has been purchased.

## **4.5. Final Inspection**

Upon completion of the installation, a System Completion Certificate must be completed and provided to the program office. Completion of documentation helps to ensure that all installations supported through this incentive meet District of Columbia building and electrical codes, as well as to facilitate proper interconnection of systems to the electrical grid.

## **5. Self-Installation**

Self-installations are not currently allowed under this program.

For a listing of Washington area renewable energy contractors, aggregators, installers and suppliers, refer to the program web site.

## **6. Contact Information**

### **7. Program inquiries:**

Renewable Energy Incentive Program  
District Department of the Environment  
1200 1<sup>st</sup> Street NE, 5th Floor  
Washington, DC 20002  
Phone: 202.535.2600 Fax: 202.535.2881 Email: [greenenergy@dc.gov](mailto:greenenergy@dc.gov)  
[www.greenenergy.dc.gov](http://www.greenenergy.dc.gov)

### **8. Technical inquiries:**

Please consult a system reseller or installer for questions specific to your particular application. A list of area dealers and installers is attached as Appendix 3.

## APPENDIX 1: DEFINITIONS AND GLOSSARY OF TERMS

**ALTERNATING CURRENT (AC):** Electric current (flow of electrons) in which the direction of flow is reversed at constant intervals, such as 60 cycles per second. Home and business appliances plugged into an outlet typically utilize alternating current.

**AMPERE (AMP or A):** A measure of electrical charge that equals the quantity of electricity flowing in one second past any point in a circuit, or defined as one coulomb per second.

**AMPERE-HOUR (AMP-HOUR or AHR):** A measure of electrical charge that equals the quantity of electricity flowing in one hour past any point in a circuit. Battery capacity is measured in amp-hours.

**ARRAY:** A collection of photovoltaic modules electrically wired together in one structure to produce a specific amount of power.

**AUTONOMOUS OPERATION:** Self-contained operation, capable of existing independently.

**AZIMUTH:** The angular measure between due south and the point on the horizon directly below the sun.

**BALANCE OF SYSTEM (BOS):** Components of a photovoltaic system other than the photovoltaic or solar thermal array and load.

**CELL (PHOTOVOLTAIC):** A semiconductor device that converts light directly into DC electricity.

**CHARGE CONTROLLER:** A component of a photovoltaic system that controls the flow of current to and from the battery subsystem to protect batteries from overcharge, overdischarge or other control functions. The charge controller may also monitor system operational status.

**DIRECT CURRENT (DC):** Electric current (flow of electrons) in which the flow is in only one direction. Output from photovoltaic systems must be converted from direct current through the use of an inverter and other power conditioning equipment to supply AC current to wall outlets.

**ENERGY:** The capacity for doing work.

**GRID-CONNECTED:** A photovoltaic system that is connected to a centralized electrical power network such as a utility.

**HYBRID SYSTEM:** A power system consisting of two or more power generating subsystems.

**INSOLATION:** The amount of energy in sunlight reaching an area. Usually expressed in watts per square meter ( $W/m^2$ ), but also expressed on a daily basis as watts per square meter per day ( $W/m^2/day$ ).

**INVERTER:** A device that converts direct current (DC) to alternating current (AC) electricity.

**KILOWATT (kW):** 1,000 Watts.

**KILOWATT-HOUR (kWh):** 1,000 Watt-hours. A typical residence in the United States consumes about 1,000 kilowatt-hours each month at a price in the range of \$.06 to \$.15 per kilowatt-hour.

**LIFE CYCLE COST (LCC) ANALYSIS:** A form of economic analysis to calculate the total expected cost of ownership over the lifespan of the system. LCC analysis allows a direct comparison of the costs of alternative energy systems, fossil fuel generators, or the extension of utility power lines.

**LOAD:** Any device or appliance in an electrical circuit that uses power, such as a light bulb.

**MAINTENANCE COSTS:** Any costs incurred in the upkeep of a system. These costs may include replacement and repair of components.

**MODULE:** A number of photovoltaic cells wired together to form a unit, usually in a sealed frame of convenient size for handling and assembling into arrays; also called a "panel."

**NET ENERGY METERING (NET METERING):** Service to an electric consumer under which electric energy generated by that electric consumer-generator from an eligible on-site generating facility and delivered to the local distribution facilities may be used to offset electric energy provided by the electric utility to the electric consumer during the applicable billing period. Net metering is typified by the electrical meter "running backward" when on-site generation exceeds demand.

**OPERATING COSTS:** The costs of using a system for a selected period.

**PARALLEL CONNECTION:** A wiring configuration where positive terminals are connected together and negative terminals are connected together to increase current (amperage).

**PEAK SUN HOURS:** The equivalent number of hours when solar insolation averages 1000 Watts per square meter and produces the same total insolation as actual sun conditions.

**PEAK WATTS (WP):** The maximum power (in watts) a solar array will produce on a clear, sunny day while the array is in full sunlight and operating at 25 degrees Celsius. Actual wattage at higher temperatures is usually somewhat lower.

**PHOTOVOLTAIC (PV) SYSTEM:** A complete set of interconnected components for converting sunlight into electricity by the photovoltaic process, including array, balance-of-system components, and the load.

**POWER:** The rate of doing work or energy that is consumed or generated. Power is measured in Watts or horsepower.

**POWER CONDITIONER:** The electrical equipment used to convert electrical power from a photovoltaic array into a form suitable for subsequent use, such as an inverter, transformer, voltage regulator, and other power controls.

**PREPAYMENT:** The deposit paid towards the cost of the system, which includes, but is not limited to, down payments, forward payments of expected fees/bills or money used to establish a contract.

**SERIES CONNECTION:** A wiring configuration in which the negative terminal of one module is connected to the positive terminal of the next module to increase voltage.

**SILICON:** A non-metallic element, the basic material of beach sand and the raw material currently used to manufacture most photovoltaic cells.

**STAND-ALONE PHOTOVOLTAIC SYSTEM:** A solar electric system, commonly used in a remote location that is not connected to the main electric grid (utility). Most stand-alone, or off-grid systems include some type of energy storage, such as batteries.

**VOLTAGE (V):** A measure of the force or "push" given the electrons in an electrical circuit; a measure of electric potential. One volt produces one amp of current when acting against a resistance of one ohm.

**WATT (W):** A measure of electric power or amount of work done in a unit of time and equal to the rate of current flow (amps) multiplied by the voltage of that flow (volts). One amp of current flowing at a potential of one volt produces one Watt of power.

**WATT-HOUR (Wh):** A measure of electrical energy equal to the electrical power multiplied by the length of time (hours) the power is applied.

## **APPENDIX 2: REFERENCES AND RESOURCES**

### **Maintaining Your Photovoltaic System**

#### **Safety**

With respect to both maintenance inspections and troubleshooting, a proper knowledge of safety and potential hazards cannot be overemphasized. Service personnel should familiarize themselves with the hazards and safety precautions listed below.

#### **Current and Voltage Safety**

Remember that photovoltaic systems produce enough current to cause serious injury.

- Check all safety disconnects for proper operation.
- Insure that all metal parts are grounded.
- Cover the modules when working on them during the day (or work on them at night).

#### **Battery Safety**

Special care must be used when working with and around batteries. When charging, lead acid batteries give off hydrogen gas, which can be highly explosive. Smoking and spark producing activities must be avoided when working around these batteries. Low voltage batteries can produce enough short-circuit current to cause physical harm!

Extra precaution must be taken when disconnecting wiring from batteries when they are charging, as this can create sparks and lead to explosions:

- Neutralize lead acid battery acid that gets on the skin with a mixture of baking soda and water.
- Neutralize Ni Cad battery acid that gets on the skin with boric acid or vinegar.
- Ensure that a portable eye wash kit is on hand in case acid is splashed into the eyes. Flush eyes for ten minutes and contact a physician immediately.
- Use eye protection and rubber gloves when working around batteries.

#### **Maintenance**

All photovoltaic systems must be inspected and maintained on a regular basis. This preventive maintenance ensures that systems are operating effectively and, in many cases, prevents problems from occurring. Maintenance inspections require a minimal amount of time and are very simple once the procedure is understood and maintenance records are developed. Some of the procedures can be carried out by the system owner, but most should be conducted only by trained technicians familiar with photovoltaic systems, subsystem components and proper safety procedures. A well maintained system is the best insurance against future problems.

#### **General Guidelines**

- Inspect system twice per year (Spring and Fall).
- Develop and maintain inspection forms and records.

## ATTACHMENT A: APPLICATION PROCESS

### Step One: Advance Preparation

1. Review program checklist and guidelines.
2. Conduct an energy audit on your home or facility and implement the recommended conservation measures. An energy audit is not required to receive a rebate but is highly recommended.
3. Schedule a renewable energy site assessment with a renewable energy installer.

### Step Two: Apply for a Rebate

Your contractor will assist you in completing your application.

- Submit Prequalification Application
- Await email receipt of REIP Reservation Number
- Submit full application and supporting documents to DDOE
- Completed REIP Photovoltaic Application
- Signed cost estimate or purchase order
- Letter of intent indicating equipment purchase and proof of deposit/payment
- System schematic or line drawing
- Site plan (photos, an aerial map or renderings identifying the location of collectors or modules, their orientation and tilt)
- Shading analysis (if shading exists between 9am and 3pm any time of the year); a PV Watts output calculation printout will be accepted if shading is not an issue.
- District of Columbia Master Supplier Form
- Form W-9 Federal Tax Identification
- Pepco Bill for address of installation location

DDOE will only approve projects that have submitted a complete application. **The Program operates on a first-come, first-served basis and incentive requests are dependent on funding availability.**

### Step Three: Application Approval Letter and Rebate Payment

Full applications will be considered and approved/rejected in the order received.

1. If the application is approved, DDOE will mail an approval letter to the applicant confirming the amount of the rebate.
2. The applicant must sign and return the approval letter within 15 business days.
3. Rebate payment requests will be processed upon receipt of the signed approval letter by DDOE. Rebates will be issued in approximately 30-45 business days after receipt.
4. Applicants will have 6 months to complete the installation from the date the rebate check is issued. An additional 6 month extension may be obtained with written approval submitted 5 days before the expiration date of the rebate. If this condition is unmet, the system owner must return the rebate to DDOE. Failure to return the rebate will constitute a lien on the system owner's real and personal property to secure repayment.

#### **Step 4. Complete Your Clean Energy System Installation**

- Systems must be installed according to all District of Columbia regulations. Typically both electrical and building permits are required. In addition, historic permits and other special permits may be required. All work must be performed in accordance with all applicable federal and local manufacturer's codes and standards and Pepco interconnection guidelines for electricity generation systems.
- Pepco should be sent a pre-installation notification before any work begins on systems that will be grid-interconnected. Such notification provides ample time for scheduling a meter connection. Contact the Pepco Green Power Connection™ Team at (202) 872-3419 or [gpc-south@pepco.com](mailto:gpc-south@pepco.com); <http://www.pepco.com/home/choice/dc/greenpower/>
- To protect the purchaser against defective workmanship, system or component breakdown, or severe degradation all systems must carry the original manufacturer's warranty of one year or greater, and all installation workmanship must be guaranteed for a minimum of one year. The entire solar generating system must carry a warranty, including PV modules (panels) and inverters. Warranties should provide for no-cost repair or replacement of the system or system components, including any associated labor during the warranty period.
- All equipment must be new.

#### **Additional Requirements**

- No system can be removed from the District of Columbia for a period of 10 years following installation.

#### **Step 5. Final Inspection**

1. Once the project is completed, arrange final inspection from the Department of Consumer and Regulatory Affairs ("DCRA") building and electrical inspectors.
2. Complete interconnection agreement with Pepco when applicable.
3. Schedule a final inspection with DDOE to verify project completion according to the approval letter. Applicants must submit a System Completion Certificate specific to the technology rebated.

#### **Rebate Levels**

##### **Solar photovoltaic**

- \$1.50 for each of the first 3,000 installed watts or watt equivalents of capacity;
- \$1.00 for each of the next 7,000 installed watts or watt equivalents of capacity;
- \$0.50 for each of the next 10,000 installed watts or watt equivalents of capacity;

\*Rebates are capped at a maximum of \$16,500 (20 kilowatts/kilowatt equivalents) for each applicant site per program year. An applicant may only apply for one rebate per unique address per program year.

## **Rebate Rules & Guidelines**

### **Multifamily Residential Dwellings**

- Individual condominium owners must obtain written permission from the condo association.
- Condo associations can apply for a rebate, and the system must be connected to a commercial meter.
- Apartment buildings are eligible to receive a rebate under this program. The entire project must come under a single rebate application submitted by the building owner.

### **Third Party Owners**

- Third party owners (e.g. leasing companies) are eligible for this rebate. In these cases, the full amount rebated by DDOE must be applied as prepayment (as defined in Appendix 1) toward the total cost of the system.

### **Solar photovoltaic**

- Applicant's shading diagram or Solar Pathfinder plot must demonstrate minimal shading by trees, buildings and other structures and good direct exposure to the sun between the hours of 9am and 3pm any time of the year.

DDOE retains the right to deny rebates based on excessive shading and or poor orientation of solar collectors or modules.