

City of Columbia, Missouri Photovoltaic System Rebate, Interconnection, and Net Metering Guidelines

When you add clean, renewable solar photovoltaic (PV) power to your home or business you are reducing Columbia's carbon footprint, protecting the environment, and contributing to the City of Columbia's renewable energy portfolio. Columbia Water & Light provides incentives for these multiple benefits through our solar rebate program and net metering agreements.

The program rewards customers based on the overall capacity of their PV system (kW) as well as its energy production (kWh) during "peak" times. Peak times are periods of high system demand when electricity is most expensive for Water & Light to provide to its customers and normally occur on hot summer afternoons and evenings. The utility provides a premium rebate for PV systems designed to perform best during peak periods using azimuth, tilt and shading as determining factors.

Please review the following details and program steps with your contractor.

Process for Photovoltaic Rebates, Interconnection, and Net Metering

1. **Educate yourself:** Study PV systems and evaluate your energy consumption history. This will give you an idea of what type will work best for your location, the size and cost of the system.
2. **Choose your contractor.** Contact several PV installation contractors. Columbia Water & Light maintains a list of PV contractors who meet our program requirements. It is important to ask the contractors for references, licenses and certifications.
3. **Review the parameters of the rebate program.** Review the steps outlined below in "Determining your Rebate" and the [net metering](#) information with your contractor.
4. **Fill out and submit the [Interconnection & Net Metering Agreement](#).** This provides details about your PV system and site to Columbia Water & Light. The Agreement can be filled out electronically, however a signed hard copy must be emailed, faxed or mailed to Columbia Water & Light using the contact information on the form. Columbia Water & Light staff will review your proposal and notify you of any changes or additional information needed.
A letter from Columbia Water & Light approving your PV project for interconnection will also notify you of the amount of reserved rebate funds. Fund reservations are valid for six months from the date of the project's approval letter. **Projects not completed within six months of approval must be resubmitted and will forfeit their place in the rebate process.** If funds are unavailable at time of approval, your project will be placed on a waiting list based on the date of approval. The rebate fund is allocated during the City's annual budget process and subject to City Council approval. Placement on the waiting list does not guarantee rebate funding.
5. **Permits, installation and inspection:** After approval from Columbia Water & Light, work with your contractor to obtain an electrical permit from Building and Site Development (BSD), a division of the Community Development Department. This allows your contractor to proceed with the installation of your PV system.
After the PV installation is complete, contact BSD to schedule a final code inspection for your electrical permit.
Upon receiving final electric code approval from BSD, the project is considered complete, the next step is to contact Columbia Water & Light at 573-874-7325 and schedule a rebate inspection.

6. **Finalize your rebate:** Your rebate will be finalized at the time of inspection by Columbia Water & Light staff. Please supply copies of all applicable invoices for the PV system, a copy of the final approved code inspection and a copy of the insurance certificate, if required. You have 30 days from the date of this inspection to provide any additional information. Once all information has been submitted your rebate will be processed and mailed to you. If you were notified your project was placed on a waiting list for rebate funds the rebate will be processed as funds become available.

Determining Your Rebate

The rebate paid for a PV system is based on the total capacity(kW) and modelled energy production at the utility peak (kWh). Water & Light will only provide a rebate for the capacity needed to meet up to 100% of the customer's annual consumption. Annual consumption is an average of the most recent 3 years consumption at the installation location. Systems with a tilt greater than 10 degrees from horizontal **and** azimuths ranging from 0 – 110 and 320 – 0 **are not eligible** for rebates. However, these systems **are eligible** for interconnection and net metering.

Step 1. System size: To determine the dollar value of the Baseline Rebate, use the tier corresponding to the rated DC capacity of the system on Chart #1 below.

Step 2. System output at peak: Once the size of the system is determined, the solar vendor/contractor is required to complete and submit modeling of the solar array using the National Renewable Energy Laboratory's System Advisor Model (SAM) software (<https://sam.nrel.gov/>) and/or Solar Pathfinder. This modeling will provide production characteristics specific to the solar array design features. Contractors should contact Columbia Water & Light for the required conditions to model a system's output. System output is expressed in terms of First year kWh/kW (kWh generated per kW of system size) and corresponds to a "Peak Factor" in Table #1. Systems containing arrays with multiple tilt, azimuth and shading conditions must be modeled separately.

Chart #2 below is provided as an indicator of potential rebate based on the system orientation (azimuth and tilt) and **does not** take into account system shading. Site specific conditions, such as shading, may affect the final rebate amount and must be taken into consideration during the modelling process. Water & Light reserves the right to verify modelled output at any time.

Step 3. Multiply the Baseline Rebate amount by the Peak Factor to arrive at the final rebate amount. Systems containing arrays with multiple tilt, azimuth and shading conditions must be modeled separately. Rebates for these systems are prorated based on the contribution of each array to the total system capacity.

Single Array: **Baseline Rebate** (From Chart #1) × **Peak Factor** (From Table #1) = **Rebate Amount**

Multiple Arrays: **%of total DC capacity** × **Baseline Rebate** × **Peak Factor** = **Rebate Amount**

Interconnection Standards

Please review the Interconnection & Net Metering Agreement for the full list of requirements for PV systems attached to Columbia Water & Light's electric distribution system.

The PV system shall comply with the following standards:

National Electric Code (NEC) including but not limited to NEC Articles 690 (Guidelines outlining the installation of the system including structural and electrical components) Section 690.12 (rapid shut down requirement) and NEC 705 – (regarding the safety and warning signs of the system).

Underwriters Laboratories (UL) including but not limited to, UL 1741 (standard for static Inverters and charge controllers for use in PV systems) and UL 1703 (Standard for Safety: Flat Plate Photovoltaic Modules and Panels).

Institute of Electrical and Electronics Engineers (IEEE) Standards including, but not limited to 1547-2003 Standard for Interconnecting Distributed Resources with Electric Power Systems).

The solar modules and inverters must be new and listed as eligible solar energy equipment by the California Energy Commission's Go Solar: <http://www.gosolarcalifornia.ca.gov/equipment/index.php>

The PV system must be located on the customer's premises and must be intended primarily to offset part or all of the customer's own electrical requirements.

Net Metering

The value of the excess electricity generated by the solar energy system and delivered to Columbia Water & Light, will be credited to the customer's account at their current applicable electric rate. [An Interconnection & Net Metering Agreement](#) must be approved by the utility for the customer to receive a credit for the excess energy they generate. The utility retains the renewable energy credits (RECs) for the project. Customers choosing to retain the RECs for their solar energy system will receive credit for the excess energy based on the avoided average energy market price at the Columbia pricing node.

Columbia Water & Light reserves the right to reject interconnection of PV systems not meeting the net metering or rebate program parameters.

First year kWh/kW (From SAM)	Peak Factor	Chart #2 Icon
Greater than 1.97	1.25	●
1.97 to 1.35	1.00	●
1.35 to 0.41	0.75	○
Less than 0.41	0.0	X

Sample Calculation

Total System Size: 12 kW
 20 degrees tilt
 250 degrees orientation
 No Shading
 Output at Peak: 1.98 kWh/kW (From SAM, <https://sam.nrel.gov>)

Baseline rebate: \$5,800 (From Chart #1)
 Peak Factor: 1.25 (From Table #1)
 Rebate amount: (\$5,800 X 1.25) = \$7,250

Chart #1 - PV Project Baseline Rebate based on rated kW of the system

Capacity	0 - 10 kW	10.1 - 50 kW	50.1 kW - 100 kW	More than 100 kW
Rebate	\$500/kW \$5,000 available	\$400/kW \$16,000 available	\$200/kW \$10,000 available	No Rebate offered
Total project size	0 kW	10 kW	50 kW	100 kW
Max total rebate	\$0	\$5,000	\$21,000	\$31,000

Chart #2 -Unshaded Production at Peak

For an estimate of unshaded production at Peak, choose the row/column corresponding to the tilt/azimuth of the array. The color of the icon represents the Peak Factor found in Table #1. Orientations indicated with "X" receive no rebate.

	350	340	330	320	310	300	290	280	270	260	250	240	230	220	210	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
0	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
10	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	X	X	X	X	X	X	X	X	X	X	X	X
15	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	X	X	X	X	X	X	X	X	X	X	X
20	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	X	X	X	X	X	X	X	X	X	X	X	X
25	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	X	X	X	X	X	X	X	X	X	X	X	X	X
30	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	X	X	X	X	X	X	X	X	X	X	X	X	X	X
35	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
40	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
45	X	X	X	●	●	●	●	●	●	●	●	●	●	●	●	○	○	○	○	○	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

This table is provided as a planning tool only. Site specific conditions such as shading of the PV array may greatly reduce its production. Final rebate amount will be determined using modeled output of the PV system using NREL's SAM and/or Solar Pathfinder.