

# CSI Incentive Calculator Concentrating Photovoltaic User Guide

## 1. Guide Overview

This User Guide provides background on the concentrating photovoltaic version of the California Solar Initiative (CSI) Incentive Calculator, describes how the calculator determines the CSI incentives for a proposed concentrating photovoltaic system and detailed step by step instructions on its use. The calculator is web-accessible at <http://www.csi-epbb.com>.

## 2. CSI Eligibility

Eligible concentrating photovoltaic (CPV) projects must be located within sites where the Host Customer is a Pacific Gas & Electric (PG&E), Southern California Edison (SCE) or San Diego Gas & Electric (SDG&E) retail electric customer.<sup>1</sup> Systems between 1 kW and 5,000 kW are eligible to participate in CSI, however incentives are paid on the first 1,000 kW of installed capacity. All systems are eligible for Performance Based Incentives (PBI).

All customer classes are eligible for CSI except for residential new construction systems which must apply to the New Solar Home Partnership (NSHP) program. NSHP details may be found at <http://www.gosolarcalifornia.ca.gov/nshp/>. The CSI calculator is currently not applicable to systems applying to the NSHP.

Program eligibility details can be found at the Go Solar California and CSI Program Administrators' websites listed below

- Go Solar California <http://www.gosolarcalifornia.ca.gov/>
- PG&E <http://www.pge.com/csi>
- SCE <http://www.sce.com/csi>
- CCSE  
<http://www.energycenter.org/ContentPage.asp?ContentID=377&SectionID=406&SectionTarget=370>

Municipal electric utility customers are not eligible to receive incentives from the above designated program administrators.

---

<sup>1</sup> Note that the California Center for Sustainable Energy (CCSE) is the Program Administrator for CSI in SDG&E's service territory.

### 3. CSI Incentive Calculator Overview

The CSI calculator is an internet accessible tool (<http://www.csi-epbb.com>) used to determine the Design Factor and the resulting PBI incentive for eligible CPV systems.<sup>2</sup>

The calculator determines the CSI incentive for a single type of CPV system and inverter combination. The incentive for multiple units of the same type of CPV system and/or inverter can be accommodated by the calculator in a single calculation. Mixed systems that use different types of inverters, CPV systems, PV + CPV hybrids require individual incentive calculations for each combination and the incentives summed. More details on mixed system CSI incentive calculation can be found in Section 6 of this guide.

When first opened, the calculator has an input page, where the user inputs the project name, zip code location of the system, the customer's electric utility, type of customer, the type and number of CPV systems, the type and number of inverters, tracking method, the proposed system's tilt and azimuth (if applicable) and the estimated annual system production (kWh/yr).

Once all required data is entered, the user initiates the calculator by pressing the "GO" button. The calculator then uses the inputs to determine the resulting CSI incentive for the proposed system.

The user can press the "Recalculate" button, found at the bottom of the results screen, to return to the input page and make adjustments to their original inputs.

### 4. Required Calculator Inputs

The CSI calculator is configured to calculate the incentive for a single CPV system type, inverter type. For example if a system utilizes two different inverter models, but the two of the same type of CPV system, the calculator must be run twice. More details on mixed system EPBB incentive calculation can be found in Section 6 of this guide.

The inputs for the calculator are described below.

**Project Name:** This is text string identifying the project. It is repeated at the top of the results page to help the user identify which project the results are for.

**ZIP Code:** This is the zip code of the location of the proposed PV system. Note that this zip code must be located within the specified utility's service territory where the system is or will be located.

**Utility:** This is the utility in whose service territory the proposed PV system is or will be located. Note that the zip code inputted must be located within the specified utility's service territory.

---

<sup>2</sup> Note that CSI calculator PBI results are used by the Program Administrator to set-aside funds for future PBI payments. The CSI PBI results are not a guarantee of payment. PBI payments are based on the actual metered output of the proposed system.

**Customer Type:** Select the customer classification associated with the Host Customer. For definitions of the various customer types, refer to the latest California Solar Initiative Program Handbook.

**Concentrating PV Module:** The make and model of the proposed CPV system is typed here.

**PTC Rating:** The PVUSA Test Condition rating for the proposed CPV system is input here.

**Number of Modules:** This is the total number of CPV systems of the designated type that will be connected to the inverter(s) that are selected below.

**Inverter:** This is the type of inverter that will be used with the proposed PV system. The options in this pull-down are based on the CEC's list of eligible inverters found at [http://www.consumerenergycenter.org/cgi-bin/eligible\\_inverters.cgi](http://www.consumerenergycenter.org/cgi-bin/eligible_inverters.cgi). If multiple inverter types are to be used, you must make multiple CSI calculator runs. Also, if the CEC-AC rating of the proposed system is greater than 125% of the inverter rating, an error is flagged which must be corrected (by reducing the number of panels, choosing a lower PTC rated panel, increasing the number of inverters or choosing a larger capacity inverter) before being allowed to proceed to the results page. See description of "CEC-AC Rating" in Section 5 of this guide for more discussion on oversized systems.

**Number of Inverters:** This is the total number of inverters of the selected type that will be installed for use with the PV modules selected above.

**Minimal Shading:** This is a deactivated input until a method for shading can be determined.

**Shading Derate Factors (%):** This is a deactivated input until a method for shading can be determined.

**Tracking:** This is the tracking method and number of tracking axis.

**Array Tilt (degrees):** This is only applicable for fixed or single axis tracking systems. This is the proposed system tilt from horizontal. Flat (horizontal) systems have a 0° tilt.

**Array Azimuth (degrees):** This is only applicable for fixed systems. This is the horizontal direction ("true" north-south) the proposed system is pointing; due South is 180° azimuth and due North is 0° azimuth. The optimal reference system for proposed flat (horizontal) systems is assumed to have a 180° azimuth. Magnetic direction measured by a compass can be converted to "true" direction by adding the appropriate magnetic declination for the specific location. Magnetic declination can be determined at the NOAA website (<http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp>).

**Estimated Annual Production:** The estimated electric energy output of the CPV system is input here. Annual electric production must be estimated using performance parameters established by SRCC or Sandia National Laboratories, and site specific typical meteorological year weather data. Acceptable models are the Solar Advisory Model (<https://www.nrel.gov/analysis/sam>) or TRNSYS (<http://sel.me.wisc.edu/trnsys>). Other modeling approaches may be considered on a case by case basis by the Program Administrator.

After the inputs are set, the user can click the “GO” button and the calculations will be executed. If an input error is detected, the calculator will refresh the input page and note the error with a comment at the bottom and an asterisk next to the field containing the error. The error must be corrected before the calculator will proceed to the results output page.

## 5. Description of the Outputs

Once the calculator has completed its computations, it will display a results page containing inputs (Site Specifications and CPV System Specifications) and outputs (Results) for the proposed and reference optimal system, as well as the Design Factor and calculated incentive. If the user wishes to apply to the CSI program, they must include a hardcopy of the CSI Calculator results screen in their application materials.

The outputs are described below.

**PV Module:** Lists the specified PV module name and module DC rating per panel; STC, and PTC.

**DC Rating (kW PTC):** This is the calculated total DC PTC rated capacity of the PV modules and is calculated by multiplying the PTC module rating by the number of panels. This capacity is used to calculate the CEC-AC rating of the system.

**Annual kWh:** This is the estimated annual energy output of the proposed system. This value is reported for the sole purpose of transparency of the calculator and is not a guarantee of future system performance.

**CEC-AC Rating:** This is the product of the PV module PTC rating, module count and inverter efficiency. If the CEC-AC rating exceeds the rated capacity of the inverter by no more than 125%, a warning is displayed on the results page. This warning is only informational and does not prevent the user from proposing the system in a CSI application.<sup>3</sup>

**Capacity Factor:** This is the estimated annual output of the proposed system divided by the product of 8760 annual hours and the proposed system’s CEC-AC rating.

<sup>3</sup> Some inverters allow operation above their rated capacity, to a degree, for at least short periods limited by their operating temperature and amperage carrying capability. The CSI Program Administrators reserve the right to seek justification for proposed oversized systems which may result in poor reliability due to mis-matched equipment.

**Prevailing Capacity Factor:** This is 18% for incentive steps 2 and 3 and 20% for incentive steps 4 through 10.

**Design Factor:** This is the ratio of the Capacity Factor and the Prevailing Capacity Factor. This Design Factor is not used to directly calculate the PBI incentive amount. The Program Administrators use it to modify the CEC-AC rating of the system for incentive trigger tracking purposes.

**Eligible Annual kWh:** This is the annual performance prorated to 1 MW CEC-AC for systems that are larger than 1 MW. If the system is equal to or smaller than 1 MW than the Eligible Annual kWh is the same as the Annual kWh above.

**Incentive Rate:** This is the current CSI PBI incentive rate (\$/kWh) and depends on the selected utility and customer type. It is obtained directly from the CSI Trigger Tracker located at [www.csi-trigger.com](http://www.csi-trigger.com).

**Incentive:** This is the estimated total incentive for the proposed system, and is calculated as the estimated annual output times the incentive rate times 5 years. The incentive paid will be based on the actual production of the installed system.

**Report Generated on:** is a date and time stamp to document when the report run occurred.

## 6. Multiple Systems or Inverter Types

If a proposed system consists of CPV systems with different inverter types, if different CPV systems or installed as part of a conventional PV system, a CSI calculator run must be done for each configuration and the resulting incentives totaled.

If two CPV systems are installed one with an inverter of type “Z” and the other inverter of type “X”, the user must make one calculator run with one system with inverter “Z” and second calculator run with inverter “X”. The incentives from the two runs must then be added together.

## 7. Shading Input Requirements

Shading input is not activated at this time until a shade methodology for tracking CPV systems is developed.

## 8. PBI Incentive Computation Details

The PBI incentive is calculated with the following formula.

$$\text{PBI Incentive} = \text{Incentive Rate} \times \text{Est. Annual Output} \times \text{Five Years}$$

Where,

**PBI Incentive** – is the total estimated monetary incentive paid monthly over a five year period. Note that this estimate is used by the Program Administrators to set-aside funds for future payments. It is not a guarantee of payment. Actual payments are based on the metered output of the PV system, which may vary significantly from the PBI Incentive estimate provided by the calculator.

**Incentive Rate** – is the PBI incentive rate (\$/kWh) available at the time of application. The table below presents the PBI incentive rate schedule.

**PBI Payment Amounts**

MW Step	MW per step	PBI payments (per kWh)		
		Residential	Non-Residential	
			Commercial	Government Non-Profit
1	50	n/a	n/a	n/a
2	70	\$0.39	\$0.39	\$0.50
3	100	\$0.34	\$0.34	\$0.46
4	130	\$0.26	\$0.26	\$0.37
5	160	\$0.22	\$0.22	\$0.32
6	190	\$0.15	\$0.15	\$0.26
7	215	\$0.09	\$0.09	\$0.19
8	250	\$0.05	\$0.05	\$0.15
9	285	\$0.03	\$0.03	\$0.12
10	350	\$0.03	\$0.03	\$0.10

**Annual kWh:** This is the estimated annual energy output of the proposed system.

## 9. Getting Help & Providing Comments

Questions and comments regarding the calculator or this User Guide should be emailed to [CSI-EPBB@aesc-inc.com](mailto:CSI-EPBB@aesc-inc.com). Questions will be addressed on a first-come first-served basis.