



NSHP Calculator Versions 4.1 and 5.0 Training

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NSHP Training Workshop



Installing the NSHP Calculator

- Must have PC platform with MS Windows operating system
(Windows 2000, XP, Vista, Windows 7)
- Need to have Microsoft Excel
(2000, 2002, 2003, 2007, 2010)
- Must be run from a writable disc (typically a hard drive)
- Can be run on a Mac with PC emulator software
- Will not run from CD or DVD



Registering for Updates

<http://www.gosolarcalifornia.org/nshpcalculator/index.html>

- Registering allows users to get updates.
- Only need name and email address.
- Registration is voluntary. Can use calculator without registering.

Please enter your first name: last name: e-mail address:	<input type="text"/> <input type="text"/> <input type="text"/>
Choose what to do: Subscribe <input type="radio"/> Unsubscribe <input type="radio"/>	
<input type="button" value="Send"/> <input type="button" value="Reset"/>	
<small>Note: Your first & last name and e-mail address must be exact and complete. Incorrect or incomplete addresses will not work. You will receive a welcoming e-mail to confirm your subscription.</small>	

CECPV Calculator Version 4.0
Updated: April 19, 2013



Certified Calculator Versions

http://www.gosolarcalifornia.org/nshpcalculator/download_calculator.html

- To check if an older version of the NSHP calculator is still certified, go to the link provided above.

NSHP applications must use a version of the NSHP CECPV Calculator that is listed as "certified" on the date the NSHP application is postmarked (or date of submission for electronic NSHP applications).

Version Number	Release Date	Libraries	Decertified Date	Currently Certified	Market Rate \$/Watt Tier I	Market Rate \$/Watt Tier II	Solar as a Standard	Affordable Housing Dwelling Unit \$/Watt	Affordable Housing Common Area \$/Watt
v.4.0	April 19, 2013	Mod4.0a/Inv4.0a	None Scheduled	Yes					
v.3.1 Update 1	January 22, 2013	Mod3.1b/Inv3.1b	None Scheduled	No	\$1.75/watt	\$2.00/watt	N/A	\$2.55/watt	N/A
v3.1	October 2, 2012	Mod3.1a/Inv3.1a	None Scheduled	No	\$1.75/watt	\$2.00/watt	N/A	\$2.55/watt	N/A
v3.0 Update 3	September 1, 2012	Mod3.0d/Inv3.0d	October 2, 2012	No	\$2.00/watt	\$2.25/watt	N/A	\$2.90/watt	N/A
v3.0 Update 2	July 17, 2012	Mod3.0c/Inv3.0c	October 2, 2012	No	\$2.00/watt	\$2.25/watt	N/A	\$2.90/watt	N/A
v3.0 Update 1	May 23, 2012	Mod3.0b/Inv3.0b	October 2, 2012	No	\$2.00/watt	\$2.25/watt	N/A	\$2.90/watt	N/A



Downloading the NSHP Calculator

http://www.gosolarcalifornia.org/nshpcalculator/download_calculator.html

- Using the Automated Installation will simplify the process.
- Manual Installation lets you choose where to install the calculator.

[Download the Energy Commission CECPV Calculator](#)

New [Version 4.0 Automated Installation](#)

New [Version 4.0 Manual Installation](#)

[Version Change Details](#)

(Acrobat file, 40 kilobytes)



Downloading Equipment Updates

- Equipment lists are updated on a regular basis.
- Using the automated install will simplify the installation process.

New Download the module/inverter update for the
CECPV Calculator

Module/Inverter Update Automated Installation

(MSI file, 204 kilobytes) Left-Click the Link to download. Choose "Open" or "Run" at the first dialog window. Depending on your Windows settings, you may get a security warning. If you get a warning, choose "Run" or "OK". The files will be automatically placed in the same directory where the calculator is installed. If you require a different directory, please use a manual installation with the zip file below.

Module/Inverter Update Manual Installation

(ZIP file, 32 kilobytes) Left-Click the Link to download. Choose "Save" to store the file on your hard disk. The files must be unzipped to the same directory where the calculator is installed.



Enabling Macros in Calculator

- Must enable macros before using the calculator.

- For Excel 2000, 2002, or 2003 you will see a pop-up like this.



- For Excel 2007, 2010 please go to the following link and follow the instructions provided:

http://www.gosolarcalifornia.ca.gov/nshpcalculator/Excel_2007_Security_Level.pdf



Entering Information in the Calculator

- California Flexible Installation
- Project Description
 - Single/Multifamily
 - Code Compliant, Tier I/II
 - Market Rate/Affordable
 - Dwelling/Common Area
- Input design details
- Minimal shading criterion

CECPV Calculator

Project Title

Number of Sites with Solar

Number of Inverters per Site with Identical Design Details

Is this project eligible for the California Flexible Installation? Yes No

Project Description:

Single Family Multifamily Market Rate Affordable

Tier I EE Tier II EE Dwelling Unit Common Area

PV Module

Standoff Height

Mounting Height ft

Number of Series Modules in each String

Number of Parallel Strings per Inverter

Tracking

Roof Pitch Tilt degrees

Azimuth degrees

Inverter

City Climate Zone

Minimal Shading

Run Status

CECPV 3.0 MOD3.0a/INV3.0a



- For additional details about each field, refer to the instructions on the right side of the calculator input page.

Instructions:

1. To qualify for a NSHP incentive, residential buildings must receive electricity distribution service, at the site of installation of the PV system, from either Pacific Gas & Electric, San Diego Gas & Electric Company, Southern California Edison, or Golden State Water Company (doing business as Bear Valley Electric Service).
On the list of cities within the calculator, there are cities that are not served by the above utilities.
2. Number of Sites with Solar means the number of physical addresses where a solar energy system is proposed to be installed. Typically this will be 1 unless the project is a development.
3. Number of Inverters per Site with Identical Design Details means the number of inverters per site where all installation characteristics of the array are identical. For microinverters, this number will be greater than 1.
4. The California Flexible Installation (CFI) option is allowable only when solar energy systems are proposed for multiple sites. CFI is applicable when all of the proposed solar energy systems meet the following conditions:
 - Azimuth range is from 150 degrees to 270 degrees
 - Tilt corresponds to a roof pitch between 0:12 and 7:12
 - The minimal shading criterion is met
 - Systems are Fixed (non-tracking)
 - The major system components (modules and inverter) are identical in make and quantity
5. Standoff height is the minimum distance from the mounting surface to the back of the modules.
6. Mounting height is the distance from the ground to the lowest point on the array.
7. [Click](#) for information on tracking types.
8. Select the roof pitch (rise/run) or select Enter Tilt to enter tilt in degrees (between 0 and 90).
9. Azimuth of array; 180 degrees is due South, 90 due East, 270 due West
10. Select a city; if your city is not listed, choose the city that was used in your Title 24 energy efficiency calculations.
[Click](#) for Energy Commission climate zone information by zip code.
11. Check Minimal Shading only if there are no shading obstructions (including the mature height of planned trees) which fail to meet the minimal shading criteria. Minimal shading criteria is met only if all obstructions are at a distance, more than twice their height, from the array. For installations with shading obstructions that fail to meet the minimal shading criteria, click the Add Shading Detail button.
12. Click the Run button to begin the simulation. The program will process the data and estimate monthly and annual kWh production and calculate the NSHP incentive. The Run button will only work for simulations that are Minimal Shading.



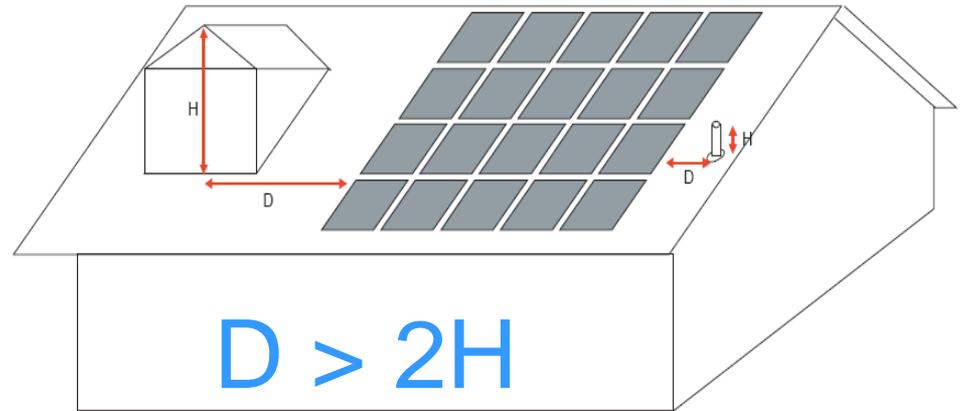
California Flexible Installation (CFI)

- Only allowed when solar energy systems are proposed for multiple sites.
 - Warning for single site CFI attempt
- CFI is applicable only under the following conditions:
 - Azimuth range between 150 and 270 degrees
 - Tilt corresponds to a roof pitch between 0:12 and 7:12
 - The Minimal Shading Criteria is met
 - Systems are non-tracking (fixed).
 - Identical major system components (modules and inverters)



Minimal Shading Criterion

- No obstruction is closer than a distance (“D”) of twice the height (“H”) it extends above the PV modules.
- Obstructions include:
 - Vents, Chimneys, architectural feature, mechanical equipment that project above the roof
 - Any part of a neighboring terrain that projects above the roof
 - Any tree that planted or planned
 - Any existing or planned neighboring building
 - Any utility pole closer than thirty feet from the nearest point of the array





Adding Shading Details

- Needed when Minimum Shading Criterion is not met
- How to find Shading Angle
 - Tape Measure
 - Digital Protractor
 - Solar Assessment tool
- Enter shading for up to 11 azimuth bins
 - Only worst case shading will show up in a bin
- Instructions and examples are provided

User Input for Describing Shading

Orientation - Enter Shading Sector Here	Obstruction Type	Height* of Shading Obstruction	Horizontal Distance to Shading Obstruction	Shading Angle
1 SSE (Azimuth >146.25 to 168.75)	Medium Tree (Existing - Mature)		15.00	
2 S (Azimuth >168.75 to 191.25)	On Roof Obstruction (Enter Distance and Height)	2.00	3.00	
3 SSW (Azimuth >191.25 to 213.75)	Neighboring Structure (Enter Distance and Height)	40.00	70.00	
4				
5				
6				
7				
8				
9				
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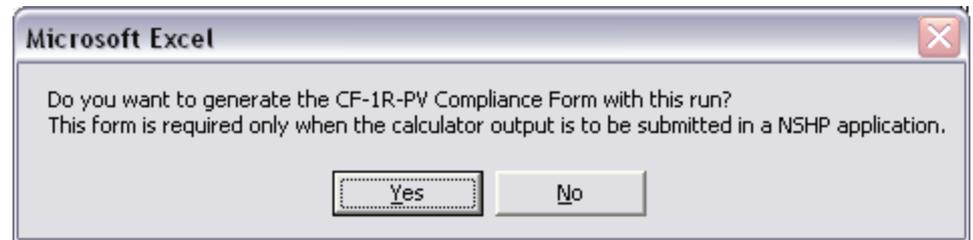
Clear Entries Run Run Status

CECPV 2.4 MOD2.4a/INV2.4a



Generating Compliance Forms

- User can choose if they want compliance forms to be generated with the output.
- Generate forms if design is finalized. Requires entering Site Information.
- Forms not necessary if you only want to compare results with different configurations.





Entering Site Information

- For multiple site applications, enter all Project Addresses or lot numbers.
- Documentation author can be homeowner, builder, PV system retailer/installer/designer

CECPV Calculator - Site Information

Project Title

Project Address(es)

City, State Zip

Homeowner or Builder/Developer or Applicant's Authorized Representative

Name

Title/Firm

Address

City, State Zip

Telephone No. License No.

Documentation Author

Name

Title/Firm

Address

City, State Zip

Telephone No. Run Status

CECPV 5.0 MOD5.0a/INV5.0a



Results Page

- Expected production and TDV amounts are given for each site and the overall application.
- The expected incentive is given in a separate table.
- TDV, kWh and incentives may be different for identical 2008 and 2013 projects
 - Due to changes in weather and TDV metric files.

CEC PV Calculator - Results

kWh Production per Site	kW AC system size per Site	<input type="text" value="2.18"/>
January <input type="text" value="208"/>	Annual kWh per Site	<input type="text" value="3,869"/>
February <input type="text" value="239"/>	Annual TDV kBtu per Site	<input type="text" value="55,236"/>
March <input type="text" value="330"/>		
April <input type="text" value="374"/>		
May <input type="text" value="418"/>		
June <input type="text" value="413"/>		
July <input type="text" value="427"/>		
August <input type="text" value="415"/>		
September <input type="text" value="357"/>		
October <input type="text" value="293"/>		
November <input type="text" value="217"/>		
December <input type="text" value="178"/>		
Annual <input type="text" value="3,869"/>		

The NSHP incentive may be reduced to a maximum percentage of the total system cost. Refer to NSHP Guidebook, 4th edition, Chapter III, Section C.

External display or standalone performance meter required to meet NSHP Guidebook requirements.

Application Total kW AC system size	<input type="text" value="2.18"/>
Application Total Annual kWh	<input type="text" value="3,869"/>
Application Total Annual TDV kBtu	<input type="text" value="55,236"/>

The CECPV Calculator determines the appropriate incentive amount for a PV system as calculated by the Expected Performance Based Incentive approach outlined in the NSHP Guidebook. The expected performance of a system provided by the CECPV Calculator is an estimate and actual performance will be different.



Results Page – Incentive Table

<https://www.newsolarhomes.org/WebPages/Public/RebateLevelView.aspx>

- Incentive table lists all possible incentives for project between incentive steps 1 through 10.
- Can find current incentive level by using the link above.

Project Description: Single Family, Market Rate, Tier I EE, Dwelling Unit

For Current Incentive Level see: <https://www.newsolarhomes.org/WebPages/Public/RebateLevelView.aspx>

The incentive level reserved for a project will be determined at the time the reservation application is approved by the Energy Commission. Projects may be issued a reservation at a lower incentive level than the one in effect at the time the reservation application is submitted. The final incentive amount paid to the applicant is subject to change based on the specifications and configuration of the installed solar energy system. The table below provides the expected incentive amount for this project, based on the information provided, at each possible base incentive level in the current NSHP Guidebook. The base incentive levels noted in the table below may be changed in future NSHP Guidebook revisions.

Level	Base Incentive Level	NSHP Incentive per Site	Application Total NSHP Incentive
1	\$2.50/W	\$4,482	\$4,482
2	\$2.25/W	\$4,034	\$4,034
3	\$2.00/W	\$3,586	\$3,586
4	\$1.75/W	\$3,138	\$3,138
5	\$1.50/W	\$2,689	\$2,689
6	\$1.25/W	\$2,241	\$2,241
7	\$1.00/W	\$1,793	\$1,793
8	\$0.75/W	\$1,345	\$1,345
9	\$0.50/W	\$896	\$896
10	\$0.25/W	\$448	\$448



Results Page – Current Incentive Level

- Highlighted row is the current incentive level.
- Incentive Level may be different for Market Rate and Affordable Housing.

Search Criteria

Incentive Type: Market Rate Housing**** Affordable Housing

View: Summary Detail

Under Review *: 2,711.61 kW

Level	Goal (kW)	Adjusted Goal (kW)	Adjusted Approved (kW)	Balance Until Incentive Level Changes (kW) **	Tier 1 Incentive	Tier 2 Incentive
1	55,300.00	55,300.00	41,982.34	0.00	\$2.50	\$2.60
2	N/A	5,000.00	1,671.24	0.00	\$2.25	\$2.35
3	5,000.00	5,000.00	3,231.72	0.00	\$2.00	\$2.25
4	10,000.00	10,031.57	9,642.78	0.00	\$1.75	\$2.00
5	15,000.00	15,315.44	11,271.05	0.00	\$1.50	\$1.75
6	20,000.00	20,248.19	1,038.06	13,371.77	\$1.25	\$1.50
7	35,000.00	35,000.00	0.00	0.00	\$1.00	\$1.25
8	50,000.00	50,000.00	0.00	0.00	\$0.75	\$1.00
9	65,000.00	65,000.00	0.00	0.00	\$0.50	\$0.75
10	85,000.00	85,000.00	0.00	0.00	\$0.25	\$0.50



Results Page (cont.)

- The results page also displays all of the user inputs for the application.

CEC PV Calculator - Inputs

Project Title:	Example
Number of Sites with Solar:	1
Number of Inverters per Site with Identical Details:	1
California Flexible Installation:	No
PV Module:	Example Module
Standoff Height:	Building Integrated
Mounting Height:	One-Story
Number of Series Modules in each String:	48
Number of Parallel Strings per Inverter:	1
Tracking:	Fixed
Roof Pitch:	5:12
Azimuth:	180
Inverter:	SMA America SWR2500U (240V)
City Used in Calculator Run:	Arcata
Project Description:	Single Family, Market Rate, Tier I, Dwelling Unit
Minimal Shading:	Yes



NSHP PV-1/CF-1R-PV Form

NSHP PV-1 (previously CF-1R-PV) CECPV Output Form Page 1 of 3

Example _____ 12/09/2013 10:11:23 AM
 Project Title _____ Date _____
 12 First St
 Project Address: Lot Number _____
 West Sacramento, CA 95691
 City/State/ZIP _____
 Arcata 1
 City Used in Calculator Run _____ Climate Zone _____
 Number of Sites with Solar: 1 Number of Inverters per Site: 1
 with Identical Design Details
 Project Address List
 12 First St

FOR OFFICIAL USE ONLY
 Reservation: _____
 PV: _____
 Date: _____

Project Description: Single Family, Market Rate, Tier I, Dwelling Unit
PV SYSTEM INFORMATION
 Module Manufacturer and Model: Example Module
 Inverter Manufacturer and Model: SMA America SWR2500U (240V)
 Series Modules in each String: 48 Parallel Strings: 1 Total Modules per Inverter: 48
 Mounting (BIPV or Rack Mounted): Building Integrated
 Standoff Height (if rack mounted): N/A
 Installation Option: Detailed
 Azimuth: 180 degrees Tilt: 22.6 degrees Mounting Height Above Ground: One-Story
 Shading Type: Minimal Shading Tracking: Fixed

External display or standalone performance meter required to meet NSHP Guidebook requirements.

SHADING TABLE		Altitude Angle to Shading Obstruction	Distance To Obstruction Height Ratio	Minimum Distance To Small Tree	Minimum Distance To Medium Tree	Minimum Distance To Large Tree
ENE (55-79)	N/A	Min Shading	2	16	46	76
E (79-101)	N/A	Min Shading	2	16	46	76
ESE (101-124)	N/A	Min Shading	2	16	46	76
SE (124-146)	N/A	Min Shading	2	16	46	76
SSE (146-169)	N/A	Min Shading	2	16	46	76
S (169-191)	N/A	Min Shading	2	16	46	76
SSW (191-214)	N/A	Min Shading	2	16	46	76
SW (214-236)	N/A	Min Shading	2	16	46	76
WSW (236-259)	N/A	Min Shading	2	16	46	76
W (259-281)	N/A	Min Shading	2	16	46	76
WNW (281-305)	N/A	Min Shading	2	16	46	76

CEC PV CALCULATOR RESULTS

	Per Site	Application Total
kW AC System Size:	2.18	2.18
Annual kWh:	3,272	3,272
Annual TDV kBtu:	86,025	86,025

The CECPV Calculator determines the appropriate incentive amount for a PV system as calculated by the Expected Performance Based Incentive approach outlined in the NSHP Guidebook. The expected performance of a system provided by the CECPV Calculator is an estimate and actual performance will be different.
 CECPV 5.0 The NSHP incentive may be reduced to a maximum percentage of the total MOD5.0a/INV5.0a

- NSHP PV-1 has three pages
 - Page 1: Summary of project location, equipment, shading table, and calculator results.
 - Page 2: Field Verification Table used by the installer and HERS rater for field verification.
 - Page 3: Compliance Statement signed by Homeowner and Documentation Author

CEC PV CALCULATOR RESULTS

	Per Site
kW AC System Size:	2.18
Annual kWh:	3,272
Annual TDV kBtu:	86,025

	Application Total
kW AC System Size:	2.18
Annual kWh:	3,272
Annual TDV kBtu:	86,025

The CECPV Calculator determines the appropriate incentive amount for a PV system as calculated by the Expected Performance Based Incentive approach outlined in the NSHP Guidebook. The expected performance of a system provided by the CECPV Calculator is an estimate and actual performance will be different.



Field Verification Table (FVT)

- Used by: Installer and HERS rater
- Purpose: To verify system performance at a specific irradiance and temperature.
- FVT shows expected production for one inverter.
 - Exception: Microinverters projects will have an aggregated expected production amount.

CERTIFICATE OF COMPLIANCE FORM: NSHP PV (Page 2 of 3) CF-1R-PV

Example Project Title: _____ The AC power output values (watts) in this table are for one inverter. For microinverters only, the values are for the specified Number of Inverters per Site with Identical Design Details. Date: 04/22/2013 12:32:35 PM

FIELD VERIFICATION TABLE FVT113

Irradiance on Tilted Surface (W/m ²)	Temperature (degrees Fahrenheit)																					
	T=15	T=20	T=25	T=30	T=35	T=40	T=45	T=50	T=55	T=60	T=65	T=70	T=75	T=80	T=85	T=90	T=95	T=100	T=105	T=110	T=115	T=120
300	613	605	597	590	582	574	567	559	551	543	535	527	518	510	502	494	486	477	469	461	452	444
400	814	804	793	783	772	762	752	741	730	720	709	698	687	676	666	655	644	633	622	611	600	589
500	1010	997	985	972	959	946	933	920	906	893	879	866	852	839	825	811	797	783	770	756	742	728
600	1208	1194	1179	1163	1147	1130	1113	1097	1080	1063	1046	1030	1013	996	979	961	944	927	911	894	877	860
700	1407	1391	1374	1356	1338	1320	1302	1284	1266	1249	1231	1212	1194	1176	1158	1139	1121	1103	1085	1067	1049	1031
800	1606	1588	1569	1550	1531	1512	1493	1474	1455	1436	1417	1398	1379	1360	1341	1322	1303	1284	1265	1246	1227	1208
900	1805	1785	1765	1745	1725	1705	1685	1665	1645	1625	1605	1585	1565	1545	1525	1505	1485	1465	1445	1425	1405	1385
1000	2004	1983	1962	1941	1920	1899	1878	1857	1836	1815	1794	1773	1752	1731	1710	1690	1670	1650	1630	1610	1590	1570
1100	2203	2181	2159	2137	2115	2093	2071	2049	2027	2005	1983	1961	1939	1917	1895	1873	1851	1830	1810	1790	1770	1750
1200	2402	2379	2356	2333	2310	2287	2264	2241	2218	2195	2172	2149	2126	2103	2080	2057	2034	2011	1988	1965	1942	1919

CECPV 4.0 MOD4.0a/INV4.0a

The power output values in this table are for one inverter. For microinverters only, the values are for the specified Number of Inverters per Site with Identical Design Details.



Compliance Statement

- Summarizes Applicant and Documentation Author information.
- A signature is no longer required.

NSHP PV-1 (previously CF-1R-PV) CECPV Output Form Page 3 of 3

Example	12/09/2013 10:11:23 AM
Project Title	Date

This CECPV output form lists the PV features and specifications needed to comply with the current NSHP Guidebook requirements. The PV installation will require installer testing and certification and field verification by an approved HERS rater. The final NSHP incentive amount paid to the applicant is subject to change based on the NSHP incentive level in effect at the time the reservation application is approved by the Energy Commission and is subject to change based on the specifications and configuration of the installed solar energy system.

Homeowner or Builder/Developer or Applicant's Authorized Representative

Name: John Doe
Title/Firm: John's Builders
Address: 78 Fourth St
West Sacramento, CA 95691
Telephone: 916-123-4567
Lic. #: C012345

Documentation Author

Name: Jane Smith
Title/Firm: California Energy Commission
Address: 1516 Ninth St
Sacramento, CA 95814
Telephone: 800-555-7794



Compliance Statement (cont.)

- Applicant acknowledges that they may receive an incentive lower than the one in effect at the time they submitted their application.

- No additional approvals needed from applicant

Project Description: Single Family, Market Rate, Tier I EE, Dwelling Unit

For Current Incentive Level see: <https://www.newsolarhomes.org/WebPages/Public/RebateLevelView.aspx>

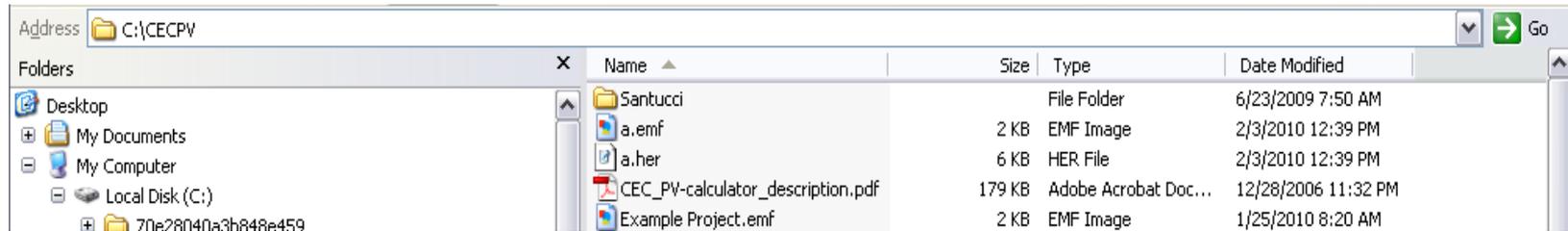
The incentive level reserved for a project will be determined at the time the reservation application is approved by the Energy Commission. Projects may be issued a reservation at a lower incentive level than the one in effect at the time the reservation application is submitted. The final incentive amount paid to the applicant is subject to change based on the specifications and configuration of the installed solar energy system. The table below provides the expected incentive amount for this project, based on the information provided, at each possible base incentive level in the current NSHP Guidebook. The base incentive levels noted in the table below may be changed in future NSHP Guidebook revisions.

Level	Base Incentive Level	NSHP Incentive per Site	Application Total NSHP Incentive
4	\$1.75/W	\$3,820	\$3,820
5	\$1.50/W	\$3,274	\$3,274
6	\$1.25/W	\$2,729	\$2,729
7	\$1.00/W	\$2,183	\$2,183
8	\$0.75/W	\$1,637	\$1,637
9	\$0.50/W	\$1,091	\$1,091
10	\$0.25/W	\$546	\$546



Where to find .emf and .her files

- After running the calculator, go to the C:\ directory and open the **CECPV** folder.



- The .emf and .her files will be found in this folder with the file names being the same as the application's project title.
- If the project title is re-used in a new calculator run, the existing files will be overwritten.
- Email or send these files to the NSHP program administrator with your signed CF-1R-PV so that this information can be uploaded to the HERS database.



Links

- Frequently Asked Questions

<http://www.gosolarcalifornia.org/builders/faqs.html>

- NSHP Calculator Examples

http://www.gosolarcalifornia.org/tools/nshpcalculator/calculator_examples_ver3.pdf

- NSHP Guidebook

<http://www.energy.ca.gov/renewables/06-NSHP-1/documents/index.html>

- Solmetric Suneye –Entering Shading Data into Calculator

<http://www.solmetric.com/newsletters.html>