NSHP Calculator
Versions 4.1 and 5.0 Training

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NSHP Training Seminar
February 7, 2014
Installing the NSHP Calculator

• Must have PC platform with MS Windows operating system
  (Windows 2000, XP, Vista, Windows 7)
• Need to have Microsoft Excel
• 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.
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 CEC PV Calculator that is listed as “certified” on the date the NSHP application is postmarked (or date of submission for electronic NSHP applications).

<table>
<thead>
<tr>
<th>Version Number</th>
<th>Release Date</th>
<th>Libraries</th>
<th>Decertified Date</th>
<th>Currently Certified</th>
<th>Code Compliant Tier $/Watt</th>
<th>Market Rate Tier I $/Watt</th>
<th>Market Rate Tier II $/Watt</th>
<th>Solar as a Standard</th>
<th>Affordable Housing Dwelling Unit $/Watt</th>
<th>Affordable Housing Common Area $/Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>v5.0</td>
<td>January 23, 2014</td>
<td>Mod5.0a/Inv5.0a</td>
<td>None Scheduled</td>
<td>Yes</td>
<td>$1.00/watt</td>
<td>$1.25/watt</td>
<td>$1.75/watt</td>
<td>N/A</td>
<td>$2.20/watt</td>
<td>N/A</td>
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<tr>
<td>v4.1</td>
<td>January 23, 2014</td>
<td>Mod4.1a/Inv4.1a</td>
<td>None Scheduled</td>
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<td>N/A</td>
<td>$1.25/watt</td>
<td>$1.50/watt</td>
<td>N/A</td>
<td>$2.20/watt</td>
<td>N/A</td>
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<tr>
<td>v4.0 Update 3</td>
<td>December 6, 2013</td>
<td>Mod4.0d/Inv4.0d</td>
<td>January 28, 2014</td>
<td>No</td>
<td>N/A</td>
<td>$1.25/watt</td>
<td>$1.50/watt</td>
<td>N/A</td>
<td>$2.20/watt</td>
<td>N/A</td>
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<tr>
<td>v4.0 Update 2</td>
<td>October 7, 2013</td>
<td>Mod4.0c/Inv4.0c</td>
<td>January 28, 2014</td>
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<td>$1.25/watt</td>
<td>$1.50/watt</td>
<td>N/A</td>
<td>$2.20/watt</td>
<td>N/A</td>
</tr>
</tbody>
</table>
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 4.1 Automated Installation

New  Version 4.1 Manual Installation
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:
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

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).
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 criteria 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

\[ D > 2H \]
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
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.
• 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.
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.

<table>
<thead>
<tr>
<th>Level</th>
<th>Base Incentive Level</th>
<th>NSHP Incentive per Site</th>
<th>Application Total NSHP Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$2.50kW</td>
<td>$4,482</td>
<td>$4,482</td>
</tr>
<tr>
<td>2</td>
<td>$2.25kW</td>
<td>$4,034</td>
<td>$4,034</td>
</tr>
<tr>
<td>3</td>
<td>$2.00kW</td>
<td>$3,586</td>
<td>$3,586</td>
</tr>
<tr>
<td>4</td>
<td>$1.75kW</td>
<td>$3,130</td>
<td>$3,130</td>
</tr>
<tr>
<td>5</td>
<td>$1.50kW</td>
<td>$2,688</td>
<td>$2,688</td>
</tr>
<tr>
<td>6</td>
<td>$1.25kW</td>
<td>$2,241</td>
<td>$2,241</td>
</tr>
<tr>
<td>7</td>
<td>$1.00kW</td>
<td>$1,793</td>
<td>$1,793</td>
</tr>
<tr>
<td>8</td>
<td>$0.75kW</td>
<td>$1,345</td>
<td>$1,345</td>
</tr>
<tr>
<td>9</td>
<td>$0.50kW</td>
<td>$898</td>
<td>$898</td>
</tr>
<tr>
<td>10</td>
<td>$0.25kW</td>
<td>$448</td>
<td>$448</td>
</tr>
</tbody>
</table>
Results Page – Current Incentive Level

- Highlighted row is the current incentive level.
- Incentive Level may be different for Market Rate and Affordable Housing.
The results page also displays all of the user inputs for the application.

<table>
<thead>
<tr>
<th>CEC PV Calculator - Inputs</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title:</td>
<td>1</td>
</tr>
<tr>
<td>Number of Sites with Solar:</td>
<td>No</td>
</tr>
<tr>
<td>Number of Inverters per Site with Identical Details:</td>
<td>Example Module</td>
</tr>
<tr>
<td>California Flexible Installation:</td>
<td>Building Integrated</td>
</tr>
<tr>
<td>PV Module:</td>
<td>One-Story</td>
</tr>
<tr>
<td>Standoff Height:</td>
<td>40</td>
</tr>
<tr>
<td>Mounting Height</td>
<td>1</td>
</tr>
<tr>
<td>Number of Series Modules in each String:</td>
<td>Fixed</td>
</tr>
<tr>
<td>Number of Parallel Strings per Inverter:</td>
<td>5:12</td>
</tr>
<tr>
<td>Tracking:</td>
<td>180</td>
</tr>
<tr>
<td>Roof Pitch:</td>
<td>SMA America</td>
</tr>
<tr>
<td>Azimuth:</td>
<td>SWR2500U (240V)</td>
</tr>
<tr>
<td>Inverter:</td>
<td>Arcata</td>
</tr>
<tr>
<td>City Used in Calculator Run:</td>
<td>Single Family, Market Rate, Tier 1, Dwelling Unit</td>
</tr>
<tr>
<td>Project Description:</td>
<td>Yes</td>
</tr>
<tr>
<td>Minimal Shading:</td>
<td></td>
</tr>
</tbody>
</table>
NSHP PV-1/CF-1R-PV Form

• 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

The CEC PV 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 CEC PV 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.

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.
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

<table>
<thead>
<tr>
<th>Level</th>
<th>Base Incentive Level</th>
<th>NSHP Incentive per Site</th>
<th>Application Total NSHP Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>$1.75 W</td>
<td>$3,820</td>
<td>$3,820</td>
</tr>
<tr>
<td>5</td>
<td>$1.80 W</td>
<td>$3,274</td>
<td>$3,274</td>
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<tr>
<td>6</td>
<td>$1.25 W</td>
<td>$2,729</td>
<td>$2,729</td>
</tr>
<tr>
<td>7</td>
<td>$1.00 W</td>
<td>$2,183</td>
<td>$2,183</td>
</tr>
<tr>
<td>8</td>
<td>$0.75 W</td>
<td>$1,637</td>
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<tr>
<td>9</td>
<td>$0.50 W</td>
<td>$1,091</td>
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</tr>
<tr>
<td>10</td>
<td>$0.25 W</td>
<td>$546</td>
<td>$546</td>
</tr>
</tbody>
</table>

Project Description: Single Family, Market Rate, Tier 1 EE, Dwelling Unit

For Current Incentive Level see: [https://www.newsolarhomes.org/WebPages_Public/RebatesLevelView.aspx](https://www.newsolarhomes.org/WebPages_Public/RebatesLevelView.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.
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

• NSHP Guidebook

• Solmetric Suneye –Entering Shading Data into Calculator
  http://www.solmetric.com/newsletters.html

• Other Questions?
  Send an email to: renewables@energy.ca.gov