NEW SOLAR HOMES PARTNERSHIP GUIDEBOOK

Fourth Edition

CALIFORNIA
ENERGY COMMISSION

Edmund G. Brown, Jr., Governor

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These guidelines were formally adopted by the California Energy Commission on December 13, 2006, pursuant to Public Resources Code Sections 25744, 25747, and 25780 through 25784, and subsequently revised pursuant to this authority on July 11, 2007, August 21, 2008, January 27, 2010, April 7, 2010, and January 12, 2012.

ABSTRACT

The New Solar Homes Partnership (NSHP) Program is part of a statewide solar program known as the California Solar Initiative (CSI). The NSHP provides financial incentives for installing solar energy systems on new residential buildings. Incentives from the NSHP are intended to help create a self-sustaining market for solar homes that incorporate high levels of energy efficiency and high performing solar energy systems. The buildings must achieve energy efficiency levels greater than the requirements of the Building Energy Efficiency Standards, Title 24, Part 6. The final incentive amount will be determined by the expected performance of the system.

This Guidebook details the eligibility requirements, rules, and process for reserving and claiming an incentive under the NSHP.

Keywords: New Solar Homes Partnership, NSHP, Energy Commission, PV, solar energy system, energy efficiency, standards, Title 24 Part 6, tier, incentive, CECPV Calculator, HERS Rater, field verification, Program Administrator, shading, module, inverter, plan check

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What's New in This Guidebook?

Below are the major changes in this edition of the New Solar Homes Partnership Guidebook as compared with the April 2010 3rd edition of the NSHP Guidebook:

Market Rate Housing

- Modifies the Solar As An Option incentive by removing the "Solar As An Option Approval Form" (NSHP-1.5) requirement.

- Requires projects applying for the Solar As Standard incentive to submit a build-out schedule with the reservation application.

- Requires projects approved for the Solar As Standard incentive to submit to the Program Administrator an update on the project's construction and system installation progress 18 months after the reservation approval. This will be used to evaluate the progress of the project. Depending upon the progress of the project, the project's funding reservation may be reduced or cancelled.

Affordable Housing

- Affordable housing with final building permit signoff or occupancy permits less than two years old are not eligible to apply for NSHP incentives.

Energy Efficiency

- The Field Inspection Energy Checklist (CF-4R-EE NSHP) form must be completed by a Home Energy Rating System (HERS) Rater and uploaded to a HERS Provider data registry to show that the installation of energy efficiency measures have been verified.

- Each building where a portion of the electric load is offset by a solar energy system shall meet the NSHP energy efficiency requirements. If the solar energy system offsets the electrical load in a building that has no conditioned space, then at least one residential building associated with that project must meet the NSHP energy efficiency requirements.

- Solar energy systems installed on residential buildings shall be eligible for NSHP only when the energy efficiency requirements are met by using the whole building compliance approach as defined in the Building Energy Efficiency Standards, Title 24, Part 6. Using the addition alone approach or the existing+addition+alteration approach is not acceptable.

- Common area spaces attached to a residential building can no longer be separated from the rest of the building and used to show compliance with NSHP energy efficiency requirements. The whole building must now meet the NSHP energy efficiency requirements to be eligible for solar incentives.

- Common area spaces that are detached from a residential building in a multifamily development must meet the NSHP energy efficiency requirements. In addition, at least one residential building associated with that common area must also meet the NSHP energy efficiency requirements.

General Program Changes

- Recognizes virtual net metering for multifamily housing as acceptable to apply for NSHP incentives.

- Increases in system size for approved reservations will be funded at the incentive level in effect at the time the change request, with supporting documentation, is submitted to the NSHP Program Administrator and deemed complete.

- Funding for Solar as an Option projects will be reserved assuming a 3 Kilowatt (kW) AC system size at the Tier I or Tier II incentive level in effect at the time of reservation.

- Modifies the incentive levels and decline schedule for market rate housing and affordable housing. Market rate housing incentives will be based on the achieved energy efficiency level of the project, beginning at the following levels:
    - The rebate level for Tier I projects will begin at $2.00/watt.

    - The rebate level for Tier II projects will begin at $2.25/watt.

- Affordable housing common areas will no longer qualify for the affordable housing incentive levels and will be subject to the market rate housing incentive level decline schedule. The rebate level for affordable housing residential unit projects will begin at $2.90/watt.

- A 30 day notice will not be provided prior to a decline in the incentive level. Applicants may view the current incentive level, and the MW capacity approved and under review at [https://www.newsolarhomes.org/RebateLevels.aspx].

- The incentive for affordable housing projects will be limited to 75% of the total system cost. The incentive for all other projects will be limited to 50% of the total system cost. For projects subject to the 7.5 kW AC system size cap, the incentive will be equal to the lesser of the system size cap or total system cost cap. NSHP Program Administrators may request documentation to verify system costs.

- Clarifies the definition of a building's permanent foundation for purposes of funding eligibility.

- Clarifies the definition of transient housing for purposes of funding eligibility.

- A HERS Rater must be identified for verification of the installation of both the energy efficiency measures and solar energy system when submitting the NSHP-1 Reservation Form.

- Revises NSHP application forms.

- Applicants must use the same HERS Provider for both the Energy Efficiency and PV field verifications.

- The Energy Commission may suspend the NSHP and/or establish a waiting list once program funding is exhausted.

- The authorized representative, as designated on the NSHP-1 Reservation Form, may sign all Expected Performance Based Incentive (EPBI) documentation for the project on behalf of the applicant.

- Clarifies the process for selecting a new retailer/installer for a reservation.

- Clarifies the process for cancelling a reservation.

Chapter I: Introduction

The New Solar Homes Partnership (NSHP) provides financial incentives and other support for installing eligible solar energy systems on new residential buildings[1] that receive electricity from specified investor-owned utilities.[2] The California Energy Commission implements the NSHP in coordination with the California Public Utilities Commission (CPUC) as part of the overall California Solar Initiative. This Guidebook describes the requirements to receive incentives for constructing energy efficient, solar homes under the NSHP.

A. Purpose

The goal of the NSHP is to create a self-sustaining market for solar homes where builders incorporate high levels of energy efficiency and high-performing solar energy systems. The NSHP provides financial incentives and non-financial assistance in the form of builder and market support to accomplish this goal.

B. Program Overview

The NSHP is part of a comprehensive statewide solar program known as the California Solar Initiative (CSI). Senate Bill 1 (SB 1)[3] establishes three goals of the CSI: 1) to install 3,000 megawatts (MW) of distributed solar electric capacity in California by the end of 2016; 2) to establish a self-sufficient solar industry in which solar energy systems are a viable mainstream option in 10 years, and 3) to place solar energy systems on 50 percent of new homes in 13 years. The NSHP seeks to achieve 400 MW of installed solar electric capacity in California by the end of 2016.

The Energy Commission and the CPUC each administer separate, but coordinated elements of the CSI.

The NSHP is administered by the investor-owned utilities, (IOUs), Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E), for their respective service areas. These entities administer the NSHP on the Energy Commission's behalf in accordance with their respective agreements with the Energy Commission. The Energy Commission provides oversight of the program and program administration for eligible customers of Bear Valley Electric Service (BVES).

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1 See Chapter II, Program Eligibility Requirements, for the definition of new residential buildings.
2 Eligible electric utilities are Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, and Golden State Water Company (doing business as Bear Valley Electric Service).
3 SB 1 (Murray), Chapter 132, Statutes of 2006, § 4, as codified in Public Resources Code sections 25780 – 25784.

The NSHP program provides two incentive structures, one for conventional or market rate housing, affordable housing common area projects, and another for qualified affordable housing residential projects. For market rate housing and affordable housing common area projects, the incentive rate is determined by the energy efficiency level of the residential building. The NSHP offers a higher incentive to affordable housing residential projects, because the affordable housing industry often faces more difficulties in the financing and incorporation of solar energy systems in its developments than do conventional housing developments.[4]

To qualify for an incentive, both the residential building and the installed solar energy system must meet specific program requirements included in this Guidebook.

The residential buildings must achieve energy efficiency levels substantially greater than the requirements of the current Building Energy Efficiency Standards, Title 24, Part 6. Energy efficiency requirements may be satisfied through either Tier I or Tier II level energy efficiency measures. Please see Chapter II, Section B for additional information.

The Energy Commission places great importance on ensuring that residential buildings, which qualify for an incentive under the NSHP, are as energy-efficient as possible. The Tier I level is a minimum condition of participation in the NSHP, and consistent with the energy efficiency savings needed to qualify for incentives from current residential new construction energy efficiency programs offered by the IOUs. The Tier II level is expected to achieve an immediate positive cash flow for homeowners and encourages builders to move toward constructing net zero energy residential buildings,[5] reflecting what is regularly being accomplished in California by builders that are participating in the national *Building America* program. For both tiers, incentives to builders for delivering the required energy efficiency levels are expected to be made available through coordinated utility energy efficiency programs overseen by the CPUC, such as the residential new construction programs.

Applicants are strongly encouraged to participate in their utilities new construction energy efficiency program to obtain the financial incentives that may be available for meeting either Tier I or Tier II energy efficiency requirements and to streamline the NSHP energy efficiency verification process. See Chapter II, Section C for additional information.

The expected performance of the solar energy system (anticipated annual electrical generation), which depends on specific key factors regarding equipment efficiency and the design and installation of the system, will determine the incentive amount. The incentive is paid once the system is installed and operational, and has met all program requirements.

Along with the financial incentive, the NSHP will provide non-financial support services, offering marketing and technical assistance to builders, as well as training to building officials

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4 These higher incentives are provided consistent with Public Resources Code section 25401.6.

5 The U.S. Department of Energy (DOE) Building Technologies Program defines a net zero energy building as "a residential or commercial building with greatly reduced needs for energy through efficiency gains, with the balance of energy needs supplied by renewable technologies." Source: NREL – NAHB Research Center, February 2006.

and salespeople. The Energy Commission may provide greater assistance for builders choosing to build to Tier II energy efficiency levels. The Energy Commission's goal is to assist the building and solar industries to the maximum extent feasible to construct and sell new energy-efficient, solar residential buildings.

By participating in the NSHP, applicants authorize the Energy Commission and/or the Program Administrators[6] during the term of the NSHP to obtain information from the utility serving the project to verify compliance with program requirements, including requirements for system interconnection to the utility grid. In addition, the applicant must provide to the Energy Commission new homeowner contact information when requested by the Energy Commission and/or the Program Administrators.

The NSHP may be periodically evaluated and modified to ensure progress towards program goals. The evaluation may include: comparing the expected energy generation of systems to the actual output over time; determining the cost-benefit profile of systems; and/or, assessing overall program progress towards meeting installed capacity targets. In addition, an evaluation could include investigating risks to long-term achievement of expected performance levels, such as the effects of unforeseen shading or poor system maintenance, and identifying potential actions that would reduce those risks. Lastly, the NSHP may be modified in the future to address the eligibility of solar thermal electric systems, which are potentially eligible for funding under the CSI (SB 1) pursuant to Senate Bill 107[7] and Senate Bill 1250.[8]

Funding for the NSHP is provided through the Energy Commission's Renewables Resources Trust Fund pursuant to Senate Bill 107, which authorizes the allocation and use of funding available for emerging renewable technologies pursuant to Public Resources Code sections 25744 and 25751 to fund photovoltaic and solar thermal electric systems in accordance with the eligibility requirements established under SB 1. Because of this, the NSHP is considered an element within the Energy Commission's Renewable Energy Program umbrella and is subject to the general administrative requirements in the Energy Commission's *Overall Program Guidebook* for the Renewable Energy Program *(Overall Program Guidebook)*.

The *Overall Program Guidebook* describes how the Renewable Energy Program is administered. It includes information and requirements that apply overall to the Renewable Energy Program and the program elements, including information dealing with appeals, record retention, audits, and enforcement actions. To qualify for funding under the NSHP, applicants must satisfy the requirements specified in this *NSHP Guidebook* and the *Overall Program Guidebook.* The energy efficiency requisites in NSHP are subject to the requirements of the Building Energy Efficiency Standards (Title 24, Part 6). **Applicants are strongly encouraged to read and understand their responsibilities under these documents .**

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6 The term "Program Administrators" refers to PG&E, SCE, and SGD&E, for their respective service territories.

7 SB 107 (Simitian), Chapter 464, Statutes of 2006, § 7, as codified in Public Resources Code section 25744.5.

8 SB 1250 (Perata), Chapter 512, Statutes of 2006, § 11, as codified in Public Resources Code section 25744, subd. (d).

C. Summary of New Solar Homes Partnership Guidebook Requirements

The following table is a brief summary of program eligibility requirements. The applicant should refer to Chapter II for more detailed descriptions of the requirements.

Table 1-1: Summary of Program Eligibility Requirements

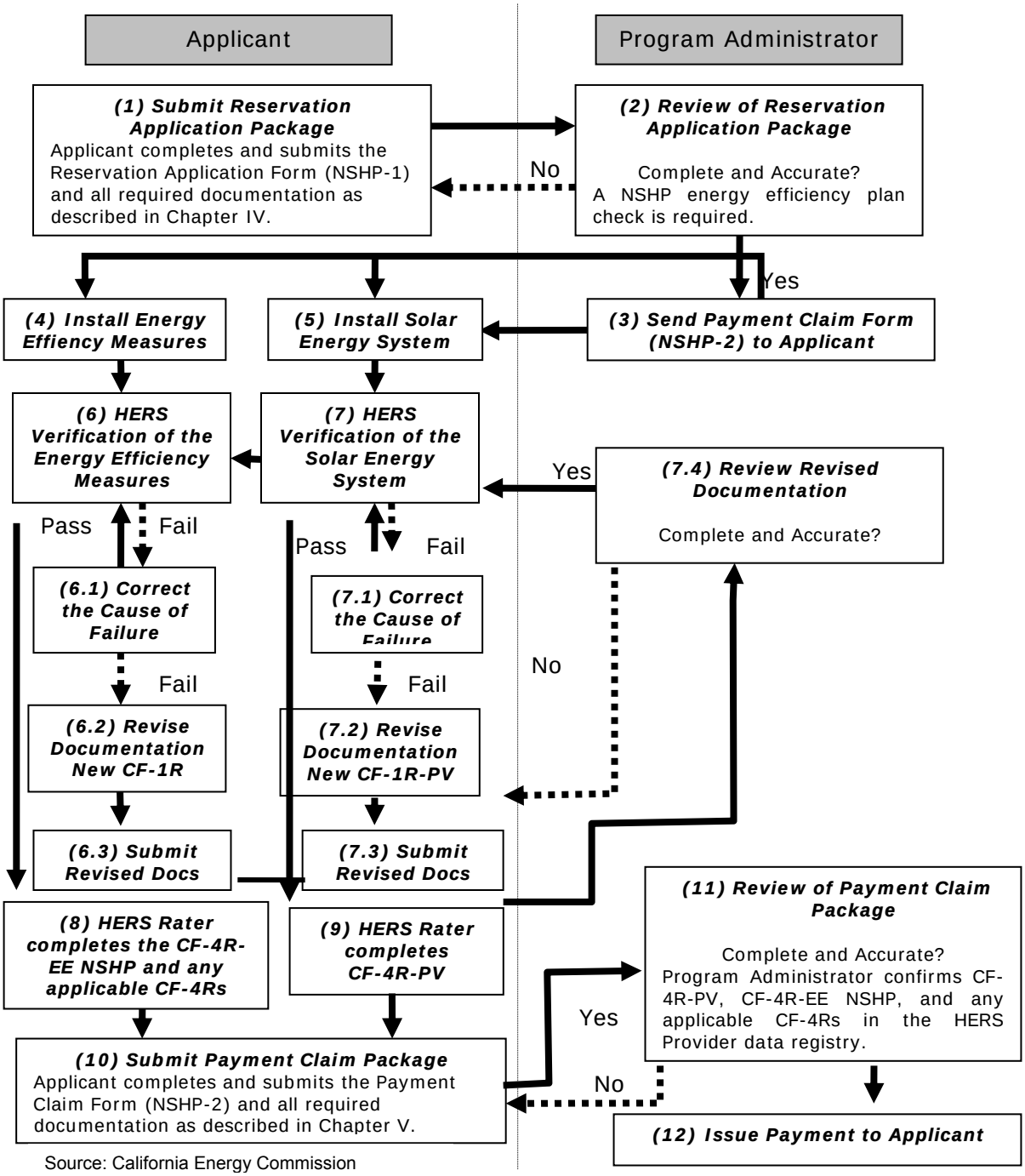
Program Element	NSHP Requirement
Eligible technologies	Flat plate photovoltaics only
Eligible electric service territories	PG&E, SCE, SDG&E, and BVES
Eligible housing types	New residential construction, including total building renovations, common areas of housing developments, and qualifying mixed-use projects.
Eligible equipment	New and not previously placed in service, and on the Energy Commission's eligible equipment website.
Reservation period	36 months for qualifying Solar as Standard and Solar as an Option developments and affordable housing projects. 18 months for all other projects.
Initial Incentive level	Expected Performance-Based Incentive (EPBI) based on the reference system receiving $2.90/watt for affordable housing dwelling units, $2.00/watt for projects meeting Tier I energy efficiency requirements, or $2.25/watt for projects meeting Tier II energy efficiency requirements. Additional funding may be available from the utilities for meeting Tier I and Tier II energy efficiency requirements.
Incentive level adjustment	Volumetric trigger. Declines as pre-specified target MW volumes are reached.
Incentive adjustments	Depends on geographic location, orientation, tilt, shading, and equipment efficiency.
Energy efficiency requirements	Tier I: Exceeds the Building Energy Efficiency Standards (Title 24, Part 6) in effect on the date the building permit is applied for by at least 15%. Tier II: Exceeds the Building Energy Efficiency Standards in effect on the date the building permit is applied for by at least 30%. ENERGY STAR® label for appliances provided by the builder for both Tier I and Tier II projects, if applicable.
Energy Efficiency Measures Installation Field Verification	Energy efficiency measures used to meet the NSHP energy efficiency requirements shall be field verified by a certified HERS Rater. Verification of some energy efficiency measures may be required to be completed as early in the construction process as the foundation or rough-in construction work.
Solar Energy System Installation Field Verification	Solar energy system installation, equipment and performance shall be verified by the installing contractor and a certified HERS Rater.
Checkpoints	Solar as an Option projects only.
Interconnection	Grid connected with eligible utility required.

Source: California Energy Commission

D. Flow Charts of the NSHP Application and Payment Process

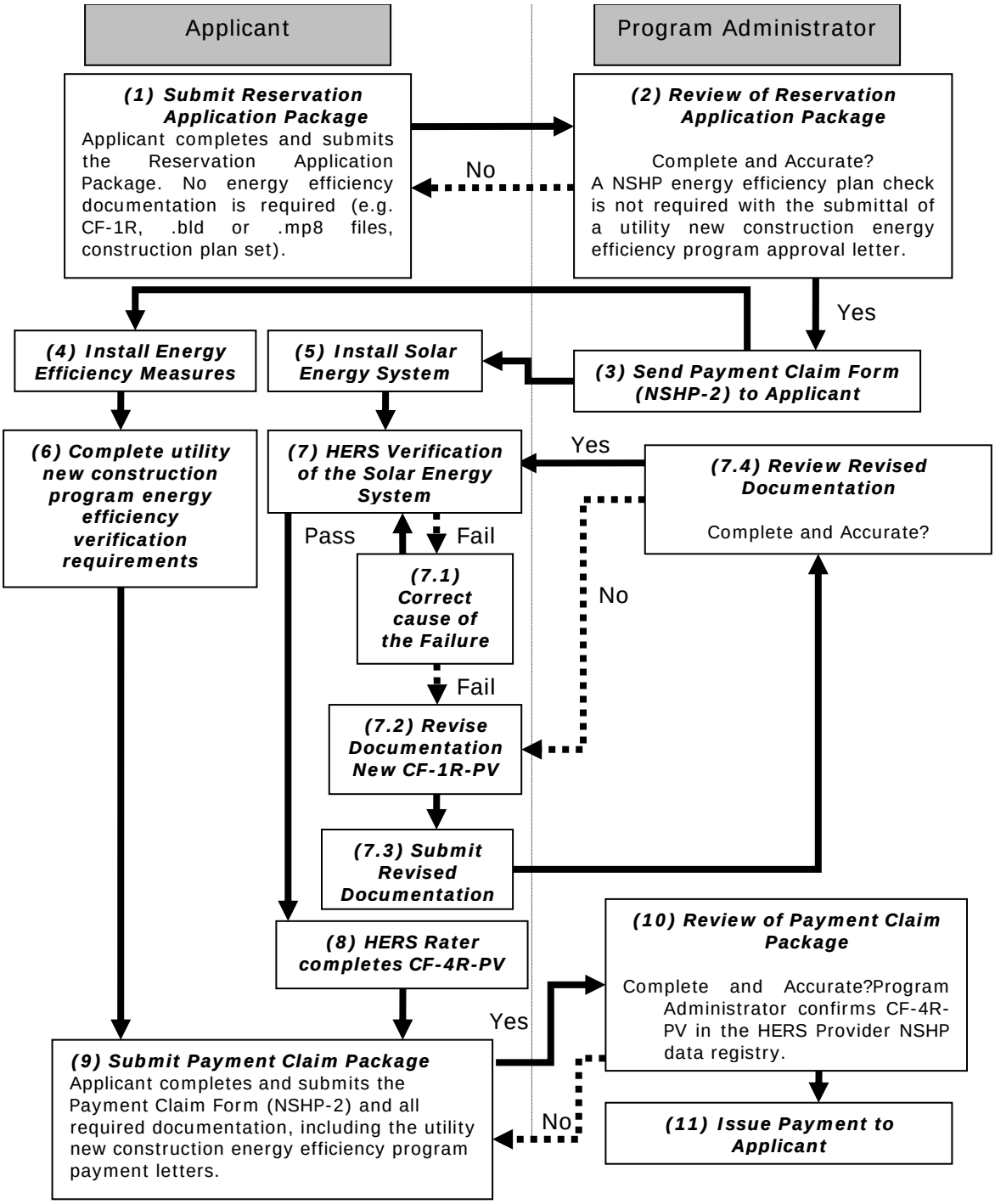
The following flow charts provides a summary of the application and payment processing of the NSHP program. Figure 1-1 shows the process for projects with the NSHP energy efficiency plan check and Figure 1-2 shows the process for projects participating in their utilities new construction energy efficiency program.

Figure 1-1:
Application Process Flow Chart for Projects with the NSHP Energy Efficiency Plan Check



Source: California Energy Commission

Figure 1-2:
Alternate Application Process Flow Chart for NSHP Projects Participating in a Utility New Construction Program



Source: California Energy Commission

E. Renewable Energy Credits/Certificates

When electricity is generated using an eligible renewable energy resource, two commodities are created. The first commodity is the electricity, and the second is the renewable energy credits (also referred to as renewable energy certificates, or RECs) representing the non-energy, environmental attributes associated with the electricity. For purposes of the state's Renewables Portfolio Standard, a renewable energy credit is defined to include "…all renewable and environmental attributes associated with the production of electricity from the eligible renewable energy resource..."[9]

The Energy Commission recognizes that owners of solar energy systems, including those participating in the NSHP, may assert claims concerning renewable energy credits attributed to their solar energy systems. However, the Energy Commission has established no rules or policies governing the creation, ownership, or disposition of any such renewable energy credits. The Energy Commission does not require participants of the NSHP to relinquish their claims of renewable energy credits, or to transfer ownership of any such credits to the Energy Commission or any other entity, as a condition of receiving NSHP funding.

F. Applicability of Guidebook Changes to Existing Applications

1. The rules below explain the applicability of this fourth edition of the *NSHP Guidebook* to existing applications. For purposes of this section, "adoption date" means the date the Energy Commission adopts this edition of the Guidebook, and an "approved application" means one that the Commission approved prior to the adoption date. An approved application that has not received an approved payment claim will continue to be governed by the previous edition of the Guidebook except as follows:
    a) Multifamily projects are eligible to use Virtual Net Metering, as long as they comply with the requirements in Chapter II, Section B.
    b) Solar as Standard projects must submit to the Program Administrator an update on the project's construction and system installation progress 18 months after the reservation approval. A build-out schedule must also be submitted if it was not previously provided with the reservation application.
    c) Solar as an Option projects do not have to submit the "Solar as an Option Approval Form" (NSHP-1.5).
    d) Applicants that increase the size of their reserved system may qualify for funding for the net increase in the expected performance of the system based on the incentive level in effect at the time the change request, with supporting documentation, is submitted to the Program Administrator, and deemed complete. This request is subject to all funding caps and the availability of funding at the time of request.
2. Approved applications that have been paid or that have approved payment claims are not eligible for additional compensation or to re-apply for additional compensation.

9 Refer to definition in the *Overall Program Guidebook, January 2011 edition*, page 28.

3. An applicant who submitted an application prior to the adoption date of this fourth edition of the Guidebook and did not receive approval of the application by the adoption date may opt to follow either the previous Guidebook edition or this fourth edition. The applicant must provide written or e-mail notice to be subject to this fourth edition of this Guidebook. If no notice is received by the Program Administrators or the Commission prior to the reservation approval of the application by the Program Administrator, the application will be governed by the previous edition of the Guidebook.
4. All applications submitted on or after the adoption date will be governed by this fourth edition of the Guidebook.

Chapter II: Program Eligibility Requirements

This chapter covers the eligibility requirements necessary to receive incentives. Applicants may be either building owners or builders/developers. Eligible solar energy systems are limited to systems that use flat plate photovoltaic technology installed on new residential buildings that have achieved an Energy Commission-specified level of energy efficiency beyond that required by the Building Energy Efficiency Standards.

Qualifying solar energy systems must service newly-constructed residential buildings that are single-family homes, duplexes, triplexes, condominiums, and other multifamily buildings, including both market rate and affordable housing projects. Mixed-use[10] buildings with both residential and non-residential occupancies may also qualify for funding provided that they meet the energy efficiency requirements described in Chapter II, Section B. Solar energy systems serving the common areas of new residential and mixed-use buildings or developments are also eligible for incentives as long as the common areas are for the primary benefit of the residential occupants. A common area that is part of a mixed-use building or development must be shown to be for the primary benefit of the residential occupants to be eligible. Solar energy systems installed on additions or alterations to existing buildings do not qualify for NSHP incentives unless the entire building complies with the NSHP energy efficiency requirements described in Chapter II, Section B.

NSHP incentives will not be provided to any solar energy system serving electrical loads in the non-residential portions of a development, except in cases of mixed-use buildings or the common areas of residential developments that meet the requirements of Chapter II, Section B. NSHP incentives will not be provided to any solar energy systems installed on transient residences (e.g. motels, hotels). (See Chapter II, Section E for additional information on transient residences.)

To be eligible for NSHP incentives, a solar energy system must be installed in conjunction with the construction of a new residential building that is permanently fixed to its foundation. In addition, the building permit for the solar energy system should be approved by the building code enforcement agency prior to the original occupancy of the newly constructed building, but no later than 180 days after the issuance of the occupancy permit, with original occupancy occurring on or after January 1, 2007.

A. Technology and System Ownership

Flat plate photovoltaic technology is the only technology eligible to receive NSHP incentives. Eligible solar energy systems shall be 1.00 kW AC (alternating current) or larger in size, measured after the inverter. The solar energy system must be located on the same site where the end-use customer's own electricity demand is located. It is the intent of the program that

10 A mixed-use building has both residential and nonresidential occupancies (e.g. first floor retail, upper floors multifamily residential).

eligible systems remain interconnected to the utility distribution grid and be operated at the original location for at least the 10-year warranty period. If the system is removed from the building on which it was originally installed within the 10-year warranty period, the Energy Commission may request repayment of all or a portion of the NSHP funding provided for that system.

Solar energy systems that are leased by the end-use customer or that supply electricity to the end-use customer through a power purchase agreement (PPA) may qualify for NSHP funding, provided the applicant and system satisfy the additional requirements in Chapter II, Section O.

B. NSHP Energy Efficiency Requirements

To be eligible for NSHP incentives, buildings are required to meet one of two tiers of energy efficiency by exceeding the energy efficiency requirements of the edition of Title 24, Part 6, in effect[11] on the date the building permit is applied for[12]. Table 2-1 and Table 2-2 show the Tier I and Tier II efficiency requirements for different eligible building types.

Each building where a portion of the electrical load is served by the solar energy system shall meet the energy efficiency requirements. Energy efficiency compliance shall be demonstrated for a building as a whole and cannot combine unrelated or detached buildings.

11 The 2008 Building Energy Efficiency Standards (Title 24, Part 6) became effective on January 1, 2010.
12 The NSHP energy efficiency requirements are based on Title 24, Part 6, and not any local ordinance requiring energy efficiency exceeding Title 24, Part 6.

Table 2-1: NSHP Energy Efficiency Requirements for Eligible Building Types, Excluding Mixed-Use Buildings

Building Type	Tier I Energy Efficiency Requirements[13]	Tier II Energy Efficiency Requirements (2008 Title 24, Part 6)[13,14]
Low-Rise Residential[15]	Total compliance margin of at least 15 percent better than standard as indicated on the Certificate of Compliance (CF-1R).	Total compliance margin of at least 30 percent better than standard as indicated on the CF-1R AND space cooling compliance margin of at least 30 percent better than standard.
High-Rise Residential[16]	Compliance margin, excluding receptacle, process[17], process lighting energy, of at least 15 percent better than standard as indicated on the Performance Certificate of Compliance (PERF-1).	Compliance Margin, excluding receptacle, process, process lighting, of at least 30 percent better than standard as indicated on the PERF-1 AND space cooling compliance margin of at least 30 percent better than standard.
Detached non-residential building that is solely for the use and benefit of the residential occupants.[18]	Compliance margin, excluding receptacle, process, process lighting, of at least 15 percent better than standard as indicated on the PERF-1.	Compliance margin, excluding receptacle, process, process lighting, of at least 30 percent better than standard as indicated on the PERF-1.

Source: California Energy Commission

13 The entire building must meet the energy efficiency requirements. Each appliance provided by the builder must be ENERGY STAR labeled if ENERGY STAR is applicable to that appliance. This applies to Tier I and Tier II projects.

14 For the 2005 Title 24, Part 6, Tier II energy efficiency requirements were total compliance margin of at least 35 percent better than standard AND space cooling compliance margin of at least 40 percent better than standard.

15 A building, other than a hotel/motel that is of Occupancy Group R, Division 1, and is multifamily with three stories or less, or a single-family residence of Occupancy Group R, Division 3, or an Occupancy Group U building located on a residential site. Refer to Title 24, Part 2, for building occupancy groups.

16 A building, other than a hotel/motel, of Occupancy Group R, Division 1 with four or more habitable stories. High-rise residential buildings are subject to the provisions of Title 24, Part 6, for nonresidential buildings. Refer to Title 24, Part 2, for building occupancy groups.

17 Process is an activity or treatment that is not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Refer to the *2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings* for additional information.

18 Additional energy efficiency requirements: For multifamily developments, at least one residential building must meet the energy efficiency requirements. For single-family residential developments (subdivisions), all homes in the residential development must meet the energy efficiency requirements.

Table 2-2: NSHP Energy Efficiency Requirements for Eligible Mixed-Use Buildings

Building Type	Tier I Energy Efficiency Requirements	Tier II Energy Efficiency Requirements (2008 Title 24, Part 6)[13,14]
Low-rise mixed-use where the CFA[19] of the nonresidential occupancy comprises no more than 20 percent of the CFA of the building [20]	Total compliance margin of at least 15 percent better than standard as indicated on the CF-1R.	Total compliance margin of at least 30 percent better than standard as indicated on the CF-1R AND space cooling compliance margin of at least 30 percent better than standard.
Low-rise mixed-use where the CFA of the nonresidential occupancy comprises more than 20 percent of the CFA of the building [21]	Residential Occupancy: Total compliance margin of at least 15 percent better than standard as indicated on the CF-1R. AND Nonresidential Occupancy: Compliance margin, excluding receptacle, process, process lighting, of at least 15 percent better than standard as indicated on the PERF-1.	Residential Occupancy: Total compliance margin of at least 30 percent better than standard as indicated on the CF-1R AND space cooling compliance margin of at least 30 percent better than standard. AND Nonresidential Occupancy: Compliance margin, excluding receptacle, process, process lighting, of at least 30 percent better than standard as indicated on the PERF-1.
High-rise mixed-use where the CFA of the nonresidential occupancy comprises no more than 20 percent of the CFA of the building[22]	Compliance margin, excluding receptacle, process, process lighting, of at least 15 percent better than standard as indicated on the PERF-1.	Compliance Margin, excluding receptacle, process, process lighting, of at least 30 percent better than standard as indicated on the PERF-1 AND space cooling compliance margin of at least 30 percent better than standard.

19 Conditioned floor area (CFA) is the floor area (in square feet) of enclosed conditioned space on all floors of a building, as measured at the floor level of the exterior surfaces of exterior walls enclosing the conditioned space.
20 A solar energy system serving electrical loads in the entire mixed-use building shall be eligible for NSHP. The entire building is subject to the provisions of Title 24, Part 6, for low-rise residential buildings.
21 Only the portion of a solar energy system serving electrical loads in the low-rise residential occupancy shall be eligible for NSHP. Each occupancy shall meet the provisions of Title 24, Part 6, applicable to that occupancy.
22 A solar energy system serving electrical loads in the entire mixed-use building shall be eligible for NSHP. The entire building is subject to the provisions of Title 24, Part 6 for high-rise residential buildings.

High-rise mixed-use where the CFA of the nonresidential occupancy comprises more than 20 percent of the CFA of the building[23]	High-rise residential Occupancy: Compliance margin, excluding receptacle, process, process lighting, of at least 15 percent better than standard as indicated on the PERF-1 AND Nonresidential Occupancy: Compliance margin, excluding receptacle, process, process lighting, of at least 15 percent better than standard as indicated on the PERF-1.	High-rise residential Occupancy: Compliance margin, excluding receptacle, process, process lighting, of at least 30 percent better than standard as indicated on the PERF-1 AND space cooling compliance margin of at least 30 percent better than standard AND Nonresidential Occupancy: Compliance margin, excluding receptacle, process, process lighting, of at least 30 percent better than standard as indicated on the PERF-1.

Source: California Energy Commission

Compliance with the NSHP energy efficiency requirements shall be determined using the performance compliance approach utilizing software approved by the Energy Commission. A Certificate of Compliance (CF-1R) or Performance Certificate of Compliance (PERF-1) must be submitted. The compliance documentation must be signed by a Certified Energy Plans Examiner (CEPE) or a Certified Energy Analyst (CEA) who is approved by the California Association of Building Energy Consultants (CABEC). CABEC requires CEPEs and CEAs to have separate certifications for residential and nonresidential standards as well as separate certifications for each of the different editions of Title 24, Part 6. At the time the compliance documentation is signed, the CEPE or CEA must have a valid CABEC certification for the building type (residential or nonresidential), and for the edition of Title 24, Part 6 in effect on the date the building permit is applied for. The CEPE or CEA can help determine which energy efficiency measures are needed to meet NSHP energy efficiency requirements, and prepare the necessary documentation that must be submitted as part of the NSHP application. For a list of CEPEs and CEAs, visit the CABEC website at: [www.cabec.org/].

A NSHP application must identify a Home Energy Rating System (HERS) Rater for both the energy efficiency measures and for the solar energy system. Applicants may select a different HERS Rater for the verification of energy efficiency measures and the solar energy system, but the documentation must be submitted to the same HERS Provider. A HERS Rater will verify the installation of both the energy efficiency measures and the solar energy system for compliance with NSHP requirements. There may be energy efficiency inspections that need to take place early in the construction process; therefore, it is critical that there be good communication

23 Only the portion of a solar energy system serving electrical loads in the high-rise residential occupancy shall be eligible for NSHP. Each occupancy shall meet the provisions of Title 24, Part 6, applicable to that occupancy.

between the NSHP applicant, builder, solar installer, and HERS Rater to coordinate when during the construction process a HERS verification is needed.

Solar energy systems installed on additions or alterations to existing buildings do not qualify for NSHP incentives except in the case of residential buildings where the energy efficiency requirements are met for the entire structure by utilizing the whole building compliance approach[24]. Meeting the energy efficiency requirements by using the addition alone compliance approach or the existing+addition+alteration compliance approach will not be accepted. Refer to Chapter 8 of the 2008 Title 24, Part 6, Residential Compliance Manual[25].
NSHP incentives will not be provided to any solar energy system serving electrical loads in the nonresidential portions of a development, except in cases of mixed-use buildings or the common areas[26] of single-family residential developments (subdivisions) or multifamily developments. Solar energy systems serving electrical loads only in the common areas of multifamily developments are eligible for NSHP incentives if the entire multifamily residential building associated with the common area meets the energy efficiency requirements. Solar energy systems serving electrical loads only in the common areas of a single-family residential development (subdivision) are eligible for NSHP incentives if all homes in the residential development meet the energy efficiency requirements. Any additional buildings where electrical loads are served by the solar energy system must also meet the energy efficiency requirements. If the solar energy system does not serve any electrical loads in a building or serves electrical loads in a building that does not have any conditioned space[27], then for multifamily developments at least one residential building must meet the energy efficiency requirements and for single-family residential developments (subdivisions) all homes in the residential development must meet the energy efficiency requirements.

When there is a new edition of Title 24, Part 6, buildings for which a building permit has been applied for prior to the effective date of the new edition shall meet the NSHP energy efficiency

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24 The whole building approach is defined in Section 8.7.1 of the *2008 Building Energy Efficiency Standards Residential Compliance Manual*, http://www.energy.ca.gov/2008publications/CEC-400-2008-016/CEC-400-2008-016-CMF-REV1.PDF
25 www.energy.ca.gov/title24/2008standards/residential_manual.html
26 Common areas are defined as those non-dwelling portions of a building that are intended for the primary benefit of the residential occupants of the building. Examples include, but are not limited to: hallways, laundry rooms, recreation rooms, manager unit, and tenant parking.
27 Conditioned space may be directly conditioned or indirectly conditioned. Directly conditioned space is an enclosed space that is provided with wood heating, is provided with mechanical heating that has a heating capacity exceeding 10 Btu/hr-ft^2, or is provided with mechanical cooling that has a cooling capacity exceeding 5 Btu/hr-ft^2, unless the space-conditioning system is designed for a process space. Indirectly conditioned space is enclosed space, including, but not limited to, an unconditioned volume in atria of a building, that (1) is not directly conditioned space; and (2) either (a) has a thermal transmittance area product (UA) to directly conditioned space exceeding that to the outdoors or to unconditioned space, and does not have fixed vents or openings to the outdoors or to unconditioned space, or (b) is a space through which air from directly conditioned spaces is transferred at a rate exceeding three air changes per hour. See the 2008 Building Energy Efficiency Standards. (www.energy.ca.gov/2008publications/CEC-400-2008-001/CEC-400-2008-001-CMF.PDF)

requirements based on the prior edition of Tilte 24, Part 6; buildings for which a building permit has been applied for on or after the effective date of the new edition of Title 24, Part 6, shall meet the NSHP energy efficiency requirements based on the new edition of Title 24, Part 6. For all NSHP applications, including those submitted, under review, and approved, any buildings associated with a solar energy system which does not have an approved payment claim prior to the effective date of the new edition, shall meet the NSHP energy efficiency requirements based on the new edition of Title 24, Part 6. Buildings, which must meet the NSHP energy efficiency requirements based on the new edition of Title 24, Part 6, shall be subject to a new NSHP energy efficiency plan check.

EXCEPTION: If the NSHP applicant provides a building permit for the buildings associated with the solar energy system, or other documentation from the authority having jurisdiction, indicating that the building permit was applied for prior to the effective date of the new edition of Title 24, Part 6, the NSHP energy efficiency requirements shall be met based on the prior edition of Title 24, Part 6.

Questions on energy efficiency requirements should be directed to the Energy Standards Hotline at title24@energy.state.ca.us or 1-800-772-3300. Additional information can be found on the Building Energy Efficiency Standards webpage at www.energy.ca.gov/title24/2008standards/index.html.

Energy Efficiency Documentation Submittal Process

Applicants are strongly encouraged to participate in their utilities new construction energy efficiency program to obtain the financial incentives that may be available for meeting either Tier I or Tier II energy efficiency requirements and to streamline the NSHP energy efficiency verification process. See Chapter II, Section C for additional information.

Energy Efficiency Documentation Requirements During Reservation Phase

1. The applicant selects a CEPE or CEA to prepare the Title 24, Part 6, documentation. The applicant identifies a HERS Rater for both the energy efficiency measures and the solar energy system, and identifies the HERS Provider that has certified the HERS Rater. Applicants do not have to select the same HERS Rater for verification of both the energy efficiency measures and the solar energy system, but the documentation must be submitted to the same HERS Provider.

2. Once the CEPE or CEA completes the energy efficiency documentation (CF-1R or PERF-1), the applicant must include a signed copy of the energy efficiency documentation and the associated electronic input file(s)[28] as part of the NSHP application. The electronic input file must be generated directly by one of the Energy Commission-approved Title 24, Part 6, compliance software programs, showing all of the measures used to meet the energy savings requirements. The CF-1R (or PERF-1 when applicable) and other energy efficiency

28 Electronic files may be submitted via e-mail or on electronic media. For 2008 Title 24, Part 6, the file extension for EnergyPro files will be .bld and for MICROPAS files will be .mp8.

documentation forms must be consistent with the construction plan-set. These documents will be used for the subsequent NSHP energy efficiency plan check.

The associated digital input files (e.g. *.bld or *.mp8) will be uploaded into the HERS Provider data registry of an Energy Commission approved HERS Provider. This step is usually completed by the Program Administrator.

The energy efficiency documentation will be submitted to the NSHP Program Administrators with the NSHP Reservation Application (NSHP-1). A copy of the construction plan-set that is used for building permit purposes must be submitted by the applicant. The construction plan-set is used during the plan-check process to verify the energy efficiency measures to be installed on the project. For a list of energy efficiency documents required for the NSHP plan-check see the Plan Check Checklist in Appendix C. Applicants are encouraged to provide the construction plan-set in electronic format, preferably portable document format (PDF). Upon completion of the NSHP plan check and review and approval of all other NSHP reservation application documents, the applicant will receive a Payment Claim Form (NSHP-2). The NSHP-2 form must be completed and submitted once the solar energy system and all energy efficiency measures have been installed and verified.

Projects partipating in a utility new constuction program, are not required to submit these documents to the NSHP Program Administrator, but shall submit the utility new construction energy efficiency program approval letter in their NSHP application. Please see Chapter II, Section C for additional information.

Energy Efficiency Documentation Requirements During Field Verification Phase

3. The applicant begins construction and installation of energy efficiency measures. If required, the installing contractor performs diagnostic testing or inspections and completes Installation Certificates (CF-6R) to verify that energy efficiency compliance was achieved. A HERS Rater will need to be provided a signed CF-6R from the installing contractor or the forms must be left at the site.

   The applicant must make arrangements with a HERS Rater to complete energy efficiency verification of measures that require the HERS Rater to be on-site early in the construction process (e.g. Quality Installation of Insulation [QII], Housewrap/Air-retarding wrap).

   A HERS Rater will be required to perform an inspection to verify all measures listed on the Field Inspection Energy Checklist (CF-4R-EE NSHP) for all projects, except those using a PERF-1. The HERS Rater will verify these energy efficiency measures by completing a CF-4R-EE NSHP. For further details on the CF-4R-EE NSHP, please see Appendix C, Section B. For projects using a PERF-1 to show compliance with the NSHP energy efficiency requirements, the HERS Rater will not complete the CF-4R-EE NSHP. In lieu of the CF-4R-EE-NSHP, the applicant is required to complete all acceptance tests that are required in the PERF-1.

In addition, any measures listed in the HERS Required Verification section of the CF-1R, require a HERS Rater field test and/or verification and the applicable CF-4R shall be completed by the HERS Rater.

Projects partipating in a utility new constuction program, are not required to complete NSHP energy efficiency field verification requirements, but must complete the energy efficiency field verification requirements of the utility new construction energy efficiency program. Please see Chapter II, Section C for additional information.

Energy Efficiency Documentation Requirements During Payment Phase

4. NSHP Program Administrators will confirm, in the HERS Provider data registry, that the following documents have been completed:
    - All applicable (Certificate of Field Verification and Diagnostic Testing (CF-4R) form; and
    - CF-4R-EE NSHP.

Projects using a PERF-1 must submit copies of the applicable acceptance test forms to the Program Administrator for compliance verification.

For projects partipating in a utility new constuction program, completion of the above documents will not need to be confirmed; instead, the applicant shall submit the utility new construction energy efficiency payment letter in their NSHP payment claim. Please see Chapter II, Section C for additional information.

C. Utility New Construction Energy Efficiency Program Participation

Applicants are strongly encouraged to participate in their utilities new construction energy efficiency program to obtain the financial incentives that may be available for meeting either Tier I or Tier II energy efficiency requirements and to streamline the NSHP energy efficiency verification process.
When projects are participating in both the NSHP and a utility new construction energy efficiency program, the project shall meet the energy efficiency requirements of the utility new construction program in lieu of the NSHP energy efficiency requirements. The utility new construction energy efficiency program is meant to provide a separate, alternate path for energy efficiency compliance.

For projects participating in a utility new construction energy efficiency program, the following applies:

- For NSHP projects where a utility new construction energy efficiency program approval letter is submitted with the NSHP reservation application, or the approval is otherwise confirmed by the utility Program Administrator, the applicant is not required to provide

energy efficiency documentation (e.g. CF-1R form, electronic input files, plan set and checklist items) with the NSHP reservation application. Additionally, the project is not required to complete a NSHP plan check.

- For NSHP projects where a utility new construction energy efficiency program payment letter is submitted, or the payment is otherwise confirmed by the utility Program Administrator, the applicant is not required to have the CF-4R-EE NSHP or any CF-4Rs confirmed to be in a HERS Provider data registry by the Program Administrator during the NSHP payment process.

Once an NSHP applicant chooses to have their project participate in a utility new construction energy efficiency program, it is expected that the project will successfully complete the utility new construction energy efficiency program. If for some reason, the project is not able to successfully complete the utility new construction energy efficiency program, then the NSHP energy efficiency requirements shall be met in their entirety.

D. Permanent Foundation

Eligible solar energy systems must be installed on newly constructed buildings permanently fixed to their foundation. Permanent foundation is defined in the "Permanent Foundations Guide for Manufactured Housing" (HUD-7584).[29]

Manufactured housing seeking eligibility for the NSHP must provide a "Notice of Manufactured Home or Commercial Modular Installation on a Foundation System" (HDC 433A) prior to approval of a payment claim.

E. Transient Housing

Solar energy systems installed on transient residences are not eligible to receive NSHP incentives. Only buildings where 50 percent or more of the residential units are occupied for 30 days or more and are one of the following occupancy groups listed in the California Building Code, Title 24, Part 2[30] are eligible for NSHP funding.

- Occupancy Group R, Division 2;
- Occupancy Group R, Division 2.1;
- Occupancy Group R, Division 3;
- Occupancy Group R, Division 3.1;

29 U.S. Department of Housing and Urban Development, *Permanent Foundations Guide for Manufactured Housing*, HUD 7584, Issued September 1996.

30 http://publicecodes.citation.com/st/ca/st/b200v10/st_ca_st_b200v10_3_sec010.htm

- Occupancy Group R, Division 4

The Energy Commission or its Program Administrators reserve the right to request applicants provide documentation verifying that the project meets the transient housing requirements listed above.

F. Grid Interconnection

Eligible solar energy systems must be permanently interconnected to the electrical distribution grid of the utility serving the customer's electrical load. The site where the system is installed must receive electrical distribution service from an existing in-state electrical corporation collecting funds to support the program as stated in Chapter I. These in-state electrical corporations are PG&E, SCE, SDG&E, and BVES. The system interconnection to the utility distribution grid must also comply with applicable electrical codes, utility interconnection requirements, and metering requirements. The solar energy system shall not be interconnected to the utility distribution grid until the applicant has received a formal approval letter from the interconnection department of applicant's electric utility.

Multifamily housing projects, both market rate and affordable, using virtual net metering[31] are eligible for NSHP incentives. For multifamily housing projects using virtual net metering, the residential dwelling units must meet energy efficiency requirements in Chapter II, Section B.

G. System Components

Major solar energy system components are defined as flat plate photovoltaic modules, inverters, and meters.

All major system components must be new and must not have been previously placed in service in any other location or for any other application. **Equipment purchased or installed more than 24 months before applying for a reservation is not eligible.** System components must satisfy the eligibility requirements specified in the most recent approved edition of Guidelines for California's Solar Electric Incentive Programs (Senate Bill 1) [www.energy.ca.gov/sb1/meetings/index.html]. Approved major components will be posted on the Energy Commission's eligible equipment website available at: [www.gosolarcalifornia.ca.gov/equipment/index.php].

The applicant must confirm that the components purchased for a system are eligible when applying for NSHP funding. The Energy Commission or the Program Administrators will

31 Virtual net metering allows the electricity produced by a single solar energy system installation to be credited to the benefit of multiple tenants in a multifamily building without requiring the solar energy system to be physically connected to each tenant's meter. Virtual net metering was originally adopted in the California Public Utilities Commission Decision 08-10-036 and modified in Decision 11-07-031. [docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/139683.htm]

confirm that the equipment identified in a reservation package meets eligibility requirements prior to a reservation being granted.

Because equipment is added and removed from the eligible equipment on a regular basis, the Energy Commission recommends the applicant wait for an approved reservation before installation commences. If the applicant begins or completes the installation before the Energy Commission has approved the reservation, changes to the eligible equipment may create a situation where significant and costly system modifications are required to comply with program guidelines.

H. System Performance Meter

All solar energy systems must be installed with a standalone performance meter or an inverter with a built-in performance meter so that the customer can determine the amount of energy produced by the system.

I. System Sized to Offset On-site Electricity Load

Eligible solar energy systems shall be a minimum size of 1.00 kW AC measured after the inverter and shall be sized so that the amount of electricity that is produced offsets part or all of the end-use customer's electrical needs at the site of installation. Systems 7.5 kW AC or less are considered to be sized to serve the on-site electric load of the end-use customer. The maximum incentive paid for a system serving a single-family residential unit is limited to the first 7.5 kW AC of the system. For systems greater than 7.5 kW, see "Calculator Examples" at [www.gosolarcalifornia.ca.gov/tools/nshpcalculator/Calculator_Examples.pdf] for further details on how to determine the maximum incentive. While common areas are not subject to the 7.5 kW AC cap, program administrators may request additional documentation justifying the system size. See Chapter III, Section C for additional information on maximum incentives.

J. System Performance

The incentive amount will be based on the estimated performance of the solar energy system, calculated using the California Energy Commission's PV Calculator (CECPV Calculator).[32] The estimated performance of the system will be the basis for qualifying for a reservation, and for the final incentive amount. System installation shall be consistent with the characteristics used to determine estimated performance to receive the reserved incentive amount. The final incentive amount is subject to available funds. The characteristics that are addressed by the CECPV Calculator include shading by any obstruction of the modules.

The CECPV Calculator will include "California Flexible Installation" criteria (as detailed in Chapter III Section B) to estimate performance for a range of module orientations and tilts. The

32 Solar energy systems using flat plate photovoltaic technology are the only systems eligible to receive NSHP incentives.

California Flexible Installation is intended for use only by new single-family residential developments (subdivisions) and is not allowable for applications consisting of only one single-family dwelling or only the common area of a multifamily development. Systems installed within the allowable range of orientations and tilts and meeting the "minimal shading criteria" can use the California Flexible Installation criteria as the basis for the reservation application and incentive request without providing more specific orientations and tilts. Third-party field verification will be conducted to assess whether systems have been installed consistent with the characteristics used to determine estimated performance.

K. System Installation

Solar energy systems must be installed in conformance with the manufacturer's specifications and installation instructions; all applicable electrical, fire, and building codes and standards; all utility interconnection requirements; and any local codes and ordinances.

If installed under contract, systems must be installed by an appropriately licensed contractor, in accordance with rules and regulations adopted by the California Contractors State License Board. Installation contractors must have an active A, B, C-10, or a C-46 license. Contractors with roofing specific licenses may place photovoltaic modules in accordance with limitations of their specific licenses; however, electrical connections must be made by an above-mentioned contractor. Owner-builders are allowed under the NSHP to install their own systems.[33]
The Energy Commission encourages installation contractors to become certified by the North American Board of Certified Energy Practitioners (NABCEP). See [www.nabcep.org] for additional information.

L. Solar Energy System Field Verification

All installed solar energy systems shall be third-party field-verified as described in Appendix B to ensure that installations are consistent with the information used to determine the estimated performance, reservations, and ultimately the final incentive amount. Field verification procedures shall be consistent with the current Building Energy Efficiency Standards [www.energy.ca.gov/title24]. Field verification for new housing developments may employ the sampling approach as allowed in the current Building Energy Efficiency Standards.[34]

Field verification will determine if the installed solar energy system is consistent with the "California Flexible Installation" criteria (including the minimal shading criteria) or the uniquely specified orientation, tilt and shading characteristics of the system, as appropriate. When field verification indicates that the installation is not consistent with the parameters used to calculate the estimated performance submitted in the NSHP application, the deficiencies

33 For information on restrictions placed on owner-builders, contact the Contractors State License Board at (800) 321-CSLB to obtain a current edition of the Contractor's License Law and Handbook.
34 For the 2005 Building Energy Efficiency Standards see Chapter 7 of the Residential Alternative Calculation Method (ACM) Approval Manual. For the 2008 Building Efficiency Standards see Appendix RA2 of the 2008 Reference Appendices.

must be corrected or the estimated performance must be recalculated based on the actual installation parameters. When field verification indicates that the installation will achieve an estimated performance greater than that used for the reservation, the estimated performance may be recalculated at the applicant's option to reflect the higher performance. Any revised estimated performance documentation must be re-submitted to NSHP.

M. Warranty Requirements

All solar energy systems must have a minimum 10-year warranty provided in combination by the manufacturer and equipment/seller installer. During the 10-year period, the warranty must protect against:

1) Defects in materials and workmanship;
2) System or component breakdown; and
3) Degradation in electrical output of more than 15 percent from the originally rated electrical output.

The warranty must cover the solar generating system, including the flate plate photovoltaic modules, inverters, and meters, and provide for no-cost repair or replacement of the system or system components, including any associated labor during the warranty period.

N. Equipment Sellers/Installers

To participate in the NSHP, companies that sell and/or install solar energy system equipment must be self-registered on the Energy Commission's Contractors, Installers, and Sellers Database (Database). Equipment sellers/installers should have the following information available prior to self-registration:

1) Business name, address, phone, fax, and e-mail address
2) Owner or principal contact
3) Business license number
4) Contractor license number (if applicable)
5) Proof of good standing on record with the California Secretary of State, as required for corporate and limited liability entities
6) Reseller's license number

This information must be submitted to the Energy Commission through the self-registration process before a company can become eligible to participate in the NSHP.
Self-registration can be done online at:
www.gosolarcalifornia.ca.gov/database/addcompany.php.

Sellers, contractors, or installers that are listed in the online Database should maintain their information on a regular basis. This can be done using the log-on account name and password provided when the company has initially self-registered. Updates can be completed online at:

www.gosolarcalifornia.ca.gov/database/update.php

The Energy Commission will send out e-mails periodically to remind companies to update their online information, contacts, and other data.

It is the responsibility of each company to maintain its online information. If the Energy Commission's e-mails are returned as undeliverable, and the Energy Commission cannot reach that company by phone or by regular U.S. mail, the Energy Commission reserves the right to remove the company from the online Database after a three-month period.

O. Leases and Power Purchase Agreements

Solar energy systems that are leased by an end-use customer or provide electricity to an end-use customer under a power purchase agreement (PPA) are eligible for NSHP funding if the lease agreement or PPA is executed and has a start date on or after July 1, 2009. Lease agreements and PPAs that are executed or have a start date prior to July 1, 2009, are not eligible for funding even though the system may have been installed after this date. Lease agreements and PPAs must have an initial term of no less than 10 years and must provide the lessee or customer the following options at the end of the initial term of the agreement:

1) Renew the agreement;

2) Purchase the system; and

3) Remove the system at no cost to the lessee or customer.

In addition, lease agreements and PPAs must demonstrate that the NSHP funding benefits the end-use customer by directly and exclusively reducing the lease payments for the system or the cost of electricity produced by the system.

For the first five years of the lease or PPA, the lessor or owner of the solar energy system, in the case of a PPA, shall provide an annual status report to the Program Administrator on the operation of the NSHP-funded solar energy system. The annual status report shall address agreements executed through December 31 of each year, be submitted to the Program Administrator no later than January 31 of each year, and shall include the following information for each system:

1) Date that the agreement was fully executed and the start date of the agreement;

2) Operational status of the system; and

3) Status of the agreement, and if status has changed, date of change and reason for the change. (Status changes would primarily include, change in lessee or customer, system purchase, termination of agreement, and system removal.)

The annual status report shall be submitted to the Energy Commission if the NSHP is not administered by a Program Administrator.

If any lease agreement or PPA for a system that received funding from the NSHP is terminated and the system is removed from the building on which it was originally installed, the NSHP funding received by the applicant shall be repaid by the Lessor or system owner to the Energy Commission in the amounts specified below:

- If the agreement is terminated within one year of the system's installation or the start date of the agreement, whichever is later, 100 percent of the funding received shall be repaid.

- If the agreement is terminated within two years of the system's installation or the start date of the agreement, whichever is later, 80 percent of the funding received shall be repaid.

- If the agreement is terminated within three years of the system's installation or the start date of the agreement, whichever is later, 60 percent of the funding received shall be repaid.

- If the agreement is terminated within four years of the system's installation or the start date of the agreement, whichever is later, 40 percent of the funding received shall be repaid.

- If the agreement is terminated within five years of the system's installation or the start date of the agreement, whichever is later, 20 percent of the funding received shall be repaid.

- Repayment shall not be required if the agreement is terminated more than five years after the system's installation or the start date of the agreement, whichever is later.

- Repayment will not be required if a system is destroyed by natural disaster or fire at no fault of the lessor/owner or lessee/customer.

Nothing in this section precludes an applicant from using an otherwise valid reservation to request a rebate for a system that is leased or provides electricity through a power purchase agreement.

Chapter III: Incentive Levels and Structure

This chapter describes the incentives offered by the NSHP program. The NSHP provides an Expected Performance-Based Incentive (EPBI) using a specific dollars-per-watt amount applied to the Energy Commission-specified reference solar energy system. The incentive amount for each applicant solar energy system is determined by analysis using the CECPV Calculator, and is paid when the solar energy system has been installed, approved by the local building authority, and all program requirements have been met. Detailed information on how the incentive amount is determined can be found in Section B.

Incentives will decline over the life of the program, with the program's application process closing no later than the end of 2016. Incentive levels and reserved volume are subject to funding availability.

A. Incentive Levels and Decline Schedule

1. Incentive Levels for Market Rate Housing and Affordable Housing Common Area Projects

There are two available incentive levels:

- **Tier I Incentive:** Beginning on January 12, 2012, the EPBI amount is based on the reference solar energy system receiving $2.00/watt. The Tier I incentive applies to projects that have an energy efficiency compliance margin of at least 15% better than the Building Energy Efficiency Standards as specified in Chapter II, Section B.

- **Tier II Incentive:** Beginning on January 12, 2012, the EPBI amount is based on the reference solar energy system receiving $2.25/watt. The Tier II incentive applies to projects that have an energy efficiency compliance margin of at least 30% better than the Building Energy Efficiency Standards and a space cooling compliance margin of at least 30% better than the Building Energy Efficiency Standards as specified in Chapter II, Section B.

The actual incentive amount for a particular solar energy system and installation depends on the EPBI calculation of the system's expected performance compared to the reference solar energy system. Incentive levels will decline when the cumulative MW capacity of plan-check ready applications[35] equals the MW reserved volume target specified in Table 3-1, below[36]. An

35 Plan-check ready applications are complete reservation applications where the supporting documentation has been reviewed and deemed correct by the Program Administrator.

36 For example, when the cumulative capacity of Tier I, Tier II, and affordable housing applications (plan-check ready applications) equals 5 MWs, the Tier I incentives will drop from $2.00/watt to $1.75/ watt and the Tier II incentives will drop from $2.25/watt to $2.00/watt. At that time, the incentive level for affordable housing projects will drop from $2.90/watt to $2.55/ watt, unless the incentive level had

application deemed complete by the Program Administrator does not indicate reservation approval and should not be considered a reservation approval. The Program Administrator's review for completeness is merely used for determining incentive level declines.

Funds reserved for solar energy systems not installed within the allowed reservation period will be reallocated to the incentive level in effect at the time those approved reservations expire or are cancelled, and the reserved volume targets from that point forward will be adjusted to reflect the funds from the expired or cancelled reservations. Unused funds from reservations for solar energy systems that reduce their size will be added to the incentive level in effect at the time the Program Administrator receives notification of that change and supporting documentation.

Table 3-1: EPBI Incentive Levels and Related Reservation Volumes

Tier I Incentive (per watt, reference system)	**Tier II Incentive** (per watt, reference system)	**Reserved Volume Target** (MW-AC)
$2.50	$2.60	55.3
$2.25	$2.35	N/A
$2.00	$2.25	5
$1.75	$2.00	10
$1.50	$1.75	15
$1.25	$1.50	20
$1.00	$11.25	35
$0.75	$1.00	50
$0.50	$0.75	65
$0.25	$0.50	85
For the original incentive levels, please refer to the previous edition of the NSHP Guidebook. *Reserved volume includes reserved affordable housing residential unit volume, discussed later in this Guidebook.		

Source: California Energy Commission

2. Incentive Levels for Affordable Housing Residential Unit Projects

Beginning on January 12, 2012, the EPBI amount for affordable housing residential unit projects is based on the reference solar energy system receiving $2.90/watt. The following incentive levels apply to eligible affordable housing residential unit projects. Eligibility requirements for affordable housing can be found in Chapter IV, Section A. The design of the incentive levels and decline structure for affordable housing is the same as the design for market rate housing as discussed earlier.

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already dropped to $2.55/watt because the 0.25 MW reserved volume target for affordable housing projects had already been reached.

Table 3-2: EPBI Incentive Levels for Affordable Housing Residential Unit Projects

Residential Dwelling Unit Incentive (per watt, reference system)	**Common Area Incentive*** (per watt, reference system)	**Reserved Volume Target**** (MW-AC)
$3.50	$3.30	5.5
$3.15	$2.97	N/A
$2.90		0.25
$2.55		0.5
$2.20		0.75
$1.85		1.0
$1.50		1.75
$1.15		2.5
$0.80		3.25
$0.45		4.25

*Affordable housing common area projects receive the incentive levels that apply for market rate housing.
**The reserved affordable housing residential unit volumes is included in the reserved volume for market rate housing and affordable housing common area projects.

Source: California Energy Commission

Multifamily affordable housing projects using virtual net metering are eligible for the affordable housing residential dwelling unit incentive for the portion of the solar energy system that is allocated to the tenants. For multifamily affordable housing projects using virtual net metering, the residential dwelling units must meet the energy efficiency requirements in Chapter II, Section B.

3. Change in Incentive Level

When the cumulative MW capacity of applications (deemed complete by Program Administrators) reaches the MW reserved volume target for that incentive level, the incentive level will drop to the next incentive level. If the capacity for an application exceeds the remaining capacity in the current incentive level, the reservation for that application will be split between the current incentive level and the next incentive level. **The Energy Commission will not provide advance notice to inform program participants of a drop in the incentive levels as shown in the above tables. However, information on the current incentive level, the MW capacity approved for the current incentive level, and the MW currently under review will be available on the NSHP Application Web Tool, https://www.newsolarhomes.org/RebateLevels.aspx, to assist applicants in making an informed decision on program incentives.** It is the applicant's responsibility to be aware of the current incentive level and the MW capacity remaining in the current incentive level. Projects may be reserved at a lower incentive level than the incentive level in effect at the time the reservation application is submitted.

B. Expected Performance-Based Incentive Calculation

The NSHP provides an incentive based on the expected performance (i.e., expected annual electrical generation), of a solar energy system installed in a specific location. The EPBI is determined by analysis using the CECPV Calculator. The analysis accounts for the tested and certified performance of the specific module and inverter, the mounting type and cell temperature, the orientation and tilt of the modules, and the extent to which the system is shaded. The CECPV Calculator accounts for these parameters that are under the control of the builder/installer, as well as the solar and climatic conditions for the locale of the building to determine the hourly estimated performance over a year. This is then weighted to account for the time-of-use value of the electric generation to the utility system (referred to as time dependent valuation [TDV]).

The weighted TDV annual kilowatt-hour (kWh) production of an applicant system is compared to the weighted TDV annual kWh production of a reference system. The CECPV Calculator converts the available $/watt AC incentive level into the equivalent incentive amount for the TDV-weighted kWh of annual production for the reference system. This equivalent incentive per TDV-weighted kWh rate is applied to the expected annual TDV performance determined by the CECPV Calculator for the applicant system to determine the incentive for the specific equipment and installation characteristics of that system.

The Energy Commission uses the reference system shown in the following table:

Table 3-3: Reference Solar Energy System and Installation

Parameters	Reference System and Installation
Location	San Jose (latitude, longitude, Climate Zone 4, weather file, TDV values)
Azimuth	180 degrees (south orientation)
Tilt	22.6 degrees (5:12 pitch)
Mounting	Building Integrated Photovoltaics (BIPV)
Photovoltaic Modules	Matches Systems Installed at Premier Gardens, Sacramento[37]
Number of Modules	
Strings (series and parallel)	
Inverter	
Shading	None
Default Losses	0.88 for dirt, dust and mismatched wiring

Source: California Energy Commission

California Flexible Installation

In lieu of site-specific EPBI analysis as described above, the NSHP program permits applicants to use the California Flexible Installation criteria as an alternative approach to estimate the

37 The modules and inverter performance characteristics for the reference system are those that are specific to the installation in the Premier Gardens subdivision in Sacramento and include 42 BIPV modules connected in a single series string to a 2.5 kW inverter.

EPBI. The California Flexible Installation is intended for use only by new single-family residential developments (subdivisions) and is not allowable for applications consisting of only one single-family dwelling or only the common area of a residential development. The California Flexible Installation criteria offer a simplified approach to estimating the incentives for those solar energy systems in a development that are designed and installed to meet the criteria. One EPBI calculation can be made for all solar energy systems in a subdivision that meet all of the following: 1) have an azimuth ranging from 150 to 270 degrees, 2) have a tilt corresponding to a roof pitch between 0:12 and 7:12, 3) meet the "minimal shading criteria," 4) use the same make, model, and quantity of major system components, and 5) fixed, nontracking mounting. The minimal shading criteria implies no existing, planned, or potential shading obstructions that are closer than a distance of twice the height that the obstruction extends above the nearest point on the array.

California Flexible Installation incentives will be calculated using the following default parameters: azimuth of 170 degrees, tilt of 5:12, two-story mounting height, fixed non-tracking mounting, and minimal shading. User input will be used for photovoltaic module and inverter make, model and quantity, array standoff height from roof, location, and incentive type.

C. NSHP Incentive Amount Cap

Incentives for affordable housing projects (residential dwelling unit and common areas) will be limited to 75% of the total system cost. Incentives for all other projects will be limited to 50% of the total system cost. For projects subject to the 7.5 kW AC system size cap referenced in Chapter II, Section I, the incentive will be equal to whichever amount is less. For projects where the incentive has been limited to the first 7.5 kW AC of the system:

- If this is an affordable housing residential dwelling unit project and the 7.5 kW AC capped incentive is greater than 75% of the total system cost, then the total incentive will be 75% of the total system cost.

- If this is a market rate housing project and the 7.5 kW AC capped incentive is greater than 50% of the total system cost then the total incentive will be 50% of the total system cost.

- If this is an affordable housing residential dwelling unit project and the 7.5 kW AC capped incentive is less than 75% of the total system cost then the total incentive will be the 7.5 kW AC capped incentive.

- If this is a market rate housing project and the 7.5 kW AC capped incentive is less than 50% of the total system cost then the total incentive will be the 7.5 kW AC capped incentive.

Total system cost consists of the cost of the equipment and materials for the solar energy system, including sales tax, labor to install the solar energy system, and costs of solar energy system permits issued by the authority having jurisdiction. All other costs, including financing or administrative fees, incurred by any party are not considered part of the total system cost. The cost of any equipment used to store the electricity produced by the solar energy system is not considered part of the total system cost.

D. Other Incentives May Affect the NSHP Incentive Amount

Incentives received from sources other than the NSHP that lower the cost of the solar energy system may affect the incentive amount applicants receive from the Energy Commission. If incentives are from other utility incentive programs, a State of California-sponsored incentive program, or a federal government sponsored incentive program (other than tax credits), a minimum of five percent of the total incentives received or expected from other sources will be subtracted from the NSHP incentive amount. The percentage reduction will be increased as necessary to ensure the sum of all incentives received or expected from all sources, including the NSHP, does not exceed the total cost of the system.

The NSHP will not issue a reservation or make a payment for any system or portion of a system that has received payment from, or is eligible for and participating in, the California Public

Utilities Commission-approved California Solar Initiative program, or any other incentive program for solar energy systems using electric utility ratepayer funds.

Chapter IV: Reservation Process

This chapter describes the types of reservations and the documentation required to reserve funding from the NSHP.

Please read the following descriptions carefully to determine which reservation your project may qualify for and the documentation you will need to provide. Once the required information has been submitted and confirmed to meet the requirements of the NSHP, the reservation application will be approved, and funding will be reserved for your project.

A. Types of Reservations

Projects will receive an 18-month or 36-month reservation depending on the project type.

1. 36-Month Reservation

The following projects are eligible for a 36-month reservation period:

- Solar as Standard: Developments of 6 or more residential dwelling units where the builder/developer has committed to installing solar energy systems on 50 percent or more of the dwelling units and that meet at minimum, the California Flexible Installation criteria, are eligible for a Solar as Standard reservation.[38] This includes single-family and multifamily projects. Please see Chapter IV, Section D for additional information.

- Solar as an Option: The builder/developer offers solar energy systems as an option to residential home buyers. Please see Chapter IV, Section E for additional information.

- Affordable Housing Projects: This includes Affordable Housing Residential Dwelling Unit projects and Affordable Housing Common Area projects. Please see Chapter IV, Section C for additional information.

2. 18-Month Reservation

The following projects are eligible for an 18-month reservation period:

- Custom homes

- Small developments/phases (under 6 residential dwelling units)

- Projects where solar will be installed on less than 50 percent of the residential dwelling units

38 A buildout phase is part or all of a development which an applicant plans to build within the reservation period.

- Common areas of market rate residential developments

Table 4-1, shown below, lists the project types and their required documentation for the reservation application.

Table 4-1: Project Types and Required Reservation Application Documentation

Reservation Application Documents	Project Type							
	Solar as Standard	Solar as an Option	Affordable Housing Residential Dwelling Unit	Affordable Housing Common Area	Custom Home	Small Development /Phases	Projects w/ Solar on less than 50% of Residential Units	Market Rate Common Areas
Reservation Application Form: NSHP-1	X	X	X	X	X	X	X	X
Final Subdivision Map*	X	X				X	X	
Building Permit			X	X	X			X
EPBI Documentation								
CF-1R-PV Form	X	X	X	X	X	X	X	X
Electronic Input Files (.emf, .her)	X	X	X	X	X	X	X	X
Energy Efficiency Documentation								
CF-1R Form	X	X	X	X	X	X	X	X
Electronic Input Files (.bld/.mp7, .mp8)	X	X	X	X	X	X	X	X
Plan Set and Checklist Items	X	X	X	X	X	X	X	X
Utility New Construction Energy Efficiency Program Approval Letter**								
Equipment Purchase Agreement	X	X	X	X	X	X	X	X
Lease Agreement/Power Purchase Agreement (PPA)***								
Installation Contract	X	X	X	X	X	X	X	X
Regulatory Agreement			X	X				
Buildout Schedule	X	X						

*Applicants may provide either a final subdivision map or building permit as proof of residential new construction.

**If the project is participating in the utility new construction energy efficiency program, then the applicant may submit the program approval letter in place of the energy efficiency documentation.

***In the case of lease or PPA projects, a lease agreement/PPA is not required until payment claim, however a lease agreement or PPA with equipment listed may replace the equipment purchase agreement.

Source: California Energy Commission

B. Forms and Documentation

1. Reservation Application Form

The Reservation Application Form (NSHP-1) provides general information about the proposed project, and the electric utility service area in which the project will be located, and must be signed by the homeowner or builder/developer. The form also identifies what information must be submitted with the application and requires applicants to provide the contact information of the HERS Rater. The NSHP-1 provides the homeowner or builder/developer an opportunity to assign his/her administrative rights.

2. Proof of Newly Constructed Residential Building

Applicants must submit either a copy of the final subdivision map or building permits for newly constructed buildings. If a final subdivision map is submitted, each site included in the reservation must be indicated as preplotted locations on the map. Grading permits and expired permits are not acceptable and may not be submitted to support an application. Total rehabilitations of residential dwelling units must provide adequate proof that the entire unit(s) are to be renovated and will meet or exceed the energy efficiency requirements for the entire structure. Please refer to Chapter II, Section B for information on the energy efficiency requirements and additional building permit requirements when there is a new edition of Title 24, Part 6.

3. Expected Performance-Based Incentive (EPBI) Documentation

The Expected Performance-Based Incentive (EPBI) documentation specifies the expected performance of the solar energy system(s) to be installed and the eligible funding amount to the applicant. To complete this documentation, the applicant must use the CECPV Calculator for each unique solar energy system.[39] The CECPV Calculator will produce the CF-1R-PV compliance form. A development may use the California Flexible Installation criteria to calculate the incentives for all systems that meet the criteria.[40] In cases where there is more than one solar energy system design that results in different levels of expected performance, a CF-1R-PV for each system design that results in a unique expected performance calculation must be submitted.

Applicants must submit each CF-1R-PV and the associated .emf digital input file and .her digital output file for review by the Program Administrator. The Program Administrator will upload the .her digital output file into the HERS Provider data registry of an Energy

39 For solar energy systems consisting of photovoltaic modules, NSHP defines a system as one or more modules connected to one inverter.

40 The California Flexible Installation criteria offer a simplified approach to estimating the incentives for those solar energy systems in a single-family residential development (subdivision) that are designed and installed to meet the criteria, as outlined in Chapter III, Section B.

Commission approved NSHP HERS Provider. Applicants must identify the HERS Rater and HERS Provider during the application process.

4. Energy Efficiency Documentation

To participate in the NSHP, the buildings associated with the solar energy system(s) must also be highly energy-efficient. Documentation showing at least 15 percent greater energy efficiency than the Building Energy Efficiency Standards is required. Either of the two tier levels described in Chapter II, Section B can be used to meet this requirement. All projects must provide documentation that appliances provided by the builder are ENERGY STAR labeled if ENERGY STAR is applicable to that appliance. Solar water heating may be used to assist in meeting the energy efficiency requirements of either Tier I or Tier II.

Energy efficiency documentation must be completed by a CEPE or CEA. Applicants must submit the CF-1R (or PERF-1 when applicable) and the associated digital input files . A copy of the construction plan-set must also be submitted by the applicant. For additional details about energy efficiency documentation submittal, please see Chapter II, Section B and Appendix C.

Applicants are strongly encouraged to participate in their utility's new construction energy efficiency program to obtain the financial incentives that may be available for meeting either Tier I or Tier II energy efficiency requirements and to streamline the NSHP energy efficiency verification. Please see Chapter II, Section C for additional information.

For Affordable Housing Projects

Projects requesting funding from the California Tax Credit Allocation Committee (TCAC) are given up to 60 days after the approval from TCAC to provide finalized energy efficiency documentation as described in Chapter II, Section B.

5. Equipment Purchase Agreement and Installation Contract

The equipment purchase agreement and installation contract indicate the applicant's commitment to the purchase and installation of solar energy systems. The applicant must submit one master equipment purchase and installation agreement for all the residential dwelling units in the reservation or one agreement for the system equipment and a second agreement for the installation. In cases where the installation is performed by the builder's employees, installation labor cost must be listed separately.

The master purchase agreement(s) for the equipment and installation labor must contain language indicating the applicant's commitment to purchase eligible solar energy systems for all of the residential dwelling units in the reservation and include the following information:

- List of the physical addresses for the system installations.
- Quantity, make and model of the photovoltaic modules, inverters, and meters to be installed at each address.

- Total system cost of the eligible equipment and/or labor.

The master purchase agreement(s) must be signed by the applicant or the applicant's representative, the seller of the systems, and the installer (an installer's signature on the equipment purchase agreement is not required if the applicant is hiring a separate company for the installation of the equipment). The seller and installer of the system(s) must be self-registered with the Energy Commission as specified in Chapter II, Section N.

In cases where there is no signed purchase agreement, the applicant may provide invoices or receipts showing that at least 10 percent of the system equipment purchase price [photovoltaic modules, inverters, and performance meter(s)] or $1,000 per residential unit has been paid to the seller(s).

In situations where the applicant is purchasing the system from one company and hiring a separate company for installation, the applicant must provide proof of his or her commitment to purchase and install the system in separate documents.

An installation contract must state the price charged for the installation of equipment for all of the residential dwelling units in the reservation. Installation contracts must comply with the California Contractors State License Board (CSLB) requirements. In general, proper contracts will contain the following information:

- Name, address, and contractor's license number of the company performing the system installation.
- Site address for the system installation.
- Description of the work to be performed.
- Total agreed price to install the system.
- Payment terms (payment dates and dollar amounts).
- Printed names and signatures of the builder and the installation company's authorized representative.

For more information on CSLB guidelines, please refer to its website at: [www.cslb.ca.gov/]

For systems that are leased or provide electricity under a power purchase agreement, instead of providing both an equipment purchase agreement and installation contract, applicants must provide an installation contract that lists the proposed equipment to be installed.

C. Affordable Housing Projects

The NSHP offers higher incentives for qualifying systems installed on affordable housing residential dwelling unit projects. Affordable housing projects of all sizes are eligible for a 36-month reservation period.

Eligible projects include multifamily and single-family developments where at least 20 percent of the project units are reserved for extremely low, very low, lower, or moderate income households for a period of at least 10 years. Qualifying systems must be connected to and serving the energy needs of 1) residential dwelling units subject to affordability requirements, 2) the office and residential dwelling unit of the manager, provided all other residential units in the project are subject to affordability requirements, or 3) the common areas of the project, where all of the project's dwelling units are reserved for extremely low, very low, lower or moderate income households, except for the manager's unit. Examples of common areas include, but are not limited to: hallways, recreation rooms, manager's unit, and tenant parking.

Below are Additional Requirements for Affordable Housing Projects:

1. Regulatory Agreement

The affordable housing project must be undertaken pursuant to section 50052.5, 50053, or 50199.4 of the Health and Safety Code, or other affordable housing laws or regulations adopted by the California Department of Housing and Community Development. Applicants must demonstrate this by providing documentation that identifies the statutory basis under which the project was undertaken. In addition, the applicant must provide a copy of the regulatory agreement or approval for the project's development that identifies 1) the project, 2) the number of residential units in the project subject to the affordability requirements, and 3) the applicable affordability requirements for these residential units. The regulatory agreement or approval must expressly limit residency in the affordable residential units to persons with extremely low, very low, lower or moderate income persons as defined by the Health and Safety Code sections 50079.5, 50105, 50106, and 50093 et seq. or regulations adopted by the California Department of Housing and Community Development. The regulatory agreement shall reserve at least 20 percent of the project units for extremely low, very low, lower, or moderate income households for a period of at least 10 years.

2. Individual Meter Requirement

Each residential dwelling unit for which a solar energy system is being installed must have an individual electricity consumption meter capable of monitoring and reporting the utility electricity consumption of that unit. The solar energy system for each residential dwelling unit shall be separately net-metered through that individual electricity consumption meter. If the meter is an electric utility meter, applicants must provide documentation from the electric utility confirming service and meter number at payment claim time. If the meter is supplied by an entity other than the utility, documentation must be provided explaining how the meter monitors and reports individual unit consumption. Meters supplied by an entity other than a

utility must be utility-grade and have the same reporting accuracy levels of utility-supplied meters.

EXCEPTION: Projects that qualify for virtual net metering (VNM) as adopted by the California Public Utilities Commission (CPUC) in Decision 08-10-036 and modified in Decision 11-07-031 are not required to separately net-meter each residential dwelling unit that will be allocated electricity from the solar system.

3. Maintenance and Monitoring Plan

Affordable housing applicants shall develop a maintenance and monitoring plan for NSHP-funded systems and shall retain a copy of such plan for inspection by the Energy Commission or the Program Administrator. This plan shall be provided to the system owner and the building or property manager and shall identify specific maintenance, monitoring, and inspections the building or property manager will need to undertake, or have contracted for, to ensure that the system produces maximum output over the system's expected life. The plan should include activities such as: a) cleaning schedule for the removal of any dirt and dust build-up on the solar energy system; b) periodic checking of all electrical connections for corrosion and looseness; c) checking the inverter for instantaneous power and long-term energy output and diagnose and taking corrective action needed if production is significantly lower than expected; and d) checking for any tree/plant growth or other obstructions that are causing shading on the array and take action to eliminate that shading. The Energy Commission or its Program Administrators reserve the right to request applicants to provide a copy of the maintenance and monitoring plan at anytime during the course of the NSHP.

D. Solar as Standard Projects

For projects where the builder/developer has committed to installing solar on 50 percent or more of the dwelling units and that meet at minimum, the California Flexible Installation criteria, a reservation application may be submitted for a build-out phase of 6 or more residential dwelling units. In addition to the reservation forms listed in Chapter IV, Section B, the NSHP requires the following document for reservation approval:

- Build-out schedule for the project, including a projected timeline for completing the construction of dwelling units that will have solar energy systems.

The applicant shall provide the Program Administrator an update on the project's construction and system installation progress 18 months after the reservation has been approved. The update shall include an evaluation of the probability of how many of the remaining residential dwelling units will have solar energy systems installed, stating the projected timeline. The Program Administrator will evaluate the progress on the project to determine if the reserved funding is deemed greater than the projected payout in the remaining months of the reservation. This evaluation will consider the buildout schedule the applicant included with its Reservation Application. If the Program Administrator, in consultation with Energy

Commission staff, concludes that the project is not progressing as expected, the project's funding reservation may be reduced or completely disencumbered.

E. Projects Where Solar is Offered as an Option to Homebuyers

For projects where the builder/developer offers solar energy systems as an option to residential home buyers, the NSHP will reserve funding for up to 50 percent of the residential dwelling units in the project. Funding will be reserved assuming a 3 kW AC system size at the Tier I or Tier II incentive available at the time of reservation[41]. In addition to the reservation forms listed in Chapter IV, Section B, the NSHP requires the following document for reservation approval:

- Build-out schedule for the project, including a projected timeline for completing the construction of dwelling units that will have solar energy systems.

Upon reservation approval, the NSHP-2 form will be available for up to 50 percent of the residential dwelling units identified in the application. The applicant will then fill out the NSHP-2 with a specific address, sign, and submit the NSHP-2 and supporting documentation for payment claim.

The applicant shall provide the Program Administrator an update on the project's construction and system installation progress 18 months after the reservation has been approved. The update shall include an evaluation of the probability of how many of the remaining residential dwelling units will have solar energy systems installed, stating the projected timeline. The Program Administrator will evaluate the progress on the project to determine if the reserved funding is deemed greater than the projected payout in the remaining months of the reservation. This evaluation will consider the buildout schedule the applicant included with its Reservation Application. If the Program Administrator, in consultation with Energy Commission staff, concludes that the project is not progressing as expected, the project's funding reservation may be reduced or completely disencumbered.

F. Additional Information for All Reservation Applications

Funding is available on a first-come, first-served basis, until available program funds are exhausted and subject to any waiting list criteria established by the Energy Commission for applicants who submit complete and accurate applications. Complete applications will be reviewed in the order in which they are submitted to the Program Administrator. To ensure timely receipt of an application, it is recommended that applications be submitted electronically via the NSHP Application Web Tool, [https://www.newsolarhomes.org/RebateLevels.aspx].

41 The Tier I incentive level will be used to calculate funding if the applicant's energy efficiency documents identify the project meets the Tier I energy efficiency requirements. The Tier II incentive level will be used to calculate funding if the applicant's energy efficiency documents identify the project meets the Tier II energy efficiency requirements.

Applications submitted via the NSHP Application Web Tool will be given priority over mailed-in applications received on the same date. Only one reservation and one incentive payment will be allowed for each residential dwelling unit during the reservation period.[42] Applicants will not be allowed to submit multiple reservation applications for the same residential dwelling unit.

Only applicants or designated payees who submit complete and accurate reservation applications and provide all supporting documentation will receive reservation approval. In applications with only minor omissions or discrepancies that do not affect eligibility or the requested amount to be reserved, the Energy Commission or its agents *may* request clarification of information. If the additional information is not supplied within the stated timeframe, the applicant may be notified to reapply.

No funding will be reserved if an application is incomplete or illegible, has conflicting information, or does not otherwise comply with the program requirements. Incomplete applications will not be approved and will require reapplication. If an applicant reapplies, the complete reservation application and all supporting documentation must be submitted as one package and will be subject to the program requirements and funding availability in effect at the time of re-application.

While information sent in after the initial application may be matched to the application, it is not guaranteed.

Information provided in the application and supporting documentation must be consistent throughout. Applicants should ensure all names, addresses, and equipment are the same throughout all documentation or provide an explanation if they are different. Failure to do so may result in delays or application rejection.

An application will be approved for a reservation based on the date it is deemed complete, not the date it was first submitted. The incentive level and other program criteria applicable on the date the application is deemed complete will apply. **Applicants are strongly encouraged to keep copies of all applications and supporting documentation submitted to the Energy Commission or its agents.**

Because program funding will decrease over the term of the program, and ultimately be exhausted, the Energy Commission recommends that applicants not start construction on residential buildings and system installations until they receive a reservation confirming the availability and amount of funding approved for their application. The Energy Commission intends to provide regular updates on program funding through the NSHP Application Web

42 An applicant may only cancel their reservation and reapply for a new reservation within the original reservation period if the incentive has dropped at least one level from the incentive level in the original reservation. A letter explaining the request must be submitted with a new Reservation Application Form signed by the applicant. This is designed to discourage applicants from applying too early in the construction process for a system to be installed within the reservation period.

Tool, [https://www.newsolarhomes.org]. Applicants are encouraged to check the NSHP Application Web Tool to determine available funding before applying for reservations. Once program funding is exhausted, the Energy Commission may suspend the NSHP and/or establish a waiting list for complete applications that are not funded. Applications on a waiting list may be funded if additional program funding becomes available. The Energy Commission may establish additional conditions for applications on the waiting list, including, but not limited to, conditions that limit the total dollar amount of applications on the waiting list and the duration of time applications may remain on the waiting list.[43]

G. Where to Send Reservations

The complete reservation application must be delivered to the appropriate Program Administrator. For mailing address, fax and contact information, please visit [http://www.gosolarcalifornia.ca.gov/contacts/consumers.php].

Alternatively, applicants are strongly encouraged to electronically send applications through the NSHP Application Web Tool [https://www.newsolarhomes.org]. Please visit the Go Solar California website for tutorials on how to use and navigate through the NSHP Application Web Tool before submitting applications electronically.

43 On November 16, 2011, the Energy Commission established waiting list criteria for the NSHP. These criteria are described in a November 4, 2011 notice, which is available at [www.energy.ca.gov/renewables/06-NSHP-1/notices/2011-11-04_NSHP_Waiting_List_Notice.pdf].

Chapter V: Payment Process

This chapter identifies the information and steps necessary to receive the incentive payment. To be eligible, all applications must first have followed the instructions outlined in Chapter IV in securing a reservation. In addition, the solar energy system must be completely installed, grid-connected, and operating satisfactorily, and the building must be in compliance with the energy efficiency specifications proposed in the applicant's reservation. The applicant must then complete the Payment Claim Form (NSHP-2), which the applicant should have received when the reservation was approved, and provide all supporting documentation listed below before the reservation expires.

If the reservation expires on or before the payment claim and supporting documentation have been submitted to the Program Administrator, the applicant will be required to reapply under the program eligibility requirements and incentive levels in effect at the time of the reapplication.

A. Forms and Documentation

1. Payment Claim Form (NSHP-2)

The applicant will receive a Payment Claim Form (NSHP-2) for each residential dwelling unit upon reservation approval. When the system has been installed, the applicant may submit the completed NSHP-2 to request payment. The completed NSHP-2 must identify any changes (e.g., changed equipment, installer, or equipment seller) that have been made to the information submitted since the reservation was approved. Additional pages may be attached if needed. Please see Appendix A for information on how reservation changes may affect application eligibility or the incentive amount.

The NSHP-2 requests applicants to submit information on solar energy equipment and installation costs. If the HERS rating cost can be broken down by unit, the HERS rating cost shall also be reported.

Assignment and reassignment of incentive payment. The designated payee may use the NSHP-2 to assign his or her right to receive the incentive payment to another party. If a designated payee assigns his or her rights to receive the incentive payment to one party and then cancels that assignment, the designated payee may subsequently reassign his or her right to receive payment to another party. Designated payees that assign their incentive payment to another party will still be reported as the recipients of the incentive payments for tax purposes.

The NSHP-2 with original signatures (copies are not accepted) must be submitted to the Program Administrator by mail. The Energy Commission encourages applicants to sign with blue or other ink that is clearly distinguishable as original. Stamped signatures will not be accepted.

2. Documentation Confirming the Total System Cost

Prior to issuing payment, Program Administrators will verify that the amount of the NSHP incentive does not exceed the funding cap based on total system cost as described in Chapter III, Section C. Upon request of the Program Administrator, the applicant must provide final system cost documentation clearly identifying the final amount paid or legally incurred by the applicant for the purchase and installation of the solar energy system.

3. Expected Performance Based Incentive (EPBI) Documentation

A HERS Rater must complete a Certificate of Field Verification and Diagnostic Testing (CF-4R-PV) for each solar energy system consistent with the procedures found in Appendix B.[44] HERS Raters must be certified and work under the oversight of an Energy Commission approved NSHP HERS Provider. Web links to these HERS Providers can be found on the Energy Commission Website: [www.energy.ca.gov/HERS]. The CF-4R-PV must be generated through the HERS Provider data registry. The applicant must provide the HERS Rater with the solar energy system information specified in Appendix B, Section C2 for each solar energy system being tested. In cases where the CF-4R-PV shows that the installed solar energy system is not consistent with CF-1R-PV that has been previously submitted to the Energy Commission or the Program Administrator, a revised CF-1R-PV that reflects the actual installation shall be prepared and submitted. When such an inconsistency is found when the sampling approach is used, a revised CF-1R-PV shall be prepared for all systems in the group that was sampled, consistent with the Energy Commission's re-sampling and corrective action procedures. Applicants may be required to submit Installation Certificates (CF-6R-PVs) to the Energy Commission or the Program Administrator upon request.

4. Energy Efficiency Documentation

NSHP Program Administrators will confirm, in the HERS Provider data registry, that the following documents have been completed:

- Certificate of Field Verification and Diagnostic Testing (CF-4R) as applicable; and
- Field Inspection Energy Checklist (CF-4R-EE NSHP)

A complete description of the energy efficiency documentation requirements can be found in Chapter II, Section B. For projects using a PERF-1 to show compliance with the NSHP energy efficiency requirements, the applicant must submit all required acceptance test documents to the Program Administrator.

Applicants are strongly encouraged to participate in their utilities new construction energy efficiency program to obtain the financial incentives that may be available for meeting either

44 The field verification procedures found in Appendix B are applicable only for solar energy systems using flat plate photovoltaic modules.

Tier I or Tier II energy efficiency requirements and to streamline the NSHP energy efficiency verification process. Please see Chapter II, Section C for additional information.

5. Ten-Year Warranty (NSHP-3)

A Ten-Year Warranty Form (NSHP-3) must be completed and signed by the appropriate party(ies).

For owner-builder installed systems, please submit copies of the manufacturers' 10-year warranties for the inverter(s) and solar electric generating equipment. Please see Chapter II, Section M for additional information on warranties.

6. System Interconnection With Utility Grid

Program Administrators will verify that the system has been interconnected prior to issuing payment. Upon request of the Program Administrator, the applicant must provide proof from the electric utility that the solar energy system is interconnected to the utility distribution grid and that the utility has approved the system's interconnection. Approval by the utility to interconnect reflects that the appropriate building inspectors have approved the installation of the solar system.

7. Payee Data Record (STD-204)

The Payee Data Record must be completed by the party identified as the designated payee in the NSHP-1 Reservation Application Form. If the designated payee has already submitted a complete STD-204 form with a prior application and has already received an incentive payment within the past year from the Program Administrator or the Energy Commission, a new STD-204 is not needed. In these cases the Program Administrators and Energy Commission will use data from the previously submitted STD-204 form. If the data provided in a previously submitted STD-204 has changed, the designated payee must submit a new STD-204.

When the payee is a corporation or limited liability entity, the payee must also submit proof of good standing with the California Secretary of State.

8. IRS W-9 Form / Form 590 / Form 587

Payees for projects located in the SDG&E territory must provide a copy of the following forms if requested by the Program Administrators:

- Request for Taxpayer Identification Number and Certification (IRS W-9 form)
- Withholding Exemption Certificate (Form 590)
- Nonadmitted Insurance Tax Return (Form 570).

9. Lease Agreement or Power Purchase Agreement

For systems using third-party ownership structures, the lease agreement or power purchase agreement shall be submitted to the Program Administrator. See Chapter II, Section O for requirements.

B. Additional Information on Payment Claims

Applicants must ensure that all program requirements as stated in Chapter II have been met prior to the submission of a payment claim package.

Applicants must submit the complete payment claim package to the appropriate Program Administrator on or before the expiration date specified on the Payment Claim Form. A payment claim package is for one residential dwelling unit. Multiple payment claim packages for multiple residential dwelling units may be submitted at the same time. Applicants who reserve more than one residential dwelling unit in the program are not required to have completely installed all systems in their reservations before submitting a payment claim package. **Applicants are strongly encouraged to keep copies of all documents included in the payment claim package submitted to the Program Administrator.**

If the payment claim package is incomplete, the Program Administrator will request the applicant to provide all missing or unclear information. The applicant will be responsible for obtaining missing or revised information from the equipment seller, installer, or HERS Rater to process the request. The Program Administrator will allow the applicant up to 60 days to respond with corrections to all the missing or unclear information to approve payment.

If the claim is made after the expiration date of the reservation or is otherwise ineligible, the applicant may reapply for an incentive reservation but will be subject to the program eligibility requirements, incentive levels, and funding available at the time of the reapplication.

The complete payment claim package must be delivered to the appropriate Program Administrator. For mailing address, fax, and contact information, please visit [www.gosolarcalifornia.ca.gov/contacts/consumers.php]. Alternatively, if the applicant had previously submitted the application via the NSHP Application Web Tool, the applicant may choose to submit all of the documents in the payment claim package, except the NSHP-2, through the Web Tool as well. **Applicants are strongly encouraged to use the Web Tool for submitting payment claim documents**.

The Energy Commission and the Program Administrators intend to make payments within 6 to 8 weeks of receipt of a complete payment claim package. Payment will be made to the payee and mailed to the address on the NSHP-2 and/or Payee Data Record (STD-204).

C. Claiming an Incentive Payment Without a Prior Reservation

If a solar energy system has been installed and the applicant subsequently wishes to receive an incentive from the program, the reservation process in Chapter IV must still be followed. However, applicants should be aware that program eligibility requirements and incentive levels at the time of application/payment claim submission may have changed since the system installation, resulting in necessary system modifications, lower incentives, or ineligibility for incentives.

APPENDIX A
FREQUENTLY ASKED QUESTIONS

A. Can My Installed System Be Different Than My Reservation?

The Energy Commission expects a solar energy system to be installed as described in the Expected Performance Based Incentive Documentation (CF-1R-PV), but recognizes that changes may occur during installation. Any change in the solar energy system specifications or the expected performance of the system as determined through field verification must be documented by rerunning the CECPV Calculator.

If the applicant uses the California Flexible Installation criteria, the payment claim package may be completed using the expected performance calculated for the reservation as long as the orientation, tilt and minimal shading criteria are confirmed to be met by the field verification. The applicant also has the option of recalculating the incentive based on the actual orientation and tilt of the system as determined by the field verification. If the field verification determines that the California Flexible Installation criteria are not met, the expected performance shall be recalculated based on the actual orientation, tilt and shading.

When a change increases the expected performance of the system, the incremental increase in expected performance will be funded at the incentive level in effect at the time the change request, with supporting documentation, is submitted to the Program Administrator and deemed complete, provided program funding is available. These changes must be submitted to the Program Administrator prior to the submission of the payment claim package. Changes must also be documented in the Payment Claim Form (NSHP-2).

B. Can Applicants Add to Their Existing Systems?

Once incentives are paid, changes to expand or otherwise improve the expected performance of a system(s) are not eligible for NSHP funding. Homeowners otherwise ineligible for NSHP funding may apply to the California Solar Initiative Program administered by the California Public Utilities Commission. See [http://www.gosolarcalifornia.ca.gov/csi/index.php] for additional information and requirements.

C. Time Extensions

Projects with valid, unexpired reservations as of January 1, 2010, were automatically granted a one-time time extension as follows: Solar as Standard and affordable housing projects have an additional 12 months from the expiration date of their reservations as stated on the NSHP-2 to submit a payment claim package. Base incentive projects (as defined by previous editions of the Guidebook) have an additional six months from the expiration date of their reservation as stated on the NSHP-2 to submit payment claim packages.

No other time extensions will be granted to any other projects under any circumstances.

D. Can the Equipment Seller/Installer Be Different From the Equipment Seller/Installer in the Reservation Application?

Applicants wishing to use a different equipment seller/installer from the equipment seller/installer selected in their reservation application must notify the Program Administrator and provide the following supporting documentation verifying this change. The supporting documentation consists of:

- An equipment purchase agreement and installation contract.
- A revised CF-1R-PV.
- If the original equipment seller/installer is the rebate payee, as indicated on the NSHP-1, they must provide written confirmation acknowledging that they are no longer the equipment seller/installer for the specific project and will no longer receive the NSHP incentive.

Before approving the change in equipment seller/installer, the Program Administrator will verify that the new equipment seller/installer meets the program eligibility requirements outlined in Chapter II, Section N and the supporting documentation meets the document requirements outlined in Chapter IV, Section B.

E. Reservation Cancellations

Project reservations may only be cancelled by the applicant. Applicants wishing to cancel their project reservation must provide written notification to the Program Administrator. The written notification must include the following items:

- Date of the notification.
- The name of the project.
- The site address(es).
- Statement that the applicant would like to cancel the project reservation.
- Acknowledgement that if the applicant cancels their reservation prior to the expiration of the project, they may not reapply for a new reservation until the incentive level has dropped at least one level from the incentive level in the original reservation.
- Printed name and signature of the applicant.

APPENDIX B
FIELD VERIFICATION AND DIAGNOSTIC TESTING OF SYSTEMS[45]

A. Background

The NSHP provides incentives for installing high-performance solar energy systems on energy-efficient homes. The incentive amount is determined by the expected performance of the solar energy system. The expected performance calculation accounts for the tested and certified performance of the specific photovoltaic (PV) modules and inverter, mounting type, cell temperature, orientation, tilt of the modules, and the extent to which the system is shaded. The CECPV Calculator developed by the Energy Commission accounts for these parameters as well as the solar and climatic conditions for the location of the system to determine hourly estimated performance, which is weighted to account for the time-dependent valuation (TDV) of the electricity that is produced. Third-party field verification must be conducted to ensure that the components of the PV system and its installation are consistent with the characteristics used to determine the estimated performance. Field verification is a value-added service paid for by the applicant that provides quality control and can protect the applicant, builder, installer, supplier, and homeowner. Field verification is completed consistent with the procedures found in the current Building Energy Efficiency Standards [www.energy.ca.gov/title24]. Field verification for new housing developments may employ the sampling approach as allowed in the current Building Energy Efficiency Standards.[46] When PV systems are grouped for sampling, all PV systems that meet the minimal shading criterion may be included in the grouping, regardless of the actual azimuth, tilt, array capacity, etc.

The field verification and diagnostic testing procedures described in this Appendix are intended to ensure that the:

- PV modules and inverters used in the expected performance calculations are actually installed at the applicable site.

- PV modules are minimally shaded, or if shaded, that the actual shading does not exceed the shading characteristics that were included in the expected performance calculations.

45 The field verification procedures found in Appendix B are applicable only for solar energy systems using flat plate photovoltaic modules.
46 For the 2005 Building Energy Efficiency Standards see Chapter 7 of the Residential Alternative Calculation Method (ACM) Approval Manual. For the 2008 Building Efficiency Standards see Appendix RA2 of the 2008 Reference Appendices.

- Measured AC power output from the PV system is equal to or exceeds that calculated by the CECPV Calculator within the specified margin at the prevailing conditions at the time of field verification and diagnostic testing.

B. Responsibilities

Field verification and diagnostic testing are the responsibility of both the PV system installer and the HERS Rater who completes the third-party field verification. The PV installer must perform the field verification and diagnostic testing procedures in this document for every system that he or she installs. The HERS Rater working under the oversight of an Energy Commission-approved NSHP HERS Provider then performs independent third-party field verification and diagnostic testing of the systems.

The field verification and diagnostic testing protocol is the same for both the PV installer and the HERS Rater. The protocol anticipates that the PV installer will have access to the roof to make measurements, but that the HERS Rater may not. The measurements required by this protocol are not required to be completed on the roof, but more accurate measurement techniques are possible with roof access. The measurements required by the protocol may be performed in multiple ways as described in the subsections below.

C. Field Verification and Diagnostic Testing Process

The NSHP field verification and diagnostic testing of PV systems follows the process described below. Note, for NSHP purposes, a PV system is one or more PV modules connected to one inverter. Documentation of the process uses three forms that are counterparts to the compliance forms used for the *Building Energy Efficiency Standards*.

1. The applicant enters the necessary input data into the CECPV Calculator, which produces an Certificate of Compliance Form (CF-1R-PV) that documents the specific modules, inverter(s) and meter(s) that are used in each PV system, the anticipated shading of each system (either the intent for the system to meet the minimal shading requirements or the actual shading that is anticipated), and a table of predicted electrical generation for each system for a range of solar irradiance and ambient air temperature. The CF-1R-PV is provided to the Program Administrator with the NSHP reservation application and to the HERS Provider.
2. Once each PV system is installed, the PV installer completes the field verification and diagnostic testing protocol for each PV system and documents the results on the Installation Certificate (CF-6R-PV), verifying that the installation is consistent with the CF-1R-PV. The PV installer documents and certifies that the PV system meets the requirements of this appendix and provides copies of the CF-6R-PV to the builder/homeowner, applicant, and HERS Rater. The CF-6R-PV shall indicate the actual azimuth and tilt for all PV systems where the California Flexible Installation was used

on the CF-1R-PV. The CF-6R-PV shall be completed by the PV system installer in all cases.

EXCEPTION: If 100 percent of the PV systems in a NSHP application are being tested by a HERS Rater (sampling is not being used), the HERS Rater can complete the testing required for the CF-6R-PV; however, the PV installer is still required to sign the CF-6R-PV.

The applicant shall provide the CF-6R-PV to the HERS Rater. In conjunction with the CF-6R-PV, the applicant shall provide to the HERS Rater a site plan for each lot:

a) Identifying the height category (small, medium, or large) of all pre-existing, planted, and planned trees and the location and height of any structures which will be built on the lot and neighboring lots of the building with the PV system; and

b) Showing the bearing of the property lines and the azimuth and tilt or roof pitch of each PV system.

The applicant shall also provide the HERS Rater a product specification (cut-sheet) for the PV modules, inverter, and meter for the specific system, attached to the CF-6R-PV along with an invoice or purchase document which lists the make and model of the PV modules installed.

3. The HERS Rater completes independent third-party field verification and diagnostic testing of each PV system and documents the results on the Certificate of Field Verification and Diagnostic Testing (CF-4R-PV), independently verifying that the installation is consistent with the CF-1R-PV and the CF-6R-PV. The HERS Rater provides a copy of the CF-4R-PV to the applicant and the HERS Provider. The CF-4R-PV shall indicate the actual azimuth and tilt for all PV systems where the California Flexible Installation was used on the CF-1R-PV. In cases where the CF-6R-PV or the CF-4R-PV show that the installed PV system is not consistent with the previously submitted CF-1R-PV, a revised CF-1R-PV must be prepared and submitted with the associated electronic files to the Program Administrator , that is consistent with the as-installed conditions. When such an inconsistency is found when the sampling approach is used, revised CF-1R-PVs must be prepared and submitted to the Program Administrator for all systems in the sampling group.
4. As part of the payment process, the Program Administrator will confirm, in the HERS Provider data registry, that the Certificate of Field Verification and Diagnostic Testing (CF-4R-PV) has been completed for each PV system in the NSHP application.

D. Relationship to Other Codes, Standards, and Verification

The local jurisdiction must issue a building permit for the qualifying PV system, either as a separate permit or as part of the new residential building permit. The PV system must meet all

applicable electrical code, structural code, building code, fire code, and local electric utility interconnection requirements.

The field verification and diagnostic testing procedures described in this document do not substitute for normal electrical, structural, or building plan check or field inspection. Nor do they substitute for field verification by the local utility regarding interconnection to the electric grid.

E. Field Verification Visual Inspection

The purpose of the visual inspection described in this protocol is to verify the installation of the proper equipment and the installation conditions specified on the CF-1R-PV. The HERS Rater shall use binoculars or another means to view the installation without being required to have access to the roof. The HERS Rater may rely on photographic evidence provided by the installer on the make, model and quantity of PV modules, standoff distance, and shading, but in the absence of such evidence, must rely on a conservative determination based solely on his or her own observation.

1. PV Modules

The PV installer and the HERS Rater shall verify that the make, model, and quantity of PV modules specified on the CF-1R-PV are installed in the field. The PV installer and HERS Rater shall verify the module mounting type (BIPV or rack-mounted) and in the case of rack-mounted modules, the standoff distance of the modules above the mounting surface. The PV installer and the HERS Rater shall verify the mounting height of the modules above the ground (either one-story, two-story, or applicant-specified height).

2. Inverters

The PV installer and the HERS Rater shall verify that the make, model, and quantity of inverters specified on the CF-1R-PV are installed in the field.

3. System Performance Meters

The PV installer and the HERS Rater shall verify that either a standalone system performance meter or an inverter with a built-in system performance meter is installed that is the same make and model specified on the CF-1R-PV and that the meter meets all Guidebook requirements for system performance meters.

4. Tilt and Azimuth

The PV installer and the HERS Rater shall verify that the tilt and azimuth of the PV modules installed in the field match the values specified on the CF-1R-PV, within ± 5 degrees. In some systems, PV modules may be installed in multiple orientations with different tilts and azimuths. In these cases the tilt and azimuth of each array must be verified. Note that for systems using the California Flexible Installation criteria, the tilt and azimuth of each system must be shown to

fall within the range of tilt and azimuth that is allowable under that criteria (see section E. 4. c) below).

a. Determining Tilt

The tilt angle of the PV modules is measured in degrees from the horizontal (horizontal PV modules will have a tilt of zero and vertically mounted PV modules will have a tilt of 90 degrees). The tilt of the PV modules may be determined in the following ways:

i. Using the building plans

The as-built or construction drawings for the residential building will state the slope of the roof, usually as the ratio of rise to run. If the PV modules are mounted in the plane of the roof then the slope of the PV modules is the same as the slope of the roof. Table B.1 may be used to convert rise to run ratios to degrees of tilt.

Table B.1. Conversion of Roof Pitch to Tilt

Roof Pitch (Rise:Run)	Tilt (degrees)
2:12	9.5
3:12	14.0
4:12	18.4
5:12	22.6
6:12	26.6
7:12	30.3
8:12	33.7
9:12	36.9
10:12	39.8
11:12	42.5
12:12	45.0

Source: California Energy Commission

ii. Using a digital protractor

A digital protractor may be used to measure either horizontal or vertical angles (see Figure B.1). These devices when sighted up the slope of the PV modules from the ground will display the slope, relative to the horizontal.

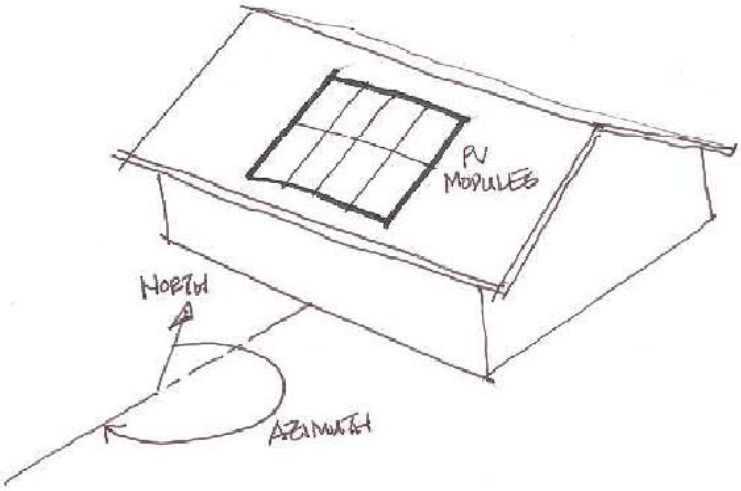
Figure B.1 Digital Protractor

Source: http://www.digitalmeasuringtools.com/z509-9606.shtml

b. Determining Azimuth

The PV installer and the HERS Rater must determine the azimuth of the PV modules and verify that the azimuth is the same as that used to determine the expected performance of each PV system. The convention that is used for measuring azimuth is to determine the degrees of angle clockwise from north: north azimuth is zero degrees, east is 90 degrees, south is 180 degrees, and west is 270 degrees (see Figure B.2).

Figure B.2. Azimuth of the PV Array



Source: California Energy Commission

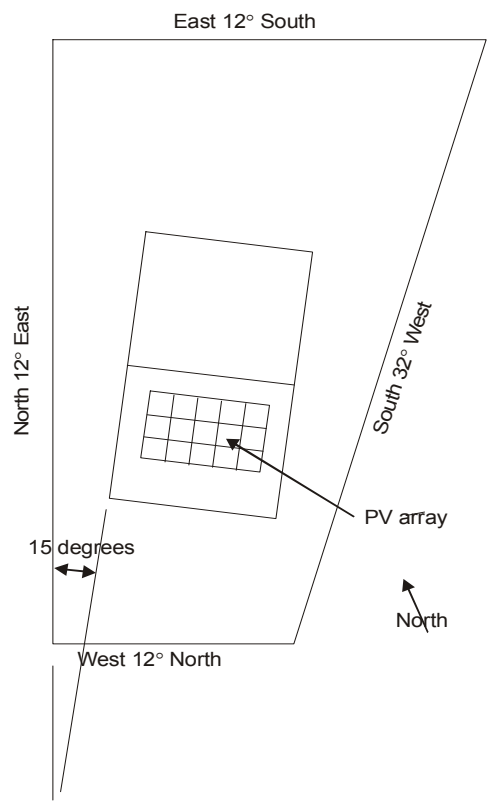
The following methods may be used to determine the azimuth.

i. Using the site plans

In new subdivisions, the house plans will often not show the property lines since the plans are used on multiple lots. However, the subdivision plot plan will show the property lines of the lots. The plot plan will show the bearing of the property lines, and from this information the azimuth of the roof surfaces where the PV modules are mounted may be determined from the position of the house on the lot relative to the bearings of the property lines.

Figure B.3 shows an example plot plan with a house located on it. In this case, the house does not align with any of the property lines but is rotated 15 degrees from the westerly property line as shown. Property lines on plot plans are typically labeled in terms of their bearing, which is the direction of the line. The westerly property line is labeled "North 12° East." If the house was aligned with this property line, the southerly exposure of the house would have an azimuth of 192° (180° plus the 12° bearing of the property line). Since the house is rotated an additional 15°, the azimuth of the southerly face of the house and the azimuth of the PV array is 207° (192° plus 15°). Usually, the house will be aligned with one of the property lines, and the calculation described above will be simplified.

Figure B.3. Example Plot Plan



Source: California Energy Commission

ii. Using a compass with a sighting feature and an adjustment for magnetic declination.

Make sure that the compass has a sighting feature. The compass may have an adjustment built in for magnetic declination so that the reading on the compass is true north or the installer and the HERS Rater shall determine the magnetic declination using the tool available at [http://www.ngdc.noaa.gov/geomagmodels/Declination.jsp] and adjust the compass reading to account for the magnetic declination. Position the compass and determine the angle between compass north and the direction that the PV modules face. It's usually convenient and most accurate to align the compass along the edge of the array using the sighting feature (see Figure B.4).

Figure B.4. Compass With a Sighting Feature

Source: *http://www.rei.com/product/638694/brunton-eclipse-8099-compass* , http://www.opticsplanet.net/silva-olive-drab-compass-15118.html

c. Verifying Tilt and Azimuth for Systems Meeting the California Flexible Installation Criteria

For new single-family residential developments (subdivisions), NSHP allows determination of expected performance using the California Flexible Installation criteria. The California Flexible Installation criteria allow all PV systems that are installed with an azimuth ranging from 150 to 270 degrees, with a tilt ranging from 0:12 and 7:12, and meeting the minimal shading criterion to use a single expected performance calculation. The CECPV Calculator allows the user to choose the California Flexible Installation criteria for easy input and easy compliance when there are multiple systems at various azimuths and tilts. For each system on each building that has the expected performance based on the California Flexible Installation criteria, the HERS Rater must verify that the array is installed with both an azimuth and with a tilt within the acceptable range. The California Flexible Installation criteria requires each PV system to meet the minimal shading criterion discussed below.

F. Shading Verification

Shading of photovoltaic systems, even partial shading of arrays, can be the most important cause of failure to achieve high system performance. Significant shading should be avoided whenever possible. Shading can be avoided by careful location of the array at the point of installation or in some cases, particularly during the process of constructing buildings, by moving obstructions to locations where they do not cast shading on the array. Partial shading from obstructions that are relatively close to the array, particularly obstructions that are on the roof, even if they are relatively small, can be particularly problematic because they cause partial shading of the array for longer time periods of the year. Shading caused in the future due to the maturing of trees that are immature at the time of installation of the PV system can also be a major cause of failure to achieve high performance over the life of the PV system.

The PV installer and the HERS Rater must verify that the shading conditions on the PV system in the field are consistent with those used in the expected performance calculations. The estimated performance calculations will be done either assuming that the minimal shading criterion is met or based on the specific shading characteristics of each system.

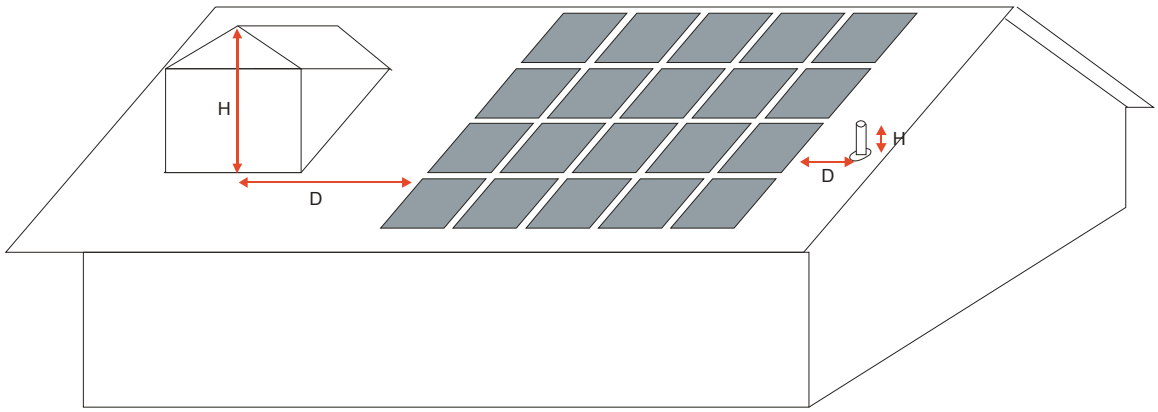
1. Minimal Shading Criterion

The minimal shading criterion is that no obstruction is closer than a distance ("D") of twice the height ("H") it extends above the PV array (see Figure B.5 for an artistic depiction of "H" and "D"). As the figure illustrates, the distance "D" must be at least two times greater than the distance "H." All obstructions that project above the point on the array that is closest to the obstruction must meet this criterion for the array to be considered minimally shaded. Obstructions that are subject to this criterion include:

- Any vent, chimney, architectural feature, mechanical equipment, or other obstruction that is on the roof or any other part of the building.
- Any part of the neighboring terrain.
- Any tree that is mature at the time of installation of the PV system.
- Any tree that is planted on the building lot or neighboring lots or planned to be planted as part of the landscaping for the building (the expected shading must be based on the mature height of the tree).
- Any existing neighboring building or structure.
- Any planned neighboring building or structure that is known to the applicant or building owner.

- Any telephone or other utility pole that is closer than 30 feet from the nearest point of the array.

Figure B.5. The Minimal Shading Criterion Artistic Depiction of "H" and "D"



Source: California Energy Commission

To determine whether or not the minimal shading criterion is met, the PV installer or HERS Rater shall determine for each shading obstruction the smallest ratio of the horizontal distance from the obstruction to the array divided by the vertical height of the obstruction above that point on the array (this is the "closest point on the array"). Often the point on the obstruction that results in the smallest ratio is the topmost point of the obstruction, but in cases where the shape of the obstruction is complex, points on the obstruction that are not the topmost but are closer to the array may actually produce the lowest ratio. "H" is the height of the shading obstruction point above the horizontal projection to the closest point on the array. "D" is the horizontal distance from the closest point on the array to the vertical projection from the point on the obstruction that results in the lowest ratio of "D" divided by "H." Any obstruction located north of all points on the array need not be considered as shading obstructions. When an obstruction is north of some parts of an array but east, south, or west of other parts of the array, the minimal shading criterion shall be determined to the closest point on the array that is west, north, or east of the obstruction.

The PV installer and the HERS Rater may verify through visual inspection that all obstructions meet the 2:1 criterion (note that an altitude angle of 26.6 degrees is equivalent to the 2:1 criterion). For obstructions that visual inspection indicates potentially do not meet the criterion, the PV installer and HERS Rater must measure the height and distance of the obstruction(s) relative to the PV array as described above to verify that the 2:1 shading criterion (or a lower than 26.6 altitude angle through the same points on the obstruction and array) is met. A tolerance of ± 5 percent will be permissible when determining the ratio (or the altitude angle).

2. Accounting for Actual Shading

When a PV installation does not meet the minimal shading criterion, it can still qualify for an incentive and participate in the NSHP program, but the shading conditions for each PV system at the site must be accounted for in the expected performance calculation as described in this section. The basic method is used when the shading condition is measured using a tape measure or using a digital protractor. A different method is used when measurements are made with a solar assessment tool.

For shading obstructions that are accounted for in the expected performance calculation, the CECPV Calculator will produce on the CF-1R-PV a table similar to Table B.2 that shows the distance-to-height ratio and altitude angle for the closest point on the array for each obstruction including mature trees that shade the PV array. This table divides the compass into 11 (approximately 22.5 degree) sectors, progressing clockwise around the compass from north. The table provides the distance-to-height ratio and altitude angle for each sector of the compass. When there is more than one obstruction in a sector, the information is reported for the obstruction with the lowest distance to height ratio (highest altitude angle). The distance to height ratio will be a number less than or equal to two, because if it is greater than two, the minimal shading criterion is satisfied in that direction and shading is not considered in the expected performance calculation for that sector. The table also shows the minimum distance to small, medium, and large trees to meet the minimal shading criterion for trees that are not at their mature heights. The data in Table B.2 is specific to a particular PV system installation. In this example the minimal shading condition is not met for five sectors of the compass, ESE, SSE, S, SW, and WNW.

The PV installer and the HERS Rater must verify that the shading conditions that exist (or are expected to exist in the case of the mature heights of trees that are planted on the building lot or neighboring lots or planned to be planted as part of the landscaping or planned buildings or structures on the building lot or neighboring lots that are known to the applicant or building owner) at the site will not cause greater shading of the PV array than the shading characteristics that were used in the expected performance calculations.

Table B.2. Example CF-1R-PV Format for PV Shading

Orientation	Obstruction Type	Altitude Angle to Shading Obstruction	Distance to Height Ratio	Minimum Distance to Small Tree	Minimum Distance to Medium Tree	Minimum Distance to Large Tree
ENE (55 – 79)	NA	Minimal Shading	2.00	16	46	76
E (79 -101)	NA	Minimal Shading	2.00	16	46	76
ESE (101 – 124)	Neighboring structure	45 degrees	1.00			
SE (124 – 146)		Minimal Shading	2.00	16	46	76
SSE (146 – 169)	On roof obstruction	50 degrees	0.84			
S (169 – 191)	Tree (existing-mature)	70 degrees	0.36			
SSW (191 – 214)		Minimal Shading	2.00	16	46	76
SW (214 – 236)	Tree (existing-not mature)	30 degrees	1.5			
WSW (236 – 259)		Minimal Shading	2.00	16	46	76
W (259 – 281)		Minimal Shading	2.00	16	46	76
WNW (281 – 305)	Tree (planned)	65 degrees	0.49			

Source: California Energy Commission

3. Measuring Heights and Distances or Altitude Angles

One of the following procedures may be used to measure heights and distances or altitude angles to obstructions.

a) Using a Tape Measure

A tape measure or other measuring device may be used to measure the distance (“D”) from the point on the PV array corresponding to the lowest ratio of distance to height (“H”) for each shading obstruction for each 22.5 degree compass sector. The distance to a tree is measured to the nearest edge of the trunk of the tree. Once the height difference (“H”) and distance (“D”) are determined in each compass sector, the ratio is calculated and must be greater than the value used in the expected performance calculation as reported on the CF-1R-PV (see the fourth column in Table B.2 labeled Distance-to-Height Ratio). This method can be employed from the ground without access to the roof, when factoring in the rooftop dimensions.

The height measurement for trees that are immature shall be based on the mature tree height discussed below. Determining the distances and heights of obstructions for buildings and structures that are planned but have not yet been constructed shall be based on plans for those structures.

b) Using a Digital Protractor

A digital protractor (see Figure B.1) may be used to measure the highest altitude angle from the obstruction to the closest point on the array (using the same points on the array and on the obstruction that produce the lowest ration of “D” to “H” if those dimensions were measured instead of the altitude angle). The measured altitude angle for each obstruction in each compass sector must be smaller than or equal to that used in the expected performance calculation as

reported on the CF-1R-PV (see the third column in Table B.2). To use the digital protractor measurement directly, the measurement must be made from the roof. Alternatively, the digital protractor measurement may be made from the ground. Trigonometric adjustments will be required to correct for the height difference between the ground where the measurements are made and the nearest point, on the PV array, to the shading obstruction.

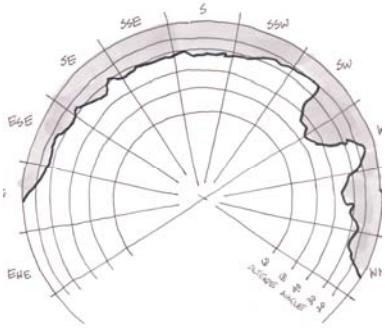
This method does not address expected shading resulting from the mature heights of planted immature trees or planned trees. To determine distances for planted immature trees a tape measure should be used. The height measurement for trees that are immature shall be based on the mature tree height discussed below. Determining the distances and heights of obstructions for buildings and structures that are planned but have not yet been constructed shall be based on plans for those structures.

c) Using a Solar Assessment Tool

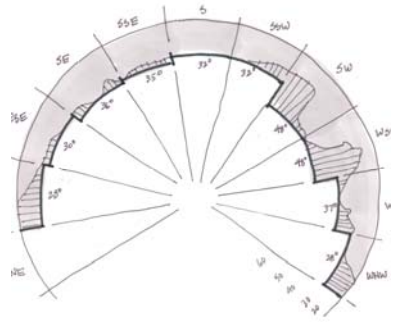
For shading from existing obstructions, shading conditions may be verified using a solar assessment tool. This procedure will typically be used by the PV installer, but the HERS Rater may not have direct access to the array and if not, would rely on the adequacy of documentation by the installer to confirm the shading conditions.

At each point of measurement, the tool is placed on the PV array, leveled and oriented consistent with the manufacturer's instructions. Once the tool is properly positioned, it will determine the obstructions that cast shade and the month and time of day when shading will occur. The tool will enable these determinations either through the use of a digital photograph or a manual tracing on an angle estimator grid overlay. These results for a single point of reference on the array are converted into a format that can be used by the CECPV Calculator, either through software provided by the tool manufacturer or manually, as shown in Figure B.6(b), to determine the altitude angle of an obstruction in each compass sector. The installer should keep documentation of the shading shown on the tool, the location of the tool on the array, and the shading obstructions that are indicated on the tool for the HERS Rater to verify the results.

Figure B.6. Conversion of Results to CECPV Calculator Input



(a) This diagram shows the 22.5 degree compass sectors used by the CECPV Calculator and the altitude angles determined by a Solar Assessment Tool for a single point of reference on the array.



(b) Within each compass sector, the highest altitude is selected and used for that entire sector. This data is shown for a single point of reference on the array.

Source: California Energy Commission

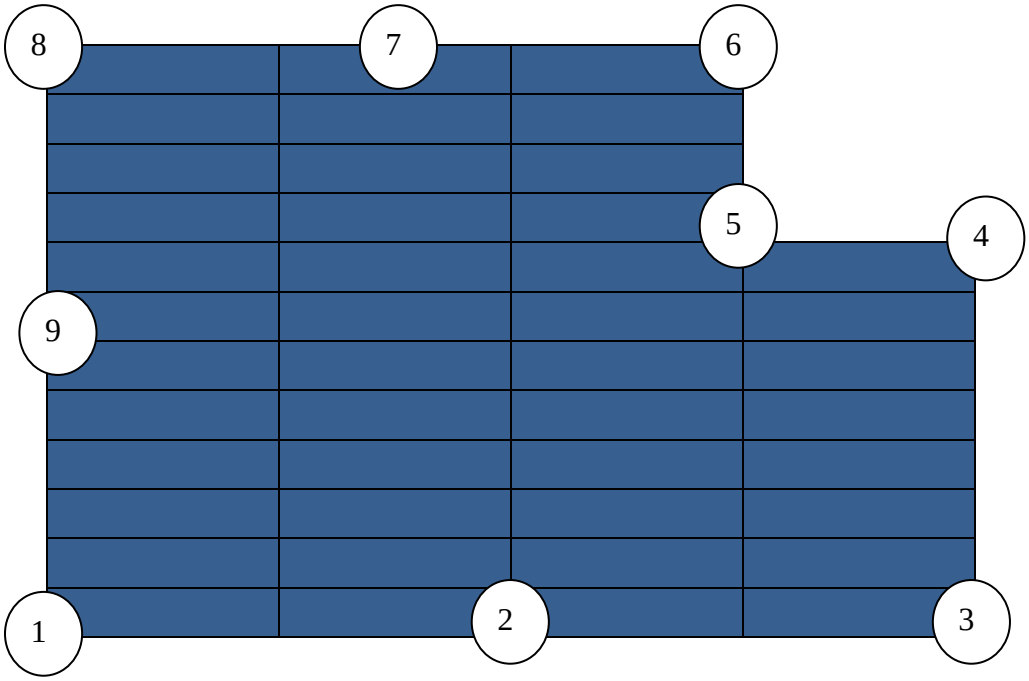
Measurements shall be made at all the major corners of the array with no adjacent measurement being more than 40 feet apart (see example in Figure B.8). The points of measurement shall be distributed evenly between two major corners if they are more than 40 feet apart such that the linear distance between any sequential points is no more than 40 feet. However, if any linear edge of the array has no obstructions that are closer than two times the height they project above the closest point on the array, then the intermediate measurements along that edge do not need to be made.

The altitude angles measured at each major corner shall be overlapped onto a single diagram or processed with the tool manufacturer's software. The maximum altitude angles measured at any of the major corners of the array within a given sector shall be applied to the entire sector. This creates a set of 11 values that are used in the CECPV Calculator.

This method does not address expected shading resulting from the mature heights of planted immature trees or planned trees or expected construction of buildings or other structures on neighboring lots. To determine distances for planted immature trees a tape measure should be used. To determine distances for planned trees a landscape plan provided by the applicant should be used. The height measurement for trees that are immature must be based on the mature tree height discussed below. Determining the distances and heights of obstructions for buildings and structures that are planned but have not yet been constructed shall be based on plans for those structures. Such shading shall be addressed separately.

The results determined by the tool in combination with the expected future shading described above are compared to the data that was used in the expected performance calculations to ensure that there is not greater shading at the site than was used in the expected performance calculations.

Figure B.7. Example of Points Where Measurement Shall Be Made Using a Solar Assessment Tool (overall array dimensions 76 feet by 50 feet)



Source: California Energy Commission

4. Mature Tree Height

The expected performance calculations require the mature height to be used when accounting for the shading impact of planted immature trees. This section provides guidelines for determining the mature height of such trees. Applicants must identify the height category (small, medium, or large) of all planted and planned trees at the site. That information must be documented in conjunction with the CF-6R-PV and provided to the HERS Rater for verification. Any existing tree with a height greater than 50 feet at the time observations are made shall be recorded with its actual height or altitude angle instead of the height category.

All trees are classified as small, medium, or large by species. Trees with a mature height of 20 feet or smaller are small trees. Trees with a mature height greater than 20 feet but less than 50 feet are medium trees. Trees with a mature height equal to or greater than 50 feet are large trees. If the type of tree is unknown, it must be assumed to be large. The mature heights of small, medium and large trees that must be used in the expected performance calculations are 20 feet, 35 feet, and 50 feet, respectively.

The Center for Urban Forestry Research of the U.S. Department of Agriculture's Forest Service has published tree guides for tree zones that are applicable to California. Table B.3 shows the

appropriate tree guide to use for each of California's climate zones for the expected performance calculations.

The guides provide tree selection lists for each tree zone. The lists provide either the mature height or the size category in that tree zone for each species. These tree guides are posted at: [http://www.fs.fed.us/psw/programs/cufr/tree_guides.php].

For trees not listed in the tree selection tables of the tree guides, the *Sunset Western Garden Book* should be consulted. This document provides the mature height range or maximum height for each species. If a range is given, the average of the maximum height range should be used to determine if the tree is large, medium, or small.

Table B.3. Appropriate Tree Guide to Use for Each California Climate Zone

CEC Climate Zones	Tree Regions	Tree Guide to Use	
1, 2, 3, 4, 5	Northern California Coast	Under Development (Use Sunset Western Garden Book)	
6, 7, 8	Southern California Coast	McPherson, E.G., et al. 2000. Tree guidelines for coastal Southern California communities. Sacramento, CA: Local Government Commission	Chapter 5, pages 57-65
9, 10	Inland Empire	McPherson, E.G., et al. 2001. Tree guidelines for Inland Empire communities. Sacramento, CA: Local Government Commission	Chapter 6, pages 65-82
11, 12, 13	Inland Valleys	McPherson, E.G., et al. 1999. Tree guidelines for San Joaquin Valley communities. Sacramento, CA: Local Government Commission	Chapter 5, pages 50-55
14, 15	Southwest Desert	McPherson, E.G., et al. 2004. Desert southwest community tree guide: benefits, costs and strategic planting. Phoenix, AZ: Arizona Community Tree Council, Inc.	Chapter 7, pages 51-53
16	Northern Mountain and Prairie	McPherson, E.G, et al. 2003. Northern mountain and prairie community tree guide: benefits, costs and strategic planting. Center for Urban Forest Research, USDA Forest Service, Pacific Southwest Research Station.	Chapter 5, pages 47-55

Source : California Energy Commission

Table B.4 shows the horizontal distance that trees of each mature height category would need to be located from nearest point of the PV array in order to meet the condition of minimal shading.

Table B.4. Horizontal Distance Trees Would Need to Be Located From the Closest Point of a PV Array to Qualify for Minimal Shading

Mounting Location	Small Tree (20 ft)	Medium Tree (35 ft)	Large Tree (50 ft)
1 Story (Lowest Point of Array at 12 ft)	16	46	76
2 Story (Lowest Point of Array at 22 ft)	Any Distance	26	56
3 Story (Lowest Point of Array at 32 ft)	Any Distance	6	36

Source: California Energy Commission

G. Verification of System Performance

The PV installer and HERS Rater must verify that the AC power output from the PV system is consistent with that predicted by the expected performance calculations. The CECPV Calculator will determine an estimate of system AC power output for a range of solar irradiance and ambient air temperature conditions and print a table on the CF-1R-PV form. The values in the table will be 90 percent of the output estimated by the CECPV Calculator for each set of conditions in the table. (The calculations also include the default adjustment of 0.88 for losses such as dirt, dust, and mismatched wiring.) The values in the table are for an unshaded array. An example of the data that will be produced is shown in Table B.5. The data in the table is specific to each PV system.

Verification of system performance must be performed after the PV system is installed and connected to the electricity grid. Measurements must be made with a minimum irradiance of 300 W/m² in a plane parallel to the array. The PV installer and/or the HERS Rater must 1) measure the solar irradiance in a plane parallel to the array 2) measure the ambient air temperature and 3) determine the expected AC power output for the measured field conditions from the table on the CF-1R-PV form. The PV installer or the HERS Rater must then observe the AC power output displayed on the system performance meter (typically an inverter with a built-in performance meter) and verify that the AC power output is equal to or greater the amount shown in the table for the field measured conditions. To qualify for incentives under NSHP, PV systems must have a standalone performance meter or an inverter with a built-in performance meter that measures AC power output.

The PV installer and HERS Rater must observe the AC power output on the system performance meter after waiting for a period of stable conditions during which the measured solar irradiance has stayed constant within ± 5 percent.

Table B.5. Example Table of Expected AC Power Output From CECPV Calculator (Watts)

(W/m²)	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	614	606	599	591	584	576	568	560	553	544	536	528	520	512	504	496	487	479	471	463	454	446
325	665	657	648	640	632	623	615	607	598	590	581	572	564	555	546	537	528	519	510	501	492	483
350	716	707	698	689	680	671	662	653	643	634	625	616	606	597	588	578	569	559	550	540	530	520
375	766	757	747	738	728	718	708	699	689	679	669	659	649	639	629	619	609	598	588	578	568	557
400	817	807	797	786	776	765	755	745	734	723	713	702	691	681	670	659	648	637	626	615	604	593
425	868	857	846	835	824	813	802	790	779	768	757	745	734	722	711	699	688	676	664	653	641	629
450	918	907	895	883	872	860	848	836	824	812	800	788	776	764	752	739	727	715	702	690	677	665
475	967	955	943	931	919	907	894	882	869	856	843	831	818	805	792	779	766	753	740	727	714	700
500	1016	1004	991	978	966	953	940	927	913	900	887	873	860	846	832	819	805	791	777	763	750	736
525	1065	1052	1038	1025	1012	998	984	971	957	943	929	915	901	887	872	858	843	829	814	800	785	770
550	1113	1099	1085	1071	1057	1043	1029	1014	1000	986	971	956	942	927	912	897	882	866	851	836	820	805
575	1161	1147	1132	1117	1102	1088	1073	1058	1043	1027	1012	997	982	966	951	935	919	903	887	871	855	839
600	1209	1194	1178	1163	1147	1132	1116	1100	1085	1069	1053	1037	1021	1005	989	972	956	940	923	906	890	873
625	1256	1240	1224	1208	1192	1176	1159	1143	1126	1110	1093	1077	1060	1043	1026	1009	992	975	958	941	924	906
650	1302	1286	1269	1252	1236	1219	1202	1185	1168	1150	1133	1116	1098	1081	1063	1046	1028	1010	992	974	957	939
675	1348	1331	1314	1296	1279	1261	1244	1226	1208	1190	1172	1154	1136	1118	1100	1081	1063	1045	1026	1007	989	970
700	1394	1376	1358	1340	1322	1304	1285	1267	1248	1230	1211	1192	1174	1155	1136	1117	1098	1078	1059	1040	1021	1001
725	1439	1420	1401	1383	1364	1345	1326	1307	1288	1269	1249	1230	1210	1191	1171	1151	1132	1112	1092	1072	1052	1032
750	1483	1464	1444	1425	1405	1386	1366	1346	1327	1307	1287	1267	1246	1226	1206	1185	1165	1144	1124	1103	1082	1061
775	1526	1506	1487	1466	1446	1426	1406	1385	1365	1344	1323	1303	1282	1261	1240	1219	1198	1176	1155	1134	1112	1090
800	1569	1549	1528	1507	1486	1466	1445	1423	1402	1381	1360	1338	1317	1295	1273	1252	1230	1208	1186	1164	1141	1119
825	1611	1590	1569	1547	1526	1504	1483	1461	1439	1417	1395	1373	1351	1328	1306	1284	1261	1238	1216	1193	1170	1147
850	1653	1631	1609	1587	1565	1542	1520	1498	1475	1452	1430	1407	1384	1361	1338	1315	1292	1268	1245	1221	1198	1174
875	1693	1671	1648	1626	1603	1580	1557	1534	1510	1487	1464	1440	1417	1393	1369	1345	1322	1298	1273	1249	1225	1200
900	1733	1710	1687	1663	1640	1616	1593	1569	1545	1521	1497	1473	1449	1424	1400	1375	1351	1326	1301	1276	1251	1226
925	1772	1748	1725	1701	1676	1652	1628	1603	1579	1554	1529	1505	1480	1455	1430	1404	1379	1354	1328	1302	1277	1251
950	1811	1786	1762	1737	1712	1687	1662	1637	1612	1586	1561	1536	1510	1484	1459	1433	1407	1381	1354	1328	1302	1275
975	1980	1823	1798	1772	1747	1721	1696	1670	1644	1618	1592	1566	1540	1513	1487	1460	1434	1407	1380	1353	1326	1299
1000	1980	1980	1980	1807	1781	1755	1729	1702	1676	1649	1622	1595	1569	1542	1514	1487	1460	1432	1405	1377	1349	1322
1025	1980	1980	1980	1980	1815	1788	1761	1734	1706	1679	1652	1624	1597	1569	1541	1513	1486	1457	1429	1401	1372	1344
1050	1980	1980	1980	1980	1980	1820	1792	1765	1737	1709	1681	1653	1624	1596	1568	1539	1511	1482	1453	1424	1395	1365
1075	1980	1980	1980	1980	1980	1980	1823	1795	1767	1738	1709	1680	1652	1623	1593	1564	1535	1506	1476	1446	1417	1387
1100	1980	1980	1980	1980	1980	1980	1980	1825	1796	1766	1737	1708	1678	1648	1619	1589	1559	1529	1499	1468	1438	1407
1125	1980	1980	1980	1980	1980	1980	1980	1980	1824	1794	1764	1734	1704	1674	1643	1613	1582	1551	1520	1490	1458	1427
1150	1980	1980	1980	1980	1980	1980	1980	1980	1980	1822	1791	1760	1729	1698	1667	1636	1605	1573	1542	1510	1479	1447
1175	1980	1980	1980	1980	1980	1980	1980	1980	1980	1980	1817	1786	1754	1722	1691	1659	1627	1595	1563	1530	1498	1466
1200	1980	1980	1980	1980	1980	1980	1980	1980	1980	1980	1980	1810	1778	1746	1714	1681	1649	1616	1583	1550	1517	1484

Source: California Energy Commission

1. Measuring Solar Irradiance

Solar irradiance must be measured using an irradiance meter. When making this measurement, the PV installer or HERS Rater must place the irradiance meter in a plane that is parallel to the PV array. The PV installer should position the irradiance meter on top of the PV array or on the roof next to the PV array. If the HERS Rater does not have direct access to the roof, he or she must position the irradiance meter such that it is in full sun and is in a plane that is parallel to the PV array. Digital protractors or other instruments may be used to properly position the irradiance meter.

2. Measuring Ambient Air Temperature

Ambient air temperature must be measured with a digital thermometer in the shade. The instrument must have an accuracy of ± 2 degrees Celsius.

3. Observing AC Power Output at the System Performance Meter

The PV installer and the HERS Rater must observe and record the AC power output reading from the system performance meter as soon as possible after making the measurements of solar irradiance and ambient temperature. The inverter may cycle between multiple readings (total kWh, AC power output, etc.), so the PV installer or HERS Rater will need to wait until the power is displayed and record this reading; several readings should be made to make sure that they are consistent and stable.

4. Multiple Orientation Arrays

Multiple orientation arrays are those with parallel strings, each with an equal number of modules, in different orientations (azimuth and tilt) and connected to the same inverter.[47] When parallel strings in different orientations are connected to the same inverter, separate CF-1R-PV forms must be prepared for each orientation, and solar irradiance must be measured separately in a plane parallel to each orientation. Field verification will require separate CF-6R-PV and CF-4R-PV forms for each orientation. The expected AC power output is determined separately for each orientation, and the sum is used for verification purposes.

For example a qualifying 3 kW PV system has 20 PV modules grouped evenly into two parallel strings of 10 modules each, one facing south with an azimuth of 170 degrees and one facing west with an azimuth of 260 degrees. The installer or HERS Rater evaluates system performance at 11:30 AM in March with an ambient temperature of 62 degrees Fahrenheit. The installer or HERS Rater measures 950 W/m² of solar irradiance in the plane parallel to the south string and 500 W/m² in a plane parallel to the west facing string.[48]

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47 Substantial reductions in performance will result if there are different numbers of modules in each string or if modules with different orientations are connected in series.

48 When testing systems with multiple orientation arrays, the solar irradiance levels on all arrays must remain constant within ± 5 percent as discussed in Verification of System Performance above.

The total expected AC power output table on the CF-1R-PV indicates that the system should be producing 1,200 W at 950 W/m² and 700 W at 500 W/m² of solar irradiance. The expected AC power output is calculated as 1,900 W by summation of each orientation's expected AC power output (1,200 W + 700 W = 1,900 W). This calculated value must be compared to the value displayed on the system performance meter.

APPENDIX C

ENERGY EFFICIENCY DOCUMENTATION REQUIREMENTS

A. Plan Check Checklist

The purpose of this checklist is to expedite the required plan check process. Applications submitted without the following documents will be returned to the Applicant. Additional documentation may be requested during the plan-check.

A complete set of construction plans[49] which contain the following:

- Architectural, electrical, mechanical, and plumbing information (as applicable)
- A window and door schedule that shows sizes and includes all skylights (if not shown on the floor plan)
- Elevation, wall, roof, floor construction assemblies
- Floor finish schedule (if CF-1R shows high mass design)
- A list of lots and addresses (for residential developments)
- A site plan with a North arrow (for custom homes)

Compliance forms and electronic files:

- Hard copy of the final CF-1R or PERF-1 signed by a CEPE or CEA
- Electronic input file(s) for the CF-1R or PERF-1

Equipment and materials documentation:

- Windows, glazed doors, skylights—specification sheet with manufacturer's name that demonstrates U-factor and Solar Heat Gain Coefficient (SHGC)

49 Plans may be submitted electronically either as a .pdf file or .dwf file. Minimum plan size of 15″ x 21″ for printed plans.

- Space heating equipment—specification sheet with manufacturer's name/model number and efficiency rating for each unit

- Air Conditioner—specification sheet with manufacturer's name/model numbers for condenser/coil match or AHRI reference number for each proposed unit (http://www.Ahridirectory.org) that has an efficiency rating greater than SEER 13, EER 11

- Water heater—specification sheet with manufacturer's name/model number and efficiency rating. If installing a solar water heater, a Solar Water Heating Calculation Form (CF-SR) from either the California F-Chart (OG 100) or Solar Fraction Calculator for Rated Systems (OG 300) is required.

- Roofing material—specification sheet which shows emissivity and reflectivity value of product.

- Specification sheets for any special features or equipment used for compliance with the energy efficiency requirements.

Additional requirements:

- For appliances provided by the builder, specification sheets with manufacturer's name/model number that demonstrate the appliance is ENERGY STAR labeled if ENERGY STAR is applicable to that appliance. Only products listed under the "Appliances" heading of the ENERGY STAR website, need to be verified as ENERGY STAR labeled.[50]

B. CF-4R-EE NSHP Verification Guidelines

The CF-4R-EE NSHP form is completed by a HERS Rater to verify the energy efficiency requirements of the NSHP program. This verification is in addition to any verifications required for any applicable HERS measures. The process to verify energy efficiency compliance involves a field inspection by a HERS Rater where the measures listed on the CF-4R-EE NSHP form are checked off as having passed or failed inspection. The CF-4R-EE NSHP form will be prepopulated with information from the CF-1R submitted in the NSHP application and that has been uploaded to a HERS Provider data registry. The HERS Rater will only need to check off whether a measure passed or failed.

Items listed in the Opaque Surface Details section of the CF-4R-EE NSHP (e.g. wall insulation) can be verified either by having a HERS Rater on-site while the item is accessible (e.g. prior to

50 www.energystar.gov/index.cfm?c=products.pr_find_es_products

enclosure of walls) or by providing the HERS Rater with photographs of the installed items, invoices for materials purchased, and any relevant CF-6Rs. The same allowance for photographs, invoices, and relevant CF-6Rs applies to any special feature listed in Appendix C, Section C that is not accessible to the HERS Rater. Acceptance of photographs, invoices, and relevant CF-6Rs is solely at the discretion of the HERS Rater.

Note: The HERS verification measure, Quality Installation of Insulation (QII), cannot be verified using photographs, invoices, or CF-6Rs. A HERS Rater must be on-site and perform the required verification prior to wall enclosure or QII may not be used to meet the NSHP energy efficiency requirements.

All other measures listed on the CF-4R-EE NSHP must be verified through visual inspection.

Each item listed on the CF-4R-EE NSHP must be compared and verified against what was actually installed because each item is critical to the building's overall performance and energy savings.

Special features are items that require special attention. For example, items such as radiant barriers would require a HERS Rater to visually verify the proper installation of the radiant barrier, ensuring that it is installed between the rafters and on the gable ends of the attic. The list of special features can be found in Appendix C, Section C of the NSHP Guidebook. Special features can be inspected at any time during the construction process, with the exception of the Housewrap/Air-retarding wrap which must be inspected prior to wall enclosure.
If an applicant is participating in a utility new construction energy efficiency program, such as the California Advanced Homes Program (CAHP), they must meet the energy efficiency requirements of that utility new construction energy efficiency program rather than the NSHP energy efficiency requirements (i.e. the CF-4R-EE NSHP will not be completed). See Chapter II, Section C for additional information on participation in a utility new construction energy efficiency program.

C. NSHP List of Energy Efficiency Special Features

Special Feature	Special Feature Description
Housewrap/ Air - retarding wrap	This building incorporates an air retarding wrap that shall be installed to meet the requirements of Section 150 (f) of the 2008 Building Energy Efficiency Standards, Title 24, Part 6.
Metal-framed walls	This building uses metal-framed walls that shall meet mandatory insulation requirements. In many cases sheathing insulation is used in addition to cavity insulation. Metal-framed walls shall be built according to the details in Reference Joint Appendix 4 of the Reference Appendices for

	the 2008 Building Energy Efficiency Standards for this construction type.
Controlled-ventilation Crawlspace	Controlled-ventilation Crawlspace is to be constructed in accordance with the alternative to section 150(d) of the 2008 Building Energy Efficiency Standards, Title 24, Part 6, and section 3.5.4 of the 2008 Residential Alternative Calculation Method Approval Manual.
High mass building features	High-mass building features are described in the THERMAL MASS FOR HIGH MASS DESIGN table of compliance form CF-1R.
Radiant Barriers installed	The radiant barriers installed in this building shall meet eligibility and installation criteria as specified in Reference Residential Appendix RA4.2.2 of the Reference Appendices for the 2008 Building Energy Efficiency Standards.
Multiple conditioned zones	This building uses multiple conditioned zones. The nonclosable area between zones cannot exceed 40 ft^2 and each zone must be controlled with a separate thermostat. In addition, the air flow requirements and fan watt draw requirements in Reference Residential Appendix RA3.3 of the Reference Appendices for the 2008 Building Energy Efficiency Standards[51] must be met.
Cool Roofing products installed	Cool roof products installed on this building qualifying for compliance with Sections 141(a)1.B, 143(a)1 or 149(b) 1 B, 151(f)12, or 152(b)1H of the 2008 Building Energy Efficiency Standards, Title 24, Part 6, shall be rated and labeled by the Cool Roof Rating Council in accordance with Section 10-113 of the 2008 Building Energy Efficiency Standards, Title 24, Part 6.
Hydronic heating system	Table R3-50 of the 2008 Residential Alternative Calculation Method Approval Manual specifies default assumptions for hydronic systems for existing buildings. System details are in the SPECIAL SYSTEMS - HYDRONIC DISTRIBUTION SYSTEMS AND TERMINALS table of the CF-1R.
Gas Absorption equipment	Minimum efficiency for Gas Absorption equipment is specified in Table 112-D in Subchapter 2 of the 2008 Building Energy Efficiency Standards, Title 24, Part 6.
Non-NAECA large storage gas water heater	A non-NAECA large storage gas water heater is specified for this building. System specifications are shown in the SPECIAL WATER HEATER/BOILER DETAILS table of compliance form CF-1R.
Water-heating system	Water-heating system specifications are in the SPECIAL

51 www.energy.ca.gov/2008publications/CEC-400-2008-004/CEC-400-2008-004-CMF.PDF

does not have a single separate water heater serving each dwelling unit .	WATER HEATER/BOILER DETAILS table of compliance form CF-1R.
Solar thermal water heating	Energy benefits of solar water heating shall be calculated using procedures described in Section 5.1.5 of the 2008 Residential Compliance Manual and Section 5.13 of the 2008 Residential Alternative Calculation Method Approval Manual. See the Reference Appendix RA4.4.10 of the Reference Appendices for the 2008 Building Energy Efficiency Standards for additional information.
Sunspace attached to building	This building has an attached sunspace with interzone surfaces, custom solar heat gain distribution, and sunspace thermal mass elements.

APPENDIX D
NSHP FORMS

NSHP-1	**Reservation Application Form**
NSHP-2	**Payment Claim Form**
NSHP-3	**Ten-Year Warranty Form**
STD-204	**Payee Data Record**

The following forms are not in the Guidebook, and are either produced by the CECPV Calculator or provided by the solar energy system installer or HERS Rater:

CF-1R-PV	**Energy Commission CECPV Calculator Output Form**
CF-4R-EE NSHP	**Certificate of Field Verification**
CF-4R-PV	**Field Verification and Diagnostic Testing Form**
CF-6R-PV	**Installation Certificate Form**

NSHP-1

RESERVATION APPLICATION FORM
NEW SOLAR HOMES PARTNERSHIP

1. Applicant Name and Contact Information

Homeowner or Builder/Developer Name	Phone Number	Email Address

Please check one of the following:

I am the: ☐ Homeowner ☐ Builder/Developer

Mailing Address	City:	State:	Zip Code:

Contact Name (if different from above) & Company	Address	Phone, Fax and Email Address

2. Project Description

Please give a general project description including the site address of development.

Name of project: _____

Address where the system will be installed (if this is a housing development, only the city or location to nearest city needs to be specified): _____

Please check all that apply to your project:

Occupancy type: ☐ Single Family ☐ Multifamily ☐ Mixed-Use ☐ Nonresidential

Project type:
- ☐ Solar as Standard (More than 50 percent of the residential dwelling units in a large project (minimum of 6 residential dwelling units) will have solar energy systems installed)
- ☐ Custom home
- ☐ Small housing developments with less than 6 residential units
- ☐ Projects where solar will be installed on less than 50 percent of the residential dwelling units
- ☐ Common area systems in residential developments
- ☐ Solar as an Option (Please note, if solar is offered as an option, your reservation can only be for up to 50 percent of the residential dwelling units in the project)

Total number of residential dwelling units in the project: _____
Total number of residential dwelling units with solar energy systems installed: _____

☐ Affordable Housing
- ☐ Total number of common areas systems installed: _____
- ☐ Total number of residential dwelling units with solar energy systems installed: _____

Please note that only Solar as Standard, affordable housing, and solar as an option projects will receive a 36-month reservation. All others will receive an 18-month reservation.

For custom home applicants to complete
Anticipated new construction permit issue date(s): _____

Anticipated solar permit issue date(s):_____ Anticipated occupancy permit issue date(s):_____

Please note that the building permit for the solar energy system should be approved by the building code enforcement agency prior to the original occupancy of the newly constructed building, but no later than 180 days after the issuance of the occupancy permit.

3. Electric Utility, Participation in Utility's Energy Efficiency Program

Please select the utility providing electricity to the project: ☐ PG&E ☐ SCE ☐ SDG&E ☐ BVE

Is your project participating in the electric utility's new construction energy efficiency program? ☐ Yes ☐ No

Please note that projects participating in the electric utility's new construction energy efficiency program will not need to submit the NSHP energy efficiency documentation.

4. Home Energy Rating System (HERS) Information[52]

	HERS Rater Company	HERS Rater	Phone number	HERS Provider
Energy efficiency measures verification				
Solar energy system field verification				

5. Supporting Documentation Required for Application Submittal

All Projects:

- ☐ Final Subdivision Map or Building Permit
- ☐ EPBI Documentation
  - ☐ CF-1R-PV form
  - ☐ Electronic input files (.emf, .her)
- ☐ Equipment Purchase Agreement*
- ☐ Installation Contract (if separate from the equipment purchase agreement)
- ☐ Energy Efficiency Documentation**
  - ☐ CF-1R form
  - ☐ Electronic input file (.bld/.mp7, .mp8)
  - ☐ Construction plan set***

Additional Requirements for:

Affordable Housing Projects:

- ☐ Regulatory Agreement

Solar as Standard Projects:

- ☐ Build-Out Schedule

Solar as an Option Projects:

- ☐ Build-Out Schedule

Affordable Housing Projects. TCAC projects have up to 60 days after funding approval to submit the Energy Efficiency Documentation.
**In the case of lease or PPA projects, an installation contract with equipment listed shall replace the equipment purchase agreement.*
*****Waived if participating in a utility new construction energy efficiency program***
****See Appendix C for document requirements.*

6. Other Terms and Conditions

- ☐ Builder/Developer is aware that initial energy efficiency measure verification may need to be completed early in the construction process. Energy efficiency measures requiring early verification include, but are not limited to:
  - ☐ Quality Installation of Insulation (QII)
  - ☐ Special Features*
- ☐ Builder/Developer is aware that all NSHP Energy Efficiency verification requirements must be completed in order to receive NSHP incentives. Required energy efficiency verifications include, but are not limited to:
  - ☐ Envelope Assembly (Wall, Roof)
  - ☐ Fenestration Surface Details
  - ☐ HVAC System Details- Heating and Cooling
  - ☐ Water Heating
  - ☐ Special Features*

*Please see Appendix C, Section C for more information on special features measures requiring verification.

7. Declaration

The undersigned party declares under penalty of perjury that the information in this form and the supporting documentation submitted herewith is true and correct to the best of his or her knowledge and acknowledges the following program requirements to reserve funding:

- ☐ Incentives are based on the expected performance of the systems installed.
- ☐ Buildings must achieve at a minimum Tier I Energy Efficiency to be eligible for the program.
- ☐ Systems that are leased or provide electricity under a power purchase agreement are subject to special reporting requirements. Applicant may be required to repay some or all of the NSHP funding he or she receives if the system is leased or provides electricity through a power purchase agreement, and the lease agreement or power purchase agreement is terminated within five years of the system's installation or the start date of the agreement, whichever is later.

The undersigned party further acknowledges that he or she is aware of the requirements and conditions of receiving funding under the New Solar Homes Partnership (NSHP) and agrees to comply with all such requirements and conditions as provided in the Energy Commission's NSHP Guidebook, Fourth Edition, Overall Program Guidebook, and Building Energy Efficiency Standards (Title 24, Part 6) as a condition to receiving funding under the NSHP. The undersigned party authorizes the Energy Commission, during the term of the NSHP, to exchange information on this form with the applicable electric utility servicing the project to verify compliance with NSHP requirements.

[52] This information is used to upload the project information to the HERS Provider data registry.

Signature, Assignment of Administrative Rights and Incentive Recipient Information

(Optional)

☐ I, the applicant, designate _____ as my authorized representative for the New Solar Homes Partnership program. This party is permitted to sign the NSHP-2(s) and any EPBI Documentation on this project on my behalf.

Designated Payee of NSHP Incentive:	_____
Payee's Address:	_____

Homeowner or Builder/Developer Name:	_____	Date:	_____
Signature:	_____	Title:	_____

NSHP-2

PAYMENT CLAIM FORM
NEW SOLAR HOMES PARTNERSHIP

[CEC use only]

Incentive @ _____ = $_____

Payment Approval Date:_____

Reservation ID _____

Project Name Address or Site ID _____

1. Confirmation of Reservation Amount

_____ has been granted a reservation of $ _____ for a _____ kW solar energy system. This reservation is for a _____ project and will expire on _____. The system is being installed at _____. The payment will be made to _____ (designated payee).

The solar energy system must be completed and the claim submitted with the appropriate documentation by the deadline. All energy efficiency measures must be completed and verified by a HERS Rater prior to payment claim submittal. Failure to meet these requirements will cause the payment of NSHP incentives to be delayed or withheld. Claims must be postmarked by the expiration date or the reservation will expire. This reservation is non-transferable. System must be installed at the installation address.

2. Major System Equipment of Record (Modules, Inverters, Meters)

Quantity	Manufacturer	Model	Cost
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

3. System Details

Total System Price: _____

Equipment Cost (before rebate): _____

Installation Cost: _____

Sales Arrangement:
☐ Purchased ☐Leased ☐PPA

Total HERS Cost: _____

PV HERS Cost: _____

EE HERS Cost: _____

Solar Permit Cost: _____

Annual kWh:

Lot Number: _____

Final Address: _____

Interconnection Date: _____

New Construction Building Permit Issue Date:

Final Equipment Seller Name:	Final PV HERS Rater Name and Provider:
Final System Installer Name:	Final EE HERS Rater Name and Provider:

4. PV Modifications

Have any of the equipment or installation specifications changed since the reservation was approved? ☐ Yes ☐ No
If yes, note the changes before claiming payment.

_____

_____

5. Energy Efficiency Modifications

Have any of the measures used to meet the Building Energy Efficiency Standards or NSHP energy efficiency requirements changed since the reservation was approved? ☐ Yes ☐ No
If yes, note the changes before claiming payment.

_____

_____

_____

_____

6. Payment Assignment

Is payment assigned to another party?

☐ **Yes (Please fill out all the sections below.)**
☐ **No (Please skip Section 5 and complete all others.)**

Assignment Request

I, _____, the applicant or authorized representative of the applicant as specified on the NSHP-1 form, hereby assign the right to receive payment for the above noted reservation under the NSHP to the following individual or entity and request that payment be forwarded to this individual or entity at the address below. A STD-204 must be submitted for the person/entity receiving the payment, if it is not already on record with the Energy Commission.

Name: _____

Address: _____

_____

Phone Number: _____

As the applicant or authorized representative of the applicant as specified on the NSHP-1 form, I understand that I remain responsible for complying with the requirements of the NSHP and will remain liable for any tax consequences associated with the reservation payment, despite the payment's assignment. I further understand that I may revoke this payment assignment at any time prior to the Energy Commission's processing of the payment by providing written notice to the Energy Commission's Renewable Energy Office.

Signature: _____ Date: _____

Name: _____ Title: _____

7. Signatures

The undersigned party declares under penalty of perjury that the information in this form and the supporting documentation submitted herewith is true and correct to the best of his or her knowledge. The party further declares under penalty of perjury that the following statements are true and correct to the best of his or her knowledge:

(1) The electrical generating system described above and in any attached documents meets the terms and conditions of the Energy Commission's NSHP and has been installed and is operating satisfactorily as of the date stated below.
(2) The electrical generating system described above and in any attached documents is properly interconnected to the utility distribution grid and has been issued utility approval to operate the system as interconnected to the distribution grid.
(3) The rated electrical output of the generating system, the physical location of the system, and the equipment identified were installed as stated above in Sections 1-4.
(4) Except as noted above, there were no changes in the information previously submitted for this system.

The undersigned party further acknowledges that he or she is aware of the requirements and conditions of receiving funding under the NSHP, including the special reporting and repayment requirements for leased systems and systems providing electricity under a power purchase agreement, and agree to comply with all such requirements and conditions as provided in the Energy Commission's NSHP Guidebook, Fourth Edition, Overall Program Guidebook and the Building Energy Efficiency Standards (Title 24, Part 6) as a condition to receiving funding under the NSHP. As specified in the NSHP Guidebook, the undersigned applicant authorizes the Energy Commission during the term of the NSHP to exchange information on this form with the electric utility servicing the system in order to verify compliance with the NSHP requirements.

Applicant/ Authorized Representative	***Required Supporting Documentation***	***Documents to be Verified by Program Administrator***
Name: _____ Title: _____ Signature: _____ Date: _____	• Ten-Year Warranty Form (NSHP-3) • Payee Data Record (STD-204), and IRS W-9 if requested • Lease or Power Purchase Agreement, if applicable	• Final EPBI Documentation (CF-4R-PV) • Final NSHP Energy Efficiency Documentation (CF-4R and CF-4R-EE NSHP) or utility new construction energy efficiency program payment letter • Utility Approval of Interconnection

For the latest mailing address information, visit [http://www.gosolarcalifornia.ca.gov/contacts/consumers.php].

NSHP-3	TEN-YEAR WARRANTY FORM *NEW SOLAR HOMES PARTNERSHIP*

System Information

This warranty applies to the following _____ kW solar electric generating system

Equipment Description: _____

Located at: _____

What is Covered

This ten-year warranty is subject to the terms below (check one of the boxes):

☐ **All components of the generating system AND the system's installation.** Said warrantor shall bear the full cost of diagnosis, repair, labor, and replacement of any system or system component, at no cost to the customer. Said warrantor also assumes coverage of the major system components in all situations where the manufacturer warranty does not cover the entire ten-year period; or

☐ **System's installation only.** Said warrantor shall bear the full cost of diagnosis, repair, labor, and replacement of any system or system component, exclusive of the manufacturer's coverage, at no cost to the customer. Copies of manufacturer ten-year warranty certificates for the major system components (i.e. photovoltaic modules and inverter MUST be provided with this form).

☐ **Owner-builder or self-installed installation.** Warranty is inclusive only of the manufacturer's coverage. Copies of manufacturer ten-year warranty certificates for the major system components (i.e. photovoltaic modules and inverter MUST be provided with this form). The owner-builder or self-installer assumes coverage of all other aspects of the ten-year warranty.

General Terms

This warranty extends to the original purchaser and to any subsequent purchasers or owners at the same location during the warranty period. For the purpose of this warranty, the terms "purchaser," "subsequent owner," and "purchase" include a lessee, assignee of a lease, and a lease transaction. This warranty is effective from _____ (date of completion of the system installation). A copy of this warranty is provided to the purchaser of the solar electric generating system.

Exclusions

This warranty does not apply to:

- Damage, malfunction, or degradation of electrical output caused by failure to properly operate or maintain the system in accordance with the printed instructions provided with the system.
- Damage, malfunction, or degradation of electrical output caused by any repair or replacement using a part or service not provided or authorized in writing by the warrantor.
- Damage malfunction, or degradation of electrical output resulting from purchaser or third party abuse, accident, alteration, improper use, negligence or vandalism, or from earthquake, fire, flood, or other acts of God.

Obtaining Warranty Service

Contact the following warrantor for service or instructions:

Name: _____ Phone: ( )

Company: _____ Fax: ( )

Address: _____

Authorized Representative(s): _____ Date: _____