CALIFORNIA
PUBLIC UTILITIES
COMMISSION

CALIFORNIA SOLAR INITIATIVE-THERMAL

PROGRAM HANDBOOK

May 2010

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Center for Sustainable Energy CALIFORNIA

Pacific Gas and Electric Company®

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1. Introduction to CSI-Thermal Program

1.1 Program Background

In 2006 the California Public Utilities Commission (CPUC) authorized the California Solar Initiative (CSI), a $2.16 billion incentive program to promote solar development through 2016. The CSI program was authorized by Public Utilities Code 2851, created by Senate Bill (SB) 1 (Murray, 2006). The solar program has a goal to install 1,940 megawatts (MW) of new solar generation and to help create a sustainable solar industry. The CSI program is funded from the distribution rates of the electric ratepayers of Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E). (See Decisions (D.) 06-01-024 and D.06-12-033). The CPUC allowed $100.8 million of total CSI funds to be used for incentives for solar thermal technologies that displaced electricity usage, but deferred allowing solar water heating (SWH) technologies to be eligible for CSI until after a pilot program for SWH was conducted in SDG&E territory. Starting in July 2007, the California Center for Sustainable Energy (CCSE) administered a $2.59 million pilot program for SWH incentives in the SDG&E territory. In D.08-06-029, the Commission made minor modifications to the pilot and allowed it to run until December 31, 2009 or until the budget is exhausted, whichever occurred first.

In 2007, the legislature authorized the extension of the solar program by allowing a new program to be funded by natural gas ratepayer with the passage into law of Assembly Bill (AB) 1470 (Huffman, 2007). AB 1470 created Public Utilities Code 2860-2867 which authorizes the CPUC to create a $250 million incentive program to promote the installation of 200,000 SWH systems in homes and businesses that displace the use of natural gas by 2017. The statute requires the Commission to evaluate data from the SWH Pilot Program and determine whether an SWH program is "cost effective for ratepayers and in the public interest" before designing and implementing an incentive program for gas customers.

On January 21, 2010, the CPUC established the CSI-Thermal Program in D. 10-01-022, allocating funds for both natural gas and electric displacing solar thermal system incentives, including SWH technologies in all investor-owned utility territories. The Commission established the incentive structure, the Program Administration details, and other key CSI-Thermal Program rules. The Commission designated that the Program Administrators (PAs) for the CSI-Thermal Program are PG&E, Southern California Gas Company (SCG), SCE, and CCSE for the SDG&E service territory. This Program Handbook contains the detailed requirements and guidelines for participation in the CSI-Thermal Program, and this Program Handbook is consistent with both Public Utilities Code and Commission decision.

1.2 Program Budget

The total incentive budget for the CSI-Thermal Program is approximately $280,800,000. Of this total, $180,000,000 is allocated for natural gas displacing SWH systems (not including low-income incentives), as authorized by AB1470, and up to $100,800,000 for electric displacing systems, as authorized by SB1. Incentive dollars will be allocated between two customer classes, single family residential and commercial/multifamily, as follows:

- 40% of the total incentive budget is reserved for single-family residential customer SWH systems;
- 60% of the total incentive budget is reserved for commercial or multifamily SWH systems. Funds may be moved from the commercial/multifamily budget to the single family residential budget, but not vice versa.

The incentive budget is split proportionately among the PAs based on the size of their respective service territory. Table 1 below displays the incentive allocation percentage and budget amount by PA for the natural gas displacing SWH systems. Table 2 below displays the incentive allocation percentage and budget amount by PA for the electric displacing SWH systems.

Table 1: Total Incentive Allocation per Program Administrator for Natural Gas Displacing SWH Systems

PA	Budget Allocation	Total Incentive Budget (in millions)
PG&E	39.0%	$70.2
CCSE	10.0%	$18.0
SCG	51.0%	$91.8
Total	100.0%	$180.0

Table 2: Maximum Incentive Allocation per Program Administrator for Electric Displacing SWH Systems

PA	Budget Allocation	Maximum Incentive Budget (in millions)
PG&E	43.7%	$44.0
CCSE	10.3%	$10.4
SCE	46.0%	$46.4
Total	100.0%	$100.8

1.3 Program Goals

The CSI-Thermal Program is designed to significantly increase the adoption rate of SWH technologies into the California marketplace. The program strategy and design principles will address the barriers to growth, namely installation costs, lack of public knowledge about SWH, permitting costs and requirements, and a potential shortage of experienced installers.

The primary goals of the CSI-Thermal Program include the following:

- Significantly increase the size of the SWH market in California by increasing the adoption rate of SWH technologies, including:
    - Achieving the installation of natural gas-displacing systems that displace 585 million therms (equivalent to 200,000 single family residential systems) over the 25 year life of the systems;
    - Achieving the installation of electric-displacing SWH systems that displace 275.7 million kilowatt hour (kWh) per year (equivalent to 100,800 single family residential systems); and
    - Achieve an expansion of the market for other solar thermal technologies that displace natural gas and electricity use, in addition to SWH.

- Support reductions in the cost of SWH systems of at least 16% through a program that increases market size and encourages cost reductions through market efficiency and innovation;
- Engage in market facilitation activities to reduce market barriers to SWH adoption, such as high permitting costs, lack of access to information, and lack of trained installers;
- Increase consumer confidence and understanding of SWH technology and their benefits

1.4 Program Contact Information

Pacific Gas and Electric:
Phone: (877) 743-4112
Email: solar@pge.com
Website: www.pge.com/csithermal

California Center for Sustainable Energy (SDG&E territory):
Phone: (877) 333-SWHP
Email: swh@energycenter.org
Website: www.energycenter.org/swh

Southern California Gas Company:
Phone: (800) Gas-2000
Email: CSIThermalProgram@SoCalGas.com
Website: www.socalgas.com/rebates/solar/

Southern California Edison:
Phone: (866) 584-7436
Email: CSIGroup@sce.com
Website: www.sce.com/csithermal

CSI-Thermal Program website: www.gosolarcalifornia.com

2. Program Eligibility Criteria and Requirements

Items listed throughout Section 2 address the criteria and requirements that must be met for a project to be deemed eligible for a CSI-Thermal Program incentive. Many of these items are further detailed in Section 4, where the application process is outlined.

2.1 Participants in the CSI-Thermal Program

2.1.1 Host Customer

For the CSI-Thermal Program, the Host Customer is, in most cases, the utility customer of record at the location where the SWH system will be located. Any class of customer is eligible to be a Host Customer. To be eligible to receive an incentive, the Project Site must be within the service territory of, and receive retail level gas or electric service[1] from, PG&E, SCE, SCG, or SDG&E. Municipal electric utility customers are not eligible to receive incentives from the designated

[1] "…retail level electric or gas service…" means that the Host Customer pays for and receives distribution services, as defined by their respective utility rate schedule

Program Administrators. The Host Customer shall always be party to the CSI-Thermal Program contract.

In circumstances where the Host Customer is not on the Gas or Electric Service Provider Account, a letter of explanation must be sent to the Program Administrator explaining the relationship of the Host Customer to the person(s) who is on the utility service account.

2.1.1.1 Customer Class

This program consists of two customer classes: single family residential and multifamily/commercial. Each class is further broken down into natural gas water heating customers and electric water heating customers.

The CSI-Thermal Program customer class and incentive rate will be determined by the utility rate schedule of the Host Customer. In cases where the requested customer class differs from the classification of the Host Customer utility rate schedule, the customer must work with their respective utility to have their rate schedule changed prior to receiving the incentive payment. Rate schedule changes are subject to the conditions of the utility rates.

2.1.1.2 Natural Gas Displacing SWH Customer

To be eligible for a SWH natural gas-displacing incentive, the Host Customer must be a gas customer of PG&E, SDG&E or SCG. The customer must be installing SWH on a new or existing home or facility to offset gas water heating. If SWH becomes mandatory for new home construction in the state of California, new homes will no longer be eligible for incentives under this program.

2.1.1.3 Electric Displacing SWH Customer

To be eligible for a SWH electric-displacing incentive, the Host Customer must be an electric customer of PG&E, SCE, or SDG&E. The customer must be installing SWH on an existing home or business to offset electric water heating. Solar water heating systems installed with electric back up water heaters on new construction projects are not eligible for an incentive through the CSI-Thermal Program. A residential building is considered “new construction” if the entire building structure is subject to current Title 24 building efficiency standards and does not yet have a Permit of Occupancy from the relevant Building Department.

2.1.2 System Owner

The System Owner is the owner of the SWH system at the time the incentive is paid. For example, when a vendor sells a turnkey system to a property owner, the property owner is the System Owner. In the case of a third-party-owned system, the third party (or leaser) is the System Owner.

The System Owner should be designated on the CSI-Thermal Program application. If different from the Host Customer, the System Owner shall also be a party to the CSI-Thermal Program contract. The PA may require documentation substantiating equipment ownership.

2.1.3 Applicant

The Applicant is the entity that completes and submits the CSI-Thermal Program application and serves as the main contact person for the CSI-Thermal PA throughout the application process.

The eligible Solar Contractor or Self-Installer will be the Applicant for CSI-Thermal Program applications.

2.1.4 Solar Contractor

2.1.4.1 Contractor Participation

All contractors installing SWH systems through the CSI-Thermal Program must become listed as eligible to participate in the program. Contractors must meet the license, warranty, and training requirements as stated in Sections 2.1.4.2, 2.1.4.3, 2.6 of this handbook. Contractors must complete the Contractor Participation Application, offered by the PAs. Each contractor who meets these requirements will be added to our list of eligible contractors. This list will be available publicly on the program website.

2.1.4.2 Contractor License Requirements

Eligible contractors must be licensed by the State of California Contractors State License Board (CSLB) and have an active A (Engineer), B (General), C-4 (Boiler, Hot Water Heating and Steam Fitting), C-36 (Plumbing) or C-46 (Solar) contractors' license, and be in accordance with rules and regulations adopted by the CSLB. PAs may request documentation from the contractor proving that they have the minimum insurance requirements mandated by the CSLB.

If a contractor's license expires or becomes suspended during the program, the PAs will deactivate their approved contractor standing until their license becomes active again. Current projects will not be paid unless the system was signed off by the city or county prior to the suspension or until the license is reinstated.

All solicitations, sales, negotiations, or executions of home improvement contracts outside of the contractor's normal place of business shall abide with all codes, laws, and other jurisdictional requirements by a Home Improvement Salesperson (HIS) including but not limited to those outlined by the CSLB under the California Contractors License Law.

2.1.4.3 Contractor Training Requirements

Contractors are required to attend a designated CSI-Thermal Program training workshop. This contractor training is intended to familiarize contractors with program rules and requirements; it is not a course on the basics of solar thermal installation. Please contact your local PA for the dates and locations of these workshops. Availability of these workshops will be publicized on each PA website (See Section 1.4). Only contractors who participate in this workshop will be allowed to install and collect incentives from the program. The workshop provides an overview of the CSI-Thermal Program Handbook, application process, program requirements, technical requirements, and additional related resources. Upon completion of this designated CSI-Thermal Program training workshop and meeting other said requirements, a contractor will be eligible to install SWH systems and collect incentives in all PA territories.

In order to remain on the active list of eligible contractors, contractors must complete a minimum of three CSI-Thermal Program projects per year or must attend the designated workshop annually. All PAs will conduct training in their respective service territories. A project is considered complete when the Incentive Claim Form has been approved.

The Program Administrators will maintain a list of eligible contractors. This list will be updated monthly. Each month, the PAs will review whether a contractor has either (1) completed training in the previous 12 months and/or (2) completed three or more projects in the previous 12 months.

2.1.5 Self-Installer

Self-installations are permitted in the CSI-Thermal Program. Homeowners or building owners who choose to install a SWH system on their property must attend a designated CSI-Thermal Program training workshop. This training is intended to familiarize self-installers with program rules and requirements; it is not a course on the basics of solar thermal installation. Please contact your local PA for the dates and locations of these workshops. Availability of these workshops will be publicized on each PA website (See Section 1.4). The workshop provides an overview of the CSI-Thermal Program Handbook, application process, program requirements, technical requirements, and additional resources. Self-Installers must install their SWH system within 12 months of attending the required training otherwise they must once again attend the designated training workshop.

Self-Installers are also required to comply with all applicable laws, codes, regulations, permits and installation requirements listed in this handbook. Self-Installers must submit receipts or invoices showing 100% of the system has been purchased in place of the installation agreement outlined in Section 4.5.3.

2.1.6 Equipment Sellers

Equipment Seller in the CSI-Thermal Program refers to retail sellers such as manufacturers, distributors, retail businesses, and contractors. If the equipment seller is not the contractor, indicate the contact information for the seller on the project application. An Equipment Seller is not an in-home sales representative. As noted in section 2.1.4.2, all solicitations, sales, negotiations, or executions of home improvement contracts outside of the contractor's normal place of business shall abide with all codes, laws, and other jurisdictional requirements by a Home Improvement Salesperson (HIS) including but not limited to those outlined by the CSLB under the California Contractors License Law.

2.2 Equipment Eligibility and Requirements

2.2.1 Eligible Equipment

In order to receive an incentive through the CSI-Thermal Program, installed SWH equipment must meet the following criteria:

- Single family residential SWH systems must have a Solar Rating and Certification Corporation (SRCC) OG-300 System Certification;
- Solar collectors used in multifamily residential, commercial, or industrial water heating shall have SRCC OG-100 Collector Certification;
- Components must be new and unused. The only exception is existing de-scaled copper piping which may be reused if it is replacing an existing SWH system;
- System installations must conform to manufacturer's specifications and all applicable codes and standards;

- All SWH systems with the capacity of displacing over 30 kilowatt thermal (kW_{th})[2] (more than 462 square feet of collectors) must have meters or other measuring devices to monitor and measure system performance and the quantity of energy generated or displaced by the system. Please refer to Section 2.8 for details on metering requirements.

2.2.2 Ineligible Technology and System Applications

CSI-Thermal Program will only pay incentives to SRCC rated SWH systems that displace natural gas or electricity usage. Propane displacing systems are not eligible for a CSI-Thermal Program incentive. The CPUC may consider, at a later date, allowing incentives for non-SWH solar thermal systems and combination systems that displace natural gas and meet all other program requirements. Solar thermal systems that heat pools and spas are not eligible for a CSI-Thermal Program incentive.

If an Applicant requests an incentive for a combination system, the CSI-Thermal Program will only provide an incentive for the energy savings associated with the domestic hot water (DHW) usage. The DHW savings must be clearly isolated and identified.

2.2.3 Building Permit Requirements

Project completion will be determined by a final signed-off building permit issued by the appropriate City or County building department. In order to be eligible for the CSI-Thermal Program incentive, a final permit must be signed-off after July 15, 2009. Contractors should be familiar with local code requirements as they relate to SWH installations to include, but not limited to roof loading, anti-scald valves, heat exchangers, back flow protection, health and safety.

A customer is eligible for a CSI-Thermal Program Incentive for up to 24 months after the date on the final signed-off building permit.

2.3 Technical Requirements

It is the intent of the CSI-Thermal Program to provide incentives for reliable, permanent, and safe SWH systems. This Section outlines the technical installation requirements that all projects must meet in order to receive a CSI-Thermal Program incentive.

Systems must conform to manufacturers' specifications and with all applicable electrical, plumbing and building codes and standards. Permits are required for all SWH system installations. All systems must be installed in compliance with SRCC standards and guidelines. Information on standards and guidelines may be found on the SRCC website: www.solar-rating.org

2.3.1 Freeze Protection

All installed systems must meet freeze protection requirements set forth by SRCC. The CSI-Thermal Program uses the 16 California climate zones established by the California Energy Commission (CEC) to determine eligibility of appropriate freeze protection technologies. The CEC Climate Zone Handbook is available on www.gosolarcalifornia.com

[2] 30 kWth is equivalent to 462 square feet of collectors based on a calculation developed by a consortium of international solar rating agencies in 2004, using .7 kWth per M^2. This includes unglazed, glazed, and evacuated tube collectors.

2.3.1.1 Integral Collector Storage

Integral Collector Storage (ICS) systems are protected by the thermal mass of the storage in the collector down to the Freeze Tolerance Level (FTL) as certified by SRCC. If the historical low temperature for the climate zone of the project site has dropped below the FTL for a period of 18 consecutive hours or greater, the ICS system may not be installed in that climate zone due to freeze risk and high overnight heat losses.

2.3.1.2 Direct Forced Circulation

There are two methods of freeze protection for Direct Forced Circulation systems (also known as open-loop systems): automatic freeze drain valves and active pump recirculation. The only authorized freeze protection method by SRCC is the automatic freeze drain valve, which does not depend on grid power. The automatic freeze drain valves open at 45°F, and allow a small but continuous stream of water to evacuate the collector.

Active pump recirculation freeze protection protects potable water in the collector from freezing by turning on the recirculation pump to move warm water from the tank through the collector when the collector temperature is less than 41°F. This method is not recognized by SRCC as a reliable freeze protection method, due to the risk of power loss with freezing conditions. There is no loss of water; however, the storage medium is cooled.

Direct Forced Circulation systems will not be allowed in the CSI-Thermal Program, pending the results of a technical task force study on the feasibility of these freeze protection methodologies in California.

2.3.1.3 Indirect Forced Circulation

There are two types of Indirect Forced Circulation systems- active closed loop glycol and closed loop drainback.

- Active closed loop glycol systems are protected by a mixture of propylene glycol and water in the collector loop.

- Closed loop drainback systems, in sunny conditions, pump water through the collectors capturing heat which is transferred to the potable water supply via a heat exchanger. Closed loop drainback systems drain the water from the collectors when the pump shuts down.

Indirect Forced Circulation systems are acceptable in all CEC climate zones.

2.3.1.4 Thermosyphon

Thermosyphon systems are passive systems, which may be open or closed loop.

Closed loop thermosyphon systems protected by a mixture of propylene glycol and water in the collector loop are acceptable in all CEC climate zones.

Open loop thermosyphon systems which have potable water in the collector loop are not allowed in the CSI-Thermal Program.

2.3.1.5 Air Collectors with Non-Coupled Water Circulation

Air collectors do not require freeze protection. Non-coupled water circulation systems maintained in conditioned space do not require freeze-protection and may be open-loop.

2.3.2 Stagnation/Overheat Protection for Fluid Collectors

Stagnation is the condition in which heat transfer fluid boils off in the collector, due to prolonged solar exposure with no cooling flow.

Closed loop drainback systems must be equipped with a controller that shuts the pump off when the storage tank reaches its high limit.

Closed loop systems with a glycol and water mixture shall be able to withstand prolonged periods of stagnation without significant system deterioration and with no maintenance. Acceptable stagnation control measures in closed loop glycol systems include, but are not limited to, the items outlined in Sections 2.3.2.1-2.3.2.5. Additional stagnation or overheat protection measures may be allowed at the PAs discretion:

2.3.2.1 Advanced Controller with a Vacation or Holiday Mode

This function controls the system to shut the pump off when the tank reaches its high limit and to run the pump at night to cool the tank temperature down, reducing the risk of stagnation of the glycol mixture in the collector. The controller must be programmed by the System Owner to Vacation or Holiday mode.

2.3.2.2 Advanced Controller with a Thermal Cycling Function

This function allows the tank temperature to exceed its high limit in order to maintain a lower temperature of the fluid in the collector. This provides the capability of the controller to turn the pump on periodically while solar energy is available. The solar energy is collected and transferred to the tank, therefore reducing the risk of stagnation of the glycol mixture in the collector.

2.3.2.3 Heat Dump Radiator

A heat dump radiator allows heat from the glycol mixture to be dissipated to the atmosphere, therefore cooling the temperature of the glycol mixture and reducing the risk of stagnation.

2.3.2.4 Steam back

The steam back function allows water in the water/glycol mixture to boil at high temperatures in the collector. Steam produced from the boiling water pushes the liquid glycol out of the collector and into the expansion tank or heat dump radiator. This function reduces the risk of stagnation of the glycol mixture in the collector.

2.3.2.5 Pressure Stagnation Protection (PSP)

This stagnation/overheat method allows over sizing of the pressure relief valve to 150 pounds per square inch (psi), which allows the system pressure to rise with stagnation temperature. This protects the fluid from overheating and preserves the properties of the glycol by keeping it in a liquid form at all times.

2.3.3 System Sizing

Over sizing the SWH system will not be permitted in the CSI-Thermal Program as this may

- Generate excessive temperatures which could damage equipment or heat transfer fluids
- Release hot fluids from relieve valves exposing humans to risk of scalding
- Accelerate scale accumulation
- Reduce life cycle cost-effectiveness

Accurately estimating the gallons per day (GPD) of hot water consumption is important for the selection of fluid collector area to prevent the generation of excessive temperatures.

2.3.3.1 Single Family projects

Single-family residential systems should be sized according to the number of occupants in the household or based on actual hot water usage, as determined through metering prior to installation. The following guidelines are required for appropriate system sizing for single family SWH systems:

- Step 1: Determine Demand
    - For retrofit projects: Use the occupant method. Assume 20 GPD of hot water usage by the first occupant, 15 GPD by the second occupant, and 10 GPD by each additional occupant.
    - For new construction projects where demand is unknown: Use the bedroom method. Assume 20 gallons per day (GPD) of hot water usage for the first bedroom, 15 GPD for the second bedroom, and 10 GPD for each additional bedroom.
- Step 2: Determine Collector Area Needed
    - As a general rule of thumb, one square foot of fluid collector area, or five square feet of air collector area, is needed for each gallon of hot water used per day.
- Step 3: Determine Storage Capacity Needed
    - As a general rule of thumb, a minimum of 1.5 gallons of storage is needed for each square foot of fluid collector area, and 0.25 gallons of storage for each square foot of air collector area.
- Step 4: Select an SRCC OG-300 system with the appropriate square footage of collector area and gallons of storage space
- Sizing Example for Fluid Collectors:
    - Demand: 3 occupants use approximately 45 gallons of hot water per day
    - Collector Area: approximately 45 square feet of collector space is needed
    - Storage Capacity: at least 68 gallons of storage capacity is needed
    - Appropriate OG-300 system would likely include one 4X10 collector (40 square feet) and 80 gallons of storage capacity

If the system is sized outside of the above guidelines, Applicants must submit sizing justification showing data and calculations used to determine the system size.

2.3.3.2 Multifamily/Commercial Projects

TBD and submitted with MF/Commercial Handbook

2.4 Shade

Contractors are required to conduct a shade analysis for each site. It is strongly recommended that contractors use a Solar Pathfinder, Solmetric SunEye, or similar device to conduct the shade analysis on the collector(s). If a shade analysis cannot be conducted from the center of the array, the measurements should be taken at the major corners.

The minimum allowable average annual availability of the solar collector(s) between the hours of 10:00 am and 3:00 pm is 85% (15% average annual shade between 10:00 am and 3:00 pm). Collectors with an annual average availability less than 85% between the hours of 10:00 am and 3:00 pm are not eligible for an incentive through the CSI-Thermal Program.

2.4.1 Shade Factor

Additionally, for each percentage of average annual availability below 100% on the solar collector(s) between 10:00 am and 3:00 pm, there will be an equal percentage reduction in the system incentive payment down to 85%. For example, if the shade analysis reveals a 95% average annual availability between 10:00 am and 3:00 pm, the PAs will multiply the incentive amount by 95% (reduce the incentive by 5%).

2.5 Surface Orientation Factor

The Surface Orientation Factor (SOF) is one of the variables in the CSI-Thermal Program incentive calculation formula. It is calculated by measuring the tilt and compass orientation, or azimuth, adjusted for magnetic declination of the SWH collectors. The ideal SOF is a value of 1.0, which is achieved by mounting the SWH collector(s) facing due South and tilted at latitude of the project site. The minimum SOF permitted to receive a CSI-Thermal Program incentive is 0.75. Collectors positioned outside of the ideal range will receive a SOF between 0.75 and 1.0 as defined in Appendix C, and the incentive will be decreased accordingly.

2.6 Warranty Requirements

All solar collectors must have a minimum of a 10-year manufacturer's performance warranty to protect against defects and 15% degradation. All contractors shall provide a minimum 10-year warranty to protect the purchaser against more than a 15% degradation of system performance that may occur as a result of faulty installation. All contractors must provide a minimum of a 1-year warranty on installation labor and workmanship not otherwise covered by the manufacturer's performance warranty.

For self-installed systems the warranty need not cover the labor costs associated with removing or replacing major components because any repairs would be done by the self-installer or at the self-installer's expense.

System Owners will acknowledge on the Incentive Claim Form that they have received the above said warranties.

2.7 Energy Efficiency Requirements

Making a home or business energy efficient before going solar is an essential first step. Although not a requirement of the CSI-Thermal Program, installing low flow shower heads and faucet aerators are simple and inexpensive energy efficiency measures that will reduce overall hot water demand.

Sections 2.7.1 and 2.7.2 outline the minimum energy efficiency requirements for participation in the CSI-Thermal Program. The CS-Thermal PAs will work with the Energy Division and other industry members to evaluate additional energy efficiency measures that may be required at a future date. The additional requirements will only apply to applications submitted after the requirements are included in the program.

2.7.1 Energy Efficiency Audit

An energy efficiency audit is required for all existing residential and commercial buildings in order to receive a CSI-Thermal Program incentive. The audit must have been performed during the past three years. Acceptable audit protocols consist of an online audit, telephone audit, or onsite audit provided by the utilities, PA, or a qualified independent vendor or consultant. Audit information can be found at your utility website. A copy of the completed Energy Efficiency Audit must be submitted with the project application.

Applicants may submit proof of Title 24 energy efficiency compliance issued within the last three years as an alternate to an energy efficiency audit. A Title 24 report would be required for new residential homes to satisfy energy efficiency requirements.

2.7.2 Pipe Insulation

To be eligible for a CSI-Thermal Program incentive, SWH systems are required to have minimum R2.6 value insulation on all exposed and accessible hot water piping. Pipes are considered accessible if the contractor can access them safely without damaging or displacing building materials.

Systems with recirculation loops must have insulation on all accessible piping with a minimum of R2.6 value insulation. This includes the hot supply line from the auxiliary water heater to the farthest accessible point of use and the return line from the farthest accessible point of use back to the auxiliary water heater.

2.8 Metering Requirements

2.8.1 Small Systems (displacing 30kW$_{th}$ or less)

A sample of all systems displacing 30kW$_{th}$ or less (462 square feet of collectors or less) will be selected for performance metering and monitoring for program evaluation purposes. The cost for performance metering and monitoring equipment on this sample will be borne by the PAs through their measurement and evaluation (M&E) budgets. Data and information collected by the M&E

process will not be used by the PAs to inform customers directly on the performance of their systems.

Customers not selected for the CSI-Thermal M&E program are still encouraged to install performance metering equipment at their own expense to ensure the system is operating as planned.

2.8.2 Large Systems (displacing over 30kW$_{th}$)

Performance monitoring and metering equipment will be required on all solar water heating installations displacing more than 30kW$_{th}$ (more than 462 square feet of collectors). The cost for performance metering and monitoring equipment will be at the customer's expense. Metering requirements will be determined with the launch of the multifamily/commercial CSI-Thermal Program.

2.9 Owner's Manual

The CSI-Thermal Program requires the contractor to provide a detailed operation and maintenance manual to the customer at the time of the final City or County building inspection. The owner's manual should contain details on system design and operation, including a maintenance schedule, a sequence of operations for system shutdown and restart, warranty information and contact information for follow-up service. A properly designed owner's manual will help the customer maintain and troubleshoot the system, increasing performance and reducing the need for contractor maintenance.

2.10 Performance and Permanency Requirements

Equipment installed under the CSI-Thermal Program is intended to be in place for the duration of its useful life. Only permanently installed systems are eligible for CSI-Thermal Program incentives. This means that the solar water heating system must demonstrate to the satisfaction of the PAs adequate assurances of both physical and contractual permanence prior to receiving a CSI-Thermal Program Incentive.

Physical permanence is to be demonstrated in accordance with industry practice for permanently installed equipment. Equipment must be secured to a permanent surface. Any indication of portability, including but not limited to temporary structures, quick disconnects, unsecured equipment, wheels, carrying handles, dolly, trailer, or platform, will deem the system ineligible.

2.11 Onsite Field Inspections

A portion of all CSI Thermal Program projects are subject to onsite field inspections at the PA's discretion. For each eligible contractor, PAs will conduct an onsite field inspection for the first three submitted Incentive Claim Forms that displace 30kW$_{th}$ or less and the first three Incentive Claim Forms that displace more than 30kW$_{th}$. PAs will inspect a random sample of projects thereafter.

Please refer to Section 4.6 for details on the inspection process.

3. CSI-Thermal Program Incentive Structure

The intent of the CSI-Thermal Program is to lower the cost of solar water heating technology to the system owner through incentives. The incentive will be a one-time lump sum payment, based on estimated first year therm or kWh displacements of the SWH system[3]. The incentive will be paid upon the completion of all program participation requirements as approved by the respective PA. Incentive rates will decline over the life of the program in four steps to facilitate market transformation. To determine the incentive amount, Applicants will use the online incentive calculation tool provided by the program, as described in Section 3.3.

Natural gas displacing incentives will decline from step to step when the amount paid incentives is equal to the budget allocation for the given step in each service territory. If a PA receives applications accounting for more dollars than what is left in the budget allocation for a given step, a lottery may determine which projects receive the higher incentive level. Electric displacing system incentive step changes will occur at the same time as natural gas displacing system incentive step changes.

Incentive step changes will move independently in each service territory[4] and for each class of customer. Incentives will be paid on a first come, first serve basis. The most current information on incentive step status per customer class will be posted on the websites listed in Section 1.4

A system may not receive SWH incentives from both a utility energy efficiency program and CSI-Thermal Program for the same SWH system. A CSI-Thermal Program incentive may not exceed the total project cost alone or when combined with other incentives. Other incentives may include, but are not limited to, rebates, grants, tax credits, government funding, and/or funding from any public or private source. This program will not pay an incentive for a SWH system that replaces a SWH system which previously received a CSI-Thermal Program incentive.

3.1 Natural Gas Displacing System Incentives

Incentive rates will decline over the duration of the program in four steps. Table 3 below displays the dollar amount per therm in each step and the total program budget allocation per step. The budget allocations per step in Table 3 are divided among the PAs per the percentages shown in Table 1.

Table 3: Natural Gas Displacing System Incentive Steps and Total Program Budget Allocations

Step	Incentive per therm displaced	Total Program Budget Allocation (in millions)
1	$12.82	$50
2	$10.26	$45
3	$7.69	$45
4	$4.70	$40

3.1.1 Single Family

[3] Estimated first year therm or kWh displacement may not reflect actual energy savings
[4] Southern California Edison incentive step changes will correspond with Southern California Gas Company gas incentive step changes for each customer class.

Single family residential system incentives are calculated using the SRCC OG-300 estimated annual therm savings in the appropriate climate zone, combined with the SOF and shade factor. The actual incentive paid to any qualified system is derived by multiplying the system's OG-300 rating by the incentive rate in the appropriate step per PA territory as listed in the table below, and multiplying this result by the SOF and shade factor.

Customers are eligible for one OG-300 incentive per single family residential dwelling unit. A single family residential dwelling unit is defined as a group of rooms, such as a house, a flat, an apartment, or a mobile home which provides complete single-family living facilities in which the occupant normally cooks meals, eats, sleeps, and carries on the household operations incident to domestic life. Table 4 below displays the single family natural gas displacing system incentive steps and budget allocations.

Table 4: Single Family Natural Gas Displacing System Incentive Steps

Step	Incentive per therm displaced	Maximum Incentive Single Family Residential Projects	Total Program Budget Allocation (in millions)
1	$12.82	$1,875	$20
2	$10.26	$1,500	$18
3	$7.69	$1,125	$18
4	$4.70	$688	$16

An example of the incentive formula for a project submitted in Step 1 is as follows:

(SRCC OG-300 estimated annual therm savings) X ($12.82) X (SOF) X (Shade Factor) = $ Incentive Amount

Refer to Section 3.3.1 SRCC OG-300 Single Family Residential Incentive Calculator for additional details.

3.1.2 Multi-Family/Commercial

Table 5: Multi-Family and Commercial Natural Gas Displacing System Incentive Steps

Step	Incentive per therm displaced	Maximum Incentive for Commercial/Multifamily SWH projects	Budget Allocation (in millions)
1	$12.82	$500,000	$30
2	$10.26	$500,000	$27
3	$7.69	$500,000	$27
4	$4.70	$500,000	$24

3.2 Electric Displacing System Incentives

As incentives decline under the natural gas-displacing program, a corresponding step reduction occurs to the electric-displacing incentive. Like the natural gas incentive rates, electric incentive

rates will decline over the duration of the program in four steps. Electric-displacing SWH installations will count against the MW trigger in Step 10 of the general market CSI program. If the Step 10 budget is insufficient, the PAs may use funds from Step 9 as well. See the CSI Program Handbook for details on the CSI step changes. The electric displacing incentive budget allocation is divided among the PAs per the percentages shown in Table 2.

3.2.1 Single-Family

Single family residential system incentives are calculated using the SRCC OG-300 estimated annual kWh savings in the appropriate climate zone, combined with the SOF and shade factor. The actual incentive paid to any qualified system is derived by multiplying the system's OG-300 rating by the incentive rate in the appropriate step as listed in the table below, and multiplying this result by the SOF and shade factor.

Customers are eligible for one OG-300 incentive per single family residential dwelling unit. A single family residential dwelling unit is defined as a group of rooms, such as a house, a flat, an apartment, or a mobile home which provides complete single-family living facilities in which the occupant normally cooks meals, eats, sleeps, and carries on the household operations incident to domestic life. Table 6 displays the dollar incentive amount per kWh in each step for electric-displacing systems.

Table 6: Single Family Electric Displacing System Incentive Steps

Step Level	Electric-Displacing Incentive ($/kWh)	Maximum Incentive for Residential System
1	0.37	$1263
2	0.30	$1025
3	0.22	$750
4	0.14	$475

An example of the incentive formula for a project submitted in Step 1 is as follows:

(SRCC OG-300 estimated annual kWh savings) X ($0.37) X (SOF) X (Shade Factor) = $ Incentive Amount

Refer to Section 3.3.1 SRCC OG-300 Single Family Residential Incentive Calculator for additional details.

3.2.2 Multi-Family/Commercial

Table 7: Multi-Family and Commercial Electric Displacing System Incentive Steps

Step Level	Electric-Displacing Incentive ($/kWh)	Maximum Incentive for Multi-Family/ Commercial System
1	0.37	$250,000
2	0.30	$250,000
3	0.22	$250,000
4	0.14	$250,000

3.3. CSI-Thermal Program Incentive Calculator

An online calculator tool will be available to estimate natural gas or electricity displacement for SWH systems based on system location, design and expected performance. This calculator will not be used to predict system performance, but rather is a tool to standardize the incentive calculation method. The calculator is available at the websites listed in Section 1.4.

3.3.1 SRCC OG-300 Single-Family Residential Incentive Calculator

There are four variables used in calculating the incentive for SRCC OG-300 single-family projects:

- SRCC estimated annual energy savings, based on the CEC climate zone of the project site
- Incentive Step Level at the time the Incentive Claim Form is approved
- Surface Orientation Factor (SOF), which includes the azimuth and tilt of the collectors (See Section 2.5 and Appendix C)
- Shade factor based on the average annual availability between the hours of 10:00 am and 3:00 pm on the collector(s) (See Section 2.4)

Incentive Calculation Formula:

(SRCC OG-300 estimated annual energy savings) X (Current Incentive Step Level) X (SOF) X (Shade Factor) = $ Incentive Amount

3.3.2 SRCC OG-100 Multi-Family/Commercial Incentive Calculator

TBD and submitted with MF/Commercial Handbook

4. Application Process for CSI-Thermal Program

The CSI-Thermal Program application process for single family residential SWH system installations is a one-step process. The Applicant is required to submit the Incentive Claim Form and supporting documentation after the system has been installed and has received a final signed-off building permit.

Applications will be completed online, through a dedicated CSI-Thermal Program web-based application processing database. The incentive step level for the project is determined by the available incentive step level on the day that the application is reviewed and deemed complete.

4.1 Single-Family Residential Project Application Submittal

The Applicant for a single-family residential incentive must submit the following documentation:

1. Completed Incentive Claim Form with required signature(s)[5], including agreement to allow system to be monitored and data used for program evaluation purposes.
2. Documentation of a completed Energy Efficiency Audit or Title 24 documentation
3. Copy of Executed Agreement of eligible Solar Water Heating System Purchase and Installation, including demonstration that system contains eligible equipment and required warranties.
4. Copy of Executed Alternative System Ownership Agreement (If System Owner is Different from Host Customer)
5. Copy of Final Signed-off Building Permit
6. Authorization to Receive Customer Information or Act on a Customer's Behalf (only required for SDG&E applicants)

All of the above documentation must be submitted in order for the payment to be issued. Refer to Section 4.5 for a description if these items.

4.2 Multi-family/Commercial Project Application Submittal

TBD and submitted with MF/Commercial Handbook

4.3 Incentive Claim Review Process

Once received, the PA will review the Incentive Claim Form and supporting documentation, for completeness and determine eligibility. Incentive Claim Forms will also be screened to ensure that the total incentives received from all sources do not exceed total project cost. The system must be purchased, installed, and operational for the Incentive Claim Form and supporting documentation to be processed.

Once the PA approves the Incentive Claim Form, the PA will issue an Incentive Approval notice to the Applicant and System Owner, confirming that a specific incentive rate and dollar amount has been granted for the project. Payment will be disbursed separately following the Incentive Approval notice.

Incentive payments may be adjusted if discrepancies exist between the Incentive Claim Form and the results of the onsite field inspection.

4.3.1 Incomplete Incentive Claim Forms

If an Incentive Claim Form and supporting documentation is found to be incomplete or require clarification, the PA will request additional information. Applicants have 20 calendar days to respond to the request with the necessary information. If after 20 calendar days the Applicant has not submitted the requested information, the Incentive Claim Form will be cancelled. However, cancellation does not preclude the Applicant from resubmitting an Incentive Claim Form for the

[5] Signatures for all submitted documentation are acceptable in the following formats:
- Original signed documents, or "wet" signatures
- Scanned copies of original signed documents
- Faxed copies of original signed documents

Although "wet" signatures are not required on submitted documents, original signed documentation must be maintained by the Applicant, Host Customer and/or System Owner for at least five years from the date of submission. PAs reserve the right to request original signed documents within the five-year period.

same project to the PA if the Incentive Claim Form and supporting documentation can be submitted correctly on the subsequent attempt. All resubmitted Incentive Claim Forms will be treated as new (i.e., all required documents must be resubmitted) and processed in sequence along with other new Incentive Claim Forms.

The incentive step level for the single-family residential project is determined by the available incentive step level on the day that the Incentive Claim Form is reviewed and deemed complete.

4.4 Payment Process

Upon final approval of the Incentive Claim Form and completed onsite field inspection (if applicable), the PA will disburse the CSI-Thermal Program incentive payment. Payment will be made to the Host Customer or a third party as indicated on the Incentive Claim Form, and will be mailed to the address provided. The payee must submit their tax ID number and tax status on their Incentive Claim Form.

4.5 Application Forms and Documentation

4.5.1 Incentive Claim Form

A completed Incentive Claim Form must be submitted. It must be read, completed, and signed by the Applicant, Host Customer, System Owner (if different than the Host Customer) and contractor after the SWH system has been installed.

4.5.2 Energy Efficiency Audit or Title 24 Documentation

Please refer to Section 2.7 for more information about energy efficiency requirements.

4.5.3 Executed Agreement of SWH System Purchase and Installation

Applicants must submit a copy of executed contract for purchase and installation of the system, and/or alternative System Ownership agreement. Agreements must be legally binding and clearly spell out the scope of work, terms, price, and SWH system components to be installed. Agreements must be signed by all parties pursuant to the contract (supplier/Solar Contractor, Host Customer, and/or System Owner).

The executed purchase and/or installation agreements must be internally consistent and must be consistent with information entered in the Incentive Claim Form. Agreements for the purchase and installation of a system or system equipment must be in writing and must include, at a minimum, 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
- The quantity, make and model number (as shown on the SRCC certified system and collector lists) for the collectors, storage tank, and system performance meters (if applicable)
- The total purchase price of the eligible system before tax incentives and rebates

- Language indicating the purchaser's commitment to buy the system if the system has not already been purchased
- Printed names and signatures of the purchaser and equipment seller's authorized representative.
- Payment terms (payment dates, dollar amounts and how the CSI-Thermal Program Incentive will be applied)
- Printed names and signatures of the purchaser and the installation company's authorized representative.

If the equipment seller differs from the installation contractor, separate purchase and installation agreements must be submitted.

Installation contracts must comply with the Contractors State License Board (CSLB) requirements. Please refer to the CSLB website for more information on CSLB guidelines at www.cslb.ca.gov. Entities without a valid A, B, C-4, C-36 or C-46 contractor's license may not offer installation services or charge for installation in any agreement under the CSI-Thermal Program. In addition, sales representatives must be listed on the CSLB License, and installation contractors must conform to CSLB rules.

4.5.4 Executed Alternative System Ownership Agreement (If System Owner is Different from Host Customer)

If the System Owner is different from the Host Customer (an alternate System Ownership arrangement), the System Owner must provide a copy of the agreement(s) to purchase and install the system.

4.5.5 Final Signed-off Building Permit

The Incentive Claim submittal must include a signed-off building permit that indicates the project has been installed and approved by the local building authority. Please refer to Section 2.2.3 for more information about Building Permit requirements.

4.5.6 Authorization to Receive Customer Information or Act on a Customer's Behalf

CCSE is the only non-utility Program Administrator, and therefore does not have direct access to SDG&E customer accounts. In order to verify program eligibility, SDG&E customers must complete and submit the Authorization to Receive Customer Information or Act on Customer's Behalf with the application. This form is not required with applications submitted to PG&E, SCG, and SCE.

4.6 Onsite Field Inspection Process

A portion of all CSI-Thermal Program projects are subject to onsite field inspections at the PA's discretion. For each eligible contractor, PAs will conduct an onsite field inspection for the first three submitted Incentive Claim Forms that displace 30kW$_{th}$ or less (462 square feet of collector area or less) and the first three submitted Incentive Claim Forms that displace more than 30kW$_{th}$ (more than 462 square feet of collector area). PAs will inspect a random sample of projects thereafter.

The PAs may determine whether to conduct an onsite field inspection randomly and/or based on Applicant or Solar Contractors' participation in the CSI-Thermal Program. Parameters that may affect frequency or incidence of onsite field inspection include, but are not limited to: Applicant or Solar Contractor being new to the CSI-Thermal Program, frequency of new Incentive Claim Forms in the program, and results of prior CSI-Thermal Program onsite field inspections, or results of prior CSI-Thermal Program project application review, and customer complaints.

It is highly recommended, but not required, that the Applicant attend the inspection. If neither the Applicant nor the Host Customer will be present during the inspection, the inspector must obtain permission from the Applicant or Host Customer to perform the inspection.

4.6.1 Trained Inspectors

Onsite field inspections will be performed by PA-designated personnel trained to conduct CSI-Thermal Program SWH system inspections. The PAs have developed a consistent statewide onsite inspector-training plan, which will serve as the basis for determining "trained" status of onsite field inspectors. The inspectors will verify the SWH system is installed in accordance with information provided on the Incentive Claim Form and in compliance with CSI-Thermal Program handbook requirements.

4.6.2 Infractions

An infraction is a minor discrepancy of an installation item that is noncompliant with the CSI-Thermal Program inspection checklist found during the onsite field inspection. An infraction does not require corrective action by the Contractor or Self-installer in order to receive the incentive payment. Tracking of infractions will be used as an educational tool to inform Contractors on best practices to improve future SWH system installations.

4.6.3 Failure Items

A failure is a major discrepancy regarding an installation item that is noncompliant with the CSI-Thermal Program inspection. Failure items will require corrective action by the Contractor or Self-installer in order to receive the incentive payment. The following are considered failure items if found to be out of compliance with program requirements or SRCC standards:

- System:
    - Operation: The system must be in operational condition when inspected
    - Freeze Protection Measures: The system must have one of the freeze protection measures as described in Section 2.3.1
    - Control Lines and Sensors: All wires and connections, sensors, or other means for transmitting sensor outputs to control devices shall be sufficiently protected from degradation or from introducing false signals as a result of environmental or system operation instructions.
    - Operating Limits: Means shall be provided to protect the SWH system within the design limits of temperature and pressure. Limit tank temperatures to a value not to exceed the tank supplier's specified high temperature limit. The pressure/temperature relief valve shall not be used for this purpose under normal operating conditions.
    - Protection from Ultraviolet Radiation: Components or materials shall not be affected by exposure to sunlight to an extent that will significantly deteriorate their function during their design life. Pipe insulation and sensor wires must be

protected by a minimum of two coats of the insulation manufacturer's recommended coating.

  - Back Thermosyphon Prevention: Means shall be provided to prevent undesired escape of thermal energy from storage through thermosyphoning action.
  - Protection from Leaks: All piping and components must be leak free. All roof penetrations must be properly sealed or flashed and leak free.

- Collector:
  - Must be SRCC certified and consistent with Incentive Claim Form
  - Must have stagnation control measures as described in Section 2.3.2
  - Collector Flow Rate/Distribution: In multiple collector arrays, the instantaneous flow rate variations between collectors shall not exceed 10% of the array average flow. When an array of collectors is connected by manifolds to form a parallel flow configuration, provision shall be incorporated in the manifold and/or collectors to maintain the proper design flow rate of the heat transfer fluid through each collector.
  - Surface Orientation Factor: Collectors must have an SOF value of between 0.75 and 1.0 as defined in Appendix C.
  - Shade: Collector(s) must have greater than or equal to 85% annual average availability between the hours of 10am and 3pm..
- Solar Tank:
  - Capacity, make, and model must be in compliance with SRCC OG-300 system or in compliance with SRCC guidelines for OG-100 systems
  - Waterproofing: Underground and above ground unsheltered storage tanks shall be waterproofed to prevent water seepage.
- Plumbing and Piping:
  - Insulation: SWH systems are required to have minimum R2.6 value insulation on all exposed and accessible hot water piping. Pipes are considered accessible if the contractor can access them safely without damaging or displacing building materials. Systems with recirculation loops must have insulation on all accessible piping with a minimum of R2.6 value insulation. This includes the hot supply line from the auxiliary water heater to the farthest accessible point of use and the return line from the farthest accessible point of use back to the auxiliary water heater. All exterior piping insulation shall be protected from ultraviolet radiation, excessive temperature, and moisture damage.
  - Mixing Valve: The system must be equipped with a means for automatically limiting the temperature of the hot water at the fixtures to a selectable temperature. The range of selectability shall be at least 18˚F, and shall include a set point of 122˚F.
- Owner's Manual
  - An owner's manual or manuals shall be provided to the System Owner with each SWH system.

Refer to the Inspection Checklist for details on compliance with the above items. If additional major discrepancies not noted above are identified during the onsite field inspection and are found to affect health and safety, PAs reserve the right to issue a failure.

4.6.4 Notification of Inspection Results

The PA will notify in writing the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer of the results of the onsite field inspection.

4.6.4.1 Passed Inspection

Upon passing the onsite field inspection, the PA will process payment to the Payee named on the Incentive Claim Form. An infraction of the SOF found during the onsite field inspection may result in an adjusted incentive amount. The Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer will be informed of any incentive adjustment. Refer to Section 4.4 Payment Process for details.

4.6.4.2 Failed Inspection

Upon failing the onsite field inspection, the PA will notify in writing the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer of the reason(s) for the failure. Section 4.6.5 Failure Sanction describes the required actions following failure notification.

4.6.5 Failure Sanction

Once notified of a failure, the Applicant, Host Customer, or System Owner will either accept the results or dispute the results through the appeals process found in Section 5.3 Dispute Resolution.

If the results are accepted, the Solar Contractor must make the corrections to the failure items within 30 calendar days. Projects that do not pass the CSI-Thermal Program initial inspection will not receive the incentive payment until the necessary corrections have been made. Corrections may be verified at the PAs discretion via an onsite re-inspection or through acceptable photos of the correction items. PAs reserve the right to revoke the contractor's eligibility status if contractor fails to correct the failure items identified at the onsite field inspection. Correction of failure items does not remove the failure from the contractor's record. The failure will still count towards the maximum allowable failures in a rolling 12-month period.

Companies that receive three failures in a rolling 12-month period across all PA territories will be put on probation for 6 months and required to once again attend the CPUC designated CSI-Thermal Program training workshop. Additional CSI-Thermal Program applications will not be processed until completion of the workshop. Probation may entail inspections of 100% of systems installed by the sanctioned contractor at the PA's discretion. The fifth failure received in a rolling 12-month period across all PA territories by an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer will result in disqualification from participating in the CSI-Thermal Program for a minimum of 6 months at the PAs' discretion.

5. Disqualification and Right to Audit

5.1 Grounds for Immediate Disqualification from the CSI-Thermal Program

An Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer will be immediately disqualified from participating in the CSI-Thermal program if one or more of the following occurs:

- Solar Contractors that operate under a false CSLB number or another contractors license
- Failure to disclose other incentives funding sources such as rebates, grants, tax credits, government funding, and/or funding from any public or private source in an attempt to claim more incentive dollars
- Installation of used SWH Equipment with the exception of de-scaled copper piping
- Claiming of an incentive for a system that was never installed
- Attempt to claim an incentive for ineligible equipment
- Failure to correct inspection failure items
- Submitting false information on the application in an attempt to collect more incentive dollars

If an entity is has been disqualified in other CPUC Programs, to include but not limited to CSI general market program, Multifamily Affordable Solar Housing (MASH), Single Family Affordable Solar Housing (SASH), or Self Generation Incentive Program (SGIP), CSI-Thermal Program PAs reserve the right to impose an equivalent sanction within the CSI-Thermal Program.

5.2 Disqualification Sanctions

If an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer is immediately disqualified due to the reasons outlined in Section 5.1, the following will occur:

- All applications associated with the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer will be suspended;
- No CSI Incentive payment will be made to the party that has been immediately disqualified;
- All parties indentified on the application will be notified of their application status.

In cases where the Solar Contractor is disqualified from participating the CSI-Thermal Program due to the reasons outlined above, and if the system has not yet been installed, the Host Customer will be able to hire a new Solar Contractor to without losing its current incentive reservation and apply for an extension, if necessary.

5.3 Dispute Resolution

If an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer disputes the findings and/or sanctions of the PA, he or she may appeal in writing to the PA within 30 calendar days of notification.

A panel of non-sanctioning PAs and a representative from the Energy Division of the CPUC will review the appeal. Written appeals should substantiate any reasons that warrant reconsideration of the failure or disqualification. The PAs may request additional information to substantiate the written appeal. The final decision will be provided to the PA, Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer within 60 days of receipt of the written appeal.

5.4 Right to Audit

The PAs reserve the right to conduct spot checks to verify that project related payments were made as identified in the final invoices or agreements provided by equipment sellers and/or contractors. As part of these spot checks, the Program Administrators will require Applicants to

submit copies of cancelled checks, credit card statements, or equivalent documentation to substantiate payments made to the equipment seller and/or contractor. The final amount legally incurred or paid to the equipment seller and/or the final amount paid to the contractor for the purchase and installation of the system must match the cost information identified in the project application.

To meet this requirement, the system owner must submit final invoices and/or a copy of the final agreement, and cost documentation must provide sufficient information to identify clearly the equipment purchased and the labor paid. If there is no direct proof of actual payment from the system owner to an appropriately licensed contractor or seller, the incentive will be cancelled or reduced. Applicants must explain the discrepancy if the final amount paid by the System Owner is different from the amount of the purchase and/or installation shown in any agreement or invoice or in the previously submitted Reservation Request.

In addition, the final invoices or agreements should clearly indicate the extent to which the CSI Thermal incentive lowered the cost of the system to the system owner. If the system owner has entered into an agreement to pay the equipment seller over time rather than in lump sum, the final agreement must indicate the terms of payment and the amount of any deposits or payments paid by Applicant to the equipment seller to date. The system owner must pay the cost of any system installation prior to submitting a payment request to the PA.

When submitting this documentation, Applicants are encouraged to remove their personal account numbers or other sensitive information identified in the documentation.

APPENDICES

Appendix A: Acronyms

AB: Assembly Bill

Btu: British Thermal Unit

CCSE: California Center for Sustainable Energy

CEC: California Energy Commission

CPUC: California Public Utilities Commission

CSI: California Solar Initiative

CSI-Thermal Program: California Solar Initiative Thermal Program

CSLB: Contractors State License Board

FTL: Freeze Tolerance Level

GPD: Gallons Per Day

kWh: Kilowatt-hour

kW_{th}: Kilowatt-thermal

M&E: Measurement and Evaluation

MW: Megawatt

NREL: National Renewable Energy Laboratory

OG: Operating Guidelines

PA: Program Administrator

PG&E: Pacific Gas and Electric

SB: Senate Bill

SCE: Southern California Edison

SCG: Southern California Gas Company

SDG&E: San Diego Gas and Electric

SOF: Surface Orientation Factor

SRCC: Solar Rating and Certification Corporation

SWH: Solar Water Heating

Appendix B: Definitions and Glossary

Applicant: The Applicant is the entity that completes and submits the CSI-Thermal Program application and serves as the main contact person for the CSI-Thermal Program PA throughout the application process. The eligible Solar Contractor or Self-Installer will be the Applicant for CSI-Thermal Program applications.

Azimuth: Azimuth is the horizontal angular distance between the vertical plane containing a point in the sky and true south. All references to azimuth within the CSI-Thermal Program, unless expressly stated otherwise, refer to true, not magnetic, azimuth.

British Thermal Unit (Btu): A traditional unit of energy equal to about 1.06 kilojoules. It is approximately the amount of energy needed to heat one pound of water one degree Fahrenheit.

Commercial: For the purposes of the CSI-Thermal Program, commercial customers are considered to be all customer classes other than single family and multifamily customers.

Contractor: A person or business entity who contracts to erect buildings, or portions of buildings, or systems within buildings. Under the CSI-Thermal Program, all contractors must be appropriately licensed California contractors in accordance with rules and regulations adopted by the State of California Contractors State License Board.

Contractors State License Board (CSLB): Installation contracts for photovoltaic systems installed under the CSI Program must comply with the Contractors State License Board (CSLB) requirements. Please refer to the CSLB website for more information on CSLB guidelines at: www.cslb.ca.gov.

Equipment Seller: Equipment Seller in the CSI-Thermal Program refers to retail sellers such as manufacturers, distributors, retail businesses. An Equipment Seller is not an in-home sales representative.

Host Customer: Host Customer is, in most cases, the utility customer of record at the location where the solar water heating system will be located. Any class of customer is eligible to be a Host Customer. The Project Site must be within the service territory of, and receive retail level gas or electric service[1] from, PG&E, SCE, SCG, or SDG&E. Municipal electric utility customers are not eligible to receive incentives from the designated PAs.

In-Home Sales Representative: All individuals who visit homes to sell home improvements are required to be listed as sales personnel affiliated with the contractor's license.

Kilowatt Hour (kWh): The use of 1,000 watts of electricity for one full hour. kWh is a measure of energy, not power, and is the unit on which the price of electrical energy is based. Electricity rates are most commonly expressed in cents per kilowatt hour.

Kilowatt Thermal (kW_{th}): A unit of measurement developed by a consortium of international solar rating agencies in 2004 to approximate the amount of energy produced by solar thermal collectors. Each M^2 of collector space equals .7 kW_{th} Based on this calculation, 30 kW_{th} is equivalent to 462 square feet of collectors. This includes unglazed, glazed, and evacuated tube collectors.

Lessor: A person or entity who rents property to another under a lease. Under the CSI Program, in the case of a third-party owned system (or leased system, for example), the lessor is classified as the System Owner

Megawatt (MW): Unit of electrical power equal to one million watts; also equals 1,000 kW.

Multi-Family Dwellings: Multifamily complexes are defined as those with five (5) or more dwelling units. Duplexes, triplexes, and four-plexes will be qualified as single family homes for the purposes of determining income eligibility.

New Construction Project: A residential building is considered "new" if the entire building structure is subject to current Title 24 building efficiency standards and does not yet have a Permit of Occupancy from the relevant Building Department. Solar water heating systems installed with electric back up water heaters on new construction projects are not eligible for an incentive through the CSI Thermal program.

OG-100: Operating Guidelines 100 (OG-100) is a certification and rating program for solar collector developed by the Solar Rating and Certification Corporation (SRCC). The purpose provides a means for evaluating the maintainability of solar collectors and a thermal performance rating characteristic of all-day energy output of a solar collector under prescribed rating conditions.

OG-300: Operating Guidelines 300 (OG-300) is the solar water heating system rating and certification program developed by the Solar Rating and Certification Corporation (SRCC). The purpose of this program is to improve performance and reliability of solar products and is based upon the determination by SRCC that the system successfully meets its minimum criteria for design, reliability and durability, safety, operation and servicing, installation, and operation and maintenance manuals. OG-300 is a comprehensive certification of the entire SWH system.

Payee: The person, or company, to whom the CSI- Thermal Program incentive check is made payable.

Program Administrator (PA): For purposes of the CSI Thermal Program, PG&E, SCE, SCG, & CCSE (which administers the program on behalf of SDG&E) are the PAs.

Project: For purposes of the CSI-Thermal Program, the "Project" is the installation and operation of the SWH system, as described by the submitted application.

Residential: Residential entities are private household establishments that consume energy primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying. The classification of an individual consumer's account, where the use is both residential and commercial, is based on principal use. A power purchase agreement on a residence is considered a residential application. It should be noted that the CSI-Thermal Incentive rate will be determined by the utility rate schedule of the Host Customer (may require more than one application). If the requested incentive rate differs from the classification of the Host Customer utility rate schedule, the PAs may, at their discretion, allow the requested incentive rate given that the Host Customer change its utility rate schedule.

Retrofit Project: A retrofit is a modification of an existing building or facility to include new systems or components.

Self-Installer: Homeowners or building owners that install the solar water heating system on their individual property without the assistance of a contractor.

Shade Factor: A variable in the OG-300 incentive calculation where for each percent of average annual availability below 100% on the solar collector(s) between 10:00 am and 3:00 pm, there will be an equal percentage reduction in the system incentive payment down to 85%.

Single Family Residential Dwelling Unit: Group of rooms, such as a house, a flat, an apartment, or a mobile home which provides complete single-family living facilities in which the occupant normally cooks meals, eats, sleeps, and carries on the household operations incident to domestic life.

Solar Rating and Certification Corporation (SRCC): SRCC is a non-profit organization that operates as an independent third party certification entity. SRCC administers a certification, rating, and labeling program for solar collectors and a similar program for complete solar water heating systems.

System Owner: The owner of the SWH system at the time the incentive is paid. For example, in the case when a vendor sells a turnkey system to a Host Customer, the Host Customer is the System Owner. In the case of a leased system, the lessor is the System Owner.

Therm: A unit of heat energy equal to 100,000 British thermal units (BTU). It is approximately the energy equivalent of burning 100 cubic feet of natural gas.

Appendix C: Surface Orientation Factor (SOF) Chart [6]

The ideal SOF is a value of 1.0 and the minimum SOF required in order to receive a CSI-Thermal Program incentive is 0.75. Azimuth directions are True orientation: 0° is True North and 180° is True South. Add magnetic declination to the compass magnetic orientation to get true orientation.

Azimuth	Tilt	SOF		Azimuth	Tilt	SOF
60-90 (East)	0-30	0.85		181-210 (South)	0-30	1
	31-60	not allowed			31-60	0.95
	61-90	not allowed			61-90	0.75
91-120 (East)	0-30	0.85		211-240 (Southwest)	0-30	1
	31-60	0.75			31-60	1
	61-90	not allowed			61-90	0.75
121-150 (Southeast)	0-30	0.95		241-270 (West)	0-30	0.9
	31-60	0.9			31-60	0.85
	61-90	0.75			61-90	not allowed
151-180 (South)	0-30	1		271-300 (West)	0-30	0.85
	31-60	0.95			31-60	not allowed
	61-90	0.75			61-90	not allowed

[6] Source: Craig Christensen (NREL) and Greg Barker (Mountain Energy Partnership), "**Effects of Tilt and Azimuth on Annual Incident Solar Radiation for United States Locations**"; Proceedings of Solar Forum 2001: Solar Energy: The Power to Choose, 2001. This data is for 33° North Latitude. The source SOF charts have been climate-adjusted; the differences between the charts for six representative California cities (Arcata, San Francisco, Santa Maria, Los Angeles, Long Beach and San Diego) are inconsequential. Therefore, the Surface Orientation Chart for San Diego is adopted for the state of California.