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May 24, 2010

Advice No. 4115

(Southern California Gas Company - U 904 G)

Advice No. 3673-E/3119-G

(Pacific Gas and Electric Company – U 39 M)

Advice No. 2475-E

(Southern California Edison Company – U 338 E)

Advice No. 12

(California Center for Sustainable Energy)

Public Utilities Commission of the State of California

Subject: Compliance Advice Letter to Establish the Multi-Family and Commercial Project Portion of California Solar Initiative Thermal Program Handbook per Decision 10-01-022

Purpose

Pursuant to Decision (D.) 10-01-022, *Decision Establishing the California Solar Initiative Thermal Program to Provide Solar Water Heating Incentives*, Ordering Paragraph (OP) 7, Southern California Gas Company (SoCalGas), on behalf of the California Solar Initiative (CSI) Thermal Program Administrators (PAs), hereby submits this compliance advice filing to establish the multi-family and commercial project portion of the CSI-Thermal Program handbook. The CSI-Thermal PAs include SoCalGas, Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and the California Center for Sustainable Energy (CCSE).

Background

On January 21, 2010, the California Public Utilities Commission (Commission) approved D.10-01-022. OP 7 of D.10-01-022, orders the CSI-Thermal PAs to submit by May 1, 2010, the multi-family and commercial project portion of the CSI-Thermal Program handbook as an Advice Letter to begin accepting incentive applications for multi-family and commercial projects on June 1, 2010.

On April 23, 2010, SoCalGas, on behalf of the CSI-Thermal PAs, sent an electronic mail to Administrative Law Judge (ALJ) Dorothy Duda requesting an extension of the deadline

from May 1, 2010 to May 24, 2010. This delay was necessary to focus all resources on the May 1 launch and start up activities for the single-family residential portion of the CSI-Thermal Program, and because topics related to the multi-family and commercial project portion of the CSI-Thermal Program handbook required more time to finalize than originally anticipated. ALJ Duda found the CSI-Thermal PAs request reasonable and granted the request by a Ruling dated April 28, 2010.

Accordingly, SoCalGas, on behalf of the CSI-Thermal PAs, submits the multi-family and commercial project portion of the CSI-Thermal Program handbook, included as Attachment B.

In addition to the submission of the multi-family and commercial project portion of the CSI-Thermal Program handbook, Attachment B includes revisions made by the CSI-Thermal PAs to several sections of the single-family residential portion of the handbook approved on May 12, 2010, by letter from the Energy Division Director¹.

A redline version is available, on request, that shows the changes in the handbook filed herein, as compared to the approved single-family handbook¹. Parties who would like a PDF version of the redline document should contact Gretchen DiAlto at (213) 244-3387 or GDiAlto@semprautilities.com.

Protest

Anyone may protest this Advice Letter to the Commission. The protest must state the grounds upon which it is based, including such items as financial and service impact, and should be submitted expeditiously. The protest must be made in writing and must be received within 20 days of the date of this Advice Letter, which is June 13, 2010. There is no restriction on who may file a protest. The address for mailing or delivering a protest to the Commission is:

CPUC Energy Division
Attention: Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Copies of the protest should also be sent via e-mail to the attention of both Maria Salinas (mas@cpuc.ca.gov) and Honesto Gatchalian (inj@cpuc.ca.gov) of the Energy Division. A copy of the protest should also be sent via both e-mail and facsimile to the address shown below on the same date it is mailed or delivered to the Commission.

Attn: Sid Newsom
Tariff Manager - GT14D6
555 West Fifth Street
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Facsimile No. (213) 244-4957
E-mail: snewsom@SempraUtilities.com

¹ Energy Division Director letter approved Advice 3102-G-A/3637-E-A (Pacific Gas and Electric Company ID U 39 M) Advice 2454-E-A (Southern California Edison Company ID U 338-E) Advice 4090-G-A (Southern California Gas Company ID U 904-G) Advice 9-A (California Center for Sustainable Energy).

Effective Date

SoCalGas believes that this filing is subject to Energy Division disposition and should be classified as Tier 2 (effective after staff approval) pursuant to GO 96-B. SoCalGas respectfully requests that this filing become effective on June 23, 2010, which is 30 calendar days from the date filed.

Notice

A copy of this advice letter is being sent to the parties listed on Attachment A, which includes parties to R.08-03-008.

Rasha Prince
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Attachments

CALIFORNIA PUBLIC UTILITIES COMMISSION

ADVICE LETTER FILING SUMMARY ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No. **SOUTHERN CALIFORNIA GAS COMPANY (U 904G)**

Utility type:

☐ ELC

☒ GAS

☐ PLC

☐ HEAT

☐ WATER

Contact Person: Sid Newsom

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EXPLANATION OF UTILITY TYPE

ELC = Electric

GAS = Gas

PLC = Pipeline

HEAT = Heat

WATER = Water

(Date Filed/ Received Stamp by CPUC)

Advice Letter (AL) #: 4115

Subject of AL: Establishment of the Commercial and Multifamily Project Portion of California Solar Initiative Thermal Program

Keywords (choose from CPUC listing): Compliance

AL filing type: ☐ Monthly ☐ Quarterly ☐ Annual ☒ One-Time ☐ Other _____

If AL filed in compliance with a Commission order, indicate relevant Decision/Resolution #:

D.10-01-022

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL No

Summarize differences between the AL and the prior withdrawn or rejected AL¹: N/A

Does AL request confidential treatment? If so, provide explanation: No

Resolution Required? ☐ Yes ☒ No

Tier Designation: ☐ 1 ☒ 2 ☐ 3

Requested effective date: 5/23/10

No. of tariff sheets: 0

Estimated system annual revenue effect (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: None

Service affected and changes proposed¹: NA

Pending advice letters that revise the same tariff sheets: None

Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this filing, unless otherwise authorized by the Commission, and shall be sent to:

CPUC, Energy Division

Attention: Tariff Unit

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¹ Discuss in AL if more space is needed.

ATTACHMENT A

Advice No. 4115

(See Attached Service Lists)

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ATTACHMENT B

Advice No. 4115

**California Solar Initiative –Thermal
Program Handbook**

CALIFORNIA SOLAR INITIATIVE-THERMAL

CALIFORNIA
PUBLIC UTILITIES
COMMISSION

PROGRAM HANDBOOK

May 2010



The California Public Utilities Commission (CPUC) prohibits discrimination in employment, its regulatory programs, and activities on the basis of race, national origin, color, creed, religion, sex, age, disability, veteran status, sexual orientation, gender identity, or associational preference. The CPUC also affirms its commitment to providing equal opportunities and equal access to CPUC regulated facilities and programs. For additional information or to file a complaint, contact the State Personnel Board, Office of Civil Rights, Discrimination Complaint Monitoring and Analysis, Kristen Trimarche (916) 653-1621

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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 CSI-Thermal Program Handbook (Handbook) contains the detailed requirements and guidelines for participation in the CSI-Thermal Program, and this Handbook is consistent with both Public Utilities Code and Commission D. 10-01-022.

1.2 Program Budget

The total incentive budget for the CSI-Thermal Program is approximately \$280.8 million. Of this total, \$180 million is allocated for natural gas-displacing SWH systems (not including low-income incentives¹), as authorized by AB1470, and up to \$100.8 million for electric-displacing systems, as authorized by SB1. Incentive dollars will be allocated between two customer classes, single-family residential and multi-family/commercial, as follows:

- 40 percent of the total incentive budget is reserved for single-family residential customer SWH systems;

¹ Decision 10-01-022 sets aside \$25 million for low-income customers. However, to implement the CSI Thermal Program in early 2010, the Commission decided to address the detailed comments by parties on the design of a low-income CSI Thermal Program in a separate decision.

- 60 percent of the total incentive budget is reserved for multi-family/commercial SWH systems. Funds may be moved from the multi-family/commercial 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 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:
 - o 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;

-
- o 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
 - o 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 percent 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 Administrator Contact Information

California Center for Sustainable Energy (SDG&E territory):

CSI-Thermal Program
8690 Balboa Ave Suite 100
San Diego, CA 92123
Phone: (877) 333-SWHP
Email: swh@energycenter.org
Website: www.energycenter.org/swh

Pacific Gas and Electric:

PG&E Solar and Customer Generation: CSI-Thermal
PO Box 7433
San Francisco, CA 94120
Overnight Deliveries
PG&E Solar and Customer Generation
245 Market St., MC N7R
San Francisco, CA 94105-1797
Phone: (877) 743-4112
Email: solar@pge.com
Website: www.pge.com/csithermal

Southern California Gas Company:

CSI-Thermal Program
555 W. Fifth Street ML GT22H4
Los Angeles, CA 90013
Phone: (800) GAS-2000
Email: swh@socalgas.com
Website: www.socalgas.com/rebates/solar

Southern California Edison:

Attn: CSI Thermal Program Administrator
P.O. Box 800
Rosemead, CA 91770-0800
Phone: (866) 584-7436
Email: CSIGroup@sce.com
Website: www.sce.com/csithermal

CSI-Thermal Program website: www.gosolarcalifornia.org/solarwater

1.5 CSI-Thermal Handbook Structure

Following this introduction, the Handbook is divided into two primary sections: Program and Technical. The Program Section focuses on descriptions of eligibility and participation, incentive structure and application processes. As its name applies, the Technical Section includes technical program information, such as metering requirements, freeze protection, stagnation/overheat protection, and system sizing. Appendices of acronym and term definitions follow these sections. This structure is intended to make the Handbook more useful and accessible.

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 an 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 service² from, PG&E, SCE, SCG, or SDG&E. The Host Customer shall always be party to the CSI-Thermal Program contract and will retain sole rights to the incentive and the reservation for multi-family/commercial projects.

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 PA 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 multi-family / commercial. For purposes of the CSI-Thermal Program, commercial customers include all non-residential customer classes. 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 "...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

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 natural 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 natural 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. SWH systems installed with electric back-up water heating 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 lessor) 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 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, training, and warranty requirements as stated in Sections 2.1.4.2, 2.1.4.3, and 2.5 of this Handbook. Contractors must also complete the Contractor Participation Application, offered by the PAs. Each contractor who meets these requirements will be added to the program’s list of eligible contractors. This list will be available publicly on the program’s www.gosolarcalifornia.org/solarwater 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 eligible standing as a CSI-Thermal Program contractor until their license becomes active again. Current projects will not be paid unless the system was signed off by the appropriate permitting agency prior to the suspension or until the contractor's 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. Only contractors who participate in this workshop will be eligible to apply for incentives from the program. Completing a workshop in any PA territory makes a contractor eligible program wide.

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. A project is considered complete as defined in Section 4.6.

The PAs 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.

2.1.4.4 CSI-Thermal Program Training Workshop

Contractors and self-installers are required to attend a designated no-cost CSI-Thermal Program training workshop. All PAs will conduct training in their respective service territories. Availability of these workshops will be publicized on each PA website, see Section 1.4.

The CSI-Thermal Program training workshop is intended to familiarize Applicants with program rules and requirements; it is not a course on the basics of solar thermal installation. The workshop provides an overview of the 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, Applicants will receive a key that will allow them to register and be eligible to apply for CSI-Thermal Program incentives in any PA territory.

2.1.5 Suspended Solar Contractor

If it is determined that a contractor's CSLB license was suspended during the application process or that the Solar Contractor has been suspended from the CSI-Thermal Program, the following will occur:

- Reservations will not be confirmed and all applications associated with the contractor will be suspended;
- No CSI-Thermal incentive payment will be made unless the Applicant obtains the final signed-off permit prior to the suspension;
- All parties identified on the application will be notified of the suspension;

-
- If the system has not yet been installed, the Host Customer will be able to hire a new contractor without losing its current incentive reservation and apply for an extension, if necessary.
 - Upon project completion, the CSI-Thermal incentive payment will be made only directly to the Host Customer and not any other third-party.

If it is determined that an Applicant, System Owner, Seller, and/or Host Customer is suspended from the program, the PA will notify all parties involved in the application of the suspension. The PA will determine whether the project can be paid incentives or whether the project is ineligible to be paid incentives. If the project is deemed to be payable, the PA, in most cases, will only pay the Host Customer for the project.

2.1.6 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 the CSI-Thermal Program training workshop, see Section 2.1.4.4. Self-Installers must install their SWH system within 12 months of attending the required training otherwise they must once again attend the 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 percent of the system has been purchased in place of the installation agreement outlined in Section 4.7.4. PAs reserve the right to request proof of property ownership from Self-Installers.

2.1.7 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 when applying for an incentive. An Equipment Seller is not an in-home sales representative, see Section 2.1.4.2.

2.1.8 Customer Performance Monitoring Providers

Customer Performance Monitoring (CPM) providers in the CSI-Thermal Program refer to the entity that provides SWH system performance monitoring and reporting services to the System Owner. The data provided allows the System Owner to maintain and evaluate system performance.

For SWH systems that displace over 30 kWth, the System Owner must contract with an eligible CPM. See Section 6.5.3 for more details.

2.1.9 Program Performance Data Providers

Program Performance Data (PPD) providers in the CSI-Thermal program refer to the entity that provides SWH energy delivered monitoring and reporting services to the PAs. The data will serve as basis for 50/50 true-up incentive payments, see Section 6.5.4 for details, and Measurement and Evaluation (M&E) studies.

For SWH systems that displace over 30 kW_{th}, the System Owner must contract with an eligible PPD. See Section 6.5.4 for more details.

2.2 Equipment Eligibility and Requirements

2.2.1 Eligible Equipment

To receive a CSI-Thermal Program incentive, 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 multi-family/commercial water heating shall have SRCC OG-100 Collector Certification. Systems in compliance with SRCC OG-300 standards will also be eligible to receive multi-family/commercial incentives.
- Components must be new and unused. Exceptions include the following if proposed system is replacing an existing SWH system:
 - o existing de-scaled copper piping, and/or
 - o existing racking with a design that has been stamped by a State of California licensed Structural Engineer.
- System installations must conform to manufacturer's specifications and all applicable codes and standards;
- All systems must have freeze and stagnation protection, see Section 6.1 and 6.2.

2.2.2 End Use Eligibility

2.2.2.1 Single-Family End Uses

In single-family applications, all Domestic Hot Water (DHW) end uses are eligible in the CSI-Thermal Program. DHW is defined as water used, in any type of building, for domestic purposes, principally drinking, food preparation, sanitation and personal hygiene (but not including space heating, space cooling, or swimming pool heating).

2.2.2.2 Multi-Family/Commercial End Uses

In multi-family/commercial applications, DHW end uses are eligible in the CSI-Thermal Program. Typical examples include the following: apartment buildings with central DHW systems, convalescent homes, hotels and motels, military bachelor quarters, school dormitories with central DHW systems, and prisons. In addition, the following end uses of hot water are also eligible for incentives: commercial laundries, laundromats, restaurants, food processors, agricultural processes, and car washes.

2.2.3 Ineligible Technology and System Applications

The CSI-Thermal Program will only pay incentives for SWH systems that displace natural gas or electricity usage. The following system applications are ineligible:

- (a) Direct Forced Circulation systems, see Section 6.1.2.
- (b) Open loop Thermosiphon systems that have potable water in the collector loop, see Section 6.1.4.
- (c) Closed loop recirculation systems that recirculation water in the collector loop, see Section 6.1.3.
- (d) Systems that use propane as back-up water heaters.
- (e) Systems that heat pools and spas.
- (f) Combination system energy savings for anything other than DHW usage. Applicants must provide documentation proving DHW energy savings for combination systems. Incentives will only apply to the DHW portion of the load.
- (g) Non DHW thermal end uses, e.g., heating, ventilating or air conditioning processes, or process heat applications.
- (h) Systems with a Surface Orientation Factor of less than 0.75, see Section 2.4.
- (i) Systems with an average annual solar availability less than 85 percent between 10:00 am and 3:00 pm, see Section 2.3
- (j) Portable systems or systems that are not permanently installed.
- (k) A SWH system that replaces a SWH system which previously received a CSI-Thermal Program incentive.
- (l) A SWH system that received incentives from a utility Energy Efficiency program. Water heater replacements can be eligible for an EE program incentive, however, that work needs to be contractually and physically distinguishable from the SWH system.

2.2.4 Permit Requirements

Necessary local permits are required for SWH system installations. A final signed-off permit issued by the appropriate permitting agency is a key requirement in determining project completion. In most cases, a permit will be signed-off by a City or County building department official. To be eligible for the CSI-Thermal Program incentive, a final permit must be signed-off on or after July 16, 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 must apply for their incentive within 24 months after the date on the final signed-off permit.

2.3 Shade Factor

Since shading from trees and structures reduces the effectiveness of SWH systems, 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 percent (15 percent average annual shade between 10:00 am and 3:00 pm). Collectors with an annual average availability less than 85 percent between the hours of 10:00 am and 3:00 pm are not eligible for an incentive through the CSI-Thermal Program.

Additionally, for each percentage of average annual availability below 100 percent 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 percent. For example, if the shade analysis reveals a 95 percent average annual availability between 10:00 am and 3:00 pm, the PAs will multiply the incentive amount by 95 percent (reduce the incentive by 5 percent). In this example, an incentive of \$1,500 with a 95 percent Shade Factor will be reduced by 5 percent such that the incentive payment will be \$1,425.

2.4 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 collector's tilt from horizontal 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.

In cases where there are multiple arrays that have various tilts and azimuths, refer to Section 3.4 that discusses how to calculate weighted average SOF.

2.5 Warranty Requirements

System owners will acknowledge on the ICF that they have received, at a minimum, the following warranties:

2.5.1 Contractor-Installed Systems

All contractor-installed systems must provide for the following warranties:

- All solar collectors must have a minimum of a 10-year manufacturer's performance warranty to protect against defects and 15 percent degradation.
- All systems must have a minimum 10-year performance warranty to protect the purchaser against more than a 15 percent degradation of system performance over the 10-year period that may occur as a result of faulty installation.

-
- All systems must have a minimum 1-year warranty on installation labor and workmanship not otherwise covered by the manufacturer's performance warranty.

2.5.2 Self-Installed Systems

All self-installed systems must provide for the following warranty:

- All solar collectors must have a minimum of a 10-year manufacturer's performance warranty to protect against defects and 15 percent degradation.

2.6 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 2.6.1 through 2.6.3 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.

2.6.1 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.

2.6.2 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 back-up water heater to the farthest accessible point of use and the return line from the farthest accessible point of use back to the back-up water heater.

2.6.3 Customer Energy Efficiency Affidavit

Contractors shall inform customers of energy efficiency opportunities. After doing so, contractor will have the customer sign an Affidavit which states they were informed of such opportunities. The Affidavit will be submitted by the contractor to the PA.

2.7 Metering Requirements

Accurate measurement of system performance is necessary to ensuring cost effectiveness for System Owners and ratepayers. The CSI-Thermal Program requires metering for two separate purposes:

- A sample of all systems will be selected by the PAs to be metered for measurement and evaluation (M&E) purposes. Any participant in the program must agree to allow their system to be metered for M&E, if selected
- Metering and monitoring is required on all large multi-family/commercial systems for customer protection and 50/50 true-up payment purposes, see Section 2.7.2

If selected for M&E, any participant in the program must agree to allow their system to be metered for M&E.

2.7.1 Small Systems (displacing 30 kW_{th} or less)

A sample of all systems displacing 30 kW_{th} (equivalent to 462 square feet of fluid collectors³) 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 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. The sample metering options will be as follows:

2.7.1.1 Opt-In Metering

The PAs will pay the solar contractor \$400 per project for customers that elect to participate in the M&E metering process. The \$400 will cover the equipment, monitoring, and labor associated with the installation of the meter. The metered data must be provided to the PAs designee on a quarterly basis for a period of five years. Payment will be provided upon completion of the project and proof that metering requirements have been met.

The opt-in method will be available to the first 1,000 customers per year program wide. Applicants must elect to opt-in on the ICF, and are only eligible for one system per customer per year.

2.7.1.2 Third Party Metering

Customers that do not participate in the opt-in M&E metering process must agree to allow a third party M&E contractor to install metering on their system, if selected for M&E purposes. The PAs

³ 30 kW_{th} is equivalent to 462 square feet of fluid collectors based on a calculation developed by a consortium of international solar rating agencies in 2004, using 0.7 kW_{th} per M². Fluid collectors include unglazed, glazed, and evacuated tube collectors. 30 kW_{th} is also equivalent to or 628 square feet of air collectors.

will select a sample of projects displacing 30 kW_{th} or less for metering and will notify the customer after payment of the incentive.

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

2.7.2 Large Systems (displacing over 30 kW_{th})

Performance metering and monitoring equipment is required on all SWH system installations displacing more than 30 kW_{th}. The Host Customer or designee will provide the PAs with interval data to pay the 50/50 true-up incentive payment after one year. The Host Customer or designee will also provide interval data to the PAs on a quarterly basis for a period of five years for M&E purposes. See Section 6.4 for minimum metering requirements.

2.8 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 SWH system must demonstrate to the satisfaction of the PAs adequate assurances of both physical and contractual permanence prior to receiving an 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.

2.9 Onsite Field Inspections

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

Please refer to Section 4.8 for details on the inspection process.

2.10 Owner's Manual

The CSI-Thermal Program requires the contractor to provide a detailed operation and maintenance manual to the customer on or before the permitting authority's final 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.

3. CSI-Thermal Program Incentive Structure

Part of the goal of the CSI-Thermal Program is to lower the cost of SWH technology for the System Owner through incentives. 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 3.5.

Natural gas-displacing incentives will decline from step to step when the amount reserved in 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. 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, above.

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

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

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

Incentive step changes will move independently in each service territory⁴ 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 www.csithermal.com

3.1 Single-Family Incentives

Single-family residential system incentives are calculated using the SRCC OG-300 rating (i.e., the estimated annual therm or kWh savings) in the appropriate CEC climate zone, combined with the SOF, the Shade Factor and the current incentive rate. Single-family incentives are paid in one lump sum after the project is completed and approved. The actual incentive paid for any qualified system is derived as follows:

⁴ Southern California Edison incentive step changes will correspond with Southern California Gas Company gas incentive step changes for each customer class.

Incentive = system's OG-300 rating * incentive rate * SOF * Shade Factor
not to exceed the PAs current step maximum

The system's SRCC OG-300 rating is generally displayed in annual kWh savings. To convert kWh to therms, multiply kWh by 0.03412128. For example, 3000 kWh equals 102.4 therms.

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.

The OG-300 system incentive calculator is described in Section 3.5.1.

3.1.1 Natural Gas

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

3.1.2 Electric

Table 5 displays the dollar incentive rate per kWh in each step for electric-displacing systems.

Table 5
Single-Family Electric-Displacing System Incentive Steps

Step	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

3.2 Multi-Family/Commercial Incentives

Multi-family and commercial systems with SRCC OG-100 collectors will use the CSI-Thermal Program online incentive calculator tool to calculate the incentive amount, as described in Section 3.5.2. Multi-family/commercial projects with SRCC OG-300 systems may use the OG-300 incentive calculator as described in Section 3.5.1.

A maximum of one multi-family or commercial incentive will be allowed per SWH system, not to exceed \$500,000 for natural gas displacing systems or \$250,000 for electric displacing systems. In addition, the total incentives for multiple systems on one site cannot exceed the incentive maximums stated above and described in Sections 3.2.1 and 3.2.2 below. A site is defined as follows:

- The Host Customer's premises, consisting of all the real property and apparatus employed in a single enterprise on an integral parcel of land undivided, excepting in the case of industrial, agricultural, oil field, resort enterprises, and public or quasi-public institutions divided by a dedicated street, highway or other public thoroughfare or railway.
- Automobile parking lots constituting a part of and adjacent to a single enterprise may be separated by an alley from the remainder of the premises served.
- Separate business enterprises or homes on a single parcel of land undivided by a highway, public road, and thoroughfare or railroad would be considered for purposes of CSI-Thermal Program as separate sites.

Each individual site must be able to substantiate sufficient hot water usage to support the proposed system size.

For example: A multi-family building owner owns two buildings on one site under one business. Each building has a natural gas-displacing solar water heating system that qualifies for a CSI-Thermal Program incentive. A separate incentive will be allowed for each building, as long as the combined total of the incentives do not exceed \$500,000 for the site.

3.2.1 Natural Gas

Table 6 displays the dollars per therm displaced incentive amount for each incentive step, the maximum incentive amount per project and each PAs budget allocation.

Table 6
Multi-Family and Commercial Natural Gas-Displacing System Incentive Steps

Step	Incentive per annual therm displaced	Maximum Incentive for Commercial/Multi-Family 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

3.2.2 Electric

Table 7 displays the dollar incentive rate per kWh in each step for electric-displacing systems and the maximum incentive amount for electric-displacing multi-family/commercial systems.

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

Step	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 Initial and 50/50 True-up Incentive Payments for Multi-Family/Commercial Systems

3.3.1 Small Multi-Family/Commercial Systems (30 kW_{th} or less)

Small multi-family/commercial system incentives are paid in one lump sum based on estimated first year therm or kWh displacement when the project is completed, approved, and inspected (if applicable).

3.3.2 Large Multi-Family/Commercial Systems (More than 30 kW_{th})

Large multi-family/commercial system incentives are paid in two parts. For the purposes of this program this is called the “50/50 true-up method.” The process is as follows:

1. Energy savings are estimated based on the OG-100 incentive calculator inputs, see Section 3.5.2.1. PA confirms initial incentive amount using current step incentive rate
2. PA pays 50 percent of the confirmed incentive amount in an upfront lump sum to the payee after the project is completed, approved, and inspected (if applicable)
3. Actual energy delivered from the solar tank to the back-up tank is measured for twelve months and divided by a designated Annual Fuel Utilization Efficiency (AFUE) factor of 82 percent for natural gas systems or an AFUE factor of 98 percent for electric systems, which is indicative of energy displaced by the SWH presuming a relatively efficient back-up heater
4. To determine final incentive amount, twelve months of recorded savings in step No. 3, above, is calculated using the same incentive rate used for the initial incentive in step No. 1, above.
5. PA subtracts the upfront lump sum payment from the final incentive amount to determine true-up incentive payment. If the difference in amount is positive, PA pays the outstanding amount. In the very unlikely event the amount is negative; payee reimburses amount of the initial lump sum payment that exceeds final incentive amount.

The following three examples all assume a SOF of 1.0 and a Shade Factor of 100 percent:

Example No. 1 (Actual energy savings less than expected): Customer's estimated energy savings is 5,000 therms per year and program is in step one, which equates to a \$64,100 incentive. PA pays 50 percent of this amount, which is \$32,050, once the project is completed, approved, and inspected (if applicable). Customer's energy savings is then measured for twelve months and is found to be 4,900 therms. Based on the actual metered energy delivered from the SWH system, the total incentive amount is \$62,818, or 4,900 therms * \$12.82 per therm. PA then pays the true-up incentive payment of \$30,768, which is \$62,818 less the \$32,050 upfront lump sum incentive.

Example No. 2 (Actual energy savings more than expected): Customer's estimated energy savings is 5,000 therms per year and program is in step one, which equates to a \$64,100 incentive. PA pays 50 percent of this amount, which is \$32,050, once the project is completed, approved, and inspected (if applicable). Customer's energy savings is then measured for twelve months and is found to be 5,100 therms. Total incentive is \$65,382, or 5,100 therms * \$12.82 per therm. PA then pays true-up incentive payment of \$33,332, which is \$65,382 less \$32,050 upfront lump sum incentive.

Example No. 3 (Incentive above cap): A natural gas customer's estimated energy savings is 100,000 therms per year and program is in step one, which equates to a \$1,282,000 incentive; however, the incentive is reduced to \$500,000 due to program cap. PA cuts upfront check to payee in the amount of \$250,000, which is 50 percent of the maximum incentive. Customer's energy savings is measured for twelve months and is 100,200 therms. Total incentive is \$500,000, or 100,200 therms * \$12.82 per therm but capped at the maximum amount for natural gas displacing systems. PA cuts true-up incentive payment to payee of \$250,000.

3.4 Multiple Orientation Arrays

3.4.1 Determine Weighted Average SOF

In situations where there are multiple arrays with different tilts and azimuths, the Applicant needs to determine an aggregate SOF. This is done as follows:

1. Determine the SOF of each array.
2. Weight the SOFs based on the relative number of square footage. For example: A system has two arrays, one with 400 square feet with a SOF of 0.9, and the other with 800 square feet and a SOF of 0.8. The weighted average SOF for this system would be $0.83 = (400 * 0.9) + (800 * 0.8) / 1200$.

3.4.2 Determine Weighted Average Shade Factor

In situations where there are multiple arrays with different tilts and azimuths, the Applicant needs to determine an aggregate Shade Factor. This is done as follows:

3. Determine the Shade Factor of each array.

-
4. Weight the Shade Factors based on the relative number of square footage. For example: A system has two arrays, one with 400 square feet and a Shade Factor of 98 percent, and the other with 800 square feet and a Shade Factor of 86 percent. The weighted average Shade Factor for this system would be 90% = $(400 * 98\%) + (800 * 86\%) / 1200$.

3.5 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. The calculators are embedded in the application processing database and can also be accessed separately for incentive estimation purposes at www.csithermal.com.

3.5.1 SRCC OG-300 Incentive Calculator

The installation of an OG-300 system will use the following calculation method. System incentives are calculated using the SRCC OG-300 rating (i.e., the estimated annual energy savings) in the appropriate CEC climate zone, combined with the SOF, the Shade Factor and the current incentive rate. The actual incentive paid to any qualified system is derived as follows:

Incentive = system's OG-300 rating * incentive rate * SOF * Shade Factor
not to exceed the PAs current step maximum incentive

Single-family customers are required to use this method and multi-family/commercial customers may use it if their system is OG-300 certified.

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

3.5.2.1 Calculator Inputs

All multi-family and commercial SWH systems that use OG-100 collectors, but do not have an OG-300 system certification, must use this calculator to determine the project incentive. This incentive calculator is not for single-family SWH systems. The incentive calculator for multi-family/commercial projects requires various inputs as necessitated by SWH system type including but not limited to the following:

- SRCC OG-100 Collector
- Number of collectors (square feet will be calculated)
- Heat exchanger type (immersed or external), if applicable
- Freeze protection type
- Number of tanks (1 tank, 2 tank, or 1 tank with a tankless back-up)
- Solar storage capacity (gallons)
- Back-up heater storage capacity (gallons)
- Back-up fuel source (natural gas or electricity)
- ZIP code
- Hot water demand (gallons per day)
- Building load profile, e.g., hotel, laundromat, 5-day business, university dorms
- Recirculation loop (yes/no)
- Set point temperature for back-up heater (degrees Fahrenheit)
- Set point temperature for delivered water to end-use (degrees Fahrenheit)
- Array tilt
- Array true azimuth
- Shade Factor

3.5.2.2 Calculator Outputs

The multi-family/commercial calculator will produce the following outputs:

1. Estimated annual energy savings in units of therms or kWh, based on back up fuel source
2. Estimated incentive amount, based on energy savings produced from the calculator and the current incentive step level
3. Solar Fraction
4. Total collector area in units of square feet

If estimated annual energy savings is greater than 3.5 therms or 102 kWh per square foot of collector area, Applicant must provide justification to PA for calculator input values. Estimated annual energy savings may not exceed actual gas or electric usage based on the last twelve months of utility bills.

3.5.2.3 Calculator Modifications

The PAs in conjunction with the CPUC developed a calculator that helps Applicants determine their incentives. As it gains experience with the calculator, the CPUC reserves the right to modify the calculator at any time without advance notice to Applicants.

If changes to the calculator do not affect the incentive amount on a given project, the PAs are not required to notify the Applicant for that project.

If changes to the calculator effect the Applicant's confirmed reservation, the PA will notify the Applicant in writing. Upon receiving the notification, Applicant can do one of the following:

1. Nothing, in which case Applicant will keep their confirmed reservation.
2. Resubmit the application using the updated calculator within 30 calendar days. If the Applicant chooses to resubmit, they will neither lose their place in the queue nor their application fee.

If the Applicant has not yet received a confirmed reservation before a calculator change, the PA will use the updated calculator when issuing Applicant's confirmed reservation. The confirmed reservation notice will inform Applicant that the reservation is different than what the Applicant originally submitted. Upon receiving the notice, the Applicant can do one of the following:

1. Nothing, in which case the confirmed reservation stands.
2. Notify PA within 30 calendar days that they wish to withdraw their application. If the Applicant chooses to withdraw their application, the PA will reimburse the application fee without interest and cancel the project. If Applicant withdraws their application after 30 calendar days, they will forfeit their application fee.

3.6 Incentive Limitations

If the project is installed as described on the ICF and all program and contract terms and conditions are complied with, including timely submission of all documents described in the Handbook, the PA will pay an incentive to the entity designated as the incentive recipient. The PA reserves the right to modify or cancel the reservation if the actual installation of the system differs

from the proposed installation, fails inspection, is not installed by the reservation expiration date, and/or if the documents submitted fail to meet the requirements of the Handbook.

Incentive amounts and project eligibility for the CSI-Thermal Program are limited by a number of factors, including:

- Total eligible project costs
- Other incentives or rebates received
- Incentive step cap
- PA budget allocation
- Shade Factor (see Section 2.3) and SOF (see Section 2.4)

3.6.1 Total Eligible Project Costs

No project can receive total incentives (incentives from the CSI-Thermal Program combined with other programs) that exceed total eligible project costs. The Applicant must submit project cost details to report total eligible project costs and to ensure that total incentives do not exceed out-of-pocket expenses for the System Owner. Total eligible project costs cover the SWH system and its ancillary equipment. Equipment and other costs outside of the project envelope, as listed below, are considered ineligible project costs. For large, multifaceted projects where the SWH system costs are embedded, applications must include a prorated estimate of the total eligible costs for the SWH system.

The following System Owner costs may be included in total eligible project cost:

1. Solar equipment capital costs including ancillary equipment associated with the SWH system, except back-up water heater
2. Engineering and design costs for the SWH system
3. Construction and installation costs including labor. For projects in which the SWH equipment is part of a larger project, only the construction and installation costs directly associated with the installation of the SWH equipment are eligible
4. Engineering feasibility study costs
5. Permitting costs
6. Warranty and/or maintenance contract costs associated with eligible SWH equipment
7. Sales tax and use tax
8. On-site system measurement, monitoring and data acquisition equipment not paid for by the CSI-Thermal Program
9. Mounting surfaces directly under the SWH collector(s) and/or the materials that provide the primary support for the collector(s)
10. Opt-in metering costs, if applicable, net of \$400 metering allowance from PA, see Section 2.7.1.1.

In cases where an installation contract encompasses all costs associated with the installation of a SWH system and additional measures such as energy efficiency, other renewable generating technologies, etc., the contractor must delineate the costs for each measure separately in the agreement.

3.6.2 Reportable Project Costs

All systems receiving an incentive are required to enter the costs identified below in the CSI-Thermal Program's online database so PAs can track SWH system cost data.

-
- Collector costs – the cost for collector(s)
 - Tank costs – the cost for the solar storage tank(s)
 - Permitting Fees – only include the cost of the permitting fees charged by the permitting agency (do not include any costs associated with time and labor in applying for permits)
 - All other costs – all other eligible costs associated with the installation of the SWH system. Please see Section 3.6.1 for a description of eligible project costs

3.6.3 Other Incentives or Rebates

Customers may not receive CSI-Thermal Program incentives for the same SWH equipment from more than one PA (i.e., PG&E, SCE, SoCalGas and CCSE). For projects receiving incentives under other programs, the CSI-Thermal Program incentive may be reduced, depending on the source of the other incentive.

CSI-Thermal Program incentives are distinct and separate from Energy Efficiency (EE) Program incentives, like DHW heater replacement programs. Customers may not receive an incentive from both a CSI-Thermal Program and an EE Program for the same equipment. For instance, if a customer wants to utilize an EE Program to support the energy efficient replacement of their DHW heater, that work needs to be contractually and physically distinguishable from the SWH system.

For projects that receive other incentives for the same SWH equipment that are funded by California investor-owned utility ratepayers (e.g., utility or California Energy Commission public goods charge programs), the incentive is discounted by the amount of the other incentive. For projects that receive other incentives funded from other sources than utility ratepayers (e.g., federal and state grants, air district grants or tax credits) no adjustment is made to the CSI-Thermal Program incentive, except where total incentives exceed total costs.

In no event may the combined incentives received from CSI-Thermal Program and other funding sources exceed the total eligible project cost. Host Customers, Applicants and System Owners are required to disclose information about all other incentives, including incentives for equipment or systems ancillary to the SWH system, post-installation performance payments, or additional incentives. The Host Customer and System Owner understand that other program rebates, grants, forgiven loans, financial incentives, post-installation agreements, Renewable Energy Credits (RECs), Green Credits, and performance payments are other incentives and must be disclosed as soon as those agreements or payments are made.

4. Application Process for CSI-Thermal Program

Through the CSI-Thermal Program, funding may be reserved for projects where there has been a commitment to purchase and install an eligible SWH system.

Applications for both single-family residential and multi-family/commercial projects will be completed online, through a dedicated CSI-Thermal Program web-based application at www.csithermal.com. The online application tool simplifies the application process and makes document submission more efficient for the Applicant. All documents should be submitted through the online application tool. Documents that cannot be submitted online must be delivered to the PA via U.S. mail or overnight mail. E-mails, faxes or hand deliveries will not be accepted to initiate a project.

Single-family residential systems will apply for incentives via a one-step process. For this application process, the applicant will submit an ICF and supporting documentation after the system has been installed and received a final signed-off permit. The incentive rate for each project will be determined based on the then-current rate when the application is approved by the PA.

Depending on the size of the SWH system, a multi-family/commercial project will follow either a two- or three-step application process. For multi-family/commercial projects, applicants will submit a Reservation Request Form (RRF) prior to the installation of the system to receive a reservation based on the then-current incentive rate. A reservation of incentive dollars provides the purchaser assurance that the reserved funds will be available when the incentive claim is made. The Applicant will submit an ICF and supporting documentation after the system has been installed and received a final signed-off permit.

Table 8
Application Process by Customer Type & Project Size

Sector	Application Process
Single-Family Residential	1-Step
Multi-family / Commercial (30 kW _{th} or less)	2-Step
Multi-family / Commercial (over 30 kW _{th})	3-Step

4.1 Single-Family Residential Project Application Process

A single-family residential project will follow a one-step application process. Once a SWH system has been installed and a final signed-off permit is received, the Applicant submits the following documentation:

1. Completed ICF 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 SWH system purchase and installation, including demonstration that system contains eligible equipment and required warranties
4. Customer affidavit stating contractor informed them regarding energy efficiency improvement opportunities
5. Copy of final signed-off permit

⁵ Signatures for all submitted documentation are acceptable in the following formats:

- Original signed documents with “wet” signatures
- Copy 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.

The following documents may also be needed:

1. Copy of executed alternative system ownership agreement (If System Owner is different from Host Customer)
2. Authorization to Receive Customer Information or Act on a Customer's Behalf (only required for SDG&E applicants)
3. System sizing justification, if applicable, see Section 6.3.1
4. Stagnation protection documentation, if different from methods listed in Section 6.2

All of the above documentation must be submitted in order for the payment to be issued. Refer to Section 4.7 for a description of these documents.

4.2 Multi-Family/Commercial Project Application Process (displacing 30 kW_{th} or less)

All multi-family/commercial SWH projects that displace 30 kW_{th} or less will follow a two-step application process. The two primary steps are as follows:

1. Complete and submit a RRF package to get a confirmed reservation
2. Complete and submit an ICF Package to request payment

The following sections describe each step in more detail.

4.2.1 Step No. 1: Submit Reservation Request Form Package

Once the Host Customer has decided to install a SWH system and has an executed contract with a solar contractor or a purchase order demonstrating proof of purchase of SWH equipment, a RRF package can be submitted. Applicants should submit the incentive RRF along with required documents prior to the installation of the system to receive a confirmed reservation at the current incentive rate.

Every RRF package must contain the following documents:

1. Completed RRF and program contract signed by the Applicant, Host Customer and System Owner (if different from Host Customer)⁵
2. Documentation of a completed Energy Efficiency Audit or Title 24 documentation
3. Copy of executed agreement of SWH system purchase and installation
4. Customer affidavit stating contractor informed them regarding energy efficiency improvement opportunities

The following documents may also be needed:

1. Copy of executed alternative system ownership agreement (If System Owner is different from Host Customer)
2. Authorization to Receive Customer Information or Act on a Customer's Behalf (only required for SDG&E Applicants)
3. System sizing justification signed by P.E. if one of the acceptable methods listed in Section 6.3.2 is not used

-
4. Stagnation protection documentation if different than methods listed in Section 6.2

All of the above documentation must be submitted in order for the incentive to be reserved. Refer to Section 4.7 for a description of these documents.

4.2.2 Step No. 2: Submit Incentive Claim Form Package

After the SWH system is purchased, installed, received final signed-off permit and put into operation, the Applicant should submit the ICF and required supporting documentation.

The ICF package includes the following documentation:

1. Completed ICF signed by the Host Customer and System Owner (if different from Host Customer)⁵
2. Final signed-off permit or Federal Government's Certificate of Acceptance (in lieu of the final signed-off permit)

Refer to Section 4.7 for a description of these required documents.

4.3 Multi-Family/Commercial Project Application Process (displacing over 30 kW_{th})

All multi-family/commercial SWH projects that displace over 30 kW_{th} will follow a three-step application process. In cases where the executed agreement exists at the time of RRF submittal, Applicants may submit documentation for steps one and two together to get a confirmed reservation. The three steps are as follows:

1. Complete and submit a RRF package and application fee to get conditional reservation
2. Complete and submit a Proof of Project Milestone (PPM) package to get confirmed reservation
3. Complete and submit a ICF package to request payment

The following sections describe each of the three steps in more detail.

4.3.1 Step No. 1: Submit Reservation Request Form Package

Once the Host Customer has decided to install a SWH system, a RRF package can be submitted. Applicants must submit the incentive RRF along with requirements documents prior to the installation of the system to receive a conditional reservation at the current incentive rate.

The RRF package includes the following documentation:

1. RRF and program contract signed by the Applicant, Host Customer and System Owner (if different from Host Customer)⁵
2. Documentation of a completed Energy Efficiency Audit or Title 24 documentation
3. Customer affidavit stating contractor informed them regarding energy efficiency improvement opportunities
4. Application fee

The following documents may also be needed:

1. Authorization to Receive Customer Information or Act on a Customer's Behalf (only required for SDG&E Applicants)
2. System sizing justification signed by P.E. if one of the acceptable methods listed in Section 6.3.2 is not used
3. Stagnation protection documentation if different than methods listed in Section 6.2

All of the above documentation must be submitted in order for the incentive to be reserved. Refer to Section 4.7 for a description of these documents.

4.3.1.1 Application Fee Process

In addition to the RRF and required documents, Applicants are required to submit an application fee for systems larger than 30 kW_{th}. The application fee is based on the following table of collector square footage ranges:

Table 9
Application Fee Schedule for Large Multi-Family/Commercial Systems

Collector Sq. Ft. $\geq$		Collector Sq. Ft. <		Application Fee
462	-	4,000	=	\$1,250
4,000	-	8,000	=	\$2,500
8,000	-	12,000	=	\$5,000
12,000	-	16,000	=	\$10,000
16,000	-	No Limit	=	\$20,000

Applicants should send the application fee to the PA, via U.S. mail or overnight mail, at the same time they submit the RRF.

The Applicant has 30 calendar days from the day the PA receives the complete RRF packet to submit the application fee to secure a conditional reservation. The payment must reference the project by Host Customer name and application ID number, e.g., SCG-000007 or PGE-000012.

If needed, Applicant may request an invoice for the application fee from the PA after the RRF has been submitted. Once the PA has invoiced the Applicant, Applicant has 30 calendar days to submit the application fee.

PAs will accept payments from either the Applicant or a third party on behalf of the Host Customer for a particular project; however, a refunded application fee will be paid as described in Section 4.3.1.3, Refund of Application Fee.

PAs will only accept application fees in the form of a check. Cash, credit cards, money orders, promissory notes, etc. will not be accepted.

Application fees will be linked to application ID numbers, not to the project sites; therefore, the project must be completed under the same application ID number as the one linked to the application fee.

Once systems are complete, the application fee will be refunded. No interest will be paid on refunded application fees.

4.3.1.2 Failure to Submit Application Fee

Failure to submit payment within 30 calendar days will result in the cancellation of the application.

Application fee checks returned by the bank for insufficient funds will result in the PA rejecting the application. Applicants will be asked in writing to reimburse PA for any insufficient fund charges or fees.

4.3.1.3 Refund of Application Fee

Application fees will be refunded in the following cases:

- Once systems are complete, the application fee will be refunded. No interest will be paid on refunded application fees.
- If upon eligibility screening the project does not qualify for the CSI-Thermal Program, the application fee will be refunded. No interest will be paid on refunded application fees.
- If the application fee was invoiced and a refund is due, PAs will pay the invoiced party.
- If the application fee was not invoiced and a refund is due, PAs will pay the party that submitted the application fee.

4.3.1.4 Forfeit of Application Fee

Application fees will be forfeited in the following cases:

1. Once a conditional reservation is granted and the PA rejects the project for failing to meet adequate proof of project milestone or reservation expiration date requirements, the application fee will be forfeited.
2. Once a confirmed reservation is granted and the project is cancelled or withdrawn by the Applicant and/or Host Customer, the application fee will be forfeited.
3. If a project reservation is allowed to lapse and the project is later built under a new reservation, the application fee for the previous reservation will be forfeited.
4. If a confirmed reservation is granted and the incentive level has been reduced (due to Commission directive, moving to the next step, etc.), the Applicant and Host Customer will be notified and given 20 calendar days to submit in writing a request to withdraw their

reservation request without losing their application fee. Upon receipt of a request to withdraw, the application fee shall be returned to the Host Customer. If the Applicant fails to withdraw the reservation request within 20 calendar days, the application will be processed at the new, lower incentive level. If the application is not withdrawn within the 20-day period, the Applicant will forfeit the application fee if it subsequently withdraws or fails to pursue its project.

All forfeited application fees will be re-allocated to the PAs CSI-Thermal Program budget.

4.3.1.5 Effect of Change of System Change on Application Fee

Application fees will be retained until the completion of the proposed project and will not be adjusted due to changes in collector size.

4.3.2 Step No. 2: Submit Proof of Project Milestone Package

The PPM demonstrates to the PA that that project is progressing. The conditional reservation is valid only until the PPM date. The PPM date will be 60 calendar days after the date the conditional reservation is issued. The following documentation must be submitted on or before the PPM date indicated on the conditional reservation notice:

1. Copy of executed agreement of SWH system purchase and installation
2. Copy of executed alternative system ownership agreement (If System Owner is Different from Host Customer)

For more information on the above-referenced documentation, see Section 4.7.

Once the Applicant has sufficiently demonstrated that the project is advancing, the PA will issue a confirmed reservation notice.

4.3.2.1 Incomplete Proof of Project Milestone

If submitted PPM documentation is received by the PPM date but requires clarification or is missing required documentation, the PA will request the information necessary to process that application further. Applicants have 20 calendar days to respond with the necessary information. If, after 20 calendar days, the Applicant has not submitted the requested information, the application will be cancelled.

4.3.2.2 Proof of Project Milestone Extensions

In general, no extensions to the PPM date are permitted.

4.3.3 Step No. 3: Submit Incentive Claim Package

Upon project completion, receipt of final signed-off permit and prior to the reservation expiration date, Applicants must submit a completed ICF along with all of the necessary documentation to request an incentive payment. The ICF package includes the following documentation:

1. Completed ICF signed by the the Host Customer and System Owner (if different from Host Customer)⁵

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2. Final signed-off permit or Federal Government's Certificate of Acceptance (in lieu of the final signed-off permit)

4.4 Application Review Process

Once received, the PA will review the application package for completeness and determine eligibility.

4.4.1 Incomplete Reservation Request Form Package

If the PA finds that an application requires clarification or is missing required documentation, the PA will request the information necessary to process that application further. Applicants have 20 calendar days to respond to the requested clarification with the necessary information. If after 20 calendar days, the Applicant has not submitted the requested information the application will be cancelled.

This does not preclude an Applicant from resubmitting their project to the PA for an incentive. All resubmitted application packages will be treated as new applications, i.e., all required documents must be resubmitted and will be processed in sequence along with other new applications.

4.4.2 Approval of Reservation Request Form Package

Once a RRF package is determined to be complete and eligible, the PA will lock-in the current incentive rate, reserve funds for the specified system, and send a conditional or confirmed reservation notice to the Applicant.

For a two-step process, the confirmed reservation will state that an incentive amount has been reserved for a project. The confirmed reservation notice will list, at a minimum, the approved incentive amount and the date by which the ICF must be submitted.

For a three-step process, the conditional reservation confirms that an incentive amount has been reserved for a project. The conditional reservation notice will list, at a minimum, the approved incentive amount and the date by which the PPM package must be submitted to confirm the reservation. Refer to Sections 4.3.2 and 4.7 for more information on the PPM requirements.

4.4.3 Reservation Period

The reservation period for multi-family/commercial projects is 12 months with one optional 180 calendar day extension; see Section 4.5 for details regarding changes to reservations.

4.5 Changes to Reservations

4.5.1 System Changes

If an incentive increases due to installed systems differing from the system submitted on the RRF, the difference in energy savings will be paid at the then-current incentive rate. Applicant may only submit system changes at PPM or ICF stages.

4.5.2 Withdrawal

The Host Customer and System Owner agree that either of them may withdraw the project for any reason by providing written notice of such withdrawal to PA. In the event the Host Customer or System Owner withdraws, the reservation will be cancelled.

The Host Customer understands that if they withdraw a project, the application will be terminated in its entirety by the PA and any previously reserved incentive funding will be released. In that instance, the Host Customer must re-apply for a new incentive reservation should the Host Customer still wish to participate in the program.

4.5.3 Extending the Reservation Expiration Date

A request to extend the reservation expiration date is limited to a maximum of 180 calendar days of additional time. An extension request must include a written explanation of why the extension is required. Approval of a request for a change in reservation expiration date will not change or modify any other reservation condition.

Failure to submit the ICF package by the original or extended reservation expiration date will result in a cancellation of the application.

The Applicant must submit a time extension request in writing to the PAs before the reservation expiration date. In describing the reason for the time extension request, the Applicant must provide information on the following to aid the PAs in their decision to grant an extension:

1. For circumstances beyond the control of the reservation holder that prevented the system from being installed as described in the RRF, the Applicant must describe the situation that occurred and reasons for such circumstances.
2. If there was a problem in the permitting process and it was the cause of delay, the Applicant must provide documentation, such as any correspondence with the building department, to support this assertion.
3. Documentation of any equipment installed at the site and expenses incurred to date. Cost documentation must demonstrate that the system purchaser has incurred at least 50 percent of the reserved system's total purchase price. However, in cases where this amount exceeds the purchaser's contribution, the purchaser may still retain 10 percent of the total system cost and meet this cost documentation requirement. Attach copies of paid invoices, checks or other verifying documentation with the extension request.

In order for any project to receive a reservation extension, the Applicant may need to show documentation of a purchase order or commitment from SWH system manufacturer to supply the necessary equipment.

The PA reserves the right to perform a site inspection to verify the status of the project installation prior to granting the request for extension. If required, the PA shall notify the Applicant and schedule the site visit within 10 days of notification.

4.5.4 Transfer of Reservation from one Site to Another

Applicants can request a transfer of a reservation from one site to another as long as it is for the same Host Customer. Applicants should contact their PA as soon as they realize a Reservation

Transfer is necessary. A request to transfer a CSI-Thermal Program reservation from one site to another within a single utility service territory may be considered in accordance with the following provisions:

1. Reservation Transfer requests must be made within 180 days of the conditional or confirmed reservation notice. Projects that have been cancelled or have withdrawn are ineligible for a retroactive Reservation Transfer.
2. To transfer a reservation, Host Customers must demonstrate to the PA that they have spent a non-negligible amount of money on project development at the first site reserved, and must provide documentation proving that this first site is not viable for SWH system project development.
3. Host Customers must provide documentation and demonstrate to the PA that the second site, to which the application will be moved, is viable for SWH system project development.
4. A reservation may only be transferred once.
5. Reservations can only be transferred to another site within the same PA service territory.
6. Transferred Reservations that increase overall energy savings following the Reservation Transfer are eligible to receive incentives for additional energy savings only at the current incentive levels in that service territory and subject to other Handbook provisions on system up-sizing. The original reservation cannot be changed with respect to the amount of energy savings that is eligible for incentives. This means that if incentive levels decline between the time of the initial reservation and when the Reservation Transfer occurs, any energy savings in excess of the initial reservation will be reserved at a lower (i.e., the current) incentive level, if it is eligible.
7. Once a Reservation Transfer has been granted by the PA, the project timeline resets as per the date of the Reservation Transfer and the project will be eligible for the full implementation time allowed to their project class (e.g., multi-family, commercial) in the Handbook.
8. Once a Reservation Transfer has been granted by the PA, the application fee becomes non-refundable.

4.6 Payment Process

Once a project is deemed completed, Applicants may request payment of the incentive amount listed on their ICF. A project is considered complete when it is completely installed, received final signed-off permit, paid for, passed site inspection (if required) and capable of producing energy savings in the manner and in the amounts for which it was designed.

To receive the incentive, all program requirements must be met and a complete ICF package submitted prior to the reservation expiration date. Applicants are required to keep a copy of the ICF package along with all required documentation for five years. The application processing sections of this Handbook contain more detailed information on the ICF package and submittal process.

Upon final approval of the ICF package and completed onsite field inspection (if applicable), the PA will disburse the incentive payment with the exception of systems that displace over 30kW_{th}.

For these systems, a 50/50 true-up incentive payment method will be applied. See Section 3.3.2 for more details.

4.6.1 Incomplete Incentive Claim Form Packages

If an ICF package is incomplete or is found to require clarification, the PA will request the information necessary to process that application further. Applicants have 20 calendar days to respond to the requested clarification with the necessary information.

If after 20 calendar days, the Applicant has not submitted the requested information, the request for payment may be denied.

If an ICF package is not received by the expiration date of the ICF, or the ICF package indicates that the project is otherwise ineligible, the PA will send a written notice stating the reasons why the project is ineligible and the project will be rejected. If this is the case, the Applicant or Host Customer may reapply for an incentive reservation but will be subject to the eligibility requirements, incentive levels, and funding available at that time of re-application.

4.6.2 Incentive Check Payment and Terms

Upon final approval of the ICF documentation and completed onsite field verification visit (if required), the PA will issue the incentive payment. Payment will be made to the payee as indicated on the ICF, and will be sent to the address provided via U.S. mail. As the reservation holder, the Host Customer may assign payment to a third party on the ICF.

The payee must submit their tax ID number and tax status to the PA.

4.7 Application Forms and Documentation

Forms identified in this section are primarily submitted by attaching a PDF image of the document in the program online application processing system. Documents may also be submitted by U.S. mail.

4.7.1 Reservation Request Form

A completed RRF must be submitted for a multi-family/commercial project. A RRF is not required for single-family SWH projects because single-family applications use a one-step application process.

The RRF must be completed and signed⁵ by the Applicant, Host Customer and System Owner (if different than the Host Customer) prior to the SWH system being installed.

4.7.2 Incentive Claim Form

A completed ICF must be submitted for all SWH projects. It must be completed and signed⁵ by the Host Customer and System Owner (if different than the Host Customer) after the SWH system has been installed.

As part of the one-step application process, this form must be submitted along with other required documents for single-family SWH projects.

For multi-family/commercial projects displacing 30 kW_{th} or less, this form must be submitted in Step 2 of the application process. For multi-family/commercial projects displacing over 30 kW_{th}, this form must be submitted in Step 3 of the application process.

4.7.3 Energy Efficiency Audit or Title 24 Documentation

Refer to Section 2.6 for more information about energy efficiency requirements.

4.7.4 Executed Agreement of SWH System Purchase and Installation

For single-family and multi-family/commercial projects displacing 30 kW_{th} or less, the Applicant must submit a copy of an executed agreement to purchase and install the SWH system in Step 1 of the application process.

An executed SWH system purchase and installation agreement for multi-family/commercial Projects displacing over 30 kW_{th} must be submitted in Step 2 of the application process.

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 ICF. 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, solar storage tank, and system performance monitoring meters (if applicable)
- The total purchase price of the eligible system before tax incentives, other funding and CSI-Thermal Program incentives
- 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 this program. In addition, sales representatives must be listed on the CSLB License, and installation contractors must conform to CSLB rules.

4.7.5 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.

4.7.6 Final Signed-off Permit

The ICF package must include a signed-off permit that indicates the project has been installed and approved by the appropriate authority. Please refer to Section 2.2.4 for more information about permit requirements.

4.7.7 Federal Government's Certificate of Acceptance in lieu of the final signed-off Permit

For Federal projects that do not come under the jurisdiction of any local permitting authority, a Certificate of Final Acceptance will be accepted in lieu of a final signed-off permit. The certificate must be on government letterhead from the contracting authority and must reference the contract number and satisfactory acceptance of the contract's construction scope of work, inclusive of the thermal solar domestic water heating system(s), and signed by the Contract Officer.

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

CCSE is the only non-investor owned utility PA, and therefore does not have direct access to SDG&E customer accounts. 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, SoCalGas, and SCE.

4.7.9 Application Fee

For all systems that displace more than 30 kW_{th}, Applicants will also be required to submit an application fee based on the collector square footage. See Section 4.3.1.1 for more information on application fees.

4.7.10 System Sizing Justification

For single-family residential systems, Applicant must submit sizing justification showing data and calculations used to determine system size.

For multi-family/commercial systems, a system sizing justification document stamped and signed by P.E. is required and must be submitted if one of the acceptable methods listed in Section 6.3.2 is not used.

4.7.11 Energy Efficiency Customer Affidavit

An affidavit stating that the contractor informed the customer of energy efficiency improvement opportunities.

4.7.12 Stagnation Protection Method Documentation

If a stagnation protection method other than those listed in Section 6.2 is used, documentation describing how the system is protected against stagnation must be submitted to the PA.

4.8 Onsite Field Inspection Process

A portion of all projects are subject to onsite field inspections at the PAs discretion. For each eligible contractor, PAs will conduct an onsite field inspection for the first three submitted ICFs that displace 30 kW_{th} or less (462 square feet of collector area or less) and the first three submitted ICFs that displace more than 30 kW_{th}. 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' performance in the program. Parameters that may affect frequency of onsite field inspection include, but are not limited to the following: Applicant or Solar Contractor being new to the program, frequency of new ICFs in the program, 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 field inspections. 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.

4.8.1 Trained Inspectors

Onsite field inspections will be performed by PA-designated personnel trained to conduct SWH system inspections. The PAs have developed a consistent statewide onsite inspector-training plan and inspection checklist, 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 ICF and in compliance with Handbook requirements.

4.8.2 Tolerances

Inspectors will report measurement discrepancies that fall outside of the following tolerances:

- Tilt: $\pm 3^\circ$
- Azimuth: $\pm 5^\circ$
- Shading (Average annual availability between 10:00 am and 3:00 pm): 5%

4.8.3 Infractions

An infraction is a minor discrepancy of an installation item that is noncompliant with the inspection checklist found during the onsite field inspection. An infraction does not require corrective action by the contractor or self-installer to receive the incentive payment. PAs will track infractions on a program-wide basis and use these data as an educational tool to inform contractors on best practices to improve future SWH system installations.

4.8.4 Failure Items

A failure is a major discrepancy regarding an installation item that is noncompliant with the program requirements. Failure items require corrective action by the contractor or self-installer 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 6.1.
- 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 Thermosiphon Prevention: Means shall be provided to prevent undesired escape of thermal energy from storage through thermosiphoning 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 OC-100 certified and consistent with ICF
- Must have stagnation control measures as described in Section 6.2
- Collector Flow Rate/Distribution: In multiple collector arrays, the instantaneous flow rate variations between collectors shall not exceed 10 percent 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 and Section 2.4.
- Shade: Collectors must have less than or equal to 15 percent annual average shading between the hours of 10:00 am and 3:00 pm, see Section 2.3.

Solar Tank

- Capacity, make, and model must be in compliance with SRCC OG-300 system. For OG-100 systems, they must be in compliance with SRCC guidelines.
- Waterproofing: Underground and above ground unsheltered storage tanks shall be waterproofed to prevent water seepage.

Plumbing and Piping

- Insulation: All interconnecting hot water piping and the final 1.5 meters (five feet) of metallic cold water supply pipe leading to the system, or the length of piping which is accessible if less than 1.5 meters, shall be insulated with R-2.6 degrees Fahrenheit (ft²-hr /Btu) or greater insulation. All exterior piping insulation shall be protected from ultraviolet radiation, excessive temperature, and moisture damage.
- Mixing Valve: SWH DHW systems must be equipped with a means for automatically limiting the temperature of the hot water at the fixtures to a selectable temperature.

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.

4.8.5 Notification of Inspection Results

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

4.8.5.1 Passed Inspection

Upon passing the onsite field inspection, the PA will process payment to the Payee named on the ICF. An infraction of the SOF or shading percentage 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 4.6 Payment Process for details.

4.8.5.2 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 4.8.9 Failure Sanction describes the required actions following failure notification.

4.8.6 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 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 program 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 six months and required to once again attend the CPUC designated contractor / self-installer training workshop. Additional applications from this contractor will not be processed until completion of the workshop. Probation may entail inspections of 100 percent of systems installed by the sanctioned contractor at the PAs discretion. The fifth program-wide failure received in a rolling 12-month period by an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer will result in disqualification from participating in the program for a minimum of six 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, Multi-Family 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;

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- All parties identified 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 PAs 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 RRF.

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.

6. 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.

6.1 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.

6.1.1 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, the ICS system may not be installed in that climate zone due to freeze risk and high overnight heat losses.

6.1.2 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 primary freeze protection method recognized 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. A second option is to use a Uninterruptible Power Supply.

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.

6.1.3 Indirect Forced Circulation

There are three types of Indirect Forced Circulation systems: active closed loop glycol, closed loop drainback, and closed loop recirculation.

-
- Active closed loop glycol systems are protected by a mixture of propylene glycol and water in the collector loop. These systems are eligible for an incentive in all CEC climate zones.
 - 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 circulate non-toxic water to collect solar energy, then drain the water from the collectors when the pump shuts down. These systems are eligible for an incentive in all CEC climate zones.
 - Closed loop recirculation systems re-circulate water in the collector loop and have an Uninterruptible Power Supply (UPS) to power a freeze-protecting pump when power is lost simultaneously with freezing conditions. These systems are not eligible, pending the results of a technical task force study on the feasibility of these freeze protection methodologies in California.

6.1.4 Thermosiphon

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

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

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

6.1.5 Air Collectors

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. If the water piping of the circulation system is exposed to the environment, automatic freeze protection for the piping is required.

6.2 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 6.2.1 through 6.2.6. For OG-300 systems, stagnation and overheat protection measures must be those that are in the manufacturers installation manual approved by SRCC for the specific system. For multi-family/commercial systems using OG-100 collectors, stagnation protection is also required.

Additional stagnation or overheat protection measures may be allowed at the PAs discretion; however, Applicant must provide documentation if an alternate stagnation protection method is used.

6.2.1 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 activate Vacation or Holiday mode.

6.2.2 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, even after the tank temperature has reached its high temperature limit. The solar energy is collected and transferred to the tank, causing the tank temperature to rise above the high limit setting, therefore reducing the risk of stagnation of the glycol mixture in the collector.

6.2.3 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.

6.2.4 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.

6.2.5 Pressure Stagnation Protection (PSP)

This stagnation/overheat protection 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, thus delaying stagnation. This protects the fluid from overheating and preserves the properties of the glycol by keeping it in a liquid form at higher temperatures.

6.2.6 Hartgard

Hartgard is an inhibited and buffered propylene glycol which is protected from stagnation high temperature damage by oxidation-inhibiting chemicals and locking out oxygen after installation.

6.3 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.

6.3.1 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 maximum 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. Systems that exceed a factor of 1.25 collector square feet per GPD are considered over-sized and must submit justification to the PA.

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. The following is a 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 area
- 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.

6.3.2 Multi-Family/Commercial Projects

Multi-family/commercial systems should be sized according to the hot water GPD consumption of the building. The following guidelines are required for appropriate system sizing for multi-family/commercial SWH systems. If a sizing methodology is used that deviates from the below methods, justification stamped by a Professional Engineer (P.E.) must be submitted with the RRF.

If more than three summer months show a Solar Fraction of 100 percent when modeled by the multi-family/commercial calculator, see Section 3.5.2, or the calculator shows a predicted maximum collector temperature over 300°F, the system will be deemed to be over-sized. The designer must submit documentation to justify the sizing.

If the SWH system preheats other loads beside those qualifying for an incentive, (e.g., pool, spa, space heat, etc.), the designer must account for them and show that the collectors sized for the SWH rebate are not over-sized for that load.

Determine demand using one of the following methods:

Multi-family only

- Use the occupant method or bedroom method for multi-family buildings as described in Section 6.3.1

Multi-Family or Commercial

- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) statistical estimates of average daily hot water consumption for a variety of commercial and residential sites⁶. If hot water GPD consumption is more than 10 percent higher than ASHRAE guidelines, Applicant must provide justification to PA. Refer to Appendix D for guidelines.
- Meter actual hot water consumption using either an in-line water flow meter with accumulator or an ultrasonic flow meter for a minimum of 30 calendar days.
- For a natural gas-displacing system, conduct a gas billing analysis. Using knowledge of summertime gas usage, estimate the GPD of hot water use by making assumptions about the summer gas use being wholly (or mostly) for water heating. An apartment building for example, may have no summer space heating load, no pool heating load, and the only summer gas use is for water heating and cooking. The estimating engineer must show supporting calculations showing how they arrived at the GPD estimate. Include the effect of gas hot water system losses (combustion, standby, recirculation, etc.) in arriving at the final estimate. If other gas loads exist, the Engineer doing the estimating must account for other loads to arrive at a monthly gas consumption for water heating only.

6.4 Minimum Metering Equipment Requirements

This section contains detailed information on the minimum metering requirements for participation in the CSI-Thermal Program for SWH systems greater than 30kW_{th} (larger than 462 square feet of fluid collector area or 628 square feet of air collector area). These minimum metering requirements were developed to increase owner knowledge of system performance, foster adequate system maintenance, and thereby ensuring ratepayer-funded incentives result in expected levels of energy displacement. All systems greater than 30 kW_{th} must be installed with metering equipment at the System Owner's expense which allows the System Owner and PA to determine the amount of energy displaced by the SWH system and allows the System Owner to support proper system operation and maintenance. Contractors are responsible for maintenance of meters and communications.

⁶ ASHRAE Heating, Ventilating, and Air Conditioning (HVAC) Applications Handbook, 2007 Edition, Chapter 49

6.4.1 Minimum Metering Equipment Components/Specifications

6.4.1.1 Flow meter

Contractor must install an electromagnetic flow meter complete with integral electronics module. The flow meter shall be installed in the domestic cold water pipe of the system to be measured following the manufacturer's instructions.

Full bore style flow meters shall be installed via ANSI class 150 flanges (wafer style preferred to reduce cost). The installing contractor is responsible for providing suitable mating flanges. For installations in non-metallic pipe, install grounding rings between flanges. Each flow meter shall be individually wet-calibrated and accurate to within $\pm 0.4\%$ of reading from 3 to 30 feet per second velocity. Accuracies stated as a percentage of full scale will not be accepted. Overall turndown shall exceed 300:1 from 0.1-30 feet per second. A certificate of wet calibration shall be provided with each flow meter to the System Owner.

Insertion style flow meters (3" and larger pipes) shall be installed through a 1" full port ball valve to enable insertion and removal of the meter without system shutdown. Insertion flow meters shall be hand-insertable up to 400 psi. Each flow meter shall be individually wet-calibrated and accurate to within $\pm 1\%$ of reading from 2 to 20 feet per second velocity. Accuracies stated as a percentage of full scale will not be accepted. Overall turndown shall exceed 80:1 from 0.25-20 ft/s. A certificate of wet calibration shall be provided with each flow meter to the System Owner to be kept at the project site.

6.4.1.2 Temperature sensors

Temperature sensors: Two semiconductor-based electronic temperature sensors shall be loop-powered current-based (mA) sensors and shall be bath-calibrated and matched (National Institute of Standards and Technology (NIST) traceable) for the specific temperature range for each application. The calculated differential temperature used in the energy calculation shall be accurate to within $+0.15^{\circ}\text{F}$ (including the error from individual temperature sensors, sensor matching, input offsets, and calculations). Two matching semiconductor-based electronic temperature sensors are required for each BTU meter kit.

6.4.1.3 BTU Calculator

The entire Energy Measurement System shall be built and calibrated by a single manufacturer and shall consist of a flow meter, two matching semiconductor-based electronic temperature sensors, a BTU meter, temperature thermowells, and all required mechanical installation hardware. The energy measurement system shall meet or exceed the performance characteristics of EN-1434. A certificate of wet-calibration shall be provided with each system. All equipment shall be covered by the manufacturer's two year warranty.

6.4.2 System Configurations

6.4.2.1 Two Tank Fluid System

A Two Tank Fluid System is one which has a separate solar storage tank preheating a back-up water heater or tankless water heater. An Integral Collector Storage System feeding a back-up

heater is a two tank system. A thermosiphon system feeding a separate back-up heater is a two tank system if its electric heating element is not activated. For two tank systems:

- BTU's will be measured as delivered from the solar storage tank to the back-up water heater. A controller system that does not continually measure the actual water flow is not acceptable. The BTU calculator, flow meter and temperature sensors must comply with the requirements of Sections 6.4.1.1. through 6.4.1.3
- Controller options or Btu meters that measure only the collector loop Btu's are not acceptable for this purpose

Acceptable metering points for two tank fluid systems are described in Section 6.4.3.1 and 6.4.3.2.

6.4.2.2 One Tank Fluid System

A one tank fluid solar system is one in which both the solar collector loop and the back-up heater feed heat energy to a common storage tank. Delivered solar energy is the net solar energy delivered from the solar collector to the auxiliary heater. The solar system and the conventional heater both share the single tank, and therefore both contribute to the tank and system losses. It is not practical to separate the solar contribution from the back-up heater contribution except via a collector-side Btu meter, complimented by a boiler-side BTU meter. An estimate of the standby and system losses will be made by TRNSYS, and the solar contribution to standby losses will be assumed to be proportional to the amount of solar input relative to conventional energy input (gas or electricity) measured by the boiler side BTU meter. The solar and the boiler input may be metered by either of the following:

- a. For one tank systems with an external heat exchanger and either a standalone BTU meter or controller with a BTU meter option:
 - An in-line pulse-sending fluid flow meter (calibrated for water)
 - Two temperature sensors measuring the differential temperature in the potable water side of the collector loop. The flow meter and two temperature sensors will be installed on the potable water-side of a collector-side external heat exchanger, rather than in the collector loop. The flow and temperature signals are sent to a calculator which calculates and accumulates Btu's for retrieval
- b. For one tank systems with an internal heat exchanger and either a standalone Btu meter or controller with a Btu meter option:
 - An in-line flow meter (calibrated for the heat transfer fluid used) and
 - Two temperature sensors measuring the differential temperature in the collector loop. The flow meter and two temperature sensors will be installed on the collector loop side of the internal heat exchanger to measure BTU's delivered to the internal heat exchanger. Modeling will be done by TRANSYS to estimate the heat exchanger effectiveness.

Delivered Solar Energy is that solar energy which enters the single tank/heater after adjustment for heat exchanger effectiveness (internal heat exchangers), standby and system losses.

Displaced solar energy is delivered solar energy divided by the combustion efficiency, which is assumed to be 82 percent for natural gas water heaters, or 98 percent for electric water heaters.

Either BTU metering configuration in (a) or (b) must comply with the requirements of Sections 6.4.1.1 through 6.4.1.3.

Acceptable metering points for one tank fluid systems are described in Sections 6.4.3.3 through 6.4.3.6.

6.4.2.3 Two Tank Air System

An air collector system uses an air-to-water heat exchanger to transfer energy from heated air to the domestic hot water system. The metering of two tank air systems will be identical with that for two tank liquid systems. Acceptable metering points for two tank air systems are described in Section 6.4.1.1 and 6.4.1.2.

6.4.2.4 One Tank Air System

A one tank air collector system is one in which the air collector transfers energy directly to a single storage tank with an external air to water heat exchanger on the collector loop

Metering of a one-tank air system will be treated as in a one-tank fluid system with external heat exchanger.

6.4.3 Acceptable Metering Points

Flow meter and the hot sensor must be located on the potable water plumbing loop that records identical flow (GPM) rates for the flow meter and the hot sensor, in order to avoid distorted calculations of Btu's. The location of the mixing valve (between the tank and the back-up heater or after the back-up heater) creates branches of water that have different flow rates. If the hot sensor is placed on the wrong branch, with different flow than the cold sensor/flow meter, the calculation of Btu's will be erroneous. BTU meters shall accumulate, store and communicate BTU's and gallons. Flow meters must be installed in the appropriate location based on one of the following system configurations:

6.4.3.1 Two tank fluid system with mixing valve after (downstream from) the back-up

heater: The flow meter and cold sensor must be placed on the cold supply pipe downstream from the branch of cold water branch to the mixing valve so that the flow measured is the same flow as in the pipe between the tanks (upon which the hot sensor is placed).

6.4.3.2 Two tank fluid system with mixing valve between solar storage tank and back-up

heater: The flow meter and cold must be placed before (upstream from) the branch of cold water going to the mixing valve and the hot sensor placed after (downstream from) the mixing valve on the pipe from the mixing valve to the back-up heater

6.4.3.3 One tank pumped fluid system with external collector loop heat exchanger: The flow meter and cold sensor must be placed on the cold tube from the tank to the heat exchanger and the hot sensor on the return from the heat exchanger to the tank.

6.4.3.4 One tank pumped fluid system with internal heat exchanger: A flow meter compatible with glycol shall be used. The flow meter and cold sensor shall be installed on the

cold tube from the internal heat exchanger and the sensor on the hot return from the collector to the tank.

6.4.3.5 One tank thermosiphon system with mixing valve: A flow meter and cold sensor shall be installed on the cold supply pipe to the collector/tank assembly downstream from the branch of cold water to the mixing valve, and the hot sensor on the hot pipe from the thermosiphon system to the mixing valve. An electric meter is required to record the electricity used by the back-up heater element in the thermosiphon system.

6.4.3.6 One tank thermosiphon system without mixing valve: A flow meter and cold sensor shall be installed on the cold supply pipe to the thermosiphon system, and a hot sensor on the hot pipe from the thermosiphon system. An electric meter is required to record the electricity used by the back-up heater element in the thermosiphon system.

6.4.3.7 Air System: A fluid flow meter and cold sensor shall be installed on the cold pipe of the potable water side of the air-to-water heat exchanger. The hot sensor shall be placed on the hot pipe from the heat exchanger to the potable water tank.

Metering configurations not shown herein shall be pre-approved by the PA.

6.4.4 Inspection

The meters will be inspected as part of the onsite field inspection process

6.5 Performance Monitoring and Communication Requirements

Metering communication capability will provide meaningful feedback to System Owners and PAs. CSI-Thermal Program requirements are summarized in the following table:

Table 10
Summary of Performance Metering and Communication Requirements

Incentive Structure	System Size	M&E Process	Min. BTU Meter Accuracy	CPM Required	PPD Required	Cost
Upfront Payment	$\leq 30 \text{ kW}_{\text{th}}$	Opt-in to M&E	$\pm 3\%$	No	Yes	\$400 paid to contractor
Upfront Payment	$\leq 30 \text{ kW}_{\text{th}}$	Third Party M&E (Selected by PA)	$\pm 3\%$	No	Yes	Paid by PA
Upfront Payment	$\leq 30 \text{ kW}_{\text{th}}$	Neither opted in nor selected for M&E by PA	N/A	No	No	N/A
50/50 True-up	$> 30 \text{ kW}_{\text{th}}$	Required for all projects	$\pm 2\%$	Yes	Yes	Customer

CPM provides insight to the System Owner regarding their SWH system's performance. PPD is provided to the PAs for 50/50 true-up incentive payment as well as M&E purposes. CPM is encouraged for all systems, but required for all systems displacing over $30 \text{ kW}_{\text{th}}$. PPD is required for all systems displacing over $30 \text{ kW}_{\text{th}}$ and systems of all sizes that are participating in the M&E process as outlined in Section 2.7.1.

6.5.1 Data Privacy

Protecting privacy of data for System Owners and Host Customers is of the highest order. As such, data shall be collected, processed, and reported to the System Owner and the Program Administrator via secure channels. The CPM provider may provide data to third parties, including Solar Contractors and Host Customers (if different than the System Owners), provided the System Owner has consented in writing to the release of such performance data.

6.5.2 Remote Access

All monitoring systems must have remote communication capability whereby performance data can be collected, accessed remotely, and uploaded for processing by a CPM and/or PPD.

6.5.3 Minimum Customer Performance Monitoring Requirements (Systems displacing over 30 kW_{th})

CPM is defined as, at a minimum, a service that monitors and reports the performance of the SWH system to the System Owner. In order to ensure proper maintenance and system performance, the System Owner must contract with an eligible CPM provider for systems displacing over 30 kW_{th}. The CPM contract must include the following items in order to meet the program requirement:

- System Owner has remote access to summarized performance data
- Notification to the System Owner indicating a non-functioning or underperforming system
- Listed on the PAs eligible CPM provider list found at www.gosolarcalifornia.org/solarwater.

The CPM provider must at all times provide System Owners with access to all items required above. System performance alerts must be provided to the System Owner immediately upon the CPM provider receiving the recorded data points which, when analyzed, indicated a problem with the system.

6.5.4 Minimum Program Performance Data Requirements (all systems displacing more than 30 kW_{th} and all M&E Participants)

For 50/50 true-up recipients and M&E participants, a PPD provider is defined as a service provider that monitors and reports the energy delivery data from the SWH system to the Program Administrator to serve as the basis for 50/50 true-up incentive payments and M&E studies. The data flow between the SWH system and the PA must meet the PPD requirements described in Appendix E.

50/50 true-up incentive payments are calculated and paid based on the actual energy delivered from the SWH system to the back-up water heater.

All PPD providers must be approved by the PAs. The instructions for qualifying as a PPD provider can be found in Appendix E. Approved PPD providers can be found on the following website: www.gosolarcalifornia.org/solarwater.

6.5.4.1 Required Solar Performance / Output Data

The PPD provider must monitor, trend, archive, and report the following on 15-minute intervals that will be available on a daily basis:

- Total BTU's
- Peak BTU demand
- Date and time of peak BTU demand
- Daily peak BTU
- Logs:
 - o Alarm
 - o System Messages
 - o System Events
 - o Trends

6.5.4.2 Minimum Report Delivery Requirements

The PPD provider must electronically submit performance data reports for each project through www.csithermal.com. The data is utilized for 50/50 true-up incentive payments as well as M&E purposes.

6.5.4.3 Time Granularity of Acquired Data

The PPD provider must record all required solar performance or output data points no less frequently than once every 15 minutes.

6.5.4.4 Frequency of Data Collection

The CPM and PPD providers must remotely acquire and process all data points no less frequently than once per day.

6.5.4.5 Frequency of Data Reporting

PPD providers are required to report performance data quarterly to the PA or its designee for all systems participating in the M&E process. The first four data submissions of data will also be used to determine the 50/50 true-up incentive payments for systems displacing over 30 kW_{th}.

6.5.4.6 Data Retention Policy

The M&E data collection time period is five (5) years; however, PPD providers must retain performance data for five years from the M&E data collection end date.

APPENDICES

Appendix A Acronyms

AB: Assembly Bill

AFUE: Annual Fuel Utilization Efficiency rating

Btu: British Thermal Unit

CCSE: California Center for Sustainable Energy

CEC: California Energy Commission

CPM: Customer Performance Monitoring

CPUC: California Public Utilities Commission

CSI: California Solar Initiative

CSI-Thermal Program: California Solar Initiative Thermal Program

CSLB: Contractors State License Board

DHW: Domestic Hot Water

FTL: Freeze Tolerance Level

GPD: Gallons Per Day

ICF: Incentive Claim Form

kWh: Kilowatt-hour

kW_{th}: Kilowatt-thermal

M&E: Measurement and Evaluation

MW: Megawatt

NREL: National Renewable Energy Laboratory

OG: Operating Guidelines

PPM: Proof of Project Milestone

PA: Program Administrator

PDP: Performance Data Provider (applies to CSI General Market)

PMRS: Performance Monitoring and Reporting Service (applies to CSI General Market)

PPD: Program Performance Data

PG&E: Pacific Gas and Electric

RRF: Reservation Request Form

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

TRNSYS: The Transient Energy System Simulation Tool

Appendix B

Definitions and Glossary

50/50 true-up: The CSI-Thermal Program will pay large multi-family/commercial projects (more than 30kW_{th}) in two parts. The first payment will be 50 percent of the incentive based on the energy savings estimate from the OG-100 calculator at the time the ICF is submitted. The second payment is paid based on subtracting the first payment from the final incentive amount based metered energy savings for the first year.

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.

Array: A group of interconnected solar collectors

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 multi-family 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.

Customer Performance Monitoring (CPM): A service that monitors and reports the performance of the SWH system to the System Owner.

Domestic Hot Water (DHW): Water used, in any type of building, for domestic purposes, principally drinking, food preparation, sanitation and personal hygiene (but not including space heating, swimming pool heating, or use for processes such as commercial food preparation or clothes washing).

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 SWH 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 service¹ 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 M² of collector space equals 0.7 kW_{th}. Based on this calculation, 30 kW_{th} is equivalent to 462 square feet of fluid collectors or 628 square feet of air collectors. Fluid collectors includes unglazed, glazed, 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: Multi-family 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. SWH 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 SWH 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.

Program Performance Data: A service that monitors and reports the energy delivery data from the SWH system to the PA to serve as the basis for 50/50 true-up incentive payments and M&E studies.

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 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 SWH 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 percent 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 percent.

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.

Site: The Host Customer's premises, consisting of all the real property and apparatus employed in a single enterprise on an integral parcel of land undivided, excepting in the case of industrial, agricultural, oil field, resort enterprises, and public or quasi-public institutions divided by a dedicated street, highway or other public thoroughfare or railway. Automobile parking lots constituting a part of and adjacent to a single enterprise may be separated by an alley from the remainder of the premises served. Separate business enterprises or homes on single parcel of land undivided by a highway, public road, and thoroughfare or railroad would be considered for purposes of CSI as separate sites. Each individual site must be able to substantiate sufficient hot water usage to support the proposed system size.

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 SWH systems.

SWH Energy Delivered: Measuring the flow and cold water temperature into the solar storage tank and the resultant solar-hot water temperature delivered to the back-up water heater is an accurate method of determining energy delivered to the customer due to SWH. In the case of a one tank system, energy delivered can be defined as energy which enters the single tank/heater after adjustment for heat exchanger effectiveness (internal heat exchangers), standby and system losses.

SWH Energy Displaced: The amount of energy, that would have otherwise been needed from the back-up water heater is equal to SWH Energy Delivered divided by the assumed AFUE water heater efficiency of 82 percent for natural gas and 98 percent for electric.

SWH Energy Production: Measuring the flow and temperature difference of the solar collector loop provides a measure of solar production that has the potential of displacing energy.

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.

Tilt: The number of degrees a collector is angled from horizontal.

TRNSYS: An energy simulation tool, designed to simulate the transient performance of thermal energy systems. The multifamily and commercial OG-100 incentive calculator will use the TRNSYS software to estimate energy savings.

Appendix C

Surface Orientation Factor (SOF) Chart⁷

The ideal SOF is a value of 1.0 and the minimum SOF required to receive an 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
0°-59° True	Any	Not Eligible
60°-89° True	10°-19°	0.80
60°-89° True	20°-29°	0.75
60°-109° True	40°-50°	Not Eligible
60°-139° True	50°-80°	Not Eligible
60°-300° True	80°-90°	Not Eligible
60°-300° True	0° ⁸ -9°	0.85
90°-109° True	10°-29°	0.85
90°-109° True	30°-39°	0.80
110°-139° True	10°-49°	0.90
140°-169° True	10°-49°	0.95
140°-239° True	50°-69°	0.85
140°-239° True	70°-79°	0.75
170°-209° True	10°-49°	1.00
210°-239° True	10°-49°	0.95
240°-300° True	40°-70°	0.75
240°-269° True	10°-39°	0.85
270°-300° True	10°-19°	0.80
270°-300° True	20°-39°	0.75
301°-360° True	Any	Not Eligible

⁷ 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.

⁸ Please reference the manufacturer instructions for collectors tilted at 0°

Appendix D

GPD Guidelines for Multi-Family/Commercial Projects⁹

Type of Building	Average Daily
Men's Dormitories	13.1 gal/student
Women's Dormitories	12.3 gal/student
Motels (Number of Units) ¹⁰	
20 or less	20.0 gal/unit
60	14.0 gal/unit
100 or more	10.0 gal/unit
Nursing homes	18.4 gal/bed
Office buildings	1.0 gal/person
Food service establishments	
Type A- full-meal restaurants & cafeteria	2.4 gal/avg. meals/day ¹¹
Type B- drive-ins, grilles, luncheonettes, sandwich, & snack shops	0.7 gal/avg. meals/day ¹¹
Apartment houses (Number of apartments)	
20 or less	42.0 gal/apartment
50	40.0 gal/apartment
75	38.0 gal/apartment
100	37.0 gal/apartment
200 or more	35.0 gal/apartment
Elementary schools	0.6 gal/student ¹¹
Junior and senior high schools	1.8 gal/student ¹¹
Hotels (Number of Rooms)	
Less than 150	178 gal/day/room
150-299	228 gal/day/room
300-500	303 gal/day/room
Greater than 500	285 gal/day/room
Laundromats	2 gal/pound/hour

Source: 2007 ASHRAE HVAC Applications Handbook
Table 7, Hot Water Demands and Use for Various Types of Buildings, page 49.14

⁹ Small multi-family/commercial systems are those that displace 30 kW_{th} or less.

¹⁰ Interpolate for intermediate values

¹¹ Per day of operation

Appendix E

INSTRUCTIONS FOR QUALIFYING AS A PPD PROVIDER FOR THE CALIFORNIA SOLAR INITIATIVE THERMAL PROGRAM

The purpose of this section is to outline the required process and qualifications to be approved as a PPD provider for the CSI-Thermal Program. This section also details the data reporting requirements (format, delivery method) and schedule for 50/50 true-up payments and M&E purposes. The PPD provider may also provide CPM provider services. All PPD providers must meet the requirements established herein in addition to the requirements set forth in the CSI-Thermal Program Handbook.

BACKGROUND AND REQUIREMENTS

Customers participating in the CSI-Thermal Program 50/50 true-up payment process and/or M&E program are required to install performance meters to determine the energy delivered by their SWH system. For customers enrolled under the 50/50 true-up program, the PA will use the first four quarters of data to calculate the true-up payment. This data must be read and communicated to the PA by a third-party PPD provider. This document provides information and instructions for providers wishing to qualify to provide PPD provider services.

The following are the PPD provider's primary responsibilities:

- Manage meter reading and data retrieval schedule
- Read and retrieve performance meter data
- Post data to www.csithermal.com on a consistent and reliable schedule, per PA requirements.
- Validate performance data prior to submitting
- Calculate quarterly energy delivered by the SWH system for true-up payment and M&E purposes
- Format data using the CSI-Thermal program approved protocol
- Troubleshoot and resolve communications issues
- Store data in accordance with program requirements
- Make historical performance data available to PAs as requested
- Provide technical support to PAs as well as customer support
- Communicate meter/device changes to the PA
- Provide disaster recovery and data backup services as requested by the PAs
- Ensure confidentiality of customer information and performance data
- Possess technical expertise and capability
- Comply with all State and Federal laws

PPD Provider Task Requirements

Data Format

Data must conform to the specific program requirements as outlined in Section 6.5.4. The 50/50 true-up and M&E data reports must include 15-minute interval (as defined in Section 6.5.4.3 Time Granularity of Acquired Data). All 50/50 true-up and M&E data reports must be formatted using

the ANSI X.12 Electronic Data Interchange 867 protocol (EDI 867) unless otherwise specified. Sample EDI 867 Implementation Guides and Tutorials are available from each of the PAs.

Data Validation

The PPD provider must validate all data prior to posting it to the PAs secure FTP server. The following data validation rules shall apply:

- Time Check of Meter Reading Device/System (all)
- Meter Identification Check (all)
- Time Check of Meter (all)
- Pulse Overflow Check (if applicable to metering system)
- Test Mode Check (if applicable to metering system)
- Sum Check

Descriptions of these validation rules are included in Attachment A.

Payment Validation, Audits, and Measurement and Evaluation

The PA may, at their discretion, perform validations on performance data prior to issuing payments to customers participating in this program. The validations will compare actual first year performance data with the expected performance as estimated based on documentation submitted on the Host Customer's approved incentive claim form. If payment falls outside expected ranges for the year, the incentive payment will be withheld until the PA determines to its satisfaction the reason for the discrepancy.

The PPD provider will work with the Host Customer to resolve any discrepancies identified by the PA which may include testing and/or recalibrating the meter/devices if deemed necessary. The PAs are not responsible for the costs associated with investigating and resolving any such discrepancies (i.e., testing, meter replacement hardware, installation labor).

The PA will also perform random audits of PPD provider data to ensure accuracy and compliance with the requirements outlined in this document, or as part of the CSI-Thermal Measurement and Evaluation Program in accordance with the CSI-Thermal Handbook. Any PPD provider found to be in violation of any of these requirements will be subject to the penalties outlined later in this document. The PA, via the local utility or its designated contractor may, at its discretion, inspect and test the performance meter or install separate metering in order to check meter accuracy, verify system performance, or confirm the veracity of monitoring and reporting services.

Any additional metering installed by or at the request of the PA will be paid for by the PA. However, in the event metering is installed during the course of an audit or investigation initiated by the PA where cheating or tampering is suspected and confirmed, the System Owner will be charged for these costs.

Data Retention

Raw and PPD provider validated interval and cumulative monthly data must be retained in accordance with appropriate program requirements (see Section 2.8.4.6 of the CSI-Thermal Handbook for CSI-Thermal program requirements). The PPD provider must be prepared to post historical interval data at the PAs request. The PA audit will include raw interval data which is to

be maintained by the PPD provider for comparison with validated interval data transmitted to the database. The PPD provider is also responsible for providing backup and disaster recovery services for 100 percent of the data (in accordance with the CSI-Thermal data retention policy outlined in Section 2.8.4.6 of the Handbook)

Technical and Customer Support

The PPD provider must provide a technical support number to the PA for use during normal business hours (8am to 5pm Pacific time, Monday through Friday, except holidays) to help resolve any data availability, format or corruption issues, communication problems, server access problems, or other technical issues. Within those normal business hours, the PPD provider must respond to PA requests within two business days with a status report and plan for correcting the issues. The PPD provider must also provide a customer support number to respond to customer inquiries within two business days from the initial customer contact. PAs will have the discretion to set deadlines for the resolution of data transfer problems/issues.

PPD Provider Performance Exemptions

The PPD provider is responsible for meeting the above noted program requirements and for consistently posting performance data in accordance with the PAs scheduling and data posting requirements. At its discretion, the PA may grant reasonable allowances for occasional issues or technical problems, as well as for large catastrophic events such as earthquakes.

In the event of such catastrophic event resulting in an energy delivered interruption; OR in the event of metering or communications equipment failure where the data is irretrievable by the PPD provider at no fault of the customer AND it can be determined that the customer's SWH equipment was still operating, the PA may extend the 50/50 true-up incentive payment period beyond the established timeframes otherwise specified by the incentive program Handbook. The 50/50 true-up incentive payment extension period will be equivalent to the same period the system energy production data is unavailable. To submit a Data Report relative to missing data, the PPD provider will resubmit the respective Data Report, thereby replacing the previous incomplete report with a complete quarter of data.

PPD Provider Non-Performance

The PA will not issue incentive payments to customers based on estimated data from the PPD provider, nor will the PA estimate incentive payments under any circumstances. It is the PPD provider's responsibility to ensure timely (within 5 days after the end of the specified reporting period) and accurate posting of validated performance data so customer incentive payments can be made.

The following conditions may result in penalties, suspension of activity, or revocation of PPD provider approval from the PA:

- Data not posted by specified date (10 percent of accounts serviced by PPD provider over a one month period are late).
- No data received for incentive period (per customer: no data posted 2 times consecutively OR 2 times in 9 months; and/or per PPD provider: no data posted for 10 percent of accounts serviced by PPD provider). Submittal of corrected data or previously missing quarterly data must be received in cycle sequence.

-
- Data not validated in accordance with program requirements over the course of the CSI-Thermal Program. (1 time)
 - Estimated data posted instead of actual data. (1 time)
 - Meter change information not reported within 30 days of the meter change. (3 times within 6 months)
 - If an audit or investigation shows a discrepancy of more than 5 percent between the PPD provider reported data and PA check meter production data for one data report period. This discrepancy will trigger an audit schedule set by the PA for the PPD provider.

The PPD provider will be given reasonable opportunity to correct problems identified by the PA. The PA will work with the PPD provider to correct any such problems and avoid unnecessary delays in issuing incentive payments to customers, to the extent feasible. However, if the PPD provider fails to resolve any issues to the PAs satisfaction within 60 days which result in delays in incentive payments to customers, the following penalties may apply:

- If the problem is with a single or less than 20% of customer accounts served by the PPD provider, the PA will suspend PPD provider activity with just those affected customers. The affected customers will be notified that the PPD provider has been unable to resolve the specified issue within an acceptable timeframe and they will be given a 30 day grace period to select and engage with another PPD provider. The original PPD provider will be required to transfer all historical data to the newly selected PPD provider. An incentive payment will not be made until the customer provides a contract or similar document proving they are engaged with another PPD provider, but the customer's incentive payment period will be extended beyond the established period allowed under the applicable program rules to compensate for this interruption in data collection. If the customer fails to engage with and provide proof that they have contracted with a new PPD provider within the allowable grace period, the time between the grace period expiration date and the date the PA receive such proof will be deducted from the final payment amount.
- If the problem is of a more serious nature as determined by the PA and continues over 60 days, or it affects more than 20% of customers served by the PPD provider, the PPD provider's approval will be revoked and all customers will be notified that they must select another PPD provider. As above, an incentive payment will be made until the customer selects another PPD provider, but the customers' incentive payment period will be extended beyond the established payment period. The PPD provider will be eligible to reapply after six months upon demonstrating that they have successfully resolved all problems to the PAs satisfaction.

Unless the PPD provider's actions results in revocation, upon receipt of a notice from the PA with respect to the PPD provider's failure to provide the performance, the PPD provider must, as soon as reasonably practicable: (1) perform a root-cause analysis to identify the cause of such a failure; (2) provide the PA with a report detailing the cause of, and procedure for correcting such failure within 3 days of completion of such root-cause analysis; (3) implement such procedure after obtaining the respective PA approval of such procedure.

Criteria for a PPD Provider Appeals Process

Should the PPD provider disagree with a PA decision regarding a penalty, the PPD provider has the right to appeal to the CSI-Thermal Working Group for further consideration.

APPLICATION PROCESS

Application & Documentation

The PPD provider applicant completes the attached “Application to provide PPD Services” and provides all documentation in the attached checklist. Note that the PPD provider Applicant must submit an application to and successfully complete the data transfer test described later in this document to any of the four.

The PAs will review the submitted documentation, determine if the PPD provider Applicant meets the program requirements and notify the PPD provider Applicant via email. The PA will review the application and respond to the PPD provider Applicant within 10 business days.

Data Transfer Test

Once the PA has reviewed and accepted the prospective PPD provider’s application, they will contact the PPD provider to schedule a data transfer test. Upon approval of the test, the PPD provider is eligible to submit quarterly performance data for CSI-Thermal customers.

PPD Provider Approval Initial Audit Period

Upon PA approval of the required PPD provider application documentation, and successful completion of the PPD provider data test procedures, the PPD provider will be qualified to provide performance data to the PA for incentive payment. However, the PAs will audit the raw production data from each PPD provider’s first data report for their first three customers for compliance with these PPD provider requirements. The PA will notify the PPD provider of noncompliance and will work to assist the PPD provider with resolving the issues.

Application to Provide PPD Provider Services

This application and the attached documents are to be used by Applicants for approval as a PPD provider. Please refer to the checklist to ensure your application includes all applicable documentation.

Company Name: _____

Primary Contact: _____

Address: _____ Address 2: _____

City: _____ State: _____ ZIP: _____

Phone: (____) ____ - ____ Fax: (____) ____ - ____

Email: _____

Technical Support Contact

Contact Name: _____

Phone: (____) ____ - ____ Email: _____

Customer Support Contact

Contact Name: _____

Phone: (____) ____ - ____ Email: _____

PPD provider APPLICATION CHECKLIST

Background

- ☐ Company background (years in business, number of employees, general description, executive team, etc.)
- ☐ Meter data reading and reporting experience and capabilities, capacity, technology overview, IT capabilities, etc.
- ☐ Proof of sufficient bond or insurance coverage

Procedures

- ☐ Meter reading and data retrieval procedures
- ☐ Data communication (frequency, scalability, types, troubleshooting, etc.)
- ☐ Process for retrieving missed reads
- ☐ Data validation procedures
- ☐ Technical Support (hours of operations, staff levels, procedures, etc.)
- ☐ Customer Support (hours of operations, staff levels, etc.)

IT Systems and Processes

- o Data posting (data translation, formatting, firewall access, etc.)
- o Data retention plan
- o Backup and recovery plans
- o Hardware and software scalability plans
- o Data confidentiality and security procedures

By signing this document, the Applicant agrees to comply with all program requirements including those described in the CSI-Thermal Program Handbook (signature must be someone with legal authority at the PPD provider). Additionally, Applicant agrees to keep confidential all data received from the PA for testing. Information in this document will remain confidential.

Signature: _____ Date: _____

Printed Name: _____ Title: _____

ATTACHMENT A

CSI-Thermal Data Validation Rules

Check	Purpose
Time Check of Meter Reading Device/system	Check for time drift of meter reading device/system outside standard
Meter ID Check	Check for the following: • Meter ID reported correctly • Meter has not been changed out • Data is being reported for correct meter
Time Check of Meter	Check for time drift of meter clock outside standard
Pulse Overflow Check	Check for the following: • Improper scaling factor in meter • Hardware problem
Test Mode Check	Check that data collected when meter was in test mode represents test production rather than actual production
Sum Check	Check for the following in combination meter/recorder installations: • Crossed channels between meter & recorder • Pulse relay problems Check for the following in all installations: • Invalid meter constants • Sensor test verification