CALIFORNIA SOLAR INITIATIVE-THERMAL

CALIFORNIA
PUBLIC UTILITIES
COMMISSION

PROGRAM HANDBOOK

October 2016

GO solar CALIFORNIA

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Pacific Gas and Electric Company®

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

SoCalGas
A Sempra Energy utility

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October 2016 Handbook:

What's New

In order to alleviate any potential contractual problems for single family installation within SoCalGas' service territory, SoCalGas is modifying the date of the permit requirements for applications submitted to ensure that funds will still be available at the higher temporary incentive rate when contracts are executed and permits are issued.

The following changes made in this handbook only apply to SoCalGas are temporary and only apply to installations in SoCalGas service territory:

In order to be eligible under this temporary rebate structure, building permits will have to be dated between April 15, 2016 and December 31, 2016 (inclusive). Applicants will have until February 28, 2017 to submit the Incentive Claim Form in order to receive the higher incentive. If Step 1 incentive funds are exhausted prior to December 31, 2016, SoCalGas will accept and approve applications at the higher Step 1 incentive rate that have a building permit application date no later than October 7, 2016. Applications submitted outside of this timeframe will receive the existing step level rates. If the application has a reservation at Step 1, it will receive the Step 1 rate as of March 2016. Subsequent applications will receive a reservation at the existing Step 2 rate. If there are funds remaining in Step 1 in excess of the Step 1 budget in the March 2016 handbook, those funds to will be returned to Step 3 or 4 as appropriate. As of February 28, 2017, this handbook will no longer be valid and will revert back to the March 2016 handbook. [1]

The following changes in the Handbook apply to participating utilities:

For all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted for single family or multi-family applications, the low income incentive level will remain at the Step 1 level while low income funds are available.

The following changes have been made to the Handbook:

Updated specific program changes that apply only to SoCalGas regarding permit issue date should single family funds be exhausted.
Affected Section(S): 2.3.1, 2.7, 2.7.1, 12.1

Updated the low income incentive rates for all utilities to remain at Step 1 while low income funds are available.
Affected Section(S): 2.7, 2.7.1, Table 5, 3.2.1.1, 3.3, Table 8, 3.7.1, 4.3.1.1, Table 13, 4.7.1

[1] Step 3 will be refunded before Step 4.

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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 Company (PG&E), Southern California Edison Company (SCE) and San Diego Gas & Electric Company (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 Center for Sustainable Energy (CSE) administered a $2.59 million pilot program for SWH incentives in the SDG&E territory. In D.08-06-029, the CPUC 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 ratepayers 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 solar thermal systems in homes and businesses that displace the use of natural gas by 2017. The statute requires the CPUC to evaluate data from the SWH Pilot Program and determine whether a solar thermal 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 CPUC established the incentive structure, the program administration details, and other key CSI-Thermal Program rules. The CPUC designated that the Program Administrators (PAs) for the CSI-Thermal Program are PG&E, Southern California Gas Company (SCG), SCE, and CSE 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.

On October 6, 2011, the CPUC signed D. 11-10-015 which authorized the low income component of the CSI-Thermal Program. The $25 million budget for CSI-Thermal low income SWH incentives is funded by collections from gas ratepayers pursuant to Assembly Bill 1470 (stats. 2007, ch. 536), and as previously established in D.10-01-022.

On November 10, 2011, the CPUC issued D.11-11-005 which modified D.10-01-022 to allow for payment of incentives to solar thermal systems that displace propane usage for electric customers of PG&E, SCE or SDG&E. Also on November 10, 2011, the CPUC issued D.11-11-004 which modified D.10-01-022 to include the International Association of Plumbing and Mechanical Officials (IAPMO) as an accredited listing agency for the CSI-Thermal Program along with Solar Rating and Certification Corporation (SRCC). The Decision notes that when solar thermal systems have SRCC ratings from two or more certifying entities, the CSI-Thermal Program will accept only the lowest of the ratings, to eliminate motivation for solar equipment manufacturers to "shop around" for the highest rating.

On August 6, 2012, the Commission issued D.12-08-008, effective on August 2, 2012, which modified the incentive structure for the single-family and multi-family/commercial mainstream programs. The new rates were incorporated into the program on October 4, 2012, and were retroactive to projects that were in application review as of July 4, 2012.

On March 6, 2013, D.13-02-018 was issued to implement CSI-Thermal rebates for expanded solar thermal applications, such as process heat, solar cooling and space heating systems.

On August 15, 2013, D. 13-08-004 was issued to implement CSI-Thermal rebates for solar pool systems for commercial, multifamily, governmental, educational and nonprofit applications

On December 1, 2014, the CPUC approved CSE Advice 51 / SCG Advice 4682 / PG&E Advice 3503-G / SCE Advice 3096-E to reduce the incentive amounts for solar pool applications.

On January 29, 2015, D.15.01.035 was issued that further modified the CSI-Thermal Program, raising incentive rates in all sub-programs except for solar pools, increasing the maximum allowable incentive, restructuring the sub-program funding firewalls, capping the pool incentive at 50% of project cost and allowing the PAs the ability to file Advice Letters to make future changes to the program. This Handbook has been modified to reflect those changes.

On October 1, 2015, D. 15-10-004 was issued modifying the CSI Thermal program to expand the eligibility requirements for single-family low income customers.

On March 17, 2016, the CPUC approved AL PG&E Advice 3691-G/4800-E / CSE Advice 69 / SCG Advice 4930 to shift $25 million from all sectors of the CSI-Thermal general market budget to the CSI-Thermal low income budget, increasing the total low income budget to $50 million.

On April 29, 2016, the CPUC approved Advice No. 4953 to temporarily shift only SoCalGas funds from the Single Family and Commercial/Multifamily Step 3 and 4 into Step 1. The Step 1 incentive level was also increased to $70/therm for Single Family and $25/therm for Commercial/Multifamily applications. The 50% cap for Solar Pool applications was also

eliminated. These changes will be in effect between April 15, 2016 and December 31, 2016 (inclusive).

On October 26, 2016, the PUC approved AL SCG 5034/AL PG&E Advice 3758-G/4922-E/ CSE Advice 70 to maintain the low income incentive level at the current Step 1 level should the general market CSI-Thermal incentive funds be exhausted for single family or multi-family applications. For SoCalGas, if Step 1 incentive funds are exhausted prior to December 31, 2016, SoCalGas will accept and approve applications at the higher Step 1 incentive rate that have a building permit application date no later than October 7, 2016.

1.2 PROGRAM BUDGET

The total incentive budget for the general market CSI-Thermal Program is approximately $280.8 million. Of this total, $155 million is allocated for natural gas-displacing solar thermal systems, as authorized by AB1470, and up to $100.8 million for electric-displacing and propane-displacing systems, as authorized by SB1. An additional $50 million in natural-gas incentives is set aside for low income customers as established in D.10-01-022 and PG&E Advice 3691-G/4800-E / CSE Advice 69 / SCG Advice 4930. Per D.15-01-035, the incentive dollars for the natural gas portion of the program is allocated between three customer classes effective March 2016, to single-family residential, multifamily/commercial and solar pools as follows:

- 10 percent of the total gas incentive budget is reserved for single-family residential customer solar thermal systems,
- 63 percent of the total gas incentive budget is reserved for multifamily/commercial solar thermal systems. Funds may be moved from the multifamily/commercial budget to the single-family residential budget, but not vice versa; and,
- 27 percent of the total gas incentive budget is reserved for solar pool systems.

The incentive budget is split proportionately among the PAs based on the size of their respective gas and electric sales. Table 1 displays the incentive allocation percentage and budget amount by PA for natural gas-displacing solar thermal systems. Table 2 displays the incentive allocation percentage and budget amount by PA for electric/propane-displacing solar thermal systems.

Table 1
Total Incentive Allocation per Program Administrator for Natural Gas-Displacing Solar Thermal Systems

PA	Budget Allocation	Total Incentive Budget (in millions)
PG&E	39.0%	$60.45
CSE	10.0%	$15.50
SCG	51.0%	$79.05
Total	100.0%	$155.0

Table 2
Maximum Incentive Allocation per Program Administrator for Electric/Propane-Displacing Solar Thermal Systems

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

The $50 Million natural-gas low income incentive budget is allocated among CSE, PG&E, and SCG in the same proportions as the total CSI-Thermal gas-displacing program as outlined in Table 3. Incentives for low income projects will be available until the $50 Million incentive budget is fully expended. There will not be specific low income incentive allocations between single-family and multifamily projects. Funding will be available on a first-come, first served-basis.

Table 3
Total Low Income Incentive Allocation per Program Administrator for Natural Gas-Displacing Solar Thermal Systems

PA	Budget Allocation	Total Incentive Budget (in millions)
PG&E	39.0%	$19.5
CSE	10.0%	$5.0
SCG	51.0%	$25.5
Total	100.0%	$50.0

1.3 PROGRAM GOALS

The CSI-Thermal Program is designed to significantly increase the adoption rate of solar thermal 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 solar thermal technology, 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 solar thermal market in California by increasing the adoption rate of solar thermal technologies, including:

  Achieving the installation of natural gas-displacing solar thermal systems that displace

  - 463 million therms over the 25-year life of the systems;
  - Achieving the installation of electric-displacing solar thermal systems that displace 275.7 million kilowatt hour (kWh) per year (equivalent to 100,800 single-family residential systems); and
  - Achieve an expansion of the market for other solar thermal technologies that displace natural gas and electricity use, in addition to SWH.
- Support reductions in the cost of solar thermal 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 solar thermal adoption, such as high permitting costs, lack of access to information, and lack of trained installers;

- Increase consumer confidence and understanding of solar thermal technology and their benefits.

1.4 PROGRAM ADMINISTRATOR CONTACT INFORMATION

Center for Sustainable Energy (SDG&E territory):

CSI-Thermal Program
9325 Sky Park Court, Suite 100
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Phone: (858) 244-1177
Email: swh@energycenter.org
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Phone: (800) GAS-2000
Email: swh@socalgas.com
Website: www.socalgas.com/save-money-and-energy/solar-water-heating

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.csithermal.com

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

1.5 CSI-THERMAL HANDBOOK STRUCTURE

This CSI-Thermal Program Handbook describes the detailed requirements for receiving incentives for the installation of solar thermal systems under the CPUC-managed rebate program.

For ease of use, the Handbook is divided into several sections utilizing a straight forward and comprehensive approach to outlining program requirements based on end use. Customers and contractors will be able to quickly and efficiently identify necessary information pertinent to their program related questions and inquiries. Appendices of acronyms, term definitions, and additional program details follow these sections.

2. DOMESTIC HOT WATER – SINGLE-FAMILY

This chapter outlines the requirements for single-family solar water heating (SWH) systems only. It covers customer eligibility, incentives, eligible equipment, installation requirements, incentive calculation, and incentive application process.

2.1 DEFINITION

For single-family residential dwelling units, 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. This does not include space heating, space cooling, swimming pool heating, or combination systems.

Customers are eligible for one CSI-Thermal 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.

2.2 ELIGIBLE CUSTOMERS

To be eligible to receive an incentive, the Project Site must be within the service territory of, and receive retail level gas or electric service[2] from, PG&E, SCE, SCG, or SDG&E. Customers of these

[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.

utilities installing a SWH system to displace natural gas, electricity, or propane are eligible to receive a rebate. Self-installations are permitted in the CSI-Thermal Program. Please see Sections 6.4.3 and 7 for mandatory training and specific warranty requirements.

2.2.1. 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 to displace 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.

2.2.1.1. Low Income Natural-Gas Displacing SWH Customer

The low income component of the CSI-Thermal Program offers higher incentives to qualifying single-family, low income customers. To be eligible for low income SWH incentives, the following requirements must be met:

- The project site must be within the service territory of, and receive natural gas service from PG&E, SCG, or SDG&E; and
- The SWH system must displace the use of natural gas and meet the equipment eligibility requirements of the CSI-Thermal Program, listed in Section 2.4.

Low income customers that have already received a CSI-Thermal incentive will not be eligible for the incremental amount provided by the low income program.

To qualify for low income SWH incentives for a single-family residential property, these additional requirements must be met:

1. The host site must be occupied by the homeowner and/or applicant;
2. The SWH system must be owned by the homeowner;
3. The property must meet one of the following conditions:
    a. Low income housing:

       If the property is occupied by renters, then the property must meet the definition of low income residential housing in Public Utilities Code (PUC) Section 2861(e); or

b. ESAP Participation:

i. The household must currently be participating, or have previously participated, in a Commission-approved and supervised gas corporation Energy Savings Assistance Program (ESAP) administered by PG&E, SCG, or SDG&E

ii. The property will be required to remain low income for at least 10 years from the time of the SWH system installation.

iii. The property at which the system will be installed must meet one of the following conditions:

1. A resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;
2. An equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;
3. A presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;
4. A presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or
5. A presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

c. LIWP or LIHEAP Participation:

i. The household must currently be participating, or have previously participated, in the Low Income Weatherization Program (LIWP) or Low Income Home Energy Assistance Program (LIHEAP)

ii. The property will be required to remain low income for at least 10 years from the time of the SWH system installation.

iii. The property at which the system will be installed must meet one of the following conditions:

1. A resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;
2. An equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;
3. A presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;
4. A presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or
5. A presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

2.2.2. 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 to displace 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.

2.2.3. Propane-Displacing SWH Customer

To be eligible for a SWH propane-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 to displace propane water heating. SWH systems installed with propane 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.

Propane water heating customers will be held to the same customer eligibility requirements and incentive levels of the CSI-Thermal electric-displacing program and the same equipment eligibility requirements of the CSI-Thermal gas-displacing program.

2.3 INCENTIVES

One 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 at www.csithermal.com/calculator, as described in Section 2.6.

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

Incentive step changes will move independently in each service territory[3] 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/tracker.

For SoCalGas[4], the incentive budgets for Step 3 and 4 for Single Family and Commercial/Multifamily applications will be shifted into Step 1. This will be in effect between April 15, 2016 and December 31, 2016 (inclusive). As of January 1, 2017, any Step 1 unencumbered funds in excess of the Step 1 budget as of March 2016 will be returned to Step 3 or 4 as appropriate.

For more information about the incentive budget, please see Section 1.2.

All single-family incentives are paid in one lump sum after the project is completed and approved.

[3] SCE incentive step changes will correspond with SCG gas incentive step changes for each customer class.
[4] This is a temporary change which, on January 1, 2017, will revert to the program rules as of March 2016

2.3.1. Natural Gas Single-Family Incentives

Table 4 displays the single-family natural gas-displacing system incentive steps, the maximum incentive amount per project, and step budget allocation.

In order to receive the higher SoCalGas Step 1 incentive rate in parenthesis in Table 4 below, systems must be installed between April 15, 2016 and December 31, 2016 (inclusive) which will be determined by final permit sign-off date. Complete Incentive Claim packages must be submitted by February 28, 2017. If an application does not meet these requirements, that application will receive a rebate at the applicable step at the step rates as of March 2016. The application is not guaranteed a rebate at the Step 1 rate. Should Step 1 incentive funds be exhausted prior to December 31, 2016, SoCalGas will accept and approve applications at the higher Step 1 incentive rate that have a building permit application date with proof of time stamp no later than October 7, 2016. Proof of a time stamp for a building permit application by the October 7 deadline includes one of the following: a plan check time stamp, permit application with a time stamp, email confirmation of permit application with a time and date, or receipt from the jurisdiction for a plan check fee or building permit fee dated on or before October 7, 2016.

Table 4
Natural Gas-Displacing Single-Family System Incentive Steps

Step	Incentive per annual therm displaced ()For SoCalGas only	Maximum Incentive Single-Family Residential Projects ()For SoCalGas only	Budget Allocation (in millions)
1	$29.85 ($70.00)	$4,366 ($10,238)	$7,907,636
2	$25.37	$3,710	$4,900,000
3	$14.30 ($0)	$2,091	$784,000
4	$3.23 ($0)	$472	$1,323,000

Table 5 displays the low income single-family natural gas-displacing incentive steps and the maximum incentive amount per project. Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

Table 5
Low Income Natural Gas-Displacing Single-Family System Incentive Steps

Step	Incentive per annual therm displaced	Maximum Incentive Low Income Single-Family Residential Projects
1	$36.90	$5,397

2.3.2. Electric/Propane Single-Family Incentives

Table 6 displays the single-family electric/propane-displacing incentive steps and the maximum incentive amount per project.

Table 6
Electric/Propane-Displacing Single-Family System Incentive Steps

Step	Incentive per annual kWh displaced	Maximum Incentive Single-Family Residential Projects
1	$0.54	$1,834
2	$0.38	$1,311
3	$0.22	$752
4	$0.10	$329

2.3.3. Incentive Limitation

If the project is installed as described on the Incentive Claim Form (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 on the ICF. 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 (see Section 11)
- Other incentives or rebates received (see Section 11)

- Incentive step cap
- PA budget allocation
- Shade Factor (see Section 2.6.2) and SOF (see Section 2.6.1)

2.4 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) or International Association of Plumbing and Mechanical Officials (IAPMO)[5] OG-300 System Certification, except for the following:
    - Substitution of Solar Storage Tank: The PAs will allow Applicants to substitute a solar storage tank of equal or greater performance than the solar tank specified in the OG-300 certification. The substituted solar storage tank must meet or exceed the tank volume (gallons) and insulation R-Value of the certified tank. The substitution applies only to OG-300 systems. It also applies to both 1 and 2 tank systems. A substitute tank must be in the same configuration as that of the originally certified system. That is, the type of heat exchanger may not be changed, the orientation of the tank may not be changed, a drain back tank may not be exchanged for a pressurized tank (and vice versa), and a 2-tank system may not be replaced with a one-tank system (and vice versa).The incentive payment will not change based on tank substitutions from the original OG-300 calculations. The Applicant is required to report solar storage tank substitutions on the Incentive Claim Form.
    - Substitution of Auxiliary Tank with Tankless: For 2-tank systems, the PAs will allow Applicants to substitute an auxiliary tank-type water heater with an auxiliary tankless water heater, even when the OG-300 system is not certified with a tankless auxiliary water heater. The auxiliary tankless water heater must use the fuel source in which the system was certified by SRCC or IAPMO, e.g. if the fuel source is electric, then the tankless water heater must be for an electric system, not natural gas or propane. The auxiliary tankless is required to have a modulating heater. This substitution is only allowed for two tank systems. For OG-300 systems with tankless auxiliary heaters, the PAs will not allow a tankless auxiliary to be substituted with an auxiliary non-tankless water heater. The incentive payment will not change based on tank substitutions from the original OG-300 calculations.
    - Substitution of Auxiliary Tank with a Heat Pump Water Heater (applies to electric displacing OG-300 systems only): For 2-tank systems, the PAs will allow Applicants to substitute an auxiliary tank-type water heater with a separate

[5] The CSI-Thermal Program currently has two approved listing agencies - Solar Rating and Certification Corporation (SRCC) and International Association of Plumbing and Mechanical Officials (IAPMO). References to individual listing agency will be identified in the Handbook if needed. Otherwise, the Handbook will refer only to the OG-300 certification going forward with the understanding that the systems are listed with at least one of the two listing agencies.

heat pump water heater for electric displacing SWH systems, even when the OG-300 system is not certified with a heat pump water heater as the auxiliary tank. One tank electric SWH systems are also eligible for this substitution only if thermal stratification is maintained. Thermal stratification means that the solar collector loop and heat pump water must be connected at tank heights that will maintain the intended stratification. This substitution option is not permitted for natural gas displacing OG-300 SWH systems.

  - OG-300 systems certified to a boiler may be installed to a natural gas tank or tankless auxiliary and maintain CSI-Thermal Program eligibility.

- Expired OG-300 systems that were previously certified by SRCC or IAPMO: The system must be purchased prior to the expiration or removal date of the certification. In order to meet this exception, the date of the Executed Agreement of SWH System Purchase and Installation or Executed Alternative System Ownership Agreement (if System Owner is different from Host Customer) must be before the expiration date of the certification. The applicable document must list the expired OG-300 system in order to be eligible for incentives; otherwise the system is ineligible.
- All components must be new and unused. Exceptions include the following:
  - Existing de-scaled copper piping,
  - Existing racking with a design that has been stamped and signed by a State of California licensed Professional Engineer (P.E.)
- System installations must conform to manufacturer's specifications and all applicable codes and standards;
- All systems must have freeze and stagnation protection, see Sections 12.2 and 12.3.

2.4.1. Ineligible Equipment

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

- Direct Forced Circulation systems, where potable water is pumped and heated directly in the collector. This restriction applies whether the freeze protection is provided by an automatic valve, recirculating warm water through the collector, or any other means. See Section 12.2.2.
- Open loop thermosiphon systems with potable water in the collector loop. See Section 12.2.4.
- Portable systems or systems that are not permanently installed. See Section 9.
- Systems with a Surface Orientation Factor of less than 0.60. See Section 2.6.1.

2.5 INSTALLATION REQUIREMENTS

It is the intent of the CSI-Thermal Program to provide incentives for reliable, permanent, and safe SWH systems. This Section outlines the installation requirements that all single-family 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 or IAPMO standards and guidelines. Information on standards and guidelines may be found on the SRCC or IAPMO website:

www.solar-rating.org
www.iapmo.org

2.5.1. 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 relief valves exposing humans to risk of scalding
- Accelerate scale accumulation
- Reduce life cycle cost-effectiveness
- If glycol is used, additional overheat protection must be used. See Section 12.3.

Accurately estimating the GPD of hot water consumption is important for the selection of fluid collector area to prevent the generation of excessive temperatures.[6]

Single-family residential systems should be sized according to the number of occupants in the household or based on actual hot water usage. The PAs will use the following guidelines to determine 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 occupancy is unknown: The bedroom method should be used. Assume 20 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

[6] Air collectors are exempt from the collector sizing requirements listed in Section 11.2.5.

- Systems that exceed a fluid collector area (measured in square feet) of 1.25 times the GPD are considered over-sized and must submit justification to the PA.

Step 3: Select an OG-300 system with the appropriate square footage of collector area. The following is a sizing example for fluid collectors:

- GPD demand: three occupants use approximately 45 gallons of hot water per day.
- OG-300 system will have with a maximum collector area of 56.3 square feet (45 multiplied by 1.25).

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. Oversizing beyond 1.25 sf/GPD without acceptable overheat protection (drainback or any of the listed glycol overheat protection methods is not acceptable. (For more information see section 12.3)

2.5.2. Freeze Protection

All installed systems must meet freeze protection requirements set forth by SRCC or IAPMO. The CSI-Thermal Program uses the 16 California climate zones established by the CEC to determine eligibility of appropriate freeze protection technologies. The CEC Climate Zone Handbook is available on www.gosolarcalifornia.com. For details, see Section 12.2.

2.5.3. Stagnation/Overheat Protection for Fluid Collectors

Stagnation is the condition where the solar collector has reached its maximum temperature with no fluid circulation. For detailed requirements, see Section 12.3.

2.5.4. Metering/Monitoring

Metering and monitoring is not required for single-family residential solar water heating systems. However, metering and monitoring equipment can increase owner knowledge of system performance and foster adequate system maintenance.

2.5.5. Energy Efficiency

Single-Family Residential projects are required to complete an energy efficiency audit/survey and meet minimum pipe insulation requirements. For more details, go to Section 8.1.

2.5.6. Warranty

The System Owner will acknowledge on the ICF that they have received, at minimum, the warranties outlined in Section 7.

2.5.7. Performance and Permanency

Only permanently installed systems are eligible for CSI-Thermal incentives. For more details regarding Performance and Permanency requirements, see Section 9.

2.6 INCENTIVE CALCULATION

An online calculator tool is available to estimate natural gas, electric, or propane displacement for SWH systems based on system location, design and expected performance. The calculator is embedded in the application processing database and can also be accessed separately for incentive estimation purposes at www.csithermal.com.

Single-family residential customer must use the OG-300 calculator. This calculator uses the following method: System incentives are calculated using the SRCC or IAPMO OG-300 rating (i.e., the estimated annual energy savings) in the appropriate CEC climate zone, combined with the Surface Orientation Factor (SOF), the Shade Factor and the current incentive rate. The actual incentive paid to any qualified system is derived as follows:

Incentive =	**OG-300 rating * SOF * Shade Factor * incentive rate** (Not to exceed the PA's current step maximum incentive)

2.6.1. Surface Orientation Factor

The Surface Orientation Factor (SOF) is one of the variables in the OG-300 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 for water heating 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 0.60. Collectors positioned outside of the ideal range will receive a SOF between 0.60 and 1.0 as defined in Appendix D, and the incentive will be decreased accordingly.

2.6.2. 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, and then averaged.

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. 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 $2,000 with a 95 percent Shade Factor will be reduced by 5 percent such that the incentive payment will be $1,900.

2.7 APPLICATION PROCESS

Applications are 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 accepted to initiate a project.

Incentives are applied for by the solar contractor unless the system is being self-installed by the host customer. In the case of self-installation, the host customer is also the applicant.

Single-family residential systems apply for incentives via a one-step process. The incentive rate for each project will be determined based on the then-current rate when the application is approved by the PA. Once a SWH system has been installed and a final signed-off permit is received, the Applicant submits the following documentation:

1. Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary. Completed Incentive Claim Form (ICF) with required signature(s)[7],

[7] 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.

including agreement to allow system to be monitored and data used for program evaluation purposes

2. Documentation of a completed Energy Efficiency Audit/Survey 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. Copy of final signed-off permit

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 the fluid collector square footage exceeds 1.25 times the gallons per day (GPD)
4. Stagnation protection documentation, if different from methods listed in Section 12.3.

Additional items for low income applicants:

Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

Please note for SoCalGas only, if Single Family low income applications receive a final permit signoff between April 15, 2016 and December 31, 2016 (inclusive) and submit a complete low income Incentive Claim package by February 28, 2017, they will qualify for the temporary higher SoCalGas Step 1 general market CSI-Thermal incentive rate. Should Step 1 incentive funds be exhausted prior to December 31, 2016, SoCalGas will accept and approve applications at the higher Step 1 incentive rate that have a building permit application date with proof of time stamp no later than October 7, 2016. Proof of a time stamp for a building permit application by the October 7 deadline includes one of the following: a plan check time stamp, permit application with a time stamp, email confirmation of permit application with a time and date, or receipt from the jurisdiction for a plan check fee or building permit fee dated on or before October 7, 2016.

1. If participating in the ESAP (not required if property is occupied by renters and meets PUC 2861(e)) :

    a. An affidavit that shows the property will remain low income for at least 10 years (see Appendix I); and

    b. Documentation proving that property owners meet one of the following conditions:

        i. a documented resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

        ii. a documented equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

        iii. a presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;

        iv. a presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development, or

        v. A presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

    Or

2. If participating in the LIWP or LIHEAP (not required if property is occupied by renters and meets PUC 2861(e)) :

    a. An affidavit that shows the property will remain low income for at least 10 years (see Appendix I);

    b. A document certifying participation in LIWP or LIHEAP provided by the California Department of Community Services and Development (CSD); and

    c. Documentation proving that property owners meet one of the following conditions:

i. a documented resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

ii. a documented equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

iii. a presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;

iv. a presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or

v. a presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

Or

3. If proving low income status through PUC 2861(e) (not required if household is currently participating, or have previously participated in the ESAP),

   a. Documentation will be required to prove renter low income status.

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

2.7.1. Application Review and Payment Process

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

To receive the incentive, all program requirements must be met and a complete ICF package submitted. Applicants are required to keep a copy of the ICF package along with all required documentation for five years.

To receive the temporary, higher SoCalGas incentive, all program requirements must be met and the system must receive a final permit sign-off between April 15, 2016 and

December 31, 2016 and the ICF package must be submitted by to February 28, 2017. If these requirements are not met, the application will receive the statewide current step rate. The application will not be guaranteed a rebate at the Step 1 rate. Should Step 1 incentive funds be exhausted prior to December 31, 2016, SoCalGas will accept and approve applications at the higher Step 1 incentive rate that have a building permit application date with proof of time stamp no later than October 7, 2016. Proof of a time stamp for a building permit application by the October 7 deadline includes one of the following: a plan check time stamp, permit application with a time stamp, email confirmation of permit application with a time and date, or receipt from the jurisdiction for a plan check fee or building permit fee dated on or before October 7, 2016.

Upon final approval of the ICF package and completed onsite field inspection (if applicable), the PA will disburse the incentive payment.

Once an ICF package is approved, no further changes to the application will be allowed. Should an onsite field inspection be required, no changes will be allowed to the ICF package once the inspection notice has been sent out.

2.7.1.1. 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 application may be cancelled.

If the ICF package indicates that the project is 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.

2.7.1.2. 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.

3. DOMESTIC HOT WATER – MULTIFAMILY/COMMERCIAL ≤ 250 kWth

This chapter discusses the requirements only for multifamily/commercial solar water heating systems in applications where the solar heated potable water is directly consumed. Incentives for these systems will be paid a lump-sum, up-front incentive based on estimated performance in the incentive calculator. In this chapter, the Handbook covers eligible customers, incentives, eligible equipment, installation requirements, incentive calculation, and incentive application process. For information on multifamily/commercial solar thermal systems for other end uses, please see Chapter 4.

3.1 DEFINITION

Domestic hot water (DHW) SWH systems for multifamily or commercial applications directly consume the solar heated potable water, as opposed to using the solar heated water as a medium to carry heat for some other end use. In multifamily/commercial applications, DHW and commercial end uses are eligible for CSI-Thermal Program incentives. Examples of eligible DHW end uses include: apartment buildings with central DHW systems, convalescent homes, hotels and motels, military bachelor quarters, school dormitories with central DHW systems and prisons. Examples of eligible commercial end uses include: commercial laundries, laundromats, restaurants, food processors, agricultural processes and car washes.

3.2 ELIGIBLE CUSTOMER

To be eligible to receive an incentive, the Project Site must be within the service territory of, and receive retail level gas or electric service[8] from, PG&E, SCE, SCG, or SDG&E. Customers of these utilities installing a SWH system to displace natural gas, electricity, or propane are eligible to receive a rebate. Self-installations are permitted in the CSI-Thermal Program. Please see Sections 6.4.3 and 7 for mandatory training and specific warranty requirements.

[7]"…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.

3.2.1. 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 facility to displace natural gas water heating. If solar thermal becomes mandatory for new facility construction in the state of California, new facilities will no longer be eligible for incentives under this program.

3.2.1.1. Low Income Natural-Gas Displacing SWH Customer

The low income component of the CSI-Thermal Program offers higher incentives to qualifying multifamily, low income customers. To be eligible for low income SWH incentives, the following requirements must be met:

Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

- The project site must be within the service territory of, and receive natural gas service from PG&E, SCG, or SDG&E; and
- The SWH system must displace the use of natural gas and meet the equipment eligibility requirements of the CSI-Thermal Program, listed in Section 3.4.

Low income customers that have already received a CSI-Thermal incentive will not be eligible for the incremental amount provided by the low income program.

To qualify for low income SWH incentives for a multifamily residential property, these additional requirements must be met:

1. The benefits of the SWH system must be passed to the low income residents through reduced energy costs. The total value of the benefits provided to the tenants shall be no less than 30% of the total incentive amount; see Appendix M for further details.
2. The property must meet one of the following conditions:
   a. Low income housing:
      The property must meet the definition of low income residential housing in Public Utilities Code (PUC) Section 2861(e); or
   b. ESAP Participation:

i. At least 50 percent of all units in the multifamily housing structure are occupied by ratepayers that are participating in a Commission approved and supervised gas corporation ESAP administered by PG&E, SCG or SDG&E, as set forth in PUC Section 2866(c).

ii. The property will be required to remain low income for at least 10 years from the time of the SWH system installation.

iii. System owners must meet one of the following conditions:

1. A resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;
2. An equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;
3. A presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;
4. A presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or
5. A presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

3.2.2. 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 facility to displace 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.

3.2.3. Propane-Displacing SWH Customer

To be eligible for a SWH propane-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 facility to displace propane water heating. SWH systems installed with propane

back-up water heating on new construction projects are not eligible for an incentive through the CSI-Thermal Program.

Propane water heating customers will be held to the same customer eligibility requirements and incentive levels of the CSI-Thermal electric-displacing program and the same equipment eligibility requirements of the CSI-Thermal gas-displacing program.

3.3 INCENTIVE

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 at www.csithermal.com/calculator, as described in Section 3.6. Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. .If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

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

Incentive step changes will move independently in each service territory and for each class of customer. Incentives will be paid on a first come, first served basis. The most current information on incentive step status per customer class will be posted on www.csithermal.com/tracker.

For SoCalGas, funds in incentive Step 3 and 4 for Single Family and Commercial/Multifamily applications will be shifted into Step 1. This will be in effect between April 15, 2016 and December 31, 2016 (inclusive). As of January 1, 2017, any Step 1 unencumbered funds in excess of the Step 1 budget as of March 2016 will be returned to Step 3 or 4 as appropriate.

For more information about the incentive budget, please see Section 1.2.

3.3.1. Natural Gas Multifamily/Commercial Incentives

Table 7 displays the multifamily/commercial natural gas-displacing non-PBI incentives, the maximum incentive amount per project/site, and step budget allocation.

In order to receive the higher SoCalGas Step 1 incentive rate in parenthesis in Table 4 below, systems must be installed between April 15, 2016 and December 31, 2016 which will be determined by final permit sign-off date. Complete Incentive Claim packages must be submitted by February 28, 2017. If an application reserved at the temporary rate does not receive a final permit sign of by December 31, 2016 or submit a complete Incentive Claim package by February 28, 2017, that application will revert to the statewide Step 1 rate (i.e. 20.19/therm).

Table 7
Non-PBI Natural Gas-Displacing Multifamily/Commercial System Incentive Steps

Step	Incentive per annual therm displaced () For SoCalGas only	Maximum Incentive Multifamily/Commercial Projects	Budget Allocation[9]
1	$20.19 ($25.00)	$800,000	$55,465,184
2	$17.16	$800,000	$29,400,000
3	$10.15 (0)	$800,000	$4,704,000
4	$3.13 (0)	$800,000	$7,938,000

Table 8 displays the low income multifamily natural gas-displacing non-PBI incentive steps and the maximum incentive amount per project/site. Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. . If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

Table 8
Non-PBI Low Income Natural Gas-Displacing Multifamily System Incentive Steps

Step	Incentive per annual therm displaced	Maximum Incentive Multifamily/Commercial Projects
1	$24.89	$800,000

[9] The budget allocations were changed in February 2015. Please see section 1.2 for more detail on the current budget allocations.

3.3.2. Electric/Propane Multifamily/Commercial Incentives

Table 9 displays the multifamily electric/propane-displacing non-PBI incentive steps and the maximum incentive amount per project/site.

Table 9
Non-PBI Electric/Propane-Displacing Multifamily System Incentive Steps

Step	Incentive per annual kWh displaced	Maximum Incentive Multifamily/Commercial Projects
1	$0.42	$250,000
2	$0.29	$250,000
3	$0.19	$250,000
4	$0.09	$250,000

3.3.3. Incentive Limitation

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 on the ICF. 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.

A maximum of one multifamily or commercial incentive will be allowed per SWH system. In addition, the total incentives for multiple systems[10] on one site cannot exceed the incentive maximums described in Sections 3.3.1 and 3.3.2. 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.

[10] Systems include any combination of solar water heating systems for domestic hot water usage, commercial process heat, space heating, absorption chilling or multifamily/commercial combination systems.

- 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.

Example: A multifamily 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 the incentive maximum.

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

- Total eligible project costs (see Section 11)
- Other incentives or rebates received (see Section 11)
- Incentive step cap
- PA budget allocation
- Shade Factor (see Section 2.6.2) and
- Tilt and azimuth: Any tilt or azimuth will be allowed unless a tilt is required for freeze protection purposes (please see freeze protection requirements in Chapter 12 and on the CSI-Thermal Program Inspection Checklists at http://gosolarcalifornia.ca.gov/documents/csi.php.).

3.4 ELIGIBLE EQUIPMENT

To receive a CSI-Thermal Program incentive, installed SWH equipment must meet the following criteria:

- Multifamily/commercial SWH systems must use collectors that have OG-100 Collector Certification. Systems in compliance with OG-300 standards will also be eligible to receive multifamily/commercial incentives. Exceptions include the following:
- Expired OG-100 collectors that were previously certified by SRCC or IAPMO: The initial reservation request date must be before the expiration date of the certification in order for the equipment to be eligible for incentives; otherwise, the collector is ineligible. This only applies to the collector listed on the Reservation Request.
- Multiple OG-300 ICS or Thermosiphon systems on one site: Please contact your Program Administrator if you plan to install multiple OG-300 ICS or Thermosiphon systems on one Multifamily/commercial building.
- All components must be new and unused. Exceptions include the following:
    - Existing de-scaled copper piping,

- Existing racking with a design that has been stamped and signed by a State of California licensed Professional Engineer (P.E.)
- Existing storage tanks in multifamily/commercial systems may be used under the following conditions:
  - The tank must meet the storage requirement of Section 3.5.1.2.
  - The tank must be in workable condition with no leaks.
  - The tank must have at least R12 insulation. The Program reserves the right to request documentation confirming that this requirement is met.
  - The tank can be plumbed to the solar system without impairing the functioning of the solar or auxiliary systems

- System installations must conform to manufacturer's specifications and all applicable codes and standards;
- All systems must have freeze and stagnation protection, see Sections 12.2 and 12.3.

3.4.1. Ineligible Equipment

a. Direct Forced Circulation (DFC) systems for DHW applications, where potable water is pumped and heated directly in the collector. This restriction applies whether the freeze protection is provided by an automatic valve, recirculating warm water through the collector, or any other means. For solar pool applications refer to Section 5.0

b. Open loop thermosiphon systems with potable water in the collector loop, see Section 12.2.4.

c. Portable systems or systems that are not permanently installed see Section 9.

3.5 INSTALLATION REQUIREMENTS

It is the intent of the CSI-Thermal Program to provide incentives for reliable, permanent, and safe SWH systems. This Section outlines the installation requirements that all multifamily/commercial SWH projects must meet in order to receive a CSI-Thermal Program incentive. Details can be found in Section 12.

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.

3.5.1. 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
- If glycol is used, additional overheat protection must be used. See Section 12.3.

Accurately estimating the GPD of hot water consumption is important for the selection of fluid collector area to prevent the generation of excessive temperatures.[11]

3.5.1.1. Gallons Per Day Sizing Validations

There are several options that can be used for GPD sizing of Multifamily/Commercial projects. Depending on the type of structure (existing versus new construction), the options vary as outlined below.

For existing structures or retrofits, the following options are available:

1. Maximum GPD Guideline Table (Appendix E): SWH systems for the building types listed in the Maximum GPD Guidelines Table may be sized using the GPD value in this table for the appropriate building type. The GPD values in the table are maximum values for the purpose of collector sizing. Systems may also be sized using a lesser GPD assumption.

2. Actual Metered Consumption: Applicants that choose not to use Appendix E or applications with building types not listed in Appendix E must do one of the following:

    a. Meter hourly actual hot water consumption using a flow meter with accumulator for an appropriate period of time to capture the full range of usage and adjust for seasonal variability to obtain an annual average GPD and hourly usage profile. Hot water consumption calculation and explanation must be stamped by a State of California licensed P.E. Refer to Appendix J for more information.

    b. Meter hourly natural gas, electric, or propane consumption at the water heater for an appropriate period of time to capture the full range of usage and adjust for seasonal variability to obtain an annual average GPD and an hourly usage profile. Water heater gas, electric, or propane meter consumption calculation and explanation must be stamped by a State of California licensed P.E. Refer to Appendix J for more information.

3. Independent Study/Report: Applicants can choose to submit independent government/educational studies or reports from third party organizations in

[11] Air collectors are exempt from the collector sizing requirements listed in Section 12.2.5.

order to accurately estimate GPD. A State of California licensed P.E. must certify that the study or report is relevant to the specific project considering project demographics and end uses, and must develop a typical hourly load profile. All data including reports or studies must be submitted to the program administrator along with relevant calculations.

4. Small Systems for Building Types not in Appendix E: For systems with less than 85 square feet of collector area which are not OG-300 certified, Applicants may select the "Small Commercial System" option in the CSI-Thermal database and calculator. The applicant must then select the building type whose load profile best represents the building hot water usage. For example; if the business has 9:00 am -5:00 pm weekday hours, the Office Buildings load profile should be selected. The calculator will assume a hot water load of 64.3 GPD[12].

For new construction, the following option applies:

Since metering cannot be performed, estimated annual average GPD and hourly usage profile calculations may be submitted. Estimates must be stamped by a State of California licensed P.E. Refer to Appendix J for more information.

For systems with non-standard load profiles or those not already included in the multifamily/commercial calculator, the PAs may require these types of projects to take PBI.

3.5.1.2. Collector and Solar Storage Tank Sizing Validations

- Fluid collector square footage cannot exceed 1.25 times the GPD.
- Systems with two or more tanks must have a minimum of one gallon of storage per square foot of collector. Systems with two or more tanks with unglazed collectors must have a minimum of 0.33 gallons of storage per square foot of collector. Systems with two more tanks using air collectors must have a minimum of 1 gallon of storage per GPD.
- One-tank systems must have a minimum of 1.25 gallons of storage per square foot of collector. One-tank systems with unglazed collectors must have a minimum of 0.41 gallons of storage per square foot of collector. One-tank systems with air collectors must have a minimum of 1 gallon of storage per GPD.

Reduced solar storage tank volume may be justified under some circumstances as long as overheat protection is maintained. For systems not meeting the solar storage volume requirements, documentation justifying the reduced storage and

[12] Hot water usage of 64.3 GPD is consistent with the hot water load assumption used in OG-300 ratings.

indicating how overheat/stagnation will be prevented must be submitted and stamped and signed by a State of California licensed P.E. Reduced storage justification should explain the need to size outside the above parameters, and explain how overheat protection is provided.

Drainback systems are inherently protected from overheat/stagnation and therefore require only a reduced storage justification document. This document does not need to indicate how overheat/stagnation will be prevented and does not require a P.E stamp and signature.

3.5.2. Freeze Protection

All installed systems must meet freeze protection requirements set forth in this handbook. The CSI-Thermal Program uses the 16 California climate zones established by the CEC to determine eligibility of appropriate freeze protection technologies for ICS systems. The CEC Climate Zone Handbook is available on www.gosolarcalifornia.com. For details regarding freeze protection, see section 12.2

3.5.3. Stagnation/Overheat Protection for Fluid Collectors

Stagnation is the condition where the solar collector has reached its maximum temperature with no fluid circulation. For detailed requirements, see Section 12.3.

3.5.4. Metering/Monitoring

This section contains information on the metering requirements for multifamily/ commercial projects to participate in the CSI-Thermal Program.

All multifamily/commercial systems over 30 kWth are required to install customer performance monitoring (CPM). SWH systems over 250 kWth are required to take a performance based incentive (PBI) and are therefore required to have more robust metering and monitoring. For details on PBI, please see Chapter 4.

3.5.4.1. Requirements for Customer Performance Monitoring (CPM) (systems > 30 kWth)

These minimum metering requirements were developed to increase owner knowledge of system performance and to foster adequate system maintenance. All systems with capacity over 30 kWth must have metering and monitoring equipment to measure system performance (the quantity of energy generated or displaced by the system). The one-time and ongoing costs are born by the System Owner while the contractor is responsible for maintenance of meters and communications.

3.5.4.2. Required Metering Equipment

Required equipment consists of a Btu meter, i.e., a flow meter, a temperature sensor pair, and a calculator. Solar water heating systems must use a meter off the approved CPM meter list which can be found at www.csithermal.com.

3.5.4.2.1. Equipment Accuracy Standards

- Flow meter must have a maximum permissible error ± 2% at full flow.
- Temperature sensors must have a maximum permissible error of ± 1° C within the range of temperatures being monitored (e.g. in the case of collector loop monitoring the range would be the minimum collector supply temperature to the maximum collector return temperature).
- For metering that does not include a flow meter and temperature sensor pair, the manufacturer must demonstrate that the accuracy of the total BTU calculation is within ±15%.
- For solar pool CPM accuracy requirements refer to Section 5.5.4.

Refer to Appendix I for metering equipment approval process.

3.5.4.2.2. Equipment Location

For CPM, metering equipment may be installed on either the collector loop or potable water side of the SWH system.

3.5.4.2.3. Communication Requirements

For a period of five years from start of operation, System Owner must have the means to determine if the system is operating. This applies to water heating and pool heating systems. At a minimum, the CPM equipment must provide the quantity of solar energy delivered to the System Owner (all systems over 30 kWth).

3.5.5. Energy Efficiency

Multifamily/commercial projects are required to complete an energy efficiency audit/survey and meet minimum pipe insulation requirements. For more details, go to Section 8.1.

3.5.6. Warranty

The System Owner will acknowledge on the Incentive Claim Form (ICF) that they have received, at minimum, the warranties outlined in Section 7.

3.5.7. Performance and Permanency

Only permanently installed systems are eligible for CSI-Thermal incentives. For more details regarding Performance and Permanency requirements, see Section 9.

3.5.8. Roof Mounting of Unglazed Collectors

Unglazed solar collectors experience large expansion and contraction cycles during their service life. To assure longevity of solar thermal systems, roof mounting of the unglazed collectors shall strictly follow the procedure required by manufacturers and shall meet all local codes and standards. Means shall be provided to protect the solar thermal system within the design limits of temperature and pressure. All solar thermal systems with unglazed collectors will require proper expansion joints or loops on collector headers and footers and all supply and return piping.

3.6 INCENTIVE CALCULATION

An online calculator tool is available to estimate natural gas, electric, or propane displacement for SWH systems based on system location, design and expected performance. The calculator is embedded in the application processing database and can also be accessed separately for incentive estimation purposes at www.csithermal.com.

All multifamily and commercial DHW SWH systems that use OG-100 collectors, but do not have an OG-300 system certification, must use the OG-100 Multifamily/Commercial Incentive Calculator to determine the project incentive. Please refer to the Calculator User Guide (www.csithermal.com/calculator/commercial) for details regarding the calculator inputs.

3.6.1. Calculator Outputs

The multifamily/commercial calculator produces the following outputs:

1. Estimated annual energy savings in units of therms or kWh, based on back up fuel source. Note: estimated annual energy savings cannot exceed actual gas or electric usage based on the last twelve months of utility bills.

2. Estimated incentive amount, based on energy savings produced from the calculator and the current incentive step level.

The PAs reserve the right to reject the calculator result for systems that operate outside of the range of the OG-100 certification test conditions.

3.6.2. Calculator Modifications

The PAs in conjunction with the CPUC developed a calculator that helps Applicants determine their incentives. 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 affect 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 with the original estimated energy savings and incentive.

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.

3.7 APPLICATION PROCESS

Applications are 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 accepted to initiate a project.

Incentives are applied for by the solar contractor unless the system is being self-installed by the host customer. In the case of self-installation, the host customer is also the applicant.

Multifamily/commercial projects will follow a two -step application process. For multifamily/commercial projects, applicants 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 submits an ICF and supporting documentation after the system has been installed and received a final signed-off permit. The two primary steps are as follows:

1. Complete and submit a RRF package to get a confirmed reservation
2. Complete and submit an Incentive Claim Form (ICF) Package to request payment

To receive the temporary, higher SoCalGas incentive, all program requirements must be met and the system must receive a final permit sign-off between April 15, 2016 and December 31, 2016 (inclusive) and the ICF package must be submitted by February 28, 2017. If these requirements are not met, an application reserved at the temporary rate will revert to the statewide Step 1 rate (i.e. $20.19/therm).

The following sections describe each step in more detail.

3.7.1. 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, an 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 participant agreement signed by the Applicant, Host Customer and System Owner (if different from Host Customer)
2. Documentation of a completed Energy Efficiency Audit/Survey or Title 24 documentation
3. Copy of executed agreement of SWH system purchase and installation

The following documents may also be needed:

1. Application Fee for projects with a capacity over 30 kWth

2. Copy of executed alternative system ownership agreement (If System Owner is different from Host Customer)

3. Authorization to Receive Customer Information or Act on a Customer's Behalf (only required for SDG&E Applicants)

4. GPD justification stamped and signed by a State of California licensed P.E. if customer's building type is not on the Maximum GPD Guideline Table; see Appendix E and Appendix J.

5. Stagnation protection documentation if different than methods listed in Section 12.3

6. Documentation describing the stagnation/overheat protection method to be used for combination systems that are oversized based on eligible loads and sizing requirements. The documentation must also describe the entire system being installed. This document must be stamped and signed by a State of California licensed P.E.

7. Solar storage tank volume justification stamped and signed by a State of California licensed P.E. if the solar storage tank volume is less than the requirements outlined in Section 3.5.1.2.

Additional documentation for low income Applicants:

Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

Please note for SoCalGas only, if multifamily low income applications receive a final permit signoff between April 15, 2016 and December 31, 2016 (inclusive) and submit a complete low income Incentive Claim package by February 28, 2017, they will qualify for the temporary higher SoCalGas Step 1 general market CSI-Thermal incentive rate.

1. An affidavit from the property owner (see Appendix M) explaining how the benefits of the SWH system will be passed to the low income residents through reduced energy costs

2. If participating in the ESAP (2866) (not required if property meets PUC (2861)e) :

a. An affidavit that shows the property will remain low income for at least 10 years (see Appendix L); and
b. Documentation proving that property owners must meet one of the following conditions:

   i. a documented resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

   ii. a documented equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

   iii. a presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;

   iv. a presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or

   v. a presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

Or

c. If proving low income status through PUC (2861)e (not required if 50% of units participate in the ESAP),

   i. Documentation will be required proving 20% of the total units in the residential complex will be sold or rented to lower income households for a period of not less than 30 years.

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

3.7.1.1. 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 system capacity ranges:

Table 10
Application Fee Schedule for Large Multifamily/Commercial Systems

Capacity (kWth)		Capacity (kWth)		Application Fee
30	-	260	=	$1,250
261	-	520	=	$2,500
521	-	780	=	$5,000
781	-	1,040	=	$10,000
1,041	-	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 confirmed 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 3.7.1.3, 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 considered complete by the PA, the application fee will be refunded. No interest will be paid on refunded application fees.

3.7.1.2. 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.

3.7.1.3. 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.

3.7.1.4. Forfeit of Application Fee

Application fees will be forfeited in the following cases:

- Once a confirmed reservation is granted and the PA rejects the project for failing to meet the reservation expiration date requirement, the application fee will be forfeited.
- 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.
- 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.
- If an RRF package is submitted and the incentive level has been reduced between submittal and application review (due to CPUC 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.

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

3.7.2. 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.

Please note that if low income applications are installed by December 31, 2016 they will qualify for the higher general market CSI-Thermal incentive rate. The ICF package must include final signed-off permit with a date between April 15, 2016 and December 31, 2016 (inclusive). The ICF package must be submitted by February 28, 2017.

The ICF package includes the following documentation:

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

Refer to Appendix C for a detailed description of these required documents.

3.7.3. Application Review Process

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

3.7.3.1. 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.

3.7.3.2. Approval of Reservation Request Form Package

Once an 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 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.

PA's email notification and confirmation serves as notice to the customer and applicant of the confirmed reservation.

3.7.3.3. Reservation Period

The reservation period for multifamily/commercial projects is 18 months with one optional 180 calendar day extension; see Section 10 for details regarding changes to reservations.

3.7.4. Changes to Reservation

There may be circumstances where a rebate application (that has already received conditional reservation or incentive approval) is impacted by changes such as a request for transfer of reservation from one site to another system changes, withdrawal of a project, etc. Details regarding the impact of these changes to the reservation are found in Section 10.

3.8 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.

Please note that all applications including low income applications are installed between April 15, 2016 and December 31, 2016 they will qualify for the higher general CSI Thermal incentive

rate. The low income ICF package must include final signed-off permit that with a date on or before December 31, 2016. The ICF package must be submitted by February 28, 2017.

Upon final approval of the ICF package and completed onsite field inspection (if applicable), the PA will disburse the incentive payment.

Once an ICF package is approved, no further changes to the application will be allowed. Should an onsite field inspection be required, no changes will be allowed to the ICF package once the inspection notice has been sent out.

3.8.1 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.

3.8.2 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. COMMERCIAL PROCESS HEAT, SPACE HEATING, ABSORPTION CHILLING, MULTIFAMILY/COMMERCIAL COMBINATION SYSTEMS, DHW SYSTEMS > 250 KWTH

This chapter of the handbook describes the program requirements for:

- commercial process heat;
- space heating;
- absorption chilling;
- multifamily/commercial combination systems, including solar pool combination systems;

- domestic hot water (DHW) systems >250 kWth; and
- DHW ≤ 250 kWth (not including single-family residential or solar pool systems) that opt-into the Performance Based Incentive (PBI) System.
- PBI is required for all of the above systems

4.1. DEFINITION

4.1.1. Process Heat

The term "process heat" may include a wide variety of applications. In general, process heating applications use heat to produce basic materials and commodities. In the context of a solar water heating system, the main difference between process heat and other types of solar water heating is that in a process heating system, it is the heat that is used, and the water or heat transfer fluid is simply a means to carry that heat. For purposes of this Handbook, the term "process heat" shall refer to those applications that do not consume the solar heated water and instead use the water as a medium to carry heat for the end process.

4.1.2. Solar Cooling

Solar cooling is the use of solar thermal collectors to provide energy for cooling. For the purposes of this application, solar cooling shall only apply to solar-assisted absorption chillers with natural gas back-up that may also be used to supplement part of an electric cooling system. Incentives from secondary heat streams resulting from the absorption cooling process will not be allowed.

4.1.3. Space Heating Systems

Space heating systems use SWH collectors to provide radiant, convection or forced air heating.

4.1.4. Combination Systems

The term "combination" system refers to the combination of any commercial end-uses permitted in the program.

4.2. ELIGIBLE CUSTOMERS

4.2.1. Natural Gas-Displacing Solar Thermal Customers

To be eligible for a solar thermal 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 a solar thermal system on a new or existing facility to displace natural gas. If solar thermal becomes mandatory for new facility construction in the state of California, new facilities will no longer be eligible for incentives under this program.

4.2.1.1. Solar-Assisted Absorption Chilling for Natural Gas Customers

For a solar-assisted absorption chiller project with natural gas backup, the Host Customer must be a natural gas customer of PG&E, SDG&E or SCG in order to be eligible for a solar thermal natural gas-displacing incentive. The customer must be installing a solar-assisted absorption chiller on a new or existing facility. Solar-assisted absorption chillers are not eligible to receive incentives in the electric portion of the CSI-Thermal program.

4.2.2. Electric-Displacing Solar Thermal Customer

To be eligible for an electric-displacing incentive, the Host Customer must be an electric customer of PG&E, SCE, or SDG&E. The customer must be installing solar thermal on an existing facility to displace electricity. Solar thermal systems installed with electric back-up heating on new construction projects are not eligible for an incentive through the CSI-Thermal Program. A 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.

4.2.3. Propane-Displacing Solar Thermal Customer

To be eligible for a solar thermal propane-displacing incentive, the Host Customer must be an electric customer of PG&E, SCE, or SDG&E. The customer must be installing solar thermal on an existing facility to displace propane. Solar thermal systems installed with propane back-up heating on new construction projects are not eligible for an incentive through the CSI-Thermal Program. A 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.

Propane heating customers will be held to the same customer eligibility requirements and incentive levels of the CSI-Thermal electric-displacing program and the same equipment eligibility requirements of the CSI-Thermal gas-displacing program.

4.3. INCENTIVES

A goal of the CSI-Thermal Program is to lower the cost of solar thermal technology for the System Owner through incentives. Incentive rates will decline over the life of the program in four steps to facilitate market transformation.

All solar thermal systems for process heat, solar cooling, space heating, combination system, and DHW systems > 250 kWth are required to take a performance based incentive (PBI). Multifamily or commercial DHW systems ≤250 kWth may opt-in to PBI. PBI is based on energy delivered from the solar thermal system to the site as measured by a Btu meter. PBI incentives will be paid quarterly over two years with the incentive rate set at one half of the otherwise applicable one-year incentive rate. The total incentive payout is capped at 100% of the estimated amount submitted by the applicant on the ICF.

To determine the estimated incentive amount that will be used for confirming incentive reservations, Applicants will use the following tool based on the category identified in the table below.

Table 11

Category	Tool
DWH ≤ 250 kWth installing OG-300 System	Online Single-Family Incentive Calculator (adjusted for Commercial / Multifamily incentive rates)
DWH ≤ 250 kWth installing non-OG-300 System	Online Commercial and Multifamily Incentive Calculator
DWH > 250 kWth	Online Commercial and Multifamily Incentive Calculator or Estimated Annual Savings Provided by Applicant, certified by State of California licensed P.E.
Commercial Process Heat, Space Heating, Absorption Chilling or Multifamily/Commercial Combination Systems	Estimated Annual Savings Provided by Applicant, certified by State of California licensed P.E.

As incentives decline under the natural gas-displacing program, a corresponding step reduction occurs to the electric/propane-displacing incentive. Electric/propane-displacing solar thermal 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, to the extent that funds are available in the CSI General Market Program. See the CSI Program Handbook for details on the CSI step changes.

Incentive step changes will move independently in each service territory and for each class of customer. Incentives will be paid on a first come, first served basis. The most current information on incentive step status per customer class will be posted on www.csithermal.com/tracker.

For SoCalGas, funds in incentive Step 3 and 4 for Single Family and Commercial/Multifamily applications will be shifted into Step 1. This will be in effect between April 15, 2016 and December 31, 2016 (inclusive). As of January 1, 2017, any Step 1 unencumbered funds in excess of the Step 1 budget as of March 2016 will be returned to Step 3 or 4 as appropriate.

For more information about the incentive budget, please see Section 1.2.

4.3.1. Natural Gas PBI Incentives

Table 12 displays the dollars per annual therm displaced at each incentive step and the maximum incentive amount per project.

In order to receive the higher SoCalGas Step 1 incentive rate in parenthesis in Table 12 below, systems must be installed between April 15, 2016 and December 31, 2016 (inclusive) which will be determined by final permit sign-off date. Complete Incentive Claim packages must be submitted by February 28, 2017. If an application reserved at the temporary rate does not receive a final permit sign of by December 31, 2016 or submit a complete Incentive Claim package by February 28, 2017, that application will revert to the statewide Step 1 rate (i.e. $10.10/therm).

Table 12
PBI Multifamily and Commercial Natural Gas-Displacing System Incentive Steps

Step	Incentive per therm displaced For SoCalGas only in ()	Maximum Incentive for Commercial/Multifamily solar thermal projects
1	$10.10 ($12.50)	$800,000
2	$8.58	$800,000
3	$5.08 ($0)	$800,000
4	$1.57 ($0)	$800,000

4.3.1.1. Multifamily Low Income PBI Incentives

Multifamily low income incentive levels will remain at the current Step 1 incentive level while low income funds are available, and use the same incentive caps as shown in Table 12. Multifamily low income systems with a capacity of ≤250 kWth are eligible to opt-in to PBI and will be paid based on the incentives rates in Table 13. If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

Multifamily low income systems or combination systems with a capacity > 250 kWth will be paid in the same manner as PBI.

Please note that if multifamily low income systems are installed between April 15, 2016 and December 31, 2016 as determined by the final building department permit sign-off date, and submit a complete Incentive Claim package by February 28, 2017 they will qualify for the higher general market CSI-Thermal incentive rate.

Table 13
PBI Multifamily Low Income
Natural Gas-Displacing System Incentive Steps

Step	Multifamily Low Income Incentive per therm displaced	Maximum Incentive Multifamily Low Income Projects
1	$12.45	$800,000

4.3.2. Electric/Propane PBI Incentives

Table 14 displays the dollar incentive rate per kWh in each step for electric/propane-displacing systems and the maximum incentive amount for electric/propane-displacing multifamily/commercial systems.

Table 14

PBI Multifamily and Commercial Electric/Propane-Displacing System Incentive Steps

Step	Electric/Propane-Displacing Incentive ($/kWh)	Maximum Incentive for Multifamily/Commercial System
1	0.21	$250,000
2	0.15	$250,000
3	0.10	$250,000
4	0.05	$250,000

4.3.3. Incentive Limitation

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 on the ICF. 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.

A maximum of one PBI Multifamily and Commercial system incentive will be allowed per solar thermal system, not to exceed $800,000 for natural gas displacing systems or $250,000 for electric/propane displacing systems. In addition, the total incentives for multiple solar thermal systems[108] on one site cannot exceed the incentive maximums stated above. 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.

  Example: A multifamily building owner owns two buildings on one site under one business. Each building has a natural gas-displacing solar thermal 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 does not exceed $800,000 for the site. [10~~8~~]

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

- Total eligible project costs (see Section 11)
- Other incentives or rebates received (see Section 11)
- Incentive step cap
- PA budget allocation
- Shade Factor (see Section 2.6.2) and
- Tilt and azimuth: Any tilt or azimuth will be allowed unless a tilt is required for freeze protection purposes (please see freeze protection requirements in Chapter 12 and on the CSI-Thermal Program Inspection Checklists at http://gosolarcalifornia.ca.gov/documents/csi.php).

4.4. PBI ELIGIBLE EQUIPMENT

To receive a CSI-Thermal Program incentive, installed solar thermal equipment must meet the following criteria:

- Multifamily/commercial solar thermal systems must use collectors that have OG-100 Collector Certification. Systems in compliance with OG-300 standards will also be eligible to receive multifamily/commercial incentives. Exceptions include the following:
  - Expired OG-100 collectors that were previously certified by SRCC or IAPMO: The initial reservation request date must be before the expiration date of the certification in order for the equipment to be eligible for incentives; otherwise, the collector is ineligible. This only applies to the collector listed on the Reservation Request.
  - Multiple OG-300 ICS or Thermosiphon systems on one site: Please contact your Program Administrator if you plan to install multiple OG-300 ICS or Thermosiphon systems on one Multifamily/commercial building.

- All components must be new and unused. Exceptions include the following:
- existing de-scaled copper piping,
  - existing racking with a design that has been stamped and signed by a State of California licensed P.E.
  - existing storage tanks in multifamily/commercial systems may be used under the following conditions:
    - The tank must be in workable condition with no leaks.
    - The tank must have at least R12 insulation. The Program reserves the right to request documentation confirming that this requirement is met.
    - The tank can be plumbed to the solar system without impairing the functioning of the solar or auxiliary systems
- System installations must conform to manufacturer's specifications and all applicable codes and standards;
- All systems must have freeze and stagnation protection, see Section 12.

4.4.1. Ineligible Equipment

a. Direct Forced Circulation (DFC) systems for DHW applications, where potable water is pumped and heated directly in the collector. This restriction applies whether the freeze protection is provided by an automatic valve, recirculating warm water through the collector, or any other means. For solar pool applications refer to Section 5.0

b. Open loop thermosiphon systems with potable water in the collector loop, see Section 12.2.4.

c. Portable systems or systems that are not permanently installed see Section 9.

4.5. INSTALLATION REQUIREMENTS

It is the intent of the CSI-Thermal Program to provide incentives for reliable, permanent, and safe solar thermal systems. This Section outlines the installation requirements that all multifamily/commercial solar thermal projects must meet in order to receive a CSI-Thermal Program incentive. Details can be found in Section 12.

Systems must conform to manufacturers' specifications and with all applicable electrical, plumbing and building codes and standards. Permits are required for all solar thermal system installations.

4.5.1. PBI System Sizing

Accurately estimating the facilities solar thermal load profile is important for the selection of fluid collector area to prevent the generation of excessive temperatures.[13]

Over-sizing the solar collector array 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
- If glycol is used, additional overheat protection must be used. See Section 12.3

The process for sizing a solar thermal system under PBI shall be based on the following:

1. Number of OG 100 collectors that shall accommodate the site load profile
2. Calculate the solar fraction
3. Provide the annual Therms Saved

A State of California licensed P.E. stamped documentation demonstrating the sizing method as described above shall be required in the CSI-Thermal Rebate application.

4.5.2. Freeze Protection

All installed systems must meet freeze protection requirements set forth in this handbook. All systems require freeze protection in every location in California. The CSI-Thermal Program uses the 16 California climate zones established by the CEC to determine eligibility of appropriate freeze protection technologies. The CEC Climate Zone Handbook is available on www.gosolarcalifornia.com. For details regarding freeze protection, see section 12.2.

4.5.3. Stagnation/Overheat Protection for Fluid Collectors

Stagnation is the condition where the solar collector has reached its maximum temperature with no fluid circulation. For details regarding stagnation requirements, see section 12.3.

[13] Air collectors are exempt from the collector sizing requirements listed in Section 12.2.5.

4.5.4. Metering/Monitoring

The purpose of PBI metering is to enable the PAs to calculate the payments on actual thermal energy displaced. Payments will be made quarterly over two years. All mandatory and opt-in PBI systems will be required to follow the metering and monitoring guidelines set forth in this section of the Handbook.

For new projects, data reporting for PBI shall commence on the 1st of the month following approval of the ICF and continue monthly thereafter. Any request for an alternate data collection commencement date will require PA approval.

Data for an application must be submitted in full calendar months. The Performance Data Provider (PDP) has until the 1st of the following month to validate, format, and submit the Meter and Application Interval data for that application. PBI Incentive Payment amounts will be processed after every calendar quarter. Most applicants will receive 9 payments with the first quarter and final quarter payments being partial payments.

4.5.4.1. Metering Plan

Eligible end-uses that require PBI must submit a metering plan as part of the reservation request package. There are two parts to the plan:

1) A Preliminary Metering Plan that is required as part of the Reservation Request Form (RRF) package submission; and

2) A Final Metering Plan that must be submitted as part of the Incentive Claim Form (ICF) package submission. Further details regarding the metering plans are outlined below.

PAs may require an Applicant to make modifications to the metering plan to comply with the requirements of the CSI-Thermal program. PA review shall not be construed as confirming or endorsing the metering plan design or as warranting the Facility's performance, safety, durability or reliability. The PAs shall not, by reason of such review or lack of review, be responsible for the strength, adequacy, or performance of such equipment.

1) Preliminary Metering Plan

A Preliminary Metering Plan must be included as part of the RRF submission and is required to have a State of California licensed P.E. stamp. The metering plan shall include the following information:

1. Metering equipment specifications and installation instructions.

2. A Piping Instrumentation Diagram (PID) of the thermal heating system indicating the proposed location of metering equipment.
3. Sampling frequency and data logging intervals.
4. How ineligible end-uses, heat dumps or any other thermal losses are separated out.
5. Data storage, transmission, and cleaning protocol.
6. Range of expected flows and temperatures.

2) Final Metering plan

A Final Metering Plan signed off by a State of California licensed P.E. must be included as part of the ICF submission. The plan shall include the following information:

1. Any changes to the Preliminary Metering Plan
2. Meter calibration/certification plan
3. Sample data collection for one week of operation (See Appendix G)
4. Executed PDP contract
5. A completed Final Metering Checklist noting metering accuracy (Appendix N)

4.5.4.2. Required Metering Equipment

- **Systems with Two or More Tanks or Tankless**

  For systems that have separate solar storage tank(s) or no storage tanks, and a back-up water heater, required equipment consists of a Btu meter, e.g., a flow meter on the cold water and/or return line, an appropriately located temperature sensor pair, and a calculator.

- **One Tank Systems**

  For one-tank systems in which the storage tank is heated by both thermal solar and an auxiliary heat source, required equipment consists of a Btu meter, e.g., a flow meter on the cold water supply line, an appropriately placed temperature sensor pair, and a meter that measures the gas, electric, or propane contribution from the back-up water heater or boiler. See Heat Metering Guide for more information.

4.5.4.3. Equipment Accuracy Standard

Metering equipment must satisfy maximum permissible error (MPE) requirements throughout its range of operation. The total Btu error is equal to the sum of the component errors (temperature sensor pair, flow meter and calculator).

E_{total}	= maximum permissible error applicable to a complete heat meter
E_f	= maximum permissible error applicable to the flow meter
E_t	= maximum permissible error applicable to the temperature sensor pair
E_c	= maximum permissible error applicable to the Btu calculator

MPE applicable to complete heat meters:

$E_{total} = E_f + E_t + E_c$

Note: Due to inaccuracy in turn-down ratio of flow meters, flow measurements below the minimum rating of the flow meter are to be recorded as zero.

The total Btu meter maximum permissible error by solar thermal system capacity can be found in Table 15.

Table 15
Btu Metering: Maximum Permissible Error

System Capacity (kWth)	Maximum Permissible Error (%)
> 250 kW_{th}	5%
≤ 250 kW_{th}	8%

- **One Tank Systems:**

For gas and propane back-up water heaters or boilers, energy usage in cubic feet shall be monitored by gas meters and temperature/pressure transducers upstream of the meters. Btu's can be calculated with the heat values of the natural gas or propane and then compensated with temperature and pressure. For constant capacity auxiliary heaters, an alternate procedure can be used, e.g., Btu's can be calculated by measuring the elapsed time of the burners multiplying by the heater capacities.

kWh meters shall be used for electric backup water heaters.

4.5.4.4. Equipment Location

Metering equipment must be installed on the load side of the solar thermal system. The meters will be inspected as part of the project inspection process.

4.5.4.5. Data Monitoring and Reporting

Applicants for PBI incentive payments must submit a PID that represents the fluid circulation between the solar system and the end loads. The PID shall show the flow meter and temperature sensor locations, with manufacturers' installation requirements for clear flow, strainer/filters, prevention of convective flow, etc. The State of California licensed P.E. shall use the checklist in Appendix N to assure that all of the requirements are met.

4.5.5. Energy Efficiency

Multifamily/commercial projects are required to complete an energy efficiency audit/survey and meet minimum pipe insulation requirements. For more details, go to Section 8.

4.5.6. Warranty

The System Owner will acknowledge on the ICF that they have received, at minimum, the warranties outlined in Section 7.

4.5.7. Performance and Permanency

Only permanently installed systems are eligible for CSI-Thermal incentives. For more details regarding Performance and Permanency requirements, see Section 9.

4.5.8. Roof Mounting of Unglazed Collectors

Unglazed solar collectors experience large expansion and contraction cycles during their service life. To assure longevity of solar thermal systems, roof mounting of the unglazed collectors shall strictly follow the procedure required by manufacturers and shall meet all local codes and standards. Means shall be provided to protect the solar thermal system within the design limits of temperature and pressure. All solar thermal systems with unglazed collectors will require proper expansion joints or loops on collector headers and footers and all supply and return piping.

4.6. INCENTIVE CALCULATION

Incentive payments for PBI systems will be made quarterly over two years with the per-therm incentive rate set at one half of the otherwise applicable one-year incentive rate. The reservation and total incentive payout is capped at 100% of the estimated amount submitted by the applicant on the ICF. Large multifamily/commercial systems with capacity > 250 kW_{th}, opt-in PBI projects ≤ 250 kW_{th}, commercial process heat, space heating, absorption chilling or multifamily/commercial combination systems must follow the PBI payment process. The PDP provider must validate all data prior to submitting metered data to the PAs.

1. PA pays the first installment of the incentive amount to the Payee after the customer completes the project, the PA inspects (as applicable), approves the ICF and the first quarter's actual performance data has been submitted and verified for completeness. The PA reserves the right to adjust the previously confirmed incentive amount based on any differences between the Applicant-provided inputs and actual field conditions.

2. Energy savings will be submitted on a monthly basis through PDP-provided metered data, see Section 4.5.4. The PA reviews the inputs and confirms the incentive amount using the current step incentive rate.

3. The system installation must include metering equipment that measures thermal solar energy delivery from the solar tank to the back-up water heater or building, as applicable. Data reporting for PBI shall commence on the 1st of the month following approval of the ICF and continue monthly thereafter. Any request for an alternate data collection commencement date will require PA written approval.

   Data for an application must be submitted in full calendar months. Partial month data will not be accepted. The PDP has until the 1st of the following month to validate, format, and submit the Meter and Application Interval data for that application. PBI Incentive Payment amounts will be processed after every calendar quarter. Most applicants will receive 9 payments with the first quarter and final quarter payments being partial payments. If data collection is stopped temporarily for any reason, that interval of time is lost and cannot be made up by additional monitoring. The customer will have a fixed two year monitoring period.

   The PA will adjust the metered data to reflect the assumed back-up water heater efficiency. This is done by dividing the metered data by an Annual Fuel Utilization Efficiency (AFUE) factor of 82 percent for natural gas and propane back-up systems or an AFUE factor of 98 percent for electric back-up systems. The result of this calculation is the energy savings to be used in the payment calculation. The following equations illustrate this calculation for 1-tank and 2 or more-tank systems.

1-tank System:

$$Energy\ Saved = \frac{Total\ BTUs\ Delivered}{Aux\ Heater\ Efficiency\ (AFUE)} - Backup\ consumption$$

2 or more-tank System:

$$Energy\ Saved = \frac{Solar\ BTUs\ Delivered}{Aux\ Heater\ Efficiency\ (AFUE)}$$

For a list of meter data requirements, see Appendix F Table F1. For a list of equipment and placement requirements, see Section 4.5.4.

4. The PA determines the final incentive amount based on quarterly metered energy savings using the incentive rate approved in the ICF.
5. For installations with multiple PBI meters on one system, the quarterly payment will be based on the sum of each metered energy savings.
6. Payments stop when 100% of the reserved amount is reached or the 24 month payment period is over, such that if a system performs well enough to reach the reserved incentive amount before the two year payment period has completed, there will not be any additional incentive payments.

The following are two examples of PBI solar thermal projects:

Please refer to Section 4.3 and 4.3.1 if you qualify for the SoCalGas temporary higher incentive rate if the specified requirements are met.

Example No. 1 (Actual energy savings less than 100 percent of expected savings): Customer's annual energy savings estimate is 20,000 therms. The total savings in eight quarter shall be 40,000 therms to be paid at $10.10/therm if in Step One. The total estimated PBI will be $404,000. After the project is completed, approved, and inspected; PA pays the incentive money in accordance with the quarterly Btu reporting[14] listed below:

Period	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 5	Qtr. 6	Qtr. 7	Qtr. 8	Total
Therm	4,500	5,500	4,800	4,700	5,300	4,800	5,200	4,400	**39,200**
Incentive	$45,450	$55,550	$48,480	$47,470	$53,530	$48,480	$52,520	$44,440	**$395,920**

*Depending on initial data submission date, payments may be made over 9 calendar quarters. All projects will be paid for a maximum of 24 months of data.

Note the total PBI payment is $395,920 which is less than $404,000.

[14] Btu reporting for each quarter is the sum of Btu's from meters which can be a single meter or multiple meters.

Example No. 2 (Actual energy savings more than 100 percent of expected savings): Customer's annual energy savings estimate is 20,000 therms. The total savings in eight quarter shall be 40,000 therms to be paid at $10.10/therm if in Step One. The total estimated PBI will be $404,000. After the project is completed, approved, and inspected; PA pays the incentive money in accordance with the quarterly Btu reporting[12] listed below:

Period	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Qtr. 5	Qtr. 6	Qtr. 7	Qtr. 8	Total
Therm	4,500	5,500	4,800	4,700	5,300	4,800	5,200	5,500	**40,300**
Incentive	$45,450	$55,550	$48,480	$47,470	$53,530	$48,480	$52,520	$52,520	**$404,000**

* Depending on initial data submission date, payments may be made over 9 calendar quarters. All projects will be paid for a maximum of 24 months of data.

The Qtr. 8 payment is reduced from $55,550 to $52,520 so that the total PBI will not exceed $404,000.

4.7. APPLICATION PROCESS

All PBI solar thermal projects 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.

4.7.1. Step No. 1: Submit Reservation Request Form Package

Once the Host Customer has decided to install a solar thermal system and has an executed contract with a solar contractor or a purchase order demonstrating proof of purchase of solar thermal equipment, an RRF package can be submitted. Applicants should submit the 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 participant agreement signed by the Applicant, Host Customer and System Owner (if different from Host Customer)[11]
2. Documentation of a completed Energy Efficiency Audit/Survey or Title 24 documentation
3. Copy of executed agreement of solar thermal system purchase and installation
4. Preliminary Metering Plan in Section 4.5.4.1

The following documents may also be needed:

1. Application Fee for projects with a capacity over 30 kWth
2. Copy of executed alternative system ownership agreement (If System Owner is different from Host Customer)
3. Authorization to Receive Customer Information or Act on a Customer's Behalf (only required for SDG&E Applicants)

Additional documentation for low income Applicants:

Please note that if multifamily low income systems are installed between April 15, 2016 and December 31, 2016 as determined by the final building department permit sign-off date, and submit a complete Incentive Claim package by February 28, 2017 they will qualify for the higher general market CSI-Thermal incentive rate.

Please note that for all participating utilities, should Step 1 general market CSI-Thermal incentive funds be exhausted, the low income incentive level will remain at the Step 1 level while low income funds are available. If the low-income program receives additional funding or if the low-income program is extended beyond December 31, 2017, the CPUC shall review and modify this incentive level as necessary.

1. An affidavit from the property owner (see Appendix M) explaining how the benefits of the solar thermal system will be passed to the low income residents through reduced energy costs

2. If participating in the ESAP (2866) (not required if property meets PUC (2861)e) :

    a. An affidavit that shows the property will remain low income for at least 10 years (see Appendix L); and

    b. Documentation proving that property owners must meet one of the following conditions:

        i. a documented resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

        ii. a documented equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

iii. a presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;

iv. a presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or

v. A presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

Or

c. If proving low income status through PUC (2861)e (not required if 50% of units participate in the ESAP),

i. Documentation will be required proving 20% of the total units in the residential complex will be sold or rented to lower income households for a period of not less than 30 years.

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

4.7.1.1. 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 system capacity ranges:

Table 16
Application Fee Schedule for Large Multifamily/Commercial Systems

Capacity (kWth)		Capacity (kWth)		Application Fee
30	-	260	=	$1,250
261	-	520	=	$2,500
521	-	780	=	$5,000
781	-	1,040	=	$10,000
1,041	-	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 confirmed 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 4.7.1.1.2, 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 considered complete by the PA, the application fee will be refunded. No interest will be paid on refunded application fees.

4.7.1.1.1. 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.

4.7.1.1.2. 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.

4.7.1.1.3. Forfeit of Application Fee

Application fees will be forfeited in the following cases:

- Once a confirmed reservation is granted and the PA rejects the project for failing to meet the reservation expiration date requirement, the application fee will be forfeited.
- 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.
- 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.
- If an RRF package is submitted and the incentive level has been reduced between submittal and application review (due to CPUC 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.

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

4.7.2. Step No. 2: Submit Incentive Claim Form Package

After the solar thermal 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)
2. Final signed-off permit or Federal Government's Certificate of Acceptance (in lieu of the final signed-off permit)
3. Final Metering Plans in Section 4.5.4.1, including meter calibration/certification plan, sample data collection for one week of operation, and
4. An executed PDP contract.

Refer to Appendix C for a detailed description of these required documents.

4.7.3. Application Review Process

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

4.7.3.1. 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.

4.7.3.2. Approval of Reservation Request Form Package

Once an 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 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.

PA's email notification and confirmation serves as notice to the customer and applicant of the confirmed reservation.

4.7.3.3. Reservation Period

The reservation period for multifamily/commercial projects is 18 months with one optional 180 calendar day extension; see Chapter 9 for details regarding changes to reservations.

4.7.4. Changes to Reservation

There may be circumstances where a rebate application (that has already received conditional reservation or incentive approval) is impacted by changes such as a request for transfer of reservation from one site to another system changes, withdrawal of a project, etc. Details regarding the impact of these changes to the reservation are found in Section 10.

4.8. PERFORMANCE BASED INCENTIVE (PBI) PAYMENT PROCESS

PBI payments will be made quarterly over two years with the incentive rate set at one half of the otherwise applicable incentive rate. The reservation and total incentive payout is capped at 100% of the estimated amount submitted by the applicant on the ICF. Payments stop when 100% of the reserved amount is reached, such that if a system performs well enough to reach

the reserved amount before the two year payment period has completed, there will not be any additional incentive payments.

To receive the PBI 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 section contains 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 PBI payments based on the metered energy delivered on a quarterly basis. The data collection and transmission system will be tested and approved before any ICF is approved. Refer to PDP communication requirements in Appendix F.

Once an ICF package is approved, no further changes to the application will be allowed. Should an onsite field inspection be required, no changes will be allowed to the ICF package once the inspection notice has been sent out.

The Program Administrator will not issue incentive payments to customers based on estimated data from the program Performance Data Provider (PDP), nor will the Program Administrator estimate incentive payments under any circumstances. It is the PDP's responsibility to ensure timely and accurate posting of validated performance data so customer incentive payments can be made. No incentives will be paid for periods of lost data. The PAs may use discretion in handling lost data in extenuating circumstances. In the event of communication failure, past data stored on logger can be used.

4.8.1. 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.

4.8.2. 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.

5. SOLAR POOL HEATING

This chapter discusses the requirements for solar pool heating systems.

5.1. DEFINITION

A solar pool heating system is a solar energy device that has the primary purpose of reducing consumption of natural gas for heating pool water. For the CSI Thermal Program, solar pool heating systems include multifamily residential, governmental, educational, commercial and nonprofit solar pool heating systems, but do not include single-family residential solar pool heating systems.

5.2. ELIGIBLE CUSTOMERS

To be eligible to receive an incentive, the Project Site must be within the service territory of, and receive retail level gas service from, PG&E, SCG, or SDG&E. Self-installations are permitted in the CSI-Thermal Program.

5.3. INCENTIVES

Part of the goal of the CSI-Thermal Program is to lower the cost of solar thermal 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 at www.csithermal.com/calculator/pool, as described in Section 5.6.

Incentive step changes will move independently in each service territory and for each class of customer. Incentives will be paid on a first come, first served basis. The most current information on incentive step status per customer class will be posted on www.csithermal.com/tracker.

For more information about the incentive budget, please see Section 1.2.

Solar pool heating sub-program incentives are funded from a dedicated budget. Thirty percent of the CSI Thermal Program budget is allocated to solar pool heating projects. Table 17 displays the solar pool incentive steps, the maximum incentive amount per project/site, and step budget allocation. The maximum incentive per project/site is capped at the lesser of $500,000 per system or site or 50% of the total system costs. The 50% cap does not apply to SoCalGas applications if the solar pool heating system receives a final permit sign-off between April 15, 2016 and December 31, 2016 (inclusive) and submits a complete ICF package by February 28, 2017.

Table 17
Solar Pool Heating System Incentive Steps

Step	Incentive per Annual Therm Displaced for Solar Pools	Maximum Incentive Multifamily/Commercial Projects (not to exceed 50% of installation costs)	Budget Allocation
1	$5.00	$500,000	$14,978,180
2	$5.00	$500,000	$14,700,000
3	$4.00	$500,000	$4,800,000
4	$3.00	$500,000	$8,100,000

5.3.1. 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 on the ICF. 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.

A maximum of one multifamily or commercial incentive will be allowed per solar thermal system. In addition, the total incentives for solar pool heating systems on one site cannot exceed the incentive maximums described in Sections 5.3. 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.

Example: A multifamily 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 the lesser of $500,000 or 50% of the total system costs. The 50% cap does not apply to SoCalGas applications if the solar pool heating system receives a final permit sign-off between April 15, 2016 and December 31, 2016 (inclusive) and submits a complete ICF package by February 28, 2017.

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

- Total eligible project costs (see Section 11)
- Other incentives or rebates received (see Section 11)
- Incentive step cap
- PA budget allocation
- Shade Factor (see Section 2.6.2) and
- Tilt and azimuth: Any tilt or azimuth will be allowed unless a tilt is required for freeze protection purposes (please see freeze protection requirements in Chapter 12 and on the CSI-Thermal Program Inspection Checklists at http://gosolarcalifornia.ca.gov/documents/csi.php).

5.4. ELIGIBLE EQUIPMENT

To receive a CSI-Thermal Program pool incentive, installed solar thermal equipment must meet the following criteria:

- Solar pool heating systems must use collectors that have OG-100 Collector Certification. Exceptions include the following:
  - Expired OG-100 collectors that were previously certified by SRCC or IAPMO: The initial reservation request date must be before the expiration date of the certification in

order for the equipment to be eligible for incentives; otherwise, the collector is ineligible. This only applies to the collector listed on the Reservation Request.

- All components must be new and unused. Existing exposed plastic piping is not allowed. Exceptions include the following:
  - existing de-scaled copper piping,
  - Buried plastic piping
  - existing racking with a design that has been stamped and signed by a State of California licensed P.E. for the pool heating application,
  - existing storage tanks in multifamily/commercial systems may be used under the following conditions:
    - The tank must be in workable condition with no leaks.
    - The tank must have at least R12 insulation. The Program reserves the right to request documentation confirming that this requirement is met.
    - The tank can be plumbed to the solar system without impairing the functioning of the solar or auxiliary systems
- System installations must conform to manufacturer's specifications and all applicable codes and standards;
- All systems must have freeze and stagnation protection, see Section 12.

5.5. INSTALLATION REQUIREMENTS

It is the intent of the CSI-Thermal Program to provide incentives for reliable, permanent, and safe pool systems. This Section outlines the installation requirements that all solar pool projects must meet in order to receive a CSI-Thermal Program incentive. Details can be found in Section 12.

Solar pool systems must be installed by Eligible Contractors (contractors who are on the CSI-Thermal List of Eligible Contractors), by installers employed by the relevant institution or by a self-installer.

Systems must conform to manufacturers' specifications and with all applicable electrical, plumbing and building codes and standards. Permits are required for all solar pool system installations. Institutions that normally have their own permitting process, such as universities, are required to use their own permitting process.

5.5.1. System Sizing

While traditional sizing guidelines call for 75-100% unglazed collector-to-pool-surface area ratio, warmer pool temperatures may be needed or colder ambient conditions may be encountered. The program therefore places no size limit on collector area.

System designers are also required to provide scald protection in cases where glazed collectors or evacuated tube collectors are used, or where the pool serves as the emergency heat dump for glycol systems. A potentially dangerous situation exists where larger areas of high performance collectors are used, such as for combination systems with large collector arrays for winter space heating. Unless the summer heat buildup can be prevented or dissipated, pool feed temperatures can reach harmful levels. Overheat prevention mechanisms listed in Section 12.3 are acceptable. The PAs reserve the right to review the overheat protection plan.

All installations must conform to all local building and safety codes and must maintain the pool water temperature or the solar water temperature entering the pool at a level to prevent scalding of swimmers.

5.5.2. Freeze Protection

All solar pool systems require freeze protection. Freeze protection for pools differs from other domestic hot water systems.

For collector mounting on flat roofs, use of manual draining is acceptable only for seasonal pools. Seasonal Pool is a selection on the pool savings calculator input form. For year-round solar pool systems, freeze protection must be automatic, by drainback or glycol. The collector tilt will be measured from the top header to the bottom header of the collector. Manufacturers may require larger collector tilt angles or slopes and additional manual drain valves to prevent freeze damage of collectors than the CSI-Thermal requirements.

The following requirements apply to roof mounting of collectors. For additional specific requirements, please see the solar pool inspection checklist. The solar pool inspection checklist may be updated based on experience gained from installation practices. CSI-Thermal Program Inspection Checklists can be found at http://gosolarcalifornia.ca.gov/documents/csi.php

- All Collectors must be installed with sufficient clearance or protection to prevent collector headers or footers from rubbing across roof surfaces.

- Piping and headers and footers must be sloped to drain or perfectly level, with no sags or rises above the collector inlet level. Sagging shall not interfere with collector draining.

- Collector risers must be tilted at least ¼ inch per foot if drainback is used.

5.5.2.1. Seasonal Pools

For seasonal pools there are multiple options allowed for freeze protection:

A. Glycol systems:

   Active, closed loop glycol systems are protected by a mixture of propylene glycol and water in the collector loop. These systems are eligible for seasonal or year-round solar pool applications.

B. Drainback systems:

   a. Automatic gravity draining of collectors freeze protection is required for year-round solar pool systems
   b. Manual draining of collectors freeze protection is allowed for seasonal solar pool systems

   For drainback systems (either open or closed loop) of commercial pools that are seasonal in Schedule of Operation with unglazed polymer collectors on flat roof with no gradient, or inadequate gradient, manual drain valves may be installed to fully drain the collectors for winterization to prevent collectors from freeze damage.

   For seasonal pools with only manual drainage, a signed affidavit will be required stating that a maintenance agreement is in effect with contractor **OR** that the owner agrees to take responsibility for freeze protection measures by draining the solar system before the freeze-risk season begins. If the owner assumes responsibility for manually draining the collectors, drainage instructions must be included as part of the operating manual including drainage over a parapet wall if applicable. The affidavit can be found in Appendix O. Participants are warned that the freeze-risk season varies throughout California. Actual freeze risk temperatures depend on collector design and local climate factors. Participants should use extreme caution, with close communication with pool owners to assure collectors are drained before freeze risk times occur.

5.5.2.2. Year Round Pools

A. Glycol systems:

Active, closed loop glycol systems are protected by a mixture of propylene glycol and water in the collector loop. These systems are eligible for year round solar pool applications. These will be the only type of systems allowed for year round solar pool systems with collectors laid flat with no gradient.

B. Automatic Drainback Systems

For year round pool systems that are not glycol protected, only automatic drainback freeze protection will be allowed. All collector risers shall be installed with a minimum slope as noted in the checklist or more if the manufacturer recommends, allowing water to be drained completely, automatically.

Piping that is required for gravity drainback function on roof installations for year round systems with parapet walls must be installed either through or around wall in order to allow for proper drainage. Drainage of the solar system for year round pools will only be allowed into storage tank, surge tank or swimming pool. Piping or riser sags that prevent gravity drainage will not be allowed.

5.5.3. Stagnation/Overheat Protection for Fluid Collectors

Stagnation is a condition where the solar collector has reached its maximum temperature with no fluid circulation. Unglazed collectors are exempt from the requirement for overheat protection. For details regarding stagnation requirements, see section 12.3.

5.5.4. Metering Requirements

5.5.4.1. Customer Performance Monitoring (CPM)

A Customer Performance Meter (CPM) is required for any solar thermal system larger than 30kW$_{th}$ including solar pool systems.

For solar pool systems, there is no accuracy requirement for flow meters or temperature gauges. A flow meter shall be capable of continuous pool flow recordings, not a single constant flow rate. The contractor does not have to use a meter from the approved list of CPM meters for SWH systems, but the BTU meter must continuously meter GPM flow, collector loop temperature differential, and must calculate BTUs saved continuously.

5.5.4.2. Communication Requirements

For a period of five years from start of operation, Owner must have the means to determine if the system is operating. At a minimum, the CPM equipment must provide the quantity of solar energy delivered to the System Owner (all systems over 30 kWth). An onsite or remote display of continuous, cumulative BTU measurement is required for solar pool systems. This requires continuous flow and temperature measurements, and continuous BTU calculations.

5.5.4.3. Performance Based Incentives (PBI)

PBI payments will not be required for solar pool systems, nor will they be eligible as opt-in.

However, when another solar thermal technology is combined with the pool solar system, PBI metering will be required as follows:

Both the solar heat going to the non-pool end use and the heat going to the pool must be metered separately and both end uses must follow the PBI procedures in Section 4.5.4.

If the pool and non-pool heat cannot be separated for metering purposes, then the applicant will be required to provide such justification. If the PAs approve the justification, then the entire solar thermal system shall be metered per instructions in Section 4.5.4. Upon submission of the application, the Applicant will provide the total estimated thermal energy delivered and the estimated solar thermal energy delivered to the pool signed by a State of California licensed P.E. The incentive will be prorated based on the pool energy delivered and the total energy delivered. Refer to Section 4.6 for details. The PAs will utilize the pool calculator to estimate the maximum pool load required in order to confirm the State of California licensed P.E. pool load estimation.

5.5.5. Energy Efficiency/Pool Covers

Solar pool covers are not mandatory in order to receive a rebate. However, solar pool heating systems should, but are not required to, utilize a swimming pool cover to cost effectively boost system savings. To encourage the use of covers, the energy savings calculator will automatically assume that a film cover is used 12 hours a day during the months of November through April on a year round pool. The use of a cover will be assumed in the calculator even if no cover is used unless the applicant provides a code or permit statement that clearly prohibits the use of a cover for the pool in question. A specific statement is required for every pool application for which a pool cover is prohibited in order to calculate the incentive without a pool cover. A claim of deniability of insurance is not acceptable.

The PAs have incorporated an energy efficiency measure into the pool calculator by making the use of a pool cover the default setting for the pool program. This shall meet the energy efficiency audit requirement and the applicant is NOT required to submit additional facility energy audits for the installation of only solar pool systems.

5.5.6. Warranty

The System Owner will acknowledge on the ICF that they have received, at minimum, the warranties outlined in Section 7.

5.5.7. Performance and Permanency

Only permanently installed systems are eligible for CSI-Thermal incentives. For more details regarding Performance and Permanency requirements, see Section 9.

5.5.8. Roof Mounting of Unglazed Collectors

Unglazed solar collectors experience large expansion and contraction cycles during their service life. To assure longevity of solar thermal systems, roof mounting of the unglazed collectors shall strictly follow the procedure required by manufacturers and shall meet all local codes and standards. Means shall be provided to protect the solar thermal system within the design limits of temperature and pressure. All solar thermal systems with unglazed collectors will require proper supports and expansion joints or loops on collector headers and footers and all supply and return piping.

5.6. INCENTIVE CALCULATION

An online calculator tool is available to estimate natural gas displacement for pool systems based on system location, design and expected performance. The calculator is embedded in the application processing database and can also be accessed separately for incentive estimation purposes at www.csithermal.com.

All pool systems must use OG-100 collectors to determine the project incentive. Please refer to the Calculator User Guide (www.csithermal.com/calculator/pool) for details regarding the calculator inputs.
The Schedule of Operation, whether year–round or seasonal, will be a required calculator input for commercial pools. No changes to an existing Schedule of Operation will be allowed in the calculator input. For example, if the actual heating schedule of the existing swimming pool is seasonal, the input shall remain seasonal. Changes to an existing Schedule of Operation may be made by the operator but are not allowed as an input to the pool calculator. “Seasonal” means the pool is assumed closed from November through April, and that the collectors are empty during that time.

5.6.1. Calculator Output

The pool calculator produces the following outputs:

1. Estimated annual energy savings in units of therms, based on natural gas as the backup fuel source.

2. Estimated incentive amount, based on energy savings produced from the calculator and the current incentive step level.

The PAs reserve the right to reject the calculator result for systems that operate outside of the range of the OG-100 certification test conditions.

5.6.2. Calculator Modifications

The PAs in conjunction with the CPUC developed a calculator that helps Applicants determine their incentives. 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 affect 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 with the original estimated energy savings and incentive.

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.

5.7. APPLICATION PROCESS

All PBI solar thermal projects will follow a two-step application process (See section 5.5.4.3.). 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.

5.7.1. Step No. 1: Submit Reservation Request Form Package

Once the Host Customer has decided to install a solar pool heating system and has an executed contract with a solar contractor or a purchase order demonstrating proof of purchase of solar pool heating equipment, an 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 participant agreement signed by the Applicant, Host Customer and System Owner (if different from Host Customer)
2. Copy of executed agreement of solar pool heating system purchase and installation

The following documents may also be needed:

1. Application Fee for projects with a capacity over 150 kWth
2. Copy of executed alternative system ownership agreement (If System Owner is different from Host Customer)
3. Authorization to Receive Customer Information or Act on a Customer's Behalf (only required for SDG&E Applicants)
4. Stagnation protection documentation if different than methods listed in Section 12.3

5. Documentation describing the stagnation/overheat protection method to be used for combination systems that are oversized based on eligible loads and sizing requirements. The documentation must also describe the entire system being installed. This document must be stamped and signed by a State of California licensed P.E.

6. A waiver from certain locations by local permitting agencies where pool covers are prohibited.

5.7.1.1. Application Fee Process

In addition to the RRF and required documents, Applicants are required to submit an application fee for systems larger than 150 kW_{th}. The application fee is based on the following table of system capacity ranges:

Table 18
Application Fee Schedule for Solar Pool Systems

Capacity (kWth)		Capacity (kWth)		Application Fee
150	-	260	=	$1,250
261	-	520	=	$2,500
521	-	780	=	$5,000
781	-	1,040	=	$10,000
1,041	-	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 confirmed 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 5.7.1.1.2, 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 considered complete by the PA, the application fee will be refunded. No interest will be paid on refunded application fees.

5.7.1.1.1. 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.

5.7.1.1.2. 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.

5.7.1.1.3. Forfeit of Application Fee

Application fees will be forfeited in the following cases:

- Once a confirmed reservation is granted and the PA rejects the project for failing to meet the reservation expiration date requirement of 18 months, the application fee will be forfeited.

- 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.

- 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.

- If an RRF package is submitted and the incentive level has been reduced between submittal and application review (due to CPUC 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.

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

5.7.2. Step No. 2: Submit Incentive Claim Form Package

After the SWH pool 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)

2. Final signed-off permit or Federal Government's Certificate of Acceptance (in lieu of the final signed-off permit)
3. For seasonal pools with only manual drainage, a signed affidavit (Appendix O) by the host customer, system owner, and installer certifying that either:
   a. a maintenance agreement is in effect to manually drain collectors OR
   b. that the owner assumes responsibility for manually draining the collectors before the freeze-risk season begins and drainage instructions are included as part of the operating manual
4. Photographs of the system will be required for all pool installations. The PAs will review photographs and determine if additional information is required or determine if an inspection is warranted. The photographs will display, at a minimum, the following:
   - The collector array with headers and footers
   - Supply and return lines with supports and expansion joints
   - Examples of roof penetrations
   - CPM meter if applicable.

   Refer to pool inspection checklist for specific photograph requirements.

Refer to Appendix C for a detailed description of these required documents.

5.7.3. Application Review Process

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

5.7.3.1. 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.

5.7.3.2. Approval of Reservation Request Form Package

Once an 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 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.

PA's email notification and confirmation serves as notice to the customer and applicant of the confirmed reservation.

5.7.3.3. Reservation Period

The reservation period for multifamily/commercial projects is 18 months with one optional 180 calendar day extension; see Section 10 for details regarding changes to reservations.

5.7.4. Changes to Reservation

There may be circumstances where a rebate application (that has already received conditional reservation or incentive approval) is impacted by changes such as a request for transfer of reservation from one site to another system changes, withdrawal of a project, etc. Details regarding the impact of these changes to the reservation are found in Section 10.

5.8. 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.

Please note that the 50% cap does not apply to SoCalGas applications if the solar pool heating system is installed between April 15, 2016 and December 31, 2016. This is determined by the date of the final permit sign-off date. The ICF package must be submitted by February 28, 2017.

Upon final approval of the ICF package and completed onsite field inspection (if applicable), the PA will disburse the incentive payment.

Once an ICF package is approved, no further changes to the application will be allowed. Should an onsite field inspection be required, no changes will be allowed to the ICF package once the inspection notice has been sent out.

5.8.1. 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.

5.8.2. 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.

6. PARTICIPANTS IN THE CSI-THERMAL PROGRAM

6.1 HOST CUSTOMER

For the CSI-Thermal Program, the Host Customer is, in most cases, the utility customer of record at the location where the solar thermal system will be located. Any class of customer is eligible to be a Host Customer. To be eligible to receive an incentive, the Project Site must be within the service territory of, and receive retail level gas or electric service[15] from, PG&E, SCE, SCG, or

[15] "…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.

SDG&E. The Host Customer shall always be party to the CSI-Thermal Program participant agreement and will retain sole rights to the incentive and the reservation for multifamily/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.

6.1.1. Customer Class

This program consists of two customer classes: single-family residential and multifamily/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, electric water heating customers, and propane 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.

6.1.1.1 Natural Gas-Displacing Solar Thermal Customer

To be eligible for a solar thermal 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 solar thermal on a new or existing home or facility to offset natural gas back-up heating. If solar thermal becomes mandatory for new home construction in the state of California, new homes will no longer be eligible for incentives under this program.

6.1.1.2 Electric-Displacing Solar Thermal Customer

To be eligible for a solar thermal electric-displacing incentive, the Host Customer must be an electric customer of PG&E, SCE, or SDG&E. The customer must be installing solar thermal on an existing home or business to displace electricity. Solar thermal systems installed with electric back-up 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.

6.1.1.3 Propane-Displacing Solar Thermal Customer

To be eligible for a solar thermal propane-displacing incentive, the Host Customer must be an electric customer of PG&E, SCE, or SDG&E. The customer must be installing solar thermal on an existing home or business to displace propane. Solar thermal systems installed with propane back-up 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.

Propane displacing customers will be held to the same customer eligibility requirements and incentive levels of the CSI-Thermal electric-displacing program and the same equipment eligibility requirements of the CSI-Thermal gas-displacing program.

6.2 SYSTEM OWNER

The System Owner is the owner of the solar thermal 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 provided the full incentive benefit.

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

6.3 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.

6.4 SOLAR CONTRACTOR

6.4.1. Contractor Participation

All contractors installing solar thermal 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 below. Each contractor who meets these requirements will be added to the program's list of eligible contractors. This list is available publicly on the program's www.csithermal.com website.

6.4.2. 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) contractor's license, and be in accordance with rules and regulations adopted by the CSLB. Contractors with an active C-53 (Pools) license will be eligible for solar pool installations only. 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. See Section 6.4.5 for further details regarding treatment of applications once a contractor license is suspended.

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.

6.4.3. Contractor Training Requirements

Contractors are required to participate in a designated CSI-Thermal Program training workshop. Attendance is required by an individual listed on the CSLB Contractor's Personnel List. Attendance is encouraged for other employees involved with the CSI-Thermal application process. Individuals listed as disassociated on a particular license are not eligible to attend on behalf of the company. Only contractors who participate in this workshop will be eligible to apply for incentives from the program. Completing a workshop in any PA territory will allow a contractor to be eligible program-wide.

6.4.4. CSI-Thermal Program Training Workshop

Contractors and self-installers are required to attend a designated no-cost CSI-Thermal Program training workshop. All PAs conduct training in their respective service territories. Availability of these workshops is 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, eligible 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.

6.4.5. 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.
- 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 for incentive payment. If the project is deemed to be payable, the PA, in most cases, will only pay the Host Customer for the project.

6.5 SELF-INSTALLER

Self-installations are permitted in the CSI-Thermal Program. Homeowners or building owners who choose to install a solar thermal system on their property must attend the CSI-Thermal Program training workshop, see Section 6.4.4.

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 as outlined in Appendix C, Section C4. PAs reserve the right to request proof of property ownership from Self-Installers.

6.6 EQUIPMENT SELLERS

Equipment Sellers 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, the applicant must 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.

6.7 PROGRAM PERFORMANCE DATA PROVIDERS (PDP)

Program Performance Data Providers (PDP) in the CSI-Thermal Program refer a service provider that monitors and reports the energy delivery data from the solar thermal system to the PA. The data serves as the basis for quarterly incentive PBI payments. The data flow between the solar thermal system and the PA's designee must meet the PDP requirements described in Appendix F. System Owners must contract with an eligible PDP unless the System Owner is the approved PDP.

All PDP providers must be approved by the PAs. The instructions for qualifying as a PDP provider can be found in Appendix G. Approved PDP providers can be found on the following website: www.csithermal.com/PDP

6.8 MEASUREMENT AND EVALUATION (M&E)

Metering for measurement and evaluation (M&E) will help the PAs and the CPUC evaluate program and technology performance over time. Data and information collected through the M&E process will not be used by the PAs to inform customers directly on the performance of their systems.

A sample of all systems will be selected by the PAs to be metered for M&E purposes and will be funded by the CSI-Thermal Program. Any participant in the program must agree to allow their system to be metered for M&E, if selected.

PAs may select projects that will be required to have M&E metering. The PAs will select a sample of projects for metering and will notify the customer after payment of the incentive. Customers selected for M&E metering must agree to allow a third party M&E contractor to install metering on their system. The cost for the M&E metering equipment on this sample will be borne by the PAs through their M&E budgets.

7. WARRANTY REQUIREMENTS

System owners will acknowledge on the Incentive Claim Form (ICF) that they have received, at a minimum, the following warranties:

7.1 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 a 15 percent performance 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.

7.2 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 performance degradation.

8. 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 8.1 through 8.2 below, outline the minimum energy efficiency requirements for participation in the CSI-Thermal Program.

8.1 ENERGY EFFICIENCY AUDIT/SURVEY

In order to receive a CSI-Thermal Program incentive, an energy efficiency audit/survey is required for existing residential and commercial buildings with the exception of solar pool systems. The audit/survey must have been performed during the past three years. Acceptable audit/survey protocols consist of an online audit/survey, telephone audit/survey, or onsite audit/survey provided by the utilities, PA, or a qualified independent vendor or consultant. Audit/survey information can be found at the utility's website. A copy of the completed Energy Efficiency Audit/Survey 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/survey. A Title 24 report would be required for new buildings to satisfy energy efficiency requirements.

8.2 PIPE INSULATION

To be eligible for a CSI-Thermal Program incentive, solar water heating 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. Title 24 may require higher pipe insulation R value.

An exception is that solar pool systems will not require pipe insulation.

9. PERFORMANCE AND PERMANENCY REQUIREMENTS

Equipment installed under the CSI-Thermal Program is intended to be in place for the duration of its useful life. Only permanently installed systems are eligible for CSI-Thermal Program incentives. This means that the solar thermal 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 render the system ineligible.

Contractual permanence shall be for the duration of the warranty period but no less than 10 years, which is to be demonstrated as follows:

- All agreements involving the solar energy system receiving an incentive are to be provided to the PA for review as soon as they become available and at the incentive-claim stage at the latest. These agreements include, but are not limited to, system purchase and installation agreements, warranties, leases, energy or solar services agreements, energy savings guarantees, and system performance guarantees.

The System Owner agrees to notify the PA in writing a minimum of 60 days prior to any change in either the site location of the solar thermal system or change in ownership of the system if either change takes place within the applicable warranty period. The warranty period for the CSI-Thermal Program is 10 years. If the system is removed prior to the end of the 10 year warranty period the solar thermal system may be installed at another site within the Program Administrator service territory and must be done so within six months of PA approval. The relocated system installed at the alternate site will not be eligible for an additional CSI-Thermal Incentive. A mandatory Site inspection is required for all relocated equipment. See Chapter 13 for more information regarding the Onsite Field Inspection.

Failure to re-install the solar thermal system within six months of the Program Administrator approval will result in the return of a pro-rated portion of the CSI-Thermal Incentive payment to the PA.

10. CHANGES TO RESERVATIONS

10.1 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. Applicants may only submit system changes at the ICF stage.

10.2 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 the 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.

10.3 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 PA 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 PA in its 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. Copies of paid invoices, checks or other verifying documentation must be attached to 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 the solar thermal 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.

10.4 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 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 solar thermal 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 solar thermal 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 to the date of the Reservation Transfer and the project will be eligible for the full implementation time allowed to their project class (e.g., multifamily, commercial) in the Handbook.

8. Once a Reservation Transfer has been granted by the PA, the application fee becomes non-refundable.

11. TOTAL ELIGIBLE PROJECT COSTS, REPORTABLE PROJECT COSTS, OTHER INCENTIVES OR REBATES

11.1 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 solar

thermal 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 solar thermal system costs are embedded, applications must include a prorated estimate of the total eligible costs for the solar thermal system.

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

1. Solar equipment capital costs including ancillary equipment, except back-up water heater, associated with the solar thermal system including a pool cover for solar pool system applications.
2. Engineering and design costs for the solar thermal system
3. Construction and installation costs including labor. For projects in which the solar thermal equipment is part of a larger project, only the construction and installation costs directly associated with the installation of the solar thermal equipment are eligible
4. Engineering feasibility study costs
5. Permitting costs
6. Warranty and/or maintenance contract costs associated with eligible solar thermal 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 solar thermal collector(s) and/or the materials that provide the primary support for the collector(s)

In cases where an installation contract encompasses all costs associated with the installation of a solar thermal 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.

11.2 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 solar thermal 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 solar thermal system.

11.3 OTHER INCENTIVES OR REBATES

Customers may not receive CSI-Thermal Program incentives for the same solar thermal equipment from more than one PA (i.e., PG&E, SCE, SCG and CSE). 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 solar thermal system. However, the California Energy Commission's Cash for Appliances Program is not a utility Energy Efficiency Program. As a result, Applicants are eligible to receive incentives from both the CSI-Thermal Program and the Cash for Appliances Program.

For projects that receive other incentives for the same solar thermal equipment that are funded by California investor-owned utility ratepayers (e.g., utility or CEC 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 solar thermal 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.

12. INSTALLATION REQUIREMENTS

12.1. PERMIT REQUIREMENTS

Necessary local permits are required for solar thermal 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. Pool systems may also require a health department permit. To be eligible for the CSI-Thermal Program incentive, a customer must apply for their incentive within 24 months of the date on the final signed-off permit. Contractors should be familiar with local code requirements as they relate to solar thermal installations.

Please note that in order to receive the higher SoCalGas Step 1 incentive rate for single family and multifamily/commercial applications and receive a rebate of over 50% of total system cost for solar pool projects, systems must be installed between April 15, 2016 and December 31, 2016. This will be determined final permit sign-off date. Complete ICF packages must be submitted by to February 28, 2017. Should Step 1 incentive funds be exhausted prior to December 31, 2016, SoCalGas will accept and approve applications at the higher Step 1 incentive rate that have a building application permit issue date with proof of time stamp no later than October 7, 2016. Proof of a time stamp for a building permit application by the October 7 deadline includes one of the following: a plan check time stamp, permit application with a time stamp, email confirmation of permit application with a time and date, or receipt from the jurisdiction for a plan check fee or building permit fee dated on or before October 7, 2016.

12.2. FREEZE PROTECTION

All installed systems must meet freeze protection requirements of the CSI-Thermal Program. The CSI-Thermal Program requires freeze protection for solar water heating systems and solar pool systems in every California location. Passive freeze protection is allowed for Integral Collector Storage systems in climate zones that meet the requirements of Appendix H.

12.2.1. Freeze Protection for Non-Pool End Uses

12.2.1.1. Integral Collector Storage

Integral Collector Storage (ICS) systems are protected to an extent by the thermal mass of the storage in the collector down to the Freeze Tolerance Level (FTL) as certified by SRCC or IAPMO from data provided by manufacturers. However, exposed pipes to and from the ICS unit may be vulnerable in cold climate areas, and should be freeze-protected in accordance with the permitting agency's requirements and California Plumbing Code Section 312.6. If the historical 18 hour continuous 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. Refer to Appendix H for the 18 hour continuous low temperatures per climate zone.

12.2.1.2. Direct Forced Circulation

Direct Forced Circulation systems for non-pool end uses, where potable water is pumped and heated directly in the collector, are not eligible for CSI-Thermal rebates. This restriction applies whether the freeze protection is provided by an automatic valve, recirculating warm water through the collector, or any other means.

For pools, direct forced circulation is acceptable for solar collection, but direct forced circulation (also called recirculation) may not be used for freeze protection.

12.2.1.3. Indirect Forced Circulation

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

Closed Loop Glycol Systems

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

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.

All collector riser tubing shall be installed with a continuous minimum slope as noted in the checklist <u>or more if the manufacturer recommends</u> allowing water to be drained completely to the atmospheric vented tank(s) and/or pool below. Sags that reduce the slope gradient to less than minimum requirements in the checklist will not be allowed.

Closed Loop Recirculation Systems

Closed loop recirculation systems re-circulate water in the collector loop. These systems must have a minimum of two separate freeze protection mechanisms on each system. Manual intervention (draining, changing valve positions, etc.) is suitable as one mechanism. At least one freeze protection mechanism, in addition to manual intervention, must be designed to function in the event of power failure e.g. an Uninterruptible Power Supply (UPS) to power a freeze-protecting pump when power is lost simultaneously with freezing conditions. Freeze drain valves are not an acceptable

freeze protection mechanism for these types of systems. If used for pool freeze protection, the roof sensor must be connected to the collector or hot out pipe.

12.2.1.4. 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.

12.2.1.5. Air Collectors

Air collectors do not require freeze protection. Non-coupled water circulation systems maintained in enclosed 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.

12.2.2. Freeze Protection for Solar Pool Systems

12.2.2.1. Integral Collector Storage

Integral Collector Storage (ICS) systems are not allowed for solar pool applications.

12.2.2.2. Direct Forced Circulation

Direct Forced Circulation systems (DFC), where pool water is pumped and heated directly in the collector are allowed if they meet the requirements below.

Recirculation-type DFC freeze protection for solar pool systems is not allowed. Drainback-type DFC freeze protection for solar pool systems is allowed in two forms:

- Automatic DFC freeze protection is allowed for seasonal and year round pools
- Manual DFC freeze protection is only allowed for seasonal pools.
  For drainback systems (either open or closed loop) of commercial pools that are seasonal in Schedule of Operation with unglazed polymer collectors on flat roof with no gradient, manual drain valves may be installed to fully drain the collectors for winterization to prevent collectors from freeze damage.

For seasonal pools with only manual drainage, a signed affidavit will be required stating that a maintenance agreement is in effect with contractor **OR** that the owner agrees to take responsibility for freeze protection measures by draining the solar system before the freeze-risk season begins. If the owner assumes responsibility for manually draining the collectors, drainage instructions must be included as part of the operating manual. The affidavit can be found in Appendix O.

All collector riser tubing shall be installed with a continuous minimum slope as noted in the checklist or more if the manufacturer recommends allowing water to be drained completely to the atmospheric vented tank(s) and/or pool below. Sags that reduce the slope gradient to less than minimum requirements in the checklist will not be allowed.

For commercial and solar pool systems, headers, footers and roof piping of 1½" and less diameter must also have at the minimum slope requirements per the checklist. If a manufacturer's installation manual recommends a greater slope, that slope will used as the criteria for failure. The CSI-Thermal Program Inspection Checklists can be found at http://gosolarcalifornia.ca.gov/documents/csi.php.

12.2.2.3. Indirect Forced Circulation

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

For year round pool systems, only glycol freeze protection or automatic drainback freeze protection will be allowed.

Closed Loop Glycol

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

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.

All collector riser tubing shall be installed with a continuous minimum slope as noted in the checklist or more if the manufacturer recommends allowing water to be drained

completely to the atmospheric vented tank(s) and/or pool below. Sags that reduce the slope gradient to less than minimum requirements in the checklist will not be allowed.

For commercial and solar pool systems, headers, footers and roof piping of 1½" and less diameter must also have at the minimum slope requirements per the checklist. If a manufacturer's installation manual recommends a greater slope, that slope will used as the criteria for failure. The CSI-Thermal Program Inspection Checklists can be found at http://gosolarcalifornia.ca.gov/documents/csi.php.

Closed Loop Recirculation

Closed loop recirculation systems that re-circulate water in the collector loop are not allowed for solar pool applications.

12.2.3. Thermosiphon

Thermosiphon systems are not allowed for solar pool applications.

12.2.4. Air Collectors

Air collectors do not require freeze protection. Non-coupled water circulation systems maintained in enclosed 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.

12.3. 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.

Open loop ICS systems that contain water in the collector do not require additional stagnation protection.

Closed loop drainback systems must be equipped with a controller that shuts the pump off when the storage tank temperature reaches its upper 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 recommended maintenance. Acceptable stagnation control measures in closed loop glycol systems include, but are not limited to, the items outlined in Sections 12.3. For OG-300 systems, stagnation and overheat protection measures must be those that are in the manufacturers installation manual approved by SRCC or IAPMO for the specific system. For multifamily/commercial systems using OG-100 glazed or evacuated tube collectors, stagnation protection is also required. The PAs may request justification for the stagnation protection method used on multifamily/commercial

systems. 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.

12.3.1. Advanced Controller with a Vacation or Holiday Mode

This function controls the system to shut the pump off when the tank temperature reaches its upper limit and to run the pump at night to lower the tank temperature, 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.

12.3.2. 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.

12.3.3. Heat Dump Radiator

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

12.3.4. Swimming Pool and Spa Heat Dump

The CSI-Thermal Program will allow for the use of a swimming pool and spa as an alternative heat dump with the following restrictions:

This will apply for fluid collectors only.

System cannot be oversized based on program sizing guidelines if swimming pool or spa is used as heat dump.

Heat dump will only be activated when collector sensor triggers upper temperature limit or stagnation set point, and not to exceed 180°F.

Heat dump will be turned off when the collector loop sensor temperature reaches 20°F below stagnation set point or the solar storage temperature drops to 20°F below the tank high limit setting.

Water temperature entering pool or spa shall not exceed 105°F.

12.3.5. 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 excessive temperature of the glycol mixture in the collector.

12.3.6. Pressure Stagnation Protection (PSP)

This stagnation/overheat protection method allows over-sizing of the pressure relief valve up 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.

12.3.7. Hartstat

Hartstat is an overheat protection kit for Solahart thermosiphon systems that consists of exposed (uninsulated) copper tubing with a reservoir. This stagnation protection method is required for collectors with selective surface paint on the absorber.

12.3.8. Unglazed Collectors

Unglazed collectors that operate at temperatures that do not exceed the maximum operating temperatures of heat transfer fluids or materials do not require further stagnation protection.

13. ONSITE FIELD INSPECTIONS

This section, in conjunction with the inspection checklist, clarifies and lists the inspection criteria used to determine whether inspection results will lead to an infraction or a failure. This section also lists the criteria tolerances required to trigger a recalculation that may result in an infraction or a failure. It also notes the relationship between multiple infractions that can cause a failure, and identifies the sanctions for multiple failures that can lead to a contractor's probation and/or suspension from the program.

CSI-Thermal Program projects are subject to onsite field inspections. For each eligible contractor, PAs will conduct an onsite field inspection for at least the first three submitted ICFs with capacity of 250 kW_{th} or less, first three solar pool ICFs, and at least the first three ICFs that require PBI. PAs will inspect a random sample of projects thereafter. Additional projects may be inspected at the PA's discretion.

Once an ICF package is approved, no further changes to the application will be allowed. Should an onsite field inspection be required, no changes will be allowed to the ICF package once the inspection notice has been sent out.

The PAs may determine whether to conduct an onsite field inspection randomly and/or based on Applicant's or Solar Contractor's 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, 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.

Onsite field inspections are performed by PA-designated personnel trained to conduct solar thermal system inspections. The PAs have developed a consistent statewide onsite inspector-training plan and inspection checklist. The inspectors verify that the solar thermal system is installed in accordance with information provided on the ICF and is in compliance with Handbook requirements. The inspection checklists shall be the primary documents for specific technical requirements and may be updated based on experience gained from installation practices. The CSI-Thermal Program Inspection Checklists can be found at http://gosolarcalifornia.ca.gov/documents/csi.php.

13.1 INFRACTIONS AND FAILURES

13.1.1 Tolerances

The onsite field inspector will review and record key project components found at the installation site. The Program Administrators will evaluate and compare the results of the inspection to the Incentive Claim documentation.

Inspectors report measurement discrepancies between ICF application and actual data that fall outside of the following tolerances:

- Tilt: ± 3°
- Azimuth: ± 5°
- Shading (Average annual availability between 10:00 am and 3:00 pm): 5%
  For seasonal pools, in operation for 6 months (May-October), the shade factor will be applied based on a seasonal shading factor.

13.1.1.2 Recalculations

A new calculation will be run and the project incentive modified accordingly if:

- The onsite field inspection results are outside the above tolerances,
  Or

- The onsite field inspection reveals other discrepancies of calculator inputs between what was found onsite and what is stated in the project's Incentive Claim documentation. The inputs may include the following (depending on the type of system):

  - Climate Zone
  - Collector
    - Collector certification number
    - Collector area
    - Number of collectors in series per flow path
  - Solar Tank:
    - Capacity, make, number of tanks, configuration, and model must be in compliance with OG-300 system unless tank substitution applies as outlined in Section 2.4. For OG-100 systems, they must be in compliance with CSI-Thermal Program guidelines.
  - System certification number (OG-300 systems only)
  - System configuration
  - Hot water demand
  - Load profile
  - Heat exchanger
  - Fluid option
  - Stagnation protection
  - Tracking
  - Set point temperature
  - Pool type
  - Pool operating schedule
  - Pool surface area

An infraction or failure, as defined in Sections 13.1.2 and 13.1.3, will be issued if the incentive identified on the original ICF is 5% above or below the recalculated incentive amount resulting from the onsite field inspection. All project incentives are subject to the results of the onsite field inspection.

The PA will notify the Applicant, System Owner, and Host Customer if an onsite field inspection will result in a change in system size and/or incentive amount.

13.1.2 Infractions

For CSI-Thermal Program purposes, an infraction is a minor discrepancy of an inspection item found during the onsite field inspection that is noncompliant with the infractions part of the inspection checklist. An infraction may not require corrective action by the contractor or self-installer to receive the incentive payment. However, multiple infractions can lead to a failure as noted below. Please see section 13.1.3 and 13.1.4.3 for more information. PAs track infractions on a program-wide basis. An infraction can be issued for the following reasons:

- The incentive amount submitted in the incentive claim documentation differs from the onsite inspection-triggered incentive recalculation by ±5-10%
- Neglecting to provide required or accurate documentation on a consistent basis, such as, but not limited to, Host Customer contact information
- Neglecting to respond to requested information within the 20-day time period on a consistent basis

Meters:

- The meter's make, model and serial number will be compared to what was submitted on the ICF. For Multifamily/Commercial systems (>30kWth): Installed CPM meters must be approved (listed on the CSI Thermal website except for pools) for the identified metering purpose. Meters must be installed properly and in the correct locations per the CSI-Thermal Metering Installation Guide.
- For MF/Commercial systems >250 kWth and Combi systems: PBI meters are required per CSI-Thermal Handbook section 4.5.4. Meters must be installed properly, in the correct locations and meet the accuracy requirements.

Multiple Infractions

- A single application shall not receive more than one recorded infraction regardless of the total number of infractions incurred for the given application.
- For any single site with multiple applications, if the multiple applications have the same infraction, then only one infraction shall be given for the entire site.
- For any single site with multiple applications, if the multiple applications have infractions that are different in nature, then an infraction shall be given for each application with an infraction that is different in nature from the other infractions at that site.

13.1.3 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 Solar 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 (please see the inspection checklist for a comprehensive list):

General:

- The incentive amount submitted in the incentive claim documentation differs from that of the onsite inspection-triggered incentive recalculation by more than ±10%
- Three Infractions on three separate applications as defined in section 13.1.2

If additional major discrepancies beyond those identified by the local building inspection authority are identified during the onsite field inspection and are found to affect health or safety, the PAs reserve the right to issue a failure.

System:

- Operation: The system must be in operational condition when inspected. A system shall be considered operational when the system is turned on, all system components are functioning (if the sun is shining and heat is needed in the solar tank), and the backup auxiliary heating system is connected.
    - For unoccupied buildings: Rebate inspection shall be requested and scheduled only when the system is in operational status. Additionally, non-tracking solar collectors and systems (OG100 and OG300 certified) with fluid in the collector shall be covered and secured by plywood or suitable opaque material during long unoccupied periods prior to inspection. Precautions should be taken to address freeze protection and overheat stagnation.
- Freeze Protection Measures: The system must have one of the freeze protection measures described in Section 12.2.
- 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 solar thermal system within the design limits of temperature and pressure. Tank/component temperatures shall be limited to a value not to exceed the tank/component

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 diminish their function during their design life. Pipe insulation and sensor wires must be protected at a minimum by two coats of the insulation manufacturer's recommended coating. Extra jacketing is strongly recommended, as paint may not last for more than a few years.
- Back Thermosiphon Prevention: Means shall be provided to prevent undesired escape of thermal energy from storage through thermosiphoning action. Examples are check valves or heat traps on glycol systems. Drainback systems do not require protection.
- Protection from Leaks: All piping and components must be leak free. Roof penetrations for collectors or collector racking shall meet all local building department codes and standards.

Collector:

- Must have stagnation control measures as described in Section 12.3.
- Collector Flow Balance: Proper flow balancing in and among collector banks by using reverse return plumbing, and flow balancing valves, and by adhering to the manufacturer's maximum collection of area for the banks.
- Surface Orientation Factor: Collectors in OG-300 systems must have an SOF value of between 0.60 and 1.0 as noted in Appendix D.
- Solar Tank: Waterproofing: Underground and above ground unsheltered storage tanks shall be waterproofed to prevent water seepage.

Plumbing and Piping:

- All plumbing and piping shall be suitable for the expected worst conditions of weather or fluid temperature and pressure.
- Insulation: All solar-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, and all collector loop tubing shall be insulated with a minimum of R-2.6 (F°-ft^2-hr/Btu) or greater insulation. All exterior piping insulation shall be protected from ultraviolet radiation, excessive temperature, and moisture damage. The only exception is for black polymer tubing certified by unglazed collector manufacturer as UV resistant. Note: Insulation R-value may be higher for Title 24 compliance.

Meter:

- CPM or PBI meter must be installed and operational at inspection (when a meter is required).

Owner's Manual:

- An owner's manual or manuals shall be provided to the System Owner with each solar thermal system. The manual shall describe system operation, maintenance procedures, and emergency shutdown/bypass procedures, along with the brand and toxicity class of heat transfer fluid. It shall provide contact information for the contractor.
- For seasonal pools with manual drainage where the system owner has taken responsibility for seasonal drainage, the manual shall include freeze protection drainage instructions and advice on when to drain the system.

Multiple Failures

- A single application shall not receive more than one recorded failure regardless of the total number of failures or infractions incurred for the given application.
- For any single site with multiple applications, if the multiple applications have the same failure, then only one failure shall be given for the entire site
- For any single site with multiple applications, if the multiple applications have failures that are different in nature, then a failure shall be given for each application with a failure that is different in nature from the other failures at that site.

13.1.4 Notification of Inspection Results

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

13.1.4.1 Passed Inspection

Upon passing the onsite field inspection, the PA will process payment to the Payee named on the ICF. If the tilt, azimuth, or shade factor found during the onsite field inspection is outside of the tolerances outlined in section 13.1.1, or if any other incentive calculator inputs were found to differ, this will trigger an incentive recalculation and 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 applicable chapter for payment process details.

13.1.4.2 Failed Inspection

Upon failing the onsite field inspection, the PA will notify in writing the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer of the reason(s) for the failure. See Section 13.1.4.3, entitled Failure Sanction, for a description of the required actions following failure notification.

13.1.4.3 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 14.3, entitled 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.

The PAs reserve the right to revoke the Contractor's program eligibility status if the 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 number of allowable failures in a rolling 12-month period.

The CSI-Thermal Program has two classifications for Applicants, Solar Contractors, System Owners and Sellers for the purposes of determining probation, suspension, and disqualification based on failures:

1. High volume Applicant, Solar Contractor, System Owner and Seller is defined as having completed 30 or more CSI-Thermal projects within the previous 12 month rolling period
2. Low volume Applicant, Solar Contractor, System Owner and Seller is defined as having completed less than 30 CSI-Thermal projects within the previous 12 month rolling period

For high volume Applicants, Solar Contractors, System Owners and Sellers:

- A six month probation status may be applied to a Solar Contractor that has received 5 failures within the previous 12 month rolling period.
- A six month suspension from the CSI-Thermal Program may be enforced against a Solar Contractor that has received 8 failures within the previous 12 month rolling period.

For low volume Applicants, Solar Contractors, System Owners and Sellers:

- A six month probation status may be applied to a Solar Contractor that has received 3 failures within the previous 12 month rolling period.
- A six month suspension from the CSI-Thermal Program may be enforced against a Solar Contractor that has received 5 failures within the previous 12 month rolling period.

The PAs reserve the right to file a Tier 2 Advice Letter to change the value for determining high volume and low volume Applicants, Solar Contractors, System Owners and Sellers based on program participation or other determining factors.

If an Applicant, Solar Contractor, System Owner and/or Seller is placed on probation they will remain under that status for a period of six months and are required to once again attend the CPUC designated contractor / self-installer training workshop. Additional applications from the sanctioned entity 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.

If an Applicant, Solar Contractor, System Owner and/or Seller is suspended from the program due to excessive failures:

- All applications associated with the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer will be suspended;
- The installer will not be able to submit any additional applications, nor have access to the CSI-Thermal database for the duration of the suspension period.
- All parties identified on the application will be notified of the suspended application status.

14. PROGRAM SANCTIONS, CONSEQUENSES AND RIGHT TO AUDIT

Probation is a temporary sanction that is a consequence of receiving a number of failures as outlined in Section 13.1.4.3. The Applicant, Solar Contractor, System Owner or Seller can still submit applications once they attend the CPUC designated contractor / self-installer training workshop. However, their CSI-Thermal activities will be monitored by the PAs during the probationary period and if additional infractions or failures are recorded during this period, the entity on probation is at risk of suspension.

Suspension is a temporary sanction that is a consequence of receiving the number of failures outlined in Section 13.1.4.3. The Applicant, Solar Contractor, System Owner or Seller will **NOT** be able submit applications for the duration of the suspension period. After the suspension period ends, the Applicant, Solar Contractor, System Owner or Seller will then be placed on Probation for up to 6 months. The terms of the probationary period will be in effect.

Disqualification for the duration of the CSI-Thermal program is a consequence that can and may be enforced against an entity based on the occurrences noted in Section 14.1. The duration of the disqualification is at the discretion of the PAs.

14.1 GROUNDS FOR IMMEDIATE DISQUALIFICATION FROM THE CSI-THERMAL PROGRAM

An Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer may 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 contractor's license
- Failure to disclose other incentives or funding sources such as rebates, grants, tax credits, government funding, and/or funding from any public or private source
- Installation of used solar thermal 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
- Submitting false information on the application in an attempt to collect more incentive dollars
- Forged paperwork with or without consent of system owner and/or host customer
- Providing any false information to the Program Administrator or any CSI program participant (Applicant, Solar Contractor, System Owner, Seller and/or Host Customer)
- Submitting any paperwork requiring the system owner's and/or host customer's signature(s) without the system owner's and/or host customer's actual signature(s)

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

14.2 DISQUALIFICATION SANCTIONS

If an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer is disqualified due to reasons outlined in Section 14.1, the following will occur:

- All applications associated with the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer will be suspended;
- No CSI-Thermal incentive payment will be made to the party that has been immediately disqualified;

- 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 without losing its current incentive reservation, and apply for an extension if necessary.

14.3 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.

14.4 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 satisfactorily 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.

APPENDICES

Appendix A:
Acronyms

AB: Assembly Bill

AFUE: Annual Fuel Utilization Efficiency rating

Btu: British Thermal Unit

CSD: California Department of Community Services and Development

CSE: 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

ESAP: Energy Savings and Assistance Program

FTL: Freeze Tolerance Level

GPD: Gallons Per Day

IAPMO: International Association of Plumbing and Mechanical Officials

ICF: Incentive Claim Form

kWh: Kilowatt-hour

kW_{th}: Kilowatt-thermal

LIWP: Low Income Weatherization Program

LIHEAP: Low Income Home Energy Assistance Program

M&E: Measurement and Evaluation

MPE: Maximum Permissible Error

MW: Megawatt

NREL: National Renewable Energy Laboratory

OG: Operating Guidelines

PA: Program Administrator

PBI: Performance Based Incentive

P.E.: State of California licensed Professional Engineer

PDP: Performance Data Provider

PID: Piping Instrumentation Diagram

PG&E: Pacific Gas and Electric

RRF: Reservation Request Form

SB: Senate Bill

SCE: Southern California Edison Company

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

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.

Collector Area: Solar thermal collector specifications often refer to multiple areas including gross, aperture, and absorber. For the purposes of the CSI-Thermal Program, the gross collector area must be used with the exception of concentrating collectors where aperture area should be used instead.

Combination System: Any solar thermal system that includes a combination of any commercial end-uses permitted in the CSI-Thermal Program.

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

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

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

Customer Performance Monitoring (CPM): A service that monitors and reports the performance of the solar thermal 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 end uses such as space heating, space cooling, swimming pool heating).

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

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

International Association of Plumbing and Mechanical Officials (IAPMO): IAPMO is a certifying agency that performs independent testing, research, and technical services in the plumbing and mechanical industries. IAPMO provides solar thermal ratings equivalent to OG-100 and OG-300 standards.

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

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

Kilowatt Thermal (kW_{th}): A unit of measurement developed by a consortium of international solar rating agencies in 2004 to approximate the amount of energy produced by solar thermal collectors. Each M^2 of collector space equals 0.7 kW_{th} Based on this calculation, 30 kW_{th} is equivalent to 462 square feet of fluid collectors or 855 square feet of air collectors. Fluid collectors include 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

Measurement and Evaluation (M&E): A process or protocol to evaluate the performance of an energy system. As a condition of receiving incentive payments under the CSI-Thermal Program, System Owners and Host Customers agree to participate in Measurement and Evaluation (M&E) activities as required by the CPUC. M&E activities will be performed by the Program Administrator or the Program Administrator's independent third-party consultant and include but are not limited to, periodic telephone interviews, on-site visits, development of a M&E

Monitoring Plan, access for installation of metering equipment, collection and transfer of data from installed system monitoring equipment, whether installed by Host Customer, System Owner, a third party, or the Program Administrator.

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

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

New Construction Project: A residential building is considered "new" if the entire building structure is subject to current Title 24 building efficiency standards and does not yet have a Permit of Occupancy from the relevant Building Department. solar thermal systems installed with propane or 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 or IAPMO 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.

One-Tank System: A system where the solar and auxiliary heat the same tank or in such a way that the solar contribution cannot be individually monitored.

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

Performance Based Incentive (PBI) Method: The CSI-Thermal Program will pay multifamily/commercial projects with capacity over 250 $kW_{th,}$ any size commercial process heat, space heating, absorption chilling, multifamily/ commercial combination system or opt-in PBI <250kWth based on energy displaced. The incentive will be paid quarterly over two years. The total incentive is capped at 100 percent of the estimated incentive amount for the two year period.

Piping Instrumentation Diagram (PID): A simple one-line diagram that represents the fluid circulation between the solar system and the end loads. A PID shows flow and temperature sensor locations, with manufacturers' installation requirements for clear flow, strainer/filters, etc.

Pool Heating: A solar pool heating system is a solar energy device that has the primary purpose of reducing consumption of natural gas for heating pool water. For the CSI Thermal Program, solar pool heating systems include multifamily residential, governmental, educational, commercial and nonprofit solar pool heating systems, but do not include single-family residential solar pool heating systems.

Process Heat: Process heating applications use heat to produce basic materials and commodities. Process heat shall refer to those applications that do not consume the solar heated water and instead use the water as a medium to carry heat for the end process.

Program Administrator (PA): For purposes of the CSI Thermal Program, PG&E, SCE, SCG, & CSE (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 solar thermal system, as described on the submitted application.

Performance Data Provider (PDP): A service that monitors and reports the energy delivery data from the solar thermal system to the PA to serve as the basis for PBI incentive payments and M&E studies.

PUC 2861: Public Utility Code 2861(e) defines "Low income residential housing" to mean either of the following:

(1) Residential housing financed with low income housing tax credits, tax-exempt mortgage revenue bonds, general obligation bonds, or local, state, or federal loans or grants, and for which the rents of the occupants who are lower income households, as defined in Section 50079.5 of the Health and Safety Code, do not exceed those prescribed by deed restrictions or regulatory agreements pursuant to the terms of the financing or financial assistance.

(2) A residential complex in which at least 20 percent of the total units are sold or rented to lower income households, as defined in Section 50079.5 of the Health and Safety Code, and the housing units targeted for lower income households are subject to a deed restriction or affordability covenant with a public entity that ensures that the units will be available at an affordable housing cost meeting the requirements of Section 50052.5 of the Health and Safety Code, or at an affordable rent meeting the requirements of Section 50053 of the Health and Safety Code, for a period of not less than 30 years.

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.

Seasonal Pool. For the purposes of the CSI-Thermal Program incentive calculation, a seasonal pool is considered to be in operation for 6 months (May-October). In practice the pool may be open for a different duration.

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

Shade Factor: A variable in the 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.

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 an 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 Cooling: Solar cooling is the use of solar thermal collectors to provide energy for cooling. Solar cooling shall only apply to solar-assisted absorption or adsorption chillers with gas back-up

that may also be used to supplement part of an electric cooling system. Incentives from secondary heat streams resulting from the absorption/adsorption cooling process will not be allowed.

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

Solar Space Heating Systems: Space heating systems use solar thermal collectors to provide radiant, convection or forced air heating.

Solar Thermal System: The process of utilizing energy from the sun through the use of collectors to produce heat for a variety of applications. For the purposes of the CSI-Thermal Program, eligible applications include heating water for domestic use, providing process heating, space heating, absorption cooling and any combination of such applications.

Surface orientation factor (SOF): The ratio of annual incident solar radiation for a particular orientation to annual incident solar radiation for an optimally oriented surface. The ideal SOF is a value of 1.0 and the minimum SOF required to receive an incentive is 0.60 and is applicable only to OG-300 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, solar energy delivered is defined as the difference between the total energy delivered by the entire system and the energy consumed by the auxiliary heat source, multiplied by the efficiency of the auxiliary heat source.

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 propane, 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 solar thermal 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.

Two-Tank System: A system where the solar contribution can be individually monitored.

Appendix C:
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.

C.1 Reservation Request Form

A completed RRF must be submitted for a multifamily/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 signed[6] by the Applicant, Host Customer and System Owner (if different than the Host Customer) prior to submitting the application.

C.2 Incentive Claim Form

A completed ICF must be submitted for all solar thermal projects. It must be completed and signed by the Host Customer and System Owner (if different than the Host Customer) after the solar thermal 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 multifamily/commercial projects this form must be submitted in Step 2 of the application process.

C.3 Energy Efficiency Audit/Survey or Title 24 Documentation

Refer to Section Chapter 8 for more information about energy efficiency documentation requirements.

C.4 Executed Agreement of Solar Thermal System Purchase and Installation

The Applicant must submit a copy of an executed agreement to purchase and install the solar thermal system in Step 1 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 solar thermal 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 or IAPMO 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.

C.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), then the System Owner must provide a copy of the agreement(s) to purchase and install the system.

C.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 12.1 for more information about permit requirements.

C.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, must reference the contract number and the contract's construction scope of work, inclusive of the thermal solar domestic water heating system(s), and must be signed by the Contract Officer.

C.8 Authorization to Receive Customer Information or Act on a Customer's Behalf

CSE 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, SCG, and SCE.

C.9 Application Fee

For all multifamily/commercial systems with capacity over 30 kW_{th}, Applicants will also be required to submit an application fee based on the collector square footage. For more information on application fees according to end use, see Section 3.7.1.1 or 4.7.1.1.

For all solar pool systems with capacity over 150 kW_{th}, Applicants will also be required to submit an application fee based on the collector square footage. For more information on solar pool application fees, see Section 5.7.1.1.

C.10 GPD justification (If building type is not on Maximum GPD Guideline Table)

For multifamily/commercial systems, a GPD justification document is required if the building type is not on the Maximum GPD Guideline Table or the GPD value exceeds the maximum amount indicated on the Maximum GPD Guideline Table. See Appendix E.

In this case, the project will be sized based on metered hot water consumption or gas and electric consumption for an appropriate period of time to capture the full range of usage, as described in Section 3.5.1. GPD justification documentation must be stamped by a State of California licensed P.E. See Section 3.5.1 and Appendix J for more information.

C.11 System Sizing Justification

For single-family residential systems whose fluid collector square footage is more than 1.25 times the usage in GPD, the Applicant must submit sizing justification showing data and calculations used to determine system size.

C.12 Stagnation Protection Method Documentation

If a stagnation protection method other than those listed in Section 12.3 is used, documentation describing how the system is protected against stagnation must be submitted to the PA.

C.13 Certificate of Calibration (For systems requiring PBI)

This document is required to verify that the temperature sensor pair meet the accuracy requirements for all systems with a capacity >250kW$_{th}$ or systems requiring PBI payment. The document can also be referred to as a sensor calibration report.

C.14 Reduced Solar Storage Tank Justification (If volume is less than requirements stated in Section 3.5.1.2)

For multifamily/commercial systems, a solar storage tank sizing justification is required if the tanks size is less than the requirements described in Section 3.5.1.2. The document should justify the reduced storage and indicate how overheat/stagnation will be prevented. This document must be stamped and signed by a State of California licensed P.E.

C.15 Multifamily/Commercial Combination Systems Documentation

Combination will follow the PBI application process and will require a Metering Plan to be submitted as part of the RRF and ICF application process. This must be stamped and signed by State of California licensed P.E..

C.16 Preliminary Metering Plan

Eligible end-uses that require PBI such as commercial process heat, space heating, absorption chilling, combination systems, domestic hot water systems > 250 kWth or opt-PBI must submit a metering plan stamped by a State of California licensed P.E. as part of the RRF package. The metering plan shall include the following information:

1. Metering equipment specifications and installation instructions.
2. A Piping Instrumentation Diagram (PID) of the thermal heating system indicating the proposed location of metering equipment.
3. Sampling frequency and data logging intervals.
4. How ineligible end-uses, heat dumps or any other thermal losses are separated out.
5. Data storage, transmission, and cleaning protocol.
6. Range of expected flows and temperatures.

C.17 Final Metering Plan

A Final Metering Plan signed off by a State of California licensed P.E. must be included as part of the ICF submission. The plan shall include the following information:

1. Any changes to the Preliminary Metering Plan
2. Meter calibration/certification plan
3. Sample data collection for one week of operation
4. Executed PDP contract
5. A completed Final Metering Checklist noting metering accuracy (See Appendix N)

C.18 10-year Low Income Property Affidavit

For all low income single-family projects proving low income status through ESAP, LIWP, or LIHEAP and multifamily projects proving low income status through the ESAP, property owners must sign a commitment that the property will remain low income for at least 10 years. This affidavit will be included in the ICF for single-family residential projects and RRF for multifamily projects.

C.19 Ensuring Benefits to Lower Income Households Affidavit

All multifamily low income participants will be required to submit an affidavit from the property owner explaining how the benefits of the solar thermal system will be passed to the low income residents through reduced energy costs. The total value of the benefits provided to the tenants shall be no less than 30% of the total incentive amount and cannot include any expenditure which the building owner would be required to incur (e.g. compliance with building codes).

If the benefits are provided in the form of reduced rent, reduced energy bills, or other monthly tenant benefits, then they shall be provided with a period not to exceed five years from the

incentive payment date. If the benefits are provided in the form of discretionary property improvements or other one-time benefits, then they shall be provided within a period not to exceed twelve months from the incentive payment date. Please see Appendix M for a sample affidavit.

C.20 Proof of Low Income Status Documentation: ESAP

For all low income single-family projects and multifamily projects proving low income status through the ESAP, applicants must provide documentation that meets one of the following conditions:

1. a documented resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

2. a documented equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

3. a document indicating a presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;

4. a document indicating a presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or

5. a document indicating a presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

Supporting documents can be in the form of a Deed Restriction, an Affordability Covenant, or a Regulatory Agreement.

C.21 Proof of Low Income Status Documentation: LIWP/LIHEAP

For all low income single-family projects and multifamily projects proving low income status through the LIWP/LIHEAP participation, applicants must provide documentation proving LIWP or LIHEAP participation from CSD and documentation that meets one of the following conditions:

1. a documented resale restriction between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

2. a documented equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the Government Code, between the homeowner and a public entity or a qualifying nonprofit affordable housing provider;

3. a document indicating a presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development;

4. a document indicating a presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development; or

5. a document indicating a presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

Supporting documents can be in the form of a Deed Restriction, an Affordability Covenant, or a Regulatory Agreement.

C.22 Multifamily Proof of Low Income Status Documentation: PUC 2861 (e)

All low income multifamily projects proving low income status through PUC 2861 (e), will require documentation, such as a Regulatory Agreement, proving 20% of the total units in the residential complex will be sold or rented to lower income households for a period of not less than 30 years.

C.23 Single-family Proof of Low Income Status Documentation: PUC 2861 (e)

All low income single-family projects proving low income status through PUC 2861 (e), will require documentation, such as a Regulatory Agreement.

C.24 Executed PDP Contract

All PBI systems are required to have a PDP and therefore must submit one of the following: a copy of the executed contract for a PDP, a letter from the PDP stating the Host Customer has purchased its service, or an invoice from the Solar Contractor clearly showing the PDP information must be provided. Whichever document is submitted must clearly identify the PDP information, including the name of the PDP, the product or service purchased and the term of agreement, along with the address of the associated solar thermal system site.

C.25 Affidavit Ensuring Freeze Protection for Seasonal Pool Applications

System owners of all seasonal solar pool systems with only manual drainage will be required to submit a signed affidavit stating that either there a maintenance agreement is in effect to manually drain the collectors OR that the owner assumes responsibility for manually draining the collectors before the freeze-0risk season begins and that drainage instructions are included as part of the operating manual. The affidavit can be found in Appendix O.

Appendix D:
Surface Orientation Factor (SOF) Chart[16]

The ideal SOF is a value of 1.0 and the minimum SOF required to receive an incentive is 0.60. The SOF is applicable only to OG-300 systems. 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 and tilt for evacuated tube collectors with adjustable absorber orientations are determined by the azimuth and tilt of the absorbers within the tubes.

Table D1
Surface Orientation Factor Chart

		Tilt (degrees)								
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-90
True Azimuth (degrees)	0-59	0.7*	0.65	0.6	NE	NE	NE	NE	NE	NE
	60-69	0.8*	0.8	0.75	0.65	0.6	NE	NE	NE	NE
	70-79	0.85*	0.8	0.75	0.7	0.65	NE	NE	NE	NE
	80-89	0.85*	0.8	0.75	0.75	0.7	0.6	NE	NE	NE
	90-99	0.85*	0.85	0.85	0.8	0.75	0.65	0.6	NE	NE
	100-109	0.85*	0.85	0.85	0.8	0.8	0.7	0.65	NE	NE
	110-119	0.85*	0.9	0.9	0.9	0.9	0.75	0.7	NE	NE
	120-129	0.85*	0.9	0.9	0.9	0.9	0.8	0.75	0.6	NE
	130-139	0.85*	0.9	0.9	0.9	0.9	0.8	0.8	0.7	NE
	140-149	0.85*	0.95	0.95	0.95	0.95	0.85	0.85	0.75	NE
	150-159	0.85*	0.95	0.95	0.95	0.95	0.85	0.85	0.75	0.6
	160-169	0.85*	0.95	0.95	0.95	0.95	0.85	0.85	0.75	0.6
	170-179	0.85*	1.00	1.00	1.00	1.00	0.85	0.85	0.75	0.6
	180-189	0.85*	1.00	1.00	1.00	1.00	0.85	0.85	0.75	0.6
	190-199	0.85*	1.00	1.00	1.00	1.00	0.85	0.85	0.75	0.6
	200-209	0.85*	1.00	1.00	1.00	1.00	0.85	0.85	0.75	0.6
	210-219	0.85*	0.95	0.95	0.95	0.95	0.85	0.85	0.75	0.6
	220-229	0.85*	0.95	0.95	0.95	0.95	0.85	0.85	0.75	0.6
	230-239	0.85*	0.95	0.95	0.95	0.95	0.85	0.85	0.75	0.6
	240-249	0.85*	0.85	0.85	0.85	0.75	0.75	0.75	0.7	0.6
	250-259	0.85*	0.85	0.85	0.85	0.75	0.75	0.75	0.65	0.6
	260-269	0.85*	0.85	0.85	0.85	0.75	0.75	0.75	0.65	NE
	270-279	0.85*	0.8	0.75	0.75	0.75	0.75	0.75	0.6	NE
	280-289	0.85*	0.8	0.75	0.75	0.75	0.75	0.75	NE	NE
	290-300	0.85*	0.8	0.75	0.75	0.75	0.75	0.75	NE	NE
	301-360	0.65*	0.6	NE	NE	NE	NE	NE	NE	NE

NE = Not Eligible
* Please reference the manufacturer instructions for collectors tilted at 0°

[16] 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.

Appendix E:
Maximum Gallon per Day (GPD) Guideline Table for Multifamily/Commercial Projects

Table E1
Maximum Gallon Per Day Guideline Table[17]

Type of Building	GPD
Apartments/Condos: Number of Units	
2 to 20	42 per unit
21 to 50	40 per unit
51 to 100	38 per unit
101 to 200	37 per unit
201 plus	35 per unit
Student Housing	13 per person
Military Barracks	13 per person
Hotels/Motels	15 per unit
Retirement/Nursing Homes	18 per bed
Office Building	1.0 per person
Restaurants	
Meal Service Restaurants	2.4 per full meal served per day
Quick Service Restaurants	0.7 per meal served per day
Elementary schools	0.6 per student
Junior and senior high schools	1.8 per student
Coin-op Laundries	2 per pound of laundry washed per day

[17] The GPD table is only a maximum justification and predates low-flow fixtures and appliances. Data should **not** be used for sizing requirements. Original source: ASHRAE Handbook

Appendix F:
Minimum Program Performance Data Provider (PDP) Requirements for PBI Required Projects

For PBI payment participants, a PDP provider is defined as a service provider that monitors and reports the energy delivery data from the solar thermal system to the PA. The data serves as the basis for PBI incentive payments. The data flow between the solar thermal system and the PA's designee must meet the PDP requirements described in Appendix F.

All PDP providers must be approved by the PAs. The instructions for qualifying as a PDP provider can be found in Appendix G. Approved PDP providers can be found on the following website: www.csithermal.com/PDP/

F.1 Data Privacy

Protecting System Owner and Host Customer data privacy is of the highest importance. As such, data shall be collected, processed, and reported to the System Owner and the PA via secure channels. The PDP 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.

F.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 PDP. If remote access is not permitted by a customer due to security policy, then manual data access will be allowed.

F.3 Solar Performance Data

The PDP provider must monitor, trend, archive, and report the fields listed in Table F1, in 15-minute intervals that will be available on a daily basis. The data must be in comma separated value (csv) for data delivery, and must reference the PDP username, password, and application number. For systems with multiple meters, the PDP will be required to submit meter level and aggregated system data. The File Format Specification can be found at www.csithermal.com.

Table F1
Program Performance Data Reporting Requirements

Data Field	1-Tank System*	2-Tank System*
Date	Required	Required
Time	Required	Required
Cumulative gallons of hot water consumed	If Available	If Available
Solar Btus delivered (2-tank system)	N/A	Required
Total Btus delivered (1-tank system)	Required	N/A
Back-up gas consumption (therms)	Required if gas	N/A
Back-up electric consumption (kWh)	Required if electric	N/A
Back-up propane consumption (therms)	Required if propane	N/A
Cold water supply temperature (ºF)[18]	If Available	If Available
Solar hot water delivery temp. (ºF)	If Available	If Available
Collector temperature (ºF)	If Available	If Available
Pump 1 run time (24 hours a day)	If Available	If Available
Pump 1 energy (kWh)	If Available	If Available
Pump 2 run time (24 hours a day)	If Available	If Available
Pump 2 energy (kWh)	If Available	If Available
Pump 3 run time (24 hours a day)	If Available	If Available
Pump 3 energy (kWh)	If Available	If Available
Log data		
• Alarms	If Available	If Available
• System messages	If Available	If Available
• System events	If Available	If Available
• Trends	If Available	If Available

*As defined in Appendix B: Glossary.

F.4 Minimum Report Delivery Requirements

The PDP provider must electronically submit performance data reports for each project through www.csithermal.com. The data is utilized for PBI incentive payments. PBI rebate payments for each month will be based on that month's aggregated energy generation. Nevertheless, PDP

[18] For unusual or complex configurations, refer to the Metering Guide.

providers are required to submit 15-minute interval production data, which will be used for studies of program effectiveness and impact. If the monthly report is found to lack some 15-minute interval production data, the PDP provider shall explain to the PA why this is so. If the PA finds the explanation insufficient or if the amount of 15-minute interval production data is insufficient, the PA shall be allowed, at its discretion, to disallow part or all of that month's PBI payment.

Data reporting for PBI shall commence on the 1st of the month following approval of the ICF and continue monthly thereafter. Any request for an alternate data collection commencement date will require PA approval. Data for an application must be submitted in full calendar months. The PDP has up until the 1st of the following month to validate, format, and submit the Meter and Application Interval data for that application.

F.5 Time Granularity of Acquired Data

The PDP provider must sample flow and temperature sensors at least every 10 seconds and record all required solar performance or output data points no less frequently than once every 15 minutes.

F.6 Frequency of Data Collection

The PDP providers must remotely acquire and process all data points no less frequently than once per day. If remote access is not permitted by a customer due to security policy, then manual data collection must be performed at least once per month.

F.7 Frequency of Data Reporting

PDP providers are required to report performance data monthly to the PAs for 24 consecutive months for systems participating in the PBI process.

F.8 Data Retention Policy

PDP providers must retain raw performance data for five years from the data collection end date.

F.9 Summary of performance metering and communication requirements

Table F2 below provides a summary of the Performance Metering and Communication Requirements.

Table F2
Summary of Performance Metering and Communication Requirements

Incentive Structure	System Size	Metering Process	Min. BTU Meter Accuracy	Metering Equipment Location	CPM Required	PDP Required	Who Bears Cost
Single Lump-sum Rebate	≤ 30 kWth	None	N/A	N/A	N/A	N/A	N/A
Single Lump-sum Rebate	DHW 30 kWth< system ≤ 250 kWth	Customer Performance Monitoring	Either Flow Meter: ± 2% At full flow Temperature sensors: ± 1° C or overall BTU accuracy ± 15%.	Collector loop or load side	Yes	No	Paid for by System Owner
Single Lump-sum Rebate	Solar Pool systems >30 kWth	Customer Performance Monitoring	Meter that shows btus	Collector loop or load side	Yes	No	Paid for by System Owner
PBI	> 250kWth Or any size commercial process heat, space heating, absorption chilling, multifamily/ commercial combination system Or opt-in PBI <250kWth	PBI	Btu meter ± 5% if >250kWth, ± 8% if ≤250kWth	Load side	Yes	Yes	Paid for by System Owner

Appendix G:
INSTRUCTION FOR QUALIFYING AS A PDP 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 PDP provider for the CSI-Thermal Program. This section also details the data reporting requirements (format, delivery method) and schedule for PBI payments. The PDP provider may also provide CPM provider services. All PDP 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's PBI payment process are required to install performance meters to determine the energy delivered by their solar thermal system. This data must be read and communicated to the PA by a third-party PDP provider. This document provides information and instructions for providers wishing to qualify to provide PDP provider services.

The following are the PDP 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 solar thermal system for PBI payment
- 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
- Manage data on PDP server
- Ensure confidentiality of customer information and performance data
- Possess technical expertise and capability
- Comply with all State and Federal laws
- Existing approved PDPs will be required to meet all new PBI requirements

PDP Provider Task Requirements

Data Format

Data must conform to the specific program requirements as outlined in Appendix F. The PBI data reports must include 15-minute interval (as defined in Appendix F, Section F.5, Time Granularity of Acquired Data). All PBI data reports must be formatted using csv unless otherwise specified. Required fields can be found in Appendix F, Section F.3, Solar Performance Data. For systems with multiple meters, the PDP will be required to submit meter level and aggregated system data. The File Format Specification can be found at www.csithermal.com.

Data Validation

The PDP provider must validate all data prior to uploading it to www.csithermal.com. 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

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 from. 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.

PBI rebate payments for each month will be based on that month's aggregated energy generation. Nevertheless, PDP providers are required to submit 15-minute interval production data, which will be used for studies of program effectiveness and impact. If the monthly report is found to lack some 15-minute interval production data, the PDP provider shall explain to the PA why this is so. If the PA finds the explanation insufficient or if the amount of 15-minute interval production data is insufficient, the PA shall be allowed, at its discretion, to disallow part or all of that month's PBI payment.

The PDP 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 PDP provider data to ensure accuracy and compliance with the requirements outlined in this document. Any PDP 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 PDP provider validated interval and cumulative monthly data must be retained for a period of five years from the data collection end date. The PBI data collection time period is two years (24 consecutive months). See Appendix F, Section F.8 of the CSI-Thermal Handbook for more details. The PDP 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 PDP provider for comparison with validated interval data transmitted to the database. The PDP provider is also responsible for providing backup and disaster recovery services for 100 percent of the data.

Technical and Customer Support

The PDP provider must provide a technical support number to the PA for use during normal business hours (8:00 a.m. to 5:00 p.m. Pacific Standard 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 PDP provider must respond to PA requests within two business days with a status report and plan for correcting the issues. The PDP 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.

PDP Provider Performance Exemptions

The PDP 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 PDP provider at no fault of the customer AND it can be determined that the customer's solar thermal equipment was still operating, the PA may extend the PBI incentive payment period beyond the established timeframes otherwise specified by the incentive program Handbook. The PBI 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 PDP provider will resubmit the respective Data Report, thereby replacing the previous incomplete report with a complete quarter of data.

PDP Provider Non-Performance

The PA will not issue incentive payments to customers based on estimated data from the PDP provider, nor will the PA estimate incentive payments under any circumstances. It is the PDP 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 PDP provider approval from the PA:

- PBI rebate payments for each month will be based on that month's aggregated energy generation. Nevertheless, PDP providers are required to submit 15-minute interval production data, which will be used for studies of program effectiveness and impact. If the monthly report is found to lack some 15-minute interval production data, the PDP provider shall explain to the PA why this is so. If the PA finds the explanation insufficient or if the amount of 15-minute interval production data is insufficient, the PA shall be allowed, at its discretion, to disallow part or all of that month's PBI payment.

- Data not posted by specified date (10 percent of accounts serviced by PDP provider over a one quarter 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 PDP provider: no data posted for 10 percent of accounts serviced by PDP 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 PDP 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 PDP provider.

The PDP provider will be given reasonable opportunity to correct problems identified by the PA. The PA will work with the PDP provider to correct any such problems and avoid unnecessary delays in issuing incentive payments to customers, to the extent feasible. However, if the PDP 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 PDP provider, the PA will suspend PDP provider activity with just those affected customers. The affected customers will be notified that the PDP 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 PDP provider. The original PDP provider will be required to transfer all historical data to the newly selected PDP provider. An incentive payment will not be made until the customer provides a contract or similar document proving they are engaged with another PDP 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 PDP 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 six months, or it affects more than 20% of customers served by the PDP provider, the PDP provider's approval will be revoked and all customers will be notified that they must select another PDP provider. As above, an incentive payment will not be made until the customer selects another PDP provider, but the customers' incentive payment period will be extended beyond the established payment period. The PDP provider will be eligible to reapply after six months upon demonstrating that they have successfully resolved all problems to the PAs satisfaction.

Unless the PDP provider's actions results in revocation, upon receipt of a notice from the PA with respect to the PDP provider's failure to provide the performance, the PDP 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 PDP Provider Appeals Process

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

APPLICATION PROCESS

Application & Documentation

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

The PAs will review the submitted documentation, determine if the PDP provider Applicant meets the program requirements and notify the PDP provider Applicant via email. The PA will review the application and respond to the PDP provider Applicant within 15 business days.

Data Transfer Test

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

The PAs, at their discretion, may require that a data transfer test be completed for specific projects. The PA will inform the Applicant, customer, and PDP provider of the project-specific data transfer test upon approval of the incentive claim documents.

PDP Provider Approval Initial Audit Period

Upon PA approval of the required PDP provider application documentation, and successful completion of the PDP provider data test procedures, the PDP 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 PDP provider's first data report for their first three customers for compliance with these PDP provider requirements. The PA will notify the PDP provider of noncompliance and will work to assist the PDP provider with resolving the issues.

Application to Provide PDP Provider Services

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

Company Name: _____ *

Primary Contact: _____

Address: _____Address 2: _____*

City: _____* State: _____ * ZIP: _____ *

Phone: (_____) ____-_____* Fax: (_____) ____-_____

Email: _____

Company Website: _____*

*The above information is subject to public display upon approval of this application.

Technical Support Contact

Contact Name: _____

Phone: (_____) ____-_____ Email: _____

Hours of Operation (PST):_____ Days of Operation: _____

Customer Support Contact

Contact Name: _____

Phone: (_____) ____-_____ Email: _____

Hours of Operation (PST):_____ Days of Operation: _____

PDP Provider Application Outline

Section I: Application to Provide PDP Provider Services (above fields)

Section II: Company Background

- Company background (i.e. years in business, number of employees, general description, etc.)
- Meter data reading and reporting experience and capabilities, capacity, technology overview, IT capabilities, etc.

Section III: Data Format

Review the data format requirements in this section and initial beside each line item to indicate compliance.

Provider can and will provide data in csv format _____

All applicable data fields will be submitted _____

Provider is able to meet data privacy and protection requirements _____

Provider is able to meet monitoring systems remote communication requirements _____

Provider is able to monitor, trend, archive, & report fields listed in Appendix F, Table F1 _____

Provider is able to electronically submit performance data reports for each project through www.csithermal.com _____

Provider is able to record all required solar performance or output data points at a minimum of every 15 minutes _____

Provider is able to report performance data quarterly to the PAs _____

Provider is able to meet data retention and performance requirements _____

Provider is able to calculate Btu values only when there is established flow _____

Section IV: Data Validation

- Data validation procedures
- Process for retrieving missed reads

Section V: Data Retention

- Data retention plan
- Backup and recovery plans

Section VI: Data Communication and Security

- Data communication (frequency, scalability, types, troubleshooting, etc.)
- Data posting (data translation, formatting, firewall access, etc.)
- Hardware and software scalability plans
- 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 PDP 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:_____

Appendix H:
Historic Minimum Sustained Temperatures in California Energy Commission's Climate Zones

Table H1
California Climate Zone Chart

CEC Climate Zone	18-hour Minimum Temperature (°F)[19]
1	31
2	38
3	34
4	38
5	43
6	49
7	48
8	48
9	41
10	40
11	28
12	29
13	31
14	25
15	43
16	7

[19] The analysis used to reach the 18-hour minimum temperature chart is based on historic air temperature readings for representative stations of each of the 16 California climate zones. Thirty years of air temperature data was obtained for each station from the National Climatic Data Center. The maximum available history was used for stations with less than 30 years. This data was then analyzed for the minimum temperature sustained for 18 continuous hours. When sub-hourly interval data was provided it was processed into hourly average temperatures for analysis. Gaps in data less than 2 hours were filled using interpolation. However, gaps in data over 2 hours were not filled. Hourly air temperature data was then analyzed to determine the minimum temperature sustained at or below for 18 hours. These 18-hour minimum temperature values for each climate zone are summarized in the table below along with the representative weather station name, and period of data analyzed.

The CSI-Thermal Program does not warrant that any ICS system placed in these climate zones will be protected from freezing. It is the responsibility of the system designer to evaluate freeze risk and provide additional freeze protection, or to not risk freezing or excessive heat loss by installing ICS systems in marginal zones. Consider the following factors that may not be reflected in the published Freeze Tolerances Limits:

1. Micro-climates that are not reflected by the "representative city"
2. Shorter duration freeze snaps, compounded by clear-sky conditions that worsen the freeze risk
3. System design factors such as type of glazing, paint, cylinder wall thickness, insulation, etc.

Finally, consider that the weakest link in ICS or thermosiphon systems may be the pipes to and from the system. Extra measures may be required by the permitting agency to protect exposed piping.

Appendix I:
Metering Equipment Approval Process

The purpose of this section is to outline the metering equipment application and approval process for Customer Performance Monitoring (CPM) and PBI required projects. CPM meters for solar pool systems do not have to be preapproved or listed.

BACKGROUND AND REQUIREMENTS

The metering accuracy requirements are as follows:

PBI Required Projects (Section 4.5.4.3)
PBI metering approval is on a case by case basis, based on the flow and temperature range for each specific site.

A State of California licensed P.E. will submit a Preliminary Metering Plan at the time of Reservation Request to be reviewed by the PA. This will include specifications and location of the PBI metering equipment. A Final Metering Plan will be submitted at the Incentive Claim stage for review and approval by the PA. Incentive payments will not begin until the metering system is demonstrated to be functional and accurate.

Metering equipment must satisfy maximum permissible error (MPE) requirements throughout its range of operation. The total Btu error is equal to the sum of the component errors (temperature sensor pair, flow meter and calculator).

E_{total}	= maximum permissible error applicable to a complete heat meter
E_f	= maximum permissible error applicable to the flow meter
E_t	= maximum permissible error applicable to the temperature sensor pair
E_c	= maximum permissible error applicable to the Btu calculator

Maximum Permissible Errors (MPE) applicable to complete heat meters:

$E_{total} = E_f + E_t + E_c$

Note: Due to inaccuracy in turn-down ratio of flow meters, flow measurements below the minimum rating of the flow meter are to be recorded as zero.

The total Btu meter maximum permissible error by solar thermal system capacity can be found in Table I1.

Table I1
Btu Metering: Maximum Permissible Error

System Capacity (kWth)	Maximum Permissible Error (%)
> 250 kW_{th}	5%
≤ 250 kW_{th}	8%

- **One Tank Systems:**

For gas and propane back-up water heaters or boilers, energy usage in cubic feet shall be monitored by gas meters and temperature/pressure transducers upstream of the meters. Btu's can be calculated with the heat values of the natural gas or propane and then compensated with temperature and pressure. For constant capacity auxiliary heaters, an alternate procedure can be used, i.e., Btu's can be calculated by measuring the elapsed time of the burners multiplying by the heater capacities.

kWh meters shall be used for electric backup water heaters.

CPM for DHW projects >30 kW_{th} (3.5.4.1)

- Flow meter must have a maximum permissible error ±2% at full flow.
- Temperature sensors must have a maximum permissible error of ± 1° C within the range of temperatures being monitored (e.g. In the case of collector loop monitoring the range would be the minimum collector supply temperature to the maximum collector return temperature).
- For metering that does not include a flow meter and temperature sensor pair, the manufacturer must demonstrate that the accuracy of the total BTU calculation is within ±15%.

CPM APPLICATION AND APPROVAL PROCESS

Applicant or metering equipment manufacturer must submit the following metering information to one of the CSI-Thermal Program Administrators (PA):

- **Complete Btu Meter**: make, model, and documentation (i.e. manufacturer equipment specification or third-party test report) that verifies the equipment meets the accuracy requirements for the metering option(s) outlined above
- Identify a metering name to appear on the approved list.

Specifications can be sent via email or US Mail to:

Center for Sustainable Energy (SDG&E territory):
CSI-Thermal Program
9325 Sky Park Court, Suite 100
San Diego, CA 92123
Email: swh@energycenter.org

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
Email: solar@pge.com

Southern California Gas Company:
CSI-Thermal Program
555 W. Fifth Street ML GT20B8
Los Angeles, CA 90013
Email: swh@socalgas.com

Southern California Edison:
Attn: CSI Thermal Program Administrator
P.O. Box 800
Rosemead, CA 91770-0800
Email: CSIGroup@sce.com

PAs will review the specifications for the accuracy level required. If the metering equipment meets the standards for CPM, this equipment will be added to the approved list of meters for CPM.

APPROVED METERING EQUIPMENT LIST

A list of all approved CPM meters will be publically available at www.csithermal.com/meters. Additionally, a drop down menu containing all approved meters will be imbedded into the application to allow applicants to easily select the metering equipment to be installed at the project site.

Appendix J:
Multifamily and Commercial Sizing Instructions for "Actual Metered Consumption" Method

The purpose of this section is to outline the requirements for sizing multifamily and commercial projects using the "Actual Metered Consumption" method described in Section 3.5.1.1. The results of this metering will determine a GPD value and a Load Profile for the OG-100 Calculator.

BACKGROUND AND REQUIREMENTS

For system sizing, one of the options available is metering actual consumption. Applicants may opt to use this method or the other methods outlined in Section 3.5.1.1. In order to meter actual consumption, applicants must do one of the following:

- Meter hourly hot water consumption using a flow meter with accumulator for an appropriate period of time to capture the full range of usage and adjust for seasonal variability to obtain an annual average GPD and hourly usage profile. Hot water consumption calculation must be stamped by a State of California licensed P.E.

- Meter hourly natural gas, electric, or propane consumption at the water heater for an appropriate period of time to capture the full range of usage and adjust for seasonal variability to obtain an annual average GPD and an hourly usage profile. Water heater gas, electric, or propane meter consumption calculation and explanation must be stamped by a State of California licensed P.E.

STATE OF CALIFORNIA LICENSED PROFESSIONAL ENGINEER (P.E.) RESPONSIBILITIES

The metered data collected for the appropriate period of time must be quality checked and processed by a State of California Licensed P.E.. The State of California licensed P.E. is responsible for the following:

- Determination of appropriate metering period to capture full range of hot water usage
- Verification of correct mounting and location of the meter (either flow meter or water heater gas or electric meter)
- Accuracy of the start/stop recording dates and times
- Extrapolation of the metered data to one year, accounting for down days (e.g., weekends or seasonal down periods)
- Development of a load profile from the collected time interval data in accordance with the data format Table J1 Load Profile Template.
- Determination of a single GPD value to be used for system sizing and incentive calculation

DATA FORMAT

The load profile must show hourly hot water gallon demand for a typical year (8760 hours).

- Hourly Hot Water Gallon Demand: Hour number one must represent the first 60 minutes of the first day of the year from midnight-1:00 am.
- Hot Water Draw, Gallons Per Hour: Gallons consumed in a given hour.
- Recirculation Loop Pump Status: On (1) or off (0) in a given hour.

Table J1 below is an example template of the required data. The Applicant will be asked to attach this table when using the OG-100 Calculator for building types not listed in the Maximum GPD Table in Appendix E or if the value in the Maximum GPD Table is too low for the building use. The results of the data will create a custom load profile for their proposed system.

Table J1
Load Profile Data Example

Elementary Schools (10-month)		
Hour	**Hot Water Draw Gallons/Hour**	**Recirculation Loop Pump Status 1=On: 0=Off**
1	0.000	0
2	0.000	0
3	0.000	0
4	0.000	0
5	0.000	0
6	0.000	0
7	0.000	0
8	73.75	1
9	43.22	1
10	70.27	1
11	40.82	1
12	20.06	1
13	22.64	1
14	28.07	1
15	28.64	1
16	12.55	1
17	11.06	1
18	0.000	0
19	0.000	0
20	0.000	0
…8760	0.000	0

DOCUMENTATION SUBMITTAL

The following items must be stamped by a P.E and submitted in the "Customer Load Profile" documents section of the application database.

- The load profile data must be submitted to the PAs in tab delimited format document using the format provided in Table J1.
- The actual monitoring data.
- The assumptions used to extrapolate the data monitored for an appropriate period of time to the 8760 hour usage profile and average GPD.

Appendix K:
Multiple Orientation Arrays

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:

Part 1: Determine Weighted Average SOF

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.

Part 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 amount 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.

Appendix L:
Sample Affidavit Low Income Property Conditions[20]

By signing this affidavit ("Affidavit"), _____ ("Host Customer") and _____ ("System Owner", if different than the "Host Customer"), jointly referred to as "Parties", with respect to the solar water heating system project ("Project") at _____(site address), which is partially funded by the _____ ("Program Administrator") California Solar Initiative Thermal (CSI-Thermal) Program under Application ID _____, each certify and declare under penalty of perjury under the laws of the State of California that each of the statements in the paragraphs below are complete, true and correct.

Parties attest that the statements in the following paragraphs are true:

1) The property served by the Project is and will remain low income residential for at least 10 years from the date of installation, including property ownership restrictions and income rental protections as required by Decision (D.) 11-10-015.

2) The property served by the Project meets one of the following conditions (check all that apply):

- a documented resale restriction between the homeowner/Host Customer and a public entity or a qualifying nonprofit affordable housing provider;

- a documented equity sharing agreement for which the homeowner does not receive a greater share of equity than described in paragraph (2) of subdivision (c) of Section 65915 of the California Government Code, between the homeowner/Host Customer and a public entity or a qualifying nonprofit affordable housing provider;

- a presumed resale restriction that exists because the residence is located in a Targeted Employment Area (TEA), as determined by the Governor's Office of Business and Economic Development; or

- a presumed resale restriction that exists because the property is located in an area that was included in a neighborhood revitalization strategy as part of the local municipality's consolidated community development plan filed with the federal Department of Housing and Urban Development.

[20] This affidavit will be provided in the CSI-Thermal online database in the ICF for single-family low income projects and the RRF for multifamily low income projects.

SAMPLE

- A presumed resale restriction that exists because the property is located in a Qualified Census Tract (QCT) as defined by Internal Revenue Code Section 143(j)(2) as a census tract in which 70 percent or more of the families have an income which is 80 percent or less of the statewide median family income.

Each of the undersigned certifies under penalty of perjury that the foregoing is true and correct and that each is duly authorized to sign this Affidavit.

[HOST CUSTOMER]	***[SYSTEM OWNER]***
Signature: _____	*Signature:* _____
Name Printed: _____	*Name Printed:* _____
Title: _____	*Title:* _____
Date: _____	*Date:* _____

Appendix M:
Sample Affidavit Ensuring Benefits to Lower Income Households[21]

By signing this affidavit, _____ ("Host Customer") and _____ ("System Owner", if different than the "Host Customer"), jointly referred to as the Parties, with respect to the solar water heating system project ("Project") at _____ (site address), which is partially funded by the Program Administrator for the California Solar Initiative Thermal (CSI-Thermal) Program under Application ID _____, each certify and declare under penalty of perjury under the laws of the State of California that each of the statements in the paragraphs below are complete, true and correct.

As a requirement for participation in the low income component of the CSI-Thermal Program, the low income residents of the multifamily housing where the Project is installed must benefit through reduced or lowered energy costs as required by Decision (D.) 11-10-015.

Therefore, the Parties attest that the attached description of how the reduced energy costs will be provided to the low income residents is true and correct.

Examples of these benefits can be, but are not limited to, reduced energy bills, reduced rent, or other measures to reinvest the money saved on energy bills to improve the property or offset other costs for low income tenants. These benefits cannot include any expenditures which the building owner would be required to incur (e.g. compliance with building codes). The PAs reserve the right to request for further documentation that demonstrates how the benefits will be passed to the tenants. The total value of the benefits provided to the tenants shall be no less than 30% of the total incentive amount.

If the benefits are provided in the form of reduced rent, reduced energy bills, or other monthly tenant benefits, then they shall be provided within a period not to exceed five years from the incentive payment date. If the benefits are provided in the form of discretionary property improvements or other one-time benefits, then they shall be provided within a period not to exceed twelve months from the incentive payment date.

Please explain how the reduced energy costs from the solar water heating system will be passed on to low income residents:

Each of the undersigned certifies under penalty of perjury that the foregoing is true and correct and that each is duly authorized to sign this Affidavit.

SAMPLE

[21] This affidavit will be provided in the CSI-Thermal online database in the RRF for multifamily low income projects.

[HOST CUSTOMER]	[SYSTEM OWNER]
Signature: _____	Signature: _____
Name Printed: _____	Name Printed: _____
Title: _____	Title: _____
Date: _____	Date: _____

Appendix N:
System Metering Checklist

Applicants for PBI incentive payments must submit the following checklist as part of the Final Metering Plan. The PE will use the following checklist to assert that all of the listed requirements are met.

Checklist

I, _____, certify that the following PBI metering requirements have been/will be complied with by the start of the Incentive Claim Form. (Initial each item.)

1. Monitoring system manufacturer's installation requirements have been met. _____
2. Unwanted convective or forced flows will be prevented, or will be accounted for by the BTU calculator. _____
3. Temperature and flow sensors will be positioned to measure solar energy delivered to the end use or auxiliary heater, and to account for energy contributions from the conventional heater(such as through a malfunctioning recirculation return diverter valve.) See sample metering schematics for guidance at www.gosolarcalifornia.ca.gov/solarwater/solar_water_docs/CSI_Thermal_Metering_Installation_Guide.pdf _____
4. Energy lost through heat dumps, if present, shall not be credited as "solar energy delivered" for the purpose of calculating displaced conventional energy. _____
5. Heat transfer fluid properties, if other than potable water, will be properly accounted for in the BTU calculator, per manufacturer's instructions. _____
6. The metering equipment is compatible with the expected temperature range and fluid flow conditions. _____
7. Temperature sensors, flow sensors, and BTU calculator meet the accuracy requirements of the CSI Thermal Program. _____
8. Data monitoring and reporting has been tested for the project and meets the requirements of the CSI Thermal Program. _____
9. If the only metering option feasible is collector loop monitoring, in addition to the above checklist requirements, a gas meter meeting the CSI-Thermal accuracy requirement will be installed to facilitate determination of storage tank losses attributable to both the solar system and the auxiliary heater. _____

_____ _____

P.E. Signature CSI-Thermal Application No. & Project Name

_____

Typed name, address, license number, & phone number.

Appendix O:
Affidavit Ensuring Freeze Protection for Seasonal Pool Applications

For seasonal pools, where collectors are not drainable by automatic means, the system owner has either a maintenance agreement in effect to manually drain the solar collectors or assumes responsibility for manually draining the solar collectors before the freeze-risk season begins and that drainage instructions are included as part of the operating manual.

By signing this Affidavit, _____ ("Host Customer") and _____ ("System Owner", if different than the "Host Customer"), with respect to the solar pool heating system project ("Project") at _____ (site address), which is partially funded by the Program Administrator for the California Solar Initiative Thermal (CSI-Thermal) Program under Application ID _____, certify that either a maintenance agreement is in effect with a contractor **OR** that the system owner agrees to take responsibility for freeze protection measures by draining the solar system for seasonal swimming pool applications.

[HOST CUSTOMER]

Signature: _____

Name Printed: _____

Title: _____

Date: _____

[SYSTEM OWNER]

Signature: _____

Name Printed: _____

Title: _____

Date: _____

[APPLICANT/CONTRACTOR]

Signature: _____

Name Printed: _____

Title: _____

Date: _____