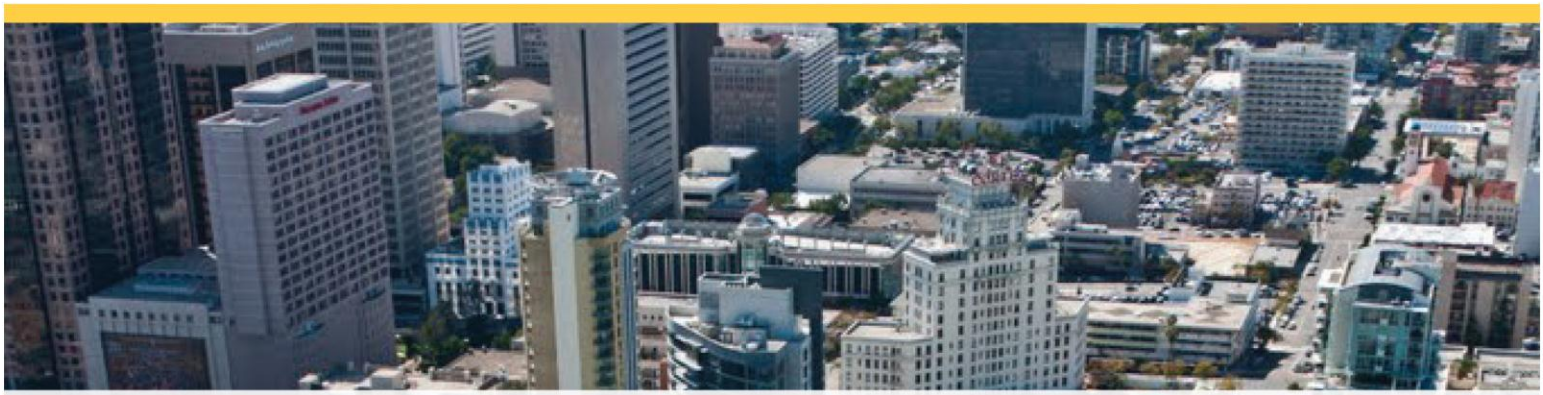

California Public Utilities Commission
California Solar Initiative
Program Handbook
August 2014

Center for Sustainable Energy™

Pacific Gas and Electric Company®

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An EDISON INTERNATIONAL® Company

August 2014 Handbook:
What's New

This August 2014 version of the Handbook includes modifications offered in CSE Advice Letters 48 and 50 that were approved by the Commission. CSE AL 48 Handbook modifications in Sections 2.1.5, 4.5.1.1, 4.11.1.8, 4.11.1.7, and Table 16 include more detailed and comprehensive low-income eligibility documentation standards for the MASH Program. Language discussing MASH Track 2 incentives, and processes, in Sections 4.5 and 4.5.2 have been removed. CSE AL 50 revisions to Sections 2.2.4, 2.2.5 and Appendix A: Definitions; all which apply to customers participating concurrently in the CSI Program and NEM-Aggregation, as a special condition of the NEM tariff. Section 2.1.5.1 has been added to define the eligibility protocols for these dual participants. Former Section 1.6 has been omitted, as it referenced an obsolete tool. Section 3.4.5 has been updated to reflect the dynamic nature of 'average system cost', and no longer defines a specific dollar amount for the average system cost of PV systems. Other revisions involve a Program Administrator name change; Center for Sustainable Energy, formerly California Center for Sustainable Energy; which is reflected throughout this revised Handbook.

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1. Introduction: California Solar Initiative Program

1.1 Program Overview

The **California Solar Initiative** (CSI) is overseen by the California Public Utilities Commission (CPUC or Commission) and provides incentives to customers in investor-owned utility (IOU) territories of Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E). These three utilities represent about 68 percent of California's electric load. The CSI provides cash back for solar energy systems for existing homes, as well as existing and new commercial, industrial, government, non-profit, and agricultural properties – within the service territories of the three above-listed IOUs. The CSI has a budget of $2,167 million over 10 years, and the goal is to reach 1,940 megawatts (MW) of installed solar capacity by 2016. This goal includes 1,750 MW from the general market (GM) CSI program, which provides incentives for photovoltaic (PV) and other solar electric generating technologies. The goal also includes 190 MW from the two low-income residential incentive programs, the Multifamily Affordable Solar Housing (MASH) Program and the Single-family Affordable Solar Homes (SASH) Program.

This CSI Program Handbook describes the detailed requirements for receiving funding for the installation of solar energy system projects under the CPUC-managed incentive programs, including the MASH and SASH Programs. Note that SASH Program details are found in its Handbook, attached hereto as Appendix D.

The CSI Program builds on nearly 10 years of State solar rebates offered to customers in California IOU territories. Former solar incentive programs included the Emerging Renewables Program (ERP) and the Self-Generation Incentive Program (SGIP). In August 2004, Governor Schwarzenegger widened State support for solar generation technologies and announced the Million Solar Roofs program. In 2006, the CPUC collaborated with the California Energy Commission (CEC) to develop the framework of the CSI Program through 2016. In August 2006, Governor Schwarzenegger signed Senate Bill 1 (Murray), which authorized the CPUC's CSI Program.[1] In January 1, 2007, the CSI Program launched and began operating under the CSI Program Handbook. PG&E and SCE act as Program Administrators (PAs) in their respective service territories, and the Center for Sustainable Energy (CSE) is the PA in SDG&E territory. The CEC separately administers the New Solar Homes Partnership (NSHP) Program for residential new construction – and they have a separate program handbook. California's publicly owned utilities administer solar programs in their respective territories.

1.1.1 CSI Program Budget

The total CSI Program budget is $2,167 million, $1,950 million for the GM CSI Program, $108.3 million for the MASH Program and $108.3 million for the SASH Program. The CSI Program budget as authorized by the CPUC for each Program Administrator is shown in Table 1 (numbers rounded). Program Goals for capacity were originally established by the Commission in 2006 in Decision (D.) 06-12-033. The program budget for incentives was also established in D.06-12-033, and modified in 2010 in D.10-09-046.

[1] Chapter 132, Statutes of 2006 (SB 1, Murray)

The CSI Program will be offered until the Program Administrator territory megawatt targets have been reached or until the allocated incentive budget for each Program Administrator territory has been spent, whichever occurs first. CSI projects will not receive a reservation if funding is not available and will be placed on a waitlist.

Once the incentive budget becomes fully subscribed within each Program Administrator territory, the incentive amount per application will be capped at the reserved amount in Step 1 (Reservation Request step). System modifications resulting in an increase in the incentive amount during the PPM or ICF step will not be paid.

Conversely, if the system modification results in a decrease in the incentive amount during the ICF step, the lower of the PPM confirmed reservation amount and the revised incentive will be paid.

Table 1
CSI Program Budget by Program Administrator, 2007-2016 ($ millions)

Program Administrator	% of Total Budget	Budget (in millions)
PG&E	43.7%	$ 946
SCE	46.0%	$ 996
CSE[2]/SDG&E	10.3%	$ 223
Total	100%	$ 2,165

1.1.1.2 Mechanisms to Forecast Remaining GM CSI Budget Funds

Due to budgetary constraints (D.10.09.046), the Program Administrators may be unable to guarantee a CSI incentive once CSI funding becomes expended for a specific customer sector of a Program Administrator's territory. Hence, the CSI Program Administrators created a CSI Weekly Budget Report which provides a snapshot of the forecasted remaining incentive budget, including the amount of funds and megawatts remaining in each sector, as well as an estimate of how far the remaining incentive budget will last through the step table. The CSI Weekly Budget Report is available on the California Solar Statistics website: http://www.californiasolarstatistics.org/reports/budget_forecast/ .

Given the high levels of program participation, the rapid pace of incentive steps reduction and the fact that payments to PBI participants are greater than forecasted in D.06-08-028, a "buffer" must be established to assure that adequate funds are available to provide incentive payments for overproducing PBI projects. The CSI PAs collectively agreed to set aside a certain percent of the currently available funds. The method for calculating the PA specific incentive dollars anticipated was performed by aggregating all currently committed Residential and Non-Residential PBI incentives in PowerClerk, and then multiplying it by 1.06 (a 6% increase). The 6% reserve amount is a value derived from the Itron impact evaluation study published in the 4th

2 CSE is administering the program in SDG&E utility territory.

quarter of 2010. The Itron study found on an aggregate basis that there was a 6% higher capacity factor for all the PBI projects that were reviewed. Given that PBI project overproduction has demonstrated high variability throughout the PA service territories, each PA may choose to adjust their respective overproduction incentive reserve amount and set aside an additional amount to the “buffer” to ensure the incentive budget is not overspent.

Remaining incentive funds have been forecasted in the Weekly Budget Report to determine at which step funds would be exhausted after applying the 6% reserve for each CSI PA’s respective sectors (Residential and Non-Residential). However, it does not include the buffer adjusted for each PA territory.

The methodology used to forecast the amount of MW incentivized by the remaining funds, utilized the current participation rates in each of the PAs respective EPBB/PBI and Customer Sectors (Residential/Commercial/Government/Non-Profit). Under the assumption that the current participation rates will continue for the foreseeable future the remaining incentive funds have been determined for each PAs currently unsubscribed steps.

1.1.2 Eligible Customer Segments and MW Targets

All customer segments are eligible for the CSI Program. Table 2 shows the MWs expected to be generated by customer sector in the GM CSI Program. An additional 190 MW is expected from the residential MASH and SASH Programs, for a total of 1,940 MW of installed solar capacity by 2016.[3] GM CSI MW targets for each PA are shown in Table 3 below (numbers rounded). Customer sectors are residential and non-residential. Customer segments include residential, commercial, and government and non-profit. For the purpose of the CSI Program, the commercial segment includes agricultural and industrial customers.

Table 2
GM CSI MW Target Allocations by Customer Sector

Customer Sector	MW	Percent
Residential	578	33%
Non-Residential	1173	67%
Total	1,750	100%

1.1.3 Currently Applicable Incentive Levels, MW Targets and Step Triggers for CSI Program

The currently applicable incentive levels available in each PA territory are available at www.csi-trigger.com. The incentive levels available through the GM CSI Program are divided into 10 "steps". Each step is for a targeted amount of MWs. As the program receives reservations in each step, it works towards the "trigger" when the next step (i.e., a lower incentive level) is

3 Currently, the GM CSI program is scheduled to end December 31, 2016, and the MASH and SASH programs end December 31, 2015.

offered. The incentive levels available reduce automatically over the duration of the program based on the volume of MW of solar reservations issued. Projects are counted toward the MW goals once they are deemed eligible, have paid an application fee (if applicable), and have received notice their reservation has been approved. CSI Incentive levels available at any particular time may vary by PA service territory, depending on the pace of solar demand in that territory. Additionally, incentive levels may differ for residential and non-residential customer sectors based on the demand by each. Table 3 displays the incentives available for each "step" by PA service territory and customer sector. The incentive levels for the low-income residential programs are not subject to change based on MW Targets and Step Triggers, but at the discretion of the CPUC, may be lowered or raised based on market changes.

Table 3
GM CSI MW Targets by Program Administrator and Customer Class

		PG&E (MW)		SCE (MW)		CSE (MW)	
Step	**MW in Step**	**Res**	**Non-Res**	**Res**	**Non-Res**	**Res**	**Non-Res**
1	50	-	-	-	-	-	-
2	70	10.1	20.5	10.6	21.6	2.4	4.8
3	100	14.4	29.3	15.2	30.8	3.4	6.9
4	130	18.7	38.1	19.7	40.1	4.4	9.0
5	160	23.1	46.8	24.3	49.3	5.4	11.0
6	190	27.4	55.6	28.8	58.6	6.5	13.1
7	215	31.0	62.9	32.6	66.3	7.3	14.8
8	250	36.1	73.2	38.0	77.1	8.5	17.3
9	285	41.1	83.4	43.3	87.8	9.7	19.7
10	350	50.5	102.5	53.1	107.9	11.9	24.2
Total	**1750**	**252.4**	**512.3**	**265.6**	**539.5**	**59.5**	**120.8**
Total by Utility		764.8		805.0		180.3	
Percent		43.7%		46.0%		10.3%	

1.1.4 Incentive Structure

The GM CSI Program offers two types of incentives: Expected Performance Based Buydown (EPBB) and Performance Based Incentives (PBI). The EPBB incentives are paid based on verified solar energy system characteristics such as location, system size, shading, and orientation. The PBI incentive is a flat cents-per-kWh payment for all output from a solar energy system over its initial five years of operation. The amount of the EPBB or PBI incentive depends on which incentive payment levels will be reduced automatically over the duration of the CSI Program in 10 steps, based on the volume of MW of solar reservations issued by each Program Administrator. The EPBB and PBI levels are directly tied to the 10 steps as outlined in Table 4. See Sections 1.5 (Getting Paid) and 3.1 (GM CSI Program Incentive Trigger Mechanism) for more detail. Incentive information for the MASH and SASH Programs is found in Section 1.1.5

(Special Funding for Low Income Projects). To find the incentive rate currently available in your Program Administrator's service territory, see www.csi-trigger.com.

Table 4
GM CSI PBI and EPBB Payment Amounts by Step

		EBPP Payments (per watt)			PBI Payments (per kWh)		
MW Step	**Statewide MW in Step**	**Residential**	**Commercial**	**Gov't/ Nonprofit**	**Residential**	**Commercial**	**Gov't/ Nonprofit**
1	50*	n/a	n/a	n/a	n/a	n/a	n/a
2	70	$ 2.50	$ 2.50	$ 3.25	$ 0.39	$ 0.39	$ 0.50
3	100	$ 2.20	$ 2.20	$ 2.95	$ 0.34	$ 0.34	$ 0.46
4	130	$ 1.90	$ 1.90	$ 2.65	$ 0.26	$ 0.26	$ 0.37
5	160	$ 1.55	$ 1.55	$ 2.30	$ 0.22	$ 0.22	$ 0.32
6	190	$ 1.10	$ 1.10	$ 1.85	$ 0.15	$ 0.15	$ 0.26
7	215	$ 0.65	$ 0.65	$ 1.40	$ 0.09	$ 0.09	$ 0.19
8	250	$ 0.35	$ 0.35	$ 1.10	$ 0.05 (a)/ $ 0.044 (b)	$ 0.05 (a)/ $0.044 (b)	$ 0.15(a)/ $ 0.139 (b)
9	285	$ 0.25	$ 0.25	$ 0.90	$ 0.03 (a)/ $ 0.032 (b)	$ 0.03 (a)/ $ 0.032 (b)	$ 0.12(a)/ $ 0.114 (b)
10	350	$ 0.20	$ 0.20	$ 0.70	$ 0.025	$ 0.025	$ 0.088

*The first 50 MW are allocated under the 2008 SGIP and are not pro-rated by customer class or service territory.

1.1.5 Special Funding for Low Income Programs

The CPUC has allocated 10 percent of the overall CSI Program budget, or $216 million, to incentives for affordable housing/low-income residents. This amount is divided equally between two programs, one for single-family residences (SASH) and one for multifamily residences (MASH). The CPUC adopted the framework for the SASH Program in Commission Decision (D.) 07-11-045, and for the MASH in D.08-10-036.

The MASH Program offers incentives for solar energy system installations on existing multifamily affordable housing that meets the definition of low-income residential housing established in Pub. Util. Code § 2852.a.2. There were two tracks originally offered in the MASH program. Track 1 and Track 2. As a result of the higher demand of the Track 1 incentive program, D.11-07-031 reallocated all unreserved Track 2 incentive budget to Track 1 and closed the Track 2 program

Track 1 provides fixed, up front, capacity-based EPBB incentives. It offers two incentive levels, Track 1A for systems that offsets common area load and Track 1B for systems that offsets tenant load. D.11-07-031 reduced the Track 1 incentive levels for any new MASH Reservation Requests that are reviewed after July 14, 2011. Please see Table 6 for Track 1A and 1B incentive levels.

Table 5
MASH Track 2 Incentive Budget Allocations

SCE	PG&E	CSE
MASH Track 2 Budget $9,200,000	MASH Track 2 Budget $8,740,000	MASH Track 2 Budget $2,060,000
Maximum Award Per Cycle $1,840,000	Maximum Award Per Cycle $1,748,000	Maximum Award Per Cycle $412,000

The SASH Program provides fully subsidized 1 kW solar energy systems to single-family very low-income households and highly subsidized systems to other single-family low-income households (both as defined in Pub. Util. Code § 2852). GRID Alternatives, a non-profit solar organization, manages the SASH Program[4] on the Commission's behalf.

All incentives offered through the MASH and SASH Programs are EPBB. There are no PBI payments for these programs. MASH and SASH incentive rates are fixed and will not increase or decrease based on “triggers” as for the GM CSI Program. Tables 6 and 7 below outline MASH and SASH EPBB payment amounts.

Table 6
MASH EPBB Payment Amounts by Track

	Track 1A Common Area (per watt)	**Track 1B Tenant (per watt)**	**Track 2 (per watt)**
Reservation Requests Reviewed before July 14, 2011	$ 3.30	$ 4.00	$ Varies
Reservation Requests Reviewed on and after July 14, 2011	$1.90	$2.80	closed

Table 7
SASH EPBB Payment Amounts*

Federal Income Tax Liability	Qualifying Low-Income CARE Eligible Homeowners (per watt)	Qualifying Low-Income Homeowners not eligible for CARE (per watt)
$0	$7.00	$5.75
$1 to $1000	$6.50	$5.25

[4] The SASH Program Handbook is attached hereto as Appendix D.

$1001 +	$6.00	$4.75

* EPBB Payments for SASH Applicants qualifying for partial subsidies. Fully subsidized projects are also available for qualifying very low-income households.

Application forms for these two programs are available online at Go Solar California (www.GoSolarCalifornia.ca.gov). SASH information and materials are also available from Grid Alternatives (www.gridalternatives.org; (866) 921-4696; SASH@gridalternatives.org).

1.1.6 Other Solar Electric Generating Technologies

Other solar electric generating technologies include, but are not limited to, electric displacing solar thermal (generally defined as solar forced air heating and solar cooler or air conditioning) and electric generating solar thermal (generally defined as dish Stirling, solar trough and concentrating solar technologies). The CPUC has included the budget for other solar electric generating technologies within the overall CSI budget, but capped the budget for electric displacing solar electric generating technologies at $100.8 million. Any MW from other solar electric generating technologies will be counted toward and paid at the currently applicable step level. Non-PV systems are ***not*** eligible for SASH Program incentives.

1.2 California Solar Initiative Statewide Eligibility

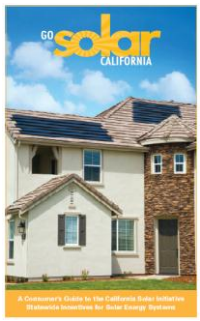
Nearly all residential, commercial, government and non-profit customers of the state's three investor-owned electric utilities—SCE, PG&E and SDG&E—are eligible for the incentives provided through the California Solar Initiative for solar energy systems from 1 kilowatt (kW) up to 1 MW.

Customers of municipal utilities may also qualify for similar incentives through their municipal service provider.

1.3 CSI Application Process

The CSI application process is simple. It begins by completing a quick, free energy efficiency audit. After doing so, select a Solar Contractor, who will then help you determine the correct system size for your premises. They also will fill out the incentive Reservation Request Package and submit it to one of the Program Administrators—SCE, PG&E or CSE (for SDG&E customers). The Program Administrator will then reserve the incentive amount based on the size of your solar project.

Once your system is installed, you or your Solar Contractor will contact the utility for permission to connect your system to its electric grid. After your system is inspected and approved, you or your Solar Contractor will fill out the Incentive Claim Form (ICF) package and submit it to the Program Administrator for payment. Then you will receive a check from the PA for your incentive amount.



More information about the California Solar Initiative is available from our Consumer Guide, available at http://www.gosolarcalifornia.ca.gov/tools/marketing/csi_prgm_info_guide.php.

1.4 Getting Started with Solar

1. Energy Efficiency Self-Audit: Right-Size Your System
Making your home or business energy efficient *before* you Go Solar is an essential first step. Energy-saving actions—such as changing incandescent bulbs to compact fluorescent lamps (CFLs), and replacing old, inefficient appliances—are the best way to save energy and money while providing real, lasting benefits to the environment.

Energy efficiency measures also help reduce the size of the solar energy system you need, saving you thousands of dollars in up-front installation costs.

You will need to complete a simple energy efficiency survey or audit of your home or business prior to applying for CSI Incentives. If you will be working with a contractor, they may be able to assist with your energy audit and energy efficiency goals.

Your California Solar Initiative Program Administrator can provide you with an easy online audit form:

- CSE (for SDG&E customers): *www.gosolar.energycenter.org*
- PG&E: *www.pge.com/csi*
- SCE: *www.sce.com/csi*

Eligible MASH and SASH participants are also encouraged to participate in the CPUC's Low Income Energy Efficiency (LIEE) program. For more information on the LIEE Program, please visit: http://www.cpuc.ca.gov/PUC/energy/consumers/liee.htm.

2. Select the Right Solar Contractor
Licensed contractors are your key to getting the most productive solar energy system for your home or business. Typically, the Solar Contractor will apply for the CSI Incentives on your behalf and arrange for your system to be interconnected to your utility company's power grid. The Solar Contractor may also apply for local permits.

The California Solar Initiative provides a list of Solar Contractors online at http://www.gosolarcalifornia.ca.gov/database/search-new.php. Searching for a Solar Contractor by zip code is the fastest way to find a Solar Contractor closest to you, although any licensed contractor may work on your project. Solar Contractors typically provide free site evaluations, comprehensive quotes and payback information.

A Solar Contractor should be able to evaluate factors that will affect your PV system performance, such as the roof size, orientation (tilt and direction) of the system, shading and other factors.

Just as if you were doing any other type of home improvement, you will want to contact at least three Solar Contractors to help ensure you receive the most competitive bid for your project. It is customary for a Solar Contractor to visit your home to help you plan the location and size of your system, as well as choose the incentive type best for you.

You can verify the Solar Contractor is using a valid contractor's license by contacting the Contractors State License Board (www.cslb.ca.gov) or 1-800-321-2752.

3. Apply for Incentives
You or your Solar Contractor will submit a Reservation Request Package along with any supporting documentation to your California Solar Initiative Program Administrator.

After the Program Administrator receives your RRF, they will reserve funds based on the size and estimated performance of your solar project. These funds will be reserved for a specified period of time during which you must install your solar energy system. Please remember that there is a deadline by which you must interconnect your system and submit your Incentive Claim Form (ICF).

Reserving your incentive early ensures your access to the highest applicable incentive. As more solar energy systems are purchased and installed by California consumers, the amount of available incentive dollars decreases, as does the incentive level.

4. Install Your System
As part of the installation process, your Solar Contractor generally handles any permits required by the city or county. Once the required permits are acquired, a typical residential installation can be completed in three to five days.

Once the system is installed, the city or county will inspect the system. After your new system passes inspection, the utility must be notified to interconnect your system to the grid. Once interconnected, the Program Administrator may also inspect your system as part of program quality control efforts.

Now that your system is interconnected, you can begin reaping the benefits of solar power generation and Net Energy Metering (NEM). Each month, electricity you produce in excess of your own consumption will be sent back to the utility grid and credited to your account for up to one yearly billing cycle. These credits are used to offset some or all of your annual electric consumption from the utility.

Building Permits
Solar contractors should seek building permits from applicable local government permit offices. For solar installations on manufactured homes (mobile home parks), solar contractors must contact the California Housing and Community Development Agency, the permit issuing agency for solar panels on mobile homes, at http://www.hcd.ca.gov/codes/

5. Claim Your Incentive
Once your system has been purchased, installed and is operational, you or your Solar Contractor will submit the Incentive Claim Form (ICF) along with any supporting documentation, including a verification of project cost and a calculation of the expected system output (if there are any changes from the time of your reservation request). The Program Administrator will

verify that your system has been properly connected to the utility electric grid before sending your California Solar Initiative incentive payment. Don't forget to apply for any applicable tax credits.

1.5 Getting Paid: A Quick Guide to CSI Incentives

There are two types of incentives available to residential and non-residential customers through the California Solar Initiative Program: the Expected Performance-Based Buydown (EPBB) and the Performance-Based Incentive (PBI). Both incentives reward high-performance systems—the EPBB is a one-time, up-front payment based on a system's expected performance; PBI payments are based on a system's actual performance and paid out over five years. Table 8 below discusses the difference between the two incentives.

Table 8
EPBB and PBI Incentives

EPBB	PBI
Intended for residential and small business customers	Ideal for large commercial, government and non-profit customers
GM CSI Systems less than 30 kW and all MASH and SASH systems	Mandatory for all systems 30 kW and greater Systems less than 30 kW can opt-in to PBI*
Incentive paid per Watt based on your system's expected future performance (factors include CEC-AC system rating, location, orientation and shading)	Incentive paid based on the actual energy produced by your solar energy system in kilowatt-hours
One-time lump sum up-front payment	Sixty payments over five years

*Systems that may opt-in to PBI include: All small single and dual-axis trackers and fixed tilt systems > 10kW

1.6 CSI Program Forum and Future Program Changes

Commission Decision (D.) 06-08-028 directed that a CSI Program Forum should "provide a public venue for interested parties to identify and discuss ongoing issues related to CSI administration and implementation." The CPUC Energy Division, in partnership with the Program Administrators, hosts quarterly public Program Forums in rotating locations throughout the state. Anyone interested in discussing any aspect of the CSI Program is invited to attend one of these Program Forums and share their comments and ideas. Many of the ideas suggested in these Program Forums have formed the basis for CSI Program Handbook changes. If the Program Forum achieves consensus for more substantive changes beyond the level of the Program Handbook, the Forum may designate a member to file a petition to modify a Commission order or decision relating to the CSI Program.

Information on upcoming CSI Program Forums can be found at http://www.gosolarcalifornia.ca.gov/news_media/newsletter/. Interested parties should also sign up for the CSI Newsletter.

1.7 CSI Handbook Structure

Following this introduction, the CSI Handbook is divided into two primary sections: Program and Technical. The Program Section includes the less technical information about the CSI Program, including descriptions of eligibility and participation, incentive structure and application processes. As its name implies, the Technical Section includes more technical Program information, such as metering requirements, formulas for incentive and system rating calculations, surface orientation factors, PTC ratings, and data transfer rules. Appendices of acronym and term definitions follow these Sections. This structure is intended to make the Handbook more useful and accessible.

1.8 CSI Program Administrator Contact Information and Other Useful Resources

Program Administrators	
Pacific Gas and Electric Company (PG&E) Telephone: Solar Customer Service Center: (877) 743-4112 Fax: (415) 973-2510 Mailing Address: PG&E Solar and Customer Generation (CSI) P.O. Box 7433 San Francisco, CA 94120-7433 Overnight Mail: 245 Market St Mail Code: N7R San Francisco, CA 94105-1797	www.pge.com/solar PG&E offers solar classes: www.pge.com/solarclasses Email: solar@pge.com
Southern California Edison (SCE) Telephone: (866) 584-7436 Fax: (626) 302-3967 Mailing Address: Attn: CSI Program Administrator SCE Customer Solar & Self-Generation Southern California Edison P.O. Box 800 Rosemead, CA 91770-0800	www.sce.com/CSI/ Email: csigroup@sce.com
Center for Sustainable Energy (CSE) – Telephone: (858) 244-1177 Fax: (858) 244-1178 Mailing Address: Attn: CSI Program 9325 Sky Park Ct., Suite 100 San Diego, CA 92123-1502	www.energycenter.org CSE solar events and classes www.energycenter.org/events Email: csi@energycenter.org
SASH Program Manager	
GRID Alternatives Telephone: (510) 652-4730 Toll free: (866) 921-4696 Fax: (510) 225-2585 Mailing Address: 1171 Ocean Ave. Suite 200 Oakland, CA 94608	www.gridalternatives.org Email: SASH@gridalternatives.org

Utility Interconnection & NEM Contacts	
Pacific Gas and Electric Company (PG&E) Telephone: Solar Customer Service Center: (877) 743-4112	www.pge.com/gen Email: gen@pge.com
Southern California Edison (SCE) Telephone: (626) 302-9680 Mailing Address: CSI NEM Program Administrator SCE Customer Solar & Self-Generation Southern California Edison P.O. Box 800 Rosemead, California 91770-0800	Email: solarnem@sce.com
San Diego Gas & Electric (SDG&E) Telephone: (858) 636-5585 Mailing Address: Net Metering Team San Diego Gas & Electric PO Box 129831, CP52F San Diego, CA 92123-9749 Telephone: (858) 636-5581 Mailing Address: Ken Parks San Diego Gas & Electric PO Box 129831, CP52F San Diego, CA 92123-9749	www.sdge.com/business/self_generation.shtml Email: netmetering@semprautilities.com Email: kparks@semprautilities.com
Other Useful Resources	
Go Solar California is the **CSI statewide consumer website** which includes information on the CPUC, CEC, and POU programs, including the CSI Program Handbook	www.GoSolarCalifornia.ca.gov
Information on upcoming **CSI Program Forums** and a sign-up form for the **CSI Newsletter** are available on the Go Solar California site.	http://www.gosolarcalifornia.ca.gov/news_media/newsletter/

The California Solar Initiative provides a **list of Solar Contractors** online	www.gosolarcalifornia.ca.gov/database/search-new.php
Verify that a Solar Contractor is using a valid contractor's license by contacting the **Contractors State License Board**	www.cslb.ca.gov
The CSI Program Administrators use an online tool to calculate the up-front Expected Performance Based Buy down (EPBB) incentive, known as the **EPBB Calculator**	www.csi-epbb.com
The CSI Program Administrators use an online application tool and reporting database, known as **PowerClerk**	www.csi.powerclerk.com
Up-to-date information about the program's current incentive level, or "step" can be found on the online CSI **Trigger Tracker**	www.csi-trigger.com
Information about the **CPUC regulatory** proceeding that deals with the CSI Program	www.cpuc.ca.gov/PUC/energy/solar/
California Solar Statistics contains data information about the progress of the CSI program	www.CaliforniaSolarStatistics.ca.gov
PV system components must be certified by the California Energy Commission. **Lists of CEC-certified eligible equipment** are available on the Go Solar California site or through the CEC Call Center	www.gosolarcalifornia.org/equipment (800) 555-7794
The California Energy Commission's **New Solar Homes Partnership (NSHP) Program** site provides information on the program and how to participate	http://www.newsolarhomes.org/
Information on **federal tax credits** for solar installations can be found on the Go Solar California site	www.gosolarcalifornia.ca.gov/consumers/taxcredits.php

1.9 Acronyms

This section provides a list of acronyms used in this Program handbook.

AB (as in AB 1407, AB 2466, AB 2724, etc.): Assembly Bill

AC: Alternating Current

AMI: Advanced Metering Infrastructure

BIPV: Building Integrated Photovoltaic

BTU: British Thermal Units

CSE: Center for Sustainable Energy

CEC: California Energy Commission

CEC-AC: California Energy Commission Alternating Current, refers to inverter efficiency rating

CPUC: California Public Utilities Commission

CSI: California Solar Initiative

CSLB: Contractors State License Board

DC: Direct Current

ERP: Emerging Renewables Program

EPBB: Expected Performance-Based Buydown

ESCO: Energy Service Company

IDR: Interval Data Recorder

IOU: Investor-Owned Utility

KW: Kilowatt

KWH: Kilowatt-hour

LIEE: Low Income Energy Efficiency

MASH: Multifamily Affordable Solar Housing

M&E: Measurement and Evaluation

M&V: Measurement and Verification

MW: Megawatt

NABCEP: North American Board of Certified Energy Practitioners

NEM: Net Metering

NEMA: NEM Aggregation pursuant to a utility NEM tariff

NRTL: Nationally Recognized Testing Laboratory

NSHP: New Solar Homes Partnership

PBI: Performance-Based Incentives

PDP: Performance Data Provider

PG&E: Pacific Gas and Electric Company

PIER: Public Interest Energy Research

PMRS: Performance Monitoring and Reporting Service

PTC: PVUSA Test Conditions

PV: Photovoltaic

PY: Program Year

RFP: Request for Proposal

SASH: Single-Family Affordable Solar Homes

SB (as in SB 1): Senate Bill

SCE: Southern California Edison Company

SDG&E: San Diego Gas & Electric Company

SGIP: Self-Generation Incentive Program

SOF: Surface Orientation Factor

STC: Standard Test Conditions

UL (as in UL 1703): Underwriters Laboratories, Inc.

PROGRAM SECTION

2. Program Eligibility Criteria and Requirements

The CSI Program offers monetary incentives for eligible systems up to the first 1,000 kW (1 MW) CEC-AC[5] of generating capacity or displaced grid electric load. To qualify for incentives, all CSI Program eligibility criteria must be satisfied. The effective dates for the CSI Program are January 1, 2007 through December 31, 2016[6], or until the CSI Program budget has been fully reserved for each Program Administrator, whichever comes first.

2.1 CSI Program Participants

Any retail electric distribution customer of PG&E, SCE, or SDG&E is eligible to install a solar energy system project (Project) and receive incentives from the CSI Program. Eligible participants in the CSI Program must be current electric distribution customers of Program Administrator at the facility (Project Site) where the Project will be installed. Within the nomenclature of the CSI Program, the person who applies for an incentive is referred to as a Host Customer, a System Owner, and/or Applicant. Other participants include Solar Contractors and Equipment Sellers. The SASH Program has different definitions and criteria for its participants than the GM CSI Program, information on which is provided in Appendix D.

2.1.1 Applicant

The Applicant is the entity that completes and submits the CSI Program application and serves as the main contact person for the CSI Program Administrator throughout the application process. Host Customers may act as the Applicant or they may designate a third party to act as the Applicant on their behalf. Applicants may be third parties (i.e., a party other than the Program Administrator or the utility customer) such as, but not limited to, engineering firms, Solar Contractors, equipment distributors, energy service companies (ESCO) and equipment lessors.

2.1.2 Host Customer

Any retail electric distribution customer of PG&E, SCE or SDG&E is eligible to install a solar project and receive incentives from the CSI Program and, therefore, can be a Host Customer.

For the GM CSI, the Host Customer is, in most cases, the utility customer of record at the location where the generating equipment will be located. Any class of customer (industrial, agricultural, commercial, or residential) is eligible to be a Host Customer. For MASH, the Host Customer may also be the owner of or persons/entity responsible for, the property where the generating equipment will be located. The Project Site must be within the service territory of, and receive retail level electric service[7] from, PG&E, SCE, or SDG&E. Municipal electric utility customers are not eligible to receive incentives from the designated Program Administrators. If

5 California Energy Commission Alternating Current is PTC Rating x Number of Modules x Inverter Efficiency
6 Currently the GM CSI program is scheduled to end December 31, 2016, and the MASH and SASH programs are scheduled to end December 31, 2015.
7 "…retail level electric service…" means that the Host Customer pays for and receives distribution services, as defined by their respective utility rate schedule.

a Host Customer ceases to be a retail level electric distribution customer of PG&E, SCE, or SDG&E, they will not be eligible to receive any remaining unpaid PBI payments.

In circumstances where the Host Customer is not on the Electric Service Provider Account, a letter of explanation must be sent to the Program Administrator explaining the relationship of the Host Customer to the person(s) who is on the utility service bill and interconnection agreement. This letter is waived for the MASH Program.

The Host Customer is the incentive reservation holder. The Host Customer may act as the Applicant and/or System Owner. The Host Customer alone will retain sole rights to the incentive reservation and corresponding incentive reservation number. The Host Customer has the right to designate the Applicant, energy services provider, and/or Solar Contractor to act on their behalf. The Host Customer also has the right to change these parties at any given time with prior written notice to the Program Administrator. However, the Host Customer shall be party to the CSI Program contract.

The Host Customer or Applicant is encouraged to submit the CSI application as early as possible in the process in order to confirm the reservation amount. All Projects must meet all eligibility requirements in order to receive the CSI Incentives.

2.1.3 System Owner

The System Owner is the owner of the generating equipment at the time the incentive is paid. For example, when a vendor sells a turnkey system to a Host Customer, the Host Customer is the System Owner. In the case of a third-party-owned system (or leased system, for example), the third party (or lessor) is the System Owner.

The System Owner should be designated on the Reservation Request Package, if known at that time, and on the Incentive Claim Form. If different from the Host Customer, the System Owner shall also be a party to the CSI Program contract. The Program Administrator may require documentation substantiating equipment ownership.

2.1.4 Solar Contractor

Except for those systems that are self-installed, all systems must be installed by appropriately licensed California contractors in accordance with rules and regulations adopted by the State of California Contractors State Licensing Board (CSLB). Solar installation contractors must have an active A, B, C-10, or a C-46 license for photovoltaic (PV) systems. Please see Section 2.4 for Warranty Requirements of Self-Installed systems and Section 4.11.3.8.1 for required documentation of Self-Installed systems.

Although not required, solar installation contractors are encouraged to become certified by the North American Board of Certified Energy Practitioners (NABCEP). For additional information on NABCEP, go to www.nabcep.org.

In all cases, systems must be installed in conformance with the manufacturers' specifications and with all applicable electrical and building codes and standards.

The Program Administrator will verify that the Solar Contractor has an active license with the California Contractors State Licensing Board (CSLB), in accordance with the above requirement, during application process review.

2.1.4.1 Suspended Solar Contractor License

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

- Reservations will not be confirmed and all applications associated with the contractor will be suspended;
- No CSI Incentive payment will be made unless the system was interconnected 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.
- Incentive payments will not be made to contractors whose license is expired or suspended

If a suspended license occurs under a qualifying bond individual or responsible managing officer, as designated by the CSLB and has previously been suspended from the Program under a different company name, the new company will also be suspended from the Program

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

2.1.5 General CSI Eligibility Guidelines

The following Customer segments and associated Project sizes are generally used to determine incentive types, application processes and Program eligibility:

GM CSI:

- Residential: All Project sizes; Retrofit projects only, no new construction
- Small Non-residential: Projects <10kW; Retrofit and new construction projects
    - Commercial (including agricultural and industrial)
    - Government, Non-profit and Public Entities
- Non-residential: Projects ≥ 10 kW; Retrofit and new construction projects
    - Commercial (including agricultural and industrial)
    - Government, Non-profit and Public Entities

MASH:

- Residential - Multi-family low-income: All eligible Project sizes (1kW – 5 MW); Retrofit projects only, no new construction
- Eligibility under Pub. Util. Code Section 2852 (a)(3) defines "low-income residential housing" as one of the following:
    - Multifamily residential complex financed with one or more of the following:
        - low-income housing tax credits
        - tax-exempt mortgage revenue bonds
        - general obligation bonds
        - local, state, or federal loans or grants

    AND for which either of the following applies:

        - the rents of the occupants who are lower income households do not exceed those prescribed by deed restrictions or regulatory agreements pursuant to the terms of the financing or financial assistance; or

        - the affordable units have been or will be initially sold at an affordable housing cost to a lower income household, and those units are subject to a resale restriction or equity sharing agreement pursuant to the terms of the financing or financial assistance

    2. Multifamily residential complex in which at least 20% of the total housing units are sold or rented to lower income households AND either of the following applies:
        - The rental housing units targeted for lower income households are subject to a deed restriction or affordability covenant with a public entity or nonprofit housing provider organized under Section 501(c)(3) of the Internal Revenue Code that has as its stated purpose in its articles of incorporation on file with the office of the Secretary of State to provide affordable housing to lower income households that ensures that the units will be available at an affordable rent for a period of at least 30 years; or

        - The housing units have been or will be initially sold at an affordable cost to a lower income household, and those units are subject to a resale restriction or 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, with a public entity or nonprofit housing provider organized under Section 501(c)(3) of the Internal Revenue Code that has as its stated purpose in its articles of incorporation on file with the office of the Secretary of State to provide affordable housing to lower income households.

SASH:

- Residential - Single-family low-income: All eligible Project sizes (see Appendix D, SASH Handbook for details); Retrofit projects only, no new construction

The following are ***not*** eligible for incentives under the CSI Program:

- Customers who have entered into utility contracts for distributed generation (DG) services (e.g., DG installed as a distribution upgrade or replacement deferral) and who are receiving payment for those services. This does not include third-party ownership arrangements, i.e., power purchase agreements, which are allowed.
- Customers who have entered into agreements that entail the export and sale of electricity from the Host Customer Site. This does not include net energy metering agreements, which are allowed.
- Customers who have received a final interconnection authorization letter more than 12 months prior to submitting a CSI Reservation Request Package.
- Publicly-owned or investor-owned gas, electricity distribution utilities or any electrical corporation (ref. Public Utility Code 218) that generates or purchases electricity or natural gas for wholesale or retail sales.
- Residential new construction systems are not eligible for the CSI Program and should apply to the California Energy Commission's New Solar Homes Partnership Program.

2.1.5.1 Eligibility for Applicants Participating Concurrently in the CSI Program and NEM Aggregation pursuant to a Utility NEM Tariff

The eligibility for applicants participating concurrently in the CSI Program and NEM Aggregation pursuant to a Utility NEM Tariff for an incentive based on the aggregated system will be based on current Reservation status in the CSI Program.

New applications: Any applicant participating in NEM Aggregation pursuant to a Utility NEM Tariff who have not yet submitted an application for a CSI incentive should submit the initial CSI reservation to reflect the aggregated system, and should supply physical address, account and meter information for all accounts (Generating and all Aggregated Accounts(s)) that are part of the NEM Aggregation arrangement, as filed with the Utility, not only in the application, but also on all supporting documents, including, but not limited to, the Reservation Request Form and Letter of Authorization to Receive Customer Information (if applicable). The Energy Efficiency Audit requirement should be completed for each physical address that is documented on the NEM Aggregation arrangement, as filed with the Utility. The PA may request additional documentation on a case by case basis.

Existing applications: Any application that has not yet reached *Reservation Reserved* status[8] will have the option to revise his/her reservation to reflect the aggregated system, except where limited by the respective utility territory's available incentive funding. The PA may request new CSI Program documentation and/or application fee(s) if the reservation is changed from the original submission.

[8] Statuses prior to *Reservation Reserved* may include *Reservation Request Review; Suspended Reservation Request Review; Pending RFP.*

Multiple solar electric systems that have multiple reservations in the CSI Program queue that have already reached *Confirmed* status, and/or any status prior to *Confirmed*[9] but not further[10], and are re-designed to form a single generating solar electric system that offsets aggregated loads and participates in NEM Aggregation may opt to combine the reservations into a single application, not to exceed the sum of the originally Reserved dollar amount(s). The PA may request new CSI Program documentation and/or application fee(s) if the reservation is changed from the original submission.

All reservation awards will be dependent upon the respective utility's available incentive funding.

2.2 Generation System Equipment Eligibility

Although solar PV systems (i.e., systems that cause direct conversion of sunlight to electricity) are expected to be the common technology to receive incentives from the CSI Program, the CSI Program also accepts applications for other solar electric generating technologies. Guidelines for other solar electric generating technologies (including estimation, measurement and metering) are included in this CSI Handbook.[11]

Details of the eligibility requirements for generation system equipment follow.

2.2.1 New Equipment, Not Pilot or Demonstration Systems

All major system components (panels and inverters) must not have been previously placed in service in any other location or for any other application. Rebuilt, refurbished, or relocated equipment is not eligible to receive CSI Incentives.

Components that are critical to the PV systems must have at least one year of documented commercial availability to be eligible. Commercially available means that the major solar energy system components are acquired through conventional procurement channels, installed and operational at a Project Site. Ineligible equipment includes field demonstrations for proof-of-concept operation of experimental and non-conventional systems partially or completely paid for by research and development funds. Pilot and Demonstration systems are ineligible for CSI Incentives. Components that are enhancements to existing products and new models of existing product lines do not have to meet the commercial availability requirement as long as they are UL-certified and performance data exists to allow the Program Administrators to estimate their expected performance.

An alternative method of seeking eligibility for solar energy systems that use new technologies is to obtain certification from a nationally recognized testing laboratory indicating that the

[9] Statuses prior to *Confirmed* may include *Reservation Request Review; Suspended Reservation Request Review; Pending RFP; Reservation Reserved.*

[10] Applicants are not eligible to revise the application to reflect an aggregated system or receive an incentive for an aggregated system if under of any of the following statuses: *Incentive Claim Request Review; Suspended Incentive Claim Request Review; Pending Payment; PBI-In Payment; Completed.* These statuses indicate that the final incentive amount has been reserved, and the system has already been interconnected with the Utility.

[11] PV systems are the only technologies eligible to receive incentives from the SASH Program. Non-PV technologies, including solar hot water systems, are not eligible for SASH Program incentives.

technology meets the safety and/or performance requirements of a nationally recognized standard. System component ratings must also be certified by the California Energy Commission as described in Section 6.1.

As an exception, the Applicant may specify equipment that has not yet received California Energy Commission certification, but the equipment must be certified prior to the first incentive payment.

New panels added to an existing inverter that is already in service are eligible to receive a CSI Incentive if the previously installed solar generating system met Program requirements at the time of installation and was partially funded by the Program Administrators in accordance with SB1. The new panels must meet the criteria for new systems found in Section 2.2.1.

2.2.2 Eligibility of Replacement PV Systems

Replacement solar energy systems may be eligible for the CSI Program provided that it meets the criteria for new systems found in Section 2.2.1 and the removed system is outside the warranty guidelines of the Self-Generation Incentive Program, the California Energy Commission's Emerging Renewables Program, or Rebuild a Greener San Diego Photovoltaic Program.

2.2.3 Eligibility of Other Solar Electric Generating Systems

Other solar electric generating technologies are categorized as either electric displacing[12] or electric generating, and include:

- Electric Displacing
  - Solar space & process heating
  - Solar driven cooling (e.g., absorption and adsorption chillers, and desiccant systems)

- Electric Generating
  - Dish Stirling
  - Solar Trough
  - Dish and Lens
  - Concentrating Solar

2.2.4 Equipment Must Serve On-Site Electrical Load

To be eligible for CSI Incentives, the system must be sized so that the amount of electricity produced by the system primarily offsets part or all of the Host Customer's electrical needs at the Project Site. Unless additional load substantiation documentation is submitted, the estimated annual kWh production of the proposed system as shown on the EPBB Calculator may not be higher than the sum of the previous 12-month energy usage(s) for all eligible meters.

[12] Other solar electric generating technologies displacing electricity are subject to an incentive cap of $100.8 million. Per D.06-01-024, domestic hot water solar thermal technologies are not eligible to receive CSI Incentives.

For systems 5kW or less, substantiation of system sizing is not required with the submittal of the initial application (Reservation Request Package).

For residential systems less than or equal to 10kW where historical electrical load cannot be determined due to extensive remodeling, on-site electrical load may be determined using the calculation of 2 watts per square foot.

For MASH systems, common load areas will be subject to the same rules as above and will be considered separately from tenant areas. Tenant units will be aggregated for sizing limits. For example, up to 50 kW of a system may be allocated to 10 units in a building without requiring system size justification because the average will be 5 kW or less.

Any local governments participating in the RES-BCT tariff (AB 2466) are eligible for incentives up to the total annual electrical load (kWh) at the Site where the generating system is located. The system's annual production capacity may not exceed the total annual electrical load at the Site where the generating system is located and the Non-Site benefitting account(s) combined. Local government sites participating in the RES-BCT tariff must comply with the 1MW cap per site.

A solar customer participating in NEM Aggregation pursuant to a utility NEM tariff may be eligible for incentives up to the total annual electrical load (kWh) of the multiple meters that the generating system is offsetting. The system's annual production capacity may not exceed the total annual electrical load of all meters, defined as the Generating Account and all Aggregated Accounts, in the NEM Aggregation arrangement filed with the Utility. Eligible NEM Aggregation participants must comply with the 1MW cap.

2.2.5 System Size

The minimum system size eligible for an incentive is 1 kW CEC-AC. The maximum incentive provided for a Host Customer Site (see Site definition) under the CSI Program is 1,000 kW (1 MW) CEC-AC; however, a Host Customer Site may elect to install up to 5 MW of generation.[13] If an Applicant has already received funding for 1 MW from another solar incentive program (such as the SGIP or ERP), they may apply for up to another 1 MW of new generation under the CSI Program on the same Project Site as long as they can demonstrate that the electricity produced by the combined system sizes does not exceed the actual energy consumed during the previous 12 months at the Site, based on the process provided in Section 2.2.4. In accordance with Senate Bill 1 (2006), no solar energy systems that exceed a customer's onsite load(s) will receive a CSI incentive.

Beginning on January 1, 2011 State Agencies[14] will be eligible for up to 5 MW (CEC-AC) of incentives. The State Agency must demonstrate that the electricity produced by the system(s) does not exceed the actual energy consumer during the previous 12 months at the Site. State

[13] Because the CSI Program and statutes only allow for customers to receive incentives up to the first MW, PBI payments for energy output on systems larger than 1 MW will be prorated based on the ratio of 1 MW to the entire size of the site. See Section 3.3 for further detail.

[14] "State Agency" means any state agency, board, department, or commission, including the entities specified in subdivision (a) of Section 15814.12 of the Government Code.

Agencies are limited to an aggregate 26 megawatts (CEC-AC) of CSI incentives. This section shall remain in effect only until January 1, 2013.

Program Administrators will use the CEC-AC rating, but not a Design Factor[15], to determine eligibility according to these minimum and maximum sizes. Program Administrators will also use the CEC-AC rating without a Design Factor to determine eligibility for the EPBB or PBI incentive.

Because the average annual residential electricity consumption in California is approximately 7000 kWh/yr, systems that are 5 kW or less, are assumed to comply with system size requirements (i.e., being sized to serve on-site electric load.)

For all systems, the system size must be calculated using the CEC-AC rating standards,[16] including inverter DC-to-AC losses. To calculate the CEC-AC rating, the following formula should be used:

System Size Rating (kilowatts) = Quantity of Photovoltaic Modules x CEC Rating of Photovoltaic Modules x CEC Inverter Efficiency Rating/ 1000 (watts/kilowatt)

However, for the Program Administrators to allocate applications against their MW in step (See Section 1.1.3), they will multiply the system size rating by a Design Factor that reflects the system's "effective capacity."

For systems applying for the EPBB incentive, this is relatively straightforward, since this ratio is equal to the Design Factor generated by the EPBB calculator. Thus for EPBB systems, system size is equal to the system size rating times the Design Factor generated by the EPBB calculator for that system.

For PBI systems, the Program Administrators will derive a Design Factor based on the following calculations:

1. Estimated Capacity Factor = Estimated annual kWh [17] ÷ (8760 x CEC-AC rating)
2. Proxy Design Factor = Estimated Capacity Factor from #1 ÷ Prevailing Capacity Factor [18]
3. CSI System Size (kW) = Proxy Design Factor x CEC-AC system size

2.2.5.1 System Sizing Based on Future Load Growth

In the case of Applicants with new or expanded sites with no electric bill history or where the existing electric bill does not reflect the Applicant's expected expanded consumption, the Applicant must include an estimate of the expected expanded consumption. An engineering

[15] The Design Factor is a ratio comparing a proposed system's expected generation output with that of a baseline system.
[16] CEC-AC is a standard for a rating a system's power that is based upon 1,000 Watt/m2 solar irradiance, 20 °Celsius ambient temperature, and 1 meter/second wind speed. The CEC-AC Watt rating is lower than the Standard Test Conditions (STC), a Watt rating used by manufacturers.
17 Found in the EPBB Calculator results (www.csi-epbb.com).
18 This equals 0.18 for steps 2 and 3, and 0.20 for steps 4-10.

estimate is preferred. The engineering estimate must include the appropriate substantiation of the forecast of the Host Customer Site's annual energy use (in kWh) if the generating system size is based on future load growth, including new construction, load growth due to site expansion or other load growth circumstances. Suggested methods of demonstrating load growth include Application for Service with corresponding equipment schedules and single line diagram; building simulation program reports such as eQUEST, EnergyPro, DOE-2, and VisualDOE; or detailed engineering calculations or lists of equipment with corresponding equipment schedules. The Program Administrator will verify the load growth predicted before moving forward with the Confirmed Reservation Notice. Systems that are 5 kW or less, are assumed to comply with being sized to serve on-site electric load and do not require substantiation. See Section 2.2.4 for information on calculations for small residential systems (≤ 10 kW) and the MASH exception.

2.3 Energy-Efficiency Requirements

2.3.1 Existing Residential and Commercial Buildings

An energy audit is required for all existing residential and commercial buildings to be eligible for a CSI Incentive. Acceptable audit protocols consist of an online audit, telephone audit, or onsite audit provided by the utilities, third-party provider or Program Administrator. The utilities or Program Administrator may also provide additional audit tools for customers. Third-party providers of energy efficiency audits may also provide audits at the expense of the Host Customer. At a minimum, the provider must perform an online or phone audit. After an audit is performed, Host Customers are responsible for submitting a copy of the completed Energy Efficiency Audit to the CSI Program Administrator. Additionally, as part of the Reservation Request Form an Energy Efficiency Disclosure must be completed and submitted to the CSI Program Administrator with their CSI Reservation Request Package.

For customers on an agricultural tariff, an energy efficiency audit is required if the solar energy system is serving a building load. Agricultural solar energy systems not serving a building load (e.g. pump) will not need an efficiency audit.

The Energy Efficiency Disclosure, included in the Reservation Request Application, must be signed and completed by the Host Customer. The Disclosure certifies that the Program Administrator has provided the Host Customer with information regarding their building that enables them to make informed decisions on energy efficiency. The Disclosure identifies which, if any, energy efficiency measures will be taken. If measures are to be installed after the installation of the solar energy system, then the Host Customer shall declare on the Disclosure which measures have or will be installed.

Additionally, the Host Customer acknowledges that the following information have been reviewed:

- Most recent 12 months of the building's energy consumption.
- List of building energy use assessment services and tools available for use by the building owner for further investigation—for commercial buildings, this must include information on available retro-commissioning services.
- List of possible cost-effective energy efficiency measures applicable to the building.

- List of current utility energy efficiency rebates and incentives that are available.

Energy Efficiency Disclosure to be signed by the Host Customer as part of the CSI Reservation Request Package:

- Certification that the building owner/manager/ratepayer has received the above information.
- A list of the energy use assessment services or tools the building owner/manager/ratepayer used to identify cost-effective energy efficiency measures that could be installed in the building.
- A list of the energy efficiency measures that have been installed or will be installed prior to or in conjunction with the installation of the solar energy system.
- If energy efficiency measures are planned to be installed at a later time, the date by which these measures are planned to be installed.
- A copy of the energy audit report for existing residential buildings and commercial buildings less than 100,000 square feet.

2.3.1.1 Existing Commercial Buildings with Conditioned Floor Area of 100,000 Square Feet or Larger Applying for an EPBB Incentive

In addition to the Energy Efficiency Audit and Energy Efficiency Disclosure requirements described above, the energy use intensity (EUI) shall be benchmarked[19] using Portfolio Manager or the equivalent for existing commercial buildings with conditioned floor area of 100,000 square feet or larger. The two benchmarking options can be accessed on the Internet at http://www.energystar.gov/benchmark.

In order to qualify for a CSI Incentive, retro-commissioning is required if these existing commercial buildings have a benchmark rating of less than 75. A Commitment Agreement, provided by the CSI Program Administrators, must be completed and signed by the Host Customer (for buildings with a benchmark rating less than 75) along with proof of benchmarking and submitted with the CSI Reservation Request Package. The Agreement will indicate dates when the retro-commissioning will begin and be completed; and commit the Host Customer to complete equipment adjustments, or cost-effective efficiency improvements identified in the retro-commissioning assessment.

Retro-commissioning is required to be completed before the CSI Incentive payment is made. If required, the Retro-commissioning report will need to be submitted with the Incentive Claim Form. Systems to be retro-commissioned include but are not limited to:

- Heating, ventilation, and air conditioning systems and controls.
- Lighting systems and controls.
- Daylighting systems and controls.
- Domestic hot water systems and controls.

[19] Benchmarking is a process that compares the energy use of the building to the energy use of a population of similar buildings.

- Renewable energy systems and associated equipment and controls.
- Process equipment and appliances specific to hospital, restaurant, and hotel/motel operations.
- Refrigeration in supermarket and refrigerated warehouses.

The Commitment Agreement form will be posted on each PA website.

After these cost-effective energy efficiency measures are implemented to improve a buildings rating to exceed 75, further energy efficiency measures are not required. A building does not need to be re-benchmarked to receive a CSI Incentive. If equipment/appliance replacement is recommended during the retro-commissioning process, the replacement shall be made with ENERGY STAR® equipment or appliances, or equipment or appliances that qualify for utility energy efficiency incentives, whichever is more efficient.

2.3.1.2 Energy Efficiency Exemptions

2.3.1.2.1 Exemptions for Existing Residential Buildings

For an existing home, an energy efficiency audit is not required if it meets one of the following circumstances. A copy of the documentation of meeting one of these circumstances must be submitted with the CSI Reservation Request Package:

1. Having an acceptable energy audit report during the past three years.
   Examples of acceptable energy audit reports: Copy of energy audit report summary completed through a customer's local utility company, home inspection report from an independent vendor or consultant, Home Energy Rating Summary (HERS) from a certified HERS rater.

2. Proof of Title 24 energy efficiency compliance that was issued within the past three years

There is no exception for the signed Energy Efficiency Disclosure Form.

2.3.1.2.2 Exemptions for Existing Commercial Buildings

For an existing commercial building, the energy efficiency requirements need not be met for the following:

- Agricultural and industrial facilities which are not covered by Portfolio Manager or the California Energy Commission's equivalent benchmark ratings are not required to be benchmarked
- Energy efficiency is not required to be addressed when solar energy systems are not serving electricity to a building
- The energy audit, benchmarking and retro-commissioning are not required for buildings that have complied with Title 24 requirements for newly constructed buildings during the last 12 months prior to applying for the solar energy incentive; proof of Title 24 compliance shall be included with the CSI Incentive application
- Retro-commissioning is not required for existing commercial buildings that have a current ENERGY STAR label

- Retro-commissioning is encouraged, but not required for PBI Applicants

2.3.2 New Construction: Residential and Commercial Buildings[20]

2.3.2.1 New Construction: Residential

Residential new construction projects (single family home, custom homes and multifamily buildings) are not eligible for CSI Incentives. They are eligible for New Solar Homes Partnership (NSHP) Program incentives. Please contact the appropriate Program Administrator managing the NSHP. NSHP information, applications and program requirements are available at www.GoSolarCalifornia.ca.gov.

2.3.2.2 New Construction: Commercial

Prior to July 1, 2009 copies of current Title 24 documentation must be submitted for all commercial new construction. One or more of the Certificates of Compliance forms listed below that demonstrate Title 24 Compliance 2005 Energy Efficiency Standards in effect as of October 1, 2005 may be used.

Envelope	Mechanical	Lighting	Outdoor Lighting
ENV-1-C	MECH- 1-C	LTG-1-C	OLTG-1-C

Only compliance documents completed by persons who are Certified Energy Plans Examiners (CEPE) by the California Association of Building Energy Consultants (CABEC) are accepted. The above compliance documents must also be generated by one of the following California Energy Commission's approved Title 24 software programs: Micropas or Energy Pro.

Beginning July 1, 2009, newly constructed commercial buildings shall achieve higher energy efficiency levels than the requirements of the Building Energy Efficiency Standards (Title 24, Part 6) in effect at the time the application for a building permit is submitted.

For commercial new construction building permits submitted before August 1, 2009, the Project is required to meet either of the following two tiers of energy efficiency:

- Tier I – 15 percent reduction in the commercial building's combined space heating, space cooling, lighting and water heating energy compared to the 2005 Title 24 Standards.
- Tier II – 30 percent reduction in the commercial building's combined space heating, space cooling, lighting and water heating energy compared to the 2005 Title 24 Standards.

For commercial new construction building permits submitted on or after August 1, 2009, the Project is required to meet either of the following two tiers of energy efficiency:

[20] For these guidelines, "commercial buildings" include all non-residential buildings and structures.

- Tier I – 15 percent reduction in the commercial building's combined space heating, space cooling, lighting, and water heating energy compared to the 2008 Title 24 Standards.
- Tier II – 30 percent reduction in the commercial building's combined space heating, space cooling, lighting, and water heating energy compared to the 2008 Title 24 Standards.

The Tier I level is a minimum condition of participation. Tier II is the preferred level that builders are encouraged to meet. For either Tier I or II, any equipment or appliance provided by the builder shall be ENERGY STAR-labeled if this designation is applicable to that equipment or appliance.

Solar water heating may be used to assist in meeting the energy efficiency requirements of either Tier I or Tier II.

Compliance documents used to demonstrate Title 24 compliance, including the PERF-1 form and accompanying supporting forms, shall be provided as proof of attainment of the Tier I or Tier II levels. Compliance documents shall be completed by persons who are Certified Energy Plan Examiners (CEPE) by the California Association of Building Energy Consultants (CABEC).

For commercial buildings that are constructed in phases with the shell built first and further energy systems installed in later phases as tenant improvements, an agreement shall be made between the building owner and the tenant. This agreement shall obligate future tenant improvements to install lighting, HVAC, and water heating equipment necessary to meet the overall building tier level that was committed to by the building owner. A copy of the agreement shall be included with the CSI Reservation Request From.

If the Title 24 documentation is modified during the application process, the new documentation must be re-submitted to the appropriate Program Administrator prior to incentive payment.

It is recommended that Applicants check their utility's non-residential new construction energy efficiency programs for availability of additional incentives that can be earned for meeting Tier I or Tier II Title 24 requirements.

2.4 Warranty Requirements

California Public Utility Code 387.5(d)(4) requires that all solar energy systems that receive an incentive must have a warranty of not less than 10 years to protect against defects and undue degradation of electrical generation output.

- All solar energy equipment for electricity generation (PV modules, inverters, solar collectors, tracking mechanisms, heat exchangers, pumps, and heat driven cooling systems) shall have a minimum 10-year manufacturer performance warranty to protect against degradation of electrical generation output of more than 15% from their originally rated electrical output.

- All contractors shall provide a minimum 10-year warranty to provide for no-cost repair and replacement of the system for any expenses not otherwise covered by the manufacturer.

- All contractors shall provide a minimum 10-year warranty to protect the purchaser against more than a 15% degradation of electrical generation output that may occur as a result of faulty installation.

- For self-installed systems,[21] the warranty need not cover the labor costs associated with removing or replacing major components because any repairs would be done by the self-installer or at the self-installer's expense.

- Meters must have a one-year warranty to ensure against defective workmanship, system or component breakdown, or degradation in electrical output of more than fifteen percent from their originally rated electrical output during the warranty period. For meters that are integrated into the inverter, the meter warranty period must be 10 years.

System Owners will acknowledge on the Incentive Claim Form that they have received a 10-year warranty for no-cost repair and replacement of the solar energy system.

2.5 Performance and Permanency Requirements

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

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

The CSI Program will allow the installation of approved hinge release technology if required by local building and permitting agencies to maintain the integrity of the solar system while also satisfying the program requirement of permanent installations.

In rare occasions, there may be extenuating circumstances that warrant equipment relocation. Allowance of the relocation to continue to receive CSI Incentives is up to the sole discretion of the Program Administrators. System Owners who have received an EPBB Incentive and have relocated their system must orient their relocated equipment to produce at least the same generation as their initial EPBB Incentive payment was based upon. Contractual permanence corresponding to a period of 10 years is to be demonstrated as follows:

- All agreements involving the solar energy system receiving an incentive are to be provided to the Program Administrator for review as soon as they become available, but at the proof-of-project milestones stage or the incentive-claim stage at the latest. These agreements include, but are not limited to, system purchase and installation agreements,

[21] Note that self-installed systems are not eligible for SASH Program incentives.

warranties, leases, energy or solar services agreements, energy savings guarantees, and system performance guarantees.

- The System Owner agrees to notify the Program Administrator in writing a minimum of 60 days prior to any change in either the site location of the solar energy system or change in ownership of the generation system if the change(s) takes place within the applicable warranty period. The warranty period for the CSI Program is 10 years.
- If the solar energy system is removed prior to end of the 10 year warranty period, either:
  - The solar energy system may be installed at another site within the Program Administrator service territory within six months. The relocated system installed at the alternate site would not be eligible for an additional CSI Incentive; or
  - The System Owner would be unable to participate in the CSI Program for any additional installations under the CSI Program, including any active reservations that have not yet been paid.
  - A mandatory Site inspection is required for all relocated equipment. See Section 4.9.1 for more the Onsite Field Inspection.

Failure to re-install the solar energy system within 6 months will result in the return of the EPBB Incentive payment.

- If the house or business is sold, the new owner/s may continue to receive the Performance-Based Incentives (PBI) and be eligible to receive future CSI Incentives if they complete a new interconnection agreement. If the seller(s) remove the panels, they may continue to receive the CSI Incentive payments and be eligible to receive future CSI Incentives if the panels they removed are installed within the same service territory within six months, and they complete an interconnection agreement at the new address. PBI recipients will receive PBI payments for the full five-year PBI payment period (not including the period between removing and reinstalling the system), as long as they reinstall their systems within the specified timeframe.

2.6 Interconnection to the Electric Utility Distribution System

All solar electric generating systems receiving incentives under the CSI Program must be connected to the local electric utility's distribution system. The system interconnection, operation, and metering requirements for solar energy systems shall be in accordance with the local electric utility rules for customer generating facility interconnections. To connect a solar energy system to the utility distribution system, Host Customers, and/or System Owners will be required to execute certain documents such as, but not limited to, an Application to Interconnect a Generating Facility and a Generating Facility Interconnection Agreement or Net Energy Metering (NEM) Agreement with the local electric utility.

Applicants, Host Customers, and System Owners are solely responsible for submitting interconnection applications to the appropriate electric utility interconnection department as soon as the information to do so is available to prevent any delays in system parallel operation. Please note that there may be insurance requirements for the Host Customer associated with the utility interconnection process.

Proof of interconnection and parallel operation is required prior to receiving an incentive payment. The local electric service provider will convey proof of interconnection to the Program Administrator. CSI Incentive payments will not be made until the Program Administrator confirms valid interconnection.

A Host Customer is not eligible for a Reservation Confirmation if the solar electric generating system has been interconnected for more than 12 months.

For more information on electric grid interconnections, contact your local utility. It is the sole responsibility of the CSI Program System Owner and Host Customer to seek and obtain approval to interconnect the solar electric system to a utility's electric distribution system. System Owners and Host Customers participating in the CSI Program should immediately contact the utility to seek guidance on how to apply for interconnection. Contact information is found in Section 1.9 (Contact Information & Other Useful Resources).

2.7 Metering Requirements

The CSI Program requires accurate energy production meters for all Projects that receive CSI Incentives. Accurate measurement of solar energy output is of paramount importance to ensure optimum value for both solar owners and ratepayers. For solar electric generating systems receiving an EPBB Incentive, a basic meter with accuracy of ±5 percent is required. For systems receiving PBI payments, an interval data meter (or equivalent Metering System) with a combined accuracy of ±2 percent or better, taking into consideration current and transformer accuracy, potential transformer accuracy and computational errors, is required. An extensive discussion on metering is contained in the Technical Section, Section 5, below.

For other solar electric displacing thermal systems, the output must be measured with a Btu meter with a combined accuracy of +/- 5 percent or better, taking into consideration differential temperature, flow and computational errors (see Section 5.1.10 (Thermal Meters) for further details).

EPBB Program participants must provide Program Administrators or their authorized agents with physical access to the meter for testing or inspection, and if applicable, data gathering. If the Host Customer's meter is not readily accessible, such access will be by appointment. To avoid inconvenience to Customers, Solar Contractors are encouraged to locate meters in areas that are easily accessible.

PBI Host Customers must provide Program Administrators or their authorized agents with physical access to the meter at all times.

2.8 Inspection Requirements

It is the intent of the CSI Program to provide incentives for reliable, permanent, safe systems that are professionally installed, and comply with all applicable federal, state, and local regulations. Program Administrators will conduct a system inspection visit for the first two Incentive Claim Forms submitted by each new Contractor to verify that the project is installed as represented in the application, is operational, is interconnected, and conforms to the eligibility

criteria of the CSI Program[22]. After the completion of two successful field inspections, each Contractor will have a minimum one in twelve of their submitted Incentive Claim Forms selected for an inspection for projects less than 30 kW; for projects 30 kW and larger field inspections may be required, at the sole discretion of the Program Administrator.

A mandatory Site inspection is required for all relocated equipment. See Section 4.91 for more on the Inspection process.

2.8.1 Inspector Training Criteria

The CPUC requires that all system inspection visits be performed by trained personnel, whether the inspection is performed by utility interconnection inspectors, other utility personnel, or contractors. The Program Administrators have developed and submitted a consistent statewide site inspectors' training plan to the CPUC's Energy Division, which will be the basis for determining status of personnel as trained.

2.9 Measurement and Evaluation Requirements

To be eligible for CSI Incentives, all Applicants, Host Customers, and System Owners must agree to comply with the terms and requirements of the measurement and evaluation program. This includes providing access to the Program Administrators and/or third parties contracted by the CPUC and/or Program Administrator access to the site and any available data and information collected on the system.

2.10 CSI Program Database Requirements

One of the notable features of the CSI Program is its online database[23]. The Program Administrators are maintaining an up-to-date application processing database named Powerclerk, which is also accessible via the www.GoSolarCalifornia.ca.gov website or csi.powerclerk.com. The database allows program participants to complete new incentive applications and submit incentive claims by uploading PDF documents and submitting them online. By utilizing Powerclerk, program participants are able to fully apply online and do not have to spend time or money on sending in hardcopy documentation.

The CSI Program Administrators also utilizing the CSI Statewide Trigger Point Tracker found at www.csi-trigger.com, to allow program participants to see, in real time, how many MWs are available in each Program Administrator territory and within each Customer Class.

The CSI Program has created the California Solar Statistics website that provides both detailed program data and easily accessible high-level data gathered through the CSI's online application tool, Powerclerk. There is a public export of Powerclerk data on a weekly basis. There are charts and tables made from the public export Powerclerk data available on www.CaliforniaSolarStatistics.ca.gov. The public export is typically uploaded midweek.

[22] All MASH systems will be inspected. SASH inspection requirements are described in Section 2.9.2.
[23] As of April 15, 2009, the SASH Program database was not yet available.

The Host Customer and System Owner shall agree to allow all information provided as part of the reservation process to be entered into a statewide database that will permit tracking of application for this and other incentive programs. Access to this database will be limited to Program Administrators and the California Public Utilities Commission.

2.11 Additional Requirements and Terms

In addition to the Program eligibility criteria and requirements described above and elsewhere in the Handbook, there are a number of additional items required of CSI Program participants. These additional requirements and terms are discussed more fully in Appendix C.

3. California Solar Initiative Incentive Structure

This section provides a general overview of the California Solar Initiative (CSI) Incentive structure. The CSI Program offers two types of incentives: PBI and EPBB. Table 9 provides an overview of the two incentive structures under the CSI Program. Both PBI and EPBB incentives are available for residential and non-residential customers. For the purpose of the CSI Program, commercial sectors include agricultural and industrial customers. Typically, the incentive structure is determined by the size of the system installed. However, customers installing smaller systems have the option to choose the PBI.

Table 9
CSI Incentive Structures

Type of CSI Incentive	Payment Structure	Size Category	Residential[24]	Commercial	Gov't and Nonprofit
GM CSI Performance Based Incentive (PBI)	Payments based on $/kWh produced over 5 year term	≥ 30 kW[25]	X	X	X
GM CSI Expected Performance Based Buydown (EPBB)	One lump sum based on $/watt	< 30 kW	X	X	X
MASH Expected Performance Based Buydown (EPBB)[26]	One lump sum based on $/watt	ALL[27]	X		
SASH Expected Performance Based Buydown (EPBB)[28]	One lump sum based on $/watt	ALL	X		

3.1 GM CSI Program Incentive Trigger Mechanism

The incentive payment levels will automatically be reduced over the duration of the CSI Program in 10 steps, based on the volume of MW of confirmed reservations issued within each utility service territory.[29] On average, the CSI Incentives are projected to decline at a rate of seven percent each year following the start of implementation in 2007. The incentives will gradually phase out over the 10 steps. Table 4 (Section 1.1.4) outlines the 10 steps for the incentive levels for the CSI Program.

The duration of that phase-out will be dependent on: (1) whether the incentive budgets are depleted; (2) when the Program Administrators reach their MW goal; or (3) the end date of the Program (2016), whichever comes first. Table 3 (Section 1.1.3) displays the MW targets by Program Administrator service territory and customer class.

24 Residential installations on existing structures. New residential construction projects will be funded through the NSHP.
25 Systems that may opt-in to receive a PBI incentive rather than the EPBB incentive include: · all small single and dual axis trackers and fixed tilt systems > 10kW.
26 Track 2 may include additional incentive based on criteria described in Section 4.5
27 All eligible Project sizes, 1kW – 5MW
28 SASH program details are found in the SASH Handbook, Appendix D hereto.
29 Investor-owned utility service territories only (PG&E, SCE, SDG&E)

Program Administrators will count a Project's size towards their step goals using a Design Factor as described in detail in Section 2.2.5 (System Size). Projects are counted toward the MW trigger once they are deemed eligible, have paid an application fee (if applicable), and have been issued a confirmed reservation. As the number of MW allocated through the confirmed reservations reaches its maximum within any particular step, the Program Administrators will move to the next step.

If there are any MWs that remain unused and unaccounted for in any previous steps, due to events such as Applicants dropping out of the process or reducing the size of their systems, those MWs will be added to the current step under which Program Administrators are issuing reservations and incentives, thus increasing the number in that step and ensuring that no MWs are left outstanding. Similarly, when MWs drop out of the current step, those MW will be returned to the current step. Any reallocation of MWs from a higher step to a lower step due to dropouts or system size reductions can take place as long as the reallocation is consistent with how the MWs were initially reserved for either residential or non-residential projects. Reallocations from Step 1 may be assigned to either residential or non-residential Applicants, at the discretion of the Program Administrators. The Program Administrators will provide updates to their CSI application websites as close as possible to real time and no less than weekly to indicate the total MWs available for incentives at each step and in each customer sector, including those MWs newly available due to reallocations.

The CSI Incentive levels may vary by service area, depending on the pace of solar demand in each Program Administrator's territory. Additionally, the CSI Incentive levels may differ based on demand in the residential and non-residential customer sectors. The status of each Program Administrator's trigger and incentive level is shown at www.csi-trigger.com.

3.2 Expected Performance Based Buydown (EPBB) Incentives

The GM CSI Program will pay incentives for Projects with system ratings of less than 30 kW CEC-AC through an up-front incentive known as an EPBB. All MASH and SASH projects will receive EPBB incentives. These EPBB incentives are based on an estimate of the system's future performance. EPBB incentives combine the benefits of rewarding performance with the administrative simplicity of a one-time incentive paid at the time of project completion. Applications for new non-residential construction projects are eligible for EPBB if the system size complies with EPBB size requirements.

The CSI 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 CSI Incentive rate given that the Host Customer change its utility rate schedule as applicable and prior to the respective CSI Incentive payment.

The Program Administrators will use the California Energy Commission's CEC-AC method to determine the system rating. The following formula determines the EPBB incentive:

EPBB Incentive Payment = Reserved Incentive Rate x System Rating[30] x Design Factor

The Design Factor is a ratio comparing a proposed system to a reference system:

$$\text{Design Factor} = \frac{\text{Proposed System}}{\text{Reference System}}$$

Details on calculating the Design Factor are found in the Technical Section, Section 6.3, below.

Please refer to the EPBB User Guide for more detailed explanation of the calculator's methodology and instructions, at www.csi-epbb.com.

For other solar electric generating systems, the Design Factor is the Surface Orientation Factor (SOF)[31]. The SOF is determined by reading the value from the chart Surface Orientation Factor for the location, tilt and azimuth of the system. Charts of SOF for various California locations may be found in Section 8. The chart for the closest location to the system's location should be chosen and the SOF determined by reading it off of the chart using the system's tilt and azimuth. Note that the described EPBB methodology is appropriate for solar energy systems displacing only electric load. For solar energy systems designed to displace both gas and electric loads, the solar energy displacing the electric load must be metered under a PBI arrangement described in Section 3.3.1.

3.2.1 EPBB Calculator Modifications

The CPUC and its Program Administrators have developed an EPBB calculator that helps Applicants determine the EPBB incentive level. As it gains experience with the EPBB and the performance of the California Solar Initiative, the CPUC reserves the right to modify the calculator at any time without advance notice to Applicants.

However, if the calculator is revised between the time an Applicant submits an application and the Program Administrator's Pending Payment stage and the revision(s) alter the project's incentive amount, the Program Administrator (PA) will notify the Applicant by letter (PA notification letter) and/or email.

If the Applicant received a Reservation Confirmation notice *before* such a calculator revision, s/he can either:

A. Resubmit the application using the new calculator (If the Applicant chooses to resubmit, s/he will not lose his/her place in the queue or application fee); or

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30 CEC-AC System Rating (kilowatts) = Quantity of Modules x CEC Rating of Photovoltaic Modules x CEC Inverter Efficiency Rating / 1000 (watts/kilowatt)

31 The "Surface Orientation Factor" and how it is calculated is detailed in "Effects of Tilt and Azimuth on Annual Incident Solar Radiation for United States Locations", Proceedings of Solar Forum 2001, April 21- 25, Washington D.C. SOF charts for various California locations may be found in Section 8 of this Handbook. Shade measurements should be taken at the major corners of the array, and should not be more than 40 ft apart.

B. Notify the PA that s/he wishes to remain at the incentive level calculated in the existing application using the modified calculator (even if the incentive would drop under the new calculator).

In both cases, the Applicant must notify the PA of his/her intent, in writing, within 30 days of the date of the PA notification. If the Applicant does not notify the PA of his/her intent within 30 days of the date of the PA notification, the application will remain in the queue at the level projected under the calculator used in the initial application process.

If the Applicant has *not* received a Reservation Confirmation notice before such a calculator revision, the PA shall notify the Applicant of the calculator change and how it impacts the incentive amount in the Application when the Reservation Confirmation notice is issued. The notification shall contain a response portion wherein the Applicant shall sign whether they accept the newly calculated incentive or wish to withdraw their application. The Applicant must either:

A. Return the notification to the PA indicating s/he accepts the recalculated incentive amount using the new calculator (If the Applicant chooses to resubmit, s/he will not lose his/her place in the queue or application fee); or
B. Return the notification to the PA indicating s/he wishes to withdraw the application (If the Applicant chooses to withdraw the application, the PA will reimburse the application fee).

In both cases, the Applicant must notify the PA of his/her intent, in writing, within 30 days of the date of the PA notification. If the Applicant does not resubmit or withdraw his/her application within 30 days of the date of the PA notification, the Program Administrator will cancel the application, and the Applicant will generally lose both his/her application fee and place in the queue.

3.2.2 EPBB Incentives for Residential Installations

Residential installations will be provided a one-time payment under the EPBB program to help reduce the cost of installation provided the system size is within EPBB size eligibility. The amount of the EPBB incentive payment is as calculated pursuant to the formula in Section 3.2, with the incentive rate portion of the formula determined as shown by Table 4 (Section 1.1.4). A Power Purchase Agreement on a residence is considered a residential application. Incentives for residential new construction projects will be funded through the California Energy Commission's New Solar Homes Partnership program.

3.2.3 Incentives for Non-Residential Installations

Non-residential installations will be provided a one-time payment under the EPBB program to help reduce the cost of installation provided the system size is within EPBB size eligibility. Incentive rates vary by the System Owner's entity type (i.e., commercial entities or government or non-profit entities). The incentive amount will be determined by the tax status of the System Owner. The amount of the EPBB incentive payment is as calculated pursuant to the formula in Section 3.2, with the incentive rate portion of the formula determined as shown in Table 4 (Section 1.1.4).

Government and non-profit entities will be required to submit verification of their tax-exempt status to receive the government/ non-profit incentive amount. Additionally, government and non-profit entities must include a certification under penalty of perjury from their chief financial officer or equivalent that they are a government or non-profit entity and that the system is not receiving and will not in the future receive federal tax benefits through financial arrangements for the entire warranty period of the system (i.e., the System Owner if a third-party, which will be receiving tax benefits from the system).

The CSI 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 as applicable and prior to the respective CSI Incentive payment

3.3 Performance Based Incentives (PBI)

The CSI Program will pay PBI for Projects with systems equal to or greater than 30 kilowatts (kW) CEC-AC with monthly payments based on recorded kilowatt hours (kWh) of solar power produced over a 5-year period, provided the Host Customer remains a retail level electric distribution customer of PG&E, SCE, or SDG&E. The Commission has determined that customers who receive incentives under a performance-based approach will be motivated to focus on proper installation, maintenance, and performance of their systems. Therefore, systems above the EPBB eligibility size limits are required to participate in the PBI program. Furthermore, only systems with single or dual axis trackers or fixed tilt systems greater than 10 kW may elect to opt into the PBI program.

Once the PBI incentive rate has been determined and final incentive claim approval has been issued, the $/kWh incentive rate will remain constant for the 5-year PBI term. PBI payments shall begin on a monthly basis after incentive claim approval. For electric generating systems, these payments will be based on the per-kWh incentive rate and the gross energy (kWh) produced in that period. For other solar electric displacing systems, these payments will be based on the per-kWh incentive rate and the net energy (kWh) displaced during that period.

PBI payments will be calculated for solar energy systems that exceed 1 MW in size by prorating the energy output based on the ratio of 1 MW to the size of the site. Thus, if a customer has installed a 5 MW system, the customer would receive PBI payments for 1/5 of the output of the system. As an alternative, and if possible, the customer may, at its election and cost, separately meter a 1 MW element of a larger system.

3.3.1 PBI for Other Solar Electric Displacing Thermal Systems

For other solar electric displacing thermal systems, the thermal output of the system serving the customer's thermal load must be metered, divided by the Performance Ratio for the backup, displaced or replaced electric heating or cooling system. The location of the metering is critical for correct assessment of the useful thermal output of the other solar electric generating system.

Metering should be placed in the process such that the thermal energy delivered (or removed in the case of cooling) to the customer's thermal load is accurately measured.

Note that hot air solar energy systems will be paid incentives based on the EPBB method described in Section 3.2[32].

Ancillary electric loads for solar thermal heating and cooling systems, under PBI, will be measured and subtracted from the calculated gross avoided electric consumption. However, ancillary load measurements will be required only if the ancillary rated load is ≥ 5% (i.e., within the uncertainty of the thermal measurement) of the gross avoided electric load potential.

The avoided monthly electric energy (kWh/month) will be calculated by dividing the measured delivered cooling or heating (in equivalent electric thermal) by the appropriate Performance Ratio and, if required, subtracting the system's measured ancillary load (kWh/month). The incentive payment is then determined by multiplying the net avoided electric load with the incentive rate ($/kWh).

Example #1 – Solar Space Cooling System

$EDE = ((TNPV / 3{,}412) / PR) - E_{AUX}$

$PBI = EDE x $Erate

Where;

"EDE" = Displaced electricity from the grid.

"TNPV" = Measured thermal (heating or cooling) output of the other solar electric generating system (which may include an absorption chiller or other heat driven cooling system) in Btu/month.

"PR" = Dimensionless Performance Ratio of the conventional electric heating or cooling system calculated by the heating or cooling energy output of the system divided by its electric energy input. In this example, the conventional cooling system is a 20 Ton (240 kBtu/hr) air cooled packaged chiller with a standard IPLV of 9.2. The Performance Ratio for this system is 2.7.

"E_{AUX}" = Ancillary electric equipment (e.g., pumps) used for the solar thermal system operation.

"$PBI" = Monthly PBI incentive payment.

"$Erate" = Current step PBI incentive rate (e.g., $0.34/kWh)

3.3.1.1 PBI for Other Solar Electric Displacing Thermal Systems

For hydronic solar heating and cooling systems, the BTU meter specifications shall be as follows:

- Provides totalizing outputs in BTUs per period

[32] Metering the thermal output of solar hot air systems, within reasonable accuracy and cost is difficult.

- Capable of remote communications
- Monthly totalizing accuracy of ≤ 5%[33]
- Flow meter and temperature sensor accuracy is National Institute of Standards and Technology (NIST) traceable

3.3.2 PBI for Residential Projects

Monthly payments will be made based on gross electricity generated in kWh as per the performance data report. Monthly payments for other solar electric generation technologies will be made based on the net-kWh-equivalent electricity displaced as per the performance data report. The residential PBI incentive rate ($/kWh) shall be in accordance with Table 4 above (Section 1.1.4).

3.3.3 PBI for Non-Residential Projects

Incentive rates vary by the System Owner's entity type (i.e., commercial entities or government or non-profit entities). The incentive amount will be determined by the tax status of the System Owner. The Program Administrators will make the monthly payments based on gross electricity generated in kWh as per performance data report. Monthly payments for other solar electric generating technologies will be made based on the net kWh-equivalent electricity displaced as per the performance data report. The incentive amount ($/kWh) will be in accordance with Table 4 (Section 1.1.4).

Government and non-profit entities will be required to submit verification of their tax-exempt status to receive the government/ non-profit incentive amount. Additionally, government and non-profit entities must include a certification under penalty of perjury from their chief financial officer or equivalent that they are a government or non-profit entity and that the system is not receiving and will not in the future receive federal tax benefits through financial arrangements for the entire warranty period of the system (i.e., the System Owner is a third-party, who will be receiving tax benefits from the system). This certification must be renewed annually only by non-profit entities if receiving PBI payments.

3.4 Incentive Limitations

If the Project is installed as described on the Reservation Request Package and all Program and Contract terms and conditions are complied with, including timely submission of all documents described in the CSI Program Handbook, the Program Administrator will pay a CSI Incentive to the entity designated as the CSI Incentive recipient. The Program Administrator reserves the right to modify or cancel the CSI Incentive if the actual installation of the solar energy system differs from the proposed installation, if the solar energy system fails inspection, if the solar energy system is not installed by the date shown on the Reservation Confirmation and Incentive Claim Form, and/or if the documents submitted fail to meet the requirements of the CSI Program Handbook Any system changes or additions made after the Incentive Claim approval must be reported to the Program Administrator and utility interconnection departments.

[33] At least one BTU meter supplier has provided information showing that 5% accuracy is achievable.

Failure to notify the Program Administrator may result in an immediate Applicant and/or Contractor failure.

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

- Total eligible project costs
- Other incentives or rebates received
- Project size and Host Customer Site limitations

3.4.1 Total Eligible Project Costs

No Project can receive total incentives (incentives from the CSI 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 energy 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 energy system costs are embedded, applications must include a prorated estimate of the total eligible costs for the solar energy system.

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

1. Solar equipment capital costs, including tracking systems and other ancillary equipment associated with the solar energy system.
2. Engineering and design costs for solar energy systems.
3. Construction and installation costs. For projects in which the generation equipment is part of a larger project, only the construction and installation costs directly associated with the installation of the energy generating equipment are eligible.
4. Engineering feasibility study costs
5. Interconnection costs, if applicable, including:
    a. Electric grid interconnection application fees
    b. Metering costs associated with interconnection
6. Building permitting costs
7. Warranty and/or maintenance contract costs associated with eligible project cost equipment
8. Sales tax and use tax
9. On-site system measurement, monitoring and data acquisition equipment.
10. Customers may claim certain mounting surface costs as eligible project costs. Costs may include mounting surfaces for the photovoltaic module/solar collector and/or the materials that provide the primary support for the modules. Only the percentage of mounting surface directly under the photovoltaic module/solar collector is eligible.
11. Cost of capital included in the system price by the vendor, contractor or subcontractor (the entity that sells the system) is eligible if paid by the System Owner.
12. Additional costs associated with Track 2 MASH solar projects where the expense is directly related to a factor that was influential in awarding an incentive rate above the Track 1 rate.

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

3.4.1.1 Reportable Project Costs

All systems receiving a CSI incentive are required to enter the costs identified below in the CSI Program's online database, PowerClerk, in order for the Program Administrators to track and maintain solar energy system cost data.

- PV Module – the cost for the number of modules installed
- Inverter – the cost for the number of inverters installed
- 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)
- Balance of System (BOS) – all other eligible costs associated with the installation of the PV System. Please see Section 3.4.1 for a description of eligible project costs.

3.4.2 Other Incentives or Rebates

Customers may not receive CSI Incentives for the same self-generation equipment from more than one Program Administrator (i.e., PG&E, SCE, and CSE). For projects receiving incentives under other programs, the CSI Incentive may be reduced, depending on the source of the other incentive. For projects that receive "other incentives" for the same generating equipment that are funded by California investor-owned utility ratepayers (e.g., utility or California Energy Commission public goods charge programs), the CSI 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 Incentive, except where a CSI Incentive would otherwise cause total incentives to exceed total costs.

In no event may the combined incentives received from CSI 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 energy 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 or Green Credits), and performance payments are "other incentives" and must be disclosed as soon as those agreements or payments are made. Program Administrators will enter applications into a statewide database that will permit universal tracking of applications for this and other programs.

3.4.3 Right to Audit Final Project Costs

The Program Administrators 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 Solar Contractors. As part of these spot checks, the Program

Administrators will require Applicants to submit copies of cancelled checks, credit card statements, or equivalent documentation to substantiate payments made to the equipment seller and/or Solar Contractor. The final amount legally incurred or paid to the equipment seller and/or the final amount paid to the Solar Contractor for the purchase and installation of the system must match the cost information identified in the Reservation Confirmation and Incentive Payment Claim Form.

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 Solar Contractor or seller, the incentive will be cancelled or reduced. Applicants must explain the difference if the final amount paid by the Applicant is different from the amount of the purchase or installation shown in any agreement or invoice or in the previously submitted Reservation Request.

In addition, the final invoices or agreements should clearly indicate the extent to which the CSI 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 Program Administrator.

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

3.4.4 Site and Host Customer Limitations

There are restrictions on the amount of incentive funding a Host Customer can reserve and receive. Host Customers may reserve up to a maximum of 1 MW of incentive funding from the CSI Program for a single Site for the duration of the CSI Program.

3.4.5 Limitations on Installed Cost

One of the goals of the CSI program is to support a reduction in PV system costs over time as defined by:

Total Project Cost ($)/CEC-AC (Watts) = $/Watt

It is the intent of this program to make steps towards this goal. Projects applying and installing PV systems through this program should have their installed cost fall within a reasonable limit. To ensure that the integrity of the program is maintained, the Program Administrators will require documentation for why system cost exceeds the limit displayed at www.CaliforniaSolarStatistics.ca.gov. .

The Commission established the following methodology to determine the soft cap for installed systems costs:

- The cost cap is calculated by using a rolling twelve-month simple mean, updated weekly, based on CSI data. National data shall be considered on an annual basis, and the cost cap methodology may be revised as needed.
- Given that there is a significant difference in costs for systems up to 10kW and systems 10 kW and greater, there will be a separate cap for a system up to 10kW and a system 10kW and greater.
- Third party-owned systems will be excluded from the data sets used to calculate the caps, but all CSI systems will be subject to the cost caps.
- The cost caps will be calculated for each category (<10kW and ≥10kW) to equal to the simple average installed cost per watt (CEC-AC), plus $1.00.

If the system cost exceeds the soft cost cap, the Host Customer is required to sign the High Cost Justification and Acknowledgement Form that describes the reasons for exceeding the soft cost cap and explains to the customer that the cost of their solar energy system is much higher per watt than the larger majority of the solar energy systems submitted to the CSI Program for incentives. Please see Section 4.11.3.8 for more information.

A System Owner's project may exceed the cost limit only if he/she or the Applicant can demonstrate to the Program Administrator through appropriate documentation that the particular project requires a special configuration that will drive project costs above the limit. Appropriate documentation consists of a letter, which outlines the system components or labor requirements that cause a particular project to exceed the reasonable cost limit. Examples include but are not limited to solar installations on historic buildings, tracker systems, new solar technologies, or other specialized products. Program Administrators may perform a site inspection to verify the documentation and reserve the right to audit the final project costs as discussed in Section 3.4.3.

Program Administrators will verify that the total cost associated with the reservation matches the system cost identified on the installation contract executed between the System Owner and Solar Contractor.

4. Application Process for CSI Projects

Through the CSI Program, funding may be reserved for Applicants who have committed to purchase and install an eligible solar energy system at a given Site. A funding reservation provides the purchaser assurance that the reserved funds will be available when the incentive claim is made. For completed applications, reservations are made on a first-come, first-served basis, and last for the duration of the applicable reservation period. The CSI Program uses an online application tool to simplify the application process and confirm the rebate amount reserved, contingent on receiving all documents. To apply for a CSI incentive online visit csi.powerclerk.com or your Program Administrator's website for downloadable forms.
Table 10 shows Reservation periods for each Customer type/Project size.

Table 10
Reservation Periods by Customer Type & Project Size

Sector	System Size	Reservation Period
Residential (GM CSI)	All*	12 months
Commercial	All*	18 months
Government, Non-profit, Public Entities	All*	18 months
Multifamily Affordable Housing (MASH)	All*	18 months

*All CSI-eligible system sizes.

4.1 1-, 2- & 3-Step Application Processes

There are four basic application process designs: 1-Step, 2-Step, Expedited 2-Step and 3-Step. The 1-Step process involves only one step of submitting an Incentive Claim package and may only be used by Applicants who have completed their interconnection to the utility grid prior to applying for a CSI Incentive. The 2-Step process includes the Application and Incentive Claim steps and is primarily intended for small (<10 kW) non-residential and all residential Applicants. However, MASH and large non-residential Applicants (≥10kW) may also opt to use the 2-Step process, but are still subject to the eligibility requirements based on system size and type. The Expedited 2-Step process includes the Reservation Request Application and Incentive Claim steps and is intended for residential and non-residential projects <5 kW that meet certain screening criteria. MASH and large non-residential Applicants will generally use the 3-Step process, which, in addition to the Reservation Request Application and Incentive Claim steps, includes a separate Proof of Project Milestone (PPM) step at which time an Executed Purchase and Installation Agreement or Alternative System Ownership Agreement is due. However, if a MASH and large non-residential applicant provide these documents at the time of Reservation Request Application submittal, PPM will no longer be required. While the application process is the same for PV Projects and other solar electric generating technologies Projects, there are a few variations in required documentation, as noted in the following sections. The SASH Program has its own application process, which is described below in Appendix D.

Table 11 shows the basic application process steps and flow between Applicant and Program Administrator for all customer type/Project size. More details on required documentation and each of these three processes may be found in subsequent sections below.

Table 11
Basic Application Process Steps & Flow for 1, 2, and 3-Step Processes

Responsible Party	Action	Residential & Small Non-Residential (<10 kW)	Gov't, Non-Profit & Public Entities (≥10 kW)	Non-Residential/ Commercial (≥10 kW)	MASH Track 1A/1B
Applicant	Complete & Submit Reservation Request Package	X	X	X	X
Applicant	Complete & Submit Grant Proposal Form with RRF Package				
Applicant	Pay Application Fee (Applicable for systems ≥ 10kW CEC-AC)		X	X	X
PA	Process & Evaluate Reservation Request Package. IF: • Incomplete: Request additional information from Applicant & suspend project • Ineligible: Send notification to Applicant via email • Complete & Eligible: Send Applicant Reservation Notice and any applicable forms	X	X	X	X
Applicant	Proceed with Project purchase & installation Project must meet incentive level requirements & be operational by Reservation Expiration Date	X	X	X	X
Applicant	Submit Proof of Project Milestone Package		X	X	X
PA	Process & Evaluate Proof of Project Milestone Package. IF: • Incomplete: Request additional information from Applicant & suspend project • Ineligible: Send notification to Applicant via email • Complete & Eligible: Send Applicant Confirmed Reservation Notice and any applicable forms		X	X	X
Applicant	Complete & Submit Incentive Claim Form Package When Project is operational	X	X	X	X
PA	Process & Evaluate Incentive Claim Form Package. IF: • Incomplete: Request additional information from Applicant & suspend project • Ineligible: Send notification to Applicant via email • Complete & Eligible: Send Incentive Payment(s) to designated payee May conduct Field Verification/Inspection	X	X	X	X

Table 12
Basic Application Process Steps & Flow for Expedited 2-Step Process

Responsible Party	Action	Residential & Non-Residential (<5 kW)
Applicant	Complete & Submit Reservation Request Package	X

PA	PowerClerk will Evaluate Reservation Request Package for the following:
	• Proposed installed cost does not exceed the most recently published Cost Cap
	  ○ If project cost does exceed the Cost Cap, PowerClerk will request a Cost Cap Justification and Acknowledgement form after which the project must go through the 2-Step manual review process
	• CSLB license is valid and active
	  ○ If not valid or active applicant must go through the 2-Step manual review process
	Complete & Eligible PowerClerk will automatically issue a Confirmation Notice.
		X

Applicant	Proceed with Project purchase & installation Project must meet incentive level requirements & be operational by Reservation Expiration Date	X
Applicant	Complete & Submit Incentive Claim Form Package When Project is operational	X
PA	Process & Evaluate Incentive Claim Form Package. IF: • Incomplete: Request additional information from Applicant & suspend project • Ineligible: Send notification to Applicant via email • Complete & Eligible: Send Incentive Payment(s) to designated payee May conduct Field Verification/Inspection	X

4.2 1-Step Application Process

This option only applies to Host Customers who have completed their interconnection to the utility grid within the past 12 months. However, Applicants of any customer class and project size (i.e., small (< 10 kW) non-residential and all residential, government, non-profit and public entities) may choose to use the 1-Step process, if they meet the interconnection requirement.

A Host Customer that is interconnected to the utility grid prior to applying for a CSI Incentive will be able to submit only the Incentive Claim Form (ICF) without submitting the Reservation Request Form. The following documents must be submitted together:

1. Completed Incentive Claim Form and Program Contract with Signature[34] (includes completed Energy Efficiency Disclosure)
2. Electrical System Sizing Documentation (new/expanded load only) for projects > 5 kW
3. Certification of tax-exempt status (gov't and non-profit only)
4. Documentation of an Energy Efficiency Audit if you have not met Title 24 or other exemptions. Title 24 documentation is mandatory for non-residential new construction.
5. Copy of signed Commitment Agreement (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75) (Proof of Benchmarking Documentation required)
6. Proof of at least 15% above current Title 24 standards (for non-residential new construction only)
7. Copy of New Construction Building Permit (for non-residential new construction only)
8. Building Site Plan (for non-residential new construction only)
9. Copy of Executed Agreement of Solar Energy System Purchase and Installation (for Host Customer Owned systems only)
10. Copy of Executed Alternative System Ownership Agreement (If System Owner is Different from Host Customer)
11. CSI eligible Performance Monitoring and Reporting Service (PMRS) provider to be listed on the Incentive Claim Form for all projects. PMRS is mandatory for projects > 10 kW (5 year contract to be submitted only upon PA request)
12. (PBI Only) Copy of Executed PDP Contract
13. Copy of Retro-commissioning Report (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75)
14. Host Customer Email Address
15. Authorization to: Receive Customer Information or Act on a Customer's Behalf (CSE/SDG&E territory only)
16. Copy of the SOF chart marking the correct data point (other solar generating technologies only)

Customers who choose this option and have not been interconnected prior to applying for a CSI Incentive may have their applications returned and/or cancelled.

[34] Signatures for all submitted documentation are acceptable in the following formats:

- Original signed documents, or "wet" signatures
- Scanned copies of original signed documents
- Faxed copies of original signed documents

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

Table 13
1-Step Application Process – Form and Documentation Requirements

Step 1	More Information
Completed Reservation Request/Incentive Claim Form and Program Contract with Signature (includes completed Energy Efficiency Disclosure)	Section 4.11.1.1
Electrical System Sizing Documentation (new/expanded load for systems greater than 5 kW)	Section 4.11.1.3
Certification of tax-exempt status (gov't and non-profit only)	Section 4.11.1.15
Documentation of an Energy Efficiency Audit if you have not met Title 24 or other exemptions. Title 24 documentation is mandatory for non-residential new construction.	Section 4.11.1.4
Copy of signed Commitment Agreement (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75) (Proof of Benchmarking Documentation req'd)	Section 4.10.1.6
Proof of at least 15% above Title 24 Standards (non-residential new construction)	Section 4.11.1.9
Copy of Executed Agreement of Solar System Purchase and Installation(Host Customer owned systems) or Copy of Executed Alternative System Ownership Agreement (Third-party owned systems)	Section 4.11.1.12, 4.11.1.3
Copy of Executed PDP Contract (PBI Only)	Section 4.11.3.3
Copy of Retro-commissioning Report (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75)	Section 4.11.3.7
Copy of Executed PDP Contract (PBI Only)	Section 4.11.3.3

4.3 2-Step Application Process for GM CSI Small (< 10 kW) Non-Residential and All Residential Projects

All residential and small (<10kW) non-residential Projects are required to receive a lump sum EPBB incentive payment. Only single and dual axis tracking systems in this size category are eligible to receive PBI payments based on $/kWh produced. For more on the CSI Incentive structure, see Section 3 above.

There are two primary steps for residential and small non-residential Applicants as follows:

1. Complete and submit a Reservation Request Package
2. Complete and submit the Incentive Claim Form Package

4.3.1 Step # 1: Submit Reservation Request Package

Once the Host Customer has decided to install a solar energy system and has one of the following: 1) an executed contract with a Solar Contractor or a purchase order demonstrating; 2) proof of purchase of solar generating equipment; or 3) an Alternative System Ownership Agreement for third-party owned systems, a Reservation Request Package can be submitted.

The Reservation Request Package must have signatures[35] of Applicant, Host Customer and System Owner (if different from Host Customer), and should be submitted with the following documentation:

1. Completed Reservation Request Package and Program Contract with Signature (includes completed Energy Efficiency Disclosure)
2. Electrical System Sizing Documentation (new/expanded load only) for projects > 5 kW
3. Certification of tax-exempt status (gov't and non-profit only)
4. Documentation of an Energy Efficiency Audit if you have not met Title 24 or other exemptions. Title 24 documentation mandatory for non-residential new construction.
5. High Cost Justification Form (if project cost exceeds cost cap)
6. Copy of signed Commitment Agreement (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75) (Proof of Benchmarking Documentation required)
7. Proof of at least 15% above current Title 24 standards (for non-residential new construction only)
8. Copy of New Construction Building Permit (for non-residential new construction only)
9. Building Site Plan (for non-residential new construction only)
10. Copy of Executed Agreement of Solar Energy System Purchase and Installation (for Host Customer Owned systems only) or Copy of Executed Alternative System Ownership Agreement (Third-party owned systems)
11. Copy of Executed Alternative System Ownership Agreement (If System Owner is Different from Host Customer)
12. Host Customer Email Address
13. Authorization to: Receive Customer Information or Act on a Customer's Behalf (Required for CSE/SDG&E service territory only)
14. Copy of the SOF chart marking the correct data point (other solar generating technologies only)

Refer to Section 4.11 for more information on the above-referenced forms and documents.

Detailed instructions are included with the Reservation Request Package. To apply for your incentive online visit csi.powerclerk.com or your Program Administrator's website to download forms.

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[35] Signatures for all submitted documentation are acceptable in the following formats:

- Original signed documents, or "wet" signatures
- Scanned copies of original signed documents
- Faxed copies of original signed documents

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

4.3.1.1 Incomplete Reservation Requests

If an application is found incomplete or requires clarification, the Program Administrator will request additional information. Applicants have 14 calendar days to respond to the request with the necessary information. If after 14 calendar days the Applicant has not submitted the requested information, the application will be cancelled. However, this does not preclude you from resubmitting your project to the Program Administrator for an incentive. All resubmitted application packages will be treated as new applications (i.e., all required documents must be resubmitted) and processed in sequence along with other new applications.

Incentive funds are not reserved until the Program Administrator receives all information and documentation required for the Reservation Request and the project is approved.

4.3.1.2 Approval of Reservation Request

The Program Administrator will review received application packages on a first-come, first-served basis to determine completeness and eligibility. Applications will also be screened to ensure that the project has not applied for incentives through other Program Administrators or other state- or government-sponsored incentive programs.

Once the Program Administrator approves the reservation request, the Program Administrator will issue a Confirmed Reservation Notice, confirming that a specific incentive amount is reserved for the project.

The system must be purchased, installed, and put into operation by the Reservation Expiration Date (see Table 10 for length of reservation) as listed in the Confirmed Reservation Notice. The Confirmed Reservation Notice will list the specific reservation dollar amount and the Reservation Expiration Date.

4.3.1.3 CSI Reservation Queuing

Once an application is submitted, the Program Administrators will review the application for completeness. If the application is not complete, the Program Administrator will notify the Applicant and the Applicant will have 14 calendar days to provide the necessary information. During the 14 calendar day period, the reservation request will maintain the same place in the reservation queue. Once the applicant submits documents that correct the deficiency, then the reservation request will be confirmed at the then-current incentive step level that was conditionally reserved and the Program Administrator will notify the Applicant via a reservation confirmation letter. If applicant fails to correct the deficiency during the 14 calendar day period, the Program Administrator will cancel the application and cancel the spot in the reservation queue. The Program Administrator will notify the applicant via a cancellation notice.

4.3.1.4 Reservation Period

CSI Incentives can be reserved for up to 12 months for residential retrofit projects. CSI Incentives can be reserved for up to 18 months for commercial, government, non-profit and public entity retrofit and new construction projects.

4.3.2 Step # 2: Submit Incentive Claim Form Package

After the solar energy system is purchased, installed, and put into operation, the Applicant should submit the Incentive Claim Form and the required supporting documentation.

The Incentive Claim Form Package must have signatures of Applicant, Host Customer and System Owner (if different from Host Customer), and should be submitted with the following documentation:

1. Incentive Claim Form with Signatures
2. CSI eligible Performance Monitoring and Reporting Service (PMRS) provider must be listed on the Incentive Claim Form for all projects. PMRS is mandatory for projects > 10 kW (5 year contract to be submitted only upon PA request)
3. Copy of Executed PDP Contract (PBI Only)
4. Copy of Retro-commissioning Report (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75)
5. Copy of the SOF chart marking the correct data point (other solar generating technologies only)

Although the Applicant is no longer required to submit Proof of Authorization to Interconnect, the Program Administrators will verify interconnection prior to any incentive payment. The Program Administrators will conduct verifications in the order that completed Incentive Claim Form Packages are received.

For more detailed information on submitting the Incentive Claim Form package, refer to Section 4.11.3.

Table 14
2-Step Application Process – Form and Documentation Requirements

Step 1: Reservation Request Package	More Information
Completed Reservation Request Package and Program Contract with Signature (includes completed Energy Efficiency Disclosure)	Section 4.11.1.1
Electrical System Sizing Documentation (new/expanded load for systems greater than 5 kW)	Section 4.11.1.3
Certification of tax-exempt status (gov't and non-profit only)	Section 4.11.1.15
Documentation of an Energy Efficiency Audit if you have not met Title 24 or other exemptions. Title 24 documentation is mandatory for non-residential new construction.	Section 4.11.1.4
High Cost Justification Form (if project cost exceeds cost cap)	Section 4.11.3.8
Copy of signed Commitment Agreement (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75) (Proof of Benchmarking Documentation req'd)	Section 4.11.1.6
Proof of at least 15% above Title 24 Standards (non-residential new construction only)	Section 4.11.1.9
Copy of New Construction Building Permit (non-residential new construction only)	Section 4.11.1.10
Building Site Plan (non-residential new construction only)	Section 4.11.1.11
Copy of Executed Agreement of Solar System Purchase and Installation (for Host Customer Owned systems only) or Copy of Executed Alternative System Ownership Agreement (Third-party owned systems)	Section 4.11.1.12, 4.11.1.13
Documentation of CPUC Code 2852 eligibility (MASH only)	Section 4.11.1.7
Step 2: Incentive Claim Form Package	
Complete Incentive Claim Form with Signatures	Section 4.11.3.1
Copy of Executed PDP Contract (PBI Only)	Section 4.11.3.3
Copy of Retro-commissioning Report (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75)	Section 4.11.3.6

4.4 3-Step Application Process for Large Non-Residential Projects (≥10 kW)

This section describes the 3-Step application process for all non-residential Projects ≥10 kW for commercial and industrial, government, non-profit, and public entities. However, the Applicant may expedite the 3-Step process by providing the required information to the Program Administrators in two steps. Non-residential projects (≥10 kW) are still subject to the eligibility requirements based on their system size and type, including the submission of any required application fees. See Section 4.3 for required timelines and paperwork.

The three primary steps for non-residential Applicants with systems larger than or equal to 10 kW are:

1. Complete and submit the Reservation Request Package and Application Fee.
2. Complete and submit the Proof of Project Milestone Package.
3. Complete and submit an Incentive Claim Form Package.

4.4.1 Step # 1: Submit Reservation Request Package and Application Fee

This subsection applies to all non-residential Applicants with solar energy systems ≥ 10 kW, regardless of whether the Applicant is a private or public entity. To reserve a specified incentive amount, Applicants must submit the Reservation Request Package, Application Fee, and all required documentation attachments. To apply for a CSI incentive online, visit csi.powerclerk.com or your Program Administrator's website for downloadable forms. The System Owner and Host Customer must always sign the Reservation Request Package. In addition, all Applicants applying for incentives must provide the following:

1. Completed Reservation Request Package and Program Contract with Signature[36] (includes completed Energy Efficiency Disclosure)
2. Electrical System Sizing Documentation (new/expanded load only)
3. Application Fee
4. Certification of tax-exempt status (gov't and non-profit only))
5. Documentation of an Energy Efficiency Audit if you have not met Title 24 or other exemptions. Title 24 documentation is mandatory for non-residential new construction.
6. High Cost Justification Form (if project cost exceeds cost cap)
7. Copy of signed Commitment Agreement (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75) (Proof of Benchmarking Documentation required)
8. Proof of at least 15% above current Title 24 standards (for non-residential new construction only)
9. Copy of New Construction Building Permit (For non-residential new construction)
10. Building Site Plan (for non-residential new construction)
11. Host Customer Email
12. Authorization to: Receive Customer Information or Act on a Customer's Behalf (required for CSE/ SDG&E service territory only)
13. Copy of the SOF chart marking the correct data point (other solar generating technologies only)

For more information on the above referenced forms and documents, go to Section 4.11.1.

[36] Signatures for all submitted documentation are acceptable in the following formats:

- Original signed documents, or "wet" signatures
- Scanned copies of original signed documents
- Faxed copies of original signed documents

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

4.4.1.1 Application Fee Process

In addition to the Reservation Request Package and Required Attachments, CSI non-residential and MASH Applicants applying for systems ≥ 10 kW will also be required to submit an application fee. The application fee is a standardized amount based on the following system size (CEC-AC) criteria:

kW ≤		kW <		FEE
10	-	50	=	$1,250
50	-	100	=	$2,500
100	-	250	=	$5,000
250	-	500	=	$10,000
500	-	1,000		$20,000

Applicants may submit the application fee with the Reservation Request Application. If the application fee is not received with the Reservation Request Application, the Program Administrators will invoice the Host Customer (utility customer of record) after review of the Reservation Request Application package.

The Host Customer will have 30 days to submit payment for the application fee in order to activate the Reservation Request. The payment must reference the Project (by invoice number, facility address, and/or application number).

Program Administrators will accept payments from either the Applicant or a third party on behalf of the Host Customer for a particular project; however, a returned application fee shall only be paid to the Host Customer.

Program Administrators 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 reservation numbers, not to the Project Sites; therefore, the Project must be completed under the same reservation number as the one linked to the application fee.

Upon verification of the installed CSI Project and initial CSI Incentive payment, the application fee will be returned in full to the Host Customer. No interest shall be paid on application fees.

4.4.1.1.1 Failure to Submit Application Fee

Failure to submit payment within 30 days will result in the cancellation of the Reservation Request Application. Returned application fee checks will result in the Program Administrator rejecting the Reservation Request Application.

4.4.1.1.2 Return of Application Fee

If upon eligibility screening the Project does not qualify for the CSI Program, the application fee will be returned in full to the Host Customer.

4.4.1.1.3 Forfeit of Application Fee

Once the initial Reservation Notice is issued and the project is cancelled or withdrawn by the Applicant and/or Host Customer, the application fee will be forfeited.

Once the initial Reservation Notice is issued and the Program Administrator rejects the project for failing to meet adequate proof of project milestone or reservation expiration date requirements, 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 the initial Reservation Notice is issued and the incentive level has been reduced (due to Commission directive, moving to the next step, etc.), the Applicant and Host Customer will be notified and given 14 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 14 calendar days, the application will be processed at the new, lower incentive level. If the application is not withdrawn within the 14-day period, the Applicant will forfeit the application fee if it subsequently withdraws or fails to pursue its project.

An application fee may be returnable if a project is cancelled or withdrawn due to circumstances beyond the Host Customer's control. The PA will grant a return of the Application fee on a case-by-case basis.

All forfeited application fees will be re-allocated to the Program Administrator's CSI budget.

4.4.1.1.4 Effect of Change of System Change on Application Fee

Application fees will be retained until the completion of the proposed CSI project and will not be adjusted downward due to changes in Project system size or CSI Incentive amount.

4.4.1.2 Review of Reservation Request

Once received, the Program Administrator will review the application package for completeness and determine eligibility. Applications will also be screened to ensure that the Project has not applied for incentives through other CSI Program Administrators or other state- or government-sponsored incentive programs.

4.4.1.2.1 Incomplete Reservation Requests

Incentive funds are not reserved until the Program Administrator receives all information and documentation required for the Reservation Request Package, the application fee and the project is approved.

If an application is found to require clarification or is missing required documentation, the Program Administrator will request the information necessary to process that application further. Applicants have 14 calendar days to respond to the requested clarification with the necessary

information. If after 14 calendar days, the Applicant has not submitted the requested information the applications will be cancelled. However, this does not preclude you from resubmitting your project to the Program Administrator for an incentive. All resubmitted application packages will be treated as new applications (i.e., all required documents must be resubmitted) and processed in sequence along with other new applications.

4.4.1.2.2 Approval of Reservation Request – Reservation Notice

Once a Reservation Request Package is determined to be complete and eligible, the Program Administrator will reserve funds allocated for a specified system size and will send an initial Reservation Notice to the Applicant.

The initial Reservation Notice documents that an incentive amount has been reserved for a project. The initial Reservation Notice will list, at a minimum, the approved incentive amount and the date by which the Proof of Project Milestone package must be submitted to secure the reservation, and all required documentation that must be submitted with it. Refer to Sections 4.4.2 and 4.10.2 for more information on the Proof of Project Milestone requirements.

4.4.1.2.3 Reservation Period for Commercial Projects

The initial Reservation is valid only until the Proof of Project Milestone Date, which will be 60 calendar days after the issuance date of the initial Reservation Notice. Within the noted 60 calendar days of the date of the initial Reservation Notice, the Applicant must submit to their Program Administrator the Proof of Project Milestone package. Once the Applicant has sufficiently demonstrated that the project is advancing, the Program Administrator will issue a Confirmed Reservation Notice. The Applicant will have 18 months to complete the project from the date that the initial Reservation Notice is issued.

4.4.1.2.4 Reservation Period for Government, Non-Profit and Public Entity Projects

The initial Reservation is valid only until the Proof of Project Milestone date, which will be 240 calendar days after the issuance of the initial Reservation Notice. Within the noted 240 calendar days of the date of the initial Reservation Notice, the Applicant the Applicant must submit to their Program Administrator the Proof of Project Milestone package. Once the Applicant has sufficiently demonstrated that the Project is advancing, the Program Administrator will issue a Confirmed Reservation Notice. The Applicant will have 18 months to complete the project from the date that the initial Reservation Notice is issued.

4.4.2 Step # 2: Submit Proof of Project Milestone Package

Within 60 calendar days (240 days for governmental, non-profit and public entities) of the date on the initial Reservation Notice, the Proof of Project Milestone package with all supporting documentation must be submitted to demonstrate to the Program Administrator that the Project is progressing and that there is a sustained commitment to complete the Project within the allowed timeline. The specific requirements by sector are as follows:

Once the Applicant has successfully met Proof of Project Milestone requirements, the Program Administrator will issue a Confirmed Reservation with a Reservation Expiration Date of 18

months from the date of the initial Reservation notice for commercial, governmental, non-profit, and public entity retrofit and new construction projects.

Powerclerk- the online application database must be used to submit Proof of Project Milestone package.

4.4.2.1 Required Proof of Project Milestone Documentation

The following documentation must be submitted on or before the Proof of Project Milestone date indicated in the initial Reservation Notice.

1. Completed Proof of Project Milestone Checklist
2. Copy of executed contract for System Purchase and Installation (for Host Customer Owned systems only) or Copy of Executed Alternative System Ownership Agreement (Third-party owned systems)
3. Copy of Executed Alternative System Ownership Agreement (if System Owner is different than Host Customer)
4. Copy of RFP or solicitation (Government, Non-Profit, and Public Entities only)
5. Revised copy of the SOF chart marking the correct data point if applicable (other solar generating technologies only)

For more information on the above-referenced documentation, see Section 4.11.2.

Once Applicants have successfully met the Proof of Project Milestones requirements, the Program Administrator will issue Confirmed Reservation Notices in the order received.

4.4.2.1.1 Incomplete Proof of Project Milestone

If submitted Proof of Project Milestone documentation is received by the Proof of Project Milestone Date but requires clarification or is missing required documentation, the Program Administrator will request the information necessary to process that application further. Applicants have 14 calendar days to respond with the necessary information. If, after 14 calendar days, the Applicant has not submitted the requested information, the application will be cancelled.

4.4.2.1.2 Proof of Project Milestone Extensions

In general, no extensions to the Proof of Project Milestone date are permitted.

4.4.3 Step # 3: Submit Incentive Claim Form Package

Upon Project completion and prior to the Reservation Expiration Date, Applicants must submit a completed Incentive Claim Form along with all of the necessary documentation to request an incentive payment. The Incentive Claim Form Package must have signatures of Applicant and Host Customer and should be submitted with the following documentation:

1. Incentive Claim Form with Signatures

2. CSI eligible Performance Monitoring and Reporting Service (PMRS) provider must be listed on the Incentive Claim Form for all projects (5 year contract to be submitted only upon PA request)
3. (PBI Only) Copy of Executed PDP Contract
4. Copy of Retro-commissioning Report (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75)
5. Copy of the SOF chart marking the correct data point (other solar generating technologies only)

Electronic submittal of documentation is mandatory by December 1, 2010. The online tool must be used to submit the Incentive Claim Form Package.

Refer to Section 4.11.3 for more information about the requirements associated with submitting the Incentive Claim Form package. The Program Administrator will process complete Incentive Claim Form Packages in the order received.

Table 15
3-Step Application Process – Form and Documentation Requirements

Step 1: Reservation Request Package	More Information
Completed Reservation Request Package and Program Contract with Signature (includes completed Energy Efficiency Disclosure)	Section 4.11.1.1
Electrical System Sizing Documentation (new/expanded load only)	Section 4.11.1.3
Application Fee	Section 4.4.1.1
Certification of tax-exempt status (gov't and non- profit only)	Section 4.11.1.15
Documentation of an Energy Efficiency Audit (if you have not met Title 24 or other exemptions) (Title 24 documentation mandatory for non-residential new construction)	Section 4.11.1.4
High Cost Justification Form (if project cost exceeds cost cap)	Section 4.11.3.8
Copy of signed Commitment Agreement (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75) (Proof of Benchmarking Documentation req'd)	Section 4.11.1.6
Copy of New Construction Building Permit (for non-residential new construction only)	Section 4.11.1.10
Building Site Plan (for non-residential new construction only)	Section 4.11.1.11
Step 2: Proof of Project Milestone Package	
Completed Proof of Project Milestone Checklist	Section 4.11.2.1
Copy of executed contract for system purchase and installation (for Host Customer Owned systems only) or Copy of executed alternative System Ownership agreement (Third-party owned systems)	Section 4.11.2.2, 4.11.2.3
Copy of RFP or solicitation (gov't, non-profit, and public entities only)	Section 11.3.5
Step 3: Incentive Claim Form Package	
Complete Incentive Claim Form with Signatures	Section 4.11.3.1
Copy of Executed PDP Contract (PBI Only)	Section 4.11.3.4
Copy of Retro-commissioning Report (EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75)	Section 4.11.3.6

4.5 Application Process for MASH Projects

This section describes the application process for Multifamily Affordable Solar Housing (MASH) Project Track 1A and Track 1B.

Track 1 provides fixed, up front, capacity-based incentives for qualifying solar energy systems, using the EPBB methodology. Incentives under Track 1 depend on whether the system offsets common area usage of the property (1A) or tenant area usage (1B). A property may receive both Track 1A and 1B incentives for the same project if the project will offset both common area and tenant load. Track 1A and Track 1B incentives will be paid based on how the system provides electricity. For example, if a 100 kW solar installation offsets both common area and tenant load, and 60 percent of the electricity output of the system is dedicated to common area load and 40 percent of the electricity output is dedicated to tenant load, the Applicant will receive Track 1A incentives for 60 kW, and Track 1B incentives for 40 kW.

4.5.1 3-Step Application Process for MASH Track 1A and 1B

There are three primary steps for MASH Track 1A and 1B Applicants as follows:

1. Complete and submit the Reservation Request Package and Application Fee (Application Fee is applicable for systems ≥ 10 kW)
2. Complete and submit the Proof of Project Milestone Package
3. Complete and submit the Incentive Claim Form Package

MASH Track 1 projects may opt into the 2-Step application process, but are still subject to eligibility requirements based on system size and type. See Section 4.3 for required timelines and paperwork.

4.5.1.1 Step # 1: Submit Reservation Request Package and Application Fee (Application Fee is applicable to systems ≥ 10 kW)

The Reservation Request Package is submitted in the first step of the application process.

To reserve a specified incentive amount, Applicants must submit the Reservation Request Package, Application Fee, and all required following documentation:

The Reservation Request Package must have signatures[37] of Applicant, Host Customer and System Owner, and should be submitted with the following documentation:

37 Signatures for all submitted documentation are acceptable in the following formats:
Original signed documents, or “wet” signatures
Scanned copies of original signed documents
Faxed copies of original signed documents

1. Completed Reservation Request Package and Program Contract with Signature (includes completed Energy Efficiency Disclosure)
2. Electrical System Sizing Documentation (new/expanded load only) for projects > 5 kW
3. Documentation of CPUC Code 2852 eligibility
4. Cover Sheet for Public Utilities Code Section 2852 Documentation
5. Documentation of an Energy Efficiency Audit (if you have not met Title 24 or other exemptions)
6. Printout of EPBB Tool Calculation (If applicable)
7. Application Fee (Applicable for systems ≥ 10 kW)

Detailed instructions are included with the Reservation Request Package. Refer to Section 4.11.1 for more information on the above-referenced forms and documents. For more information about the Application Fee, refer to Section 4.4.1.1.

4.5.1.1.1 Incomplete Reservation Requests

If an application is found to require clarification, the Program Administrator will request additional information. Applicants have 20 calendar days to respond to the clarification request with the necessary information. If after 20 calendar days the Applicant has not submitted the requested information, the application will be cancelled. Resubmitted application packages will be treated as new applications (i.e., all required documents must be resubmitted) and processed in sequence along with other new applications.

Incentive funds are not reserved until the Program Administrator receives all information and documentation required for the Reservation Request and the project is approved.

4.5.1.1.2 Approval of Reservation Request

Once a Track 1A/1B Reservation Request Package is determined to be complete and eligible, the Program Administrator will reserve a specific dollar amount for a specified system size, and send an initial Reservation Notice to the Applicant. The Notice will list, at a minimum, the approved CSI Incentive amount and the date that the Proof of Project Milestone package must be submitted. The initial Reservation Notice also will list the required information that Applicants must submit by the Proof of Project Milestone.

Refer to Sections 4.5.1.2 and 4.11.2 for more information on the Proof of Project Milestone requirements.

Once the Track 1 incentive budget becomes fully subscribed within each Program Administrator territory, the incentive amount per application will be capped at the reserved amount in Step 1

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. Program Administrators reserve the right to request original signed documents within the five-year period.

(Reservation Request step). System modifications resulting in an increase in the incentive amount during the PPM or ICF step will not be paid.

Conversely, if the system modification results in a decrease in the incentive amount during the ICF step, the lower of the PPM confirmed reservation amount and the revised incentive will be paid.

4.5.1.1.3 Reservation Period

Incentives can be reserved for up to 18 months for MASH Track 1A and 1B projects.

4.5.1.2 Step # 2: Submit Proof of Project Milestone Package

The initial Reservation is valid only until the Proof of Project Milestone Date. Within 240 calendar days of the date on the initial Reservation Notice, the Proof of Project Milestone package with all supporting documentation must be submitted to demonstrate to the Program Administrator that the project is progressing and that there is a sustained commitment to complete the Project within the allowed timeline. The specific requirements are as follows:

If issuing an RFP, the Applicant must submit a copy of the issued RFP (or equivalent) for purchase or installation of the solar energy system within 60 calendar days of the date of the initial Reservation notice.

4.5.1.2.1 Required Proof of Project Milestone Documentation

The following documentation must be submitted on or before the Proof of Project Milestone date indicated in the initial Reservation Notice.

1. Completed Proof of Project Milestone Checklist
2. Copy of executed contract for System Purchase and Installation (for Host Customer Owned systems only)
3. Copy of Executed Alternative System Ownership Agreement (if System Owner is different than Host Customer)
4. Revised EPBB Calculation Printout (if applicable)
5. Copy of RFP or Solicitation (if applicable)

For more information on the above-referenced forms, go to Section 4.11.2

4.5.1.2.2 Incomplete Proof of Project Milestone

If submitted Proof of Project Milestone documentation is received by the Proof of Project Milestone Date but requires clarification, the Program Administrator will request the information necessary to process that application further. Applicants have 20 calendar days to respond with the necessary information. If, after 20 calendar days, the Applicant has not submitted the requested information, the applications will be cancelled.

4.5.1.2.3 Proof of Project Milestone Extensions

In general, no extensions to the Proof of Project Milestone date are permitted.

4.5.1.3 **Step # 3: Submit Incentive Claim Form Package**

Once Applicants have successfully met the Proof of Project Milestones requirements, the Program Administrator will issue a Confirmed Reservation Notice, which will list the specific reserved Incentive amount and the Reservation Expiration Date. Upon Project completion and prior to the Reservation Expiration Date, Applicants must submit a completed Incentive Claim Form along with all of the necessary documentation to request an incentive payment. The Applicant should submit the Incentive Claim Form and the required supporting documentation after the solar energy system is purchased, installed, and put into operation.

The Incentive Claim Form Package must have signatures of Applicant and Host Customer and should be submitted with the following documentation:

1. Incentive Claim Form with Signatures
2. PMRS Cost Cap Exemption Documentation (if no eligible PMRS is installed)
3. Revised EPBB Calculation Printout (If applicable)
4. Documentation of Tenant/Common Load allocation

Although the Applicant is not required to submit Proof of Authorization to Interconnect, the Program Administrators will verify interconnection prior to any incentive payment. Refer to Section 4.11.3 for more information about the requirements associated with submitting the Incentive Claim Form package.

Table 16
MASH Track 1A/1B 3-Step Application Process
Form and Documentation Requirements

Step 1: Reservation Request Package	More Information
Completed Reservation Request Package, Program Contract with Signature (includes completed Energy Efficiency Disclosure)	Section 4.11.1.1
Application Fee	Section 4.11.1.14
Electrical System Sizing Documentation	Section 4.11.1.3
Documentation of CPUC Code 2852 eligibility	Section 4.11.1.7
Cover Sheet for Public Utilities Code Section 2852 Documentation	4.11.1.8
Documentation of an Energy Efficiency Audit (or Title 24 documentation, LIEE documentation or other exemptions)	Section 4.11.1.4
Printout of EPBB Tool Calculation	Section 4.11.1.7
Step 2: Proof of Project Milestone Package	
Completed Proof of Project Milestone Checklist	Section 4.11.2.1
Copy of executed contract for system purchase and installation (for Host Customer Owned systems only) or Copy of executed alternative System Ownership agreement (Third-party owned systems)	Section 4.11.2.2, 4.11.2.3
Revised EPBB Calculation Printout (if applicable)	Section 4.11.2.4
Copy of RFP or solicitation (if applicable)	Section 4.11.2.5
Step 3: Incentive Claim Form Package	
Complete Incentive Claim Form with Signatures	Section 4.11.3.1
Revised EPBB Calculation Printout (if applicable)	Section 4.11.3.2
Documentation of Tenant/Common Load allocation	Section 4.11.3.5
PMRS Cost Cap Exemption Documentation (if no eligible PMRS is installed)	Section 4.11.3.3

Note that once the Track 1 incentive budget becomes fully subscribed within each Program Administrator territory, the incentive amount per application will be capped at the reserved amount in Step 1 (Reservation Request step). System modifications resulting in an increase in the incentive amount during the PPM or ICF step will not be paid.

Conversely, if the system modification results in a decrease in the incentive amount during the ICF step, the lower of the PPM confirmed reservation amount and the revised incentive will be paid.

4.5.1.3.1 PMRS Requirements

PMRS is required for all projects; however, exemptions are allowed for CSI Low Income Programs provided the cost of the PMRS exceeds the Program cost limits.

For MASH systems up to 30kW, the total cost of the metering, communication and PMRS for the first five years following final project approval shall be less than 1% of total PV system eligible project costs (exclusive of metering, communication and PMRS costs).

For MASH systems 30kW and above, the total cost of the metering, communication and PMRS for the first five years following final project approval shall be less than 0.5% of total PV system eligible project costs (exclusive of metering, communication and PMRS costs).

MASH projects eligible for the PMRS cost cap exemption must demonstrate a valid cost proposal (dated within the last six months) that the cost for a minimum level of PMRS service exceeds the cap. Projects are not eligible for the cost cap exemption if the cost proposal is for more than the minimum level of PMRS service.

The Cost Cap Exemption Documentation consists of any of the following items that demonstrate PMRS costs exceed the cost cap:

1. A quote from an eligible PMRS provider indicating the PMRS provider's cost for providing the basic PMRS described in this section; or
2. A quote detailing the equipment, installation, maintenance, and five-year service costs of any communications equipment and service required for the provision of the PMRS (if such equipment and service does not already exist at the Host Customer premise); or
3. An invoice or quote detailing the associated metering system costs (if separate from inverter and only if necessary for the provision of the PMRS); or
4. A letter on the Solar Contractor letterhead showing any additional costs, including labor, materials, overhead and Solar Contractor mark-up, to install and maintain the PMRS.

4.6 Changes to Reservations

4.6.1 Withdrawal

The Host Customer and System Owner agree that either of them may withdraw from the Project for any reason by providing written notice of such withdrawal to Program Administrator. In the event the Host Customer or System Owner so withdraws, the CSI Contract will be cancelled. The Host Customer will retain sole rights to the Reservation and can preserve the Reservation and corresponding Reservation number by submitting a new Reservation Request Package at the same time written notification of withdrawal from the Project is provided to Program Administrator. The Host Customer understands that an increase in the system size will receive funding at the current incentive level at the time of the submittal if the entire available budget for a Program Administrator is reserved for other projects and there is no available funding, the Program Administrator cannot increase the reserved incentive amount. The Host Customer also understands that submitting a new Reservation Request Package will not move or alter the Proof of Project Advancement Milestone Date provided by Program Administrator, if any. The Host Customer further understands that if the Host Customer fails to re-submit a Reservation Request Package at the time of Project withdrawal, the Application will be terminated in its entirety by the Program Administrator and any previously reserved incentive funding will be released. In that instance, the Host Customer must apply for a new incentive reservation should the Host Customer still wish to participate in the Program.

4.6.2 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. Any request must include a written explanation of why the extension is required and how much additional time is needed. Approval of a request for a change in Reservation Expiration Date will not change or modify any other reservation condition. Failure to submit the Incentive Claim Form package by the original or extended Reservation Expiration Date will result in a cancellation of the application. The Applicant should submit a time extension request in writing to the Program Administrators. In describing the reason for the time extension request, the Applicant should provide information on the following to aid the Program Administrators in their decision on granting an extension:

1. Circumstances were beyond the control of the reservation holder that prevented the system from being installed as described in the Reservation Request Package. Describe the need and reasons for the request.
2. If there was a problem in the permitting process and it was the cause of delay, provide documentation, such as any correspondence with the building department, to support this explanation.
3. Cost documentation must demonstrate that the system purchaser has incurred substantial costs toward the reserved system's total purchase price. Attach copies of paid invoices, checks or other verifying documentation with the extension request.
4. Documentation of any equipment installed at the Site.

In order for any Project to receive a Reservation Extension, the Applicant may need to show documentation of a purchase order or commitment from a PV panel manufacturer to supply the necessary equipment.

The Program Administrator 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 Program Administrator shall notify the Applicant and schedule the Site visit within 10 days of notification.

4.6.2.1 Reservation Period Extensions for School or Community College Districts, University of California Schools, and California State Universities

Per Section 2851.5 of the Public Utilities Code:

"A school district or community college district may request an extension of a reservation expiration date for monetary incentives for a solar energy system. The Commission may grant a maximum of three extensions of 180 calendar days for each extension."

An extension request shall be made in writing, submitted to the Program Administrators, and shall include a written explanation of the need for the extension and the amount of additional time needed. In describing the need for the time extension request, the school district or community college district shall provide information on the circumstances, that are beyond the control of the district, that prevent the solar energy system from being installed as previously described in the initial Reservation Request. A failure to submit the Incentive Claim Form package by the original or extended reservation expiration date shall result in the cancellation of the Reservation Request.

An approval of a request for a change in the reservation expiration date for monetary incentives for a solar energy system shall not modify any other condition of a reservation for incentives.

Although not specified in Section 2851.5 of the Public Utilities Code, University of California Schools (UCs) and California State Universities (CSUs) may also be allowed to receive a maximum three extensions of 180 calendar days for each extension. The CSU or UC must also submit an extension request stating the circumstances, beyond the control of the University, that prevent the PV system from being installed, as stated above in Section 4.6.2.

4.6.3 Transfer of Reservation from one Site to Another

Host Customers should contact their Program Administrator as soon as they realize a Reservation Transfer is necessary. A request to transfer a CSI Reservation from one Site to another within a single utility service territory may be considered in accordance with the following provisions:

1. For applications received before December 18, 2008, Reservation Transfer requests must be made no later than 12 months (for residential / commercial) or 18 months (for government & non-profit) from the issuance of the initial Reservation Notice ***or*** within the first six-month extension. Projects that have been cancelled or have withdrawn are ineligible for a retroactive Reservation Transfer.
2. For applications received on or after December 18, 2008, Reservation Transfer requests must be made within 180 days of the initial Reservation Notice. Projects are not eligible for a Reservation Transfer after this time.

3. In order to transfer a Reservation, Host Customers must demonstrate to their Program Administrator 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 Project development.
4. Host Customers must provide documentation and demonstrate to their Program Administrator that the second Site, to which the application will be moved, is viable for solar Project development.
5. A Reservation may only be transferred once.
6. Reservations can only be transferred to another Site within the same Program Administrator service territory.
7. Transferred Reservations that increase overall capacity following the Reservation Transfer are eligible to receive CSI Incentives for additional capacity 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 capacity that is eligible for CSI Incentives. This means that if Incentive levels decline between the time of the initial Reservation and when the Reservation Transfer occurs, any capacity in excess of the initial Reservation will be reserved at a lower (i.e., the current) Incentive level, if it is eligible.
8. Once a Reservation Transfer has been confirmed, the Project timeline resets as per the date of the Reservation Transfer and the Project will be eligible for the full implementation time allowed to their Project class (residential, commercial or government and non-profit) in the Handbook.
9. Generally, once the initial reservation has been issued, the application fee becomes non-refundable.

4.7 Incentive Payment Process

Once a Project is completed, Applicants may request payment of the CSI Incentive amount listed on their Incentive Claim Form. A Project is considered completed when it is completely installed, interconnected, permitted, paid for, and capable of producing electricity in the manner and in the amounts for which it was designed. In the case of PBI projects, metering systems must be installed and fully functioning at the time of the Incentive Claim Form submittal.

To receive the CSI Incentive, all CSI Program requirements must be met and a complete Incentive Claim Form package submitted prior to the Reservation Expiration Date. Applicants are advised to keep a copy of the Incentive Claim Form package along with all required documentation for their records. The Application Process sections and Section 4.11.3 contain more detailed information on the Incentive Claim Form package and submittal process. The Program Administrator processes completed Incentive Claim Form packages on a first-come, first-served basis.

The Program Administrator reserves the right to withhold final CSI Incentive payment pending review and approval of the incentive claim documentation and field inspection results if that Project is determined to require a field inspection.

The SASH Program has its own incentive payment process, described below in Appendix D.

4.7.1 Incomplete Incentive Claim Form Packages

If an Incentive Claim Form package is incomplete or is found to require clarification, the Program Administrator will request the information necessary to process that application further. Applicants have 14 calendar days to respond to the requested clarification with the necessary information.

If after 14 calendar days, the Applicant has not submitted the requested information, the request for payment may be denied.

If an Incentive Claim Form package is not received by the expiration date of the Incentive Claim Form, or the Incentive Claim Form package indicates that the Project is otherwise ineligible, the Program Administrator 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 a CSI Incentive reservation but will be subject to the eligibility requirements, incentive levels, and funding available at that time of reapplication.

4.7.2 Incentive Check Payment and Terms

Upon final approval of the Incentive Claim Form documentation and completed field verification visit (if required), the Program Administrator will issue the CSI Incentive payment. Payment will be made to the Host Customer or a third party as indicated on the Incentive Claim Form, and will be mailed to the address provided. In cases where the contractor is the designated payee but the license is expired or suspended, see section 2.1.4.1 for the payee designation process. As the reservation holder, the Host Customer may assign payment to a third party on the Incentive Claim Form. The payee must submit their tax ID number and tax status to the Program Administrator.

4.7.2.1 Expected Performance Based Buydown (EPBB) Incentive Payment Terms

Most residential systems will receive an EPBB Incentive. The EPBB Incentive will be a one-time lump sum payment to help reduce the cost of installing a residential PV system. Upon final approval of the Incentive Claim Form package and completed field inspection visit, if applicable, the Program Administrator will issue the CSI Incentive in approximately 30 days.

The EPBB payment shall be calculated according to Section 3.2 and noted on the Incentive Claim Form, provided no adjustments to the system size or estimated output are warranted after system inspection.

Please review Section 4.8 for information on potential system size changes affecting the incentive amount.

The lump sum EPBB Incentive payment issued constitutes final and complete payment.

4.7.2.2 **Performance Based Incentive (PBI) Payment Terms**

In 2007, CSI Incentives for systems equal to or greater than 100 kW, or systems less than 100 kW who elect to opt in, will receive Performance Based Incentive (PBI) payments. As of January 1, 2008, PBI is required for systems 50 kW or larger and 30 kW or larger on January 1, 2010. PBI will be paid based on:

A. The monthly gross kWh produced by the system for electric generation systems
B. The monthly net kWh-equivalent displaced by the other solar electric generating technology

PBI payments will be made monthly and paid out over a 5-year period. The monthly PBI payment shall be calculated as follows:

Solar Electric Generating:
Monthly PBI Incentive Payment = Reserved Incentive Rate x Measured gross kWh Output[38]

Solar Electric Displacing:
Monthly PBI Incentive Payment = Reserved Incentive Rate x measured net kWh-equivalent displacement.

Upon final approval of the Incentive Claim Form documentation and completed field verification visit, if applicable, the Program Administrator will issue the first PBI payment approximately 30 days after receipt of the first scheduled meter read from the project PDP. PBI payments will continue to be paid following the receipt of performance data reports submitted by the PDP on a monthly basis for the next 59 months (five years total).

Additionally, the PAs will disburse payment(s) based on a retroactive data report(s) from the project PDP contingent upon the following criteria:

A. All pertinent ICF documentation was submitted correctly by the Reservation Expiration Date; and
B. First field inspection was passed with no compliance issues.

Should a project fail the first field inspection, the start of the data report period for PBI payments will be retroactive to first PBI Payment Cycle following the approved field inspection date only if all pertinent Incentive Claim Form documentation was submitted correctly by the Reservation Expiration Date.

Should an Applicant fail to submit all pertinent Incentive Claim Form documentation (any documentation pertaining to the installed system or Performance Data Provider) by the Reservation Expiration Date, PBI payments will not be retroactive, but rather, the start of the data report period for Host Customer will be the first PBI Payment Cycle following Final Approval of the Host Customer's project by the PA. Documentation failures pertain to non-trivial system information and signatures. Documentation failures do not include trivial mistakes that do not require submitting revised or additional information. Determination of documentation

[38] Because the CSI Program and statutes only allow for customers to receive incentives up to the first MW, PBI payments for energy output on systems larger than 1 MW will be prorated based on the ratio of 1 MW to the entire size of the site. See Section 3.3 for further detail.

failures are at PA discretion. Any documentation revisions or submittals after the initial submission will count as a documentation failure. Please note that retroactive payments will not exceed 180 days in time.

Should an Applicant or Contractor fail to install a functioning metering system before the ICF documentation is submitted that does not allow the PA to make an accurate incentive payment, the installation will be considered incomplete by the PA and the project will be reverted back to the Confirmed Reservation status. If the project reservation is expired, the Contractor will have 30 days to install a functioning metering system and resubmit the ICF package. If, after this time, the metering system is non-operational, payment for the project will commence and the System Owner must forfeit any unreported system production. Additionally, a failure will be issued to both the Applicant and Contractor.
Payments will be made to the Applicant, Host Customer, or a third party as designated on the Incentive Claim Form. In cases where the contractor is the designated payee but the license is expired or suspended, see section 2.1.4.1 for the payee designation process. At the discretion of Program Administrators, payments may either be mailed to the address provided, wire transferred, or paid via credits on the utility bill.

If a monthly payment is determined to be incorrect due to a faulty meter read, the correction will be made in the next available payment period.

If a Host Customer moves during the 5-year period, they must notify the Program Administrator, who may make subsequent adjustments to the CSI Program.

The 60th monthly PBI incentive payment constitutes final and complete payment.

4.8 System Changes Affecting Incentive Amount

The Program Administrator will expect a system to be installed as described in the Reservation Request Package. However, it is recognized that changes may occur during installation and that changes may be necessary in some circumstances.

If the installed system is smaller in output than specified in the Reservation Request Package or Proof of Project Milestone, the incentive amount will be calculated using the installed system size. If the installed system is larger than that originally specified in the Reservation Request Package or Proof of Project Milestone the incentive will be recalculated based upon the installed system size, with the incremental addition to the system receiving the current level of incentive.

If the increase in size occurs after the expiration date of the Confirmed Reservation, the incremental addition will be considered a new project and must submit a Reservation Request with its required documentation.

If the installed system changes or an increase to the system is made after the Incentive Claim approval, the new system size and equipment must be reported to the Program Administrator and utility interconnection departments. System size changes including equipment and design that are greater than or equal to 1 kW CSI AC may apply for a CSI incentive if all eligibility requirements are met. The Applicant, System Owner, or Host Customer must notify PAs via email if there is a system increase of any size due to a design factor change. Please reference

section 1.9 for PA contact information. Failure to do so may result in an Applicant and/or Contractor failure.

PBI participants who increase the size or the design of their existing project during the PBI payment period will be eligible to receive an EPBB incentive on all additions up to 30kW. The remaining PBI payments will be pro-rated based on the system size increase. For PBI projects with additions over 30kW the System Owner are required to install a new revenue-grade meter and meet PDP and PMRS obligations to ensure the addition is metered separately.

If the entire available budget for a Program Administrator is reserved for other projects and there is no available funding, the Program Administrator cannot increase the reserved incentive amount.

Please review Section 3.2.1 for information on the application process should the calculator change.

4.9 CSI Project Review

It is the intent of the CSI Program to provide incentives for reliable, permanent, and safe solar energy systems that are professionally installed in compliance with all CSI Program Handbook rules, as well as all applicable federal, state, and local regulations.

Program Administrators will conduct a CSI Project Review to verify that each project is installed as represented in the Incentive Claim Documentation and to ensure that the Host Customer and Applicant have complied with all CSI Program Handbook requirements.

Among the components of the CSI Project Review are:

- Onsite field inspections, including verification of CSI application information and/or metering inspections (if applicable)
- Application process review, including:
    - Review of all project application documentation
    - Review of interconnection information
    - Review of any other information about the Applicant's project that has been received by the Program Administrators
    - Review of PBI payment documentation (if applicable)

The results of the CSI Project Review process may affect project incentive payments and eligibility for future program participation.

First, the CSI Project Review process will determine whether a specific project should be paid incentives under the CSI program. The incentive payment will be contingent on and may be adjusted based on any aspect of the CSI Project Review, including applicable onsite field inspections. If an issue arises during the CSI Project Review, the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer may have the opportunity to correct the problem. However, if an issue arises during the onsite field inspection, the project is subject to the results of the inspection.

Second, the CSI Project Review process may also determine whether an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer are subject to the consequences for failures and/or immediate disqualification from participating in the CSI Program as provided in Sections 4.10.1 and 4.10.2.

The Program Administrator will notify the Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer if the CSI Project Review will result in a change in system size and/or incentive amount due to failure or immediate disqualification as provided in Section 4.10.3.

4.9.1 Onsite Field Inspections

A portion of all CSI general market projects (EPBB and PBI) and SASH projects are subject to onsite field inspections or may be inspected at the Program Administrator's discretion. All MASH systems will receive an onsite field inspection. The Program Administrators will perform onsite field inspection for the first two Incentive Claim Forms submitted by each new Applicant and/or Solar Contractor. After the completion of two successful field inspections, each Applicant will have a minimum one in twelve projects inspected in the program overall, but each Program Administrator may inspect more projects from any particular Applicant or Solar Contractor. The Program Administrators may determine whether to conduct an onsite field inspection randomly and/or based on Applicant or Solar Contractors' participation in the CSI Program. Parameters that may affect frequency or incidence of onsite field inspection include: Applicant or Solar Contractor being new to the CSI program, frequency of new applications in the program, and results of prior CSI onsite field inspections, or results of prior CSI Project Reviews.

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

4.9.1.1 Key Project Components Reviewed During Onsite Field Inspection

The inspectors will verify the System is installed in accordance with information provided on the Incentive Claim documentation, and in compliance with CSI handbook rules.

The following are some examples of what will be inspected and verified:

Modules and Inverter(s)

- Manufacturer
- Model Number (if model nameplate is not visible, invoice is necessary for verification)
- Quantity

Installation Parameters

- Tilt
- Azimuth
- Standoff Height
- Shading of Array(s)

- The Program Administrators reserve the right to ask for a shading study from an Applicant. Shading studies will generally be requested for projects that do not meet the minimal shading requirements

Operation

- System is operational, and output is reasonable for conditions at the time of the inspection

PBI or PMRS Meter or Metering Related Equipment

- The metering equipment must meet the requirements as outlined in Sections 5.1 and 5.2.

4.9.1.2 Acceptable Range of Parameters for Key Project Components Reviewed During Inspection

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.

The inspection results must fall within the following tolerances to pass inspection:

- Tilt ± 3º
- Azimuth ± 5º
- Summer Shading (May-October) ± 5%

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

- The onsite field inspection results are outside of the above tolerances,
  or
- The onsite field inspection reveals other discrepancies between key project components and the project's Incentive Claim documentation.

If applicable, an infraction or failure as defined in Sections 4.9.2.1 and 4.9.2.2 will be issued to the appropriate party if the incentive identified on the original Incentive Claim Form is 5% greater or below the incentive amount resulting from the onsite field inspection. All project incentives are subject to the results of the onsite field inspection.

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

4.9.2 Infractions and Failures

A project can receive an infraction or failure based on the CSI Project Review or the onsite field inspection.

4.9.2.1 Issuance of Infractions

An infraction can be issued to the Applicant, Solar Contractor, System Owner, and/or Host Customer for the following reasons but are not limited to:

- The incentive amount submitted in the incentive claim documentation differs from that of the onsite inspection incentive results between 5-10%
- Neglecting to provide required documentation on a consistent basis, such as Host Customer contact information
- Neglecting to respond to requested information within the 14 day time period on a consistent basis
- Failure to include System Owner on high-level service notification alerts indicating a non-functioning or poorly functioning system related to PBI system performance.

4.9.2.2 Issuance of Failures

A failure can be issued to the Applicant, Solar Contractor, System Owner, and/or Host Customer for the following reasons but are not limited to:

- The incentive amount submitted in the incentive claim documentation differs from that of the onsite inspection incentive results greater than 10%
- 3 Infractions as defined in section 4.9.2.1
- Re-inspections (due to contested result) found to have adjustments made to match the original submission following the initial inspection
- Re-inspections (due to contested result) found to have the same results as the original inspection
- System is found non-operational at the time of inspection due to equipment failure
- Installation of PV modules, invertors and/or performance meters not on the CEC's list of eligible equipment or otherwise ineligible for incentives
- Failing to disclose the actual contractor performing work on Installation Contract
- Failure to notify the Program Administrator of a system addition of any size after an incentive has been issued.

4.10 Notifications, Sanctions and Dispute Resolution

The CSI Program has two classifications for Applicants, Solar Contractors, System Owners and Sellers for the purposes of determining probation and/or program removal based on failures:

1. High volume Applicant, Solar Contractor, System Owner and Seller is defined as having had 200 or more projects completed within the previous 12 month rolling period
2. Low volume Applicant, Solar Contractor, System Owner and Seller is defined as having less than 200 projects completed within the previous 12 month rolling period

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

- Probation status will be applied if 1.5% of all completed projects within the previous 12 month rolling period have received failures.

- Removal from CSI Program will be enforced if 2.5% of all completed projects within the previous 12 month rolling period have received failures.

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

- Probation status will be applied if two failures were received within the previous 12 month rolling period.
- Removal from CSI Program will be enforced if three failures were received within the previous 12 month rolling period.

If an Applicant, Solar Contractor, System Owner and/or Seller is placed on probation, they will remain under that status for a period of one year.

4.10.1 Grounds for Immediate Disqualification from the CSI Program

An Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer may be immediately disqualified from participating in the CSI program if any of the following events occur:

- A Solar Contractor that operates under a false CSLB license number or another contractor's CSLB license number
- An applicant fails to disclose another funding sources (See Section 3.4.2) that materially affects the project's qualification for the CSI incentive
- The onsite field inspection results in an incentive amount that is 25% above the original Incentive Claim Form Incentive amount, or:
- The Solar Contractor installs used or stolen PV modules and/or any other system components
- Forged paperwork
- Providing any false information to the Program Administrator or any CSI program participant (Applicant, Solar Contractor, System Owner, Seller and/or Host Customer)

4.10.2 Notifications and Sanctions

The Program Administrator will notify the Applicant, Solar Contractor, System Owner, Seller, and Host Customer if the Program Administrator determines that an infraction or failure has occurred.

If a CSI project results in the imposition of an infraction or failure on an Applicant, Solar Contractor, System Owner, Seller and/or Host Customer, the Program Administrator will notify all of the related entities on the project application of the reasons for the determination.

Once notified of an infraction or failure due to an onsite field inspection or the application process review, the Applicant, Host Customer, or System Owner will either accept the results or dispute the results through the dispute resolution section found in Section 4.10.2.

4.10.3 Process for Removal from CSI Program

4.10.3.1 Removal from Program for Excessive Failures

If it is determined that an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer is immediately disqualified from participating in the CSI program because of more than the acceptable number of failures based on the company's size pursuant to Section 4.10. then the Program Administrator will:

- Withholding confirmation of all projects in the Reservation Request Review and Suspended Reservation Request Review status;
- Pay CSI Incentive payments only for Reservations Confirmed before the date of the disqualification;
- Notify all parties identified on the application will be notified of the disqualification.
- Allow completion and payments of only pending applications of the entity being disqualified if no grounds for immediate disqualification exist under Section 4.10.1.

Disqualified parties who are allowed to reenter the CSI Program will be placed on probation status after the designated removal period is complete and must send a written notification to the Program Administrators explaining in detail what actions were taken to reduce future failures and to ensure future program compliance. The notification must be received by the Program Administrators within 30 days prior to reentry into the CSI Program.

4.10.3.2 Removal from Program for Immediate Disqualification

If an Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer is immediately disqualified due to the reasons pursuant to Section 4.10.1, the following will occur:

- Projects in the Reservation Request Review and Suspended Reservation Request Review status will not be Confirmed and all applications associated with the entity being disqualified will be suspended;
- No CSI Incentive payment will be made to the entity that has been immediately disqualified; and
- All parties identified on the application will be notified of their application's status.

If the Solar Contractor is disqualified from participating the CSI Program due to the reasons outlined in Section 4.10.1 and if the system has not yet been installed, the Host Customer may

hire a new Solar Contractor without losing the existing incentive reservation and may apply for an extension, if necessary.

4.10.3.3 Contractor Suspension due to CSLB License Suspension

See Section 2.1.4 for information about the process that will be followed if a CSLB license is suspended while a contractor still has active projects.

4.10.4 Dispute Resolution

The Applicant, Solar Contractor, System Owner, Seller, and/or Host Customer may appeal in writing to the Program Administrator's regarding notification of sanction. To appeal the notification, the disqualified entity must first contact the appropriate Program Administrator within 30 days to discuss the issue. If the disqualified entity has new information to provide the Program Administrator, then it must be provided to the Program Administrator within 30 days. If the disqualified entity and the Program Administrator cannot resolve the dispute, then the disqualified entity can file a complaint using the California Public Utility Commission's (CPUC's) Formal Complaint process. Information on the formal Complaint process is available through the Public Advisor's Office at the CPUC or on CPUC's website: www.cpuc.ca.gov.

4.11 Application Forms and Documentation

The following section discusses each of the forms and documentation requirements listed in the subsections above. Refer to the subsection describing the process for your application type to determine which of the following documents are required for your situation. Note that for all submitted documentation requiring them, signatures are acceptable in the following formats:

- Original signed documents, or "wet" signatures
- Scanned copies of original signed documents
- Faxed copies of original signed documents

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

Electronic submittal of all forms and documentation is mandatory by December 1, 2010. The online tool must be used to submit these documents.

4.11.1 Reservation Request Package and Required Documentation

4.11.1.1 **Reservation Request Package with Signature**

To reserve a specified incentive amount, a Reservation Request Package must be submitted with all required documentation attached. All forms are available from the Program Administrators' website. The equipment seller, Solar Contractor, and any other third party providing service related to a system installation should be identified on the application form, together with a description of the generation site, equipment information and project incentive calculation.

4.11.1.2 **Proof of Electric Utility Service for the Site**

Eligibility requirements restrict participation in the CSI Program to Customers who are located in PG&E, SCE, or SDG&E service territories and physically connected to the electric utility transmission and distribution system. GM CSI Applicants are required to provide their utility account number and meter number on the Reservation Request Package as validation of electric utility service for the site. For new construction projects, the Applicant must provide confirmation documentation from the serving utility.

4.11.1.3 **Electrical System Sizing Documentation (New or expanded load only)**

Except for systems of 5kW or less which need no sizing documentation (see Section 2.2.5), to confirm that participating distributed generation systems will not exceed the capacity of the Host Customer's previous 12-month historical usage, all Applicants for new construction Projects must submit a copy of the data and calculations used to determine electrical system size. Please refer to Section 6.1 for more details.

4.11.1.4 Documentation of an Energy Efficiency Audit

See Section 2.3 for more information about energy efficiency audits (including Title 24 requirements for non-residential new construction).

4.11.1.5 **Copy of signed Energy Efficiency Disclosure**

See Section 2.3.1 for more information about the disclosure. Energy Efficiency Disclosure is part of the Reservation Request Form.

4.11.1.6 **Copy of signed Commitment Agreement (EPBB Existing Commercial Buildings** ≥ 100,000 sq. ft. and Benchmarking < 75)

See Section 2.3.1.1 for more information about the Commitment Agreement

4.11.1.7 **Proof of Low income Status (MASH and SASH only)**

For MASH multifamily residential projects proving low-income status per Public Utilities Code Section 2852, applicants must provide documentation that meets one of the following:

1) For a Multifamily residential complex that is financed with low-income housing tax credits, tax-exempt mortgage revenue bonds, general obligation bonds, or local, state or federal loans or grants, one of the following signed and executed documents between the property owner/developer and entity issuing financing as listed above must be submitted:

a) Deed Restriction
b) Regulatory Agreement

2) For a Multifamily residential complex where at least 20% of units of the total units are sold or rented to lower income households, one of the following signed and executed documents between the property owner/developer and public entity or non-profit housing provider under Internal Revenue Service Section 501(c)(3) must be submitted:

a) Deed Restriction
b) Affordability Covenant

For both 1 and 2 above, it is the responsibility of the Applicant to demonstrate that the rents being charged (or initial sale costs of the units) in the multifamily residential complex are or were affordable under the definitions of "affordable housing cost," affordable rent" and "lower income households", as defined in Public Utilities Code Section 2852, all of which terms have the same meanings as in Health and Safety Code Sections 50050 through 50106. If an applicant's documentation submitted pursuant to either 1 or 2 above does *not* come from one of the public entities listed below— all of whom have established authority to regulate affordable housing costs and/or rents—the applicant must present evidence to the MASH Program Administrator that the relevant affordability requirements of the Public Utilities Code and Health and Safety Code have been met for all units presented by the applicant as affordable under these code sections.

For reference, below is a non-comprehensive list of public entities that provide financing for low-income multifamily housing:

- California Tax Credit Allocation Committee (TCAC)
- California Debt Limit Allocation Committee (CDLAC)
- California Department of Housing and Community Development/The California Housing Finance Agency (HCD/CALHF)
- U.S. Department of Housing and Urban Development (HUD)
- A Redevelopment Agency (RDA) or RDA successor agency
- A Housing Authority, or a City or County in the case of a project funded by HUD HOME Funds

The MASH Program Administrator may consult the public entity or non-profit housing provider listed on any applicant's submitted low income documentation to confirm that the property is in good standing and not in violation of the terms of the low income documentation required for

MASH program eligibility. For more detailed information regarding Public Utilities Code Section 2852, please see Section 2.1.5. General CSI Eligibility Guidelines.

For SASH projects, Applicants must demonstrate that the Site meets CPUC Code 2852 low-income eligibility requirements. See Appendix D for more details.

4.11.1.8 Cover Sheet for PU Code Section 2852 Eligibility Documentation

In order to clearly outline how a proposed MASH project achieves Public Utilities Code Section 2852 eligibility, Applicants are required to submit a cover sheet summarizing key details such as, but are not limited to, property owner name, public entity/non-profit agency name, and expiration date of low income documentation. This will allow Program Administrators to more accurately and efficiently determine eligibility of projects. .

4.11.1.9 Proof of at least 15% above Title 24 Standards (non-residential new construction)

Compliance documents used to demonstrate Title 24 compliance, including the PERF-1 form and accompanying supporting forms, shall be provided as proof of attainment of the Tier I or Tier II levels. Compliance documents shall be completed by persons who are Certified Energy Plan Examiners (CEPE) by the California Association of Building Energy Consultants (CABEC).

4.11.1.10 Copy of New Construction Building Permit

Beginning July 1, 2009, all non-residential new construction projects require submittal of the new construction building permit in order to identify applicable Title 24 requirements. See Section 2.3 for more information about energy efficiency requirements and Title 24 documentation.

4.11.1.11 Building Site Plan

Beginning July 1, 2009, for all non-residential new construction projects the Applicant shall provide to the Program Administrator a site plan that for each lot:

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

- Shows the bearing of the property lines and the azimuth and tilt or roof pitch of each PV array.

4.11.1.12 Copy of Executed Agreement of Solar Energy System Purchase and Installation

For all 1-Step, 2-Step and Expedited 2-Step projects, the Applicant must submit a copy of an executed agreement to purchase and install the solar energy system with the Reservation Request package only if the solar system is Host Customer Owned.

Agreements must be legally binding and clearly identify the scope of work, terms, price, solar energy system components to be installed. Agreements must be signed by appropriate parties (supplier/Solar Contractor, Host Customer, Applicant and/or System Owner).

The Applicant must provide copies of executed purchase and/or installation agreements with the Reservation Request Package, and the information must be internally consistent and must be consistent with information entered in the PowerClerk Reservation Request. Agreements for the purchase of a system or system equipment must be in writing and must include, at a minimum, the following information:

- The quantity, make and model number (as shown on the California Energy Commission lists of eligible equipment) for the PV modules, inverters, and system performance meters
- The total purchase price of the system before applying the incentive
- Language indicating the purchaser's commitment to buy the system
- Printed names and signatures of the purchaser and equipment seller's authorized representative.

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-10 or C-46 contractor's license may not offer installation services or charge for installation in any agreement under the CSI Program.

In addition, these contracts must contain the following information:

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

The above requirements are sufficient evidence of an agreement to purchase and install a system for cases where a contractor sells and installs the system.

4.11.1.13 Copy of Executed Alternative System Ownership Agreement (If System Owner is Different from Host Customer)

For all 1-Step, 2-Step and Expedited 2-Step projects, the Applicant must submit with the Reservation Request Package a copy of Executed Alternative System Ownership agreement only if the solar system is not Host Customer owned.

Agreements must be legally binding and clearly identify the Host Customer name, site address, scope of work, terms and price. Agreements must be signed by the Host Customer and System Owner).

4.11.1.14 Application Fee

For all non-residential and MASH Projects ≥10kW, Applicants must submit application fee that is based on system size (CEC-AC) criteria. See Section 4.4.1.1 for more information on application fees.

4.11.1.15 Certification of Tax-exempt Status and AB1407 Compliance

For all non-profit entity Projects, certification under penalty of perjury from the entity's chief financial officer or equivalent of non-profit status. Such certification that the system is not receiving, and will not in the future receive, federal tax benefits through financial arrangements (i.e., the System Owner if a third party, which will be receiving tax benefits from the system) is also required. This certification must be renewed annually if receiving PBI payments.

Additionally, any public entity applying for CSI Incentives must void any existing law, under its authority, that prohibits or restricts the installation or use of a solar energy system in accordance with the requirements set forth in AB 1407:

> "Assembly Bill 1407, signed by Governor Davis on September 3, 2003. This legislation voids and makes unenforceable any existing covenant, restriction, or condition contained in any deed, contract, security instrument, or other instrument affecting real property, as specified, that prohibits or restricts the installation or use of a solar energy system. Any Public Entity (see definition) may not receive funds from a state-sponsored grant or loan program, including the SGIP, for solar energy if it fails to comply with these requirements and would require a Public Entity to certify that it is meeting these requirements when applying for these grants or loans."

4.11.2 Proof of Project Milestone Package (for Projects following a 3-Step Process)

4.11.2.1 Completed Proof of Project Milestone Checklist

All Proof of Project Milestone submittals must be accompanied by a completed and signed checklist.

4.11.2.2 Copy of Executed Contract for System Purchase and Installation

For 3-Step projects applicants must submit a copy of executed contract for purchase and installation of the system only if the system is Host Customer owned.

Agreements must be legally binding and clearly spell out the scope of work, terms, price, solar energy system components to be installed. Agreements must be signed by appropriate parties (supplier/Solar Contractor, Host Customer, Applicant and/or System Owner).

The Applicant must provide copies of executed purchase and/or installation agreements with the Reservation Request Package, and the information must be internally consistent and must be consistent with information entered in PowerClerk for the Reservation Request Package. Agreements for the purchase of a system or system equipment must be in writing and must include, at a minimum, the following information:

- The quantity, make and model number (as shown on the California Energy Commission lists of eligible equipment) for the PV modules, inverters, and system performance meters
- The total purchase price of the system before applying the incentive
- Language indicating the purchaser's commitment to buy the system
- Printed names and signatures of the purchaser and equipment seller's authorized representative.

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-10 or C-46 contractor's license may not offer installation services or charge for installation in any agreement under the CSI Program.

In addition, these contracts must contain the following information:

- Name, address and contractor's license number of the company performing the system installation
- Site address for the system installation
- Description of the work to be performed
- Total agreed price to install the system

- Payment terms (payment dates and dollar amounts)
- Printed names and signatures of the purchaser and the company's authorized representative.

The above requirements are sufficient evidence of an agreement to purchase and install a system for cases where a contractor sells and installs the system.

When a General Contractor subcontracts the Solar Installation on behalf of the Host Customer, the subcontract agreement will fulfill the requirements outlined in this section.

4.11.2.3 Copy of Executed Alternative System Ownership Agreement (If System Owner is Different from Host Customer)

For all 3-Step projects, the Applicant must submit a copy of Executed Alternative System Ownership agreement only if the solar system is not Host Customer owned.

Agreements must be legally binding and clearly identify the Host Customer name, site address, scope of work, terms and price.. Agreements must be signed by the Host Customer and System Owner).

4.11.2.4 Copy of RFP or solicitation (MASH only)

Within 60 days after the initial Reservation Notice, government, non-profit, and public entities must submit a copy of the Request for Proposals (RFP), notice to Invite Bids, or similar solicitation issued for the installation, lease, and/or purchase of the system proposed for the Project. The RFP or solicitation must include sufficient documentation details including the scope of work, schedule, terms, budget, and system components to be installed.

For government, non-profit, and public entities not issuing an RFP for the Project, all other Proof of Project Milestone documentation must be submitted within Proof of Project Milestone Date.

4.11.3 Incentive Claim Form Package

4.11.3.1 Complete Incentive Claim Form with Signatures

A completed Incentive Claim Form must be submitted. It must be read, completed, and signed by both the Host Customer and System Owner (if different). Any changes in the system upon completion of the Project, including any changes to the name of the contractor completing the Project, must include supporting documentation and a recalculated Incentive amount.

Note that solar electric displacing systems do not require interconnection.

For information on the interconnection process, see Section 2.6.

4.11.3.2 Performance Monitoring and Reporting Service (PMRS) Contract or Cost Cap Exemption Documentation

For all PBI systems, EPBB systems > 10 kW and any other systems installing a PMRS, it must be indicated on the CSI Incentive Claim Form that a PMRS is installed and name the eligible PMRS provider.. All systems installing PMRS must contract with the provider for a minimum of 5 years and must report 15 minute interval production data quarterly to the PAs. The System Owner must provide a copy of the PMRS contract upon request of the PA; however, it is not a requirement to submit the contract in the Incentive Claim package.

Systems receiving a MASH incentive must either indicate the PMRS provider on the Incentive Claim Form or submit PMRS Cost Cap Exemption Documentation if no eligible PMRS is installed (see Section 4.5.1.3.1 for details).

See Section 5: Metering Requirements for additional information on PMRS.

4.11.3.3 Copy of Executed PDP Contract

All PBI systems are required to have a PDP and therefore 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 energy system Site. A separate contract is not required if the same company is providing both the PMRS and PDP services as long as the contract specifies they are providing services that satisfy both requirements.

See Section 5: Metering Requirements for additional information on PDP.

4.11.3.4 Documentation of Load Allocation (MASH Track 1B only)

MASH Applicants must demonstrate that the load allocation of the solar energy system matches the applied for Track 1A/1B incentives.

4.11.3.5 Signed Field Verification Certification Form

The Solar Contractor must perform a Field Verification prior to submitting the Incentive Claim Form. The Field Verification Certification Form must be signed by the contractor and submitted to the Host Customer. A copy of the signed Field Verification Form must be retained by the contractor and may be requested by the Program Administrator at any time after an Incentive Claim Form is submitted. A copy of the Field Verification Form can be found on the Go Solar California website: http://www.gosolarcalifornia.org/documents/csi.php. See section 7 for Field Verification requirements.

4.11.3.6 Copy of Retro-commissioning Report Agreement

A copy of the retro-commissioning report is required for EPBB Existing Commercial buildings ≥ 100,000 sq. ft. and Benchmarking < 75, as represented in the Commitment Agreement. See section 2.3.1.1 for more information on the Commitment Agreement.

4.11.3.7 Circumstances Requiring Additional Documentation

4.11.3.7.1 Owner or Self-Installed System

In situations where the System Owner installs the Project, the Applicant must provide the following information during the first step of the application process:

- An equipment purchase agreement as described above, or
- In cases where there is not a signed agreement to purchase equipment the purchaser may provide invoices or receipts showing that at least 10 percent of the system equipment purchase price (generating equipment and inverters) has been paid to the seller(s).[39]

4.11.3.7.2 Contractor-Installed System with Separate Seller and Solar Contractor

In situations where the System Owner is purchasing the Project system from one company and hiring a separate company (licensed contractor) for installation, the System Owner must obtain proof of his or her commitment to purchase and install the system in separate documents as follows:

- An equipment purchase agreement as described above, or
- In cases where there is not a signed purchase agreement the System Owner may provide invoices or receipts showing that at least 10 percent of the system equipment purchase price (generating equipment and inverters) has been paid to the seller(s), and
- An installation contract from the second company as described above.

4.11.3.8 High Cost Justification and Acknowledgement Form (if applicable)

In situations where the Applicant submits a project to the CSI Program that exceeds the soft cost cap, the Applicant must provide the High Cost Justification and Acknowledgement Form, found on the Go Solar California and Program Administrators websites that describes the reasons why the project exceeds the Limitations on Installed Cost requirement. It is required that this form be executed by the Host Customer. Please see Section 3.4.5 for more information.

[39] An example of this situation is when the purchaser buys new equipment via the Internet or mail order.

4.12 Expended Budget Guidelines

4.12.1 Wait List

Once the funding for a Customer Sector becomes expended in a Program Administrator's territory, the Program Administrator may be unable to guarantee a CSI incentive. A Wait List will be created for all unreserved applications in that particular sector.

The wait list includes the following information:

Ranking—The position of each project on the wait list is ranked according to the date and time it is received. For example, the project that is ranked number one on the wait list will be the first to receive an incentive reservation when funding becomes available.

Application Number—The number assigned to an application (XXX-CSI-XXXXX) once it has been submitted online through PowerClerk with all required documents.

CSI System Size—The maximum system size (kW) that will be incentivized upon reservation.

Current Status—the status of the project in PowerClerk. This status will remain as "Wait List" until the Program Administrator has sufficient funding.

Date and Time of Submittal—The time that the project application was received online through PowerClerk. This is an extremely important number because it defines the criteria for chronologically ranking projects on the Program Administrators Wait List.

4.12.2 Wait List Process

- Applicant completes and submits the CSI application online. All required documents must be attached and all sections of the applications must be completed via PowerClerk.
- Applicant receives a CSI number (XXX-CSI-XXXXX) and the project will be ranked on the "Wait List" in PowerClerk. The project's ranking on the wait list can be found on the Program Administrator's website.
- As funding becomes available, the Program Administrator will review each project in the order it is ranked. At that time, the Program Administrator will invoice the Host Customer for the applicable application fee for Non-Residential projects, which must be paid within 14 calendar days of invoicing. If the application fee is not received within this period, the application will be cancelled and removed from the wait list. In this instance, the next project on the wait list will be moved to the "Reservation Request Review" status. In addition, applications that require follow up information will be suspended and will be given 14 calendar days to submit the requested information. If the required documentation is not submitted within 14 calendar days, the application will be cancelled. All suspension and application fee deadlines will be strictly enforced.
- In the case of Non-Residential projects, upon receipt of the application fee and approval of the application, the project will receive its initial reservation.

Please note that a waitlisted project is not eligible for a CSI incentive if the solar system has been interconnected for more than 12 months.

4.12.3 System Size Increase

If the incentive budget funds for a customer sector are expended in a particular PA service territory, the Program Administrator will not increase the incentive amount for projects that increase in system size.

4.12.4 Government/Non-Profit Incentive Rate Changes

If a Government/Non-Profit entity submits an initial reservation application for a Commercial incentive rate assuming the system will be owned by a third party but then decides to purchase the system and requests to change the rate to a Government/Non-Profit incentive rate, the Program Administrator will allow the change only during the Proof of Project Milestone stage. The project will be funded at the Government/Non-Profit incentive rate at the initial reserved incentive step. Host Customers requesting incentive rate changes after the PPM stage will be denied.

TECHNICAL SECTION

5. Metering Requirements

This section contains detailed information on the minimum metering and monitoring requirements for participation in the CSI Program. These minimum metering requirements were developed to increase owner knowledge of system performance, foster adequate system maintenance, and thereby ensure ratepayer-funded incentives result in expected levels of solar generation.

CSI General Market Program participants are required to install the following metering-related components based on the size of their system and type of Program participation (i.e., EPBB or PBI):

Table 17
Metering and Reporting Summary[1]

Incentive Structure	System Size	Minimum Meter Accuracy	PMRS Required[3]	PDP Required[3]
EPBB	≤ 10 kW	± 5%	No	No
EPBB	> 10 kW	± 5%	Yes	No
PBI	≥30 kW	± 2%	Yes	Yes

Table 17 Notes:

1) All metering systems are paid for at the System Owner's expense including some form of communications, performance monitoring and reporting capability.
2) System performance data is required to be submitted to the Program Administrator based on the terms and requirements of the measurement and evaluation program in section 2.9.

All System Owners are responsible for the choice and installation of the metering hardware as well as the selection of a PMRS provider and/or the PDP. The System Owner is also responsible for resolving any issues relative to PBI and PMRS performance data. Please see Section 5.1.6 for further information regarding the transfer of production data.

All systems greater than 10 kW must install PMRS. It is the responsibility of the System Owners to contract with a PMRS provider for a minimum of five years and ensure that 15 minute interval production data is provided to the Program Administrator quarterly for five years. The Applicant must submit the name of the PMRS provider on the Incentive Claim Form. While it is not a requirement to provide the PAs with the PMRS contract in the Incentive Claim package, the System Owner must submit the current PMRS contract if requested by the Program Administrators. If the five year PMRS contract is not submitted at the request of the Program Administrator, all incentives will be placed on hold.

The list of eligible PMRS providers may be found on the Go Solar CA website:
http://www.gosolarcalifornia.ca.gov/equipment/perf_monitor.php

The list of eligible PDPs for each Program Administrator territory may be found on the individual PA websites.

Detailed information on these summarized requirements follows.

5.1 EPBB Metering Requirements

All systems receiving an EPBB incentive must install a solar energy production meter accurate to within ± 5% of actual system output and systems receiving PBI payments must install a solar production meter accurate to within ± 2% of actual system output.

Other solar electric generating technologies displacing thermal system Btu meter(s) must be accurate to +/- 5%.

5.1.1 Contract for PMRS Service

PMRS is required for systems greater than 10 kW receiving an EPBB incentive and all PBI systems. See section 5.5 for minimum PMRS service requirements. If PMRS is purchased for a system receiving an EPBB incentive, and the system is less than or equal to 10 kW, the PMRS provider and performance meter information must be disclosed on the Incentive Claim Form.

If PMRS is required and purchased for the solar system, the System Owner must contract for the services. A contract will not be required to submit for PA review, but the PMRS provider name must be listed on the Incentive Claim Form. The PA reserves the right to request a copy of the contract if needed.

5.2 PBI Metering Requirements

All recipients of CSI funding under the PBI structure, regardless of system size, are required to contract with a PMRS and Performance Data Provider for five years of service that meets all of the applicable minimum standards defined in Section 10.

To ensure the system meter(s) perform to the accuracy of reporting ± 2% of actual system output, the Program Administrator may inspect the metering system. The System Owner may be invoiced if more than two inspections are required due to any non-performance of any metering system for an amount not to exceed $500.

5.2.1 Contract for PMRS and PDP Services

For PBI systems, PMRS is required and the System Owner must contract for the services. A contract will not be required to submit for PA review, but the PMRS provider name must be listed on the Incentive Claim Form. The PA reserves the right to request a copy of the contract if needed.

A copy of PDP services contract must be submitted to the PA, in addition to listing the PDP name, monitoring service, meter manufacturer and model type must be listed on the Incentive Claim Form.

5.3 Minimum Metering Equipment Requirements

All systems must be installed with a meter or metering system which allows the System Owner and Program Administrator to determine the amount of system energy production and allows the System Owner to support proper system operation and maintenance. The meter must be listed with the California Energy Commission and must meet the minimum meter requirements of this section.

The California Energy Commission's list of qualifying meters may be found at: http://www.gosolarcalifornia.ca.gov/equipment/system_perf.php

5.3.1 Meter Type

5.3.1.1 EPBB

Installed meter(s) for systems receiving an EPBB incentive do not need to be separate Interval Data Recording (IDR) meter(s) and may be internal to the inverter(s) only if they are exempt from the PMRS requirement.

5.3.1.2 PBI

For all systems receiving PBI payments, the installed meter(s) must be a separate Interval Data Recording (IDR) meter(s), or a complete system that is functionally equivalent to an IDR meter recording data no less frequently than every 15 minutes.

Program Administrators may have additional meter functionality requirements for systems receiving PBI payments, as the Program Administrators will use these meters to process PBI payments, and system compatibility may be required. For example, meters and service panels must meet all local building codes and utility codes. The meter serial number must be visible after installation. Each Program Administrator will maintain a publicly-available list of any additional functionality requirements. Please consult your Program Administrator to determine whether any additional requirements apply.

5.3.2 Meter Accuracy

All systems receiving an EPBB incentive must install a solar energy production meter accurate to within ± 5% of actual system output.

5.3.2.1 EPBB Meter Accuracy and Frequency of Data Collection

All systems receiving an EPBB incentive must install a solar energy production meter accurate to within +/-5% of actual system output. The PMRS must remotely acquire and process all data points no less frequently than once every 15 minutes.

5.3.2.2 PBI Meter Accuracy and Frequency of Data Collection

All systems receiving an PBI incentive must install a solar energy production meter accurate to within +/-2% of actual system output. The PDP must log all required solar performance / output data points no less frequently than once every 15 minutes.

5.3.2.3 Other Technologies

Other solar electric generating technologies displacing thermal system Btu meter(s) must be accurate to +/- 5%.

5.3.3 Meter Measurement and Time Granularity of Acquired Data

Electric meters must measure the gross energy generated (kWh). The PMRS and PDP must log all Required Solar Performance / Output Data points no less frequently than once every 15 minutes.

5.3.4 Meter Testing Standards

The ± 2% meters, required for PBI, must be tested according to all applicable ANSI C-12 testing protocols.

5.3.5 Meter Certification

The accuracy rating of ±2% meters must be certified by an independent testing body (i.e., a NRTL such as UL or TUV).

Certification requirements for ± 5% meters were developed for the CSI Program and have been incorporated into the December 2009 release of the Program Handbook. Until these requirements are implemented, the accuracy rating of all ± 5% meters must be certified by the manufacturer of the ±5% meter or an independent testing body (i.e., a NRTL such as UL or TUV).

The CSI program will delay the implementation and enforcement of the 5% accuracy testing requirements beginning January 1, 2010, but will adopt a new effective date in the near future.

All test results or NRTL documentation supporting the certification must be maintained on file for inspection by the Commission or California Energy Commission. The System Owner must provide a copy of the original meter testing certificate to the Program Administrator if requested.

5.3.6 Meter Communication / Data Transfer Protocols

For all applicable EPBB systems and all PBI systems required to install PMRS, protocols for the minimum required Solar Performance / Output Data must enable any PMRS and/or PDP provider to communicate with the meter to obtain the minimum required Solar Performance / Output Data from the meter. The data transfer protocol provided to the Program Administrator must satisfy servicing the Program Administrator requirements.

PMRS and/or PDP Providers that fail to submit data to the Program Administrators when requested by the PA or an authorized agent of the CPUC, may be delisted from the eligible list of PMRS Providers found at www.gosolarcalifornia.ca.gov,.and may be removed as an eligible PDP from each Program Administrator approved list. As outlined in the CSI Contract, it is the Host Customer and/or System Owner's responsibility to ensure the transfer of solar production data from the Performance Monitoring and Reporting Service (PMRS) Providers and Performance Data Providers (PDP) to the Program Administrators.

All PDP's will need to transfer performance data via EDI867 to the Program Administrators format by June 30, 2010. Failure to comply will result in removal from the Eligible list of Performance Data Providers.

5.3.7 Meter Data Access

All meters must provide the PMRS and/or PDP provider with the ability to access and retrieve the minimum required Solar Performance / Output Data from the meter using the Meter Communication / Data Transfer Protocols, as described in Section 5.2.6. In the event that the system is not required to have a PMRS Provider as shown in Table 17, the System Owner must have a means to retrieve the minimum required Solar Performance/Output Data from the meter.

5.3.8 Meter Display

All meters must provide a display showing the meter's measured net generated energy output and measured instantaneous power. This display must be easy to view and understand. This display must be physically located either on the meter, inverter, or on a remote device. For PBI, if a remote device is the only visible access, the PA may ask for verification.

5.3.9 Meter Memory and Storage

All meters must have the ability to retain collected data in the event of a power outage. Meters that are reporting data remotely must have sufficient memory to retain 60 days of data if their standard reporting schedule is monthly and 7 days of data if their standard reporting schedule is daily. Meters that are not capable of remotely reporting their data, must retain 90 days of data in support of quarterly reporting. In all cases lifetime production data must be stored.

5.3.10 Thermal Meters

For liquid solar heating and cooling systems, it is practical to use a commercial BTU meter.[40] For the CSI Program, the BTU meter specifications shall be as follows:

- Provides totalizing outputs in BTUs per period
- Capable of remote communications
- Monthly totalizing accuracy of ≤ 5%[41]

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40 Hot air solar energy systems will need to be paid incentives based on the EPBB method described herein. Metering the thermal output of solar hot air systems, within reasonable accuracy and cost, is difficult.

- Flow meter and temperature sensor accuracy is NIST traceable

Commercially available hydronic BTU meters can be found to have the following, National Institute of Standards and Technology (NIST) traceable, accuracy specifications:[42]

- Differential temperature error (ºF) = ±0.15 ºF
- Differential temperature error (%) = {(0.15 + 10) /10} . 1 = 1.5%
- Flow error (GPM) = 0.4 GPM
- Flow error (%) = 1.0%
- Computational error (%) = 0.05% (digitizing error)
- The combined BTU accuracy is calculate using the square root sum of the squares (SRSS) method

5.4 Minimum Communication Requirements

All systems must be installed with some form of communication capability that will provide meaningful feedback to System Owners and Program Administrators. In accordance with the guidelines in Section 10, the systems should have remote communicating capability whereby performance data can be collected, accessed remotely, and uploaded for processing by a PMRS and/or PDP. For systems receiving an EPBB Incentive that are unable to meet the cost cap, the meter display must be accessible to the System Owner, and the Program Administrator must be provided means to retrieve and collect performance data.

5.4.1 Data Privacy

Protecting the privacy of System Owners and Host Customer is of the highest order. As such, data shall be collected, processed, and reported to the System Owner and the Program Administrator in accordance with this Section. The PMRS 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.

41 At least one Btu meter supplier has provided information showing that 5% accuracy is achievable.
42 Compare and Contrast BTU Measurement Using Building Control Systems Versus ONICON BTUMeters., VOLUME 3.1, June 4, 2003

5.5 Minimum Performance Monitoring & Reporting Capability Requirements

For PBI recipients, a PDP is defined as, at a minimum, as a service provider that monitors and reports the energy production data from the solar energy system to the Program Administrator to serve as the basis for PBI payments. The data flow between the solar energy system and the Program Administrator must, at a minimum, meet the PDP requirements. (Section 10 – CSI PBI Data Transfer Rules). PBI incentive payments are calculated and paid based on the gross electricity produced or, in the case of other solar electric thermal displacing technologies (see Section 3.3.1), the net electricity equivalent displaced as reported by performance data transferred to the Program Administrator from the respective project PDP.

In order to enable System Owners to properly maintain and evaluate the performance of their systems and to allow Program Administrators to monitor the performance of systems receiving CSI Incentives, the System Owner must contract with a PMRS provider and/or PDP (PBI only) in order to monitor and report on the minimum data points and all monitoring, data collection, data retention, and reporting must be performed as specified in the corresponding sub-sections below.

5.5.1 Minimum PMRS requirements for EPBB systems

- ±5 % meter
- Data as collected and summarized by hour, day, month, and year.
- Provide System Owner with on-demand access to all reports required by Section 5.4
- Notification service alerts to the System Owner indicating a non-functioning or poorly functioning system
- Quarterly 15 minute interval kWh energy production data submittals to Program Administrator or its designee[43] for 5 years
- Listed on the California Energy Commission Eligible PMRS Provider list

5.5.2 Minimum PDP requirements for PBI systems

As per D.08-01-030, the element of PMRS that entails the data flow between the solar energy system and the Program Administrator that serves as the basis for PBI must, as a minimum, meet the CSI PBI data transfer rules (Section 10).

- ±2 % meter
- Data as collected and summarized by hour, day, month, and year.
- Provide System Owner access to 15 minute interval kWh system production report within 24 hours of production data received by PMRS

43 The entity currently under contract with the Program Administrators for collection of EPBB data is Itron, Inc. EPBB project data can be sent to solardata@itron.com. All PMRS providers will be notified if there is a change in this contact information.

- Notification service alerts to the System Owner indicating a non-functioning or poorly functioning system
- Monthly 15 minute interval kWh energy production data submittals to Program Administrator or its designee[4] for 5 years
- Listed on the California Energy Commission Eligible PMRS Provider list
- Listed and approved by each Program Administrator

The California Energy Commission's list of qualifying PMRS providers can be found at http://www.gosolarcalifornia.ca.gov/equipment/perf_monitor.php

The list of PDPs can be found on each PA's CSI website and instructions for PDP requirements may be found in Appendix H.

5.6 Advanced Metering Infrastructure (AMI) Coordination

To the extent AMI coordination is an important component of PBI or EBPP program administration, the Commission will re-evaluate the requirements of this section at that time.

5.7 CSI Program Administrator Liability

Apart from the requirements identified herein, the PAs are not liable for the performance or non-performance of a PDP that may result in a delay of or incorrect amount of a PBI payment. The Program Handbook defines the criteria required for PMRS providers and PDPs to participate in the Program only.

It is the System Owners' responsibility to pursue reimbursement for any non-compliance issues stemming from the PDP. Each PDP is responsible for the data management and transfer of the data to the PA only, unless otherwise specified in the System Owner-PDP contract.

6. Equipment Certification, Rating Criteria & Design Factor Calculations

6.1 Equipment Certifications and Rating Criteria

PV system components (modules, inverters, and system performance meters) must be certified through the California Energy Commission's PV system certification program. The CEC provides a list of currently certified eligible equipment on the Go Solar California site at http://www.gosolarcalifornia.ca.gov/equipment/ or through its Call Center: (800) 555-7794.

The Program Administrators will confirm that equipment identified in the Reservation Request Package meets eligibility requirements prior to providing a Confirmed Reservation Notice. As described in Section 2.2.1, an exception may be made for new equipment that has not yet received certification but for which the certification process has been initiated. Equipment is periodically added and removed from the lists of eligible equipment, so Applicants should confirm that the components purchased for a system are eligible prior to installation. Equipment must be certified before any incentive payments will be made.

Eligibility requirements for components are summarized below:

- PV modules must be listed on the California Energy Commission's Eligible Equipment List
- Inverters must be listed on the California Energy Commission's Eligible Equipment List
- Meters:
  - Inverter Integrated: must be tested in accordance with Section 5.1.5
  - External meters must be listed on the California Energy Commission's Eligible Equipment List

6.2 Other Solar Electric Generating Technologies System Capacity Rating

The CEC-AC capacity rating for other solar electric generators must be established at PVUSA Test Conditions44 (PTC) by a Nationally Recognized Testing Laboratory (NRTL)[45].

Other solar generating electric displacement thermal systems output must be rated by an NRTL, at PTC. However, the other solar electric generating system thermal capacity must be converted into an electric capacity representing the potential electric displacement. For other solar electric generating thermal systems, a Performance Ratio (PR) is used to convert the

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44 The PTC rating is based upon 1,000 Watt/m2 solar irradiance, 20 Celsius ambient temperature, and 1 meter/second wind speed. PTC ratings for other solar electric generating systems should be established by a NRTL. An example CEC-AC rating using the SRCC OG100 efficiency equation for a glazed solar collector can be found in Section 9.

45 Examples of qualified NRTL's include, but are not limited to, Solar Rating and Certification Company or National Renewable Energy Laboratory.

system thermal capacity to electric capacity. The Performance Ratio is the heating or cooling energy output of the conventional electric heating or cooling system being displaced divided by its electric energy input at rated conditions.

The Performance Ratio may be calculated one of the following two ways –

1) From the minimum efficiency standards for the type and size of the conventional electric heating or cooling system being displaced. The minimum efficiency standards for this equipment is found in the statewide Standard Performance Contract program (See Section 12) and the California Appliance Efficiency Regulations[46]. For electric resistive heating systems, the Performance Ratio will be assumed to be 1.0. Integrated Part-Load Value (IPLV), ratings will be used for systems that modulate capacity. Energy Efficiency Ratio (EER), Seasonal Energy Efficiency Ratio (SEER), Heating Seasonal Performance Factor (HSPF) or Coefficient of Performance (COP) ratings will be used for systems that do not modulate capacity. The conversion of IPLV, EER, SEER, HSPF and COP to the dimensionless Performance Ratio is accomplished as follows -

For IPLV: PR = IPLV / 3.412
For SEER: PR = SEER / 3.412
For HSPF: PR = HSPF / 3.412
For EER: PR = EER / 3.412
For COP: PR = COP

2) An engineering model of the facility's heating or cooling load resulting in the electric consumption and output of the conventional electric heating or cooling system being displaced, assuming a minimum efficiency rating for the conventional system. The Performance Ratio is then calculated by dividing the modeled annual output by the electric input and converting to dimensionless units.

For other solar electric generators, the system rating (CEC-AC) is the net electric power output of the system at PTC.
CEC-AC = E_{PTC}

Where;

CEC-AC = System electric rating at PTC.

"E_{PTC}" = Net electric output of the other solar electric generating system at PTC.

For other solar electric generating thermal systems that displace electric load the system rating (CEC-AC) is the rated thermal output at PTC, divided by the Performance Ratio of the electric equipment being displaced, less any solar thermal system ancillary loads at rated conditions.

CEC-AC = (T_{PTC} / PR) – E_{AUX}

46 Appliance Efficiency Regulations, California Energy Commission, CEC-400-2006-002, December 2006.

Where;

CEC-AC = System displaced electric rating at PTC.

"T_{PTC}" = Thermal output (cooling or heating) of the other solar electric generating system in kilowatts thermal (kWT) at PTC and the operating temperature of the solar collector. If the system includes an absorption chiller or other heat driven cooling system, the system thermal rated output is either the PTC rated thermal output of the panels multiplied by the rated COP15 of the absorption chiller, or the rated capacity of the absorption chiller, whichever is less.

"P_R" = Dimensionless Performance Ratio of the conventional electric heating or cooling system calculated by the heating or cooling energy output of the system divided by its electric energy input.

"E_{AUX}" = The load of the other solar electric generating system ancillary electric equipment (e.g., pumps) at rated conditions, used for the solar thermal system operation. Ancillary electric loads may be ignored if the load magnitude is less than 5% of the gross system capacity.

6.2.1.1 Annual Production Estimate

For other solar generation technology Projects, an annual production estimate for the system must be provided to the Program Administrators. Other solar generation technologies annual electric production or electricity displaced must be estimated using performance parameters established by SRCC or Sandia National Laboratories and site-specific typical meteorological year weather data. Acceptable models are the Solar Advisory Model (https://www.nrel.gov/analysis/sam) or TRNSYS (http://sel.me.wisc.edu/trnsys). Other modeling approaches may be considered on a case-by-case basis by the Program Administrator. For other solar generation technologies that produce thermal energy to displace electricity, production estimates must also include an annual electric consumption estimate of the served end-use using engineering calculations or a model of the heating.

6.3 Design Factor Calculation: Expected Performance Based Buydown (EPBB) Incentive (GM CSI)

The Program Administrators will use the California Energy Commission's CEC-AC method to determine the system rating. The following formula determines the EPBB incentive:

EPBB Incentive Payment = Reserved Incentive Rate x System Rating[47] x Design Factor

The Design Factor is a ratio comparing a proposed system to a reference system. Very simply, it reflects:

47 CEC-AC System Rating (kilowatts) = Quantity of Modules x CEC Rating of Photovoltaic Modules x CEC Inverter Efficiency Rating / 1000 (watts/kilowatt)

$$\text{Design Factor} = \frac{\text{Proposed System}}{\text{Reference System}}$$

More specifically, the Design Factor is calculated as follows:

DF = Dcorr * Gcorr * Icorr

Dcorr (Design Correction) = Ss,p,p / Ss,p,o

Ss,p,p = The system's estimated summer kWh output at the proposed location, with proposed tilt & azimuth

Ss,p,o = The system's estimated summer kWh output at the proposed location, with summer optimized tilt & azimuth allowing for equal treatment of proposed systems oriented from South to West (i.e., the optimized system's orientation shall be the same as the proposed system for orientations due south to due west).

Gcorr (Geographic Correction) = As,p,o / As,r,o

As,p,o = The system's estimated annual kWh output at the proposed location, with summer optimized tilt & south azimuth

As,r,o = The system's estimated annual kWh output at the reference location, with summer optimized tilt & south azimuth

Icorr (Installation Correction) = PTCadj / PTC

PTCadj = The adjusted PTC DC rating accounting for mounting method, NOCT and power temperature coefficient for that specific module.

PTC = The DC rating of the panels at PVUSA Test Conditions.

In sum, the Design Factor for EPBB will:

- Treat all systems oriented between 180° and 270° equally
- Assign optimal orientation tilt for each compass direction in range of 180° and 270°, optimized for summer production
- Include location-specific criteria to account for weather variation and shading*
- Be based on an optimal reference system and location
- Determine optimal reference latitude tilt that relates to local latitude.

Please refer to the EPBB User Guide for more detailed explanation of the calculator's methodology and instructions, at www.csi-epbb.com.

7. Field Verification

The Solar Contractor must perform field verification prior to submission of the Incentive Claim Form, following the guidelines below:

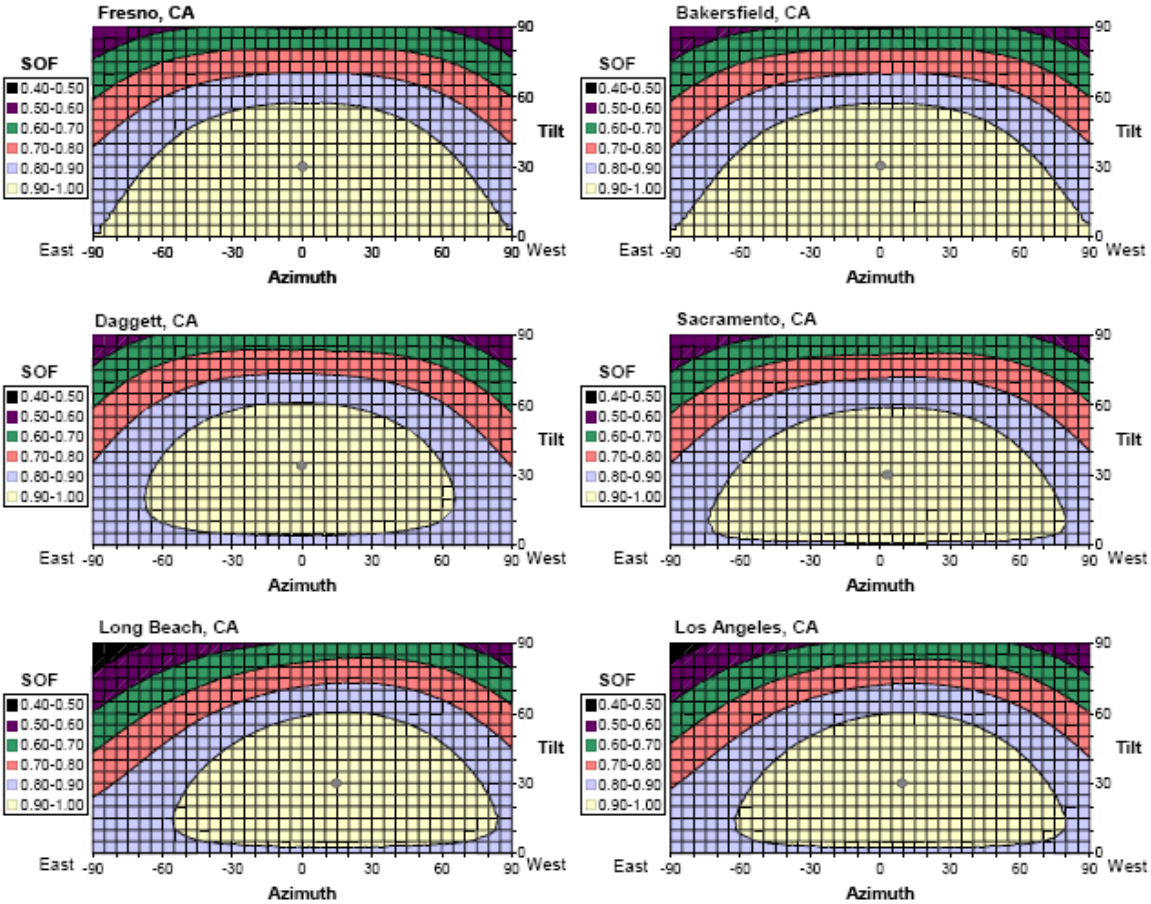
1. Measure Solar Irradiance: Solar irradiance shall be measured using an irradiance meter. When making this measurement, the Solar Contractor or verifier shall place the irradiance meter in a plane that is parallel to the PV modules. The Solar Contractor should position the irradiance meter on top of the PV modules or on the roof next to the PV modules. If the verifier is not able to get on the roof, he or she shall position the irradiance meter such that it is in full sun and is in plane that is parallel to the PV modules. Digital protractors or other instruments may be used to position the irradiance meter properly.
2. Measure Temperature: Ambient air temperature shall be measured with a digital thermometer in the shade. The instrument shall have an accuracy of ± 2° C.
3. Index Irradiance and Temperature on the Field Verification Output Table (available on Program Administrator websites) to determine performance percentage.
4. Multiply performance percentage times CEC-AC wattage of the array to determine minimal acceptable system performance.
5. Observe and Record actual output as shown on the PV system's meter. The inverter may cycle between multiple readings (total kWh of production, AC power output, etc.), so the Solar Contractor or verifier will need to wait until the power is displayed and record this reading; several readings should be made to make sure that they are consistent and stable.
6. Properly functioning systems will have actual outputs higher than the minimal acceptable system performance.

Note: ensure all values are in watts or kilowatts depending on the readout of the meter.
Exception: Systems with two or more strings with the same tilt and azimuth connected to the same inverter may do the following instead:

a. Complete a visual check of the system to ensure the modules and all other system components are bolted securely, and all wiring connections have been made properly according to the system schematic, manufacturer's instructions, and applicable electrical code requirements.
b. Check the polarity of all source circuits to be correct.
c. The open circuit voltages of source circuits shall be tested and measured to be within 2 percent of each other.
d. The short circuit currents shall be tested and measured to be within 5 percent of each other.

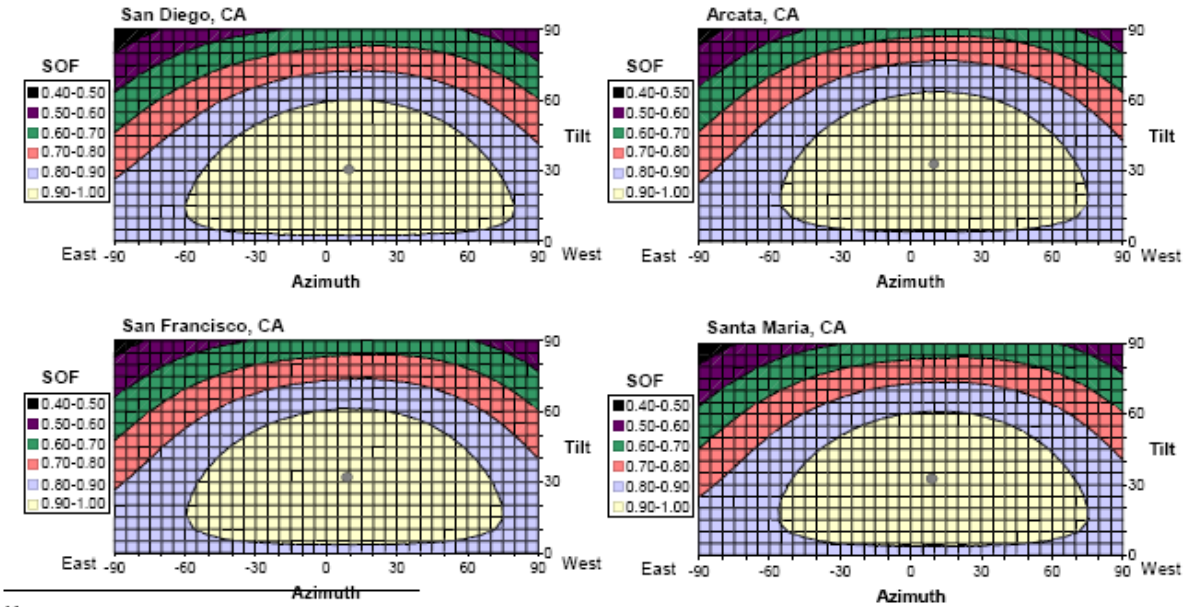
For Multiple Orientation Arrays:
Multiple orientation arrays are those with parallel strings, each with an equal number of modules, in different orientations (azimuth and tilt) connected to the same inverter. When parallel strings in different orientations are connected to the same inverter, each orientation and solar irradiance shall be measured separately in a plane parallel to each orientation. The expected AC power output is determined separately for each orientation and the sum is used for verification purposes.

8. Surface Orientation Factors for California Locations[48] [49]



48 Surface Orientation Factor plots provided courtesy of Craig Christensen, Principal Engineer, National Renewable Energy Laboratory.

49 SOF plots for coastal California locations show the optimal azimuth to be somewhat west of south (presumably due to morning fog in those locations). It is important to remember that this is a temporal effect (foggy skies in the morning when the sun is to the east, clear skies in the afternoon when the sun is to the west).


San Diego, CA
Arcata, CA
San Francisco, CA
Santa Maria, CA
SOF
0.40-0.50
0.50-0.60
0.60-0.70
0.70-0.80
0.80-0.90
0.90-1.00
Tilt
Azimuth
East
West
-90
-60
-30
0
30
60
90

9. Example PTC Rating for Glazed Solar Collector

SRCC Collector Efficiency Equation

$\eta = A_o + B_o (P)/I + C_o (P)^2/I$

Where,

I = Solar Irradiance

(P) = (Ti – Ta)

Ti = Inlet Temperature

Ta = Ambient Temperature

Values for (P)

CATEGORY	APPLICATION
A -5°C (-9°F)	Certain types of solar assisted heat pumps. Swimming pool heating.
B 5°C (9°F)	Liquid collectors with certain types of solar assisted heat pumps. Swimming pool heating. Space heating - air systems.
C 20°C (36°F)	Service hot water systems. Space heating - air systems.
D 50°C (90°F)	Service hot water systems. Space heating - liquid systems. Air conditioning.
E 80°C (144°F)	Space heating - liquid systems. Air conditioning. Industrial process heat.

Six Solar Thermal Systems STS 410BC Glazed Flat-Plat collectors used to provide space heating displacing a < 65,000 Btu/hr central air source heat pump for space heating purposes.

$\eta = 0.512 = 0.702 + (-.5785)\ (90°F) / (317.40\ Btu/hr/ft^2) + (-0.0010)\ (90°F)^2 / (317.40\ Btu/hr/ft^2)$

$1{,}000\ W/m^2 = 317.40\ Btu/hr/ft^2$

$T_{PTC} = 11.677\ kW_t = 317.40\ Btu/hr/ft^2 \times 0.512 \times 6\ panels \times 40.86\ ft^2/panel / 3{,}412$

$CEC\text{-}AC = (T_{PTC} / P_R) - E_{AUX}$

Note that $E_{AUX} = 0$, because collector pump is solar driven.

$CEC\text{-}AC = 5.174\ kW = [11.677 / (7.7 / 3.412)] - 0)$

Table C-2
Standards for Single Phase Air-Cooled Air Conditioners with Cooling Capacity Less than 65,000 Btu per Hour and Single Phase Air-Source Heat Pumps with Cooling Capacity Less than 65,000 Btu per Hour, Not Subject to EPAct

Appliance	Minimum Efficiency			
	Effective January 1, 1995		Effective January 23, 2006	
	Minimum SEER	Minimum HSPF	Minimum SEER	Minimum HSPF
Split system air conditioners	10.0	—	13.0	—
Split system heat pumps	10.0	6.8	13.0	7.7
Single package air conditioners	9.7	—	13.0	—
Single package heat pumps	9.7	6.6	13.0	7.7
Space constrained air conditioners – split system	10.0	—	reserved	—
Space constrained heat pumps – split system	10.0	6.8	reserved	reserved
Space constrained air conditioners – single package	9.7	—	reserved	—
Space constrained heat pumps – single package	9.7	6.6	reserved	reserved

2006 Appliance Efficiency Regulations

10. CSI PBI Data Transfer Rules

INSTRUCTIONS FOR QUALIFYING AS A PERFORMANCE DATA PROVIDER FOR THE CALIFORNIA SOLAR INITIATIVE PROGRAM

The purpose of this section is to outline the required process and qualifications to be approved as a Performance Data Provider (PDP) for the California Solar Initiative incentive program. This section also details the data reporting requirements (format, delivery method) and schedule for Performance Based Incentive data reports. The PDP requirement is mutually exclusive of the requirements identified in the CSI Handbook for the Performance Monitoring and Reporting Services. However, the PMRS provider may provide both PMRS and PDP services. All PDPs must meet the requirements established herein in addition to the requirements set forth in the CSI Program Handbook.

BACKGROUND AND REQUIREMENTS

Utility customers participating in the California Solar Initiative (CSI) program are required to install performance meters to determine the gross energy generated by their generation equipment. For customers enrolled under the CSI Performance Based Incentive (PBI) program, data from these meters will be used to calculate their monthly incentive payment. This data may be read and communicated to the Program Administrator (PA)[50] by a third-party Performance Data Provider (PDP). Customers may also elect to contract this service through their local utility company. This document provides information and instructions for non-utility providers wishing to qualify to provide PDP services.

The following are the PDP's primary responsibilities:

- Manage meter reading/data retrieval schedule
- Read and retrieve performance meter data
- Post data on appropriate Program Administrator server on a consistent and reliable schedule, per individual Program Administrator requirements.
- Validate performance data prior to providing to the PA using the approved validation rules outlined in this document
- Calculate monthly production of solar generating system for incentive payment
- Format data using EDI 867 or other approved protocol
- Troubleshoot and resolve communications issues
- Store data in accordance with program requirements
- Make historical performance data available to Program Administrators as requested
- Provide technical support to Program Administrators as well as customer support
- Communicate meter/device changes to the Program Administrator
- Provide disaster recovery and data backup services as requested by respective Program Administrator
- Manage data on PDP server

50 PG&E and SCE are the Program Administrators for the California Solar Initiative program for customers in their respective service territories. The Center for Sustainable Energy is the Program Administrator for the SDG&E service territory.

- Ensure confidentiality of customer information and performance data
- Possess technical expertise and capability
- Comply with all State and Federal laws

PDP TASK REQUIREMENTS

Data Format

Data must conform to the specific program requirements (for CSI requirements, see Section 5 of the CSI Handbook). The PBI Data Report must include 15-minute (as defined in Section 5.2.3 *Time Granularity of Acquired Data,* CSI Program Handbook) and the monthly cumulative production meter read. All PBI Data Reports must be formatted using the ANSI X.12 Electronic Data Interchange 867 protocol (EDI 867) unless otherwise specified. Sample EDI 867 Implementation Guides and Tutorials are available from each of the Program Administrators. The EDI 867 requirement will go into effect 6 months from the day the PDP Protocols are ratified. After this effective date, all PDP Providers must, at minimum, be in the process of EDI 867 data transfer tests with one or more Program Administrators.

Data Reporting, Security and Confidentiality

The PDP is responsible to ensure timely, consistent and accurate reporting of performance data. Data must be located in a secure facility, on a secure server and have firewall and equivalent protection. The PDP must protect the confidentiality of the customer information and performance data in accordance with all program guidelines (for CSI requirements, see Section 5 of the CSI Handbook). The data must be transferred to each PA using a secure FTP server and each PDP must contact the appropriate PA to obtain the secure FTP address. The PDP must follow all applicable state and federal privacy and data security laws. **The Program Administrator is not responsible for, and will not pay any customer incentives based on missing, estimated or invalid performance data.**

Data Validation

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

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

Descriptions of these validation rules are included in Attachment A.

Payment Validation, Data Audits, and Measurement and Evaluation Program

The Program Administrator may, at their discretion, perform validations on incentive payments prior to issuing payments to customers participating in this program. The validations will compare actual monthly incentive payments with expected payments based on design specifications and expected performance data submitted with the Host Customers' approved

incentive reservation documentation. If payments fall outside expected ranges for the month, the incentive payment will be withheld until the Program Administrator determines to its satisfaction the reason for the discrepancy.

The PDP will work with the Host Customer to resolve any discrepancies identified by the Program Administrator, which may include testing and/or recalibrating the meter/devices if deemed necessary. The Program Administrators are not responsible for the costs associated with investigating and resolving any such discrepancies (i.e., testing, meter replacement hardware, installation labor). However, if the Program Administrator requests an investigation that finds that the metering system is accurate, the Program Administrator will pay all reasonable and necessary costs for the investigation.

The Program Administrator will also perform random audits of PDP data to ensure accuracy and compliance with the requirements outlined in this document, or as part of the CSI Measurement and Evaluation Program in accordance with the CSI Handbook. Any PDP found to be in violation of any of these requirements will be subject to the penalties outlined later in this document. The Program Administrator, via the servicing 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 Program Administrator will be paid for by the Program Administrator. However, in the event metering is installed during the course of an audit or investigation initiated by the Program Administrator where cheating or tampering is suspected and confirmed, the System Owner will be charged for these costs.

Data Retention

Raw and PDP validated interval and cumulative monthly data must be retained in accordance with appropriate program requirements (see Section 5 of the CSI Handbook for CSI program requirements). The PDP must be prepared to post historical interval data at the Program Administrator's request. The Program Administrator audit will include raw interval data, which is to be maintained by the PDP for comparison with validated interval data transmitted to the Program Administrator. The PDP is also responsible for providing backup and disaster recovery services for 100% of the data (in accordance with the CSI data retention policy outlined in Section 5 of the CSI Program Handbook)

Technical and Customer Support

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

PDP Performance Exemptions

The PDP is responsible for meeting the above noted program requirements and for consistently posting performance data in accordance with the Program Administrator's scheduling and data posting requirements. At its discretion, the Program Administrator 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 production interruption; OR in the event of metering or communications equipment failure where the production data is irretrievable by the PDP at no fault of the customer AND it can be determined that the customer's generating equipment was still operating and interconnected with the utility grid, the Program Administrator 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. In situations in which a communications issue results in missing data, but the data is later retrieved, the Program Administrator will accept the retrieved data and process payment for the recovered data with the next payment period and no extensions of the PBI incentive payment period will be necessary. To submit a Data Report relative to missing data, the PDP will resubmit the respective Data Report, thereby replacing the previous incomplete report with a complete month of data.

PDP Non-Performance

The Program Administrator will not issue incentive payments to customers based on estimated data from the PDP, nor will the Program Administrator estimate incentive payments under any circumstances. It is the PDP's responsibility to ensure timely (+ 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 approval from the Program Administrator:

- Data not posted by specified date (10% of accounts serviced by PDP over a one-month period are late).
- No data received for incentive period (per customer: no data posted 2 times consecutively OR 3 times in 6 months; and/or per PDP: no data posted for 10% of accounts serviced by PDP). Submittal of corrected data or previously missing monthly data must be received in cycle sequence.
- Data not validated in accordance with program requirements over the course of the CSI 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 -/+ 5% between the PDP reported data and Program Administrator check meter production data for one data report period. This discrepancy will trigger an audit schedule set by the Program Administrator for the PDP.

The PDP will be given reasonable opportunity to correct problems identified by the Program Administrator. The Program Administrator will work with the PDP to correct any such problems and avoid unnecessary delays in issuing incentive payments to customers, to the extent feasible. However, if the PDP fails to resolve any issues to the Program Administrator's 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, the Program Administrator will suspend PDP activity with just those affected customers. The affected customers will be notified that the PDP 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. The original PDP will be required to transfer all historical data to the newly selected PDP. No incentive payments will be made until the customer provides a contract or similar document proving they are engaged with another PDP, 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 payments. If the customer fails to engage with and provide proof that they have contracted with a new PDP within the allowable grace period, the time between the grace period expiration date and the date the Program Administrator receive such proof will be deducted from the established payment period.
- If the problem is of a more serious nature as determined by the Program Administrator and continues over 60 days, or it affects more than 20% of customers served by the PDP, the PDP's approval will be revoked and all customers will be notified that they must select another PDP. As above, no incentive payments will be made until the customer selects another PDP, but the customers' incentive payment period will be extended beyond the established payment period. The PDP will be eligible to reapply after six months upon demonstrating that they have successfully resolved all problems to the Program Administrator's satisfaction.
- If an audit or investigation shows a discrepancy between the PDP reported data and data obtained by the Program Administrator for a specific customer that is greater than +/-5% and within the last three months of the PBI payment cycle, the PDP will be responsible for reimbursing the customer or Program Administrator for any such difference if it is determined that the difference is due to PDP error. The PDP will also be put on an audit schedule by the Program Administrator. If a third audit uncovers any discrepancy due to PDP error, the PDP's approval will be revoked and the customer given an opportunity to select another PDP as described above. Audits may be conducted as stated in the CSI Handbook.

Unless the PDP's actions results in revocation, upon receipt of a notice from the PA with respect to the PDP's failure to provide the performance, the PDP must, within 3 business days:

(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 Appeals Process

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

APPLICATION PROCESS

Application & Documentation

Prior to applying with each program administrator, applicants must first be listed on the Go Solar California Website as an eligible Performance Monitoring and Reporting Service Provider. Please visit the website for the PMRS Provider Certification Form at:
http://www.gosolarcalifornia.ca.gov/equipment/perf_monitor.php

The PDP Applicant completes the attached "Application for PDP Services" and provides all documentation in the attached checklist. Note that the PDP Applicant must submit separate applications to and successfully complete the data transfer test described later in this document for each utility or Program Administrator.

In PG&E's service territory, the PDP Applicant forwards the completed application and required documentation to the following:

Mail to: Program Manager, California Solar Initiative
Pacific Gas and Electric Company
P.O. Box 770000
San Francisco, CA 94177-0001

For questions, contact: Program Manager, California Solar Initiative
Phone: (415) 973-3480
Fax: (415) 973-2510
Email: SolarPBI@pge.com
Web: www.pge.com/csi

In SCE's service territory, the PDP Applicant forwards the completed application and required documentation to the following:

Mail to: Attn: CSI Program Administrator
SCE Customer Solar & Self-Generation
Southern California Edison
P.O. Box 800
Rosemead, CA 91770-0800

For questions, contact: Program Manager, California Solar Initiative
Phone: (866)-584-7436
Fax: (626) 302-3967
Email: pbi@sce.com
Web: www.sce.com/csi

In San Diego Gas & Electric's service territory, the PDP Applicant forwards the completed application and required documentation to the following:

Mail to: Center for Sustainable Energy
Attn: CSI Program Manager
9325 Sky Park Court, Suite 100
San Diego, CA 92123

For questions, contact: California Solar Initiative Program Manager
Phone: (858) 244-1177
Fax: (858) 244-1178
Email: csi@energycenter.org
Web: www.energycenter.org

The Program Administrator will review the submitted documentation, determine if the PDP Applicant meets the program requirements and notify the PDP Applicant via email. The Program Administrator will review the application and respond to the PDP Applicant within 10 business days.

Data Transfer Test

Once the Program Administrator has reviewed and accepted the prospective PDP's application, they will contact the PDP Applicant to schedule a data transfer test.

Program Administrators will provide PDP Applicants with test data sets that the prospective PDP must download, validate, and format before submitting the Data Report back to the Program Administrator via secure FTP. The PDP Applicant is also responsible for downloading the Program Administrator's EDI 867 Implementation Guide and Tutorials from its website. The PDP must contact their respective Program Administrator for specific instructions regarding this testing process.

The Program Administrator will check the test file to ensure it complies with the guidelines and notify the PDP Applicant within 5 business days. Once the PDP is notified it has passed the test, the PDP is considered qualified. If the PDP Applicant fails the test, they will be given 2 weeks to resolve any technical or data format issues. If a PDP Applicant fails their Data Transfer Test with any individual CSI PA more than 3 times, they will not be eligible to add any additional customers in that PAs service territory until such PDP Applicant passes the Data Transfer Test.

PDP Approval Initial Audit Period

Upon PA approval of the required PDP application documentation, and successful completion of the PDP data test procedures, the PDP will be qualified to provide PBI data to the Program Administrator for incentive payment. However, the PA's will audit the raw production data from each PDP's first data report for their first three customers for compliance with these PDP

requirements. The PA will notify the PDP of noncompliance and will work to assist the PDP with resolving the issues.

Application to Provide PDP Services

This application and the attached documents are to be used by Applicants for approval as a Performance Data Provider (PDP). Please refer to the checklist to ensure your application includes all applicable documentation.

Company Name: _____
Primary Contact: _____
Address: _____Address 2: _____
City: _____ State: _____ ZIP: _____
Phone: (_____) ____-_____ Fax: (_____) ____-_____
Email: _____

Technical Support Contact
Contact Name: _____
Phone: (_____) ____-_____ Email: _____

Customer Support Contact
Contact Name: _____
Phone: (_____) ____-_____ Email: _____

PDP APPLICATION CHECKLIST

Background

- o Listed as an approved PMRS provider on the CEC's eligible list
- o Company background (years in business, number of employees, general description, executive team, etc.)
- o Meter data reading and reporting experience and capabilities, capacity, technology overview, IT capabilities, etc.

Procedures

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

IT Systems and Processes

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

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

Signature: _____ Date: _____
Printed Name: _____Title:_____

ATTACHMENT A

CSI Data Validation Rules

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

Implementation Guide - Transaction Set 867 - Version 006 (CSI Specification)
28th April 2008
ST•867•000000984ª The ST is the start of the 867 Transaction
Set with a control number of 000000984

BPT•00•2007-04-21-09.01.08.795475•20000421•C1••••1948•1ª The
BPT marks the Beginning Segment for Product Transfer and
Resale where 00 is an Original data transmitted, C1
Indicates interval data value and 1 indicates cycle shift number
(1 – 1st to 1st of next month, 2 – 16th to 16th of next month)
N1•55••1•006908818••41ª Identifies the Performance Data Provider
(PDP) as a uniquely assigned number that is provided by SCE
REF•10•SCE-CSI-36949ª Identifies the CSI Project ID
REF•BT•23ª Indicates Cycle number (Report number for SCCE)
REF•59•2007-04-21-09.01.08.795434ª Identifies the prior unique
transaction BPT02 number **2007-04-21-09.01.08.795434** to be
corrected. Only used when BPT01=CO
PTD•PM•••OZ•ELª Identifies the type of product transfer to
be physical meter information, and the product reference
Identification indicates Electric Service
DTM•150••••DT•200801010000ª January 01, 2008 is the Service
Period Start Date. All dates are expressed in Greenwich Mean Time
(GMT).
DTM•151••••DT•200802010000ª February 01, 2008 is the Service
Period End Date. All dates are expressed in Greenwich Mean Time
(GMT).
REF•JH•Aª Indicates Energy is generated by the end use
Customer (Addition)
REF•6W•1ª Indicates channel ID (1 for SCE)
REF•MG•O717K-001388ª The Meter Number is O717K-001388
REF•MT•KH015ª The Meter Data Type is Monthly Kilowatt Hour and 15
indicates 15 minutes interval data
QTY•32•24709ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010015ª January 01, 2008 12:15 am is the
Interval end time Date.
QTY•32•2345ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010030ª January 01, 2008 12:30 am is the
Interval end time Date.
QTY•32•3734ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010045ª January 01, 2008 12:45 am is the
Interval end time Date.
QTY•32•1232ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010100ª January 01, 2008 01:00 am is the
Interval end time Date.

QTY•32•1535ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010115ª January 01, 2008 01:15 am is the
Interval end time Date.
QTY•32•1535ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010130ª January 01, 2008 01:30 am is the
Interval end time Date.
QTY•32•1535ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010145ª January 01, 2008 01:45 am is the
Interval end time Date.
QTY•32•1535ª The KWH data for each 15 minutes interval
DTM•151••••DT•200801010200ª January 01, 2008 02:00 am is the
Interval end time Date.
QTY•32•1235ª The KWH data for each 15 minutes interval
PDF Created with deskPDF PDF Writer - Trial :: http://www.docudesk.com

DTM•151••••DT•200801010215ª January 01, 2008 02:15 am is the
Interval end time Date.
..
..
..
..
QTY•32•1235ª The KWH data for each 15 minutes interval
DTM•151••••DT•200802010000ª February 01, 2008 is the Interval end
time Date.
****
SE•209•000000984ª Total Number of Segments is 209, Control
Number is 000000984
PDF Created

867 Product Transfer and Resale Report

Functional Group ID=PT

Introduction:

This Draft Standard for Trial Use contains the format and establishes the data contents of the Product Transfer and Resale Report Transaction Set (867) for use within the context of an Electronic Data Interchange (EDI) environment. The transaction set can be used to: (1) report information about product that has been transferred from one location to another; (2) report sales of product from one or more locations to an end customer; or (3) report sales of a product from one or more locations to an end customer, and demand beyond actual sales (lost orders). Report may be issued by either buyer or seller.

Heading:

Pos. Seg. Req. Loop Notes and
No. ID Name Des. Max.Use Repeat Comments
Must Use 010 ST Transaction Set Header M 1
Must Use 020 BPT Beginning Segment for Product Transfer and
Resale
M 1
LOOP ID - N1 5
Must Use 080 N1 Name O 1
Must Use 120 REF Reference Identification O 12

Detail:

Pos. Seg. Req. Loop Notes and
No. ID Name Des. Max.Use Repeat Comments
LOOP ID - PTD >1
Must Use 010 PTD Product Transfer and Resale Detail M 1
Must Use 020 DTM Date/Time Reference O 10
Must Use 030 REF Reference Identification O 20
LOOP ID - QTY >1
Must Use 110 QTY Quantity O 1
210 DTM Date/Time Reference O 10

Summary:

Pos. Seg. Req. Loop Notes and
No. ID Name Des. Max.Use Repeat Comments
Must Use 030 SE Transaction Set Trailer M 1

Segment: ST Transaction Set Header

Position: 010
Loop:
Level: Heading:
Usage: Mandatory
Max Use: 1
Purpose: To indicate the start of a transaction set and to assign a control number
Syntax Notes:
Semantic Notes: 1 The transaction set identifier (ST01) used by the translation routines of the interchange partners to select the appropriate transaction set definition (e.g., 810 selects the Invoice Transaction Set).
Comments:
Data Element Summary
Ref. Data
Des. Element Name Attributes
ST01 143 Transaction Set Identifier Code M ID 3/3
Code uniquely identifying a Transaction Set

867 Product Transfer and Resale Report
ST02 329 Transaction Set Control Number M AN 4/9
Identifying control number that must be unique within the transaction set
functional group assigned by the originator for a transaction set

Segment: BPT Beginning Segment for Product Transfer and Resale
Position: 020
Loop:
Level: Heading:
Usage: Mandatory
Max Use: 1
Purpose: To indicate the beginning of the Product Transfer and Resale Report Transaction Set
and transmit identifying data
Syntax Notes:
Semantic Notes: 1 BPT02 identifies the transfer/resale number.
2 BPT03 identifies the transfer/resale date.
3 BPT08 identifies the transfer/resale time.
4 BPT09 is used when it is necessary to reference a Previous Report Number.
Comments: BPT01 = 07 is used if previously furnished information is being provided in a new file.
In this case, or if data points have been corrected, only the corrected meters' data need to be provided, even if multiple meters were originally sent If a previously transmitted file is simply being reposted for download from a server, the original designation of BPT01 = 00 or CO does not need to be changed.
Data Element Summary
Ref. Data
Des. Element Name Attributes
Must Use **BPT01 353 Transaction Set Purpose Code M ID 2/2**
Code identifying purpose of transaction set
00 Original
Conveys original readings for the account being reported.
52 Response to Historical Inquiry
Response to a request for historical meter reading.
CO Corrected
Indicates that the readings previously reported for the
account are being corrected.
Must Use **BPT02 127 Reference Identification O AN 1/30**
Reference information as defined for a particular Transaction Set or as
specified by the Reference Identification Qualifier
A unique transaction identification number, assigned by the originator.
Must Use **BPT03 373 Date M DT 8/8**
Date when the PDP record is created by the application (CCYYMMDD)
Must Use **BPT04 755 Report Type Code O ID 2/2**
Code indicating the title or contents of a document, report or supporting item
C1 Cost Data Summary
Interval values
Must Use **BPT08 337 Time O TM 4/8**
Time when the PDP record is created by the application (HHMM)
Must Use **BPT09 127 Reference Identification O AN 1/30**
Reference information as defined for a particular Transaction Set or as
specified by the Reference Identification Qualifier.
Will represent Cycle shift number (1 or 2)

Segment: N1 Name

Position: 080
Loop: N1
Level: Heading:
Usage: Optional (Must Use)
Max Use: 1
Purpose: To identify a party by type of organization, name, and code
Syntax Notes: 1 At least one of N102 or N103 is required.
2 If either N103 or N104 is present, then the other is required.
Semantic Notes:
Comments: 1 This segment, used alone, provides the most efficient method of providing organizational identification. To obtain this efficiency the "ID Code" (N104) must provide a key to the table maintained by the transaction processing party.
2 Three N1 segments will be used in California, with N101 = 55, 8S, and SJ, unless the values of N104 corresponding to N101 = 8S or SJ would duplicate the value corresponding to N101 = 55. The end-use customer's account numbers for the meter data management agent (N101 = 55), utility (N101 = 8S), and the energy service provider (N101 = SJ) must be placed in REF segments following these N1 segments, with REF01 = 10, 12, and 11, respectively.
3 When N101 = 55 (Meter Data Management Agent), N106 = 41 (Submitter). When N101 = 8S (Utility) and SJ (Energy Service Provider), N106 = 40 (Receiver).
Data Element Summary
Ref. Data
Des. Element Name Attributes
Must Use **N101 98 Entity Identifier Code M ID 2/3**
Code identifying an organizational entity, a physical location, property or an individual
>> 55 Used to identify the party that manages meter data on behalf of another. Often referred to as the Performance Data Provider (PDP).
Must Use **N103 66 Identification Code Qualifier X ID 1/2**
Code designating the system/method of code structure used for Identification Code (67)
1 SCE Assigned PDP identification code
Must Use **N104 67 Identification Code X AN 2/80**
PDP identification number assigned by SCE
Must Use **N106 98 Entity Identification Code O ID 2/3**
Code identifying an organizational entity, a physical location, property or an individual
41 Submitter
Entity transmitting transaction set

Segment: REF Reference Identification

Position: 120
Loop: N1
Level: Heading:
Usage: Optional (Must Use)
Max Use: 12
Purpose: To specify identifying information
Syntax Notes: 1 At least one of REF02 or REF03 is required.
Semantic Notes:
Comments: See Comments related to the N1 segment.

Data Element Summary
Ref. Data
Des. Element Name Attributes
Must Use **REF01 128 Reference Identification Qualifier M ID 2/3**
Code qualifying the Reference Identification
10 Account manager Code (This will be used as CSI
Project ID)
BT Reference Identifier
Indicates Cycle number/Report Number
59 Prior Incorrect Batch Number
Only used when BPT01= CO
REF02 127 Reference Identification X AN 1/30
Reference information as defined for a particular Transaction Set or as specified by the Reference Identification Qualifier Reference the value of BPT02 for file already transmitted but intended for correction

Segment: PTD Product Transfer and Resale Detail

Position: 010
Loop: PTD
Level: Detail:
Usage: Mandatory
Max Use: 1
Purpose: To indicate the start of detail information relating to the transfer/resale of a product and provide identifying data
Syntax Notes: 1 If either PTD04 or PTD05 is present, then the other is required.
Semantic Notes:
Comments: 1 The PTD loop conveys consumption information for one meter or register, and for one commodity for metered service, over a number of metering intervals. Accounts which have multiple meters or registers require multiple PTD loops; the total consumption from multiple meters may be summarized in another PTD loop, qualified by SU, at the option of the Meter Data Management Agent. Accounts which have multiple services (e.g., both electric and gas) or multiple metered commodities require separate PTD loops for each service or commodity. For unmetered service, multiple commodities may be reported in a single PTD loop.
Data Element Summary
Ref. Data
Des. Element Name Attributes
Must Use **PTD01 521 Product Transfer Type Code M ID 2/2**
Code identifying the type of product transfer
PM Physical Meter Information, including data from a
meter, totalizer, or recorder.
Must Use **PTD04 128 Reference Identification Qualifier X ID 2/3**
Code qualifying the Reference Identification provided in PTD05.
OZ Product Number
Must Use **PTD05 127 Reference Identification X AN 1/30**
Reference information as defined for a particular Transaction Set or as
specified by the Reference Information Qualifier.
EL Electric Service

Segment: DTM Date/Time Reference

Position: 020
Loop: PTD
Level: Detail:

Usage: Optional
Max Use: 10
Purpose: To specify pertinent dates and times
Syntax Notes: 1 At least one of DTM02 DTM03 or DTM06 is required.
2 If either DTM05 or DTM06 is present, then the other is required.
Semantic Notes:
Comments:
Notes:
Data Element Summary
Ref. Data
Des. Element Name Attributes
Must Use **DTM01 374 Date/Time Qualifier M ID 3/3**
Code specifying type of date or time, or both date and time
150 Service Period Start
151 Service Period End
MRR Meter Reading
Date of special meter read
Must Use **DTM05 1250 Date Time Period Format Qualifier X ID 2/3**
Code indicating the date format, time format, or date and time format
DT Date and Time Expressed in Format
CCYYMMDDHHMM
Must Use **DTM06 1251 Date Time Period X AN 1/35**
Expression of a date, a time, or range of dates, times or dates and times

Segment: REF Reference Identification

Position: 030
Loop: PTD
Level: Detail:
Usage: Optional
Max Use: 20
Purpose: To specify identifying information
Syntax Notes: 1 At least one of REF02 or REF03 is required.
Comments: 1 A segment containing REF01 = LU is required if PTD01 = PM
2 Segment containing REF01 = MG and MT is required unless the service delivery point is unmetered, in which case a segment containing REF01 = SC is required.
3 For interval data, the metering interval corresponding to REF01 = MT must be the same for all PTD loops.
Data Element Summary
Ref. Data
Des. Element Name Attributes
Must Use **REF01 128 Reference Identification Qualifier M ID 2/3**
Code qualifying the Reference Identification
6W Sequence Number
Identifies channel number (identifier) when there is more than one channel on a meter measuring the same quantity (e.g., two kWh channels).
>> JH Tag
Meter Role. Valid values for REF02 are:
A = Additive (this consumption contributes to the total for the account),
I = Ignore (this consumption does not contribute to the total for the account - do nothing),
S = Subtractive (this consumption must be subtracted from the total for the account).
MG Meter Number

MT Meter Data Type (see examples in REF02)
REF02 127 Reference Identification X AN 1/30
Reference information as defined for a particular Transaction Set or as specified by the Reference Identification Qualifier
When REF01 is MT, the meter type is expressed as a 5-character field that identifies the type of consumption measured by this meter and the interval between measurements. The first two characters are the type of consumption, expressed in the units of measure from Data Element 355, as follows:
1N Count
Indicates meter pulses
70 Volt
BY British Thermal Unit (BTU)
CF Cubic Feet
EA Each
HH Hundred Cubic Feet
K1 Kilowatt Demand
Represents potential power load measured at predetermined intervals
K2 Kilovolt Amperes Reactive Demand
Reactive power that must be supplied for specific types of customer's equipment; billable when kilowatt demand usage meets or exceeds a defined parameter
K3 Kilovolt Amperes Reactive Hour
Represents actual electricity equivalent to kilowatt hours; billable when usage meets or exceeds defined parameters
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CA 867 (006) 99 April. 28, 2008
K4 Kilovolt Amperes
Measure of electrical power
KH Kilowatt Hour
TD Therms
TZ Thousand Cubic Feet
The 3-character metering interval is expressed as one of the following values:
Nnn = number of minutes from 001 to 999, DAY = daily, or MON = monthly.
For example, KHMON represents KWH per month, K1MON represents maximum kW demand during the month, and KH015 represents kWh per 15 minutes interval.
When REF01 is LU, REF02 is not used.

Segment: QTY Quantity

Position: 110
Loop: QTY
Level: Detail:
Usage: Optional (Must Use)
Max Use: 1
Purpose: To specify quantity information
Syntax Notes: 1 At least one of QTY02 or QTY04 is required.
2 Only one of QTY02 or QTY04 may be present.
Semantic Notes: 1 QTY04 is used when the quantity is non-numeric.
Comments: 1 Each QTY/MEA/DTM loop conveys consumption information about one metering interval. QTY02 reports billable quantities, including demands, while MEA05 and MEA06 report meter readings that are used to determine the billable quantities.
2 If MEA03 contains a multiplier, QTY02 equals the product of the multiplier and the meter readings reported in MEA05 and MEA06. Until it is resolved by UIG whether a MEA segment containing a multiplier (MEA02 = MU) can

also contain meter reads, it is recommended that the multiplier should be placed in a separate MEA segment within the QTY loop.
3 QTY03 is not required if the unit of measurement has been defined by the REF02 value corresponding to REF01 = MT.
Data Element Summary
Ref. Data
Des. Element Name Attributes
Must Use **QTY01 673 Quantity Qualifier M ID 2/2**
32 Quantity Sold
Normal data transmission (not estimated, adjusted, or anomalous)
Must Use **QTY02 380 Quantity X R 1/15**
The value specifying interval read in KH

Segment: DTM Date/Time Reference

Position: 210
Loop: QTY
Level: Detail:
Usage: Optional
Max Use: 10
Purpose: To specify pertinent dates and times
Syntax Notes: 1 At least one of DTM02 DTM03 or DTM06 is required.
2 If either DTM05 or DTM06 is present, then the other is required.
Semantic Notes:
Comments:
Notes: This segment may be sent to establish the date and time of the reported values, if the applicable data are available and desired by the recipient. For interval data, the ending time of each interval should be reported if the sender or receiver requires these datas
Data Element Summary
Ref. Data
Des. Element Name Attributes
DTM01 374 Date/Time Qualifier M ID 3/3
Code specifying type of date or time, or both date and time
151 Service Period End
DTM05 1250 Date Time Period Format Qualifier X ID 2/3
Code indicating the date format, time format, or date and time format
DT Date and Time Expressed in Format
CCYYMMDDHHMM
DTM06 1251 Date Time Period X AN 1/35
Expression of a date, a time, or range of dates, times or dates and times

Segment: SE Transaction Set Trailer

Position: 030
Loop:
Level: Summary:
Usage: Mandatory
Max Use: 1
Purpose: To indicate the end of the transaction set and provide the count of the transmitted segments (including the beginning (ST) and ending (SE) segments)
Syntax Notes:
Semantic Notes:

Comments: 1 SE is the last segment of each transaction set.
Data Element Summary
Ref. Data
Des. Element Name Attributes
SE01 96 Number of Included Segments M No 1/10
Total number of segments included in a transaction set including ST and SE segments
SE02 329 Transaction Set Control Number M AN 4/9
Identifying control number that must be unique within the transaction set functional group assigned by the originator for a transaction set

11. California IOU SPC Tables (ref 2007 SPC Procedures Manual, Appendix C. January 31, 2007)

Table C1 – ELECTRICALLY OPERTED UNITARY AIR CONDITIONERS AND CONDENSING UNITS – MINIMUM EFFICIENCY REQUIREMENTS (TABLE 112-A)

Equipment Type	Size Category	Efficiency [a]	Test Procedure
Air Conditioners, Air Cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	10.3 EER[b]	ARI 340/360
	≥ 135,000 Btu/h and < 240,000 Btu/h	9.7 EER[b]	ARI 340/360
	≥ 240,000 Btu/h and < 760,000 Btu/h	9.5 EER[b] and 9.7 IPLV[b]	
	≥ 760,000 Btu/h	9.2 EER[b] and 9.4 IPLV[b]	
Air Conditioners, Water and Evaporatively Cooled	> 240,000 Btu/h	11.0 EER[b] and 10.3 IPLV[b]	ARI 340/360
Condensing Units, Air Cooled	≥ 135,000 Btu/h	10.1 EER and 11.2 IPLV	ARI 365
Condensing Units, Water or Evaporatively Cooled	≥ 135,000 Btu/h	13.1 EER and 13.1 IPLV	
[a] IPLVs are only applicable to equipment with capacity modulation.			
[b] Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.			

Table C2 – UNITARY AND APPLIED HEAT PUMPS, MINIMUM EFFICIENCY REQUIREMENTS (TABLE 112-B)

Equipment Type	Size Category	Subcategory or Rating Condition	Efficiency [a]	Test Procedure
Air Cooled (Cooling Mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Split System and Single Package	10.1 EER[b]	ARI 340/360
	≥ 135,000 Btu/h and <240,000 Btu/h	Split System and Single Package	9.3 EER[b]	ARI 340/360
	≥ 240,000 Btu/h	Split System and Single Package	9.0 EER[b] 9.2 IPLV[b]	
Air Cooled (Heating Mode)	≥ 65,000 Btu/h and < 135,000 Btu/h (Cooling Capacity)	47°F db/43°F wb Outdoor Air	3.2 COP	ARI 210/240
	≥ 135,000 Btu/h (Cooling Capacity)	47°F db/43°F wb Outdoor Air	3.1 COP	ARI 340/360
[a] IPLVs and Part load rating conditions are applicable only to equipment with capacity modulation.				
[b] Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.				

Table C-4 – WATER CHILLING PACKAGES – MINIMUM EFFICIENCY REQUIREMENTS (TABLE 112-D)

Equipment Type	Size Category	Efficiency	Test Procedure
Air Cooled, With Condenser, Electrically Operated	< 150 Tons	2.80 COP	ARI 550/590
	≥ 150 Tons	3.05 IPLV	
Air Cooled, Without Condenser, Electrically Operated	All Capacities	3.10 COP 3.45 IPLV	
Water Cooled, Electrically Operated, Positive Displacement (Reciprocating)	All Capacities	4.20 COP 5.05 IPLV	ARI 550/590
Water Cooled, Electrically Operated, Positive Displacement (Rotary Screw and Scroll)	< 150 Tons	4.45 COP 5.20 IPLV	ARI 550/590
	≥ 150 Tons and < 300 Tons	4.90 COP 5.60 IPLV	
	≥ 300 Tons	5.50 COP 6.15 IPLV	
Water Cooled, Electrically Operated, Centrifugal	< 150 Tons	5.00 COP 5.25 IPLV	ARI 550/590
	≥ 150 Tons and < 300 Tons	5.55 COP 5.90 IPLV	
	≥ 300 Tons	6.10 COP 6.40 IPLV	
Air Cooled Absorption Single Effect	All Capacities	0.60 COP	ARI 560
Water Cooled Absorption Single Effect	All Capacities	0.70 COP	
Absorption Double Effect, Indirect-Fired	All Capacities	1.00 COP 1.05 IPLV	
Absorption Double Effect, Direct-Fired	All Capacities	1.00 COP 1.00 IPLV	
Water Cooled Gas Engine Driven Chiller	All Capacities	1.2 COP 2.0 IPLV	ANSI Z21.40.4

Table C-5 – PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINAL HEAT PUMPS – MINIMUM EFFICIENCY REQUIREMENTS (TABLE 112-E)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Efficiency [a]	Test Procedure
PTAC (Cooling Mode) New Construction	All Capacities	95°F db Outdoor Air	12.5 - (0.213 x Cap/1000)* EER	ARI 310/380
PTAC (Cooling Mode) Replacements[b]	All Capacities	95°F db Outdoor Air	10.9 - (0.213 x Cap/1000)* EER	
PTHP (Cooling Mode) New Construction	All Capacities	95°F db Outdoor Air	12.3 - (0.213 x Cap/1000)* EER	
PTHP (Cooling Mode) Replacements[b]	All Capacities	95°F db Outdoor Air	10.8 - (0.213 x Cap/1000)* EER	
PTHP (Heating Mode) New Construction	All Capacities		3.2 - (0.026 x Cap/1000)* COP	
PTHP (Heating Mode) Replacements[b]	All Capacities		2.9 - (0.026 x Cap/1000)* COP	

[a] Cap means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

[b] Replacement units must be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches high and less than 42 inches wide.

APPENDICES

Appendix A: Definitions

This section provides a list of definitions of key concepts used in this Program handbook.

AB 1407:
Assembly Bill 1407, codified as California Civil Code section 714, was signed by Governor Davis on September 3, 2003. Among other things, this legislation voids and makes unenforceable any existing covenant, restriction, or condition contained in any deed, contract, security instrument, or other instrument affecting real property, as specified, that prohibits or restricts the installation or use of a solar energy system, excepting provisions that impose reasonable restrictions on solar energy systems. This statute also mandates that whenever approval is required for the installation or use of a solar energy system, that such approval be processed in the same manner as approval of an architectural modification, and not be willfully avoided or delayed. Any Public Entity (see definition) may not receive funds from a state-sponsored grant or loan program, including the CSI, for solar energy if it fails to comply with these requirements. A Public Entity must meet these requirements to qualify for these grants or loans. Please see California Civil Code section 714 for full statutory requirements and further detail.

Alternating Current (AC):
Electric current that reverses direction, usually many times per second. Opposite of direct current (DC). Most electrical generators produce alternating current. Under the CSI Program, PV electric output calculations must always be made using the CEC-AC rating standards which include inverter DC to AC conversion losses.

Applicant:
The entity, either the Host Customer, System Owner, or third party designated by the Host Customer, that is responsible for the development and submission of the CSI application materials and the main point of communication between the CSI Program Administrator for a specific CSI Application.

Application Fee:
An Application Fee is required once the Reservation Request has been submitted for all non-residential projects greater than or equal to 10 kW. Where applicable, the Application Fee is a standardized amount based on system size criteria and is refundable, in general, when the Project is completed and the incentive is paid, or before the application receives the initial Reservation Notice.

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 Program, unless expressly stated otherwise, refer to true, not magnetic, azimuth. For calculating an EPBB incentive, all proposed PV systems with a true azimuth orientation between 180 degrees and 270 degrees, facing south, southwest and west, will be compared to a reference system with the same orientation as the proposed system.

Backup Generators:
Backup generators operate as short-term temporary replacement for electrical power during periods of utility power outages. In addition to emergency operation they ordinarily operate for testing and maintenance. Backup generators do not produce enough power to be sold or otherwise supplied to the grid or provide power to loads that are simultaneously serviced by a utility electric grid. Backup generators only service customer loads that are isolated from the grid either by design or by manual or automatic transfer switch.

Benchmarking:
(as used herein): process that compares the energy use of the building to the energy use of a population of similar buildings.

British Thermal Units (BTU):
The amount of heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit.

Building Integrated Photovoltaic (BIPV):
Building integrated PV systems are solar electric systems in which the PV panels constitute part of the building's roof or facade, replacing conventional building materials. For example, solar shingles may replace conventional asphalt shingles, providing roof protection while producing electricity.

Calendar Days:
All dates and schedules in the CSI are measured in calendar days, which include all days of the week.

Center for Sustainable Energy (CSE):
A Non-Profit 501(c)3 corporation that implements the CSI Program on behalf of SDG&E; formerly known as the San Diego Regional Energy Office.

California Energy Commission (CEC):
California's primary energy policy and planning agency. Created in 1974 and headquartered in Sacramento, the Commission has responsibility for activities that include forecasting future energy needs, promoting energy efficiency through appliance and building standards, and supporting renewable energy technologies. On August 21, 2006, the Governor signed Senate Bill (SB 1) which directs the CPUC and the CEC to implement the CSI Program consistent with specific requirements and budget limits set forth in the legislation.

California Public Utilities Commission (CPUC or Commission):
The CPUC regulates a number of industries including the electric utility industry that impact public well-being. Among other activities, the CPUC establishes service standards and safety rules and authorizes rate changes. The CPUC, in conjunction Senate Bill 1 (SB 1), has authorized the California Solar Initiative (CSI). In CPUC Decision (D.) 06-01-024, the California Public Utilities Commission (CPUC) established the CSI Program. In D.06-08-028, the CPUC established implementation details for the CSI Program.

California Solar Initiative (CSI):
The California Solar Initiative program pays incentives to solar photovoltaic (PV) projects in the three California IOU service territories. This Program Handbook is designed to describe the

requirements for receiving funding under the CSI. The program was authorized by the California Public Utilities Commission (CPUC) and Senate Bill 1 (SB 1). Responsibility for administration of the CSI Program is shared by Pacific Gas and Electric Company, Southern California Edison Company, and the Center for Sustainable Energy (CSE, formerly known as San Diego Regional Energy Office) for SDG&E customers.

Capacity Factor:
The ratio of the electrical energy produced by the generating system during a specific period, to the electrical energy the generating system could have produced if it had operated at full capacity rating during the same period.

Capacity Rating:
The capacity rating is a load that a power generation unit, such as a photovoltaic system, is rated by the manufacturer to be able to meet or supply. The Program Administrator will verify system capacity rating to confirm the final incentive amount.

CEC-AC Rating:
The CSI Program Administrators will use the California Energy Commission's CEC-AC method to measure nominal output power of photovoltaic cells or modules to determine the system's rating in order to calculate the appropriate incentive level. The CEC-AC rating standards are based upon 1,000 Watt/m^2 solar irradiance, 20 degree Celsius ambient temperature, and 1 meter/second wind speed. The CEC-AC Watt rating is lower than the Standard Test Conditions (STC).

Commercial:
Commercial entities are defined as non-manufacturing business establishments, including hotels, motels, restaurants, wholesale businesses, retail stores, and for-profit health, social, and educational institutions. For the purpose of CSI, commercial sectors include agricultural and industrial customers.

Contiguous Site:
An unbroken chain of adjacent parcels that are solely owned, leased or rented by the NEM customer. For the purposes of NEM Aggregation pursuant to a utility NEM tariff, parcels that are divided by a street, highway, or public thoroughfare are considered contiguous, provided they are within an unbroken chain of otherwise contiguous parcels and under the same ownership or lease, as verified in the Utility NEM Aggregation documentation.

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

CSI Program Forum:
The CSI Program Forum was established in CPUC D.06-08-028 to provide a public venue for interested parties to identify and discuss ongoing issues related to CSI administration and implementation. The forum will be used to provide input on any needed updates to this Program Handbook and future more substantive program modifications that may be considered. For more information on the CSI Program Forum, refer to Section 1.7.

Design Factor:
The Design Factor is a ratio comparing a proposed system's expected generation output with that of a baseline system. The Design Factor is used in calculating the EPBB incentive (it is multiplied by the system rating and the incentive rate to determine EPBB incentives). A Design Factor is also used by Program Administrators to allocate applications against their MW in step (Section 2.2.5).

Direct Current (DC):
Direct current (DC or "continuous current") is the continuous flow of electricity through a conductor such as a wire from high to low potential. In direct current, the electric charges flow always in the same direction, which distinguishes it from alternating current (AC). Under the CSI Program, photovoltaic electric output calculations must always be made using the CEC-AC rating standards which include inverter DC to AC conversion losses.

Electric Utility:
The Host Customer's local electric transmission and distribution service provider for their Site.

Electrical Distribution Grid:
A network of power stations transmission circuits, and substations conducting electricity. Under the CSI Program, eligible renewable energy systems must be permanently interconnected and operating parallel to the electrical distribution grid of the utility serving the customer's electrical load.

Emerging Renewables Program (ERP):
The ERP is a California Energy Commission program offering cash rebates on eligible grid-connected renewable energy electric-generating systems.

Energy Service Company (ESCO):
A business entity that designs, builds, develops, owns, operates or any combination thereof self-generation Projects for the sake of providing energy or energy services to a Host Customer.

Energy Service Provider (ESP):
An entity that provides electric power and ancillary services (including but not limited to aggregators, brokers, and marketers, but excluding utilities) to an end use customer. Also referred to as an Electric Service Provider.

Expected Performance Based Buydown (EPBB):
The EPBB incentive methodology pays an up-front incentive to participants installing systems less than 30 kW in size that is based on a system's expected future performance. EPBB incentives combine the performance benefits of PBI with the administrative simplicity of a one-

time incentive paid at the time of project installation. The EPBB Incentive will be calculated by multiplying the incentive rate by the system rating by the Design Factor.

Firm Service Level:
Power supplies that are guaranteed to be delivered under terms defined by contract.

Fraud:
A knowing misrepresentation of the truth or concealment of a material fact to induce another to act to his or her injury.

Government:
A Government entity is any federal, state, or local government agency. Federal government entities include the Air Force, Army, Navy, Marines, Postal Service, General Services Administration, and all other Federal agencies or departments. State government entities include the University of California, California State University, Department of Corrections, Department of General Services, the combination of the Department of Developmental Services and CalTrans, the combination of the California Youth Authority and the Department of Mental Health, and all other state agencies and departments. Local government entities include cities, counties, school districts, and water districts.

Host Customer:
An individual or entity that meets all of the following criteria: 1) has legal rights to occupy the Site, 2) receives retail level electric service from PG&E, SCE, or SDG&E, 3) is the utility customer of record at the Site (GM CSI only) or owns the site, 4) property owner or persons/entity responsible for the building at the location where the generating equipment will be located (MASH only), 5) is connected to the electric grid, and 6) is the recipient of the net electricity generated from the solar equipment (GM CSI only).

Hybrid System:
A self-generation system that combines more than one type of distributed generation technology and is located behind a single Electric Utility service meter.

Incentive Adjustment Mechanism:
A mechanism for CSI Incentives to automatically decline each year based upon MW reserved over the 10 years of the CSI. The adjustment mechanism reduces the statewide incentive level when specified MW levels, or "triggers," of solar installations are achieved. See Section 3.1.

Interconnection Agreement:
A legal document authorizing the flow of electricity between the facilities of two electric systems. Under the CSI Program, eligible renewable energy systems must be permanently interconnected and operating in parallel to the electrical distribution grid of the utility serving the customer's electrical load. Portable systems are not eligible. Proof of interconnection and parallel operation is required prior to receiving an incentive payment.

Interval Data Recorder (IDR):
IDR is a metering device capable of recording minimum data required. Minimum data requirements include (a) hourly data required for the Direct Access settlement process; and (b)

data required to bill the utility's distribution tariffs including 15-minute demand data--also referred to as Hourly Metering.

Inverter:
An electric conversion device that converts direct current (DC) electricity into alternating current (AC) electricity.

Inverter Efficiency:
The AC power output of the inverter divided by the DC power input.

Investor-Owned Utility (IOU):
For purposes of the CSI, this refers to Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company.

Kilowatt (kW):
A unit of electrical power equal to 1,000 watts, which constitutes the basic unit of electrical demand. The watt is a metric measurement of power (not energy) and is the rate (not the duration over which) electricity is used. 1,000 kW is equal to 1 megawatt (MW). Throughout this Program Handbook, the use of kW refers to the CEC-AC wattage ratings of kW alternating current inverter output.

Kilowatt Hour (kWh):
The use of 1,000 watts of electricity for one full hour. Unlike kW, 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.

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.

Load:
Either the device or appliance which consumes electric power, or the amount of electric power drawn at a specific time from an electrical system, or the total power drawn from the system. Peak load is the amount of power drawn at the time of highest demand.

Low Income:
Meets the definition of low income housing in Public Utility Code 2852 in order to apply for incentives through the MASH program. [51]

Maximum Site Electric Load:
The peak (maximum) kW demand at the Site, regardless if served by the existing generator, the local utility or a combination of the two.

[51] D.11-07-031 removed the two year occupancy permit requirement for low-income customers applying to the MASH program. Applicants for MASH must not have received incentives from the California Energy Commission's New Solar Homes Partnership.

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 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.

Measurement and Verification (M&V):
A process or protocol to confirm the actual energy savings realized from a project once the project is implemented and operating.

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

Meter:
A device used to measure and record the amount of electricity used or generated by a consumer. The CSI Program requires accurate solar production meters for all solar projects that receive incentives. Systems receiving an EPBB incentive require a meter accurate to within ± 5%, while systems receiving PBI payments require a more precise meter accurate to within ± 2%.

Metering System:
A metering system should include all distinct components necessary to measure the energy produced by a solar generating system. This must include equipment that allows the system to monitor and record 15-minute interval data either internally or externally through additional equipment such as a data logger. The system must include a 2% accurate meter either socket based or panel style allowing for a visual or remote display.

Minimal Shading:
No Solar obstruction is closer than a distance twice the height it extends above the PV Modules. The measurements shall be made at all the major corners of the array with no adjacent measurement being more than 40 feet apart. The points of measurement shall be distributed evenly between two major corners if they are more than 40 feet apart such that the linear distance between any sequential points is no more than 40 feet.

Modules:
Under the CSI Program, a module is the smallest complete environmentally protected assembly of interconnected photovoltaic cells. Modules are typically rated between 50 and 300 W.

Nationally Recognized Testing Laboratory (NRTL):
The Occupational Safety and Health Administration's (OSHA) Directorate of Science, Technology, and Medicine operates a program that certifies private sector organizations as NRTLs, which subsequently judges that specific equipment and materials ("products") meet consensus-based standards of safety for use in the U.S. workplace. Under the CSI Program, PV

Modules must be certified to UL 1703 by a Nationally Recognized Testing Laboratory (NRTL). Inverters must be certified to UL 1741 by a NRTL.

Net Energy Metering (NEM) Agreement:
An agreement with the local utility which allows customers to reduce their electric bill by exchanging surplus electricity generated by certain renewable energy systems such as the PV systems the CSI subsidizes. Under net metering, the electric meter runs backwards as the customer-generator feeds extra electricity back to the utility. The CSI Program permits net energy metering agreements.

New Construction:
New construction is defined as the construction of new buildings. Residential new construction systems are not eligible for the CSI Program, and should apply to the California Energy Commission's New Solar Homes Partnership Program. 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.

New Solar Homes Partnership (NSHP):
A California Energy Commission program offered as of January 1, 2007 that works with home builders and the building industry to accelerate the growth of PV in residential new construction.

Non Profit:
A Non-Profit institution is an entity not conducted or maintained for the purpose of making a profit, and is registered as a 501(c)3 corporation. No part of the net earnings of such entity accrues or may lawfully accrue to the benefit of any private shareholder or individual.

North American Board of Certified Energy Practitioners (NABCEP):
A professional association developing a voluntary national certification program for solar practitioners. Although not required by the CSI Program, installation contractors are encouraged to become certified by the NABCEP.

Pacific Gas and Electric Company (PG&E):
An investor-owned utility (IOU). The utility that provides natural gas and electricity to most of Northern California.

Parallel Operation:
The simultaneous operation of a self-generator with power delivered or received by the electrical utility while interconnected to the grid. Parallel Operation includes only those PV systems that are interconnected with the Electric Utility distribution system for more than 60 cycles.

Payee:
The person, or company, to whom the CSI Incentive check is made payable.

Performance Based Incentives (PBI):
The CSI Program will pay Performance Based Incentives (PBI) in monthly payments based on recorded kilowatt hours (kWh) of solar power produced over a five-year period. Solar projects receiving PBI incentives will be paid a flat per kWh payment monthly for PV system output that

is serving on Site load. The monthly PBI incentive payment is calculated by multiplying the incentive rate by the measure kWh output.

Performance Data Provider (PDP):
Service provider that monitors and reports the energy production data from the solar energy system to the Program Administrator to serve as the basis for PBI payments.

Photovoltaic (PV):
A technology that uses a semiconductor to convert light directly into electricity.

Power Purchase Agreements:
An agreement for the sale of electricity from one party to another, where the electricity is generated and consumed on the Host Customer Site. Agreements that entail the export and sale of electricity from the Host Customer Site do not constitute on-site use of the generated electricity and therefore are ineligible for the CSI.

Program Administrator (PA):
For purposes of the CSI Program, PG&E, SCE & CSE (which administers the program on behalf of SDG&E).

Program Year (PY):
January 1 through December 31.

Proof of Project Milestone Date:
The Proof of Project Milestone Date is the date when required information to demonstrate that a Project seeking CSI Incentives is moving forward is due.

Project:
For purposes of the CSI, the "Project" is the installation and operation of the proposed eligible PV system, as described by the submitted Reservation Request documentation.

Public Entity:
Includes the United States, the state and any county, city, public corporation, or public district of the state, and any department, entity, agency, or authority of any thereof.[52]

Rebuild A Greener San Diego Photovoltaic Incentive Program:
San Diego area program authorized by the CPUC Resolution E-3860, created to provide incentives to homeowners rebuilding homes affected by the October 2003 wildfires. The Rebuild a Greener San Diego Photovoltaic Incentive Program accepted applications from April 1, 2004 through May 31, 2006.

Renewable:
Electricity supplied by energy sources that are naturally and continually replenished, such as wind, solar power, geothermal, small hydropower, and various forms of biomass.

52 Source: CALIFORNIA CODES - PUBLIC CONTRACT CODE, SECTION 21611

Reservation Expiration Date:
The Reservation Expiration Date is the date up to when the project is active in the CSI Program.

Residential:
Residential entities are private household establishments that consume energy primarily for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying. The classification of an individual consumer's account, where the use is both residential and commercial, is based on principal use. A power purchase agreement on a residence is considered a residential application. It should be noted that the CSI 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.

Retro-commissioning:
A process to identify how major energy using equipment is being operated and maintained and to identify specific improvements to the performance of those energy using systems. The process uses a whole building systems approach to identify problems and needed repairs or adjustments to achieve energy savings, occupant comfort and improved systems performance. A commissioning agent identifies and makes the necessary equipment adjustments and identifies energy efficiency projects that will improve overall building performance.

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

San Diego Gas & Electric Company (SDG&E):
One of California's four investor-owned utilities (IOU's). SDG&E provides natural gas and electricity to San Diego County and southern Orange County in southern California. It is owned by Sempra Energy. The CSI Program is available to customers of PG&E, SCE and SDG&E.

Self-Generation Incentive Program (SGIP):
The SGIP, created pursuant to California Assembly Bill 970, provided financial incentives for business and residential customers who install up to 5.0 MW of "clean" distributed generation equipment onsite. The current program runs through December 31, 2011. The SGIP was extended in modified form for certain technologies through AB 1685.

Seller:
Any person or business entity that transfers property or property rights by sale in commerce.

Senate Bill 1 (SB 1):
Chapter 132, Statutes of 2006 (SB1, Murray) establishes the goals of installing 3,000 MW of solar generation capacity in the state of California, establishing a self-sufficient solar industry, and placing photovoltaic systems on 50 percent of new California homes within 13 years. The bill was signed into law on August 21, 2006, and it became effective on January 1, 2007. SB 1 requires the CPUC, in implementing the California Solar Initiative (CSI) to adopt performance-based subsidies (i.e., subsidies that pay based on the amount of electricity produced) by January 1, 2008 where 100% of incentives are based on performance for all PV systems 100

kW and larger, and 50% of incentives are based on performance for systems 30 kW and larger. Performance-based subsidies are encouraged, but not required, for smaller systems. Moreover, SB 1 authorizes the CPUC to award $101 million in subsidies for electric-displacing solar thermal systems and authorizes the CPUC to award $50 million for solar research and development. The bill requires municipal utilities to establish solar energy programs in support of the 3,000 MW goal and raises the net metering cap from 0.5 percent to 2.5 percent.

Site:
The Host Customer's premises, consisting of all the real property and apparatus employed in a single enterprise on an integral parcel of land undivided, excepting in the case of industrial, agricultural, oil field, resort enterprises, and public or quasi-public institutions divided by a dedicated street, highway or other public thoroughfare or railway. Automobile parking lots constituting a part of and adjacent to a single enterprise may be separated by an alley from the remainder of the premises served. Separate business enterprises or homes on single parcel of land undivided by a highway, public road, and thoroughfare or railroad would be considered for purposes of CSI as separate Sites. Each individual Site must be able to substantiate sufficient electrical load to support the proposed system size. An additional exception to this definition includes eligible customers taking service under the NEM Aggregation pursuant to Utility NEM tariff. See subsection 'a'.

a.) NEMA Site:

For eligible customers participating in NEM Aggregation pursuant to a Utility NEM tariff, the definition of Contiguous Site herein applies. For purposes of calculating onsite load, the sum of all metered load from all accounts participating in a NEM Aggregation agreement (i.e., the Generating Account and All Aggregated Account(s)) pursuant to a Utility NEM tariff is used.

Solar Irradiance:
Radiant energy emitted by the sun, particularly electromagnetic energy. In the CSI Program the CEC-AC rating standards are based upon 1,000 Watt/m^2 solar irradiance, 20 degree Celsius ambient temperature, and 1 meter/second wind speed. The CEC-AC watt rating is lower than the Standard Test Conditions (STC), a watt rating used by manufacturers.

Southern California Edison Company (SCE):
An investor owned utility (IOU) that provides electricity in a 50,000-square mile service territory in Southern California.

Standard Test Conditions (STC):
A watt rating used by manufacturers of photovoltaic cells or modules. The CEC-AC watt rating used in the CSI is lower than the Standard Test Conditions.

Surface Orientation Factor (SOF):
The ratio of the annual incident solar radiation on a surface for a specific tilt and orientation (MJ/m2/year) divided by the annual incident solar radiation on a surface for a south-facing surface with optimal tilt (MJ/m2/year).

Solar Energy System Contractor:
The Solar Energy System Contractor is responsible for installing for the Host Customer the photovoltaic system that will be eligible to receive CSI Incentives. A qualified Soalr Contractor should be able to evaluate factors that will affect photovoltaic system performance, such as the

orientation (tilt and direction) of the system, wire length and size, shading, module output mismatch, inverter efficiency, module cleanliness, and other factors.

System Owner:
The owner of the PV 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.

System Size:
Generally, under the CSI, system size is defined as the capacity of a given photovoltaic system based upon CEC-AC rating standards. Under the CSI Program, the incentive is determined based on the expected production of electricity by the system, which may not exceed the actual energy consumed during the previous 12 months at the Site (see Section 2.2.4). However, for purposes of determining the capacity a given project contributes to a given step in the incentive schedule, system size is defined as the system size rating times a Design Factor (see Section 2.2.5).

Time of Use (TOU) Rates:
Electricity prices that vary depending on the time periods in which the energy is consumed. In a time-of-use rate structure, higher prices are charged during utility peak-load times. Such rates can provide an incentive for consumers to curb power use during peak time.

UL Listed:
Tested and listed by the Underwriters Laboratories, Inc. In the CSI Program, PV modules must be certified to UL 1703 by a Nationally Recognized Testing Laboratory (NRTL). Inverters must be certified to UL 1741 by a NRTL.

Vendor:
A seller of property, goods, or services. According to the CSI Program, in cases when a vendor sells a PV system to a Host Customer, the Host Customer is the System Owner.

Warranty:
A promise, either written or implied, that the material and workmanship of a product are without defect or will meet a specified level of performance over a specified period of time. In the CSI Program, inverters and modules must each carry a 10 year warranty, and meters a one-year warranty. Meters that are integrated in the inverter must carry a 10-year warranty. The warranty may be provided in combination by the manufacturer and Solar Contractor.

Appendix B: Additional Requirements and Terms

In addition to the Program eligibility criteria and requirements described above in the Handbook, the following additional items are required of CSI Program participants.

B.1 CSI Program Handbook Requirements

By execution of the CSI Program Contract, the System Owner and Host Customer each certifies that 1) they have received and read a copy of the current CSI Program Handbook; 2) the Project meets all Program eligibility requirements; and 3) that the System Owner and Host Customer agree to abide by the rules and requirements set forth in the CSI Program Handbook.

B.2 Authority to Install System

The Host Customer and System Owner represent that they have the authority to install the generating system at the Project Site, or have obtained the permission of the legal owner of the Project Site, to install the generating system. System Owner and Host Customer shall, at their own expense, obtain and maintain all licenses and permits needed to perform work on the Project.

B.3 No Endorsement by Program Administrator

The Host Customer and System Owner understand that the Program Administrator's review of the Project and authorization for CSI funding shall not be construed as confirming or endorsing the qualifications of the Applicant or any person(s) involved with the Project, including but not limited to the Project Solar Contractor(s), designer(s), or manufacturer(s); endorsing the Project design; or as warranting the economic value, safety, durability or reliability of the Project. The Host Customer is solely responsible for the Project, including selection of any designer(s), manufacturer(s), contractor(s), or Solar Contractor(s). The Host Customer and System Owner understand that they, and any third parties involved with the Project, are independent contractors and are not authorized to make any representations on behalf of the Program Administrator. The Host Customer and System Owner shall not use the Program Administrator's corporate name, trademark, trade name, logo, identity, or affiliation for any reason, without prior written consent of the Program Administrator.

B.4 Dispute Resolution

The parties to the CSI Contract shall attempt in good faith to resolve any dispute arising out of or relating to it promptly by negotiations between a vice president of the Program Administrator or his or her designated representative and an executive of similar authority from the System Owner and/or Host Customer. Either party must give the other party or parties written notice of any dispute. Within 30 calendar days after delivery of the notice, the executives shall meet at a mutually acceptable time and place, and shall attempt to resolve the dispute. If the matter has not been resolved within 30 calendar days of the first meeting, any party may pursue other remedies, including mediation. All negotiations and any mediation conducted pursuant to this clause are confidential and shall be treated as compromise and settlement negotiations, to which Section 1152.5 of the California Evidence Code shall apply, and Section 1152.5 is

incorporated herein by reference. Notwithstanding the foregoing provisions, a party may seek a preliminary injunction or other provisional judicial remedy if in its judgment such action is necessary to avoid irreparable damage or to preserve the status quo. Each party is required to continue to perform its obligations under this Contract pending final resolution of any dispute arising out of or relating to this Contract.

B.5 Assignment

The System Owner and Host Customer consent to Program Administrator's right to assign of all of Program Administrator's rights, duties and obligations under this Contract to the CPUC and/or its designee. Any such assignment shall relieve the Program Administrator of all rights, duties and obligations arising under the CSI Contract. Neither System Owner nor Host Customer shall assign its rights or delegate its duties without the prior written consent of the Program Administrator or its assignee, if any, except in connection with the sale or merger of a substantial portion of its assets. Any such assignment or delegation without the prior written consent of Program Administrator or its assignee, if any, shall be null and void. Consent to assignment shall not be unreasonably withheld or delayed. The System Owner and Host Customer must provide assurance of the success of a Project if assigned by providing any additional information requested by the Program Administrator.

B.6 No Third Party Beneficiaries

The CSI Contract is not intended to confer any rights or remedies upon any persons other than the parties to it, as indicated by signature of the Contract.

B.7 Indemnification

To the greatest extent permitted by applicable law, the Host Customer and System Owner agree to indemnify, defend, and hold harmless the Program Administrator, its affiliates, subsidiaries, current and future parent companies, officers, managers, directors, agents, and employees from all claims, demands, losses, damages, costs, expenses, and liability (legal, contractual, or otherwise), which arise from or are in any way connected with any: 1) injury to or death of persons, including but not limited to employees of the Program Administrator, Host Customer, System Owner, or any third party, 2) injury to property or other interests of the Program Administrator, Host Customer, System Owner, or any third party, 3) violation of local, state, or federal common law, statute, or regulation, including but not limited to environmental issue or regulations, 4) strict liability imposed by any law or regulation, or 5) generation system performance shortfall; so long as such injury, violation, strict liability, or shortfall (as set forth in 1-5 above) arises from or is in any way connected with the Project, including the Host Customer's, System Owner's, or third party's performance or failure to perform with respect to the Project, however caused, regardless of any strict liability or negligence of the Program Administrator, its officers, managers, or employees, excepting only such loss, damage, or liability that is caused by the willful misconduct of the Program Administrator, its officers, managers, or employees.

B.8 Limitation of Liability

The Program Administrator shall not be liable to the System Owner, Host Customer or to any of their respective contractors or subcontractors for any special, incidental, indirect or consequential damages whatsoever, including, without limitation, loss of profits or commitments, whether in contact, warranty, indemnity, tort (including negligence), strict liability or otherwise arising for the Program Administrator's performance or nonperformance of its obligations under the CSI Contract.

B.9 Term and Termination

The Tem of the CSI Contract shall begin on the date that the last Party signs it, and shall continue for 10 years, unless terminated earlier pursuant to the operation of the Contract, or unless modified by order of the CPUC by written agreement of the Parties to the Contract.

The Contract may be terminated by the Program Administrator in the event a) the System Owner or Host Customer fails to perform a material obligation under the Contract and the System Owner or Host Customer fails to cure such default within 10 days of receipt of written notice from the Program Administrator, or b) any statement, representation or warranty made by the System Owner or Host Customer in connection with the Program or the Contract is false, misleading or inaccurate on the date as of which it is made.

The termination of the Contract shall not operate to discharge any liability which has been incurred by either Party prior to the effective date of such termination.

B.10 Venue

The CSI Contract shall be interpreted and enforced according to the laws of the State of California. Sole jurisdiction and venue shall be with the courts in San Francisco, Los Angeles or San Diego Counties, as per the Program Administrator's service territory.

B.11 Integration and Modification

The CSI Contract and CSI Handbook constitute the entire Contract and understanding between the Parties, as to the Contract's subject matter. It supersedes all prior or contemporaneous contracts, commitments, representations, writings, and discussions between the System Owner, Host Customer, and Program Administrator concerning the Project, whether oral or written, and shall not be induced by any representations, statements or contracts other than those expressed therein.

No amendment, modification or change of the Contract shall be binding or effective unless expressly set forth in writing and signed by the Program Administrator's representative authorized to do so.

B.12 PMRS and PDP Transfer of Solar Production Data

By signing the CSI Contract, the Host Customer and/or System Owner are responsible for ensuring the transfer of solar production data from the Performance Monitoring and Reporting

Service (PMRS) Providers and Performance Data Providers (PDP) to the Program Administrators.

Appendix C: Inverter Integral 5% Meter Performance Specification and Test Requirements

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Pete Baumstark, KEMA, Inc., in collaboration with the CSI Metering Subcommittee

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Appendices

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C-1 Overview

Metering devices have been an integral part of DC to AC inverters for many years. Previously, there have been no performance requirements that have been applied to verify accuracy of these metering devices. This purpose of this document[53] is to create those requirements. It draws upon several existing standards and methods to establish inverter metering accuracy requirements.

C-1.1 Objectives

The objective of this document is to provide a test protocol and performance specification that would be used for verifying inverter integral metering devices to ± 5% accuracy. The test procedures and specifications herein were developed under the assumption that the primary user of this information is either an inverter manufacturer or a Nationally Recognized Test Lab (NRTL) that is recognized by the Occupational Safety and Health Administration (OSHA) as capable of certifying products to UL1741. Many of the tests that are specified in this document can be performed concurrently with UL1741 certification.

Tests specified in this document are either classified as Series or Non-Series. Series tests are to be performed on the same unit whereas Non-Series tests can be performed on other units of the same unique model number. A unique model can pass certification to these requirements by having tests performed on various sample units, and therefore is not required to have all these tests performed on the same unit. Type testing requires each test to be performed on a unique model number. Production testing requires one test to be performed on a sampling of production units. See Appendix C-A for a listing of test classifications along with a brief over view of the tests.

C-1.1.1 Approach and Methodology

The following steps (many of which were established by the PV Metering Subcommittee) were used to develop the test requirements presented in this document:

1) Survey of applicable standards relative to meter and inverter certification protocols. These include UL1741, IEEE 1547.1, ANSI C12.1 & the Sandia Inverter Test Protocols.

2) Tabulate ANSI C12.1 tests and determine both applicability for inverter meters and synergies with requirements and intent of UL1741 and IEEE 1547.1 tests. Some test environments defined in ANSI C12.1 are more severe than UL1741 or IEEE 1547.1 environments. In such cases, the UL1741 or IEEE 1547.1 environments were used. Inverter metering systems are only expected to perform under the same environments under which inverters are expected to perform.

3) Obtain industry/technical/certification expert feedback.

[53] "Document" used in this context here and elsewhere in this Appendix refers to this Appendix D of the CSI Handbook.

4) Perform trial runs of the identified tests at an NRTL's facility and include feedback on feasibility.

5) Write draft requirements for review.

C-1.1.2 Scope and Purpose

This document provides test requirements for certification of inverter integral metering systems to an accuracy of ± 5%, as measured at the AC output terminals of the inverter or the supplied/required transformer. These requirements are intended to be used in conjunction with certification of inverter products designed for grid-connected PV systems. There is also one test that is designed to be easily performed in conjunction with the California Energy Commission's SB1 eligibility guidelines required weighted efficiency testing (known as Sandia Inverter Test Protocols).

Tests include accuracy verification under a number of typical operational scenarios and abnormal situations that are deemed reasonable based on established certification protocols.

Test protocols are applicable to integrated metering systems, but do not include displays, data logging, data retention or communication devices.

Inverters that have already been certified to UL1741 may have their metering systems certified to ± 5% accuracy per these requirements by submitting samples for testing under these requirements. The long-term purpose of these requirements is to have inverter metering systems certified to ± 5% accuracy in conjunction with UL1741 certification. Every effort has been made to allow appropriate synergies between meter accuracy certification and UL1741 certification.

These tests are intended to supplement UL1741 and are not intended to duplicate or conflict with the UL1741 safety, power quality, utility interconnection, or thermal requirements. Should there be any conflict between UL1741 or IEEE 1547.1 and these requirements, UL1741 and IEEE 1547.1 shall take precedence.

C-2 Definitions and References

C-2.1 Definitions

Accuracy: The extent to which a given measurement agrees with the defined value. (from ANSI C12.1-2008)

Calibration: Comparison of the indication of the instrument under test, or registration of the meter under test, with an appropriate standard. (from ANSI C12.1-2008)

Data Acquisition System (DAS): A system that receives data from one or more locations. (from IEEE Std. 100-1996)

Disconnect Switch: A switching device that breaks an electrical circuit. These devices may have AC or DC voltage and current ratings and may or may not be rated for breaking under load. Disconnect switches usually provide a visible break, and may have a locking feature to provide control over the status of the disconnect switch.

Display: A means of visually identifying and presenting measured or calculated quantities and other information. (from ANSI C12.1-2008)

Efficiency: The ratio of the usable AC output power to the total DC + AC input power.

Electric Power System (EPS): (from IEEE Std 1547-2003), Facilities that deliver electric power to a load.

Insolation: A measure of solar radiation energy received on a given surface area in a given time. It is commonly expressed as average irradiance in watts per square meter (W/m^2) or kilowatt-hours per square meter per day ($kW \cdot h/(m^2 \cdot day)$) (or hours/day).

Interconnection: The equipment and procedures necessary to connect an inverter or power generator to the utility grid. IEEE Std. 100-1996 Def: *The physical plant and equipment required to facilitate transfer of electric energy between two or more entities. It can consist of a substation and an associated transmission line and communications facilities or only a simple electric power feeder.*

Inverter: A machine, device, or system that changes direct-current power to alternating-current power. For the purposes of this test procedure, the inverter includes any input conversion (i.e., DC-DC chopper) that is included in the inverter package and any output device (i.e. transformer) that is required for normal operation.

Islanding: Continued operation of a photovoltaic generation facility with local loads after the removal or disconnection of the utility service. This is an unwanted condition that may occur in the rare instance of matched aggregate load and generation within the island.

Inverter Integral Meter: Electricity metering device or system of devices, which measures and registers AC electricity values, and has provisions for a user interface. The entire meter must be physically located within the environmental enclosure of an inverter. For the purpose of this specification, the meter must, at a minimum, be capable of registering cumulative AC energy (watthours). The meter is not required to have a local display.

I-V Curve: A plot of the photovoltaic array current versus voltage characteristic curve. The shape of I-V curve is dependent on the PV cell technology, the configuration of the cells and other devices (e.g., bypass diodes) within the array, varying incident solar irradiance intensity and spectral content, and PV cell temperature.

Listed Equipment: Equipment, components or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or materials meets appropriate standards or has been tested and found suitable for use in a specified manner. (from the National Electrical Code; Article 100.)

Multi-Phase Units: An inverter which exports power on more than 2 conductors.

Non-islanding: Intended to prevent the continued existence of an island. (from IEEE 1547-2003)

Nationally Recognized Testing Laboratory (NRTL): A listing organization that has passed the Recognition Process by the United States Occupational Safety & Health Administration (OSHA) to certify products to specific standards. A full product certification includes testing of the product to applicable standards and follow-up services, or visits to the manufacturing facility, to ensure consistency of materials and processes that could affect product safety.

Power – Active: The time average of the instantaneous power over one period of the wave. Note: For sinusoidal quantities in a two-wire circuit, it is the product of the voltage, the current , and the cosine of the phase angle between them. For nonsinusoidal quantities, it is the sum of all the harmonic components, each determined as above. In a polyphase circuit, it is the sum of the active power of the individual phases. (from ANSI C12.1-2008)

Power – Apparent: The product of rms current and rms voltage for any wave form in a two-wire circuit. For sinusoidal quantities, apparent power is equal to the square root of the sum of the squares of the active and reactive power in both two-wire and polyphase circuits.

Power – Reactive: For sinusoidal quantities in a two-wire circuit, reactive power is the product of the voltage, the current, and the sine of the phase angle between them, using the current as reference. (from ANSI C12.1-2008)

Reference Meter: An electricity meter used, on the AC side only, as a basis for comparison with inverter integral meter performance under test conditions. For AC energy measurements, reference meters shall be capable of registering energy flow in the positive direction (from the inverter) only.

Simulated Utility: An assembly of voltage and frequency test equipment replicating a utility power source. Where appropriate, the actual Area EPS can be used as the Simulated Utility. (From IEEE P1547.1)

Unit Under Test (UUT): The particular inverter undergoing the specified test.

Utility: For this document, the organization having jurisdiction over the interconnection of the photovoltaic system and with whom the owner may enter into an interconnection agreement. This may be a traditional electric utility, a distribution company, or some other organization. IEEE 100 Def: *An organization responsible for the installation, operation, or maintenance of electric supply or communications systems.*

C-2.2 References

Principal references used in this document are as follows:

1) UL1741, “Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources”, November 7, 2005

2) ANSI C12.1-2008, “American National Standard for Electric Meters – Code for Electricity Metering”, June 27, 2008

3) IEEE Std 1547.1™-2005, “IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems”, July 1, 2005

4) “Performance Test Protocol for Evaluating Inverters Used in Grid-Connected Photovoltaic Systems”, Ward Bower, Chuck Whitaker, William Erdman, Michael Behnke, Mark Fitzgerald; October 2004 (This document is sometimes referred to as the Sandia document)

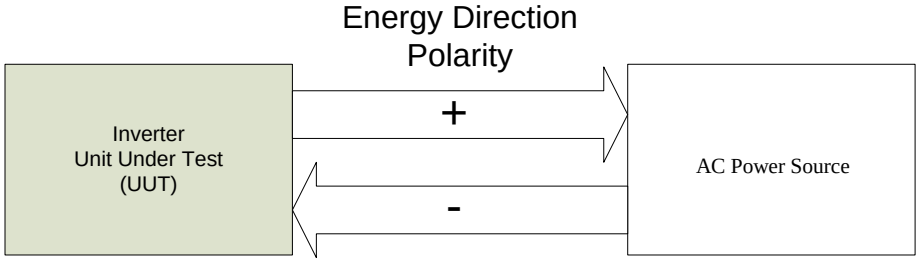
5) IEEE C37.90.1-1989, “IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems”, June 1989

C-3 Test and Equipment Requirements

C-3.1 General Requirements

As a standard convention, the power provided by the inverter to the AC power source is considered positive and power supplied by the AC power source to the inverter is considered negative.

Figure C-3-1: Energy Direction Polarity



For tests that require a recording of a stabilized operating temperature, temperatures are considered to be stable when three successive readings taken at not less than 15 minute intervals or not more than 10% of the previous elapsed duration following an initial 150 minutes of operation indicates no more than 1°C (1.8 °F) variation between any two readings..

C-3.2 Test Measurement Requirements

Unless otherwise specified, the requirements in this section apply to all test procedures. Basic measurement equipment uncertainty requirements are provided in Table C-3-1.

Table C-3-1: Basic Measurement Uncertainty Requirements

Parameter True RMS (V,I,P)	Allowable Maximum Uncertainty	Preferred Maximum Uncertainty
AC Voltage	± 1% of reading	± 0.25% of reading
AC Current	± 1% of reading	± 0.5% of reading
AC Power*	± 1% of reading	± 0.5% of reading
AC Energy*	± 1% of reading	± 0.5% of reading
AC Frequency	± 0.05 Hz	± 0.01 Hz
Temperature	±1°C	±0.5°C

*Note: AC power and energy measurements should include only the usable 60Hz power.

Though some of the wording of this document may imply a data acquisition system and logging, any suitable equipment or method that provides the necessary functionality and accuracy may be used to perform these tests.

Input voltages and currents are to be measured at the input terminals of the UUT or between the input supply (e.g., PV array) and the connection point of any optional or ancillary equipment external to the UUT. Output voltages and currents are measured at the output terminals of the UUT or at output terminals of the supplied/required external transformer.

Ambient air temperature shall be measured at least 6 inches (15 cm) horizontally away from the UUT enclosure and at the mid-point of the height of the enclosure, and out of the UUT's convection or forced airflow. Ambient air movement will be minimized only to the extent it is necessary to maintain ambient temperature at the specified level. When an environmental chamber is used to control temperature, shrouds or secondary enclosures may be needed to meet this requirement.

Inverter temperature shall be measured internally, at the switching device, or as close as practical.

All test equipment shall be calibrated and traceable to appropriate NIST or other standards.

C-3.3 Inverter AC Power Supply Requirements

The AC power supply (connected to the AC output of the UUT) may be either a simulated utility or the actual utility. A simulated utility must conform to the requirements defined in IEEE 1547.1, paragraph 4.6.1, Simulated area EPS (utility) source requirements.

C-3.4 Reference Meter Requirements

Some tests require the use of a reference energy meter to verify the accuracy of the integral metering device of the UUT. Reference energy meters shall be certified to a minimum accuracy

of, ± 0.5% of watt-hour production. Reference meter calibration shall be verified prior to any series of tests performed on each UUT.

C-3.5 Test Set-up Requirements

Each test set-up shall include the configuration the UUT will see in the field (e.g. all faceplates and covers installed, normal position, and all ground terminals wired to ground).

If the UUT has the option of an integral meter display, such a display shall be installed in normal position. It is not necessary to include connections for any remote display device.

C-3.6 Recording Energy Readings

This specification is intended to verify energy (watt-hour) production accuracy of inverter integral metering devices. For each test that specifies the recording of energy production, the UUT must run for a suitable time period to record watt-hour production. The time period may vary for different UUT model numbers based on the design of its integral metering device.

C-3.7 Accuracy Performance Check Procedure

Some tests require a periodic Accuracy Performance Check, which would be performed before and after the test. The UUT meter power output shall be read and compared to the energy output reading from a calibrated reference meter. The purpose of the check is to determine whether any detrimental damage occurred to the UUT metering device during specific tests. Where an “Accuracy Performance Check” is specified, the following procedure shall be followed:

a) Install reference meter between UUT output and power source.

b) Connect the UUT according to the instructions and specifications provided by the manufacturer to the selected input and output power sources.

c) Set all input source parameters to the nominal operating conditions for the UUT.

d) Set (or verify) all UUT parameters to the nominal operating settings.

e) Set the UUT (including the input source as necessary) to provide 20% ± 3% of its rated output power.

f) Record all applicable settings.

g) After allowing the inverter output power to stabilize, record energy (watt-hours) from both the inverter meter and the reference meter.

h) Set the UUT (including the input source as necessary) to 100% ± 3% of its rated output power.

i) After allowing the inverter output power to stabilize, record energy (watt-hours) from both the inverter meter and the reference.

j) Power down the input and output sources per manufacturers instructions.

k) Disconnect input and output power sources from the UUT.

l) Perform the specified environmental test.

m) Repeat steps a) through k).

C-3.7.1 Reporting of Data

For the test, report and calculate pre- and post- environmental test:

- Inverter meter output energy at 20% and 100%
- Reference meter energy at 20% and 100%
- The percent registration for all four cases.

The percent registration is calculated per Equation D-3-1.

Equation D-3-1: Percent Registration
Percent Registration = 100 x (Ref Meter Energy – Inverter Meter Energy)/Ref Meter Energy

C-3.7.2 Pass/Fail Criteria

The unit passes if the following two cases are met:

- At 20% output, the absolute difference between Percent Registration pre- and post-environmental test is less than 2.5%.
- At 100% output, the absolute difference between Percent Registration pre- and post-environmental test is less than 2.5%.

C-3.8 Tests Performed In Series

The following tests shall be conducted using the same inverter: Insulation, Voltage Interruptions from Loss of Control Circuit, Effect of High Voltage Line Surges, Electrical Fast/Transient Burst, Effect of Electrical Oscillatory Surge Withstand Capabilities (SWC) Test, Effect of Electrostatic Discharge (ESD) and Effect of Relative Humidity.

An Accuracy Performance Check per D-3.7 is specified to be performed in conjunction with each of these tests per this document. It is permissible to perform the Accuracy Performance Check, at a minimum, pre- and post- the entire block of series tests.

C-3.9 Weather Survivability

ANSI C12.1 defines several weather survivability tests for metering devices. UL1741 and IEEE 1547.1 also define several weather survivability tests for inverters. These requirements were developed with the assumption that inverter integral metering devices are to survive all environments that inverters are designed and tested to survive. Therefore weather survivability tests in conformance with, or similar to, the ANSI C12.1 tests are not included in these requirements.

C-4 Specific Test Requirements

C-4.1 Test No. 1: No Load

This test is intended to ensure the inverter metering device is not registering energy output with the inverter on, power sources and metering circuitry active, but no AC power being generated. The test is performed as a Type test in the lab, and also as a Production test which may be performed in the manufacturers' facility. The sampling criteria for production no-load output tests are to be determined by the NRTL in collaboration with the inverter manufacturer. Based on their experience, credibility, and requisite need to maintain their rating as a NRTL (the NRTL is deemed to be an appropriate authority for setting sample criteria based on inverter models submitted for testing.) The Specifications do not require every production unit to be tested.

C-4.1.1 Test No. 1a: No Load

The purpose of this test is to ensure the inverter meter is not registering generation when no load is on the UUT.

a) Adjust the test environment air temperature to 23°C ± 5°C.

b) Connect the UUT according to the instructions and specifications provided by the manufacturer to the selected output power source.

c) Set (or verify) all UUT parameters to the nominal operating settings. Temporary adjustment of UUT grid re-connections timer(s) is allowable for the duration of this test.

d) Set output power source to the UUT's rated voltage +/- 2%.

e) Set input power source to the UUT's nominal operating input voltage +/- 2%.

f) Ensure the UUT is on, with the metering circuitry active, but not producing any AC energy.

g) Record all applicable settings.

h) Measure and record inverter and reference meter energy (kWh) output for a duration of 15 minutes.

C-4.1.1.1 Reporting of Data

For the test, calculate and report:

- Inverter and reference meter energy output. The reference meter is used to ensure no actual AC output energy has been produced.

C-4.1.1.2 Pass/Fail Criteria

The unit passes if the inverter meter reads 0-1% of inverter's rated energy power output for the 15 minute duration.

C-4.1.2 Test No. 1b: No Load

The manufacturer is to perform the same test procedure as Test No 1a on a sampling of their production units. The sampling rate is determined by the NRTL, in collaboration with the manufacturer. These tests may be performed at the manufacturing facility.

C-4.2 Test No. 2: Load Performance

The purpose of this test is to verify the accuracy of the metering device throughout the operating power range of the UUT. The test is designed to be easily run concurrently with Sandia Test "Conversion Efficiency", paragraph 5.5.

Perform per the Sandia Conversion Efficiency test procedure with the following additions/modifications:

1) Install test reference meter between the inverter AC output and the power source.

2) In step 6, record energy (kWh) produced from the inverter meter and the reference meter at the end of each power level. For this test, it's only necessary to record energy production at the end of 10, 20, 30, 50, 75 and 100% power levels.

C-4.2.1 Reporting of Data

For each power level at each test condition, calculate and report:

- Inverter meter output energy (kWh) at each of the six power levels

- Reference meter energy (kWh) at each of the six power levels

- Meter accuracy levels at each of the six power levels

Determine meter accuracy levels per Equation C-4-2:

Equation C-4-2 Percent Accuracy

% Accuracy = 100 x (Inverter Meter kWh – Reference Meter kWh) / Reference Meter kWh

Enter the meter accuracy levels in the format shown in Table C-4-1.

Table C-4-1: Meter Accuracy Levels

Test	V_{dc}	V_{ac}	Inverter DC Input Power Level					
			10%	20%	30%	50%	75%	100%
A	V_{nom}	V_{nom}						
B	V_{max}	V_{nom}						
C	V_{min}	V_{nom}						

Calculate the weighted accuracy of the meter per Equation C-4-3 for each test (A, B & C).

Equation C-4-3 Weighted Accuracy

$$\eta_{Wtd} = 100 \times (0.04 \times \eta_{10} + 0.05 \times \eta_{20} + 0.12 \times \eta_{30} + 0.21 \times \eta_{50} + 0.53 \times \eta_{75} + 0.05 \times \eta_{100})$$

C-4.2.2 Pass/Fail Criteria

The UUT passes the test if the weighted accuracy is less than ± 5% for each test (A, B & C).

C-4.3 Test No. 3: Effect of Variation of Voltage

C-4.3.1 Purpose

The purpose of this test is to verify the accuracy stability of the metering device, during high and low operating AC voltages, relative to its accuracy at nominal voltage.

This procedure uses the inverter over and under AC voltage trip values determined in IEEE 1547.1, Paragraph 5.2, “Test for response to abnormal voltage conditions” as reference for high and low voltage settings.

For the purpose of this test, Inverter Operating Voltage Range shall be defined as, the difference between the inverter’s high trip voltage less the inverter’s low trip voltage. For example, if a 240 V inverter is tested and its trip values are determined to be 216 V (low) and 260 V (high), the Operating Voltage Range is 44 V (260 – 216 = 44).

a) Connect the inverter according to the instructions and specifications provided by the manufacturer. Include Reference Meter between the UUT AC output and the AC power source.

b) Set all source parameters to the nominal operating conditions for the inverter (e.g. input DC voltage and current is set to the inverter’s nominal specified values).

c) Set (or verify) all inverter parameters to the nominal operating settings. If the AC overvoltage or undervoltage settings are adjustable, set the inverter to the minimum overvoltage setting, but no less than the nominal voltage plus 2x the manufacturers stated accuracy, and set the inverter to the minimum undervoltage setting.

d) Record applicable settings.

e) For single-phase units, adjust voltage to the unit's nominal value. Initiate a ramp up until the unit voltage is within 20% of the Operating Voltage Range from the high voltage trip point. For example, if the nominal voltage of the UUT is 240 V, and the high end of the Inverter Operating Voltage is 260 V, and the Operating Voltage Range is 44 V, the UUT voltage must be maintained at 251.2 V to 260 V (8.8 V is 20% of 44 V). For multiphase units, adjust voltage to unit's nominal value on all phases, and initiate the ramp up on each phase until all are within 20% of the Operating Voltage Range from the high voltage trip point.

f) After allowing the inverter output power to stabilize, record energy (kWh) from both the inverter meter and the reference meter. This voltage level will be maintained for a sufficient duration to register energy readings from both the inverter meter and reference meter.

g) Initiate a ramp down until the unit voltage is within +/- 10% of the Operating Voltage Range from the nominal inverter voltage. For multiphase units, ramp down on each phase until all are within +/- 10% of the Operating Voltage Range from the nominal inverter voltage.

h) After allowing the inverter output power to stabilize, record energy (kWh) from both the inverter meter and the reference meter. This voltage level will be maintained for a sufficient duration to register energy readings from both the inverter meter and reference meter.

i) Initiate a ramp down until the unit voltage is within 20% of the Operating Voltage Range from the low voltage trip point. For example, if the nominal voltage of the UUT is 240 V, and the low end of the Inverter Operating Voltage is 216 V, and the Operating Voltage Range is 44 V, the UUT voltage must be maintained at 216 V to 224.8 V (8.8 V is 20% of 44 V). For multiphase units, ramp down on each phase until all are within 20% of the Operating Voltage Range from the unit's low voltage trip point.

j) After allowing the inverter output power to stabilize, record energy (kWh) from both the inverter meter and the reference meter. This voltage level will be maintained for a sufficient duration to register energy readings from both the inverter meter and reference meter.

k) Initiate a ramp up until the unit voltage is within 20% of the Operating Voltage Range from the high voltage trip point. For multiphase units, ramp up on each phase until all are within 20% of the Operating Voltage Range from the high voltage trip point.

l) Repeat steps f) through k) four times, always starting at the high end of, and cycling down to the low end of the Inverter Operating Voltage Range. A total of five readings will be taken at each of the high, mid and low ends of the Inverter Operating Voltage Range.

C-4.3.1 Reporting of Data

For each of the three voltage levels, calculate and report:

- Inverter meter output energy (average of five sampled values)
- Reference meter energy (average of five sampled values)
- Meter accuracy levels (average of five sampled values)

Determine meter accuracy levels per Equation C-4-2.

C-4.3.2 Pass/Fail Criteria

Accuracies at the high and low voltage settings must be within ±2.5% of the accuracy at the nominal voltage setting. These criteria are further explained in Table C-4-2.

Table C-4-2: Effect of Variation of Voltage

Voltage Level	Permissible Deviation in Energy Reading From Nominal Voltage Level
Nominal (within 10% of the operating voltage range)	Reference
High (within 20% of the operating voltage range)	±2.5%
Low (within 20% of the operating voltage range)	±2.5%

C-4.4 Test No. 4: Effect of Variation of Frequency

C-4.4.1 Purpose

The purpose of this test is to verify the accuracy stability of the metering device during high and low operating frequencies, relative to its accuracy at nominal frequency..

a) Connect the inverter according to the instructions and specifications provided by the manufacturer. Include Reference Meter between the UUT AC output and the AC power source.

b) Set all source parameters to the nominal operating conditions for the inverter (e.g. input DC voltage and current is set to the inverter's nominal specified values).

c) Set (or verify) all inverter parameters to the nominal operating settings. If the overfrequency or underfrequency settings are adjustable, set the inverter to the minimum overfrequency and underfrequency settings.

d) Record applicable settings.

e) Adjust the source frequency to the unit's nominal value.

f) Initiate a ramp up until the unit frequency is within 2x the manufacturers stated accuracy of its maximum operating frequency.

g) After allowing the inverter output power to stabilize, record energy (kWh) from both the inverter meter and the reference meter. This frequency level will be maintained for a sufficient duration to register energy readings from both the inverter meter and reference meter..

h) Initiate a ramp down until the unit frequency is within +/- 0.1Hz of its nominal operating frequency (typically 60 Hz).

i) After allowing the inverter output power to stabilize, record energy (kWh) from both the inverter meter and the reference meter. This frequency level will be maintained for a sufficient duration to register energy readings from both the inverter meter and reference meter.

j) Initiate a ramp down until the unit frequency is within 2x the manufacturers stated accuracy of its minimum operating frequency.

k) After allowing the inverter output power to stabilize, record energy (kWh) from both the inverter meter and the reference meter. This frequency level will be maintained for a

sufficient duration to register energy readings from both the inverter meter and reference meter.

l) Initiate a ramp up until the unit frequency is within 2x the manufacturers stated accuracy of its maximum operating frequency.

m) Repeat steps f) through k) four times, always starting at the high end of, and cycling down to the low end of the manufacturers operating frequency range. A total of five readings will be taken at each of the high, mid and low ends of the range.

C-4.4.2 Reporting of Data

For each of the three frequency levels, calculate and report:

- Inverter meter output energy (average of five sampled values)
- Reference meter energy (average of five sampled values)
- Meter accuracy levels (average of five sampled values)

Determine meter accuracy levels per Equation C-4-2.

C-4.4.3 Pass/Fail Criteria

Accuracies at the high and low frequency settings must be within ±2.5% of the accuracy at the nominal frequency setting. These criteria are further explained in Table C-4-3.

Table C-4-3: Effect of Variation of Frequency

Frequency Level	Permissible Deviation in Energy Reading From Nominal Frequency Level
Nominal (within 0.1Hz)	Reference
High (within 2x manufacturers stated accuracy)	±2.5%
Low (within 2x manufacturers stated accuracy)	±2.5%

C-4.5 Test No. 5: Effect of Internal Heating

The purpose of the test is to determine any effects of internal heating on inverter meter accuracy.

a) Adjust the test environment air temperature to 23°C ± 5°C. Allow UUT to stabilize at the set temperature.

b) Connect the UUT according to the instructions and specifications provided by the manufacturer to the selected input and output power sources.

c) Set all input source parameters to the nominal operating conditions for the UUT.

d) Set (or verify) all UUT parameters to the nominal operating settings.

e) Set the UUT (including the input source as necessary) to provide 100% ± 3% of its rated output power.

f) Record all applicable settings.

g) Stage 1: Allow UUT to run at 100% ± 3% rated power for 30 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 100% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 100% ± 3%.

h) Stage 2: Allow UUT to continue to run at 100% ± 3% rated power for another 30 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 100% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 100% ± 3%.

i) Shut down input source per manufacturers recommended procedures for a duration of two hours. UUT will power down and input power source will remain powered.

j) Set the UUT (including the input source as necessary) to provide 20% ± 3% of its rated output power.

k) Record all applicable settings.

l) Stage 3: Allow UUT to run at 20% ± 3% rated power for 30 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 20% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 20% ± 3%.

m) Set the UUT (including the input source as necessary) to provide 100% ± 3% of its rated output power.

n) Record all applicable settings.

o) Stage 4: Allow UUT to run at 100% ± 3% rated power for 30 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 100% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 100% ± 3%.

C-4.5.1 Reporting of Data

For each stage of the test, calculate and report:

- Inverter meter energy (kWh) output
- Reference meter energy (kWh) output
- Meter accuracy levels

Determine meter accuracy levels per Equation C-4-2.

C-4.5.2 Pass/Fail Criteria

The UUT passes this test if meter accuracy levels are within the following ranges for each test stage:

- Stage 1: ± 2.5%
- Stage 2: ± 3.75%
- Stage 3: ± 2.5%
- Stage 4: ± 2.5%

C-4.6 Test No. 6: Stability of Performance

The inverter shall be operated continuously. The output shall begin at 10% ± 3% and ramp up in 10% ± 3% increments until 100% ± 3% is achieved. The duration of each operation interval shall be at least 24 hours. The change in percentage of performance at the beginning and end of each power level shall not vary by more than 2.5%.

It is permissible for manufacturers to perform a self-certification to this test requirement.

a) Adjust the test environment air temperature to 23°C ± 5°C.

b) Connect the UUT according to the instructions and specifications provided by the manufacturer to the selected input and output power sources.

c) Set all input source parameters to the nominal operating conditions for the UUT.

d) Set (or verify) all UUT parameters to the nominal operating settings.

e) Set the UUT (including the input source as necessary) to provide 10% ± 3% of its rated output power.

f) Record all applicable settings.

g) Run UUT at this setting for a minimum of 24 hours while recording energy (kWh) from the UUT integral meter and the reference meter. Record energy production at the beginning and end of the interval for a sufficient duration to register energy readings from both the inverter meter and reference meter.

h) Repeat steps e) through g) in steps of 10% of its rated power. Maintain an output tolerance of ± 3% at each interval (e.g. 20% ± 3%, 30% ± 3%, etc). In other words, the tolerance is *not* cumulative (e.g. 20% ± 6%, 30% ± 9%, etc).

i) Entire test shall not exceed two weeks.

C-4.6.1 Reporting of Data

For each step of the test, calculate and report:

- Inverter meter output energy (kWh) at beginning and end of each power level
- Reference meter energy (kWh) at beginning and end of each power level
- Meter accuracy levels at beginning and end of each power level

Determine meter accuracy levels per Equation C-4-2. Tabulate the meter accuracy at the beginning and end of each 10% step of inverter output.

C-4.6.2 Pass/Fail Criteria

The unit passes the test if inverter meter accuracy does not vary by more than 2.5% between the beginning and end of each 10% step of inverter output.

C-4.7 Test No. 7: Independence of Elements

The purpose of this test is to ensure the inverter meter is not registering energy output when an output phase is non-functional. This test only applies to multi-phase units (an inverter which exports power on more than two conductors). This test can be performed in conjunction with Test No. 1: No Load.

a) Adjust the test environment air temperature to 23°C ± 5°C.

b) Connect the UUT according to the instructions and specifications provided by the manufacturer to the selected output power source.

c) Set (or verify) all UUT parameters to the nominal operating settings. Temporary adjustment of UUT grid re-connections timer(s) is allowable for the duration of this test.

d) Set output power source to the UUT's rated voltage +/- 2%.

e) Set input power source to the UUT's nominal operating input voltage +/- 2%.

f) Ensure the UUT is on, with the metering circuitry active, but not producing any AC energy.

g) Record all applicable settings.

h) Disconnect one phase from the output circuit. The manufacturer can select any one phase.

i) Measure and record inverter and reference meter energy (kWh) output for a duration of 15 minutes.

C-4.7.1 Reporting of Data

For the test, calculate and report:

- Inverter and reference meter energy output. The reference meter is used to ensure no actual AC output energy has been produced.

C-4.7.2 Pass/Fail Criteria

The unit passes if the inverter meter reads 0-1% of inverter's rated energy consumption for the 15 minute duration.

C-4.8 Test No. 8: Insulation

This test is performed in conjunction with UL1741, Section 44, "Dielectric Voltage-Withstand Test" (also known as the Hypot test).

The purpose of this test is to ensure the inverter meter is still functional after the application of AC rms test potentials as defined in the UL1741 Hypot test.

Perform an Accuracy Performance Check (C-3.7) in conjunction with the UL1741 Hypot test. Ensure the pre and post measurements are recorded with the UUT at operational temperatures as specified in UL1741, Section 44.

C-4.9 Test No. 9: Voltage Interruptions

This testing is performed in two parts.

C-4.9.1 Test No. 9a: Voltage Interruptions from Short Circuits

This test is performed in conjunction with UL1741, Section 47.3, “Short-circuit test”

The purpose of this test is to ensure the inverter meter is still functional after short-circuits on both the AC and DC side of the UUT.

Perform an Accuracy Performance Check (C-3.7) in conjunction with the UL1741 Short-circuit test.

C-4.9.2 Test No. 9b: Voltage Interruptions from Loss of Control Circuit

This test is performed in conjunction with UL1741, Section 47.8, “Loss of control circuit”

The purpose of this test is to ensure the inverter meter is still functional after a control circuit loss.

Perform an Accuracy Performance Check (C-3.7) in conjunction with the UL1741 Loss of control circuit test.

C-4.10 Test No. 10: Effect of High Voltage Line Surges

This test is performed in conjunction with IEEE 1547.1, Paragraph 5.5.2, “Surge withstand performance test”.

The purpose of this test is to ensure the inverter meter is still functional after a high voltage surge.

Perform an Accuracy Performance Check (C-3.7) in conjunction with the UL1741 Loss of control circuit test.

C-4.11 Test No. 11: Effect of Variation of Ambient Temperature

The purpose of the test is to determine any effects of ambient temperature on inverter meter accuracy.

a) Obtain maximum and minimum ambient operating temperatures from manufacturer’s specifications.

b) Adjust the test environment air temperature for the reference case to 23°C ± 5°C.

c) Connect the UUT according to the instructions and specifications provided by the manufacturer to the selected output power sources. Input sources are not energized for this test. Include output reference meter in set-up.

d) Set all output source parameters to the nominal operating conditions for the UUT.

e) Set (or verify) all UUT parameters to the nominal operating settings.

f) Record all applicable settings.

g) Allow UUT to stand for not less than two hours to obtain an equilibrium temperature.

h) Connect the UUT according to the instructions and specifications provided by the manufacturer to the selected input power sources.

i) Set all input source parameters to the nominal operating conditions for the UUT.

j) Set (or verify) all UUT parameters to the nominal operating settings.

k) Set the UUT (including the input source as necessary) to provide 20% ± 3% of its rated output power.

l) Record all applicable settings.

m) Stage 1: Allow UUT to run at 20% ± 3% rated power for 60 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 20% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 20% ± 3%.

n) Set the UUT (including the input source as necessary) to provide 50% ± 3% of its rated output power.

o) Record all applicable settings.

p) Stage 2: Allow UUT to run at 50% ± 3% rated power for 60 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 50% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 50% ± 3%.

q) Shut down input source per manufacturers recommended procedure. UUT will power down and output power source will remain powered.

r) Adjust the test environment air temperature within 5°C, but not exceeding the manufacturers' high ambient temperature specification.

s) Record all applicable settings.

t) Allow UUT to stand for not less than two hours to obtain an equilibrium temperature.

u) Set the UUT (including the input source as necessary) to provide 20% ± 3% of its rated output power.

v) Record all applicable settings.

w) Stage 3: Allow UUT to run at 20% ± 3% rated power for 60 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 20% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 20% ± 3%.

x) Set the UUT (including the input source as necessary) to provide 50% ± 3% of its rated output power.

y) Record all applicable settings.

z) Stage 4: Allow UUT to run at 50% ± 3% rated power for 60 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 50% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 50% ± 3%.

aa) Shut down input source per manufacturers recommended procedures. UUT will power down and output power source will remain powered.

bb) Adjust the test environment air temperature within 5°C, but not below the manufacturers' low ambient temperature specification.

cc) Record all applicable settings.

dd) Allow UUT to stand for not less than two hours to obtain an equilibrium temperature.

ee) Set the UUT (including the input source as necessary) to provide 20% ± 3% of its rated output power.

ff) Record all applicable settings.

gg) Stage 5: Allow UUT to run at 20% ± 3% rated power for 60 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 20% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 20% ± 3%.

hh) Set the UUT (including the input source as necessary) to provide 50% ± 3% of its rated output power.

ii) Record all applicable settings.

jj) Stage 6: Allow UUT to run at 50% ± 3% rated power for 60 minutes while recording energy (kWh) from the UUT integral meter and the reference meter. Ensure power level from reference meter remains at 50% ± 3% rated power for the duration of the test. Should there be any drift, adjust input source parameters as necessary to keep the UUT operation at 50% ± 3%.

kk) Shut down input and output power sources per manufacturers recommended procedures.

C-4.11.1 Reporting of Data

For each stage of the test, calculate and report:

- Inverter meter output energy (kWh)
- Reference meter energy (kWh)
- Meter accuracy levels

Determine meter accuracy levels per Equation C-4-2 and record in format shown in Table C-4-4.

Table C-4-4: Effect of Variation of Ambient Temperature

Stage	Loading	Ambient Temperature (°C)	Meter Accuracy (%)	Deviation from Stage 1 or 2 (%)
1	20% Power			Reference for

				Stage 3 & 5
2	50% Power			Reference for Stage 4 & 6
3	20% Power			
4	50% Power			
5	20% Power			
6	50% Power			

C-4.11.2 Pass/Fail Criteria

The UUT passes this test if the conditions of Table C-4-5 are met.

Table C-4-5: Effect of Variation of Ambient Temperature Pass/Fail Criteria

Stage	Loading	Ambient Temperature (°C)	Deviation from Stage 1 or 2 (%)
1	20% Power	23 ± 5	Reference for Stage 3 & 5
2	50% Power	23 ± 5	Reference for Stage 4 & 6
3	20% Power	Within 5° of manufacturer max specified temperature	± 2.5
4	50% Power	Within 5° of manufacturer max specified temperature	± 2.5
5	20% Power	Within 5° of manufacturer min specified temperature	± 5
6	50% Power	Within 5° of manufacturer min specified temperature	± 5

C-4.12 Test No. 12: Electrical Fast Transient/Burst

The purpose of this test is to ensure the inverter meter is still functional after exposure to electrical fast/transient bursts.

Perform electrical fast transient burst testing per IEEE C37.90.1.

Perform an Accuracy Performance Check as specified in this document (C-3.7).

C-4.13 Test No. 13: Effect of Electrical Oscillatory Surge Withstand Capabilities (SWC) test

The purpose of this test is to ensure the inverter meter is still functional after exposure to electrical oscillatory surges.

Perform oscillatory SWC testing per IEEE C37.90.1.

Perform an Accuracy Performance Check as specified in this document (C-3.7).

C-4.14 Test No. 14: Effect of Radio Frequency Interference

This test is not required if the unit has been certified to FCC Part 15 compliance.

The purpose of this test is to ensure UUT meter functionality after exposure to the Radio Frequency Interference (RFI) environment specified in ANSI C12.1-2008.

Perform test exactly as specified in ANSI C12.1-2008, paragraphs 4.7.3.12 and 4.7.3.12.1, except perform Accuracy Performance Check as specified in this document (C-3.7).

C-4.15 Test No. 15: Radio Frequency Conducted and Radiated Emission

This test is not required if the unit has been certified to FCC Part 15 compliance.

The purpose of this test is to ensure UUT meter functionality after exposure to radio frequency conducted and radiated emissions as specified in the Code of Federal Regulations (CFR) 47, Part 15 – Radio Frequency Devices, Subparts A – General and B – Unintentional Radiators issued by the Federal Communications Commission (FCC) for Class “B” digital devices.

Perform test exactly as specified in ANSI C12.1-2008, paragraph 4.7.3.13, except perform Accuracy Performance Check as specified in this document (C-3.7).

C-4.16 Test No. 16: Effect of Electrostatic Discharge (ESD)

The purpose of this test is to ensure the inverter meter is still functional after exposure to ESD.

Perform the ESD test as specified in ANSI C12.1, section 4.7.3.14, “Test No. 28: Effect of electrostatic discharge (ESD).

Perform an Accuracy Performance Check as specified in this document (C-3.7).

C-4.17 Test No. 17: Effect of Operating Temperature

The purpose of the test is to determine any effects of storage temperature on inverter meter accuracy.

Perform test per IEEE 1547.1, paragraph 5.1.2.2, “Storage temperature test procedure”.

Perform an Accuracy Performance Check as specified in this document (C-3.7).

C-4.18 Test No. 18: Effect of Relative Humidity

The purpose of this test is to ensure UUT meter functionality after exposure to the Relative Humidity test environment specified in UL991.

Perform a Relative Humidity test in accordance with the methods described in the Standard for Test for Safety-Related Controls Employing Solid-State Devices, UL991. The exposure class to be used is H5.

Perform an Accuracy Performance Check as specified in this document (C-3.7).

APPENDIX C-A

Table C-A-1: Inverter Meter Test Summary

Test No.	Title	Purpose of Test	Pass/Fail Criteria	ANSI C12.1 Equivalent Test No.	Series (Y/N)	Type or Production Test (T/P)
1	No Load	Ensure meter is not registering energy output when no load is on the DC input	0 ± 1% of UUT rated output	1	N	P,T
2	Load Performance	Ensure meter accuracy across the insolation spectrum quantified in the Sandia weighted efficiency test procedure (DC inputs of 10, 20, 30, 50, 75 & 100% of unit rating)	± 5% weighted accuracy across spectrum	3	N	T
3	Effect of Variation of Voltage	Verify meter accuracy during high, low and medium AC operating voltages	High and low within ± 2.5% of nominal	5	N	T
4	Effect of Variation of Frequency	Verify meter accuracy during high, low and medium operating frequencies	High and low within ± 2.5% of nominal	6	N	T
5	Effect of Internal Heating	Determine any effects of internal heating on meter accuracy	± 2.5% @ 20% & 100% output power for 30 minutes; ± 3.75% @ 100% output power for 60 minutes	11	N	T
6	Stability of Performance	Ensure meter accuracy between successive output power levels (10, 20, 30, 40, 50, 60, 70, 80, 90, 100%)	± 2.5% between beginning and end of each power level	13	N	T
7	Independence of Elements	Ensure meter is not registering energy output when one output phase is non-functional	0 ± 1% of UUT rated output	14	N	T
8	Insulation	Ensure meter accuracy after UL1741 Hypot test	± 2.5% at both 20 and 100% power levels	15	Y	T

Test No.	Title	Purpose of Test	Pass/Fail Criteria	ANSI C12.1 Equivalent Test No.	Series (Y/N)	Type or Production Test (T/P)
9a	Voltage Interruptions from Short Circuits	Ensure meter accuracy after UL1741 Short-circuit test	± 2.5% at both 20 and 100% power levels	16	Y	T
9b	Voltage Interruptions from Loss of Control Circuit	Ensure meter accuracy after UL1741 Loss of control circuit test	± 2.5% at both 20 and 100% power levels	16	Y	T
10	Effect of High Voltage Line Surges	Ensure meter accuracy after IEEE 1547.1 Surge withstand performance test	± 2.5% at both 20 and 100% power levels	17	Y	T
11	Effect of Variation of Ambient Temperature	Determine effects of ambient temperature on meter accuracy	± 2.5% @ max temp; ± 5% @ min temp	19	N	T
12	Electrical Fast/Transient Burst	Determine protection of metering device from IEC 61000-4-4 Fast Transient Surge Test	± 2.5% @ 20 and 100% rated power output between pre and post test	25	Y	T
13	Effect of electrical oscillatory Surge Withstand Capabilities (SWC) test	Determine protection of metering device from IEEE 37.90.1 Electrical Oscillatory Surge Withstand Capabilities (SWC) test	± 2.5% @ 20 and 100% rated power output between pre and post test	25a	Y	T
14	Effect of Radio Frequency Interference	Determine protection of metering device from ANSI C12.1-2008 Radio Frequency Interference (RFI) environment test	± 2.5% @ 20 and 100% rated power output between pre and post test	26	N	T

Test No.	Title	Purpose of Test	Pass/Fail Criteria	ANSI C12.1 Equivalent Test No.	Series (Y/N)	Type or Production Test (T/P)
15	Radio Frequency Conducted and Radiated Emission	Determine protection of metering device from CFR 47, Part 15 – Radio Frequency Devices, Subparts A & B	± 2.5% @ 20 and 100% rated power output between pre and post test	27	N	T
16	Effect of Electrostatic Discharge (ESD)	Determine protection of metering device from electrostatic discharge (ESD)	± 2.5% @ 20 and 100% rated power output between pre and post test	28	Y	T
17	Effect of Operating Temperature	Determine effects of operating temperature on meter accuracy	± 2.5% @ 20 and 100% rated power output between pre and post test	30	Y	T
18	Effect of Relative Humidity	Ensure meter accuracy after exposure to relative humidity environment of UL991 class H5	± 2.5% @ 20 and 100% rated power output between pre and post test	31	Y	T

APPENDIX C-B

Table C-B-1: Equations Summary

Equation ID	Standard Section ID	Equation
Equation D-3-1 Percent Registration	C-3.7 Accuracy Performance Check Procedure	Percent Registration = 100 x (Ref Meter Energy – Inverter Meter Energy)/Ref Meter Energy
Equation D-4-1 Percent Accuracy	C-4.2 Test No. 2: Load Performance	% Accuracy = 100 x (Inverter Meter kWh – Reference Meter kWh) / Reference Meter kWh
Equation D-4-4 Weighted Accuracy	C-4.3 Test No. 2: Load Performance	$\eta_{Wtd} = 100 \times (0.04 \times \eta_{10} + 0.05 \times \eta_{20} + 0.12 \times \eta_{30} + 0.21 \times \eta_{50} + 0.53 \times \eta_{75} + 0.05 \times \eta_{100})$

Appendix D: Single-Family Affordable Solar Homes (SASH) PROGRAM HANDBOOK

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1. INTRODUCTION: CALIFORNIA SOLAR INITIATIVE – SASH PROGRAM

This section of the CSI SASH Program Handbook is intended to provide SASH-specific program information. The information provided in the SASH Program Handbook supersedes the specific information in the CSI Program Handbook as it relates to the general market program. If the SASH Program Handbook does not address a specific subject area, then the general market program's provisions and program requirements contained in the CSI Program Handbook apply.

1.1 Overview of SASH Program

The goal of the SASH Program is to provide low-income single-family homeowners with access to photovoltaic (PV) systems to decrease electricity usage and bills without increasing monthly household expenses. In addition to providing low-income homeowners with reduced electricity bills, the SASH Program will also benefit the communities it serves by leveraging local green-job training and workforce development programs to assist with installing the solar systems.

To decrease the expense burden for low-income homeowners, the SASH Program provides eligible homeowners with a higher incentive than the CSI general market program (see SASH Handbook Section 3.2 for incentives details).

1.2 Program Manager

The SASH Program Manager is GRID Alternatives. GRID Alternatives is the single state-wide Program Manager for the SASH Program in the three investor-owned utility (IOU) territories.

1.3 Program Budget

The SASH Program budget is $108.3 million.

1.4 Primary differences between SASH Program and CSI general market program

- Program Budget: see SASH Handbook Section 1.3
- The SASH Program has a permanent incentive structure and does not decrease with demand like the CSI general market program. See Section 3 of the SASH Handbook for incentive level details.
- The SASH Program only offers an Expected Performance Based Buydown (EPBB) incentive and not the Performance Based Incentive (PBI). Any CSI Handbook reference to PBI does not apply to the SASH Program.
- Application Process – see SASH Handbook Section 4.

- Program Participants: see SASH Handbook Section 2.1
- Non-PV systems are not allowed in the SASH Program. Any reference to non-PV systems throughout the CSI Handbook are excluded from the SASH Program.
- System Size - see SASH Handbook Section 2.2.1
- Energy Efficiency requirements – see SASH Handbook 2.3
- Self-installed systems are not allowed in the SASH Program. Any CSI Handbook reference to self-installed systems does not apply to the SASH Program.
- Performance and Permanency Requirements: see SASH Handbook Section 2.4
- Inspection Requirements – see SASH Handbook Section 2.6
- Incentive Structure – see SASH Handbook Section 3
- SASH Program database not currently available
- Application Process – see SASH Handbook Section 4
- Incentive Payment Process – see SASH Handbook Section 5
- Field Inspections – see SASH Handbook Section 2.6
- Application Forms and Documentation: see SASH Handbook Section 4.2.1

2. PROGRAM REQUIREMENTS

2.1 The Participants in the CSI SASH Program

Within the nomenclature of the SASH Program, the person who applies for an incentive will be referred to as a Host Customer, a System Owner, and/or Applicant. GRID Alternatives is the SASH Program Manager and will be responsible for client outreach and system installation.

2.1.1 Host Customer / Applicant

The Host Customer is also the Applicant that completes and submits the SASH Program application and serves as the main contact person for the Program Manager throughout the application process. The SASH Program Manager will work directly with the Host Customer to assist them in filling out the application and collect the required documentation. Third-party applications and submissions will not be accepted by the Program Manager.

The SASH Program incentive is only available to low-income homeowners and is not available to commercial or any other non-residential projects.

See Section 4 for eligibility requirements.

2.1.2 System Owner

In the SASH Program, the Host Customer is also the System Owner and owns the generating equipment. The SASH Program currently excludes all third-party ownership arrangements.

2.1.3 Licensed Solar Contractor / Installer

The SASH Program Manager will be responsible for the installation of systems funded through the SASH program. The SASH Program Manager will either install the systems under its C-10 or C-46 contractor license or hire a third party solar contractor through the SASH Program's Sub-Contractor Partnership Program (SPP) to do the installation.

All systems must be installed by appropriately licensed California contractors in accordance with rules and regulations adopted by the State of California Contractors State Licensing Board (CSLB). Installation contractors must have an active C-10, or a C-46 license for photovoltaic (PV) systems. All systems must be installed in conformance with the manufacturers' specifications and with all applicable electrical and building codes and standards. Unlike the CSI general market program, self-installations will not be permitted in the SASH Program.

The SASH Program Manager has issued the guidelines and application for the Sub-Contractor Partnership Program which can be found at www.gridalternatives.org/sash. All PV solar contractors throughout California are encouraged to apply. Contractors will not be allowed to perform SASH installations prior to their enrollment into the Sub-Contractor Partnership Program. SPP Applications will be accepted on a rolling-basis.

The SASH Program is uniquely designed to incorporate job training programs intended to promote green-collar jobs in low-income communities and to develop a trained workforce that will help foster a sustainable solar industry in California. The sub-contractor program incorporates this workforce development component.

2.2 Generator System Requirements

PV systems (i.e., systems that cause direct conversion of sunlight to electricity) are the only technologies eligible to receive incentives from the SASH Program. Non-PV technologies, including solar hot water systems, are <u>not</u> eligible for the SASH Program incentive.

2.2.1 System size

The system size eligible for SASH Program incentives will be optimized for electric bill impact. The system size will be capped at 5kW (CEC-AC). The minimum system size is 1kW CEC-AC.

2.3 Energy Efficiency Requirements

All Applicants must have an energy efficiency audit. Applicants must enroll into the Low-Income Energy Efficiency (LIEE) Program, if eligible, and have all feasible LIEE measure installed or be on the waiting list for installation prior to receiving a SASH incentive. The LIEE Program is administered by the utility companies under the name Energy Savings Assistance Program.

Applicants must include with their application an energy efficiency audit or notification from the LIEE Program Administrators that the LIEE measures have been implemented. The audit can be performed through LIEE, if applicant is eligible, or otherwise under the same requirements for audits in the CSI general market program. The Program Manager may also provide additional audit tools available for customers.

The Program Manager will ensure incentives are not paid until feasible LIEE measures are installed, the applicant is on a waiting list for LIEE installation, or an energy efficiency audit is completed.

2.4 Permanency Requirements

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

Physical permanence is to be demonstrated in accordance with industry practice for permanently installed equipment. Equipment must be secured to a permanent surface. Any indication of portability, including but not limited to temporary structures, quick disconnects, unsecured equipment, wheels, carrying handles, dolly, trailer, or platform, will deem the system ineligible. These requirements are in accordance with the CSI Program requirements and will automatically reference any changes to the CSI general market program's requirements.

2.5 Installation Standards

To qualify for SASH Program incentives, an installation must meet a minimum performance requirement, which is 85% of the Design Factor (DF) based on a modified Estimated Performance Based Buydown (EPBB) calculation. If the modified Design Factor is less than 85%, the system does not qualify for the SASH Program incentive. The Design Factor does not affect the rebate amount.

The modified EPBB Design Factor calculation for the SASH Program must be calculated <u>without</u> the geographic correction (i.e. the geographic correction will always be 100%). Since the current online EPBB calculator auto-fills the geographic correction based on the Site's zip code and may be less than 100%, the SASH Program's modified Design Factor may need to be re-calculated manually using the formula in Exhibit A.

2.6 Inspection Requirements

2.6.1 System Inspections

The SASH Program Manager will ensure that 1 in 12 SASH system installations are inspected for proper installation and operability by an independent third party. The sampling rate of 1 in12 is based on the current general market CSI sampling rate. If the sampling rate for the general market program is changed, the SASH Program will automatically adopt the new sampling rate. The field inspectors will be approved by the CPUC and the CPUC may directly contact the inspectors at any time. Incentives will be paid only after the system has passed this field inspection.

The system inspection will include but may not be limited to the verification of the following information:

- System size and nameplates of equipment used;
- Design considerations: tilt, azimuth, standoff height, shading analysis;
- 85% Design Factor, minimum requirement;
- Address and location of system;
- Operability; on-site inverter production reading

If the field inspector finds that an installed system does not comply with program and inspection guidelines no incentive payment will be made for that system until the system is modified to meet SASH Program guidelines or the incentive amount is recalculated.

It is highly recommended, but not required, that the applicant attend the inspection. However,

- IF THE APPLICANT IS NOT PRESENT FOR THE INSPECTION, THE INSPECTOR WILL NOT CONDUCT THE INSPECTION UNLESS PERMISSION WAS PREVIOUSLY OBTAINED IN WRITING OR VIA E-MAIL ALLOWING THE INSPECTOR TO CONDUCT THE INSPECTION WITHOUT THE APPLICANT PRESENT, AND;
- ACCESS TO ALL OF THE EQUIPMENT MUST BE PROVIDED OR THE INSPECTOR WILL NOT CONDUCT THE INSPECTION.

3. SASH PROGRAM INCENTIVE STRUCTURE

This section provides a general overview of the SASH Program Incentive structure. Installations will be provided a one-time payment under the Expected Performance Based Buydown (EPBB) structure to help reduce the cost of installation. The SASH Program only offers the EPBB incentive and does not offer the Performance Based Incentive (PBI).

The SASH Program has seven incentive payment levels based on the applicant's income compared to the area median income (AMI), tax liability, and CARE-eligibility. The incentive levels will remain constant throughout the life of the SASH Program and will not decrease with program demand like the CSI general market program incentive structure.

3.1 Fully Subsidized (Free) Systems

A maximum of twenty percent ($21,668,000) of the total SASH Program funds are for full-subsidies to qualifying households. The SASH Program provides a full-subsidy for 1 - 1.2 kW systems to owner-occupied households that qualify as "extremely low income" or "very low income" (i.e., up to 50% of area median income per the Health and Safety Code definitions referenced in P.U. Code 2852). This subsidy is capped at a maximum of $10,000 per qualifying household.

A household that qualifies for a full subsidy can either take the full subsidy for a 1–1.2 kW system or take a partial subsidy, as described below, for a larger system.

3.2 Partially Subsidized Systems

The partial-subsidy is available to customers whose total household income is below 80% of the area median income. The partial-subsidy is calculated on a sliding-scale that is based on the homeowner's tax liability and the customer's eligibility in the California Alternative Rates for Energy (CARE) program. If the Applicant qualifies for the CARE program but is not currently enrolled, the Program Manager will work with the Applicant to enroll them into CARE. The table below exhibits the sliding-scale incentive rates:

Table 1
SASH Program

Partial Subsidy Solar Incentives in $/Watt		
Federal Income Tax Liability	Qualifying Low-Income CARE-Eligible Homeowners	Qualifying Low-Income Homeowners not eligible for CARE
$0	$7.00	$5.75
$1 to $1000	$6.50	$5.25
$1001 +	$6.00	$4.75

4. APPLICATION PROCESS FOR SASH PROJECTS

4.1 Applicant

The Host Customer is also the Applicant that completes and submits the SASH Program application and serves as the main contact person for the Program Manager throughout the application process. The SASH Program Manager will work directly with the Applicant to assist them in filling out the application and collect the required documentation.

4.2 Applicant Eligibility and Application Process

The following section describes in detail the processes for applying for the SASH Program. The SASH Program Manager will be the sole entity that reviews and accepts/rejects applications.

4.2.1 Applicant Eligibility

To qualify for the SASH Program, the Applicant must meet the following minimum requirements:

A. Must be a customer of PG&E, SCE, or SDG&E.

The project's Site must be within the service territory of, and receive electric service from PG&E, SCE, or SDG&E.

B. The residence must be occupied by the homeowner/applicant.

C. The household's total income must be 80% of the area median income (AMI) or less based on the most recent available income tax return.

Area Median Income is subject to annual changes based upon Housing and Urban Development's income guidelines.

D. The residence must be California Public Utilities Code (P.U.) 2852-compliant, defined as one of the following:

1) An individual owner-occupied residence sold at an affordable housing cost to a lower income household that is subject to:
    a. a resale restriction, **or**;
    b. 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.

    The resale restriction or equity sharing agreement must be between the homeowner and a public entity or a qualifying nonprofit affordable housing provider.

2) An owner-occupied residence that is part of a multi-family complex and is financed with low-income housing tax credits, tax-exempt mortgage revenue bonds, general obligation bonds, or local, state, or federal loans or grants, and where the affordable units have been or will be initially sold at an affordable housing cost to a lower income household and those units are subject to a resale restriction or equity sharing agreement pursuant to the terms of the financing or financial assistance.

3) An owner-occupied residence that is part of a multi-family complex in which at least 20 percent of the total housing units have been or will be initially sold at an affordable cost to a lower income household and those units are subject to:
    a. a resale restriction, **or**;
    b. 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.

    The resale restriction or equity sharing agreement must be between the homeowner and a public entity or a qualifying nonprofit affordable housing provider.

4.2.2 Application and Reservation Process

Potential applicants can learn more about the SASH Program or to find the nearest regional office by visiting www.gridalternatives.org. Applicants may also leave an inquiry at the toll free message line (866)921-4696 or by e-mailing SASH@gridalternatives.org
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SASH Application process

1. After an initial pre-screening phone conversation, the Program Manager will set up a meeting with the Applicant to discuss the details of the SASH Program, review the application, and answer any questions from the Applicant.

2. The Program Manager will review all applications and ensure their completeness and confirm all required documentation has been provided.
    The following documents are required:

    i. Completed SASH Application
    ii. Copy of most recent available federal income tax return
    iii. Copy of most recent electricity bill
    iv. Proof that the residence is P.U. Code 2852 compliant.

3. The Program Manager will schedule an energy efficiency audit and enroll the applicant into the LIEE program, if eligible.

4. If the Applicant qualifies for the SASH program, a Construction site visit will be scheduled to determine if the Site is amenable to a solar installation. A printout of EPBB Tool Calculation (www.csi-epbb.com) is required to ensure the system design meets the 85% Design Factor requirement (see SASH Program Handbook Section 2.5).

5. Upon completion of the system design, the Applicant will receive notification from the Program Manager confirming the incentive reservation and the maximum incentive amount.

All reservations must be made prior to December 31, 2015. The Applicant is encouraged to have the installation completed within eighteen months of the reservation date. If the installation is not completed within eighteen months of the reservation, the customer may submit a written request for a one-time extension by another six months. All installations must be completed by September 30, 2016, to receive the SASH Program incentive payment. Approval of a request for a change in Reservation Expiration Date will not change or modify any other reservation condition.

Incentive funds are not reserved until the SASH Program Manager receives all information and documentation required for the Reservation and the project is approved.

5. INCENTIVE PAYMENT PROCESS

SASH Program incentive payments are issued by the investor-owned utilities (IOUs) and not by the Program Manager. The three IOUs are PG&E, SCE, and SDG&E. Funding may be reserved for Applicants who have committed to purchase and install an eligible solar energy system at a given Site. A funding reservation provides the purchaser assurance that the reserved funds will be available when the payment claim is made.

5.1 Incentive Payments

The SASH Program Manager is the only entity authorized to initiate SASH Program incentive payments from the IOUs. The SASH Program Manager will track the status of each project and will submit the Applicant's incentive claim to the appropriate IOU only after the solar system is purchased, installed, interconnected, and inspected. Since the Program Manager tracks the status of each project and the incentive payment request is automatically generated upon completion or receipt of all required documentation, the Applicant is not required to submit a formal incentive payment request.

Incentive payments cannot exceed actual equipment and installation costs. The Program Manager will ensure that total incentives do not exceed out-of-pocket expenses for the Applicant. The Program Manager reserves the right to withhold final incentive payment pending review and approval of project cost and receipt of supporting documentation.

The Program Manager will require the completion of all project milestones including the application process, energy efficiency audit, PV-system installation, field inspection, and interconnection. Once completion of these project milestones is confirmed, the SASH Program Manager will issue an incentive payment request to the appropriate IOU.

The Applicant or designated payee will receive the incentive payment directly from the IOU. The lump sum EPBB incentive payment issued constitutes final and complete payment.

5.2 Assignment of Incentive Payment to Third Party

The Host Customer is automatically the designated payee of the incentive payment. The Host Customer may assign his or her right to receive the payment to a third party by completing a Payment Assignment Form and submitting it to the SASH Program Manager prior to the payment of the incentive. The Payment Assignment Form may not be submitted by fax or e-mail as original signatures are required to process the assignment.

Payment will be made to the Host Customer or a third party (as designated), as indicated on the Payment Assignment Form, and will be mailed to the address provided. A payment assignment form can be requested from the SASH Program Manager.

Note that the ownership of the generation system remains with the Host Customer even with the assignment of the incentive payment to a third-party. The SASH Program currently excludes all third-party ownership arrangements. It is the intent of the program requirement that all future benefits from the generation equipment remain with the Host Customer.

5.3 Existing PV Systems

The SASH Program incentive is only available for qualifying PV systems installed after the initial SASH Handbook submission date. Under no circumstances will a SASH incentive payment be made to systems installed before this date or under another CSI incentive program, even if the customer may have qualified for the SASH Program incentive.

The CSI general market program, the MASH Program, and the SASH Program are mutually exclusive CSI Programs and incentive payments can be collected from only one CSI Program per installed system.

Exhibit A
EPBB – Manual Design Factor Calculation

The SASH Program requires a minimum Design Factor of 85%. The Design Factor calculation for the SASH Program must be calculated <u>without</u> the geographic correction. The calculation requires multiplying:

1) the actual Design Correction [Dcorr]percentage (as calculated by the EPBB calculator)
2) a Geographic Correction [Gcorr] of 100% (may be different from EPBB calculator value)
3) the actual Installation Correction [Icorr] percentage (as calculated by the EPBB calculator)

<u>Example:</u> The following example illustrates how to manually calculate the SASH Program Design Factor using data from the EPBB Calculator's results page (see Image 1). Also, note that the incentive rate calculated by the EPBB Calculator does not apply to the SASH Program (see Section 3 for SASH Program incentives).

Manual Calculation for SASH-approved Design Factor (see Image 1 below):
0.97046 (actual Dcorr) x 1.00 (modified Gcorr) x 0.98840 (actual Icorr) = <u>95.92%.</u>
Since the Design Factor is over 85%, this system would be eligible for the SASH Program incentive.

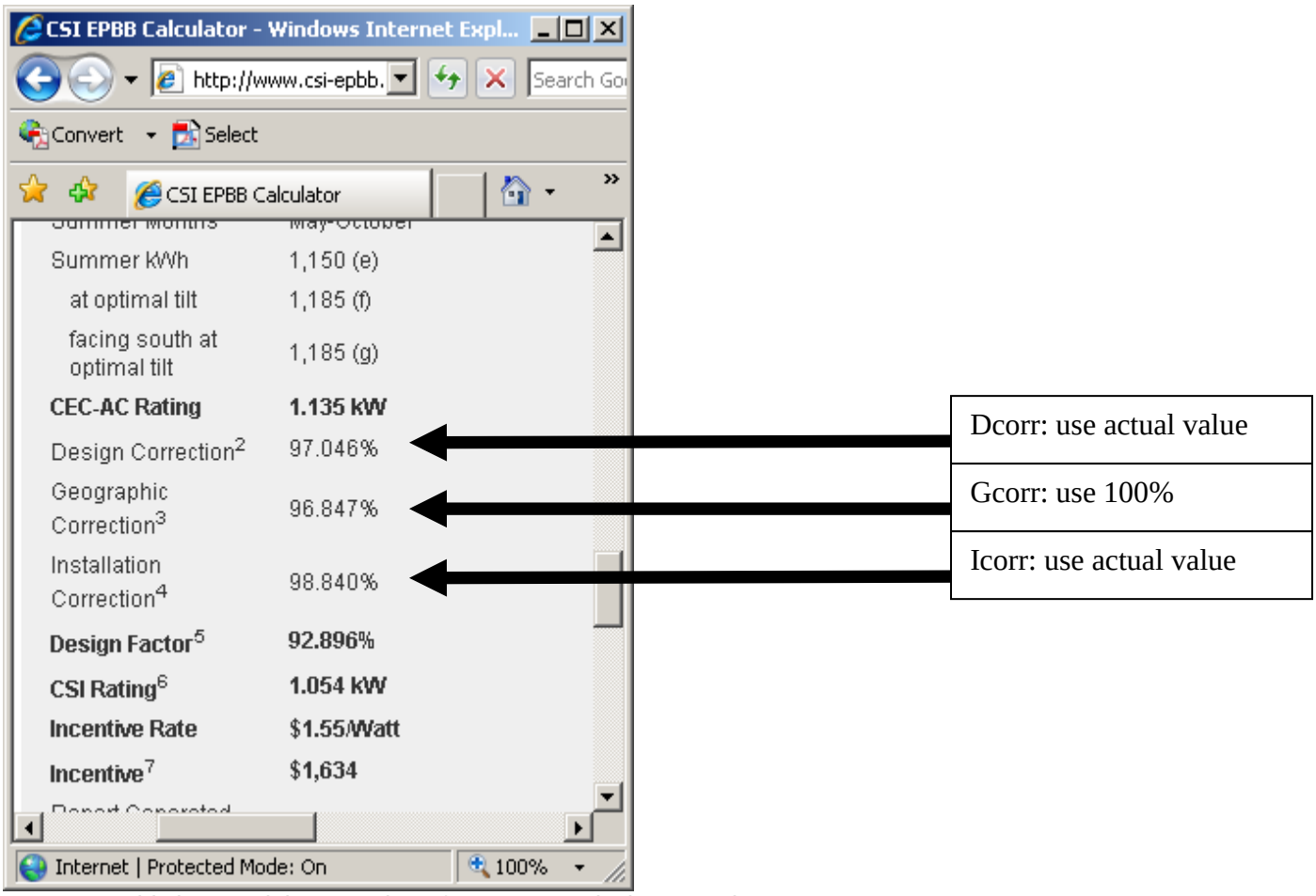

**IMAGE 1: this is a partial screenshot of an EPBB Calculator results page.*