



California Public Utilities Commission



California Solar Initiative Annual Program Assessment



June 2009

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California Solar Initiative
Annual Program Assessment
June 30, 2009

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1. Executive Summary

Introduction

In January 2007, the State of California launched an unprecedented \$3.3 billion ratepayer-funded effort that aims to install 3,000 megawatts (MW) of new solar over the next decade and to transform the market for solar energy by reducing the cost of solar. The California Public Utilities Commission (CPUC) portion of the solar effort is known as the California Solar Initiative (CSI) Program. The CSI portion, the country's largest solar program, has a \$2.2 billion budget and a goal of 1,940 MW of solar capacity by the end of 2016.

CPUC staff prepared this first Annual Program Assessment to meet a statutory requirement for an annual report to the Legislature on the success of the CSI Program.¹ This report focuses exclusively on the CSI Program, not on the California Energy Commission new homes program or publicly-owned utilities' solar offerings. This report highlights key accomplishments to date for each CSI Program component, and reports on the progress of the CSI Program Evaluation.

The California solar market has grown at a rapid pace since the beginning of the CSI Program. The annual rate of new solar installations and the cumulative installed capacity both provide evidence that California is well along the path of achieving the installed capacity goals set forth by Senate Bill (SB) 1 in 2006, the legislation that authorized the CSI Program.

Since 2007, the CPUC has launched all five program components indicated in Table 1.

Table 1. Status of CSI Program Components

CSI Program Components	Program Underway?
General Market Solar Program	☑
Single-Family Affordable Solar Homes (SASH)	☑
Multifamily Affordable Solar Housing (MASH)	☑
Research, Development, Demonstration, and Deployment (RD&D)	☑
Solar Water Heating Pilot Program (SWHPP)	☑

¹ PU Code 2851 (c)(3) states, "On or before June 30, 2009, and by June 30th of every year thereafter, the commission shall submit to the Legislature an assessment of the success of the California Solar Initiative program." The statute continues to list specific items to be included in the assessment, and that listing is included with report cross references as Appendix C.

Key Highlights

Key highlights of the report include:

- California has over half a gigawatt of solar connected to the electric grid at customer sites. With recent rapid growth, California now has over 515 megawatts (MW) of cumulative installed solar photovoltaic (PV) capacity at nearly 50,000 sites,² including 226 MW installed under the CSI Program.³ The non-CSI Program solar PV capacity was installed primarily under prior solar programs, including the Self-Generation Incentive Program (SGIP) and the Emerging Renewables Program (ERP).
- The annual rate for new installed solar capacity in California nearly doubled in 2008 over 2007 (from 81 MW per year to 156 MW per year), a marked increase from the 30-40 percent annual growth rate of prior years.
- Despite the challenging economic situation, installation data to date this year suggests that the CSI Program could install at least the same amount of MW in 2009 as 2008, since 78 MW are already installed through May 2009.
- Outside of the CSI Program, the market for solar energy also appears to be growing. The CPUC has approved numerous small and large contracts for solar PV and concentrating solar thermal power plants, which when installed, are expected to serve wholesale electrical load and help meet the requirements of the Renewables Portfolio Standard (RPS) requirements.
 - The CPUC recently approved a Southern California Edison (SCE) 500 MW solar PV application for installation of wholesale solar PV projects on existing rooftops.⁴
 - The CPUC has other approved and pending solar PV and solar thermal procurement contracts expected to serve the RPS requirements.⁵

CSI Program Demand Is At Record Levels

The CSI Program has over 22,000 solar applications, including both pending and installed systems that will account for an estimated 373 MW of new solar capacity. (See Section 3.1.3):

- The program continues to see strong demand, with May 2009 the highest month on record for new solar applications.
- The volume of applications is overwhelmingly residential, but the capacity (MW) represented by applications is primarily from non-residential customers (including commercial, government, and non-profits).

² All data in this assessment are for grid-tied solar PV (i.e. interconnected to the utility grid). All solar in this report is customer-side of the meter self-generation designed to serve onsite load. No information on wholesale solar power plants is included in this data. All references to capacity are reported in “CEC-AC” units, which is the industry standard for net electricity output in megawatts (MW) based on the California Energy Commission’s Alternating Current rating of solar panels. The “CEC-AC” rating tends to be slightly less than the nameplate capacity.

³ The CSI Program’s estimate of 226 MW of new installed capacity comes from data through May 27, 2009, as noted in Section 3.1.3. In an effort to build market transparency and ensure stakeholder real time access to program information, the CSI Program refreshes application demand and installation data every Wednesday via an online data portal at www.CaliforniaSolarStatistics.ca.gov.

⁴ See CPUC Press Release, June 18, 2009, http://docs.cpuc.ca.gov/WORD_PDF/NEWS_RELEASE/102580.PDF.

⁵ See CPUC RPS website for a list of all RPS projects. <http://www.cpuc.ca.gov/PUC/energy/Renewables/>.

The CSI Program Is Making Steady Progress Towards Goals

This report contains information, including preliminary evaluation report findings, on CSI Program participation, installed capacity, program costs, and program impacts.

- **Capacity Installed.** The CSI Program has installed 226 MW of new capacity, which is 13 percent of its program capacity goal. The CSI Program has another 147 MW, or 8 percent of program goal, pending installation. PG&E's residential and non-residential markets are the farthest along in terms of their proportional goals. (See Section 3.1.3).
- **Costs Declining.** The CSI Program data shows a slight decline in the average cost of solar PV systems, continuing a trend that also appears in SGIP data. (See Section 3.1.3.3) In 2008, CSI system costs were slightly lower than in 2007:
 - o Average systems were \$9.41/Watt for residential and small commercial systems, down from \$9.84/Watt.
 - o Average systems were \$8.14/Watt for large commercial systems, down from \$8.41/Watt.
- **Analyzing System Performance.** During the peak hour in 2008, CSI installed solar systems had a "peak-hour capacity factor" of 0.75, meaning that 75% of all installed solar capacity was performing at the peak hour. There is system performance data for an initial subset of installed systems, but more extensive data is forthcoming to more fully assess the performance of installed systems. (See Section 4.1)
- **Growing a Self-Sustaining Industry.** In an effort to reach the goal of creating a self-sustaining solar industry, the CSI Program offers trainings for solar professionals. As of June 2009, over 5,800 members of the solar industry have attended these CSI trainings. The Program Administrators (PG&E, SCE, and the California Center for Sustainable Energy) have an important role to play in facilitating the solar market. The Program Administrators have made considerable progress decreasing application processing time since the start of the program.⁶ (See Section 3.1.3.10)
- **Incentives Declining.** The CSI Program offers financial incentives that reward higher performing systems and decline as program demand grows.
 - o The CSI Program has authorized \$544 million in incentives for installed projects. These installed projects have a total system cost of over \$1.967 billion. (See Section 3.1.4.1)
 - o The CSI incentives decline based on program demand. Between 2007 (year 1) and 2008 (year 2), the rate of incentive decline varied by incentive type and by large IOU territory, but the decline ranged between 9 percent and 22 percent. The average rate of decline for EPBB projects was 15 percent, and the average rate of decline for PBI projects was 19 percent. (See Section 3.1.1.3)
 - o The solar market appears to be continuing to apply for CSI incentives (new demand) and to install new capacity despite the decline in incentives. (See Section 3.1.1.3)
- **Ongoing Program Evaluation.** The CSI Program Evaluation Plan is underway, and it will continue to assess, over the lifetime of the program, the CSI Program's progress towards reaching its goals. The preliminary impacts report, as well as other evaluation reports (including cost-effectiveness evaluations), are expected later in 2009 and 2010. The CPUC's pending framework for assessing the cost-effectiveness of distributed generation (DG) is

⁶ See the California Solar Initiative, April 2009 Staff Progress Report, Data Annex, for most recent figures for application processing times. The Data Annex is released quarterly and will be updated again in July 2009.

described. (See Section 3.1.3 and Section 4)

All Other CSI Program Components Launched

In addition to the CSI general market solar program, all other CSI Program Components listed in Table 1 have been launched.

- **Single-family Affordable Solar Homes (SASH).** The SASH Program design was adopted by the CPUC in November 2007, and it launched in December 2008 after a competitive selection of a non-profit program administrator. The SASH program rules were incorporated into the CSI Program Handbook in May 2009. The program already has 15 applications and is expecting more now that the program rules have been finalized and are better known. (See Section 3.2)
- **Multi-family Affordable Solar Housing (MASH).** The MASH Program design was adopted by the CPUC in October 2008, and began accepting applications in February 2009. It had 23 applications as of May 2009. In creating this program, the CPUC also authorized “Virtual Net Metering (VNM)” on a pilot basis. VNM allows MASH program participants to install a single solar system to cover the electricity load of both common and tenant areas in a low income multifamily residence, with the participating utility allocating solar credits to the utility bills of both building and tenant accounts. (See Section 3.3)
- **Solar Water Heating Pilot Program (SWHPP).** This pilot program began in July 2007, and has had 211 applications for solar hot water systems in the San Diego region. The CPUC has been reviewing the results of the pilot program to inform the possible creation of a \$250 million statewide SWH subsidy program for natural gas-displacing SWH systems. (See Section 3.4)
- **Research, Development, Demonstration and Deployment (RD&D) Program.** This program design was adopted by the CPUC in September 2007. After a competitive solicitation for a RD&D Program Administrator, the selected Program Manager released the first grant solicitation for PV grid integration in June 2009. (See Section 3.5)

Recommendations for Possible Program Modifications

The recommendations in Section 5 include:

- Consider expanding the CSI Program beyond the three large investor-owned electric utilities to CPUC-regulated small and multijurisdictional investor-owned utilities not currently authorized to administer this program under SB1 (Murray, 2006).
- Consider raising the net energy metering penetration cap to enable additional customers to qualify for this attractive feature.
- Consider expanding the low income housing eligibility requirements to increase the scope of households that can participate in the SASH Program.

2. Introduction to the California Solar Initiative

The California Solar Initiative (CSI or CSI Program) is overseen by the California Public Utilities Commission (CPUC) and provides incentives for photovoltaic (PV) solar system installations to customers of the state's large electric investor-owned utilities (large IOUs): Pacific Gas and Electric Company (PG&E), Southern California Edison (SCE) and San Diego Gas and Electric (SDG&E).⁷ The CSI Program provides upfront incentives for solar systems installed on existing residential homes, as well as existing and new commercial, industrial, government, non-profit, and agricultural properties within the service territories of the large IOUs.

The CSI Program demonstrates the State's strong support for solar technology and is an outgrowth from Governor Schwarzenegger's call for a "Million Solar Roofs" vision for the State of California.⁸ The CSI Program was authorized by the CPUC in a series of regulatory decisions throughout 2006. In addition, the Legislature expressly authorized the CPUC to create the CSI Program in 2006 in Senate Bill (SB) 1 (Murray, 2006).

The CSI Program focuses exclusively on onsite, grid-connected solar that is used by electric customers that want to offset some portion of their own load by installing self-generation. The CSI Program does not fund wholesale solar power plants, designed to serve the electric grid or help utilities meet Renewable Portfolio Standard (RPS) obligations.⁹

2.1 CSI Program Components

The CSI Program has a budget of \$2.167 billion over 10 years, from 2007-2016. The goals of the CSI Program are to:

- Install 1,940 MW of distributed solar energy systems in the large IOU service territories;
- Transform the market for solar energy systems so that it is price competitive and self-sustaining.

⁷ Southern California Gas Company (SoCalGas) is not included in the CSI because the program is funded through electric ratepayers.

⁸ The Million Solar Roofs goal was not adopted by the Legislature as an explicit number of projects goal in its authorization of the State's solar programs. Instead, the Legislature adopted a 3,000 MW capacity goal. However, if the entire capacity goal were installed (hypothetically) in only small residential systems averaging 3 kW in size, it would cover approximately one million roofs. In practice, the CPUC expects its CSI portion of the statewide program to be approximately one-third residential, and two-thirds non-residential projects. Since non-residential systems are fewer in number, but larger in terms of per-project capacity, the number of systems installed will not reach one million even when the capacity targets are achieved.

⁹ The California utilities contract for a variety of renewable resources, including large and small solar power plants as part of the RPS Program. Updates on the progress of the RPS program can be found at <http://www.cpuc.ca.gov/PUC/energy/Renewables/>.

The CSI Program has five program components, as shown in Table 1, each with their own Program Administrator and budgets that are overseen by the CPUC:

- **The CSI general market solar program** is administered through three Program Administrators: PG&E, SCE, and the California Center for Sustainable Energy (CCSE) in SDG&E territory. The goal is 1,750 MW with a ten-year budget of \$1.9 billion.
- **The CSI Single-family Affordable Solar Homes (SASH) Program** provides solar incentives to qualifying single-family low income housing owners. The SASH Program is administered through a statewide Program Manager, GRID Alternatives, with a budget of \$108 million through 2015.
- **The CSI Multifamily Affordable Solar Housing (MASH) Program** provides solar incentives to multifamily low income housing facilities. The MASH Program also has a \$108 million budget through 2015 and is administered through the same Program Administrators as the general market solar program: PG&E, SCE, and CCSE.
- **The CSI Solar Water Heating Pilot Program (SWHPP)** provides solar hot water incentives through a pilot program for residences and businesses in the San Diego area only; the SWHPP is administered through CCSE with a budget of \$2.6 million.
- **The CSI Research, Development, Demonstration and Deployment (RD&D) Program** provides grants to develop and deploy solar technologies that can advance the overall goals of the CSI Program, including achieving both targets for capacity, cost, and a self-sustaining solar industry in California. The RD&D Program is administered through the RD&D Program Manager, Itron, Inc., and has a budget of \$50 million.

Table 2. CSI Budget by Program Component, 2007-2016

	Budget (\$ Millions)	Goal (MWs)
General Market Solar Program	\$1,897	1,750 MW
Single-Family Affordable Solar Homes (SASH)	\$108	85 MW
Multifamily Affordable Solar Housing (MASH)	\$108	85 MW
Research, Development, Demonstration, and Deployment (RD&D)	\$50	~
Solar Hot Water Pilot Program (SWHPP)	\$2.6	750 SWH systems
Total CPUC CSI Budget	\$2,167	1,940 MW

Source: CPUC D.06-12-033, p.26.

2.2 Other Solar Programs

When it launched in January 2007, the CSI Program built upon nearly 10 years of state support for solar, including other incentive programs such as the Emerging Renewables Program (ERP)

and the Self-Generation Incentive Program (SGIP). Both programs still exist to provide incentives for other clean technologies, but the projects have been closed to new solar project applications since the end of 2006.

The CSI Program is one part of the broader solar effort in California. When authorizing the CSI Program overseen by the CPUC, the Legislature also identified having other programs to support reaching the state overall goal of solar of 3,000 MW with a total budget of \$3.3 billion, as detailed in Table 3. The other programs include the California Energy Commission's New Solar Homes Partnership (NSHP), which offers solar incentives to new homes in large IOU territories and leverages the Energy Commission's interaction with new home developers in its building standards work. There are also solar programs offered through publicly-owned utilities (POUs) that are not regulated by the CPUC. The statewide solar effort is promoted collectively on the Go Solar California website, which is the one-stop consumer web portal¹⁰ for all solar information. Go Solar California includes information on the CSI, as well as NSHP and the POU programs.

Table 3. Go Solar California Program Components¹¹

Program Authority	California Public Utilities Commission	California Energy Commission	Publicly Owned Utilities (POUs)	Total
Budget	\$2,167 million	\$400 million	\$784 million	\$3,351 million
Solar Goals (MW)	1,940 MW	360 MW	700 MW	3,000 MW
Scope	All solar systems in large IOU areas <u>except</u> new homes	Solar systems on new homes in large IOU areas	All solar systems in POU areas	All of California ¹¹

Source: SB 1 (Murray, 2006).

¹⁰ The Go Solar California web portal can be accessed at: www.GoSolarCalifornia.ca.gov.

¹¹ Go Solar California Program Components do not include the small multijurisdictional investor-owned utilities (e.g., Sierra Pacific Power Company, Golden State Water Company, Bear Valley Electric, etc.)

3. Status Update on CSI Program Components

This section reports the status on each of the five CSI Program components. Each section starts with background on the program component, including program design and offering, and then provides a snapshot of program activity.

For more detailed information on how to participate in any of the CSI Program components, please see the CSI Program Handbook or the CSI Consumer Guide, both available for download at www.GoSolarCalifornia.ca.gov.

3.1 General Market Solar Program

3.1.1 Program Design

The CSI general market solar program is the most well known part of CSI. It offers incentives to all eligible customers in large IOU territories that install solar systems. The incentives are based on the actual performance of a solar system, or on the expected performance depending on the system size, such that higher performing systems receive a higher incentive than lower performing systems. Solar system performance is affected by design considerations, including the selection of equipment and site-specific installation characteristics, as well as on-going system monitoring and maintenance. The heavy emphasis on performance in the CSI Program is designed to optimize California ratepayer investment in solar. In addition, the CSI Program requires program participants to complete energy efficiency audits to encourage applicants to invest in cost-effective energy efficiency measures prior to sizing their solar system, consistent with the State's Energy Action Plan and "loading order".

The CSI Program supports onsite solar installations designed to offset some or all of the customer's electrical load, but not wholesale generation projects designed to sell electricity to the utility grid.¹² CSI Program participants are eligible for utility interconnection and net energy metering (NEM), which facilitates solar by allowing solar customers to feed temporary amounts of excess electricity into the grid in exchange for bill credits.

3.1.1.1 Incentive Types

The CSI Program pays solar consumers an incentive based on system performance. The incentives are either an upfront lump-sum payment based on expected performance, or a monthly payment based on actual performance over five years. The Expected Performance-Based

¹² The Renewable Portfolio Standard (RPS) Program supports large scale solar power plants through the procurement of such plants to serve wholesale electrical demand. Information on solar procured by large IOUs to meet RPS requirements can be found at: <http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm>.

Buydown (EPBB) is the upfront incentive available only for smaller systems. The EPBB incentive is a capacity-based incentive that is adjusted based on expected system performance calculated using an EPBB calculator¹³ that considers major design characteristics of the system, such as panel type, installation tilt, shading, orientation, and solar insulation available by location.

The Performance Based Incentive (PBI) is the incentive paid based on actual performance over the course of five years. The PBI is paid on a fixed dollar per kilowatt-hour (\$/kWh) of generation basis and is the required incentive type for larger systems, although smaller systems may opt to be paid based on PBI. In the beginning of the CSI Program, all systems 100kW and greater were required to take the PBI incentive. As of January 2008, all systems 50kW and over are required to take the PBI incentive. In January 2010, all systems 30kW and over will be required to take the PBI incentive.

These two incentive types are explained in more detail in Table 4 below.

Table 4. CSI Incentive Types

Expected Performance-Based Buydown (EPBB) (Paid in dollars/Watt)	Performance-Based Incentive (PBI) (Paid in cents/kWh)
Ideal for residential and small business customers	Ideal for larger commercial, government & non-profit customers
Systems less than 50 kW	Mandatory for all systems 50 kW and greater Systems less than 50kW can opt-in to PBI
Incentive paid per Watt based on your system's expected performance (factors include CEC-AC rating, location, orientation and shading)	Incentive paid based on the actual energy produced by the solar system, measured in kilowatt-hours
One-time, lump sum upfront payment	60 monthly payments over five years

3.1.1.2 Incentive Level Design

The CSI Program offers financial incentives that decline over time. The incentive level design is intended to anticipate economies of scale in the California solar market – as the solar market grows, it is expected that total solar system costs will drop and the incentive scheme is designed to decline in parallel with the scale of the market.

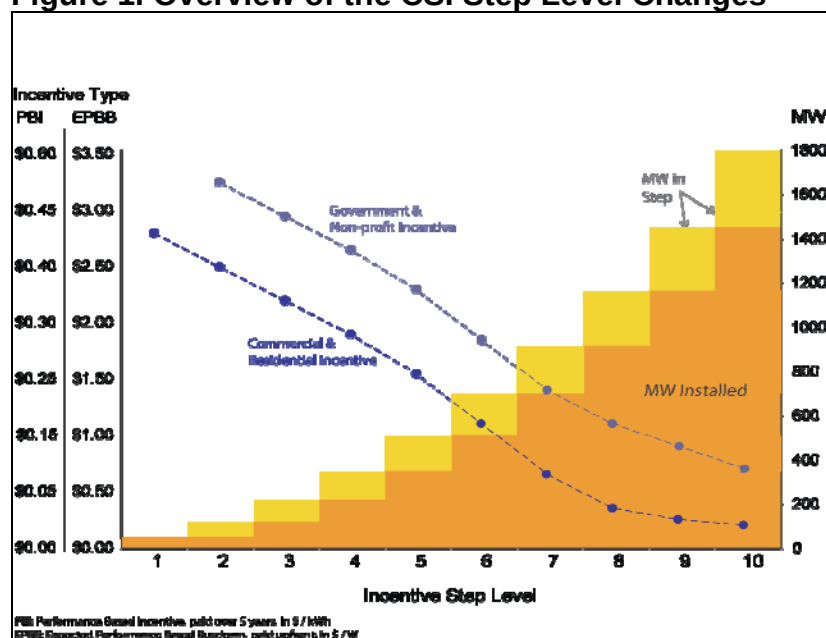
¹³ The EPBB calculator is publicly available at <http://www.csi-epbb.com/>. The EPBB calculator estimates the expected performance of a solar system based various factors including the tilt, azimuth, location, PV module type and mounting type of a specific system.

To determine the incentive levels offered, the CPUC started with the incentive levels on a dollar per Watt (\$/Watt) basis offered through prior programs. Adjustments were then made to those incentives based on an assessment of what level of return and/or payback would be required on installed systems in order to motivate program participation, given certain assumptions regarding trends in system costs, electricity costs and the availability of federal tax incentives. The decline schedule was determined by taking the overall program goal, in terms of MW of new capacity, and dividing it into 10 incentive level steps. Each incentive step was assigned an incentive level (\$/Watt) as well as a targeted amount of capacity. Each successive step is smaller in terms of financial incentive offered and larger in terms of expected MWs. At the beginning of the program, higher incentives were offered because it was assumed system costs would start higher and decrease over time while electricity rates would increase over time. While the program design cannot be guaranteed to trigger system price declines, the CPUC anticipates that as incentive levels decline either system prices will decline or other factors will change so as to increase market demand and/or solar system investment returns.

The capacity targets in each incentive step level are assigned across the whole program, as shown in Figure 1. Each step offers a certain number of MWs, shown in yellow, and the cumulative capacity of all MWs expected to be installed in the program for all steps are shown in orange. The dotted blue lines are the incentive levels available at each step. The dotted blue line for government and non-profit participants is higher at every step since those entities are eligible for higher incentives because they are ineligible for 30 percent federal tax incentives for taxable owners of solar system installations.

The incentives decline as the program demand continues, and the number of MWs eligible for each step level increases such that the later steps have more MWs than the earlier steps. The incentive level available at Step 2 was available to the smallest number of MWs but was a high incentive level. The incentive available at Step 3 was available to slightly more MWs, but was a slightly lower incentive, etc. The incentive level will continue to drop based on program demand until there is a low incentive level offered at Step 10 (but offered to a large number of MWs).

The capacity targets per incentive step were further broken down into allocations across customer type (approximately one-third residential and two-thirds non-residential) and across the three IOU service territories. The targets per IOU territory are set in proportion with each utility's contribution to CPUC-regulated electricity sales. Table 5 presents the capacity target by utility territory and customer class, showing how all of the incentives have been allocated over the expected 10-step life of the program.

Figure 1. Overview of the CSI Step Level Changes

Note: See www.csi-epbb.com for a table listing of the incentive levels per step.

Table 5. CSI MW Targets by Utility and Customer Class

Step	MW in Step	PG&E (MW)		SCE (MW)		SDG&E (MW)	
		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
5	160	23.1	46.8	24.3	49.3	5.4	11
6	190	27.4	55.6	28.8	58.6	6.5	13.1
7	215	31	62.9	32.6	66.3	7.3	14.8
8	250	36.1	73.2	38	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
Subtotals (Res and Non-Res)		252.4	512.3	265.6	539.5	59.5	120.8
Totals		764.8		805		180.3	
Percent		43.70%		46.00%		10.30%	

Source: D.06-12-033, Appendix B, Table 11.

Notes: The MWs for Incentive Step 1 were reserved under the Self-Generation Incentive Program in 2006. Non-Residential (Non-Res) includes commercial, government, and non-profit facilities.

3.1.1.3 Annual Rate of Incentive Level Decline

Once the solar system capacity targets for each incentive step level, customer class, and utility territory are reserved via CSI application, which can occur at different times for each customer class in each utility service territory, the incentive level offered by the CSI Program automatically drops to the next lower incentive step. This creates a demand-driven program that adjusts solar incentive levels based on local solar market conditions. Figure 2 shows how the incentive levels have declined across the three large IOU territories at different times since January 2007. The incentives have stepped down most frequently in the territories with the most market demand. PG&E moved to residential incentive level Step 5 in December 2008, and to non-residential incentive level Step 6 in late February 2009. SCE and CCSE moved to residential steps 4 and 5, respectively, in June 2009.

Incentive levels are required by law to decline at annual average rate of 7 percent over a 10 year period.¹⁴ Table 6 and Table 7 show that the percentage decline in the first year of CSI exceeded 7 percent. Between 2007 (year 1) and 2008 (year 2), the rate of incentive decline varied by incentive type and by large IOU territory, but the decline ranged between 9 percent and 22 percent. The average rate of decline for EPBB projects was 15 percent, and the average rate of decline for PBI projects was 19 percent.

Table 6. EPBB Incentive Level Declines by Program Administrator, 2007-2008

Program Administrator	2007 Average \$/W	2008 Average \$/W	% Decline
All EPBB applications*			
PG&E	\$2.35	\$1.93	18%
SCE	\$2.46	\$2.24	9%
CCSE	\$2.56	\$2.12	17%
Average, All EPBB applications	\$2.39	\$2.03	15%

Source: www.CaliforniaSolarStatistics.ca.gov, June 22, 2009

*Note: These figures include both “installed” and “pending” systems by year of reservation.

¹⁴ PU Code 2851(a)(1) states, “The incentive level authorized by the commission shall decline each year following implementation of the California Solar Initiative, at a rate of no less than an average of 7 percent per year, and shall be zero as of December 31, 2016.”

Table 7. PBI Incentive Level Declines by Program Administrator, 2007-2008

Program Administrator	2007	2008	
	Average \$/kWh	Average \$/kWh	% Decline
All PBI applications			
PG&E	\$0.33	\$0.27	17%
SCE	\$0.33	\$0.26	21%
CCSE	\$0.39	\$0.30	22%
Total, All PBI applications	\$0.34	\$0.28	19%

Source: www.CaliforniaSolarStatistics.ca.gov, June 22, 2009.

*Note: These figures include both “in-payment” and “pending” systems by year of reservation.

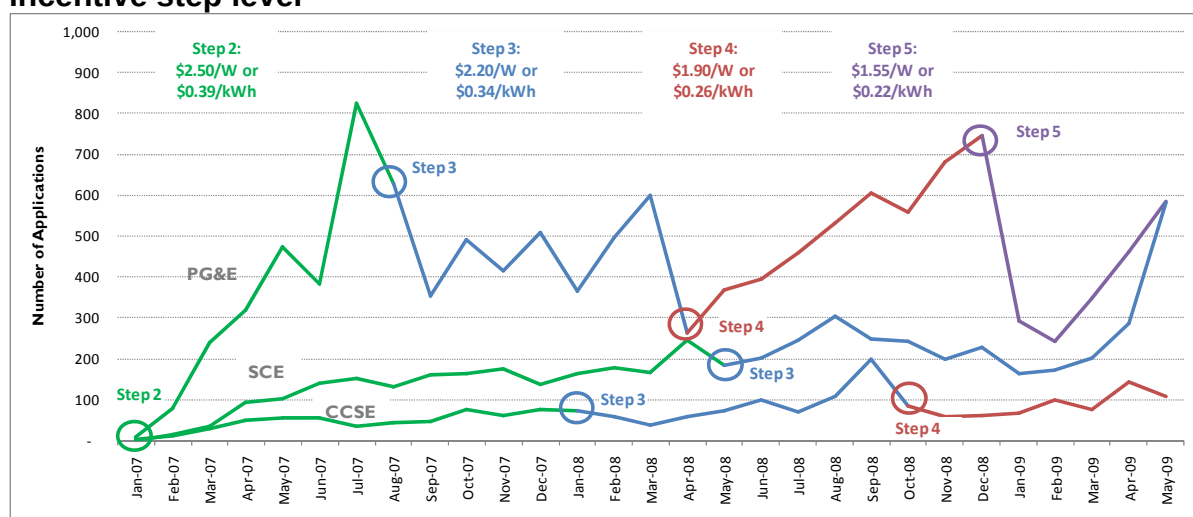
Figure 2. California Solar Initiative Incentive Levels, Current and Historic, January 2007 – June 2009

Program Month	PG&E			SCE			CCSE		
	Residential	Non-Residential	Govt & Non-Profit	Residential	Non-Residential	Govt & Non-Profit	Residential	Non-Residential	Govt & Non-Profit
Jan 07	Step 2 \$2.50 \$0.39	Step 2 \$2.50 \$0.39	\$3.25 \$0.50	Step 2 \$2.50 \$0.39	Step 2 \$2.50 \$0.39	\$3.25 \$0.50	Step 2 \$2.50 \$0.39	Step 2 \$2.50 \$0.39	\$3.25 \$0.50
Feb									
Mar		Step 3 \$2.20 \$0.34	\$2.95 \$0.37		Step 3 \$2.20 \$0.34	\$2.95 \$0.37			
Apr									
May		Step 4 \$1.90 \$0.26	\$2.65 \$0.37						
Jun									
Jul					Step 4 \$1.90 \$0.26	\$2.65 \$0.37			
Aug	Step 3 \$2.20 \$0.34							Step 3 \$2.20 \$0.34	\$2.95 \$0.37
Sep									
Oct									
Nov									
Dec							Step 3 \$2.20 \$0.34		
Jan 08									
Feb									
Mar		Step 5 \$1.55 \$0.22	\$2.30 \$0.32		Step 5 \$1.55 \$0.22	\$2.30 \$0.32			
Apr	Step 4 \$1.90 \$0.26								
May				Step 3 \$2.20 \$0.34					
Jun									
Jul									
Aug									
Sep									
Oct							Step 4 \$1.90 \$0.26	Step 5 \$1.55 \$0.22	\$2.30 \$0.32
Nov									
Dec	Step 5 \$1.55 \$0.22								
Jan 09									
Feb		Step 6 \$1.10 \$0.15	\$1.85 \$0.26						
Mar									
Apr									
May									
Jun				Step 4 \$1.90 \$0.26			Step 5 \$1.55 \$0.22		
Jul									

Notes: The yellow boxes represent previous incentive levels. The blue boxes represent current incentive levels. The EPBB incentive amount (dollars/Watt) is displayed on the top of each incentive step box, and the PBI incentive amount (cents/kWh) is displayed in italics on the bottom of each incentive step box.

Figure 3 and Figure 4 compare how application demand reacts to changes in CSI incentive levels. In all three IOU territories, incentive level changes have a short-term disruptive impact on demand. Application demand appears to recover in the months that follow. There are often peaks before or during a step level change, and then troughs after a step level change. These peaks may be caused by a rush to get applications reserved at the current incentive level before it drops to the next step. After each step level change, there is sometimes a temporary drop in demand. For example, in January 2009, PG&E experienced a drop in residential demand after its step level change in December 2008. However, by May 2009, new applications returned to October 2008 levels.

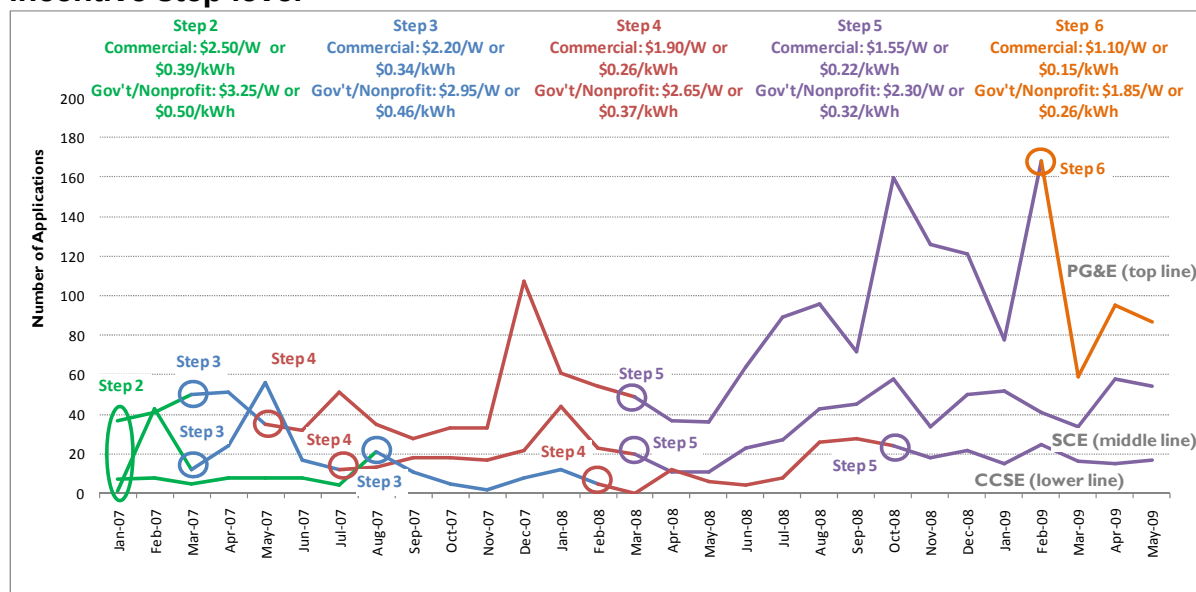
Figure 3. Number of Residential Applications by Program Administrator, with incentive step level¹⁵



Source: Courtesy of Beth Baker, Summit Blue Consulting. Based on data from June 3, 2009.

¹⁵ Data Sources: California Solar Initiative Program Data. Downloaded from the PowerClerk website (<https://csi.powerclerk.com/>). Data export from June 3, 2009. California Public Utilities Commission. "California Solar Initiative CPUC Staff Progress Report- October 2008." CPUC Energy Division. "California Solar Initiative (CSI) Newsletter- December 2008." Available on the GoSolar California website (<http://www.GoSolarCalifornia.ca.gov/news/index.html>). California Public Utilities Commission. "California Solar Initiative- Program Handbook." November 2008. CPUC Monthly CSI Newsletters. For this figure, the "Reservation Request Review Date" is used as the application date. Note that applications do not count toward the steps until they reach "conditional reservation" stage. This figure does not include projects in the database with no "Reservation Request Review Date" or with a "Reservation Request Review Date" prior to January 1, 2007. Each month has a data point; lines between months only link these points. The "System Owner Sector" database field is used as the project sector.

Figure 4. Number of Non-Residential Applications by Program Administrator, with incentive step level¹⁶



Source: Courtesy of Beth Baker, Summit Blue Consulting. Based on data from June 3, 2009.

3.1.2 Regulatory Status

In January 2006, CPUC established the California Solar Initiative in Decision (D.) 06-01-024 and D.06-08-028. The decisions established the administrative and performance-based incentive structure for the program. Following the passage of SB 1 in September 2006, the CPUC conformed the CSI Program rules to be compliant with the new law in D.06-12-033.

Since late 2006, the general market solar program has been in the implementation phase. The program started accepting applications in January 2007. Over the course of 2007 and 2008, there were several CPUC decisions and rulings related to further refinements and establishment of the program including the following policy areas:

- The solar incentive structure
- Metering and performance monitoring rules
- Program rules for building-integrated PV and other solar technologies¹⁷
- Interim marketing and outreach plans

¹⁶ See Footnote 15.

¹⁷ The CSI Program provides incentives to solar electric generating technologies, such as PV, but also other solar technologies that might be electric generating or electric displacing. Significant work went into establishing program rules for other solar (also known as non-PV) technologies. To date, the Program Administrators report receiving one application for an “other solar” technology.

- Program budget collections process; and
- Program evaluation plans

Through ongoing program tracking and regular feedback from the solar industry, the CPUC and CSI Program Administrators continue to modify the program, as needed, to increase its efficacy and impact. For example, the CSI Program Administrators host quarterly public CSI Program Forums to discuss potential program changes with stakeholders. On a periodic basis, the Program Administrators file program rule changes, consistent with the CPUC established CSI Program Handbook process. The CPUC has revised and reissued the CSI Program Handbook since the program's inception in response to stakeholder concerns and program experience.

There are several areas of CSI policy that are pending further action at the CPUC, in Rulemaking (R.) 08-03-008, including the consideration of longer-term marketing and outreach and revised energy efficiency requirements for participation in the program.

3.1.3 Program Progress

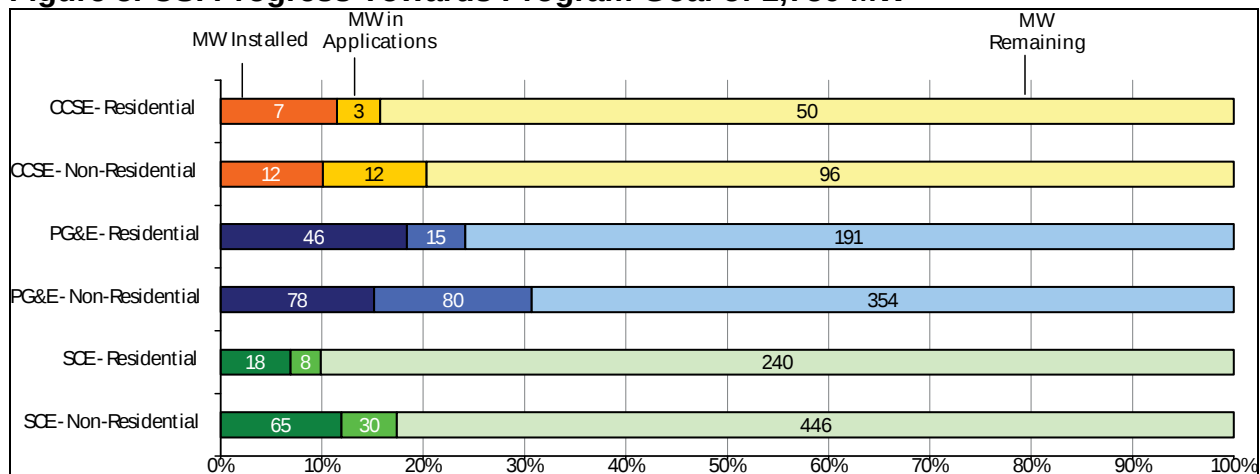
The charts and tables in this section illustrate the CSI general market solar program progress to date. For additional information on CSI progress to date, please see Appendix A. In addition, the CSI Program releases a Data Annex, available online, each quarter with key program application processing metrics.¹⁸

3.1.3.1 Goals

The CSI Program's general market solar program is making progress towards meeting the program's goal of 1,750 MW to be installed by 2017. The program has pending or installed applications for 373 MW of grid-tied, distributed solar PV projects. The program appears to be roughly on track to meet its goal by 2017.

The CPUC did not establish annual targets for the program when it was adopted, and the CPUC did not expect that the program would install an equal number of projects each year. Rather, the expectation is that the market will increase the annual rate of installations over time.

¹⁸ The CSI Program releases a Data Annex each quarter, usually in conjunction with the Staff Progress Report. The next Data Annex will be released in July 2009. See <http://www.cpuc.ca.gov/PUC/energy/Solar/news.htm>.

Figure 5. CSI Progress Towards Program Goal of 1,750 MW

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Table 8. CSI Progress Towards Program Goal of 1,750 MW

Customer Class	Installed	Pending	Remaining	Goal
SCE - Non-Residential (MW)	65	30	446	540
SCE - Non-Residential (% of Goal)	12%	5%	83%	
SCE - Residential (MW)	18	8	240	266
SCE - Residential (% of Goal)	7%	3%	90%	
PG&E - Non-Residential (MW)	78	80	354	514
PG&E - Non-Residential (% of Goal)	15%	16%	69%	
PG&E - Residential (MW)	46	15	191	252
PG&E - Residential (% of Goal)	18%	6%	76%	
CCSE - Non-Residential (MW)	12	12	96	120
CCSE - Non-Residential (% of Goal)	10%	10%	80%	
CCSE - Residential (MW)	7	3	50	59
CCSE - Residential (% of Goal)	12%	4%	84%	
Total (MW)	226	147	1377	1750
Total (% of Goal)	13%	8%	79%	

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Figure 5 and Table 8 display applications in each utility territory as a percentage of the overall program goals. Figure 5 is normalized across the three utility territories, so that it is easy to compare relative attainment towards the goals. The MW goals of each utility vary depending on the size of each service territory (See Table 5).

- Customers in SDG&E territory, where the program is administered by CCSE, have installed 7 MW of residential projects and 12 MW of non-residential projects; they have an additional 3 MW of residential and 12 MW of non-residential projects pending installation.
- Customers in PG&E territory have installed 46 MW of residential and 78 MW of non-residential projects; they have an additional 15 MW of residential and 80 MW of non-residential projects pending installation.
- Customers in SCE territory have installed 18 MW of residential and 65 MW of non-residential projects; they have an additional 8 MW of residential and 30 MW of non-residential projects pending installation.

Participants in the CSI Program have installed 226 MW of new, distributed solar PV in California since the program's start in 2007, as shown in Table 9. The CSI Program has incentivized new solar installed at nearly 16,738 sites since 2007. This report estimates the CSI Program has another 5,340 applications currently pending, which, if installed, will result in an additional 147 MW of solar PV. The installations to date will claim an estimated \$544 million in incentives, including future PBI payments. The installations of pending projects will be paid an additional \$322 million.

Table 9. Pending and Installed CSI Projects, January 1, 2007 through May 27, 2009

All CSI Projects		
Installed Projects		
<i>Installed-Under Review</i>		
Applications	851	
MW	27	MW
Incentive \$million	\$67	
<i>Installed-Completed</i>		
Applications	15,887	
MW	199	MW
Incentive \$million	\$478	
Total Installed		
Applications	16,738	
MW	226	MW
Incentive \$million	\$544	
Pending Projects		
Applications	5,340	
MW	147	MW
Incentive \$million	\$322	
Total CSI Activity		
Applications	22,078	
MW	373	MW
Incentive \$million	\$866	

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Notes: "Installed-Under Review" includes projects that are in the following statuses in the CSI PowerClerk database- Online Incentive Claim Form Submitted, Incentive Claim Request Review, Suspended Incentive Claim Request Review; "Installed-Completed" includes projects that are in the following statuses in the CSI PowerClerk database – Pending Payment, Completed, PBI-In Payment; "Pending Projects" includes projects that are in the following statuses in the CSI PowerClerk database - Online Reservation Request Submitted, Reservation Request Review, Suspended-Reservation Review, Reservation Reserved, Confirmed Reservation, Online Proof of Project Milestones Submitted, Proof Of Project Milestone Review, Suspended-Milestone Review, Pending RFP, RFP Review, Suspended - RFP Review.

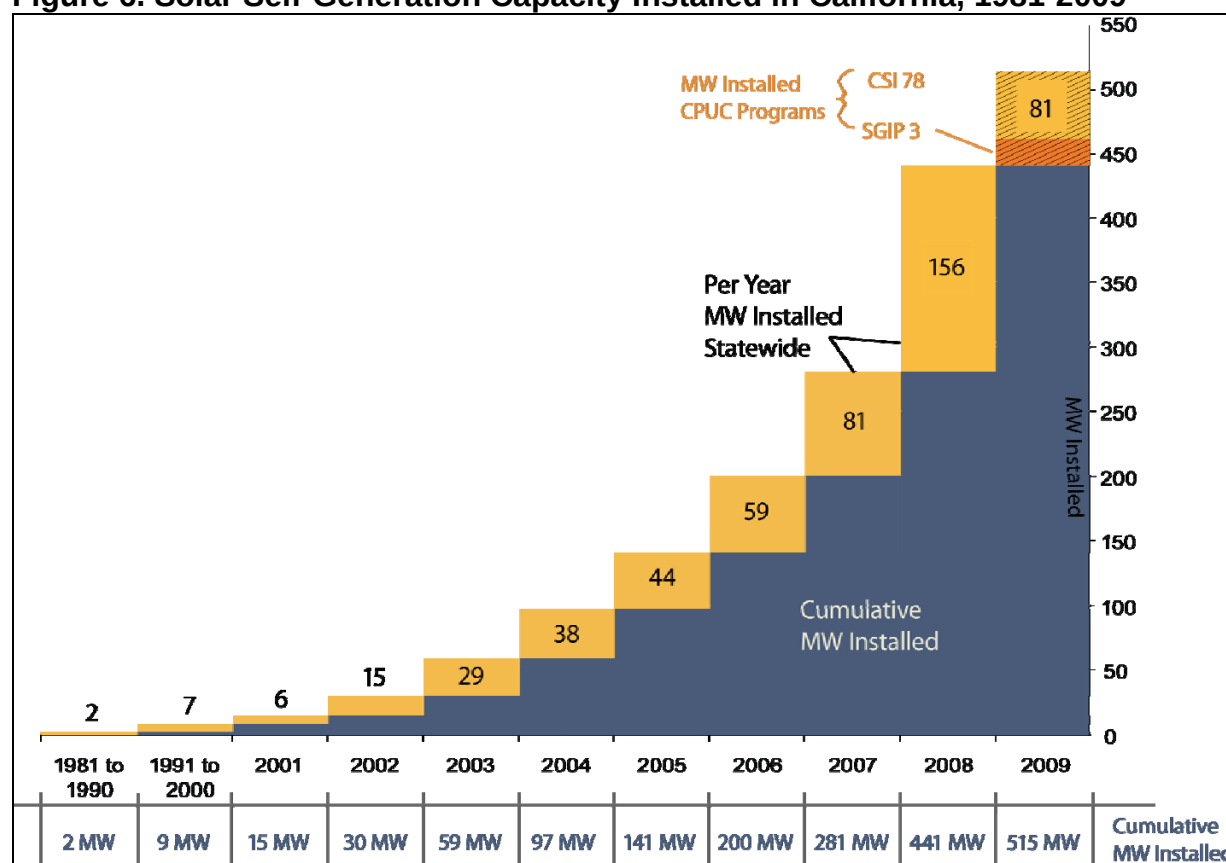
3.1.3.2 Total Installations in State of California

The CSI Program is the largest solar program in the state; however, CSI data does not reflect statewide totals for solar data. The CSI Program data needs to be combined with other program data, namely SGIP, ERP, and NSHP data, to determine the total amount of customer-sited solar installed in large IOU territories. Further, all the large IOU territory program data needs to be combined with the POU data to determine the statewide solar data. Figure 6 shows solar PV grid

installed capacity from 1981 to May 2009, including the CSI. As the old programs (prior to CSI) completed installations in 2007 and 2008, the CSI took over as the leading source of new solar MWs in the state, as shown in Table 10. The additional capacity installed by CSI Program in 2009 brings the total MWs installed in California to over half a gigawatt (515 MW) of solar capacity.

The data in Figure 6 is limited to solar "self-generation" that is used to serve on-site customer load. Figure 6 does not include solar power plants designed to serve wholesale load. (See Footnote 9.)

Figure 6. Solar Self-Generation Capacity Installed in California, 1981-2009



Sources: 1981 through 2007 data is from California Energy Commission's *Grid Connected PV Capacity Installed in California*. CSI 2008-2009 data is from CSI PowerClerk database June 2009 SGIP 2008-2009 data is from the SGIP database (SGIP 2009 data compiled by Itron). Other 2008 data is from California Energy Commission's other partial 2008 data for non-CPUC programs, data does not include most publicly owned utility data. NSHP or POU data was not yet available for 2009.

Table 10. Solar Self-Generation Capacity in California, 1981 through 2009¹⁹

Solar Program	1981 -2006 Subtotal	2007	2008	2009 (to date)	Total (1981-2009)
California Solar Initiative (CSI)	0	19	131	76	226
Self-Generation Incentive Program (SGIP)	80	33	21	2.5	137
New Solar Homes Partnership Program (NSHP)	0	0	1.4	n/a	1.4
Emerging Renewables Program (ERP)	91	26	3	n/a	120
Subtotal, all Large Investor-Owned Utility(IOU)	171	78	156	79	484
Publicly-Owned Utility (POU), subtotal	27	3	1.5	n/a	32
Statewide Total	198	81	158	79	515

Sources: 1981 through 2007 data is from California Energy Commission's *Grid Connected PV Capacity Installed in California*. CSI 2008-2009 data is from CSI PowerClerk database June 2009 SGIP 2008-2009 data is from the SGIP database (SGIP 2009 data compiled by Itron). Other 2008 data is from California Energy Commission's other partial 2008 data for non-CPUC programs, data does not include most publicly owned utility data. NSHP or POU data was not yet available for 2009.

3.1.3.3 Installed Costs of PV Systems

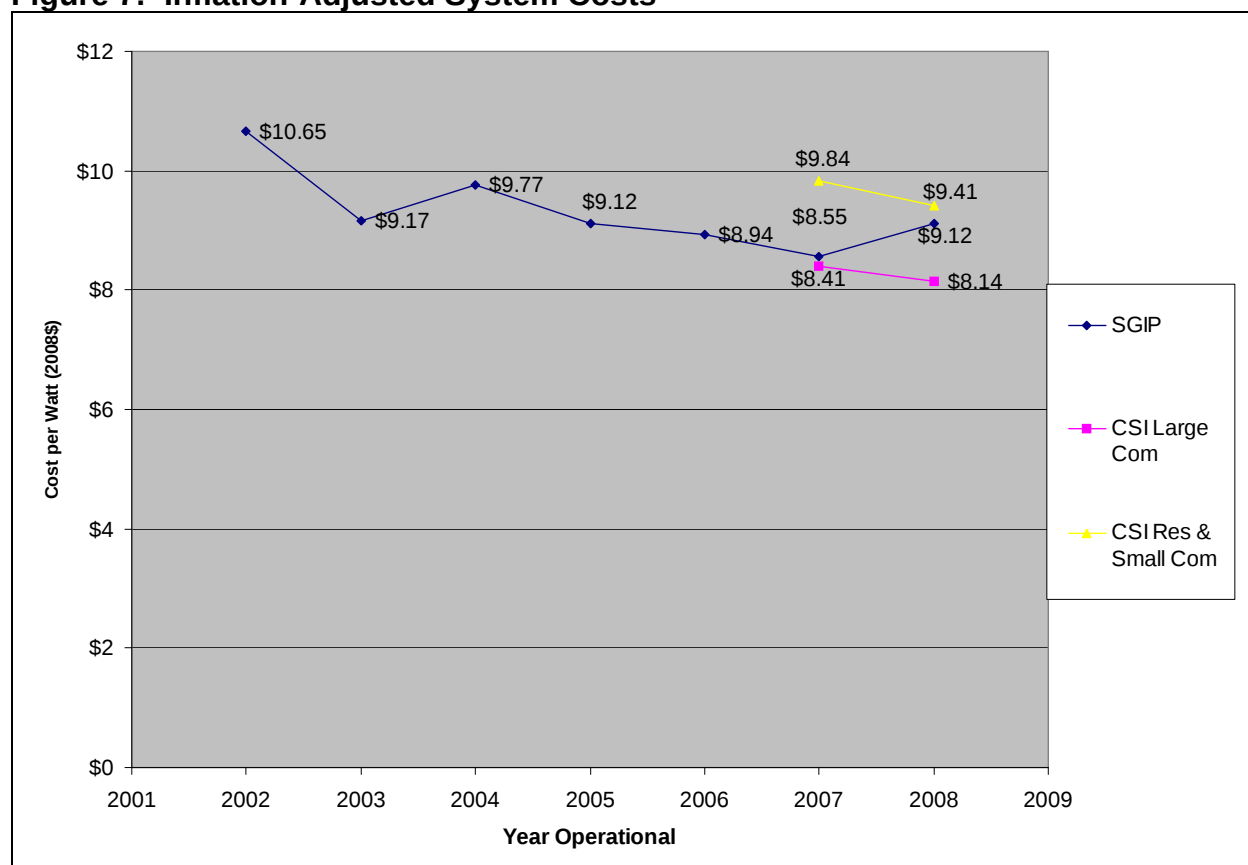
One of the key goals of the CSI Program is to help drive PV system costs down to be competitive with retail electricity rates. As the CSI Program has been operational for only a few years, progress towards this goal can be difficult to see. Consequently, we have combined CSI cost numbers with prior program cost numbers to provide a more complete trend of system prices over time.

Installed system costs are shown in Figure 7 adjusted to 2008 dollars. All costs are reported in terms of rated capacity in CEC-AC Watts, unless otherwise noted, and weighted by capacity. In general, CSI costs are in line with SGIP total installed costs and in fact show a slight downward trend from costs experienced in the latter period of the SGIP.

Figure 7 shows CSI costs for completed CSI projects in 2008:

- Average systems were \$9.41/Watt for residential and small commercial systems.
- Average systems were \$8.14/Watt for large commercial systems.

¹⁹ The January 2009 Progress Report reported 160 MW in 2008. As of May 2009, 4 MW have dropped out of the program and the number has dropped to 156 MW.

Figure 7: Inflation-Adjusted System Costs

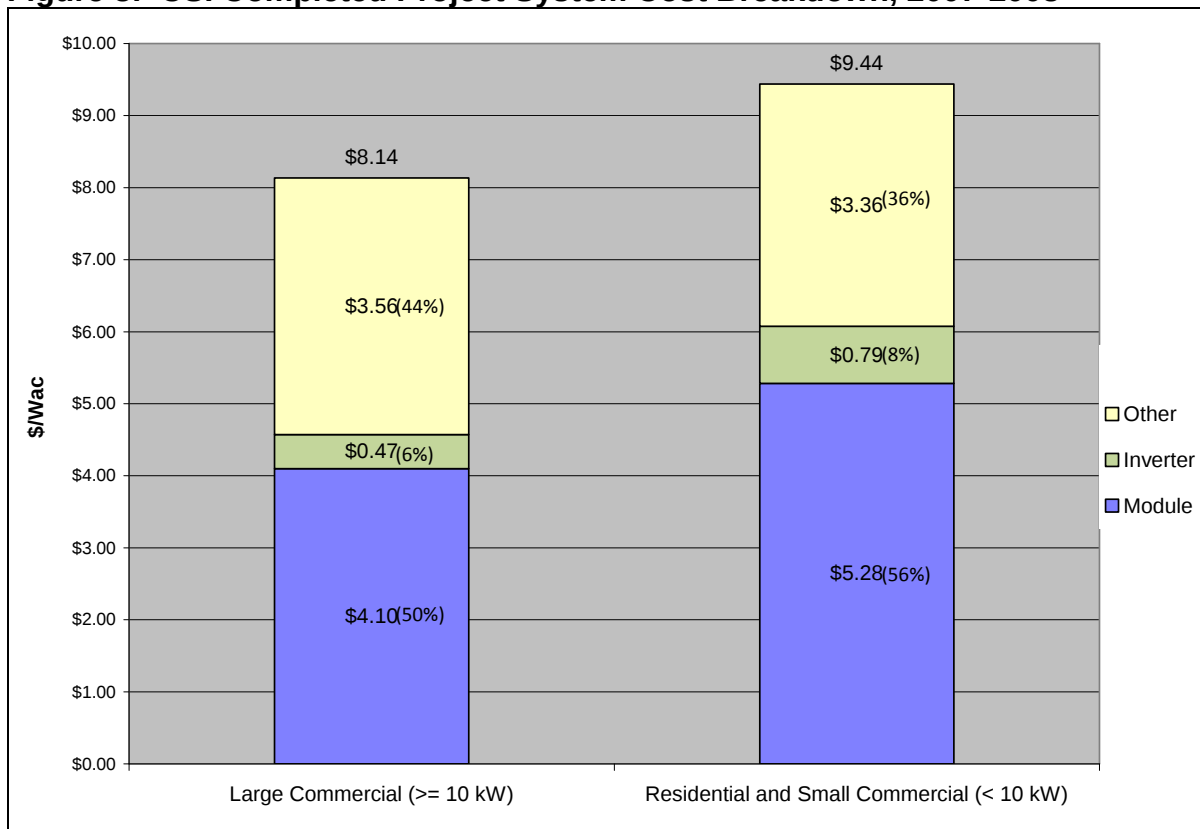
Source: Itron, *Preliminary Program Impacts Results Report*, June 2009.

PV costs are also broken out by system component in the CSI Program application database. A breakdown of system costs for PV systems installed under the CSI Program is shown in Figure 8. Overall, modules represent 50 percent of the system cost for large commercial systems and 56 percent for residential and small commercial systems.

The CSI Program database shows 2007-2008 reported module costs of \$4.10 per Watt for large commercial and \$5.28 per Watt for residential and small commercial are lower than those found from other sources for the same period. SolarBuzz²⁰ reports an average module price of \$5.72 per Watt. A recent Lawrence Berkeley National Labs study²¹ found module prices of \$4.96 per Watt for systems 10-100kW and \$5.32 per Watt for systems less than 10kW.

²⁰ See Solar Buzz, <http://www.solarbuzz.com/Moduleprices.htm>, which reported 2007 and 2008 average United States module prices of \$4.83/W_{dc}, which equates to 5.28/W_{ec ac} using a 90% STC DC-PTC DC derate and a 94% DC-AC derate .

²¹ Wiser et al, 'Tracking The Sun The Installed Cost of Photovoltaics in the US from 1998-2007'; module prices reported as \$4.5/W_{dc}, (<10kW) and \$4.2/W_{dc}, (10-100kW.)

Figure 8: CSI Completed Project System Cost Breakdown, 2007-2008²²

Source: Itron, *Preliminary Program Impacts Results Report*, June 2009.

Note: The data shown includes averages of multi-year data on a non-inflation adjusted basis.

3.1.3.4 Potential CSI Program Goal Attainment Dates

Although the data is limited, looking at the statewide trends is useful in establishing reasonable bounds on the expected rate of solar PV capacity growth in large IOU territories. Table 10 shows that the large IOUs connected 78 MW of new solar PV capacity in 2007 and 156 MW in 2008, approximately a 100 percent increase in the installed solar capacity per year (annual growth rate). The annual growth rate in prior years was between 30-40 percent. The annual growth rate has been positive every year for over a decade – there has never been a year that installed fewer MWs than the year before. Based on the historical trend, the CPUC can begin to make projections about the timeframe for meeting the CSI goals:

- High Scenario.** If it were possible for the annual growth rate in new installed capacity to continue to double year over year under the CSI Program, then the program would install ~1,750+ MWs by 2011. (Assumes 158 MW/year in 2008, and ~300 MW/year in 2009, etc.)

²² Please note that Figure 8 reflects a capacity weighted average of the 2007 and 2008 costs.

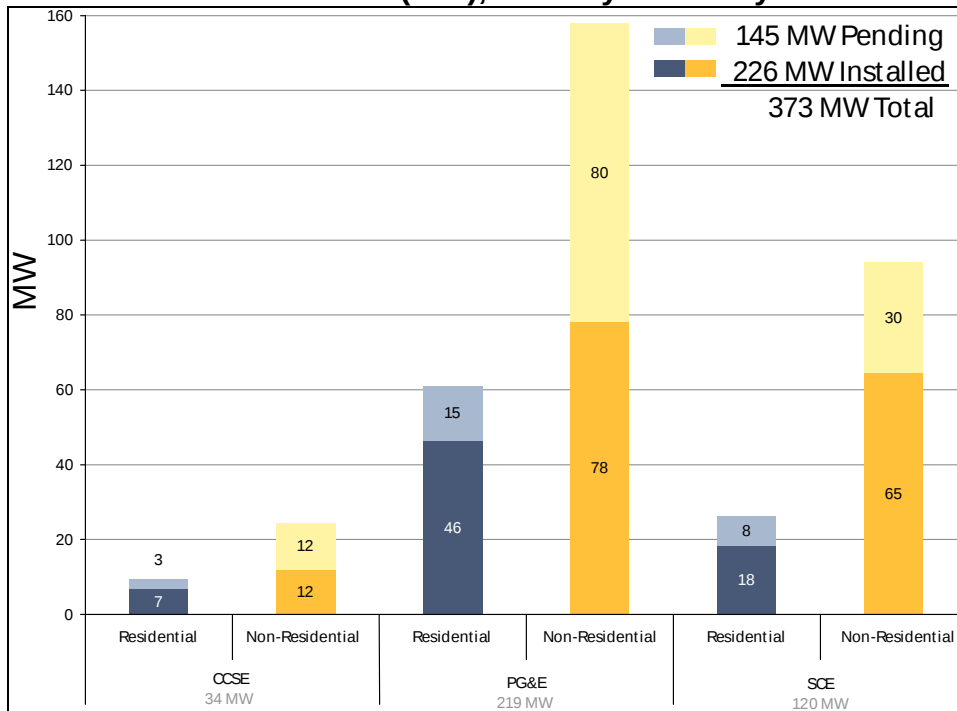
- **Medium Scenario.** If the annual growth rate in new installed solar capacity continued to grow at just 50 percent per year (which is closer to the per annum growth rate over the past decade, as shown in Figure 6), then the CSI Program would install ~1,750 MW by the end of 2012. (Assumes 158 MW/year in 2008, and ~230 MW/year in 2009, etc.)
- **Low Scenario.** If the annual growth rate in new installed solar capacity were flat (i.e. the state continued to install new solar PV capacity at the exact same amount as 2008 (Assumes 158 MW/per year), then the CSI Program would reach 1,750 MW of solar PV capacity by 2018.

3.1.3.5 CSI Program Progress by Utility Territory

As shown in Figure 9 and Figure 10, each utility territory has a different rate of solar system installations in terms of both capacity (the cumulative size of the projects) and volume (the number of residential total applications).

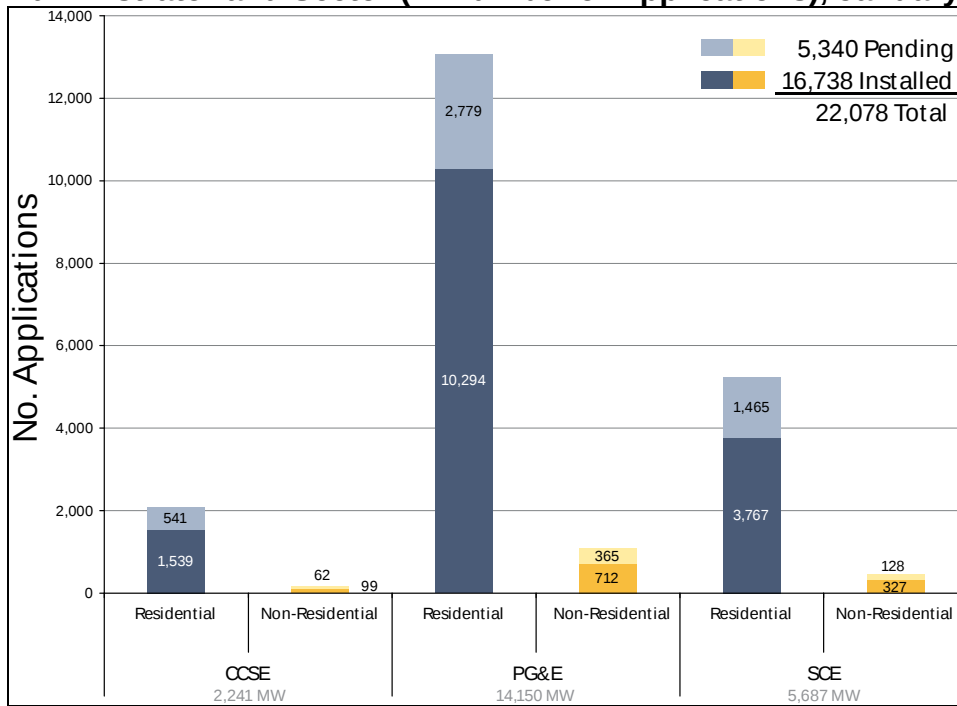
- **PG&E.** Currently, PG&E's territory demonstrates the highest demand for solar, both in terms of volume and capacity. From the inception of the program in January 2007 to the end of May 2009, the capacity of PG&E's non-residential installed applications grew by 78 MW from 712 installations. Residential customers in PG&E's territory have now installed 10,294 CSI projects, adding 46 MW of new solar capacity.
- **SCE.** SCE's territory has a lower rate for CSI application activity (both volume and capacity) than PG&E's territory. However, although SCE's overall program demand in the non-residential sector is lower relative to PG&E, it still accounts for a significant amount of installed MWs – 65 MW from 327 installations. Residential customers in SCE territory have now installed 3,767 CSI projects adding 18 MW of new solar.
- **CCSE.** CCSE has administered applications for 12 MW of non-residential installed capacity. Residential customers in SDG&E's territory have now installed 1,539 CSI projects adding 7 MW of new solar.

Figure 9. Total Capacity of Pending and Installed CSI Applications by Program Administrator and Sector (MW), January 2007-May 2009



Source: www.CaliforniaSolarStatistics.com, data through May 27, 2009.

Figure 10. Number of Pending and Installed CSI Applications by Program Administrator and Sector (in Number of Applications), January 2007-May 2009



Source: www.CaliforniaSolarStatistics.com, data through May 27, 2009.

Table 11 offers a closer look at the geographic and customer demand patterns in the CSI Program. The non-residential participants²³ in the CSI Program represent 74 percent of the MWs. The residential participants represent about 26 percent of the MWs in the program despite the fact that the number of residential applications make up 96 percent of all CSI applications in terms of volume. PG&E has both the highest volume and the highest capacity of the three Program Administrators– with 64 percent of total CSI application volume and 59 percent of applications.

Table 11. Total CSI Applications by Program Administrator and Customer Class (MW, Number of Applications, and Percentages), January 2007-May 2009

Customer Class	Data	Program Administrator			Total
		CCSE	PG&E	SCE	
Residential	# Of Applications	2,080	13,073	5,232	20,385
	Applications %	9.40%	59.20%	23.70%	92.30%
	MW	9.3	60.9	26.2	96.4
	MW %	2.50%	16.30%	7.00%	25.90%
Commercial	# Of Applications	100	671	317	1,088
	Applications %	0.50%	3.00%	1.40%	4.90%
	MW	16.9	81.3	68.3	166.5
	MW %	4.50%	21.80%	18.30%	44.70%
Government/Non-Profit	# Of Applications	61	406	138	605
	Applications %	0.30%	1.80%	0.60%	2.70%
	MW	7.5	76.5	25.8	109.8
	MW %	2.00%	20.50%	6.90%	29.40%
	Total # of Applications	2,241	14,150	5,687	22,078
	% of Applications	10.20%	64.10%	25.80%	
	Total MW	33.6	218.8	120.3	372.7
	% of Total MW	9.00%	58.70%	32.30%	

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

²³ Non-residential participants include CSI projects in the commercial, agricultural, non-profit and government sectors.

3.1.3.6 CSI Program Data by Month

Installations

As shown in the monthly installed data in Figure 11, the CSI Program participants installed PV at an unprecedented rate in the first part of 2009. Figure 11 shows participants in the CSI installed a record number of MW in the first five months of 2009 — over 78 MW of PV at over 4,252 sites.²⁴

The high volume of installation activity in the first part of 2009 can be attributed to a number of trends.

- First, the high installation volume can be attributed to a change in federal tax law, effective January 1, 2009, which allows residential consumers to be refunded a larger percentage of PV system costs as an investment tax credit.²⁵ Anticipation of the tax law change sent new applications up in the fourth quarter of 2008 and those systems were installed in early 2009.
- In addition, a number of non-residential projects benefited from tax law changes (accelerated depreciation), effective in 2009, and those projects also needed to be installed in the beginning of 2009 in order to meet project completion deadlines that are part of the CSI Program incentive application process.

Applications

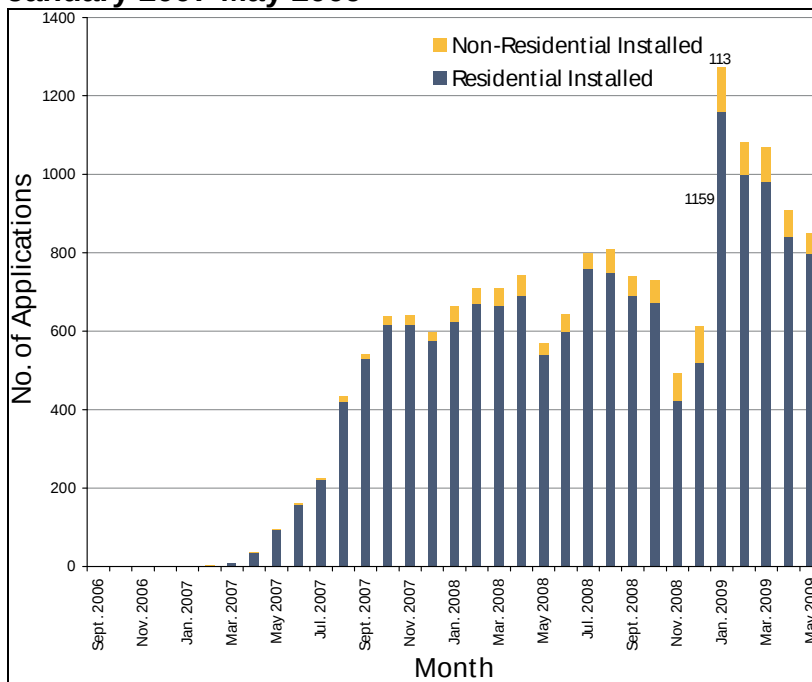
As shown in Figure 12, the CSI Program received 1,444 applications demonstrating solid growth in the application rate, despite the downturn in the economy.

- Program demand in May was also strong due to anticipated incentive level changes, which occurred in June, in SDG&E and SCE territories.
- The CSI Program received a record number of applications in May 2009.

²⁴ Please note the CSI April 2009 Progress Report reported that 78 MW were installed in Q1 2009. As of May 2009, some of these projects have since dropped out of the program (or key program database dates shifted upon review of specific project files) thus the number of installed projects has decreased to 66 MW for Q1 and a total of 78 MW through May 27, 2009.

²⁵ As of January 2009, residential systems are able to receive a Federal Investment Tax Credit (ITC) up to 30 percent of the cost of their solar system. Prior to 2009, the ITC was capped at \$2000.

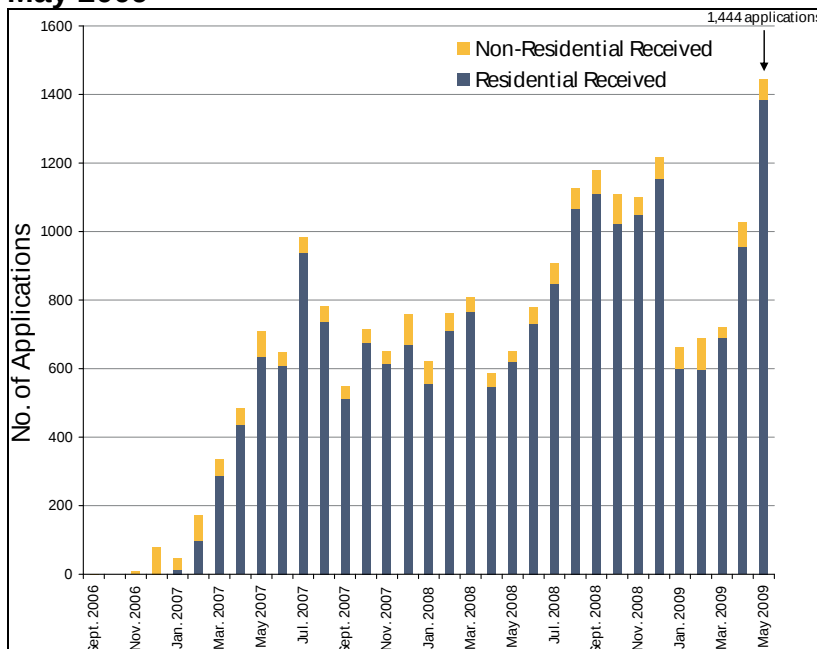
Figure 11. Total Number of Installed Applications per Month by Customer Sector, January 2007-May 2009



Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Note: See note for shows “Installed” defined as a project that has entered the “Online Incentive Claim Form Submitted” status of the online CSI application process.

Figure 12. Applications Received by Month and Customer Type, January 2007-May 2009



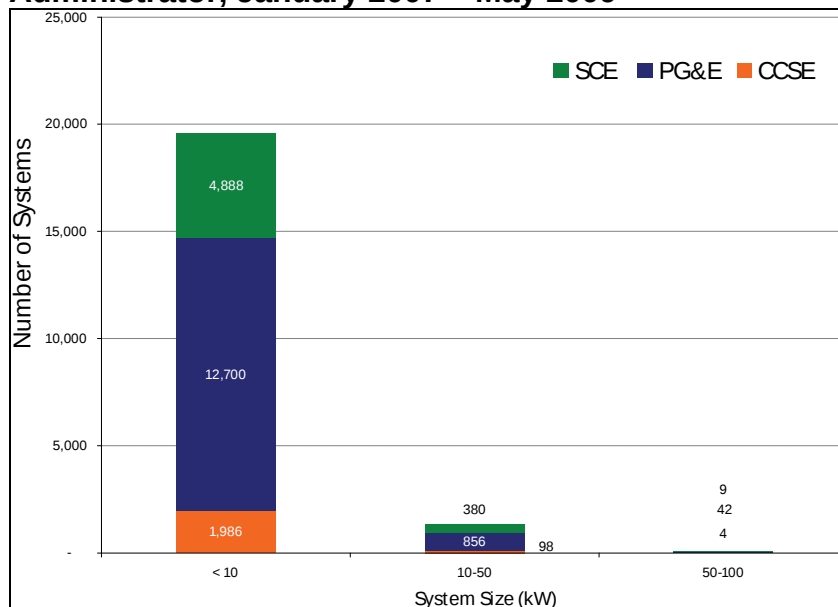
Source: www.CaliforniaSolarStatistics.com, June 10, 2009.

3.1.3.7 CSI Program Incentives by Incentive Type

As shown in Figure 13 below, 93 percent of EPBB projects – a total of 19,574 applications – are 10 kW or below. The vast majority of EPBB projects are residential. However, a small number of EPBB projects (886 projects), ranging from less than 10 kW to 100 kW, are non-residential.

Figure 13 and Figure 14 show the variation in project size for PBI and EPBB projects. Thirty-six percent of projects are less than 50 kW (390 projects); 24 percent (258 projects) are between 100 to 250 kW; 16 percent (173 projects) are between 250 to 500 kW; 9 percent are between (106 projects) are between 50 to 100 kW; 8 percent (85 projects) are between 750 kW to 1 MW; and only 6 percent (61 projects) are between 500 to 750 kW. A small number of PBI projects (305 total) are residential. As noted in Section 3.1.1, customers with systems of less than 50 kW are eligible for the EPBB incentive.

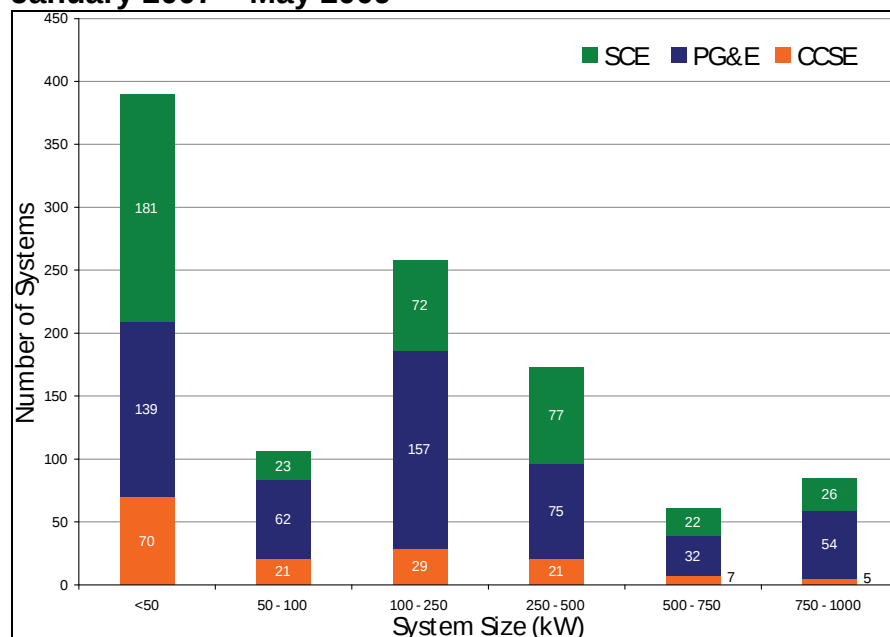
Figure 13. Number of EPBB Incentives by System Size and Program Administrator, January 2007 – May 2009²⁶



Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

A large number of projects that took the PBI incentive are below 50 kW. These projects could have opted to take the up-front EPBB incentive, but chose instead to take the PBI incentive which provides incentives based on actual performance. These projects opt for PBI likely due to the assumption that the PBI incentives will pay slightly more than EPBB incentives, assuming their systems perform optimally.

²⁶ As discussed in section 3.1.1.1, EPBB incentives were only available for systems from 50 kW to 100 kW in 2007, which accounts for the small number of EPBB projects from 50 kW to 100 kW.

Figure 14. Number PBI Incentives by System Size and Program Administrator, January 2007 – May 2009

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

3.1.3.8 CSI Program Drop Out Rate

The CSI Program drop out rate is currently estimated at 18 percent. Applicants to the CSI Program sometimes do not move forward with a reservation and are considered “drop outs.” Reasons for drop outs vary, and include but are not limited to, the lack of site suitability determined during project design, changing business conditions, and project financing constraints. The CPUC hosted a workshop on CSI Program drop outs and their effects on the CSI budget in July 2008. Since that time, CPUC staff has continued to monitor and report on both the CSI Program drop out rate and any “unreserved” incentive dollars that result. When a project receives a confirmed reservation, the capacity counts towards the current step level and an expected incentive payment is calculated and the monies set aside. When a project drops out before a step level change, the capacity is simply added back into the available pool for the same step level. When projects drop out after a step level change, the money that would have been used for the drop outs is considered unreserved, and is added back in to the program at current (i.e., lower) incentive levels. This will result in more MW of capacity for the same total amount of incentive dollars.

The sum of all unreserved incentive dollars, freed up by drop outs, was approximately \$47.6 million, as of March 31, 2009.

3.1.3.9 CSI Program Third Party Ownership Rates

We estimate that approximately 40 percent of CSI project capacity and 3 percent of total projects appear to have third-party ownership. Third-party ownership, including solar power purchase agreements (PPAs) between a solar provider and a solar project host site, is a common business arrangement in the solar project development world. Third-party ownership transactions are not tracked directly by the CSI Program database. However, there is a reasonable proxy of the frequency of third-party ownership based on looking at projects that have a “Host Customer” name that is different from a “System Owner” name. Similarly, the CSI database does not include information on whether a “System Owner” has a PPA with the “Host Customer.”

Table 12 shows 562 projects (3 percent of all projects) where the “Host Customer” is known to be different from “System Owner”. These projects make up 40 percent of total capacity.

Table 12. Third-party Owned Systems, January 2007-June 2009

	Program Administrator			
	CCSE	PG&E	SCE	Total
No. applications with different Host Customer/System Owner	68	331	163	562
% of all CSI Projects	3%	2%	3%	3%
Total capacity-applications with different Host Customer/System Owner (MW)	14	76	57	147
% of capacity of all CSI projects	41%	35%	48%	39%

Source: PowerClerk database, June 1, 2009.

3.1.3.10 CSI Marketing and Outreach

D.07-05-047 granted the CSI Program Administrators interim annual budgets of \$500,000 to conduct marketing and outreach efforts on behalf of the CSI Program. The decision noted that the CPUC would adopt a long-term marketing and outreach program at a later date.

Since 2007, Program Administrators have collectively spent \$2.4 million on marketing and outreach activities. The interim marketing and outreach efforts included basic materials such as fact sheets and brochures; direct mail campaigns to reach targeted segments of the large IOU populations; monthly training aimed at both residential customers and solar contractors to educate those groups on the specific requirements and benefits of the CSI Program; tutorial videos to educate users about the CSI Online Application; and a monthly electronic newsletter.

As noted in Table 13, training and timely communication of program changes have become the cornerstones of the CSI Program’s marketing and outreach efforts. The CSI Program Administrators have trained over 5,800 solar professionals on subjects ranging from Solar Power

Basics to specialized workshops on the EPBB Calculator, Power Purchase Agreements and interconnection process requirements. The CSI Program Administrators have also trained over 3,900 residential and small business customers, now a growing group of class attendees. Both professional trainings and customer-related information sessions have expanded over the months to accommodate weekend and evening schedules in various locations throughout the state.

The monthly electronic newsletter is enjoying similar growth. The first launch, in October 2007, was sent to 985 interested parties. Today, the distribution is over 5,300, over half of whom have voluntarily subscribed to the newsletter via opt-in forms on the Go Solar California and Program Administrator websites.

In 2009, the CSI Program Administrators will attend four major solar/renewable energy tradeshow, bringing overall exposure of the CSI Program to an additional 30,000 people professionals and customers throughout California. Other outreach efforts have been aimed at reducing barriers to solar such as supporting streamlined solar permitting processes and bringing useful decision-support tools such as solar maps and financial calculators to the public.

The CSI Program marketing and outreach efforts seek to maximize the efficiency of the program budget by integrating, as appropriate, with other demand-side management programs such as the Energy Efficiency and Demand Response programs. In addition to sharing costs, so-called “bundled messaging” opportunities provide greater reach to customers interested in overall energy savings.

Table 13. Sample CSI Marketing and Outreach Statistics

5,800+	Solar professionals attended CSI trainings
3,900+	Residential and small business customers attended CSI trainings
5,300+	Professionals & customers subscribe to the CSI monthly newsletter

Source: CPUC data requests.

3.1.3.11 CSI Program Evaluation Plan

The CSI Program Evaluation Plan, adopted in July 2008,²⁷ establishes a plan to conduct program evaluations to support the CSI in achieving its goals and creating a transparent program. The CSI Program Evaluation Plan has a nine-year work-plan and is intended to ensure that the CPUC, and by extension the CSI Program Administrators, manage the CSI in a manner consistent with the intent of the Legislature, as well as the CPUC's objectives and directives. In addition to supporting future versions of this annual report to the Legislature as required by SB 1, the Evaluation Plan is designed to ensure that the CSI Program's impacts are independently evaluated, measured, and verified to provide reliable results for decision makers, resource planners, and program implementers.

The CSI Evaluation Plan includes three main elements: 1) Progress Reports; 2) Program Evaluation Reports; and 3) Annual Program Assessments.

(1) Progress Reports – These reports are provided by CPUC staff on a quarterly or regular basis to inform the public of the progress of the program. They include information on the most pressing current issues and current program demand information. Staff has released quarterly reports in September 2007, January 2008, April 2008, July 2008, October 2008, January 2009, and April 2009.²⁸

(2) Independent Program Evaluation Reports - The Evaluation Reports are designed to look in depth at five elements of the CSI Program covering both solar PV and solar thermal technologies: 1) Impact Studies; 2) System Retention and Performance Studies; 3) Market Transformation; 4) Process Studies; and 5) Cost-Effectiveness Evaluations. The plan also includes support for other types of evaluations, including audits, the Net Energy Metering (NEM) Cost-Benefit Analysis, and any optional studies needed to fully evaluate the CSI Program. In November 2008, the CPUC staff initiated evaluation consultant solicitations and contracts for the Impact Study, Process Study, and Cost-Effectiveness Study. The contract for the Impact Study was approved in February 2009. Due to delays caused by the State's fiscal situation, the Cost-Effectiveness Study and Process Study contracts were approved in June 2009.

(3) Annual Program Assessments – This report is prepared by CPUC staff each June starting in 2009, and is submitted to the Legislature in compliance with PU Code 2851(c)(3). The assessment includes information from the evaluation and progress reports, as relevant as available. For the 2009 assessment, only information from the preliminary work of the Impact

²⁷ The CSI Program Evaluation Plan was adopted in the July 29, 2008 Assigned Commissioner's Ruling in proceeding R.08-03-008 proceeding, available at: <http://docs.cpuc.ca.gov/EFILE/RULINGS/85799.htm>. Up to \$46.7 million over 9 years was authorized for program evaluation, amounting to roughly 2.5% of the overall CSI budget.

²⁸ All reports are available online at: <http://www.GoSolarCalifornia.ca.gov/documents/csi.html>.

Evaluation is available; however, in future reports, there will be information included from other evaluation efforts.

Although the CSI Program Evaluation Plan is not yet fully underway, it is designed to assist the CPUC and the Program Administrators in managing and administering the CSI Program, particularly for information not covered in other reports.

The evaluation studies are designed to answer a number of questions about the program including, but not limited to, the following:

- What are the impacts of the program on peak electricity demand?
- What are the impacts of the program on grid reliability?
- How effective is the design and delivery of the program?
- What are the cost and benefits of net energy metering?
- Is the program cost-effective?
- Is the program achieving its goals of:
 - o Decline in solar installation costs?
 - o Increased system performance?

3.1.4 Program Budget

3.1.4.1 CSI Program Project Costs and Incentives

To date, the CSI Program has paid or reserved nearly \$866 million in incentives for total estimated project costs totaling nearly \$2.9 billion,²⁹ as shown in Table 14. In most cases, the remainder of the system costs is paid by the consumers installing the systems. The CSI Program continues to support this important sector of California's economy. The California Solar Initiative has spurred nearly \$3 billion worth of private investment in solar projects by California consumers. On average, for every \$1 in incentive paid by the CSI Program, an additional \$2 in other funds has been invested in solar technology in California from other capital sources.

²⁹ Note that a portion of the total system costs are covered through the Federal Investment Tax Credit.

Table 14. CSI Program Estimated Incentives and Total Project Costs (\$ millions), by Sector and Pending vs. Installed

	Residential		Non-Residential		Total CSI Applications	
	CSI Incentives	Total Project Costs	CSI Incentives	Total Project Costs	CSI Incentives	Total Project Costs
Pending Projects						
PG&E	\$23.2	\$135.5	\$167.0	\$408.8	\$190.2	\$544.2
SCE	\$17.3	\$79.4	\$75.2	\$232.7	\$92.4	\$312.1
CCSE	\$4.8	\$22.5	\$34.4	\$92.6	\$39.2	\$115.1
<i>Subtotal, Pending</i>	\$45.3	\$237.4	\$276.6	\$734.1	\$321.8	\$971.5
Installed Projects						
PG&E	\$92.1	\$437.1	\$182.0	\$690.3	\$274.1	\$1,127.5
SCE	\$42.9	\$173.2	\$176.0	\$499.3	\$218.9	\$672.5
CCSE	\$15.0	\$62.7	\$36.2	\$104.9	\$51.2	\$167.6
<i>Subtotal, Installed</i>	\$150.0	\$673.0	\$394.2	\$1,294.6	\$544.1	\$1,967.6
Total, All Projects	\$195.2	\$910.4	\$670.8	\$2,028.7	\$866.0	\$2,939.0

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

The CSI Program has already installed systems that are valued at approximately \$1.967 billion, that received (or will receive) incentives of \$544 million. An additional \$971 million worth of solar systems are pending installation, which will receive an additional \$322 million in incentives.³⁰

- By total project value, the residential market represents 31 percent of the total solar market covered by CSI. CPUC staff estimate that pending projects are worth \$237 million, including both the costs covered by the CSI and the system owner. Installed projects are worth and estimated \$673 million. CSI incentives cover roughly 21 percent of residential systems. Taken together these estimates suggest the residential solar market represents \$910 million of purchases to the California economy.
- The non-residential market (includes businesses, governments, and non-profits) is 69 percent of the total CSI solar market in California in terms of market value. CSI incentives cover 33 percent of non-residential systems. Considering both pending (\$734

³⁰ Projects are not required to provide total project data until the last phase of application processing, and therefore the system cost and estimated incentives figures of pending applications is based on preliminary data.

million) and installed (\$1.3 billion) projects, the non-residential solar market represents \$2.029 billion to the California economy.

3.1.4.2 CSI Program Administrative Costs

The CSI general market solar program set aside 10 percent of the total budget for administration. As shown in Table 15, the administrative budget is divided into Program Administration, Program Evaluation, and Marketing and Outreach.

Table 15. CSI General Market Solar Program 10-Year Administrative Budget (10% of Total CSI Budget)

Administrative Budget by Category	Budget (\$ millions)	% of Admin. Budget	% of Total Budget
Program Administration	\$94.85	50%	5.0%
Measurement and Evaluation	\$46.70	24%	2.4%
Interim Marketing and Outreach (\$500K per PA per Year)	\$15.00	8%	0.8%
Not yet allocated ³¹	\$33.15	18%	1.8%
Total Administrative Budget	\$189.70		

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

As shown in Table 16, the CSI Program spent \$21.7 million on Program Administration through the end of 2008. The CPUC requires that the Program Administrators report semi-annually on non-incentive program expenditures and that information is summarized in Table 16. The Program Administrators report both administrative budgets, as well as marketing and outreach expenditures, since those budgets were authorized separately by the CPUC. PG&E has the highest expenditures of the three Program Administrators, but as noted elsewhere in this report, PG&E also has handled the highest volume of CSI applications. The CPUC plans examine the administrative budget as part of its ongoing program review.

³¹ The Commission expects to address in a future decision how the Program Administrators should allocate administrative funds not yet allocated. Potential uses are for additional program administrative costs or increased marketing and outreach. The CPUC Scoping Memo and Ruling Of Assigned Commissioner and Administrative Law Judges in R.08-03-008, May 15, 2008, identified the Long Term marketing and outreach as a topic for future consideration in the rulemaking.

Table 16. Summary of CSI Program Administrator Expenditures, current as of December 31, 2008

Year	Category	PG&E	SCE	CCSE	Totals	% of Admin Budget**
2007	Administration	\$3,441,063	\$2,044,504	\$881,974	\$6,367,541	3.4%
	Marketing & Outreach	\$276,857	\$239,056	\$411,942	\$927,855	0.5%
	Measurement & Evaluation*	\$0	\$0	\$0	\$0	-
2007 Subtotal		\$3,717,920	\$2,283,560	\$1,293,916	\$7,295,396	3.8%
2008	Administration	\$6,823,091	\$5,055,336	\$1,077,287	\$12,955,714	6.8%
	Marketing & Outreach	\$722,751	\$183,476	\$604,351	\$1,510,578	0.8%
	Measurement & Evaluation*	\$0	\$0	\$0	\$0	-
2008 Subtotal		\$7,545,842	\$5,238,812	\$1,681,638	\$14,466,292	7.6%
Program Totals		\$11,263,762	\$7,522,372	\$2,975,554	\$21,761,688	11.5%

Source: January 2008 and January 2009 Program Administrator Semiannual Expense Reports submitted to CPUC Energy Division.

Notes: *Separate Program Evaluation activities did not commence until FY 2009. Any costs associated with implementing evaluation activities in 2007 and 2008 are included in “Administration” expenditures.

**Total CSI Administrative Budget is \$189.7 million for all three Program Administrators through 2016.

3.2 Single-Family Affordable Solar Homes (SASH) Program

3.2.1 Program Background

The Single-Family Affordable Solar Homes Program (SASH), the single-family low income portion of the CSI Program, was adopted by the CPUC in November 2007 in D.07-11-047. GRID Alternatives (GRID) was selected as the statewide SASH Program Manager and is currently running the program in all three large IOU territories.

The goal of the program is to provide qualifying low income homeowners with access to PV systems to decrease electricity usage and bills without increasing monthly household expenses.

The CPUC set a target goal of 1,000 solar installations by the end of 2010. In addition to providing low income residents 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 residents and meet the goal of being neutral to monthly expenses, the SASH Program provides eligible residents with a higher incentive than the CSI general market solar program. The higher incentive is intended to make the economics of solar attractive to low-income residents, some of whom may be already receiving a reduced electricity rate through the California Alternate Rates for Energy (CARE) program. In addition, the incentive level is fixed, unlike the general market CSI incentive that must decline on average at 7 percent per year.

GRID is a unique non-profit providing renewable energy services, equipment, and training in low income communities in California since 2001. GRID has trained over 2,230 community volunteers and job trainees in solar installation and energy efficiency, and continues to serve low income communities through the SASH Program. As Program Manager, GRID identifies eligible low-income households, markets the SASH program, and installs PV systems for eligible SASH participants.

3.2.1.1 Program Eligibility

The SASH Program is open to single-family, low income households as defined in PU Code 2852. PU Code 2852 (b)(2)(B) defines affordable housing as being part of a "residential complex". Thus, single-family home must be part of two or more-unit development project in order for the SASH Program.³²

3.2.1.2 Program Incentives

Eligible households will be provided a one-time payment under the CSI EPBB structure to help reduce the cost of installation. The SASH Program has one fully-subsidized and six highly-subsidized incentive payment levels based on the applicant's income compared to the area median income (AMI),³³ tax liability, and eligibility in the CARE program. The incentive rates shown in Table 17 are intended to provide low income residents who have no federal tax liability with a positive cash flow in the first year of solar installation.

³² For more information on SASH Program eligibility, please see the CSI Program Handbook, available at: <http://www.GoSolarCalifornia.ca.gov/documents/csi.html>.

³³ For more information on AMI, please visit: http://www.hcd.ca.gov/hpd/hrc/rep/state/cdbg_home09.pdf.

- **Fully-Subsidized (Free Systems)**

The SASH Program provides a full-subsidy for 1 kW systems to owner-occupied households that qualify as “extremely low income” or “very low income” (i.e., less than 50 percent of AMI). This subsidy is capped at a maximum of \$10,000 per qualifying household. A household that qualifies for a fully-subsidized system can either install a system sized up to 1 kW at no cost or take a partial-subsidy, as described in Table 17 below, for a larger system.

- **Partially-Subsidized Systems**

The partial-subsidy is available to customers whose total household income is below 80 percent 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 and participation in the CARE program. If the applicant qualifies for the CARE program but is not currently enrolled, GRID will work with the applicant to enroll them into the CARE program.

Table 17. SASH Incentive Rates in \$/Watt

Federal Income Tax Liability	Low-Income CARE- Eligible	Low-Income Residents not Eligible for CARE
\$0	\$7.00	\$5.75
\$1 to \$1000	\$6.50	\$5.25
\$1001 +	\$6.00	\$4.75

Source: D.07-11-045

3.2.2 Regulatory Status

In December 2006, the CPUC established via D.06-12-033 that 10 percent of the overall CSI Program and budget would be set aside for low income programs. The Legislature also passed a bill which the Governor signed into law in fall 2006, AB 2723 (Pavley, 2006), that established PU Code Section 2852, and required that 10 percent of the CSI overall budget be set aside for incentives for low income programs. In November 2007, the SASH Program was adopted by the CPUC in D.07-11-045 to be consistent with PU Code 2852. The SASH program is allocated half of the low income budget, \$108 million, through 2015 as part of the overall CSI Program. The remaining half of the low income budget is allocated to the MASH program, described below.

Pursuant to D.07-11-045, the CPUC Energy Division staff established the requirements for a SASH Program Manager. Southern California Edison (SCE) was selected and directed to fulfill the contracting and administrative duties related to the management of the SASH Program.

SCE's contract to retain GRID as the SASH Program Manager was effective as of November 7, 2008.

3.2.3 Program Progress

3.2.3.1 Program Applications

SASH began accepting applications in December 2008; just one month after Grid Alternatives received a final contract to administer the program. Grid Alternatives developed final program requirements and application materials in early 2009. The SASH Program Handbook changes were approved in April 2009, and SASH completed its first installation in April. Through mid-May, SASH has received a total of 15 applications, and expects that application volume will increase significantly now that program requirements are becoming known and better understood.

Table 18. SASH Applications by Month

Months	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	TOTAL
Applications	2	0	0	11	1	1	15

Source: Data provided by GRID Alternatives, May 14, 2009.

SASH has approved seven applications for PV solar installations, and the remaining eight applications are currently pending, awaiting eligibility approval. SASH allocated \$9,608 for the initial solar installation as of April 2009. SASH has staff in four offices throughout the state: Oakland, Fresno, Los Angeles, and San Diego. The staff is conducting outreach in low income communities, working directly with low income residents to evaluate program eligibility, and coordinating with local housing authorities to identify eligible housing.

3.2.3.2 Marketing and Outreach

The first quarter of 2009 was dedicated to developing the SASH program administrative infrastructure and finalizing the Marketing and Outreach plan as well as getting the SASH Program rules incorporated into the CSI Program Handbook. Part of the start-up included development of the first SASH brochure, which was translated into five languages. GRID Alternatives is developing additional outreach materials designed to reach a broad population of low income residents.

GRID Alternatives has conducted outreach for the SASH program through collaboration with local government agencies and community-based organizations to identify eligible populations throughout the state. In addition to identification, GRID has partnered with these agencies and organizations to establish relationships with this segment of low income residents.

3.2.3.3 Evaluation

In accordance with the CPUC decision, the SASH program will be evaluated by CPUC staff and an independent evaluator. GRID will be required to report to the CPUC on program progress on a regular basis, and in addition, the CPUC's Energy Division will select an independent evaluator to review the entire SASH Program.

3.2.4 Budget

In D.06-12-033, the CPUC reserved 10 percent, or \$216.7 million, of the CSI funds for low income programs. Pursuant to D.07-11-045 in R.06-03-004, on November 16, 2007, the CPUC established the Single Family Low Income Incentive program with the budget breakdowns shown in Table 19 and Table 20 below. For information on SASH Program expenditures to date, see Table 35.

Table 19. SASH Budget Allocations by IOU Service Territory

Utility	PG&E	SCE	SDG&E	Total
Percentage	43.7%	46%	10.3%	100%
Total Budget	\$47.34	\$49.80	\$11.20	\$108.34

Source: D.07-11-045

Table 20. SASH Budget Allocations by Function³⁴

Function	Allocation
Administration	10%
Marketing and Outreach	4%
Measurement and Evaluation	1%
Incentives	85%

Source: D.07-11-045

³⁴ The MASH and SASH program were established separately from the general market solar program, and have different budget allocations from the general market solar program.

3.3 Multifamily Affordable Solar Housing (MASH) Program

3.3.1 Program Background

In October 2008, the Multifamily Affordable Solar Housing (MASH) Program (D.08-10-036). The CSI general market Program Administrators –PG&E, SCE and CCSE-serve as Program Administrators for the MASH Program in their respective service territories. The Program Administrators manage the MASH program because the target customers of the MASH program, affordable housing building owners, are similar to commercial and non-profit customers of the general market program.

The goals of the MASH program are to: (a) Stimulate adoption of solar power in the affordable housing sector; (b) Improve energy utilization and overall quality of affordable housing through application of solar and energy efficiency technologies; (c) Decrease electricity use and costs without increasing monthly household expenses for affordable housing building occupants; and (d) Increase awareness and appreciation of the benefits of solar among affordable housing occupants and developers.³⁵

3.3.1.1 Incentive Types

MASH offers two types of incentives, Track 1 and Track 2.

As shown in Table 24, Track 1 offers up-front incentives for solar systems that cover the electricity load for common and tenant areas. As with the SASH program, these incentives don't decline over time.

Table 21. MASH Track 1 Incentive Rates in \$/Watt

Track 1A: PV System Offsetting Common Area Load	Track 1B: PV System Offsetting Tenant Area Load
\$3.30/Watt	\$4.00/Watt

Source: D.08-10-036.

³⁵ D.08-10-036, p. 7.

Track 2 offers higher incentives to applicants who provide quantifiable "direct tenant benefits" (i.e. any operating costs savings from solar that are shared with their tenants). Applications for Track 2 incentives are accepted every six months through a competitive bid process.

3.3.1.2 Virtual Net Metering

Virtual Net Metering (VNM) allows MASH participants to install a single solar system to cover the electricity load of both common and tenant areas in a low income multifamily residence, and the participating utility will allocate bill credits resulting from the production of that solar system to both the building owner and tenant utility accounts. The intent of VNM is to help low income multifamily residents receive financial benefits of solar technology. VNM also gives building owners the option of installing a single solar system to cover both common area and tenant load without master-meters and site-specific upgrades that are potentially cost-prohibitive.

VNM is currently limited to MASH participants through a tariff offered by PG&E, SCE and SDG&E. However, per D.08-10-036, the CPUC may consider expanding VNM to all multi-tenant properties beyond the MASH Program.

3.3.1.3 Eligibility

The MASH program is open to multifamily affordable housing properties that meet the definition of "low income residential housing" per PU Code 2852 and have an occupancy permit of at least two years.

3.3.2 Regulatory Status

D.08-10-036 established the MASH Program. Half of the 10 percent low income set-aside budget per PU Code 2852 (\$108 million) was allocated to the MASH Program. Per PU Code 2852, which includes properties that have deed restrictions and at least 20 percent of the tenants are low income, the MASH program will run as part of the California Solar Initiative until 2015, or until funds are exhausted.

3.3.3 Program Progress

The MASH Program began accepting applications for Track 1 incentives in March 2009 and Track 2 applications in May 2009 in all three large IOU service territories. Program progress is shown in Table 22.

Table 22. MASH Applications by Month

Months	Feb 09	Mar 09	Apr 09	May 09	Total
Applications	16	5	1	1	23

Source: MASH Program Administrators, May 2009

Table 23. MASH Applications by Program Administrator and Incentive Track

Program Administrator	PG&E	SCE	SDG&E	Total
Total Track 1A (Common Area) Applications	12	5	0	17
Total Track 1B (Tenant Area) Applications	3	2	1	6
Total Track 1A Applications	15	7	1	23

Source: MASH Program Administrators, May 2009

- **PG&E**

As of May 15, 2009, PG&E received a total of 15 applications worth 0.7 MW and \$2.6 million incentive dollars. Of these 15 projects, 12 applied for incentives for both common and tenant areas and 3 projects applied for common area incentives only.

- **SCE**

As of May 11, 2009, SCE received a total of 7 applications worth 0.8 MW and \$3.0 million incentive dollars. Of these 7 projects, 5 projects applied for incentives for both common and tenant areas and 2 projects applied for common area incentives only.

- **CCSE**

As of May 28, 2009, CCSE received one application worth 0.2 MW and \$67,600 incentive dollars. This project applied for tenant area incentives only.

3.3.4 Budget

As with the SASH program, pursuant to the D.06-01-024, the CPUC reserved 10 percent, or \$216.68 million, of the CSI funds for the low income programs. On February 7, 2007, the CPUC issued an Assigned Commissioner's Ruling in R.06-03-004 setting aside half of the CSI low income budget (\$108 million) for the MASH Program. This budget, shown Table 24, was adopted by the CPUC in D.08-10-036. For information on MASH Program expenditures to date, see Table 35.

Table 24. MASH Budget Allocations by Utility Territory

Utility	PG&E	SCE	SDG&E	Total
Percentage	43.7%	46%	10.3%	100%
Total Budget	\$47.34	\$49.8	\$11.2	\$108.34

Source: D.08-10-036

Table 25. MASH Budget Allocations by Function³⁶

Function	Allocation
Administration and Marketing and Outreach	12%
Measurement and Evaluation	2%
Incentives	86%

Source: D.08-10-036

3.4 Solar Water Heating Pilot Program (SWHPP)

3.4.1 Program Background

Unlike solar PV, Solar Water Heating (SWH) is a relatively old technology that has been in use for more than a century. Incentives provided by the state in the early 1980s resulted in the deployment of thousands of SWH systems, but some analysis suggests that the subsidies may have indirectly caused price increases and the deployment of a small number of faulty systems. When state and federal subsidies ended, the solar water heating market shrank considerably. In creating the CSI, the CPUC considered whether to incentivize PV only or PV and solar water heating systems within the program. In order to avoid the mistakes of the past, the CPUC decided to create the Solar Water Heating Pilot Program (SWHPP) in 2006 to test what program design could rejuvenate a market for solar water heating systems. The pilot program runs through December 31, 2009, or until funding is depleted, whichever is sooner. The pilot program is investigating various issues, including: SWH technology performance, contractor performance and warranties, the economics of SWH technologies, and market perceptions and awareness.

The SWHPP is limited to the service territory of San Diego Gas and Electric Company (SDG&E) under the administration of the California Center for Sustainable Energy (CCSE). Funding for the pilot is limited to \$3 million, provided by electric ratepayers, and incentives are based on the energy displacement of each participating system. The program has a goal to install 750 systems. One major change from the days of California's earlier SWH incentive programs is that the Solar Rating and Certification Corporation (SRCC) now certifies SWH systems to

³⁶ The CSI MASH and SASH programs were established separately from the general market solar program and have different budget allocations for the general market solar program.

ensure that they meet minimum quality standards. The SWHPP requires SRCC certification for all systems receiving incentives.

3.4.2 Regulatory Status

The SWHPP was originally scheduled to end on December 31, 2008, but it was later extended to December 31, 2009 or until exhaustion of funds. The SWHPP launched in July 2007 after the CPUC issued an Assigned Commissioner's Ruling (ACR) on February 15, 2007.

SB 1 in 2006 limited the source of funding the CSI Program to electric ratepayers only. Despite this restriction on collecting funds only from electric ratepayers, the CPUC determined it would use CSI funds for the pilot, which displaces both gas and electricity, to obtain useful information on the economics of solar hot water heating.

Assembly Bill (AB) 1470 (Huffman, 2007) requires the CPUC to use the data from the SWHPP to inform creation of a possible \$250 million statewide SWH subsidy program for natural gas-displacing systems, and stipulates that the CPUC should move forward with a program aimed at installing 200,000 natural-gas displacing SWH systems statewide only if it finds that it would be cost-effective for ratepayers and in the public interest to do so.³⁷

The CPUC staff, in collaboration with CCSE, designed the pilot to ensure that adequate data was collected to inform a statewide SWH program. As part of this effort, CCSE, under the direction of Energy Division, contracted with Itron, Inc. to evaluate the SWHPP, investigate SWH market barriers, and devise a cost-effectiveness methodology to resolve the outstanding questions about the cost-effectiveness of SWH technology and incentives. Energy Division is currently incorporating that analysis into a proposal on how to move forward on SWH with respect to AB 1470 and the CSI non-PV electric displacing fund. On April 1, 2009, Itron released its cost-effectiveness analysis for SWH, an addendum to the January report.

The CPUC staff is expected to release a staff proposal in early summer 2009 related to SWH, based on information from the SWHPP and the abovementioned evaluation reports. Meanwhile, the SWHPP is still in operation in SDG&E territory.

³⁷ PU Code 2852 (a) "The commission shall evaluate the data available from the Solar Water Heating Pilot Project conducted by the California Center for Sustainable Energy. If, after a public hearing, the commission determines that a solar water heating program is cost effective for ratepayers and in the public interest, the commission shall do all of the following: (1) Design and implement a program applicable to the service territories of a gas corporation, to achieve the goal of the Legislature to promote the installation of 200,000 solar water heating systems in homes and businesses throughout the state by 2017."

3.4.3 Program Progress

As of May 8, 2009, the program has received 211 applications for a total of \$291,000 in direct incentives (see Table 26). These direct incentives provided by the SWHPP have been matched more than 5 to 1 by private investment, bringing total project spending on SWH to \$1.6 million as a result of the pilot project.

Although the SWHPP has so far fallen short of its overall goal of 750 systems installed, the program has brought to light a number of market barriers that could be the focus of a statewide program aimed at widespread adoption of SWH technology. These market barriers include high upfront capital cost, lack of public knowledge about SWH, permitting costs and requirements, and the lack of a well-developed SWH workforce.

Table 26. Participation data for Solar Water Heating Pilot Program

System Type	Natural Gas	Residential			Commercial	Totals
		Propane	Electric	Other		
Number of applications	80	40	62	12	17	211
Total Incentives	\$95,909	\$48,642	\$80,558	\$16,459	\$49,601	\$291,169
Average Incentive	\$1,199	\$1,216	\$1,299	\$1,372	\$2,918	\$1,380
Total System Cost	\$522,212	\$276,608	\$393,439	\$131,907	\$294,296	\$1,618,462
Average System Cost	\$6,528	\$6,915	\$6,346	\$10,992	\$17,312	\$7,670
Total Savings per year	9,607 thm	5,078 thm	167,767 kWh	32,645 kWh	N/A	N/A
Average System Savings per year	120 thm	127 thm	2706 kWh	2,720 kWh	N/A	N/A

Source: CCSE, Data through May 11, 2009.

Note: savings of natural gas-displacing systems are in units of therms/year, and savings of electric displacing systems are in units of kWh/year.

3.4.4 Budget

The SWHPP is funded with \$2.59 million in CSI Program funds collected by SDG&E. Table 27 shows a breakdown of the program budget as established by the Assigned Commissioner's Ruling issued on February 15, 2007.

Table 27. SWH Pilot Program Budget

Cost category	Funding Amount
Labor	\$638,430
Travel	\$5,000
Metering Equipment	\$110,000
Mileage	\$29,000
Incentives	\$1,500,000
Marketing Materials	\$96,300
Installer Training	\$12,000
Program Evaluation	\$200,000
Total	\$ 2,590,730

Source: CPUC Ruling, February 15, 2007, R.06-03-004.

3.5 CSI Research, Development, Demonstration, and Deployment (RD&D) Program

3.5.1 Program Background

The primary purpose of the CSI Research, Development, Demonstration and Deployment (RD&D) Program is intended to identify and support projects that will help reach the CSI Program's goal of 1,940 MWs of installed distributed solar by 2016, and create a self-sustaining, subsidy-free solar market in the years beyond. The CSI RD&D Program focuses on implementation of the CPUC's adopted RD&D Plan which establishes the funding priorities for the \$50 million RD&D program as the following:

- Improving the economics of solar by reducing installed costs and increasing performance
- Enabling wide-scale deployment of distributed solar technologies by filling knowledge gaps
- Overcoming barriers to technology adoption
- Taking advantage of California's data from past, current, and future installations
- Providing bridge funding to help promising technologies make the transition to commercial viability

- Supporting efforts to integrate distributed power into the grid and maximize value to ratepayers
- Integrating the above goals with an eye toward issues that directly benefit California and may not be funded by others

The portfolio of RD&D projects will be allocated across the following RD&D stages:

- **Research:** Fundamental research to improve performance of energy technologies
- **Development:** Activities which convert research into working prototypes of improved technologies
- **Demonstration:** Activities which bring promising technologies closer to market by demonstrating their real-world feasibility to manufacturers
- **Deployment:** Aiding new technologies in gaining wide-scale adoption or to reach a “tipping point” into widespread commercialization

Within these four stages, project funds will be dispersed across a variety of different activities with distinct risk and result timeframes. The tables below show the guidelines for the RD&D budget targeted by development stages, expected activity (objectives), and expected results timeframe. Table 28 shows that the RD&D portfolio will be heavily focused on demonstration projects, with less emphasis on direct research and even less on development and deployment. Table 29 shows that 50-65 percent of funds allocated in any RD&D atage should involve grid integration, storage or metering advancements. Likewise, a smaller percentage of recipient projects should involve production technologies and business development. Finally, Table 30 shows that about 60 percent of all funded projects, again measured in dollars, should show results in the 1-3 year time frame, 20 percent in the 4-7 year time frame, and 20 percent in 8 or more years.

Table 28. RD&D Budget by Stages

RD&D Stages	Budget % (Range)	Budget (Max \$ in millions)
Demonstration	50-60%	\$25.5
Research	20%	\$8.5
Development	10-15%	\$6.4
Deployment	0-15%	\$6.4
TOTAL*	100%*	\$42.5*

Source: D.07-09-042.

Note: *Total not to exceed \$42.52 million; not all stages will be able to spend to Maximum \$ amount.

Table 29. RD&D Budget by Target Activities

Target activities	Budget % (Range)	Budget (Max. \$ in millions)
Grid integration, storage & metering	50-65%	\$27.638
Production technologies	10-25%	\$10.63
Business development	10-20%	\$8.504
TOTAL*	100%	\$42.52

Source: D.07-09-042.

Note: *Total not to exceed \$42.52 million; not all stages will be able to spend to Maximum \$ amount.

Table 30. RD&D Budget by Results Timeframe

Results timeframe	Budget %	Budget (in millions)
1-3 years	60%	\$25.512
4-7 years	20%	\$8.504
8+ years	20%	\$8.504
TOTAL	100%	\$42.52

Source: D.07-09-042.

Note: *Total not to exceed \$42.52 million; not all stages will be able to spend to Maximum \$ amount.

3.5.2 Regulatory Status

The CPUC established a \$50 million budget for the CSI RD&D program in D.06-12-033. The CSI RD&D program was codified in PU Code 2851 as part of SB 1. PU Code 2851(c)(1) as enacted by SB 1 states the Commission shall:

“... not allocate more than \$50 million to research, development, and demonstration that explores solar technologies and other distributed generation technologies that employ or could employ solar energy for generation or storage of electricity or to offset natural gas usage.”

The CSI RD&D Plan, established in September 2007 by D.07-09-042, identifies the goals and objectives of the program, sets forth allocation guidelines for RD&D funds, and establishes criteria for solicitation, selection and funding of RD&D projects. The RD&D portfolio allocation percentages are guidelines and are meant to help steer funds across a range of diverse projects – they should not be interpreted as firm limits. The intent of the RD&D Plan is to provide a flexible framework for the CPUC to select the most promising projects, which will yield the greatest public benefit. As required in D.07-09-042, \$10 million of the CSI RD&D Program will be allocated towards construction of the Helios Solar Energy Research Center at U.C. Berkeley, gaining leverage from additional funds committed from a variety of sources for a solar research program.

3.5.3 Program Progress

Through a competitive solicitation, the CPUC selected Itron, Inc. in July 2008 as the Program Manager for the RD&D program. Itron is responsible for developing requests for proposals (RFPs), evaluating grant requests, entering into grant agreements, and monitoring progress on all approved projects. To date, Itron has:

- Identified potential co-funding partners including U.S. Department of Energy (DOE), National Renewable Energy Laboratory (NREL), and Public Interest Energy Research (PIER).
- Launched a website (www.calsolarresearch.ca.gov).
- Released a draft grant solicitation and draft grant agreement for the first solicitation which will focus on grid integration. After review of comments on the draft, the grant solicitation is due for final release in mid-summer of 2009.
- Facilitated an initial grant to the Helios Solar Energy Research Center at U.C. Berkeley. Helios is a joint solar energy effort of Lawrence Berkeley National Laboratory (LBNL) and U.C. Berkeley. A key focus is developing low cost solar energy conversion technology using PV and successor materials. Helios will be owned and operated by U.C. Berkeley and will employ 500 people.

3.5.4 Budget

The CPUC established the CSI RD&D Program budget in D.06-12-033 and further detailed budget requirements in D.07-09-042. The administrative costs for the CSI RD&D Program are incorporated into the total CSI RD&D Program budget. To prevent ratepayers from excessive exposure to unreasonable costs, the CPUC capped the total administrative costs at 15 percent of the total CSI RD&D Program budget. These administrative costs include the Program Manager's costs, the Program Evaluator's costs, the costs of performing all evaluations on the program or grant recipients, as well as costs incurred by the large IOUs for accounting, reporting, and implementing the program.

Overall program administration costs over the eight-year life of the program are approximately \$5.98 million with another \$1.5 million reserved for triennial program evaluation activities. Itron is responsible for management of the \$50 million allocated for the budget and will continue to record expenditures across activity categories for transparency and accountability. The budget breakdown in Table 31 below is based on the guidelines established in D.07-09-042.

Table 31. CSI RD&D Program Budget Allocations

	Estimated Budget (millions)
Administration	\$5.98
Triennial Evaluations	\$1.50
Grants/Incentives	\$42.52
Total	\$50.00

Source: D.07-09-042.

4. CSI Program Impacts, Costs and Benefits

This section includes information on the work related to assessing the CSI Program impacts, including an evaluation of the costs and benefits of the CSI Program.

4.1 CSI Program Impacts

4.1.1 Analytical Approach

As of June 2009, the first CSI Impact Evaluation, covering Program Years (PY) 2007 and 2008, is underway, and a final report is expected to be released in the fall of 2009. For the purposes of this report, the CSI Impact Evaluation contractor used currently available data and developed a preliminary report on program impacts on peak demand for electricity, as well as the annual energy contribution of CSI systems.³⁸ Some select preliminary data analyses from the Impact Evaluation are included in *Appendix A: Assessment of CSI Program Participation*.

The CSI Impact Evaluation report is intended to measure the impacts of the CSI Program on electricity energy production and demand reduction, performance relative to installed capacity, and GHG emissions reductions. To provide an accurate analysis of CSI Program impacts, a representative sample of solar system metered performance data must be collected, and combined with project information and engineering methods (e.g., methods for estimating the performance of sites for which metered data was not available).

The CSI Impact Evaluation contractor, Itron, Inc., has collected metered system performance data from third party data providers in accordance with CSI Program Handbook rules and in cooperation with the CSI Program Administrators. Performance data comes from Performance Data Providers (PDPs) that provide data on systems paid under the Performance Based Incentive (PBI) framework, as well as Performance Monitoring and Reporting Service (PMRS) providers that provide data from “non-exempt” Expected Performance Based-Buydown (EPBB) incentive recipients.³⁹

In preparation of the preliminary report, metered data was received from all relevant PBI systems, but only a small portion of completed EPBB systems. State contracting procedures and budget issues delayed the start of several of the contractor evaluations, and this delayed the start of the data collection process. Although full data was not available in time for this report, by

³⁸ More information on CSI Program impacts is available in Itron's *Preliminary Program Impacts Results Report* (June 2009), available at <http://www.cpuc.ca.gov/PUC/energy/Solar/evaluation.htm>.

³⁹ EPBB applicants are required to take PMRS service unless the cost of PMRS exceeds the cost cap, see CSI Program Handbook.

combining the available metered data with robust engineering estimates, the CSI Impact Evaluation contractor was able to develop a preliminary report on CSI Impacts.

Since the CSI Impact Evaluation cannot be finalized without additional data, the CSI Impact Evaluation contractor, the CPUC staff, and CSI Program Administrators are currently collaborating on collecting a larger sample of performance data from CSI systems. Collection of an improved sample of metered performance data is absolutely essential for the CPUC to release a finalized CSI Impact Evaluation. The finalized CSI Impact Evaluation results will be a key input into the CSI cost benefit analysis, as well as analysis on the costs and benefits of net energy metering.⁴⁰ Once additional performance data is collected and reviewed, the finalized CSI Impact Evaluation for 2007 and 2008 is expected to be released in the fall of 2009.

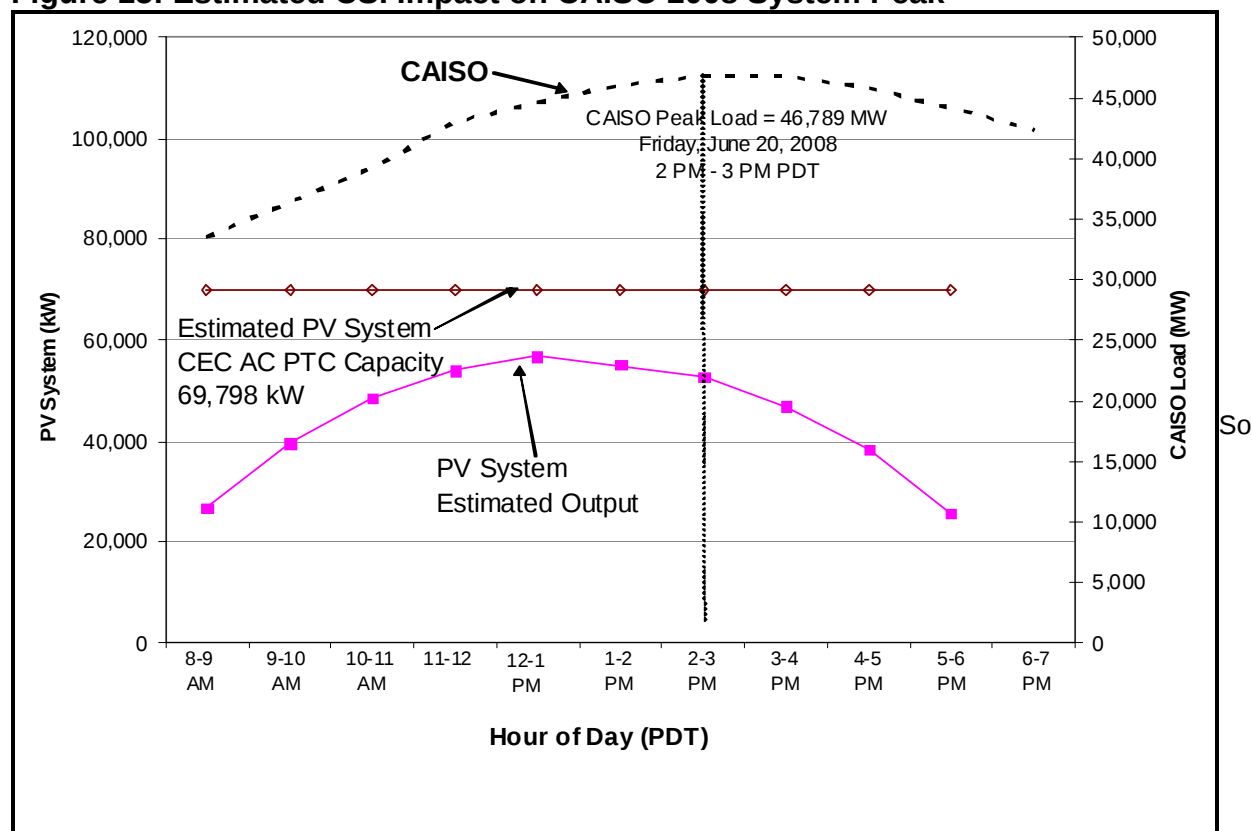
The information provided in the Appendices includes analysis of data from the program application database (Powerclerk), collected metered performance data, and engineering estimates.

4.1.2 Preliminary Findings

In Itron's *Preliminary Program Impacts Results Report* (June 2009), the electrical energy and demand impacts were estimated for projects completed or deemed to be active and on-line prior to December 31, 2008. The key energy and demand impacts are as follows:

- Residential projects represented the large majority of the total number of projects, but just under half of the total rebated capacity.
- Commercial projects represented 50 percent of the total rebated capacity. There were more non-profit projects than government projects. However, the government projects were larger and represented slightly more of the total rebated capacity.
- The annual average capacity factor for CSI PV systems for 2008 was 0.20.
- Over 6,300 CSI systems were estimated to be on-line during the 2008 CAISO peak. As shown in Figure 15, these systems had a rebated capacity of nearly 70 MW and provided an estimated 55 MW of generating capacity during the peak hour.
- At the end of 2008, the total installed generating capacity of grid connected PV in California was less than 500 MW, whereas the 2008 CAISO peak transmission capacity was close to 47,000 MW. As market penetration of PV increases in future years, transmission system impacts from PV systems should become greater and more readily observable.

⁴⁰ In PU Code 2827 (c)(4), the CPUC is required to submit to the Governor and Legislature a report on the costs and benefits of net energy metering.

Figure 15: Estimated CSI Impact on CAISO 2008 System Peak

Source: Itron, *Preliminary Program Impacts Results Report*, June 2009

4.1.2.1 Online Peak Capacity

Figure 15 shows the estimated impact of CSI projects on the 2008 CAISO system peak. Table 32 shows the number of systems which were online during the CAISO peak in 2007 and in 2008. (The number of on-line systems for 2007 and 2008 is higher than the number of systems that were online during the peak hour of the year since many systems are installed after the peak occurs in any given year.) The table also provides information on the overall CSI program impact on electricity demand coincident with CAISO system peak loads in 2007 and 2008. During the peak hour in 2008, CSI installed solar systems had a "peak-hour capacity factor" of 0.75, meaning that approximately 75% of all installed solar capacity was performing at that hour.

Table 32. Estimated Demand Impact Coincident with CAISO System Peak

Year	PV Systems On-line During Peak (n)*	Estimated Rebated Capacity (MW _r)	On-Line Peak Capacity (MW _p)	Peak-Hour Capacity Factor (MW _p / MW _r)
2007	1,006	6.4	4.4	0.69
2008	6,322	69.8	52.6	0.75

Source: Itron, *Preliminary Program Impacts Results Report*, June 2009

Note: This differs from the number of systems online as of December 31, 2008, because approximately 5,500 more systems were installed between June 20, 2008 and December 31, 2008.

4.1.2.2 PA-Specific Peak Demand Impacts

The preliminary impacts report included very limited PV metered data at the Investor Owned Utility (IOU) level for 2007 and 2008. Consequently, while PA-specific peak demand impacts have been estimated, they should not be considered statistically significant. Table 33 shows the number and estimated capacity of PV systems online during the CAISO system peak by PA and the associated impact on the CAISO peak.

Table 33. Estimated Peak Demand Impact Coincident with CAISO System Peaks by PA (2008)

Year	Program Administrator	PV Systems On-line During Peak (n)*	Estimated Rebated Capacity (MW _r)	On-Line Peak Capacity (MW _p)	Peak-Hour Capacity Factor (MW _r / MW _p)
2008	PG&E	4,370	39.2	29.6	0.75
	SCE	1,411	24.4	18.4	0.75
	CCSE	541	6.2	4.6	0.75

Source: Itron, *Preliminary Program Impacts Results Report*, June 2009

Note: This differs from the number of systems online as of December 31, 2008, because approximately 5,500 more systems were installed between June 20, 2008 and December 31, 2008.

4.1.2.3 Distribution System Impacts

In analyzing the impacts on the distribution system, the preliminary observations include:

- The peak power output of PV facilities on the PG&E and SCE circuits analyzed in most cases occurred earlier than the daily peak load on the circuits under 2008 summer peak loading conditions, but a varying degree of overlap was still observed.
- This overlap resulted in some reduction of 2008 peak circuit loading (thus increasing the useable circuit capacity) by 0.1 to 3.6 percent for the SCE circuits and 0.5 to 3.1 percent for the PG&E circuits,.
- As a result of the local PV generation, electrical heating losses on the PG&E distribution circuits analyzed were reduced from 1.7 to 2.4 percent at the time of peak circuit loading. (Note –corresponding 2008 results are unavailable for SCE circuits.)
- The presence of PV generation on a circuit can shift the time of the peak (net) circuit loading as measured at the respective substation.

4.1.2.4 CO2 Reduction Impacts

PV installations result in a direct displacement of electricity that would have otherwise been generated from natural gas fired central station power plants. As a result, the preliminary CO2 emission impacts were based on the amount of CO2 that would have been generated by the mix of utility electricity generation sources. Preliminary CO2 Impacts are as follows:

- Overall, the CSI provided nearly 89,000 tons of avoided GHG emissions (as CO2 equivalent) during 2008.
- Over 54 percent of the GHG emission reductions resulted from CSI PV systems installed in the PG&E service territory.
- In comparison, CSI PV facilities installed in the SCE and CCSE (SDG&E) regions resulted in approximately 36 percent and 10 percent of the overall 2008 GHG emission reductions, respectively.

4.2 CSI Program Costs

This section reports on ratepayer-supported costs that are charged to the CSI Program balancing accounts. This section does not include any broader discussion of non-program specific costs, such as net energy metering and interconnection. A broader concept of CSI Program costs can only be assessed through a full cost-benefit analysis, as discussed in Section 4.5 below.

4.2.1 CSI Program Balancing Accounts

In D.06-12-033, the Commission established a total budget of \$2.167 billion over ten years for the CSI, including all program components. (See Table 2) The large IOUs were authorized to collect the CSI Program funds from electric ratepayers according to the schedule provided by the CPUC.⁴¹ The CSI funds are held by each utility in a balancing account, which is a standard utility accounting practice. The CSI schedule of collection is slightly front-loaded for a number of reasons, including ensuring that participants applying for CSI incentives today can be confident that the funds will be available for their projects upon completion.

The CSI Program has collected 36 percent of the total authorized ten year budget through the end of 2008. Table 34, below, shows that as of December 31, 2008, the large IOUs had collected just over \$780 million and spent more than \$150 million. The CSI expenditures include payments for all CSI Program components. However, the CSI expenditures do not include the total estimated future payments for PBI installations that are currently “in payment” status. Expenditures for each “in payment” PBI project will be deducted monthly over 5 years based on

⁴¹ The CPUC modified the CSI Program rate collections schedule in December 2008, in D.08-12-004.

actual performance. (See Section 3.1.1, for a description of the PBI portion of the CSI general market solar program.)

Although it might seem like Table 34 indicates that the CSI Program is heavily over-collected, the program has project reservations or project commitments for 70 percent of the balance currently collected, as shown in Table 35. The estimated “CSI costs” as of December 31, 2008 in Table 35, including all of the then-current expected PBI payments totaled just under \$550 million, which represented about 70 percent of the funds collected at the time.

Table 34. CSI Balancing Accounts by IOU, through December 31, 2008

Year	IOU	Notes	a) CSI Collections	b) CSI Expenditures	c) End of Year Balance
2007	PG&E	1,2,3	\$ 180,513,901	\$ (21,913,007)	\$ 158,600,894
	SCE	1,5	\$ 251,595,000	\$ 1,288,000	\$ 252,883,000
	SDG&E	2	\$ 72,881,003	\$ (4,370,951)	\$ 68,510,052
Subtotal			\$ 504,989,904	\$ (24,995,958)	\$ 479,993,946
2008	PG&E	2	\$ 106,234,059	\$ (82,297,100)	\$ 182,537,853
	SCE		\$ 134,750,000	\$ (34,690,000)	\$ 352,943,000
	SDG&E	1,4	\$ 34,882,960	\$ (11,943,193)	\$ 91,449,819
Subtotal			\$ 275,867,019	\$ (128,930,293)	\$ 626,930,672
Grand Total			\$ 780,856,923	\$ (153,926,251)	\$ 626,930,672

Source: CPUC Data Request to CSI large IOUs, January 7, 2009.

Notes:

- (1) 2007 collections include transfer to CSI of “unspent SGIP funds” to CSI balancing accounts.
- (2) 2008 collections include transfer back to SGIP of “unspent SGIP funds.”
- (3) End of Year Balance is the cumulative net balance in account at the end of specific calendar year.
- (4) Ending Balance through November 2008
- (5) In 2007, SCE transferred \$104.6 million of funds from the SGIP Memorandum Account to the CSI Program Balancing Account (CSIPBA). Interest in the amount of \$9.1 million, included above in Column “b” associated with the over-collection, more than offset the \$7.8 million of CSI expenses recorded in the CSIPBA in 2007, which resulted in a counterintuitive negative total expenditure balance.

4.2.2 CSI Program Costs

Total CSI Program costs are shown in Table 35. Not all costs have been posted as “expenditures” in the CSI balancing accounts, but for the purposes of program budgeting can be considered spent. The table also expresses costs as a percent of each program component budget. As reference, there is additional information about the breakdown of administrative expenditures in Section 3.1.4. In that section, Table 14, Table 15, and Table 16 detail the Incentive and Administrative costs by program component and year.

Table 35. CSI Program Costs by Program Through April 1, 2009 (\$millions)

Category	CSI General Market	SASH	MASH	SHW	RD&D	Total	% Budget
Administration							
Total Budget	\$189.70	\$16.25	\$13.00	\$ 1.09	\$ 7.48	\$ 227.52	
Expenditures	\$ 21.76	\$ 0.46	\$ 0.13	\$ 1.23	\$ 0.09	\$ 23.67	10%
Balance	\$167.94	\$15.79	\$12.87	\$(0.14)	\$7.39	\$ 203.85	90%
Incentives/Grants							
Total Budget	\$ 1,707.30	\$ 92.09	\$ 95.34	\$ 1.50	\$ 42.52	\$1,938.75	
Expenditures	\$ 514.00	\$ 0.01		\$ 0.29	\$10.00	\$ 524.30	27%
Balance	\$ 1,193.30	\$ 92.08	\$ 95.34	\$ 1.21	\$ 32.52	\$1,414.45	73%
Total Program Expenditures	\$ 535.76	\$ 0.47	\$ 0.13	\$ 1.52	\$ 10.09	\$ 547.97	
Total Balance	\$ 1,361.24	\$107.87	\$108.21	\$ 1.07	\$ 39.91	\$1,618.30	
% of Budget Remaining	71.8%	99.6%	99.9%	41.2%	79.8%	74.7%	

Source: CSI Program Administrators, through May 2009.

4.3 CSI Program Benefits

As noted in Section 2.1, the CSI Program has broadly defined its goals as: 1) installing 1,940 MW of distributed solar energy systems in the large IOUs service territories; and 2) transforming the market for solar energy systems so that it is price competitive and self-sustaining. In achieving these goals, CSI has the potential to provide multiple benefits to participants, ratepayers and the state. Benefits are largely a function of perspective and would depend on who is participating, how well the systems are performing, and where they are located, among other factors.

The preliminary results of the CSI Impact Evaluation indicate that there are benefits to the state's electricity grid, including peak demand reductions, avoided energy costs, and emission reductions. Individual customers are also receiving benefits in the form of CSI incentive payments and reduced energy bills. The magnitude and scope of these benefits will be determined by a cost benefit analysis as described below.

4.4 Net Energy Metering

One of the frequently cited benefits of CSI participation is eligibility CSI customers have to be eligible to take electrical service on Net Energy Metering (NEM) tariffs, as authorized in PU Code 2827. NEM is an important part of the decision to become a solar customer.

NEM tariffs permit a solar customer to receive bill credits for a surplus of electricity production delivered to the grid, as well as to receive an exemption from interconnection and stand-by charges. Under NEM, a qualified solar customer will receive bill credits when the solar system's electrical output exceeds the amount consumed onsite at the time the system is producing. These bill credits may be applied against charges incurred by a solar customer for electricity consumed at other times. For CSI participants, NEM bill credits are calculated at the fully bundled retail rate, of electricity that the customer would otherwise pay at the time the system is producing, which includes generation, transmission, and distribution components.⁴²

Currently, NEM must be offered to up to at least 2.5 percent of aggregate peak customer demand in each utility service territory, per PU Code 2827 (c)(3). The large IOUs reported their respective NEM penetration rates to the Commission as of December 31, 2008, based on the number of NEM interconnections through the end of the year. Based on these reports, Table 36 reports the number of MWs currently on NEM, the number of MWs that could be on NEM within the existing cap, and how many MWs are expected to be interconnected on NEM if the CSI Program continues as planned.

As shown in Table 36, the current weighted average NEM penetration is just about 1 percent, but will be approximately 4.5 percent if the CSI Program achieves its goal of installing 1,940 MW. By the end of 2008, PG&E was closest to its cap, at 1.27 percent. PG&E could voluntarily allow interconnections beyond the cap. However, in order to provide the market certainty that systems will continue to be interconnected, the NEM penetration cap should be changed since PG&E will be approaching its NEM cap level by the end of this calendar year based on current CSI application levels.

⁴² For larger wind DG (greater than 50 kW, but less than 1MW), biogas DG less than 1 MW and fuel cell DG less than 1 MW, the amount of the NEM bill credit is equal to the generation component of the rate only.

Table 36. NEM Penetration by Customer and MW, through December 31, 2008

	PG&E	SCE	CCSE/SDG&E	Total
Total NEM Customer-Generators	27,225 customers	9,088 customers	5,933 customers	42,246 customers
Total NEM SOLAR Customer-Generators	27,156 customers	8,894 customers	5,907 customers	41,957 customers
Total rated generating capacity of all NEM customer-generators (MW)	265 MW	123 MW	49 MW	428 MW
Total rated generating capacity of all NEM SOLAR customer-generators (MW)	264 MW	114 MW	48 MW	426 MW
Estimated remaining MW available under 2.5% NEM Cap	~260 MW	~444 MW	~155 MW	~859 MW
MW remaining in CSI Program (not yet installed)	779 MW	840 MW	190 MW	1,808 MW
Percentage of “aggregate customer peak demand” accounted for by all NEM customers	1.27%	0.51%	0.59%	1% avg.
Estimated NEM penetration required to achieve CSI goals (Not including non-Solar NEM)	5.0 %	4.3 %	2.9 %	4.5 % avg.

Source: CPUC data request to PG&E, SCE, SDG&E, data through December 31, 2008.

Note: PG&E reports interconnected MW based on the size of inverter, not the size of the system. The CPUC has not adopted a NEM penetration calculation methodology.

4.5 Cost Benefit Methodology for CSI Program

In the sections above, this report has provided an overview of some of the major costs and benefits related to the CSI Program. However, this assessment does not include a comprehensive assessment of the costs and benefits of the CSI Program.

To support a more comprehensive analysis, the CPUC released a preliminary Proposed Decision on a Cost-Benefit Methodology for DG programs on June 19, 2009 in R.08-03-008. Once adopted in final form, the Cost-Benefit Methodology will serve as a basis for the CPUC to direct a contractor to conduct a comprehensive cost-benefit analysis of the CPUC’s DG programs, including the CSI Program.

The proposed decision released in June 2009 would adopt a cost-benefit methodology designed to reflect the costs and benefits of DG programs from various perspectives consistent with CPUC policy. The methodology uses the same cost benefit tests used or described in the Standard Practice Manual for Economic Analysis of Demand-Side Projects and Programs, namely: the

Participant Test; the Program Administrator Test; the Total Resource Cost (TRC) Test; and the Societal Test. The value of DG, including CSI installations, depends heavily on the perspective from which it is evaluated. The proposed cost-benefit methodology will be used to evaluate the CSI Program as part of the CPUC's ongoing oversight of the CSI Program. Appendix B: Distributed Generation Cost-Benefit Methodology, describes the various inputs to the Cost-Benefit methodology that is currently under consideration.

5. Recommendations for Program Modifications

The CPUC considers ongoing CSI Program changes in the DG/CSI rulemaking, R.08-03-008. In D.06-08-028, the CPUC committed to a biennial review process of the program, with the first review in 2009. This CPUC process may include a review of the program design, including the budget and incentive structure. The review analysis will be informed by evaluation reports not yet started due to delays in the state contracting process. The entire review process will occur in the DG/CSI rulemaking.

Meanwhile, for the purposes of this assessment for the Legislature, the CPUC offers CSI Program changes for the Legislature's consideration and reiterates a recommendation to modify NEM statutes (PU Code 2827) to accommodate the CSI Program.

5.1 Include Small and Multijurisdictional Utilities in the CSI Program

Small and Multijurisdictional Utilities (SMJUs) under the regulatory authority of the CPUC are currently precluded from participating in the CSI Program. PU Code 2851 limits the CSI Program funding to the large IOU territories of PG&E, SCE, and SDG&E. As noted in Table 3, SB 1 mandates that publicly-owned utilities offer solar initiatives or programs. However, the statute remains silent on SMJUs, Sierra Pacific Power Company, Golden State Water Company/Bear Valley Electric (Bear Valley), and PacifiCorp.

The lack of solar offerings in SMJU territories misses an opportunity to promote solar in new markets. Thus, the CPUC recommends the Legislature consider authorizing the CPUC to allow SMJUs into the CSI Program, and/or allow the CPUC to authorize the SMJUs to offer parallel solar programs. Making the solar incentives available to customers in the SMJU's service territories will help further SB 1's goals of installing 3,000 MW of solar capacity and creating a self-sustaining solar industry in California and make it truly a statewide program.

5.2 Raise the Net Energy Metering Penetration Cap

As described in Section 4.4, currently, NEM penetration is capped at 2.5 percent of aggregate peak customer demand in each large utility service territory. The current weighted average NEM penetration is just about 1 percent, but will be 4.5 percent if the CSI Program achieves its goal of installing 1,940 MW statewide. PG&E is closest to its cap, at 1.3 percent, and PG&E's solar

market could stall later in the year depending on the rate of CSI applications due to the approaching end of the NEM cap. In order to prevent a stall in the solar market, the CPUC recommends the Legislature address this issue this year. The CPUC has already recommended that the NEM cap be raised and has supported the passage of AB 560 (Skinner, 2009).⁴³

5.3 Expand Low Income Program Eligibility Requirements

PU Code 2852 currently restricts eligibility to low income households meeting certain requirements. These criteria greatly reduce the eligible population as compared to other programs in the state that provide incentives to low income households. In the future, the Legislature should consider expanding eligibility to increase the scope of eligible households. Expanding the eligibility requirement in PU Code 2852 would have an effect of increase in potential demand for the funds currently dedicated to enabling low income households to utilize solar energy.

⁴³ The CPUC position on pending legislation, including AB 560, can be found at: <http://www.cpuc.ca.gov/PUC/legislation/posanalyses/leg2010.htm>.

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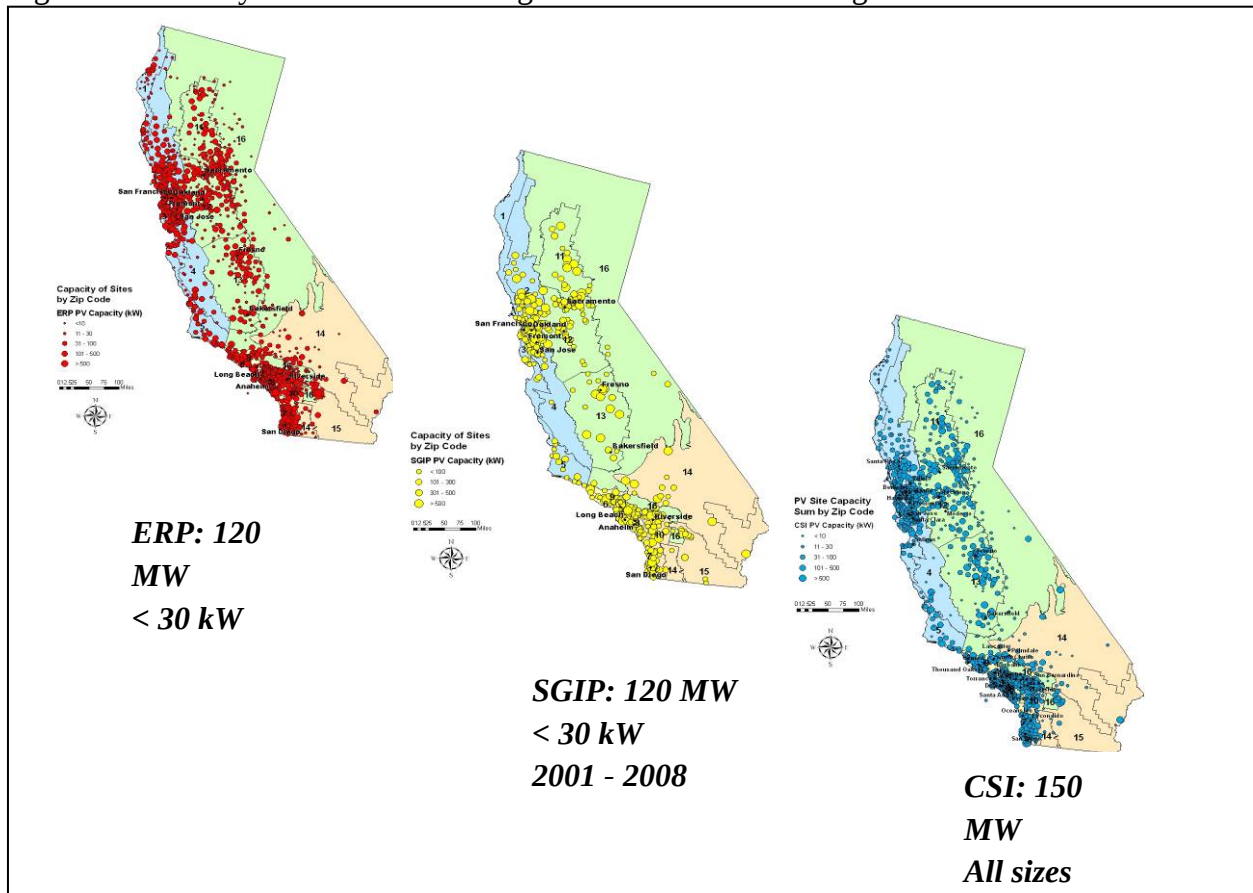
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A. Assessment of CSI Program Participation

A.1 History of PV Incentive Programs in California

The CSI represents an evolution in the deployment of PV systems through state incentive programs in California. The Energy Commission's Emerging Renewables Program (ERP) was initiated in 1998 and provided incentives to grid-connected PV systems smaller than 30 kW in capacity. Approximately 120 MW of PV capacity was installed via the ERP from 1981 through 2008. Initiated in 2001, the CPUC's Self-Generation Incentive Program (SGIP) focused on providing incentives to PV systems larger than 30 kW in rebated capacity and installed at utility customer sites. Approximately 134 MW of PV capacity was installed under the SGIP through 2008, although no new installations entered the SGIP after CSI started in 2007. As of the end of 2008, over 150 MW of PV capacity had been installed under the CSI. Figure 1 depicts the growth of PV system installed capacity and geographical distribution between the ERP, SGIP, and CSI programs.

Figure 5-1: History of PV Incentive Programs in California Through 12/31/2008



Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

A.2 Status, Classification and Geographic Distribution of CSI Projects

Table 5-1 provides a summary of the number and rebated capacity⁴⁴ of CSI projects examined under the 2007/2008 impact evaluation and grouped by Program Administrator (PA). This summary includes completed and active online CSI and SGIP transition projects⁴⁵ as of the end of 2008. These 11,828 projects correspond to approximately 150 MW⁴⁶ and represent the scope of the Preliminary 2007-2008 impact evaluation study.

There are 10,595 “complete” CSI and SGIP transition projects, accounting for 101.7 MW, which already received an incentive payment from the CSI by the end of 2008. In addition, there are

⁴⁴ The rebated capacity is the CEC AC rating associated with the rebate (incentive) provided to the applicant.

⁴⁵ “SGIP transition projects” are applications that were received under SGIP in 2006 but were funded through the CSI budget. SGIP transition projects are considered part of the CSI Program.

⁴⁶ There were approximately 2 MW of CSI projects that Itron was unable to reconcile differences in the way CSI projects are reported in the PowerClerk database between 2008 and 2009

1,233 “on-line active” CSI and SGIP projects, accounting for 48.7 MW, which are operational and awaiting their incentive payment as of the end of 2008.

In addition to their status in the CSI incentive queue, CSI projects are also classified by customer type or sector. Table 5-2 provides a summary of the number and rebated capacity of CSI projects among several different customer types as of the end of 2008. Residential projects represented the majority of the total number of projects, but just under half of the total rebated capacity. Commercial projects represented 50 percent of the total rebated capacity. There were more non-profit projects than government projects. However, the government projects were larger and represented slightly more of the total rebated capacity.

Table 5-1: CSI (Completed and Active) and SGIP Transition Projects through 12/31/2008

Table 3-1. CSI (Completed and Active) and SGIP Transition Projects through 12/31/2008							
PA	Complete		Active Online		Total		
	(n)	(MW)	(n)	(MW)	(n)	(MW)	% MW
CSI "Core" Projects							
PG&E	7,129	45.8	750	23.8	7,879	69.6	51%
SCE	2,432	32.6	384	21.7	2,816	54.3	40%
CCSE	970	9.8	93	2.0	1,063	11.8	9%
Total CSI non-SGIP Projects	10,531	88.3	1,227	47.5	11,758	135.7	100%
SGIP Transition Projects							
PG&E	38	7.2	5	1.2	43	8.3	57%
SCE	26	6.2	-	0.0	26	6.2	43%
CCSE	-	0.0	1	0.0	1	0.0	0%
Total SGIP-CSI Transitional	64	13.4	6	1.2	70	14.6	100%
CSI & SGIP-CSI Transition Projects	10,595	101.7	1,233	48.7	11,828	150.3	N/A

Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

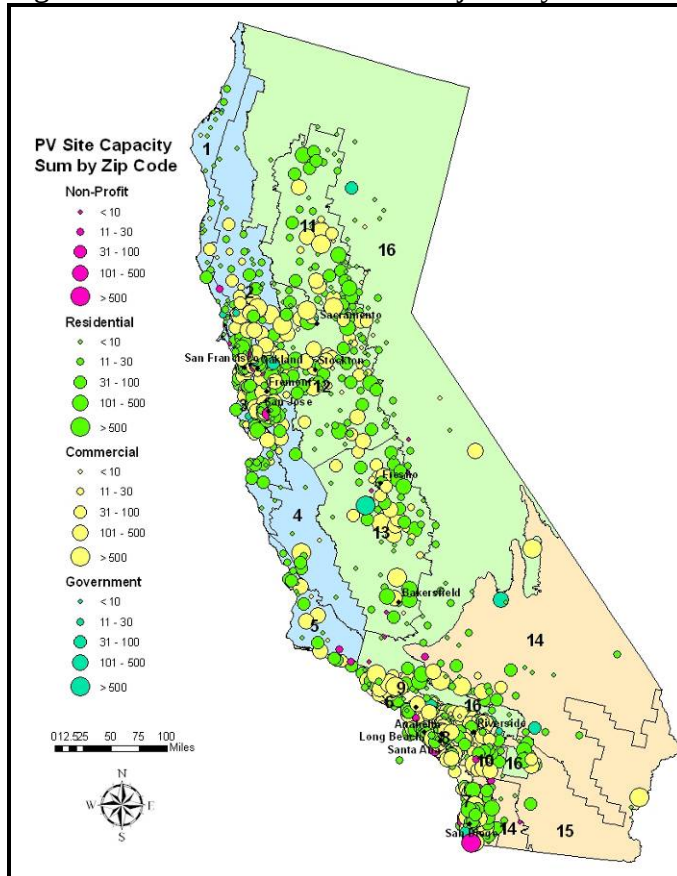
Table 5-2: CSI Projects and Rebated Capacity by Customer Type Through 12/31/2008.

Customer Sector	Complete		Active Online		Total		% MW
	(n)	(MW)	(n)	(MW)	(n)	(MW)	
Residential	10,034	46	1,005	5	11,039	50	33%
Commercial	427	51	159	34	586	84.6	56%
Non-Profit	89	2	20	1	109	2.7	2%
Government	45	3	49	10	94	12.8	8%
Totals	10,595	101.7	1,233	48.7	11,828	150.3	100%

Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

Figure 5-2 shows the geographical distribution of CSI projects based on customer type. The residential sector accounts for the majority of completed projects. However, most of these projects are small. Not surprisingly, a large number of CSI projects are concentrated in urban areas. The high concentration of PV projects within the San Francisco Bay Area is indicative of the interest in PV even in more cloudy or foggy areas. Historically, these areas were not considered to be in regions where there would be much interest in solar applications.

Figure 5-2: Distribution of CSI Projects by Customer Type as of 12/31/2008



Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

A.2.1 CSI Participation by County

Table 5-3: Top Ten CSI Participating Counties by MW Capacity in All Program Administrator Territories Through 5/27/2008

Rank	County	Total MW in Applications	Program Administrator Territory
1	Santa Clara	41.2	PG&E
2	Los Angeles	29.1	SCE
3	Alameda	23.2	PG&E
4	San Diego	22.4	SDG&E
5	San Bernardino	18.9	SCE
6	Contra Costa	15.9	PG&E
7	Fresno	14.6	PG&E
8	Sonoma	14.0	PG&E
9	Riverside	13.7	SCE
10	Napa	9.2	PG&E
All Other Counties		170.6	All
Total MW		372.8	

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Table 5-4: PG&E Top Ten CSI Participating Counties by MW Capacity Through 5/27/2008

Rank	County	Total MW in Applications
1	Santa Clara	41.2
2	Alameda	23.2
3	Contra Costa	15.9
4	Fresno	14.6
5	Sonoma	14.0
6	Napa	9.2
7	Solano	7.1
8	San Luis Obispo	6.9
9	Kern	6.6
10	San Mateo	6.4
Other/Unspecified		73.8
Total MW		218.9

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Table 5-5: SCE Top Ten CSI Participating Counties by MW Capacity Through 5/27/2008

Rank	County	Total MW in Applications
1	Los Angeles	29.1
2	San Bernardino	18.9
3	Riverside	13.7
4	Orange	8.2
5	Ventura	6.6
6	Tulare	4.2
7	Santa Barbara	1.9
8	Kern	1.0
9	Kings	0.7
10	Mono	0.4
Other/Unspecified		35.8
Total MW		120.5

Source: www.CaliforniaSolarStatistics.ca.gov , May 27, 2009.

Table 5-6: CCSE Top CSI Participating Counties by MW Capacity Through 5/27/2008

Rank	County	Total MW in Applications
1	San Diego	22.4
2	Orange	1.0
Other/Unspecified		10.2
Total MW		33.6

Source: Source: www.CaliforniaSolarStatistics.ca.gov , May 27, 2009.

A.2.2 CSI Participation by Zip Code

Table 5-7: Top Ten Zip Codes (by MW) – All IOU Territories Through 5/27/2008

Total MW in Applications				
Rank	Zip Code			IOU Territory
1	91706	8	Baldwin Park/Los Angeles	SCE
2	91761	5	Ontario/San Bernardino	SCE
3	94538	4	Fremont/Alameda	PG&E
4	92071	4	Santee/San Diego	CCSE
5	95035	4	Milpitas/Santa Clara	PG&E
6	95014	4	Cupertino/Santa Clara	PG&E
7	94551	3	Livermore/Alameda	PG&E
8	93446	3	Paso Robles/San Luis Obispo	PG&E
9	93727	3	Fresno/Fresno	PG&E
10	95123	3	San Jose/Santa Clara	PG&E
All other Zip Codes		332		ALL
Total MW		373 MW		

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Table 5-8: Top Ten Zip Codes (by MW) – PG&E Through 5/27/2008

Rank	Zipcode	Primary City/County	Total MW in Applications
1	94538	Fremont/Alameda	4
2	95035	Milpitas/Santa Clara	4
3	95014	Cupertino/Santa Clara	4
4	94551	Livermore/Alameda	3
5	93446	Paso Robles/San Luis Obispo	3
6	93727	Fresno/Fresno	3
7	95123	San Jose/Santa Clara	3
8	95403	Santa Rosa/Sonoma	3
9	94536	Fremont/Alameda	3
10	94804	Richmond/Contra Costa	3
All other PG&E zip codes			186
Total MW			219 MW

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Table 5-9: Top Ten Zip Codes (by MW) – SCE Through 5/27/2008

Rank	Zipcode	Primary City/County	Total MW in Applications
1	91706	Baldwin Park/Los Angeles	8
2	91761	Ontario/San Bernardino	5
3	92225	Blythe/Riverside	2
4	92518	Riverside ⁴⁷ /Riverside	2
5	91708	Chino/San Bernardino	2
6	92562	Murrieta/Riverside	2
7	93012	Santa Barbara/Santa Barbara	2
8	93291	Visalia/Tulare	2
9	92408	San Bernardino/San Bernardino	1
10	91710	Chino/San Bernardino	1
All other zip codes			94
Total MW			120 MW

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

Table 5-10: Top Ten Zip Codes (by MW) – CCSE Through 5/27/2008

Rank	Zipcode	Primary City/County	Total MW in Applications
1	92071	Santee/San Diego	4
2	92082	Valley Center	2
3	92154	San Diego/San Diego	2
4	92064	Poway/San Diego	2
5	91915	Chula Vista/San Diego	1
6	91911	Chula Vista/San Diego	1
7	92037	La Jolla/San Diego	1
8	92127	San Diego/San Diego	1
9	92111	San Diego/San Diego	1
10	91941	La Mesa/San Diego	1
All other zip codes			17
Total MW			34 MW

Source: www.CaliforniaSolarStatistics.ca.gov, May 27, 2009.

⁴⁷ The entire 92518 zip code is taken up by March Air Reserve Base in Riverside County.

A.2.3 PV System Mount Types

The amount and efficiency with which PV systems capture sunlight is influenced by their configuration. PV systems can be installed as either “fixed” or “tracking” systems. Fixed systems are literally fixed in their orientation (e.g., direction in which the panels face the movement of the sun across the sky) and tilt. Tracking systems use mechanical subsystems to follow the path of the sun across the sky and can be single or dual axis systems. Tracking systems can “harvest” more sunlight than fixed PV systems but have higher capital costs and require more maintenance due to their moving parts. Smaller PV systems (e.g., less than 20 kW) are typically installed as fixed systems.

Within fixed PV systems, the orientation and tilt is determined by a number of factors, including roof angle and type of roof material; orientation of the building and surrounding structures; goals of the PV system relative to electricity needs and pricing; etc. Historically, most systems have been oriented due south to maximize annual electricity production. However, California utilities typically have peak demand occurring later in the afternoon. As a result, more systems are beginning to be installed with a southwestern orientation in order to set a balance between maximum annual electricity generation and generation towards later afternoon.

Table 5-11 is a summary of the number and capacity of PV projects installed under the CSI as of the end of 2008 by tilt and type of mount (i.e., whether the system is a tracking system or fixed). The vast majority of the systems installed under the CSI at the end of 2008 were fixed systems; with an almost equal split between tilted and near-flat⁴⁸ mounting types. Figure 5-3 shows the geographical distribution of CSI projects based on the tilt of the system and type of mount.

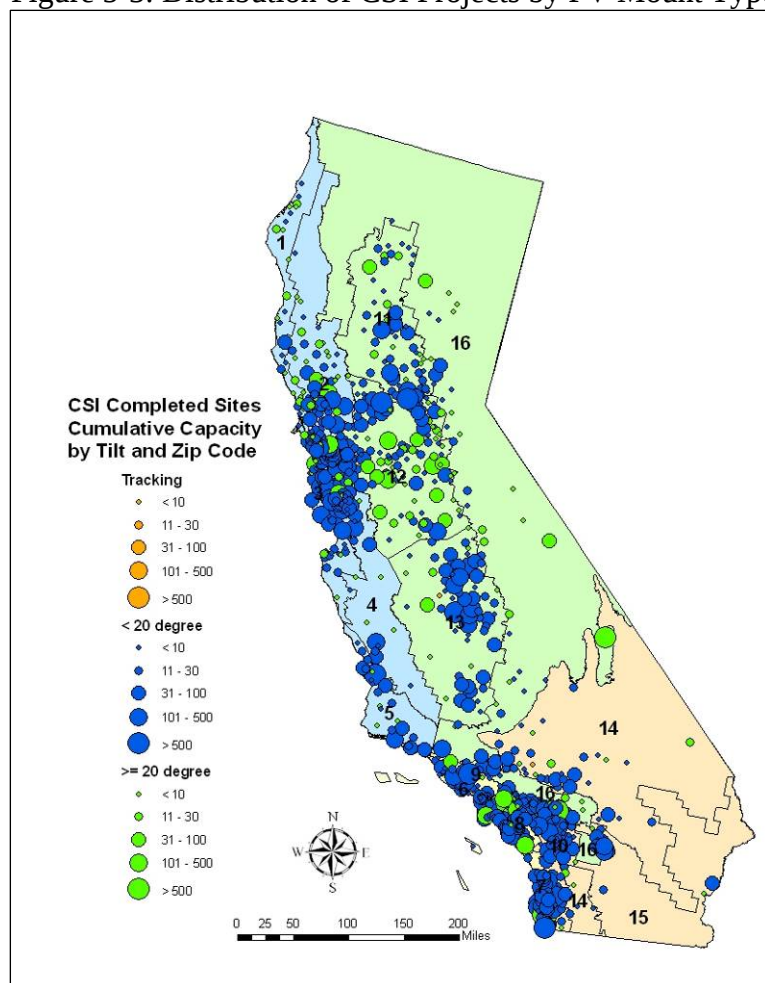
Table 5-11: CSI Projects and Rebated Capacity by PV Mount Type Through 12/31/2008

PV Mount Type	Complete		Active Online		Total		% MW
	(n)	(MW)	(n)	(MW)	(n)	(MW)	
Fixed_Near_Flat	4,575	40	609	26	5,184	66	44%
Fixed_Tilted	5,982	59.5	607	17.0	6,589	76.5	51%
Tracking	38	2.5	17	5.7	55	8.2	5%
Totals	10,595	101.7	1,233	48.7	11,828	150.3	100%

Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

⁴⁸ Near-flat mounting systems refer to PV systems with a tilt of less than 20 degrees

Figure 5-3: Distribution of CSI Projects by PV Mount Type as of 12/31/2008

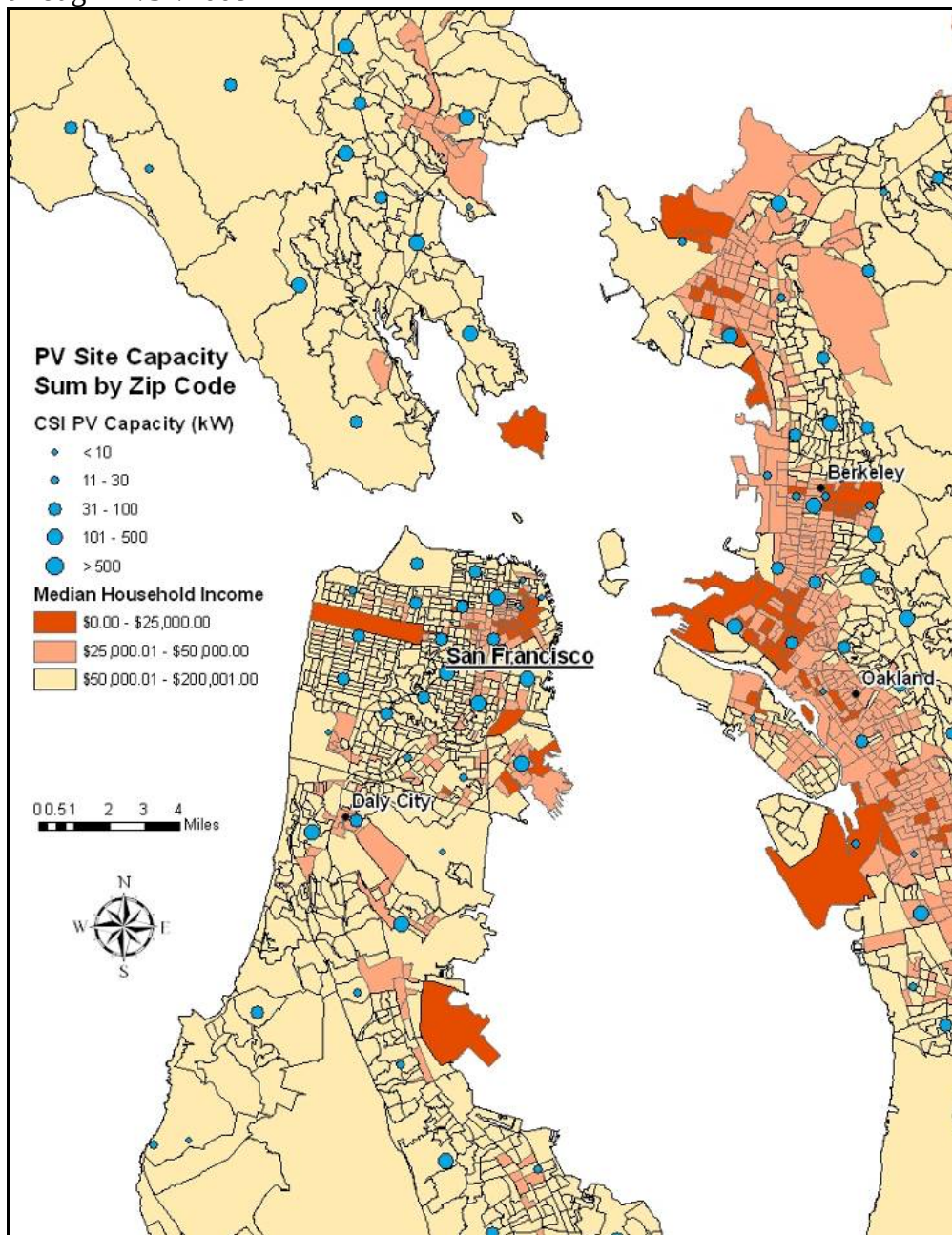


Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

A.2.4 CSI Demographics

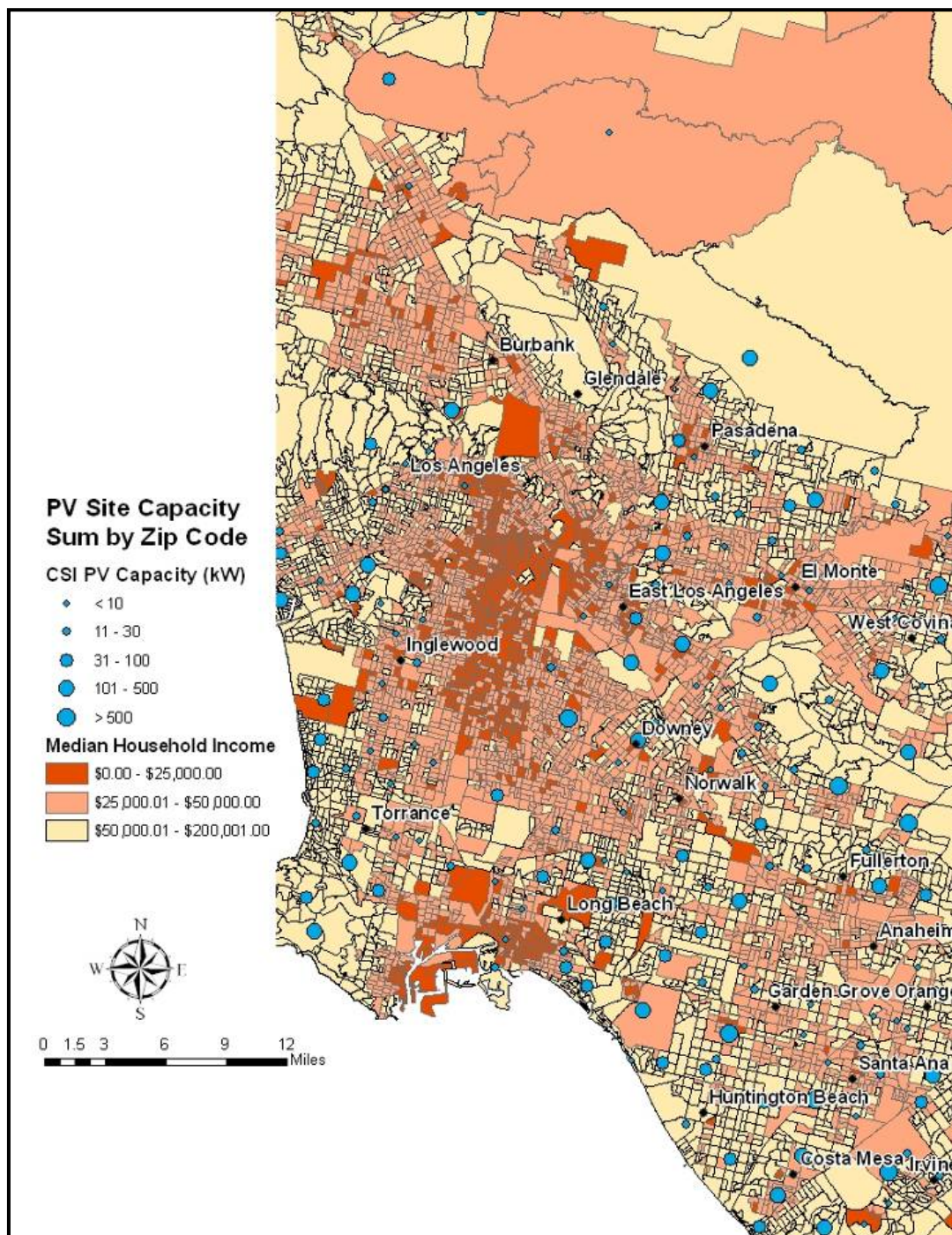
Another interesting perspective on PV system distribution has to do with income level of program participants. Due to their high first time costs, PV systems are typically considered applications reserved for upper income level areas. However, as commercial operations have become more interested in PV systems, there has been an increase in PV systems located in urban areas; including areas with lower median income. Figure 5-4 and Figure 5-5 show PV systems installed in the San Francisco and Los Angeles areas; mapped against median household income level.

Figure 5-4: CSI PV Sites and Median Household Income Levels in the San Francisco Bay Area through 12/31/2008



Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

Figure 5-5: CSI PV Sites and Median Household Income Levels in the Los Angeles Area through 12/31/2008



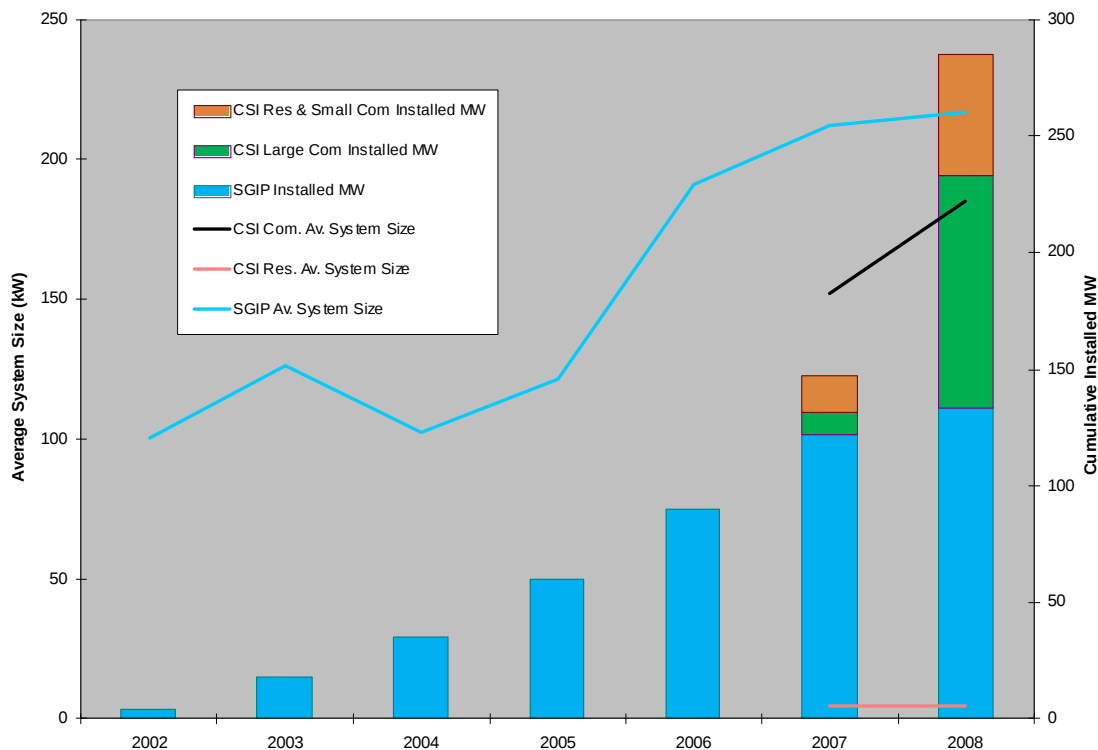
Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

In the San Francisco area there are several PV systems located in areas where the median income level falls below \$25,000. While these PV systems are likely to be larger commercial building

applications, they are indicative of the jobs creation possibility in lower income regions of California.

A.2.5 Average System Size Relative to Cumulative Installed Capacity

Figure 5-6: Average System Size and Cumulative Installed Capacity



Source: Itron Preliminary 2007-2008 CSI Impacts Evaluation, June 2009.

Figure 5-6 shows average system size (left axis, line graph) and cumulative installed capacity (right axis, bar graph) for the SGIP and CSI programs. As the cumulative capacity has increased, both commercial programs appear to be trending towards larger systems over time while the size of residential systems in the CSI program is not growing noticeably. In 2002, the average system size for SGIP, which is directed mainly at larger commercial systems anyway, was around 100 kW, but by 2008 the average size had grown to 216 kW. CSI large commercial installations show a similar trend, averaging 185 kW for 2008, up from about 150kW in 2007, while CSI residential and small commercial systems stayed flat at 4.6 kW on average. Cumulative installed capacities at the end of 2008 were 285 MW total for SGIP and CSI, with only 52 MW in the smaller CSI systems.

B. Distributed Generation Cost-Benefit Methodology

The CPUC released a Proposed Decision on a Distributed Generation (DG) Cost-Benefit Methodology on June 19, 2009 in R.08-03-008. Once adopted in final form, the Cost-Benefit Methodology will serve as a basis for the CPUC to direct a contractor to conduct a comprehensive cost benefit analysis of the CSI Program. The primary purpose of establishing a consistent DG cost-benefit methodology is to assure that the state's support for DG projects, such as those funded through the SGIP and CSI, is evaluated in an economically sound manner. The adopted methodology may be used immediately to assess ratepayer supported DG programs (i.e., SGIP and CSI), which support projects as large as 5 MW. This will assure that state programs, which promote DG facilities as high-priority energy resources, are properly informed by a sound measure of those programs' costs and benefits. A cost-benefit analysis is not the only measure of a policy or program's worth, but it is an essential input when deciding to continue, modify, or cancel a particular effort.

As currently written, the proposed cost-benefit methodology is designed to reflect the costs and benefits of DG programs from various perspectives consistent with CPUC policy. The methodology uses the same cost benefit tests used or described in the energy efficiency proceeding, namely: the Participant Test; the Program Administrator Test; the Total Resource Cost (TRC) Test; and the Societal Test. The value of any DG facility, including CSI installations, depends heavily on the perspective from which it is viewed. This proposed methodology will be used to compare resource options as part of the CPUC's ongoing oversight of the CSI Program, as well as inform the CPUC's long term procurement planning process. Figure 5-7 below describes the various inputs to the Cost-Benefit methodology that is currently under consideration.

Of the costs and benefits identified in the table above, some will be relatively straightforward to quantify, while others will be more challenging to quantify, such as market transformation impacts. DG costs and benefits vary based on technology, fuel variable, application, size, location, and frequency and duration of the facility's use. Significantly, the value of DG depends on whether the calculation is from the perspective of the DG project owner, the utility or program administrator, or society overall. In D.03-02-068, the Commission found that DG can serve different purposes, such as onsite generation or as a distribution system alternative. The value of a DG project may depend on how the power is used, technology, fuel, and application. For this reason, the proposed methodology reflects various perspectives and types of DG.

Creating a cost-benefit methodology for DG facilities is a technically complex exercise but is not a novel one. For many years, the CPUC has used cost-benefit tests for energy efficiency programs. The CPUC has used avoided costs both for analyzing energy efficiency cost-effectiveness and for assessing the value of and setting prices for “qualifying facilities,” which are privately-owned energy resources that sell power to the utilities under the Public Utilities Regulatory Policies Act of 1981.

The CPUC has developed and used a cost-benefit model for existing energy efficiency program proposals in the “Standard Practice Manual” (SPM) used to guide energy efficiency program administration. The SPM presents a cost-benefit model using four tests. The SPM model was intended to be used for resource assessments generally but has so far been used primarily to evaluate energy efficiency programs. Although the SPM describes four cost-benefit tests, the CPUC focuses on two of the tests, the Total Resource Cost Test and the Program Administrator Cost Test, when evaluating utility energy efficiency programs. (See D.05-04-051, Ordering Paragraph 5, p. 91.)

Also providing a foundation for the debate on the proposed methodology were two reports sponsored by the CEC and the Commission. One, issued by Itron in March 2005, is titled “Framework for Assessing the Cost-Effectiveness of the Self Generation Incentive Program” (Itron Framework).⁴⁹ The other, issued on October 25, 2004, by Energy and Environmental Economics, Inc. (E3), is titled “Methodology and Forecast of Long-Term Avoided Cost(s) for the Evaluation of California Energy Efficiency Programs” (E3 Report) and was submitted to the Energy Division and examined in R.04-04-025, the Commission’s inquiry into energy avoided costs.

⁴⁹ During hearings in May 2005, the Itron Framework was accepted into the evidence of this proceeding as Exhibit 37.

Figure 5-7: Distributed Generation Cost-Benefit Methodology Proposed Inputs

Category	Participant Test	RIM Test ⁵⁰	TRC Test	Societal Test	PA Cost Test
Benefits					
Avoided Line Losses		✓	✓	✓	✓
Avoided purchase of energy commodity and Resource Adequacy costs		✓	✓	✓	✓
Avoided Transmission and Distribution costs (T&D Investment Deferrals)		✓	✓	✓	✓
Combined Heat and Power (CHP) plant specific benefits	✓		✓	✓	
CHP gas and electric bill savings	✓		✓	✓	
Environmental benefits (CO ₂ , NO _x , and Particulate Matter Emissions)		✓		✓	
Increased revenue from fuel transportation for gas-fired DG		✓			✓
Market transformation effects					
Net Energy Metering bill credits	✓		✓	✓	
Rebates/Incentives	✓				
Reduced electricity bills	✓				
Reliability benefits (both system and customer ancillary services/VAR support)	✓	✓	✓	✓	✓
Standby charge exemption	✓				
Tax credits/depreciation	✓		✓	✓	
Utility interconnection not charged to DG customer	✓				
Costs					
Costs of DG system, interconnection, emission controls and offset purchases	✓		✓	✓	
Increased IOU fuel transportation costs for gas-fired DG		✓			✓
Net Energy Metering costs		✓	✓	✓	✓
Nonbypassable charges (PGC, DWR, Nuclear decommissioning, WDAT)	✓				
Operation maintenance, fuel, ongoing emission offset purchases	✓		✓	✓	
Program Administration		✓	✓	✓	✓
Reduced revenue from standby charge exemptions		✓			✓
Reduced Transmission, distribution and non-fuel generation revenues		✓			✓
Reliability costs (system cost of additional ancillary services/VAR support)		✓	✓	✓	✓
Removal costs (less salvage)	✓		✓	✓	
Utility interconnection not charged to DG customer		✓	✓	✓	✓
Utility Rebates/Incentives (non-NEM)		✓			✓

⁵⁰ The RIM test is not a required cost-benefit test for DG, but it is shown here in the event it is performed for other purposes.

C. PU Code 2851 Cross References with this Annual Program Assessment

The requirements of PU Code 2851 are included in this Annual Program Assessment as follows:

SB 1 Reporting Requirement	Reference
Assessment of the success of CSI	See full report
Total solar thermal residential and commercial sites including the dollar value of the award	Section 3.4
Total residential and commercial sites	Section 3.1 and Appendix A
Electrical generating capacity installed by CSI	Section 4
Cost of the CSI Program	Section 4.2
Total electrical system benefits	Section 4.1
Effect on electrical service rates	Section 4.5 and Appendix B
Environmental benefits	Section 4.1
Effects on operation and reliability of the electrical grid	Section 4.1
CSI effect on peak demand for electricity	Section 4.1
Progress towards goals and schedule	Section 3.1
Recommendations for CSI Program improvement	Section 5
RD&D Program Description	Section 3.5
RD&D awards/funding, including the intended purposes and results	Section 3.5

Public Utilities Code 2851(c)(3) states that:

On or before June 30, 2009, and by June 30th of every year thereafter, the commission shall submit to the Legislature an assessment of the success of the California Solar Initiative program. That assessment shall include the number of residential and commercial sites that have installed solar thermal devices for

which an award was made pursuant to subdivision (b) and the dollar value of the award, the number of residential and commercial sites that have installed solar energy systems, the electrical generating capacity of the installed solar energy systems, the cost of the program, total electrical system benefits, including the effect on electrical service rates, environmental benefits, how the program affects the operation and reliability of the electrical grid, how the program has affected peak demand for electricity, the progress made toward reaching the goals of the program, whether the program is on schedule to meet the program goals, and recommendations for improving the program to meet its goals. If the commission allocates additional moneys to research, development, and demonstration that explores solar technologies and other distributed generation technologies pursuant to paragraph (1), the commission shall include in the assessment submitted to the Legislature, a description of the program, a summary of each award made or project funded pursuant to the program, including the intended purposes to be achieved by the particular award or project, and the results of each award or project.

D. Contact Information and Other Useful Sources of Information

For **PRESS INQUIRIES** about the CPUC portion of the California Solar Initiative, contact:

Terrie Prosper, News and Public Information Office
 California Public Utilities Commission
 505 Van Ness Ave.
 San Francisco, CA 94102-3298
 Email: **news@cpuc.ca.gov** or **415-703-1366**

For **POLICY OR PROGRAM DEVELOPMENT QUESTIONS**, contact:

California Solar Initiative and Distributed Generation Information Line
 Email: **energy@cpuc.ca.gov** or **415-355-5586**

GoSolar California is the CSI statewide consumer website	www.GoSolarCalifornia.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	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
California Solar Statistics, a data reporting website that draws directly from the CSI database and is updated weekly	www.CaliforniaSolarStatistics.ca.gov
Information about the CPUC regulatory proceeding that deals with the CSI Program	www.cpuc.ca.gov/PUC/energy/solar
Pacific Gas and Electric Company	www.pge.com/solar
Southern California Edison	www.sce.com/CSI
California Center for Sustainable Energy (CCSE) – offering Solar Rebates in San Diego Gas and Electric Territory and the Solar Hot Water Pilot Program	www.energycenter.org
GRID Alternatives, Program Manager for the Single Family Affordable Solar housing (SASH)	www.gridalternatives.org
CSI RD&D Program Manager (Itron)	www.CalSolarResearch.ca.gov