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APPENDIX A

California Solar Initiative Program Evaluation Plan

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1. **Overview**

The CSI Program Evaluation Plan describes a California Public Utilities Commission (CPUC or Commission) structure and implementation strategy for the measurement and evaluation (M&E) of the California Solar Initiative. The goal of the Commission's California Solar Initiative (CSI) is to deploy1,940 megawatts (MW) of new, solar electricity by 2016, and to help create a self-sufficient solar industry in which solar energy systems are a viable mainstream option for both homes and businesses within 10 years without ratepayer support. In addition to facilitating effective management of the CSI program, this CSI Program Evaluation Plan (Evaluation Plan or Plan) will support reporting requirements contained in relevant legislation and Commission decisions.

1.1 ***Background***

This CSI Program Evaluation Plan is intended to cover all aspects of Commission decision requirements relating to M&E, most of which are highlighted below.

In Decision (D.) 06-01-024 the Commission approved initial policies and funding for the CSI. The Commission established the CSI, with a total budget of $2.500 billion from 2007 through 2016 to be funded through ratepayer support. D.06-01-024 also set aside 10% of the funds for Program Administration, Program Evaluation, and Marketing and Outreach (M&O). The decision stated "that program administrators are not appropriate candidates for program evaluation because of the inherent conflict of interest that occurs with self-assessments." (D.06-01-024, page 33) Therefore, the decision calls for Energy Division staff to oversee program evaluation.[1] The decision states that the utilities and the San Diego Regional Energy Office (SDREO, now the California Center for Sustainable Energy or CCSE) should issue Request For Proposals (RFPs) for program evaluation and "contractors would be selected and managed by Commission staff". (Ibid.) The Commission further indicated how these reports would be used:

> "*On the basis of these reports, we will solicit the proposals of staff and the parties for recommendations on program changes that would promote cost-effectiveness, a robust market, innovation and reduced program risk to ratepayers."*

The decision also directed the utilities and SDREO to file a motion by March 31, 2006 seeking approval of a proposed outline for evaluation schedules. In response to D.06-01-024 (page 34), the Self Generation Incentive Program (SGIP) Administrators, which include the current CSI Program Administrators (PAs), filed a motion in R.06-03-004 on March 31, 2006 with a proposed outline and schedule for the CSI Evaluation Plan. Their suggestions are included in this Plan, but modified to incorporate the events and decisions that have occurred since that time.

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[1] See D.06-01-024, Finding of Fact 20. "*Program evaluation and monitoring for the CSI program, including the pilot solar water heating program, should be overseen by the Commission staff and/or CEC staff. The utilities shall issue a request for proposal (RFP) for program evaluation consulting and should contract with consultants selected by the CEC and/or Commission staff, who will be responsible for all other contract decision-making and management."(D.06-01-024, Finding of Fact 20).*

In D.06-08-028 the Commission established further implementation details for the CSI, notably the adoption of performance-based incentives, and refinements to the schedule for incentive reductions. D.06-08-028 ordered the Program Administrators (PAs) to "spend no more than 5% of their total budget for administration until the Commission addresses marketing, outreach, and measurement and evaluation in Phase II of this proceeding."[2]

In D.06-08-028 the Commission decided to institute periodic reviews, every two years, through the duration of the program. The Commission anticipated opening a new rulemaking in 2009 or earlier, to review, among other issues, the following: government and non-profit incentive levels, changes to the incentive structure, PBI payment calculations and system sizing, residential incentives, the use of a "feed-in tariff" for solar, the value of renewable energy credits (RECs) and other technology and budget issues.[3] The evaluation report process established in D.06-01-024 will inform the review process that will take place in accordance with D.06-08-028.

On August 21, 2006, the Governor signed Senate Bill (SB) 1(Murray 2006)[4], which directs the Commission to implement the CSI given specific requirements and budget limits set forth in the legislation. SB 1 directs the California Energy Commission (CEC) to establish eligibility criteria for solar energy systems receiving ratepayer funded incentives and it requires the CPUC to adopt a performance-based incentive program by January 1, 2008. SB 1 mandates that the CPUC portion of CSI shall not exceed a total program cost of $2.167 billion.

D.06-12-033 modified the CSI program to conform with SB 1, including adjustments to the total budget and MW goals. The CPUC directs solar incentives to customers in investor-owned utility territories for existing homes and existing and new commercial, industrial, and agricultural properties. The CPUC program is allocated $2.167 billion over 10 years, and the goal is to reach 1,940 MW of installed distributed solar capacity by 2016. This goal includes 1,750 MW from the General Market incentive program and 190 MW from the low-income resident incentive programs. The CSI program also includes a research, development and demonstration (RD&D) program. The low-income residential incentive programs and RD&D programs will be evaluated separately and will not be addressed in this Plan. However, per Public Utilities (PU) Code 2851(c)(3), any evaluations for the RD&D program will be included in the annual assessment report to the legislature, detailed below.

SB 1 created PU Code 2851(c)(3) which requires that the CPUC submit a report to the legislature annually, commencing on June 30, 2009, with an assessment of the CPUC portion of the CSI program:

> *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*

[2] D.06-08-028, Ordering Paragraph (OP) 22.
[3] D.06-08-028, pp. 106-107 and OP 23 and OP 24.
[4] Chapter 132, Statutes of 2006 (SB 1, Murray).

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.

In addition, Ordering Paragraphs 7 and 8 of D.06-12-033 provide specific reporting or evaluation related directives to the CSI Program Administrators. Ordering Paragraph 7 requires tracking of incentive commitments for non-PV technologies (i.e., solar thermal). Ordering Paragraph 8 requires quarterly reporting by the program administrators to the Director of the Energy Division on the percent of incentives committed or paid on a PBI basis.

1.2 *Introduction: CSI Program Evaluation Plan*

The CSI Program Evaluation Plan and reporting process for the CSI program, as described in detail below, is consistent with:

- Requirements of SB 1;
- Commission precedent on program evaluation of previous distributed generation programs;
- Commission decisions in the Distributed Generation and CSI proceedings related to program evaluation; and
- Commission decisions in Energy Efficiency proceedings related to evaluation[5].

The CSI Program Evaluation Plan result will help ensure that the Commission, and by extension the CSI program administrators, manage the CSI in a manner consistent with the intent of the legislature, as well as the Commission's objectives and directives. The Evaluation Plan is designed to make sure 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 Evaluation Plan will include three main elements: 1) Progress Reports; 2) Program Evaluation Reports; and 3) Annual Program Assessments.

(1) **Progress Reports** – These reports will be provided by staff on a quarterly or regular basis to inform the public of the progress of the program. They will include information on the most pressing current issues and current program demand information.

[5] See for example, D.05-04-051 (http://www.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/45783.doc) or D.05-01-055, section 5.3 (http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/43628.htm)

(2) **Program Evaluation Reports** - The Evaluation Reports will look principally 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 SB 1 mandated Net Energy Metering (NEM) Cost-Benefit Analysis, and any optional studies needed to fully evaluate the CSI program.

(3) **Annual Program Assessments –** This report will be prepared by Commission staff each June starting in 2009, and be submitted to the legislature in compliance with PU Code 2851(c)(3). The assessment will include information from the evaluation and progress reports, as necessary and appropriate.

The CSI Program Evaluation Plan is discussed in more detail in Section 3 below. The specific Evaluations (also called Studies) and the Annual Program Assessments will measure ongoing demand for the CSI program, monitor ongoing implementation issues, assess program achievements and quantify general impacts. This will assist the CPUC and the PAs in managing and administering the CSI program, particularly for information not otherwise covered in other reports. The Impact and Retention Studies will quantify the impacts associated with the CSI Program on all levels of California's electrical grid. These studies will provide greater detail than the Progress Reports, and the Retention Studies specifically will assess the persistence of these impacts. The Market, Process and Cost-Effectiveness Studies will examine the market transformation effects associated with the CSI Program and assess the efficacy and efficiency of the Program and the Program Administrators themselves.

1.3 *CSI Program Budget*

D.06-01-024 directed 10 percent of the General Market CSI program budget be allocated to administrative costs, including program evaluation. D.06-12-033 specified in Appendix A that $189.7 million dollars was set-aside for program administration, marketing and outreach, and program evaluation to be allocated throughout the 10-year life of the program. D.07-05-047 authorized interim marketing and outreach budgets of $500,000 per program administrator per year. In D.06-08-028 (page 99), and repeated on D.07-05-047 (page 8), the Commission established that no more than 5% of the total CSI budget of $1.897 billion should be spent on program administration.

Notwithstanding the above, no evaluation budget has yet been specified. The total Program Evaluation Budget pursuant to this Evaluation Plan will be $46.700 million, over 10 years. Of that amount, CPUC Energy Division is authorized to contract directly for up to $2.166 million per year, as authorized by the State Budget[6]. The remaining budget would be contracted for directly by the utilities as has been common practice under the SGIP program. A detailed Evaluation Plan budget is set forth below in Section 4. Each year, specific Evaluation tasks and budgets, including direct contracting by the CPUC through its state budget authority and contracting by the PAs, will be established by Advice Letter submitted no later than 30 days after the Final Ruling on the Evaluation Plan is issued in the first year and by August 1st every year thereafter from the PAs to the Energy Division for approval. CCSE, as a non-utility PA, may

[6] Item 8660-001-0462, Chapter 171, Statutes of 2007 (2007 Budget Act).

alternatively file a Business Letter for this purpose. The PAs shall designate one PA to take the lead in filing the Advice Letter or Business Letter with relevant program updates to budgets and tasks each year in consultation with Energy Division.

The current breakdown of the CSI budget is as follows:

Table 1: CPUC CSI BUDGET

Program Category	**Budget** ($ Millions)
General Market Program Subtotal	$1,897
Direct Incentives to Consumers for PV and non-PV technologies	*$1,707*
Program Administration, Marketing & Outreach, Evaluation (10%)	***$189.7***
Low-Income Program (10%)	$217
Research, Development, Deployment and Demonstration (RD&D)	$50
Solar Hot Water Pilot	$2.6
Total CPUC CSI Budget	**$2,167**

This Evaluation Plan would allocate the administrative budget as follows:

Table 2: CSI ADMINISTRATIVE BUDGET

Administrative Budget by Category	**Budget ($ millions)**	**% of Admin. Budget**
Program Administration	$94.85	50%
Measurement and Evaluation	$46.70	24%
Interim Marketing and Outreach (M&O) ($500K per PA per Year)	$15.00	8%
Not yet allocated, likely to be considered under Long Term M&O[7]	$33.15	18%
Total Administrative Budget	**$189.70**	

1.4 *CSI Online Database*

Pursuant to D.06-01-024 an online, statewide database was created to "allow applicants, evaluators and administrators ready access to statewide project information and to make non-confidential project data publicly available."[8] In September 2007, the CSI PowerClerk database was made available to the public for use in application processing and program tracking.[9] This database is part of the ongoing administration of the CSI program and is funded out of the budget set aside for that purpose, but it is also a critical element of the Evaluation Plan since it will

[7] Scoping Memo And Ruling Of Assigned Commissioner And Administrative Law Judges in R.08-03-008, Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the California Solar Initiative, the Self-Generation Incentive Program and Other Distributed Generation Issues. May 15, 2008

[8] D.06-01-024, p. 36.

[9] The database can be accessed at: http://csi.powerclerk.com/.

provide data used in the Evaluation reports. Modifications to the database suggested or required by the ongoing implementation of the Evaluation Plan will be considered by the PAs and Energy Division staff as appropriate. As part of the planning process, Energy Division staff will be conducting workshops to gather stakeholder input on data needs and collection. The budget for the database is separate from the Evaluation budget, but will be covered by the CSI general administration funds.

2. CSI Measurement and Evaluations Goals

The CSI Program Evaluation Plan is designed to be rigorous and reliable and allow for independent evaluation of this ratepayer funded program. The Plan will produce reports that will:

1. Utilize a standardized process for evaluating programs and reporting program results;
2. Provide credible and objective information on program impacts and performance;
3. Provide policy and program related information to ensure achievement of CSI program goals and support the "Periodic CSI Review Process"[10] and;
4. Produce an accurate assessment of future opportunities to further the goals of SB 1 and established Commission objectives and directives.

Commission policy must be supported by relevant and accurate data regarding the program's progress in achieving the goals established by SB 1. The comprehensive evaluation plan described herein will help ensure that the impacts of the program and progress toward achieving the SB1 goals are accurately quantified and communicated. The Evaluation Plan includes development of a number of evaluation reports that collectively will provide a comprehensive evaluation of the program. The annual assessment will serve as one document that can compile all of the key points from the various evaluation studies. The evaluation process, described herein, will be open to promote transparency and avoid conflicts of interest, which is in the long term interest of ratepayers.

3 CSI Program Evaluation Plan: Reports, Studies and Assessments

The evaluation goals will be met by developing a process that includes periodic reporting on the ongoing effectiveness of the program, as well as a long-term Evaluation Plan which assesses the program's progress towards the overarching goals defined in SB 1.

3.1 *Party Roles and Responsibilities*

As stated in D.06-01-024 and reinforced in later decisions and the scoping memo for R.08-03-008, the Commission has established that Commission staff will oversee program evaluation. As a practical matter, Request for Proposals (RFPs) to carry out elements of the CSI Evaluation Plan, will be issued by the PAs or by Energy Division. Contractors will then be selected and managed by the Energy Division. Energy Division will manage all other substantive contracting

[10] D.06-08-028, pp. 106-107.

issues. The PAs should utilize co-funding agreements, as in the SGIP or CSI-RD&D program, to allow one PA to issue an RFP covering activities in all three territories. Energy Division may directly issue RFPs for certain tasks per the Commission's budget authority described in section 1.3 above. Any contractor responsible for coordinating multiple studies or activities will report directly to Energy Division staff responsible for the CSI Program Evaluation Plan, but would also be expected to work closely with the PAs and utilities to ensure timely completion of the tasks embodied in this Plan.

The three elements of the CSI Program Evaluation Plan require different skill sets and core competencies, so it is not expected that any one institution or contractor will be able to conduct all of the studies. Rather, fulfilling this plan will require strong proposals and efforts from multiple parties, therefore highlighting the need for coordination by the Energy Division. Section 3.2, Progress Reports, will largely be carried out by Energy Division, but may include RFPs for specific Progress Studies targeted at programmatic issues beyond the scope of the staff Quarterly Progress Reports. Many of the reports and studies, called for in Section 3.3 below, may be carried out in concert with a Project Coordinator, as described in Section 3.3.1, to help ensure that the goals and principles of this Evaluation Plan are met to the satisfaction of the Commission. Respondents are encouraged to form multidisciplinary teams with the expertise to fulfill the individual tasks and expectations set forth below. The Program Evaluator will be responsible for working with the Energy Division as the Commission prepares the Annual Program Assessment as described in Section 3.4 below. Certain activities called for in Section 3.3, such as External Financial Audits, Process Studies, PA Comparative Assessments and Best Practice Studies, may be covered under separate RFPs issued by the Energy Division.

In addition to issuing RFPs and providing payments to the contractors, the PAs, along with SDG&E, are expected to provide data and information as required by the studies described below to the appropriate contractors in a timely fashion. They will assist Energy Division and contractors in installing appropriate equipment and coordinate closely with all parties to insure data accuracy. On an annual basis, in consultation with the PAs, the Energy Division will adjust schedules and priorities consistent with this Evaluation Plan, approve additional studies and determine budgets and cost responsibilities through the Advice Letter process, with CCSE allowed to file a Business Letter as an alternative. Energy Division will actively seek input from the PAs and SDG&E, but will ultimately release or issue evaluation reports on its own authority. The PAs and SDG&E will then provide comments and feedback through the normal Commission process.

3.2 *Progress Reports*

3.2.1 Quarterly Progress Reports

In September 2007, and January, April and July 2008[11], Energy Division staff issued progress reports on the CSI program. The reports tracked various aspects of the program, including implementation issues, program demand, administrative processing times, and program drop outs.

[11] The most recent Quarterly Progress Report is available online at http://www.cpuc.ca.gov/NR/rdonlyres/324066F8-F449-4ECD-AEEF-8DC6A5263459/0/Final_CSI_Jul_08_Progress_Report.pdf

The Plan will incorporate continuation and enhancement of the quarterly progress reports, beyond that required by D.06-12-033. Ongoing, short-term monitoring of the program will allow the CPUC to identify and analyze issues in the program in advance of the annual, longer-term evaluation. Coupled with the Annual Program Report, the quarterly reports help further inform the CPUC and the public on the on-going effectiveness of the CSI program.

The quarterly reports will continue to track program elements that can easily be gathered in the short-term, and that can inform the long-term evaluation. Because the Progress Report examines issues in the short-term, its framework should address issues as they arise within the program and be modified, as needed, as the program continues to evolve. Progress Reports should cover, but not be limited to, the following:

- Changes in program demand;
- Administrative processing times;
- Program drop-outs;
- PBI and EPBB incentive demand including reservations and actual incentive payments;
- Program participation and installed capacity by IOU territory;
- Incentives as a percentage of installation costs per kW;
- Step and incentive level changes;
- The progress made toward reaching the goals of the program;
- Review of program implementation activities;
- Review of program administration issues including a summary of the status of various major requests received from industry stakeholders at CSI Program Forums or from other formal communications.

3.2.2 On-going Progress Studies

On-going Progress Studies will be used to assess programmatic issues in the Progress Reports beyond the scope of the staff reports.

3.3 *Program Evaluations*

3.3.1 Project Coordinator

The Project Coordinator will work closely with Energy Division staff and will be responsible for coordinating the bulk of the work described in the paragraphs below. This includes, but may not be limited to, Impact Evaluations, Retention and Performance Studies, Market Transformation Studies, Cost-Effectiveness Studies and the Net Energy Metering Cost/Benefit Study. The Project Coordinator is not required to carry out each of these studies directly, but may provide a synthesis of all the evaluations as well as provide any independent assessments of the evaluations as necessary. The Project Coordinator will work closely with the Energy Division staff responsible for the CSI Evaluation Plan and the staff responsible for the Annual Program Assessment submitted to the Legislature.

3.3.2 Impact Evaluations

Impact Evaluations will provide annual summaries of the electrical output and demand reduction associated with CSI installations during the year in question. The Impact Studies will also report on the performance of CSI installations relative to installed capacity (i.e., capacity factors for installed systems). The Studies will also provide an estimate of greenhouse gas reductions and examine the impact, if any, of CSI installations on transmission and distribution system performance, reliability, and operations. Finally, the Impact Studies will track project compliance with program requirements. In order to facilitate field verification of system performance, Energy Division staff will assist the PAs in implementing a process whereby net generation output meters or appropriate data loggers are installed on a representative sample of CSI customer participants. This process may involve the direct participation of solar installers and integrators and allow the equipment and installation costs of the monitoring scheme to be charged directly to the Evaluation Plan budget.

Periodically the scope of the annual Impact Studies may be expanded to address other impact-related issues. Evaluation criteria should:

- Measure changes in electricity usage and demand before and after participation in CSI
- Measure changes in electricity bill savings before and after participation in CSI
- Determine the energy and economic benefits from solar peak production on avoided wholesale gas purchases
- Determine the locational impacts of solar installations on overcrowded distribution feeder lines, including impacts to distribution transformer and line performance, maintenance, and other impacts.
- Determine the impacts of PV installations (with and without storage) on transmission reliability.
- Survey current incentive recipients to determine what energy efficiency measures were undertaken as a result of the audit
- Track energy efficiency measures that were implemented as a result of the CSI audit and estimate resulting savings

Impact Study Outline:

1. Executive Summary
2. Introduction
    a. Background
    b. Research objectives
    c. Report organization
3. Methodology chapter
    a. Approaches, data sources and data collection methods
4. Program Status and Participant Characterization
5. Program Impact Evaluation Sample Design
6. Data Collection Activities
7. On-Site Field Verification and Inspection Activities
8. System Monitoring and Operational Data Collection
9. System Impacts and Operational Characteristics

a. Electrical output, demand reduction, and greenhouse gas reductions by technology
b. Analysis of differences from previous Impact Studies

10. Recommendations
    a. Recommendations for CSI eligibility, technical requirements, funding, incentive levels, or process, as appropriate
11. Appendices

3.3.3 Retention and Performance Studies

Retention Studies will be conducted to assess the long-term persistence of impacts from technologies installed through the CSI. Each retention study will include installations dating back to the CSI's inception and will differentiate between technologies still in place and operational, those that are in place but not in operation or not operating to capacity, and those that have failed or have been removed. Technical degradation of impacts will also be assessed. The study will attempt to develop an effective useful life (EUL) for each of the categories of CSI technologies. This EUL will be an estimate of the median number of years that the technologies installed under the program are still in place and operational. Under SGIP, there has been no PV system failure and so EUL has not been measurable thus far.

Performance studies will examine specific operations and maintenance issues and characteristics and how they relate to measured system performance and EUL. Such studies could examine, for example, the best cleaning regime for the panels, optimal service schedules and checks for inverters, seals, and other key components. These studies could also examine the interaction of specific climate conditions with system performance.

Some areas of particular interest for the performance studies are:

- Characterize the difference in capacity factors of installed systems (PBI and EPBB) across California under the CSI program.
- Determine the impacts of temperature on module, inverter, and meters in varying California climate zones.
- Evaluation and calibration of the assumptions in the EPBB calculator with actual performance data and system characteristics;
- Assess whether the quality of installations in the state is demonstrably better under the CSI's performance-based incentive structure relative to installations under the SGIP and ERP programs, both of which provided incentives on the basis of system capacity. Determine the most effective maintenance and operation procedures to extend EUL and maximize peak performance

Retention Studies will be conducted three times over the course of the CSI, once after five years of program operation, one after another 2-3 years, and the last at the conclusion of the CSI. Waiting for five years of program implementation is necessary as a significant number of projects won't likely be installed in the first or second years, and because it is unlikely that there will be any significant removal of systems in the first year or two of system operation. SGIP will likely continue to conduct Retention Studies including PV systems installed prior to January 1, 2007. Those SGIP reports may inform the CSI program even in advance of the completion of CSI's Retention Studies.

Retention/Performance Study Outline:

1. Executive Summary
2. Introduction
    a. Background
    b. Program objectives
3. Methodology
    a. Approaches, data sources and data collection methods
4. Results
    a. Effective useful life
    b. Technical degradation
    c. Changes from previous Retention Studies
5. Recommendations
    a. Recommendations for CSI eligibility, technical requirements, funding, incentive levels, or process, as appropriate
    b. Recommendations for future research
6. Appendices

3.3.4 Market Transformation Studies

A number of Market Transformation Studies will be conducted over the course of the CSI to provide solar market intelligence to the Commission. Pursuant to PRC 25780 and SB 1, one of the goals of the CSI is "to install solar energy systems with a generation capacity equivalent of 3,000 megawatts, to establish a self-sufficient solar industry in which solar energy systems are a viable mainstream option for both homes and businesses in 10 years".[12] D.06-01-024 stated a further "objective of promoting the development of a solar market that eventually thrives independently and without government subsidies" (D.01-06-024, page 17). The Market Transformation studies will gauge the success of market transformation with respect to Public Resources Code (PRC) 25780, SB 1 and D.06-01-024.

The market studies can be categorized into macro market studies and micro market studies. The macro market studies will look at the market with a wide angle while the micro market studies will focus on individual market actors.

Macro market studies will measure the CSI's progress toward moving the market toward sustainability by looking at factors such as prices for solar power generation equipment and materials, costs of installation of solar and the number of solar installations on a statewide basis as well as by regional markets within California. By gauging the market on an ongoing basis, trends will emerge and program attribution can be estimated. It is important that data be collected on an ongoing basis, ideally annually, and collected each time using a similar strategy to allow comparison between years.

Another type of Market Study will assess the potential (in kW and kWh) for solar projects achievable through the CSI with the allocated funding. This analysis should be updated periodically because market conditions, such as advances in or new solar technologies,

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

installation costs or utility rates, could change the amount of incentive required to motivate customers to action and thus the number of projects the CSI funding can influence.

- Identify market factors that affect each of the key drivers in solar technology adoption rates
- Determine impacts to market of front-loading incentives in order to increase early-step incentive amounts
- Identify which market drivers will make solar more cost-effective
- Characterize basic system cost and performance data
- Establish benchmarks for tracking progress
- Develop a methodology to characterize and project the rate of innovation
- Surveys to installers to determine component cost breakdowns of systems not reported to the CSI database and the appropriateness of incentive levels to the costs of CSI program participation;
- Determine the impacts of IOU definitions of peak period against CAISO peak definitions on solar demand
- Characterize the categories and numbers of solar industry actors in the California market and develop an evaluation plan to track trends of these actors over the duration of the program as a result of the CSI incentives. Include an analysis of job categories, trends, and job shifting/retraining needs
- Characterize the industries and demographics of CSI program participants
- Examine the need for consumer education and outreach before and after the solar installation
- Examine the need for market support activities, such as marketing and outreach, financing, and warranty programs
- Examine the effects on the solar marketplace including component suppliers and other ancillary services
- Assess regional differences in supply and demand for solar PV and thermal systems
- Assess the effectiveness and viability of different business models operating in the solar marketplace.

Micro market studies will focus on the behaviors or needs of individual market actors as they relate to solar power generation.

One area of interest is the economic factors that may potentially influence a customer's decision-making process when considering a solar installation. Such a study might consider the following questions:

- How has the PBI impacted system costs, program participation, and performance of eligible technologies?
- What social and economic factors influence a customer's decision to pursue a solar project?
- What are the effects of time of use rates on the orientation of systems that were installed under the CSI?

- Are there any program design elements that may be discouraging interested participants from applying? What program design elements have worked well and should be continued?
- Should government and non-profit customers continue to receive a higher incentive rate?
- How did the customer's expected savings compare with achieved savings?
- Why are customers installing solar?
- How can current research on the solar industry inform the Marketing and Outreach Program?

Market Transformation Studies Outline:

1. Executive Summary
2. Introduction
    a. Background
    b. Research objectives
3. Methodology
    a. Approaches, data sources and data collection methods
4. Results
    a. Changes from previous Market Studies
5. Recommendations
    a. Recommendations for CSI eligibility, technical requirements, funding, incentive levels, or process, as appropriate
    b. Recommendations for future research
6. Appendices

3.3.5 Process Evaluations

A number of Process Evaluations will be conducted over the course of the CSI. These Process Evaluations are in-depth examinations of the design, delivery, and operations of the CSI in order to improve the ability of the program to achieve its objectives. The first Process Evaluation will occur as soon as possible to provide feedback on program design, best practices, and early implementation issues. After this initial process assessment, studies will be conducted every three years or when major program changes occur.

Three other types of evaluations will be included under the category of Process Evaluation. These are 1) Administrator Comparative Assessments, 2) Best Practices Studies, and 3) Audits. The Administrator Comparative Assessments will be conducted at least twice during the course of the CSI. These assessments should provide specific quantitative analyses and normalized metrics but will also have to account for the distinct institutional structures of the PAs. The Best Practices Studies will start with an initial assessment during the first process analysis, then twice more over the course of the CSI. At least four times over the course of the CSI, an audit of program expenditures will be conducted.

The Process Evaluation criteria should:

- Evaluate PA budgets and spending against SGIP Step 1 and CSI implementation trends;
- Measure processing efficiency of each PA as reflected in normalized overhead costs and other quantitative metrics;

- Assess whether the program is on schedule to meet the program goals, recommendations for improving the program to meet its goals

Process Evaluation Outline:

1. Executive Summary
2. Introduction
    a. Background
    b. Research objectives
3. Methodology
4. Results
    a. Analysis of the results
    b. Differences from previous Process Evaluations (if applicable)
5. Recommendations
    a. Recommendations for CSI eligibility, technical requirements, funding, incentive levels, or process, as appropriate
    b. Recommendations for future research
6. Appendices

3.3.6 Cost-Effectiveness Studies

Cost-Effectiveness Studies will be conducted at the end of every second program year to capture the impacts and costs of the preceding two years. No cost-effectiveness study will be conducted, however, until the Commission determines an appropriate cost-benefit methodology as described in the Scoping Ruling. Every attempt should be made to leverage and coordinate with previous studies and efforts by the CEC to provide similar analysis of the SGIP program.

The analysis will be broken down by technology category as well as for the program as a whole. CSI cost-effectiveness will be assessed using the cost-benefit methodology to be adopted by the CPUC in this proceeding.

Cost-Effectiveness Study Outline

1. Executive Summary
2. Introduction
    a. Background
    b. Research objectives
    c. Methodology
3. Cost Benefit Components
4. Cost-Benefit Test Results
5. Recommendations:
    a. Recommendations for CSI eligibility, technical requirements, funding, incentive levels, or process, as appropriate
    b. Recommendations for future research
6. Appendices

3.3.7 Net Energy Metering Cost/Benefit Study

In addition to the criteria that are to be reported annually, SB 1 also requires CPUC to report on the costs and benefits of net-energy metering (NEM) by January 1, 2010[13]. Therefore, an additional cost/benefit study will be conducted on the NEM program. The study will be repeated later in the program to assess any changes in the costs and benefits of NEM as the CSI program matures. This study will not be funded solely by CSI as it includes multiple technologies. Co-funding will be provided for non-CSI programs that also use NEM. Per PU Code 2827(c)(4), the NEM Cost/Benefit Study should include:

- An assessment of the costs and benefits of net energy metering from the perspectives of both participating and non-participating ratepayers;
- An assessment of wind energy co-metering
- An assessment co-energy metering
- An evaluation from the perspective of both participating and nonparticipating customers of the tradeoffs from different forms of net metering
- An evaluation of options to replace the economic costs of different forms of net metering with a mechanism that more equitably balances the interests of participating and nonparticipating customers, including the use of a "feed-in tariff" model.

3.3.8 External Financial Audit Report

Approximately every two years, starting in 2009 and ending 2015, an external audit will be performed to track spending and performance for the Program Administrators. The objective of the audit is to ascertain whether CSI administrative costs and expenditures were properly charged against program funds. A third-party financial audit will provide transparency, enable the Commission to meet its due diligence goals, as well as ensure that ratepayer funds are being prudently managed by PAs. The External Financial Audit Report should track:

- Ratepayer funding, including breakdown by customer class;
- Financial expenditures with regard to program processing;
- Financial expenditures with regard to program implementation;
- Financial expenditures with regard to program oversight;
- Program accounting and reporting.

3.3.9 Optional Analyses

Funding will be set aside for any additional analyses that may be needed for any of the studies and assessments detailed above.

3.4 Annual Program Assessment

An Annual Program Assessment will examine all of the criteria specified in SB 1 that are required to be included in the June 30, 2009 report to the Legislature, and annually thereafter.

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

The CPUC will draft the Annual Program Assessment to Legislature required by SB 1. The Annual Program Assessment should include, at a minimum, the elements identified by SB 1 to be reported to the Legislature each year[14]:

- An assessment of the number of residential and commercial sites that have installed solar thermal devices for which an award was made, and the dollar value of the award against the budget cap
- An assessment of the number of residential and commercial sites that have installed solar energy systems
- An assessment of PBI vs. EPBB payments
- An assessment of annual incentive declines
- An assessment the electrical generating capacity of the installed solar energy systems
- An assessment of the cost of the program, including disaggregating actual incentive costs from various administrative and implementation costs and the privately borne costs of system installation;
- An assessment and characterization of the demographic make-up of CSI participants by race, income, region, business type and other appropriate categories;
- An assessment of 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
- An assessment of the progress made toward reaching the PV and non-PV 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.

The Annual Program Assessment will be informed by all of the program evaluation reports and studies, which are detailed in Section 3.2. The independent evaluations will examine the program areas that fall within the SB 1 reporting requirements, as well as examine other aspects of the CSI program outside of the scope of SB 1. The Annual Program Assessment will summarize the findings and recommendations of the independent evaluations upon their completion. The Annual Program Assessment should serve as a comprehensive annual evaluation of the CSI program.

The CPUC will make the CSI Program Evaluations and independent evaluations available to the public. The findings and recommendations from the independent evaluations will be considered by the CPUC and should inform the ongoing implementation of the CSI program.

4 CSI Program Evaluation Plan: Timeline and Budget

The total required budget for the Evaluation Plan will be $46.7 million, as detailed in Table 4 below. Table 4 also lays out the overall timeline for the CSI Program Evaluation Plan. However, in order for the CPUC to meet the statutory requirement to report to the Legislature by June 2009, Table 3 outlines a more detailed timeline for the Evaluation Plan through December, 2009:

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

Table 3: 2008-2009 DETAILED CSI PROGRAM EVALUATION PLAN TIMELINE

Date	Task
June 2008	Ruling on draft Evaluation Plan issued for comment
July 2008	Final Ruling on Evaluation Plan issued
TBD – within 90 days from date of Final Ruling	RFP issued for Evaluation contractors by the CPUC for certain studies
TBD - within 90 days from date of Final Ruling	RFP issued for Evaluation Plan contractors by Program Administrators
4th Quarter 2008	Contractors begin evaluations
January 2009	Quarterly Progress Report issued by CPUC staff
February 2009	Draft Impact Evaluation issued by contractor
April 2009	Final Impact Evaluation report completed by contractor
April 2009	Second Quarterly Progress Report issued by CPUC staff
May 2009	Draft Annual Program Assessment issued for comment
June 2009	Final staff Annual Program Assessment developed and reported to Legislature
September 2009	Draft NEM Cost/Benefit Study issued by contractor
November 2009	Draft Staff NEM Cost/Benefit report issued for comment
December 2009	Final Staff NEM Cost/Benefit report developed and reported to Legislature

The following table outlines the general timetable and budget for all reports and studies in the Evaluation Plan:

Table 4: OVERALL CSI PROGRAM EVALUATION PLAN TIMELINE AND BUDGET

Study Name	Timing of Study	Budget
Project Coordinator	• Responsibilities per Section 3.3.1, commencing Q4 2008	$1.6 million
Quarterly Progress Report (Developed by CPUC staff)	• Quarterly from 2008-2017	$0
On-going Progress Studies (CPUC contracts)	• As determined necessary	$3.6 Million

Study Name	Timing of Study	Budget
Annual Program Assessment (Developed by CPUC staff with input from the Project Coordinator)	• 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016	$0
Impact Evaluations (Program Administrators contract)	• Annually, within six months of the close of the year in question	$23.4 Million
Retention/Performance Studies (Program Administrators contract)	• 2011 • 2015 • 2017 • Performance studies as determined necessary	$600,000
Market Characterization Studies (Program Administrators contract)	Macro: • 2010, 2013, and 2016 Micro: • As determined necessary	$10 Million
Process Studies (CPUC contracts)	• 2009, 2011, 2013, 2015 (these dates may be moved forward or backward if program changes warrant)	$1.0 Million
Program Administrator Comparative Assessments (CPUC contracts)	• 2009 for 2007-2008 • 2012 for 2009-2011	$500,000
Best Practices Studies (CPUC contracts)	• 2009 • 2012	$600,000
Cost-Effectiveness Studies (Program Administrators contract)	• Early 2009 to capture 2007-2008 • Early 2012 to capture 2009-2011 • Early 2015 to capture 2012-2014 • Early 2017 to capture 2015-2016	$1.6 Million

Study Name	Timing of Study	Budget
NEM Cost/Benefit Study (Program Administrators contract)	• 2009, 2013	$300,000
External Audits (CPUC contracts)	• 2009, 2011, 2013, 2015	$2.0 Million
Optional Analysis (TBD)	• As determined necessary	$1.5 Million
TOTAL CSI PROGRAM EVALUATION PLAN		**$46.7 million**

(END OF APPENDIX A)