California Solar Initiative
SASH and MASH
Program Administrator
Performance Assessment Report

Presented to:
The California Public Utilities Commission

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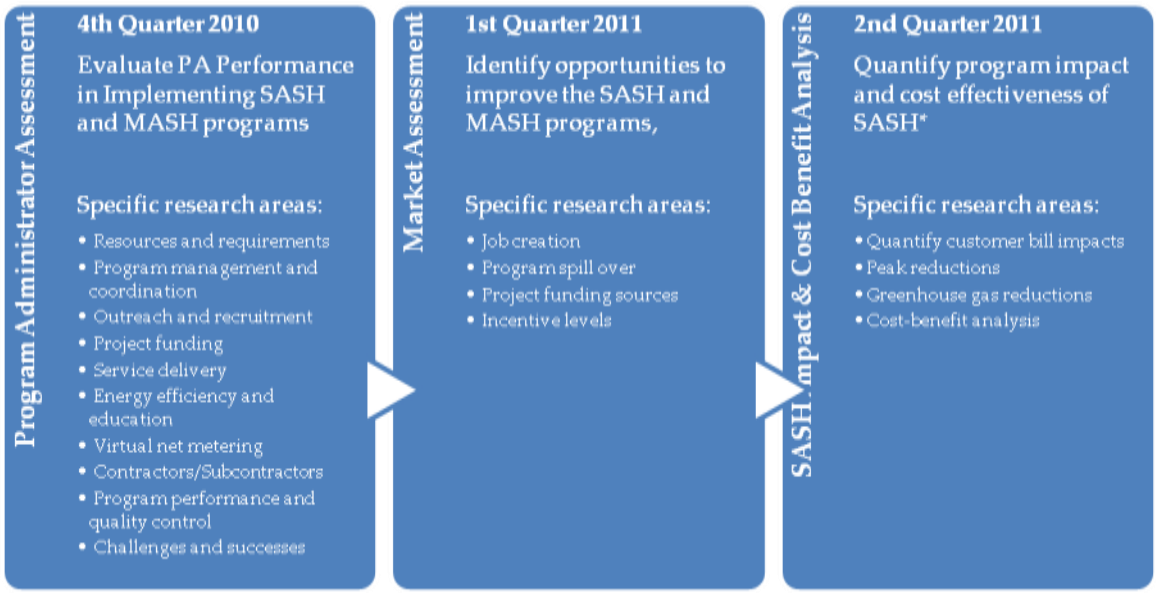
Executive Summary

Navigant Consulting, Inc., and its partner, APPRISE, are conducting an evaluation of the Single-Family Affordable Solar Housing Program (SASH) and the Multifamily Affordable Solar Housing Program (MASH). This Program Administrator (PA) Performance Assessment was conducted as part of this evaluation along with two subsequent reports, a Market Assessment and a SASH Impact and Cost Benefit Analysis, as illustrated in Figure 1. This report reviews the PA Assessment research that was conducted, provides findings from the research, and recommends modifications to the programs based on the findings.

Figure 1. Schedule of SASH and MASH Evaluation Reports



MASH and SASH

The California Solar Initiative (CSI) provides solar incentives to customers of the investor-owned utilities in California to increase the adoption of solar energy. The CSI includes components for low-income single- family homeowners and multifamily affordable housing.

The SASH, a component of the CSI, provides financial assistance for the installation of solar photovoltaic (PV) generating systems on qualifying affordable single-family housing. SASH is implemented by GRID Alternatives, a nonprofit solar provider whose mission is to "empower communities in need by providing renewable energy and energy efficiency services, equipment and training."

The Multifamily Affordable Solar Housing Program (MASH), another component of the CSI, provides financial assistance for the installation of solar PV generating systems on low-income multifamily housing. MASH is implemented by three Program Administrators—the California Center for Sustainable Energy (CCSE) in the service territory of San Diego Gas and Electric (SDG&E), Pacific Gas and Electric (PG&E), and Southern California Edison (SCE).

Research Objectives

There were several informational objectives for the Program Administrator research.

- Resources and Requirements – Document the program guidelines and regulations, experience and capabilities of the PAs, and the sufficiency of administrative budgets to provide needed oversight and support. Identify the partnerships that have been developed with agencies and stakeholders in the low-income housing area.

- Program Management – Document the staff that are responsible for the programs and how responsibilities and information are coordinated between program actors, including administrators, utilities, and contractors. Examine data systems and reports, and information from annual audits. Identify coordination and synergies with the general market multifamily program.

- Customer Outreach and Recruitment – Investigate how the programs are marketed and potential participants are recruited, the role of affordable housing entities in program marketing, and challenges faced in working with the eligible population.

- Program Implementation – Document how and when the program was initially implemented and how it has evolved, initial challenges and how they were overcome, and PAs' ability to meet program implementation goals.

- Project Funding – Track incentive levels used to date, allocation of projects between MASH Track 1 and Track 2, allocation of capacity between common and tenant space, percentage of project costs covered by incentives, customer payment responsibilities and financing, and use of "sweat equity."

- Service Delivery – Assess the application and intake process, project cycle time, home conditions that may impede installation, maintenance and follow-up, and incentives paid to date.

- Energy Efficiency – Document program requirements and enforcement, implementation of energy audits, coordination with the Low Income Energy Efficiency (LIEE) program, energy efficiency measures installed, funding of measures, and impact on system size.

- Energy Education – Establish the information provided to customers about bills and solar energy, system monitoring and maintenance, and energy efficiency.

- Virtual Net Metering – Assess the use of virtual net metering (VNM), impacts on utility billing systems and costs, and VNM challenges.

- Program Coordination – Determine the coordination between MASH and SASH, and with other low-income programs including LIEE, California Alternate Rates for Energy (CARE), and Low-Income Home Energy Assistance Program, as well as referrals made to other available assistance.

- Contractors and Subcontractors – Assess the allocation of MASH projects, and training and supervision of contractors and subcontractors.

- Program Performance and Quality Control (QC) – Document customer satisfaction and feedback, and measurement and evaluation undertaken by the PAs, as well as PA and third-party QC assessments.

- Challenges and Successes – Assess the barriers and challenges faced and furnish recommendations for program modifications.

Research Methods

The Program Administrator research and the findings expressed in this report are based upon the following evaluation activities:

- Review of background documents – The Navigant team reviewed background documents including legislation, California Public Utilities Commission (CPUC) orders, progress reports, and program information available on the CPUC website.

- Program Administrator interviews – The Navigant team conducted in-person, onsite interviews with the SASH Program Administrator and the MASH Program Administrators. We conducted additional follow-up telephone interviews with SDG&E.

- Requested document review – The Navigant team requested and reviewed documents received from the Program Administrators.

- Database analysis – The Navigant team reviewed and analyzed the SASH and MASH databases provided by the Program Administrators.

SASH Findings

Program Accomplishments

- Through September 29, 2010, the SASH program reports that 287 projects have been installed or completed, with 463 projects approved and "In Process."

Program Administration

- Overall, GRID is providing effective implementation of the SASH program. GRID's program strategy, which includes client education, referral to LIEE for eligible clients, support of job training programs, and community education through volunteers has the potential to provide benefits beyond PV generation capacity.

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Program Eligibility Requirements

- Recent clarifications to program eligibility will make outreach and recruitment easier and will reduce the time and effort spent working with customers who ultimately are ineligible.

Outreach and Recruitment

- GRID's outreach and recruitment methods are effective and appropriate for targeting the population of eligible customers. Mass market approaches would not be appropriate for a program with narrow eligibility criteria.

Program Implementation

- Program records indicate that there is room for improvement in the areas of application and records processing. Some examples include:
    - Twenty projects that have either Installation or Inspection Completed dates entered are still assigned a Status of Approved-Construction, Approved-Outreach, or Pre-Screened Qualified (only one of the latter);
    - Many projects in the Installed or Completed status categories are missing date entries for various steps in the application review, project design, and installation process; and
    - Many projects with an Installed or Competed status indicate that gap funding is required but do not have a funding source indicated.

Project Funding

- Identifying sources of funding to cover the gap between SASH incentives and system costs has been effective at securing program participation. However, this may not be a feasible model over the long term and other methods for covering this gap should be investigated and developed.

- The original SASH design envisioned the use of community financing to cover the gap between the full solar system cost and the SASH incentive, this model did not prove feasible. Given the recession and the tight credit market, loans were less readily available than they were at the time the program was designed. Clients may have also been less willing to take on debt to participate in SASH given the downturn in the housing market.

- The average SASH incentive for an Installed or Completed project is $16,799. Incentives for all Installed or Completed projects are under $50,000, with the exception of a single project with an incentive of nearly $90,000.

Energy Efficiency and Energy Education

- The one-on-one contact by the Outreach Coordinator provides an opportunity for energy education and referrals to the LIEE program.

- The energy efficiency component for non-LIEE-eligible clients is minimal. GRID reports that they provide significant energy education to all clients. However, there is no provision for energy efficiency services for the SASH participants who are not eligible for LIEE.

- The SASH implementation strategy includes a follow-up visit with the client six weeks after interconnection to educate the client on how the system works, how to check if the system is on and working, what to do if they find a problem, how to read the system's production, how to maintain the system, and how to read their electric bill. GRID conducts this training on GRID installations and on SPP projects.

Subcontractors

- The Subcontractor Partnership Program was announced in October 2009 and began accepting applications in November 2009. Sixty nine contractors had been accepted to the program as of November 1, 2010 when the program was closed to new contractors.

- Managing the high number of applicants to the SPP required a significant amount of administrative effort and project installation oversight.

- Closing the SPP to new contractors will allow GRID to manage program administrative costs and effort and monitor the participating subcontractors to ensure the installation standards set by GRID are being met. It will also provide GRID the opportunity to work through the existing list of SPP contractors to identify and remove any non-performers.

SASH Recommendations

Key recommendations based on the SASH PA Assessment are summarized below.

Program Implementation

- GRID staff should recognize that the SASH database is not only a project tracking tool but also a program reporting database. The CPUC relies on the program data to assure that ratepayer funds are used in a prudent manner. GRID should develop procedures around application processing and data management. These processing procedures should include:

    - Process flow diagrams and a "file" checklist to ensure that all of the required documentation is being gathered and all data fields are populated in the SASH database;

    - Validations on fields of the SASH database so that status codes cannot be updated without date fields being populated and dates must be entered sequentially (for instance, the installed date cannot occur before the application approval date);

    - A back-end file and database review conducted by staff not involved in the project's implementation; and

- Maintenance of all project forms and documents in a central location, whether a physical file or an electronic depository.

Project Funding

- Securing non-incentive gap funding to provide no-cost solar systems for low-income households may be necessary. The CPUC should encourage the use of other available financing programs to help clients cover the gap between the system cost and the SASH incentive. If necessary, the CPUC should allow the use of additional program funds to help GRID locate funding sources and conduct their own fundraising to fill the gap.

- The SASH incentive should be capped at $50,000. Although the vast majority of incentives for Installed or Completed SASH projects are under $50,000, a single project was granted an incentive of nearly $90,000. A cap on the incentive available per project will allow more households to participate in SASH and increase the likelihood that the program will achieve its goals within the incentive budget.

Energy Efficiency

- SASH clients who are not eligible for LIEE do not receive energy efficiency services. GRID, the CPUC, and the utilities should investigate how they can provide energy efficiency services to SASH clients who are not eligible for LIEE.

Subcontractors

- GRID should increase the job training requirements for the SPP contractors. A smaller pool of SPP contractors will provide more SASH projects to each contractor so GRID should use this leverage to further promote job training and workforce development.

Challenges and Successes

- GRID should develop a system to track and document job trainees used on SPP projects, and attempt to track the jobs that trainees obtain in the solar industry once they leave the program so that they can be claimed as a benefit or impact of the program. A benefit of SASH is the vast amount of workforce training and development that is associated with the program. GRID provides this benefit by working with job-training programs on 20 percent of their installations and by the SPP requirement that the subcontractors utilize job trainees on their installations. However, GRID has not developed a system to track the amount of training and experience that is provided or the number of jobs that are created.

MASH Findings

Key findings based on the MASH PA Assessment are summarized below.

- More than 1.4 MW of capacity have been successfully installed through Track 1, with an additional 19.5 MW of capacity expected from active reservations.

- Over $7 million and 1,274 kW of capacity have been successfully awarded through Track 2.

Program Implementation

- All of the PAs felt that the synergies with CSI helped them to implement MASH in a quick and cost-effective manner and that MASH is a successful program. The staff had the experience needed to implement the program efficiently.

Outreach and Recruitment

- The PAs reported that the MASH marketing and outreach budget is sufficient. Some noted that they had not spent their full marketing budget because Track 1 filled up so quickly.

- MASH was oversubscribed so quickly that the PAs did not do as much marketing and outreach as they expected to, or would have liked.

- One effective outreach strategy was to work closely with the affordable housing community. Another was working with Power Purchaser Agreements (PPAs).

Track 2

- Track 2 was designed to potentially provide greater incentive levels in exchange for increased tenant benefits and energy efficiency through a grant application process. Although the RFP describes direct tenant benefits, education and outreach, and green job creation/training as examples of tenant benefits, proposers are allowed to identify and propose their own.

- Some of the PAs expressed lack of clear objectives and guidance on desired outcomes has likely contributed to the poor quality proposals received. In addition, at the time of the interviews, the PAs did not have a strategy for verifying all of the proposed activities beyond the installation of the PV system. The duration of some benefits, such computer labs and green jobs, cannot be ensured with out ongoing reporting or verification activities.

Project Funding

- The PAs stated that the MASH incentives are "appropriate", "healthy" and "generous", and caused the contractors to jump on the opportunity. Funding sources that were used in addition to the MASH incentive were the federal tax credit, the net energy metering credit, government grants, and American Recovery and Reinvestment Act (ARRA) funds. PPAs were an important source of financing.

Energy Efficiency

- The only MASH energy efficiency requirements for Track 1 are the energy audit and the disclosure form, which states that the applicant had completed and reviewed the energy audit. The disclosure form provides an option to list any energy efficiency measures that they plan to implement. These documents must be submitted with the MASH application.

Energy Education

- The PAs were not involved with educating MASH participants about customer electrical usage and system maintenance which was provided by the contractors. However, the PAs did provide a certain level of energy efficiency awareness and MASH program specifics.

Virtual Net Metering

- PAs were not consistent in their verification of the allocation of benefits among tenants. Although one PA stated that they verify the percentage split between the tenants, which is based upon the size of the unit, the other PAs did not report that they conducted this check.

- Implementing Virtual Net Metering for MASH will require utility billing system reprogramming, temporary billing while the system is being programmed, account set-ups, and ongoing billing complexities. The utilities did not have estimates of all of these costs at the time of our interviews but provided estimates in a subsequent data request.

MASH Recommendations

Key recommendations based on the MASH PA Assessment are summarized below.

Project Funding

- The short time in which the MASH Track 1 program became fully subscribed suggests that the incentive levels may be higher than needed. The incentive levels should be lowered if new Track 1 funding becomes available. The Market Assessment will investigate the appropriate incentive levels to move the market.

- The current incentive strategy promotes projects that provide tenant benefits and should be maintained.

Track 2

- If Track 2 is continued, the project objectives and associated scoring criteria should be limited to providing direct tenant benefits, in the form of verifiable bill reductions (such as through a VNM agreement) and the installation of comprehensive energy efficiency retrofits in tenant spaces, unless clear and quantifiable objectives and scoring criteria can be developed for education and outreach, and job creation and training. This will ensure that the proposed activities are verifiable, the benefits accrue directly to tenants, and that complex or ongoing verification efforts are not required.

    - If Track 2 is continued, certain changes should be made to the requirements to pinpoint the desired outcomes and give clear direction to proposers on what is likely to be a successful proposal. These changes include: Objectives should be limited to direct tenant benefits, and energy-related education, outreach, and job creation;

- Tenant benefits should be limited to direct, and quantifiable tenant benefits, such as bill reductions (such as through a VNM agreement) and the installation of comprehensive energy retrofits in tenant spaces;

- Energy-related education, outreach, and job creation efforts should include a quarterly reporting requirement for the duration of the funding;

- The PAs should develop cost proposal worksheet that provides a detailed breakdown of the requested funds. The breakdown should show the costs for PV installation, energy efficiency upgrades, education, outreach, and job creation. Onetime costs, such as for the installation of PV or energy efficiency, and ongoing costs should be clearly identifiable, as should the duration of the ongoing costs;

- Details around other aspects of the proposal should also be specified so the PAs can calculate the various costs and benefits and compare these to other proposals or to a minimum threshold. These include:

    - PV capacity so that the cost per Watt is clear;

    - Number of tenants receiving PV and energy efficiency benefits; and

    - Number of education and outreach activities to be conducted.

Energy Efficiency

- If additional funds are made available for MASH, the energy efficiency requirement should be increased to include an onsite audit by a qualified energy efficiency services provider. Energy efficiency requirements in MASH are minimal and, in Navigant's opinion, are not effective. The only requirement is to conduct an online audit and submit a disclosure form that states whether the applicant will install any energy efficiency measures. The audit appears to be viewed as just another form that needs to be submitted with the application.

Virtual Net Metering

- PAs have different verification procedures for VNM tenant allocations. Such differences could be a frustration for developers working across utility territories. PAs should use the same method and level of veracity when verifying the VNM splits between tenants.

- Although an analysis of general market for PV was beyond the scope of this evaluation, there seem to be benefits to expanding VNM to general market multi-family buildings or tenant spaces. Spreading the VNM set up costs in the utility billing systems over a greater number of projects would reduce the average cost per account. However, the utilities should look for a more efficient solution for conducting the monthly, ongoing VNM billing to reduce the per account costs further

- Virtual Net Metering applies the same benefits to low-income and non-low-income residents of the participating buildings. Under the current tariffs, the benefits are applied to the residents based on apartment size, and not on whether or not the household has income at or below 80 percent of area median income. The CPUC and the utilities should consider applying the benefits from the low-income program only to the low-income tenants.

Program Tracking

- A uniform template should be developed for reporting MASH statistics to the public and CPUC. Updates to the data should be made quarterly with a standard cutoff date. Track 2 should be included with project status information included.

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I. Introduction

Navigant Consulting, Inc., and its partner, APPRISE, are conducting an evaluation of the Single-Family Affordable Solar Housing Program (SASH) and the Multifamily Affordable Solar Housing Program (MASH) for the California Public Utilities Commission (CPUC). This Program Administrator (PA) Performance Assessment report is the first of several reports to be delivered as part of the evaluation cycle. The assessment summarizes the research that was conducted as part of the PA Assessment, provides findings from the research, and recommends modifications to the programs based on the findings. This section provides an overview of the SASH and MASH programs, the research that was conducted, and the report contents.

SASH and MASH Programs

The California Solar Initiative (CSI) provides solar incentives to customers of the investor-owned utilities in California to increase the adoption of solar energy in California. The CSI includes components for low-income single-family homeowners and multifamily affordable housing.

The Single Family Affordable Solar Housing Program, a component of the CSI, provides financial assistance for the installation of solar photovoltaic (PV) generating systems on qualifying affordable single-family housing. SASH is implemented statewide by GRID Alternatives, a nonprofit solar provider whose mission is to "empower communities in need by providing renewable energy and energy efficiency services, equipment and training."

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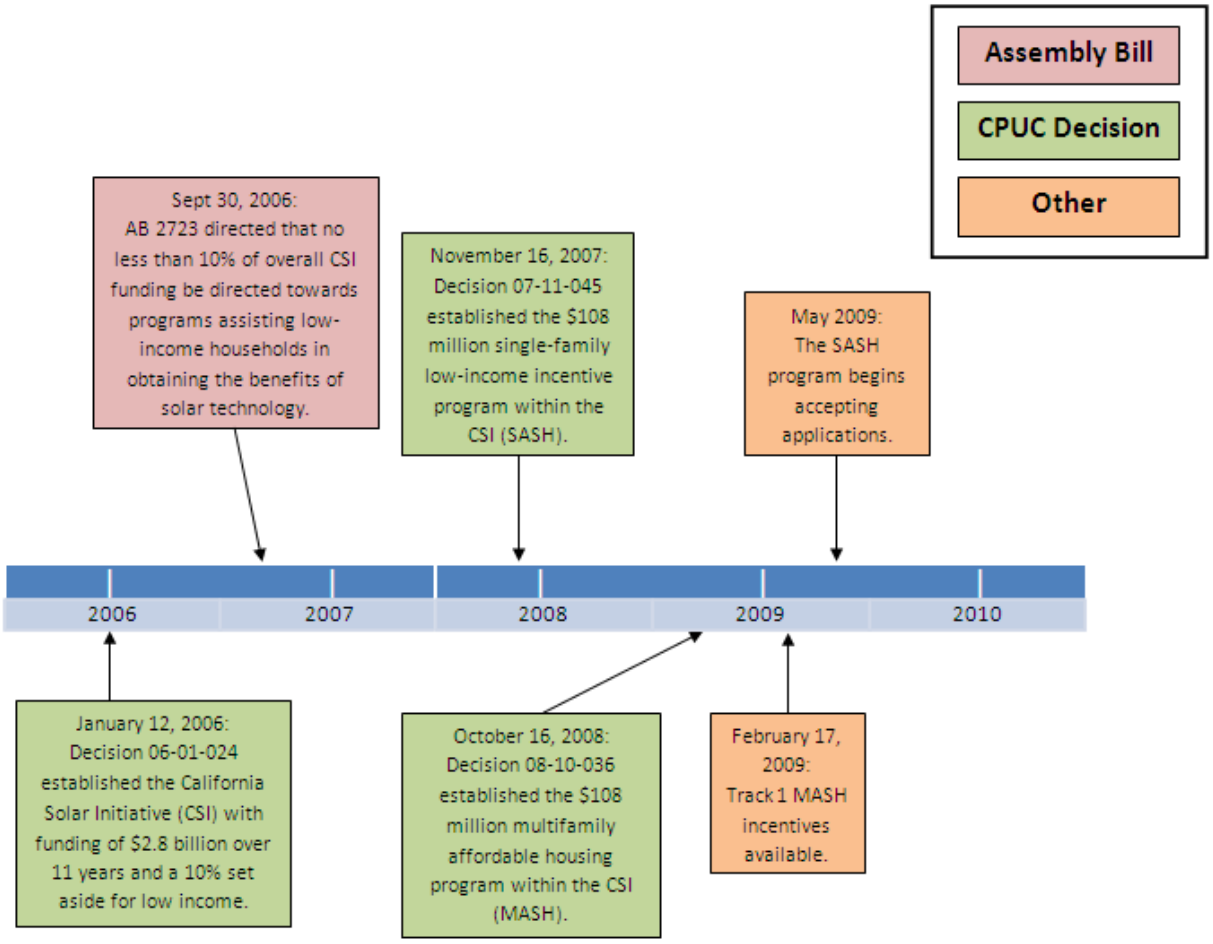
Background

The CPUC established the CSI in early 2006 in Decision 06-01-024. Decision 06-01-024 included a provision to set aside a minimum of 10 percent of CSI program funds for projects installed by low-income residential customers and affordable housing projects. Later in 2006, the California Legislature codified this low-income funding requirement in Senate Bill (SB) 1 and Assembly Bill (AB) 2723. Subsequently, in Decision 06-12-033, the CPUC directed the PAs to conform the CSI program to the SB 1 and AB 2723 requirement that 10 percent of the CSI budget be reserved for the single-family and multifamily low-income residential solar incentive programs. On November 16, 2007, the CPUC established the $108.34 million SASH program. The administration of the SASH program was awarded to GRID Alternatives, and the program began accepting applications in May of 2009. On October 16, 2008, in Decision 08-10-036, the CPUC established the $108.34 million MASH program. Track 1 incentives were first available on February 17, 2009.

Figure I-1 below summarizes the key milestones in the SASH and MASH development.

Figure I-1. CSI Low Income Timeline



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There were several informational objectives for the Program Administrator research.

- Resources and Requirements – Document the program guidelines and regulations, experience and capabilities of PAs, and the sufficiency of administrative budgets to provide needed oversight and support. Identify the partnerships that have been developed with agencies and stakeholders in the low-income housing area.

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- Energy Education – Establish the information provided to customers about bills and solar energy, system monitoring and maintenance, and energy efficiency.

- Virtual Net Metering – Assess the use of virtual net metering, impacts on utility billing systems and costs, and VNM challenges.

- Program Coordination – Determine the coordination between MASH and SASH; coordination with other low-income programs including LIEE, California Alternative Rates for Energy (CARE), and the Low-Income Energy Assistance Program (LIHEAP); and referrals made to other available assistance.

- Contractors and Subcontractors – Assess the allocation of MASH projects, and training and supervision of contractors and subcontractors.

- Program Performance and Quality Control (QC) – Document customer satisfaction and feedback, measurement and evaluation undertaken by PAs, and PA and third-party QC assessments.

- Challenges and Successes – Assess the barriers and challenges faced and make recommendations for program modifications.

This PA Assessment Report is the first in a series of three evaluation reports Navigant is conducting for the CSI Low Income programs:

- A Market Assessment will be delivered to the CPUC in the first quarter of 2011 and will identify opportunities to improve the SASH and MASH programs, along with some specific areas of

research which include job creation, program spill over, and project funding sources and incentive levels;

- A SASH Impact and Cost Benefit Analysis will be delivered to the CPUC in the third quarter of 2011 and will attempt to quantify the actual program impact of the SASH program and assess the program's cost effectiveness. Additional areas of investigation include customer bill impacts. An impact and cost benefit analysis of the MASH program was not included because of the low number of projects projected to be completed by the end of 2010.

In addition to the three formal evaluation reports, the Navigant team will support the CPUC in the development of the SASH and MASH biennial reports due to the California Legislature in June 2011.

Program Administrator Review Research Methods

The Program Administrator research and the findings expressed in this report are based upon the following evaluation activities.

- Review of background documents –The Navigant team reviewed background documents including legislation, CPUC orders, progress reports, and program information available on the CPUC website.

- Program Administrator interviews – The Navigant team developed detailed interview guides for the SASH and MASH Program Administrators. The team also conducted in-person, on-site interviews with GRID Alternatives, the SASH PA, at the GRID Alternatives headquarters and at one of their satellite offices in Carson. We conducted in-person, on-site interviews with the MASH PAs, CCSE, PG&E, and SCE. In addition, the Navigant team conducted a follow-up telephone interview with SDG&E. Detailed data requests and interview guides were developed and sent to each PA in advance of their scheduled interviews. These guides are included in Appendix A (SASH) and Appendix B (MASH). Following the on-site PA interviews, the Navigant team sent detailed summaries to the interviewees to allow them the opportunity to confirm or correct the team's interpretation of their interview responses.

- Document review –The Navigant team requested and reviewed the following documents received from the PAs.

  SASH Documents
  - Final SASH implementation plan
  - Installation protocols and procedures (field inspection protocol, field inspection work sheet, design review protocol, installation quality control checklist, and new construction staff training and orientation)
  - GRID Alternatives organizational chart and summary of job positions
  - SASH energy efficiency training outline and outreach manual
  - Subcontractor application and construction guidelines
  - Subcontractor agreements
  - Utility contracts

- SASH application
- SASH conferences and presentations
- Workforce development and job-training plan
- Request for Proposals (RFP) and Proposal response for GRID Alternatives to become the SASH program administrator

MASH Documents

- Final MASH implementation plan
- Inspection work sheet
- MASH training conference presentations and materials
- Contractor agreements
- MASH applications – Track 1 and Track 2
- Track 2 application review criteria
- MASH database reports used for program management
- MASH marketing and outreach plan
- MASH program brochures and marketing materials, bill inserts
- MASH presentations, conference attendance, and papers
- MASH semiannual progress reports
- MASH semiannual administrative expense reports
- VNM tariff used for MASH projects

- Database analysis –The Navigant team analyzed the SASH and MASH databases that were provided by the PAs.

Organization of the Report

Three sections follow this introduction.

1) Section II –SASH Assessments: This section provides the findings from the SASH PA Assessment.

2) Section III – MASH Assessments: This section provides the findings from the MASH PA Assessment.

3) Section IV – Findings and Recommendations: This section provides a discussion of the findings and recommendations for modifications to the program or to future low-income solar programs in California.

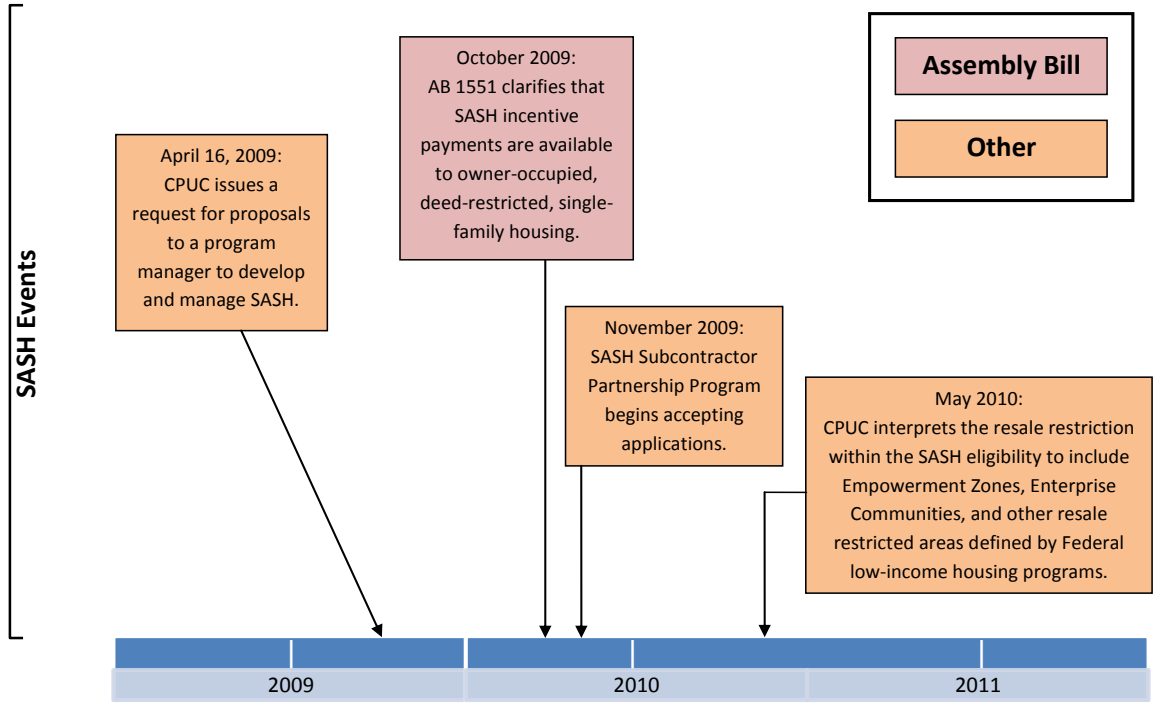
I. SASH Assessment

The SASH Program, a component of the CSI, provides financial assistance for the installation of solar PV generating systems on qualifying affordable single-family housing. SASH is implemented by GRID Alternatives, a nonprofit solar provider whose mission is to "empower communities in need by providing renewable energy and energy efficiency services, equipment and training."

SASH Overview

On November 16, 2007, the CPUC established the $108.34 million SASH program. The administration of the SASH program was awarded to GRID Alternatives, and the program began accepting applications in May of 2009. In October 2009, AB 1551 amended Section 2852 of the Public Utilities Code to clarify that SASH incentive payments were available to owner-occupied, deed-restricted, single-family housing. An additional clarification was made by the CPUC in May 2010 by the interpretation of the resale restriction within the SASH eligibility to include Empowerment Zones, Enterprise Zones, and other resale restricted areas defined by federal low-income housing programs. GRID Alternatives began accepting applications for its Subcontractor Partnership Program in November 2009. Figure I-1 below depicts these key milestones graphically.

Figure I-1. Key Milestones in the SASH Development and Implementation



The goals of SASH are the following:

- Decrease electricity usage by solar installation and reduce energy bills without increasing monthly expenses.
- Provide full and partial incentives for solar systems for low-income participants.
- Offer the power of solar and energy efficiency to homeowners.
- Decrease the expense of solar ownership with a higher incentive than the General CSI Program.
- Develop energy solutions that are environmentally and economically sustainable.[1]

Single-family low-income homeowners in PG&E, SCE, and SDG&E service territories whose homes meet the definition of low-income residential housing established in Public Utility Code 2852 are eligible for program incentives. The code states that the housing must be an individual residence sold at an affordable housing cost to a lower income household that is subject to a resale restriction or equity sharing agreement.

SASH provides incentives for PV installation based on the Expected Performance Based Buy-down Method (EPBB), a one-time lump-sum payment after verification of system installation. The program provides various incentive levels based on the household income. Households with income at or below 50 percent of the area median income qualify for a fully subsidized 1-kilowatt (kW) system, with a subsidy not to exceed $10,000. Households at higher income levels qualify for incentives based on Federal Income Tax Liability and CARE Eligibility, shown in Table I-1.

Table I-1. SASH Incentive Levels ($/Watt)

Federal Income Tax Liability	CARE Eligible	Not CARE Eligible
$0	$7.00	$5.75
$1-$1,000	$6.50	$5.25
$1,000 +	$6.00	$4.75

Source: CPUC SASH website, http://www.cpuc.ca.gov/PUC/energy/Solar/sash.htm.

The budget for SASH was established at five percent of the CSI Program budget, $108.34 million. A maximum of 20 percent of the budget, $21.668 million, can be used for the fully subsidized 1-kW systems.[2]

SASH installations must meet the minimum performance requirement, which is 95 percent of the Design Factor[3], based on a modified EPBB calculation. If the modified Design Factor is less than 95 percent, the installation does not qualify for the SASH incentive.

[1] Source: CPUC SASH website, http://www.cpuc.ca.gov/PUC/energy/Solar/sash.htm.
[2] Decision 07-11-045, Opinion Establishing Single-Family Low-Income Incentive Program Within the California Solar Initiative, November 16, 2007.

GRID Alternatives

GRID Alternatives (GRID) was founded in 2003 by two energy efficiency professionals who aimed to introduce solar energy to low-income households. GRID's founders felt that low-income households were most in need of solar energy because these customers were least likely to be able to afford their electric bills and because low-income households often suffer the most from the pollution created by energy production. GRID's mission is to empower communities in need by providing renewable energy and energy efficiency services, equipment and training. Their mission has not changed with the introduction of SASH; however, SASH has helped GRID to fulfill its mission and expand services.

All of GRID's work is in providing solar energy to low-income households. Prior to the introduction of SASH, GRID utilized local community funding, supplemented by their own fundraising and volunteers in the community, to provide solar to low-income households. GRID used the same definition for income eligibility as SASH—80 percent of area median income. GRID had completed over 200 solar installations before beginning work on SASH.

Following the introduction of SASH, GRID continues to deliver solar energy to low-income households with funding sources other than SASH. The non-SASH work is mostly done through GRID's Oakland office, where GRID had existing grants and funding through the San Francisco Department of Environment. GRID also has some outside funding sources in the Los Angeles office. GRID reported that about ten percent of their work in 2010 was non-SASH installations.

GRID views SASH as a program that provides low-income households with additional assistance to make solar work. Prior to SASH, GRID had to raise a very large amount of additional funding to supplement the general market CSI incentive to make solar affordable for low-income families. The need for large amounts of additional funding limited the number of families GRID could serve.

GRID's goal goes beyond providing solar energy to low-income families. GRID aims to engage the low-income families in the process, to educate their clients on how solar technology works and who to call for assistance, to engage the community, and to educate the community as to how everyone can benefit from solar energy.

GRID states that their advantage over a utility-administered program is their capacity and expertise in working directly with low-income homeowners. They believe that they can ensure that the solar project is cost effective for every homeowner. GRID believes that while utilities do mass marketing, GRID has the capacity to work with many small entities to conduct targeted marketing, and that a less bureaucratic, easier to reach, nonprofit organization increases trust from clients. They stated that GRID's experience and specialization in working with income-qualified communities and the family-by-family attention that GRID is able to give is an advantage.

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[3] The Design Factor is a ratio comparing a proposed system's expected generation output with that of a baseline system. The Design Factor is used in calculating the EPBB incentive. (It is multiplied by the system rating and the incentive rate to determine EPBB incentives.) *California Solar Initiative Program Handbook*, June 2010, pg. 124.

GRID also noted that by working with a large pool of volunteers, they educate the community about solar, and that this education leads to market transformation benefits. They stated that many of their volunteers educate their employers about GRID and solar energy, and encourage their employer to install solar. GRID Alternatives also works in partnership with job training organizations throughout California to integrate workforce development directly into our low-income solar project, providing an experiential "classroom in the field."

Service Delivery Capacity

GRID has built up their capacity to meet the demands of SASH. Prior to the introduction of SASH, GRID had a Bay Area office and an LA office, and they were just opening up an office in San Diego. GRID now has five fully operational offices—Bay Area, Fresno, San Diego, and greater LA, and Central Coast. GRID also has remote outreach workers in the Inland Empire. GRID anticipants opening northern California and Inland Empire offices in the first half of 2011, and expand staff in existing offices. The growth plan is included in GRID's implementation plan. They will eventually have Oakland headquarters, plus seven offices across the state. Additionally, the Subcontractor Partnership Program (SPP) will enable GRID to install many more systems beyond what their in-house staff have capacity for.

GRID Staff Organization

Each GRID office has the same staff organizational structure, as described below.

- Regional Director – Each office has a Regional Director. The Regional Director manages the regional office staff and programs, develops regional partnerships, and guides regional SASH implementation. The Regional Director focuses on the big picture—the installation numbers, quality, and the process used—and ensures that projects go through and are on time.

- Outreach Coordinators – The Outreach Coordinators are responsible for identifying applicants, guiding homeowners through the application process, solar education, and post-installation training. Each Outreach Coordinator is responsible for bringing on average four to six clients a month through the complete process. They also spend time prescreening potential clients and working with households that do not participate in SASH. Outreach Coordinators are also responsible for building relationships with partners and obtaining address lists of eligible households. The majority of the Outreach Coordinators are bilingual. Many grew up in the neighborhoods that GRID is serving.

- Solar Installation Supervisors – The Solar Installation Supervisors are responsible for system design and permitting, and for making sure that the project quality is up to GRID's standards. They supervise on-site installation and train and oversee the work of volunteers and trainees.

- Construction Staff – The Construction Staff oversee installations, train job trainees and volunteers, and work on design and engineering. The majority of the construction staff are from the solar industry. GRID provides in-house training for those who are not from the solar industry.

- Volunteer Training Associates (AmeriCorps) – They train, prepare, and manage the volunteers and trainees.

Some GRID offices also have an Outreach and Program Associate who provides additional support on outreach and on interconnection. Other staff positions include the Administrative Assistant, the Construction Assistant, and the Part-time Development Associate.

Foreign language capability among GRID staff members is primarily Spanish, the most common language among clients if their first language is not English. There are also some Mandarin Chinese and Korean speakers. Volunteers, or often an English-speaking relative in the home, can also provide translation assistance. GRID estimates that approximately 20 percent of their clients across the state have a primary language other than English.

GRID collects information on languages that their volunteers speak, and they have asked volunteers if they are willing to help translate. GRID used volunteer assistance to have their documents translated. GRID also has a SASH hotline with messages recorded by their volunteers. Clients can press a number to leave a message in any one of many languages, and someone who speaks the language will listen to the message and contact the client.

Staff Qualifications and Training

GRID hires outreach staff who have nonprofit experience or sales and marketing plus nonprofit experience. GRID also looks for experience living in a disadvantaged community or working with disadvantaged communities, good communication skills, and respect for diverse cultures. The installation staff have experience with solar design and installation. It is also helpful if they have teaching experience, as they do a great deal of work training staff and volunteers.

GRID provides internal training to staff when they are hired and on an ongoing basis. They have department-specific manuals and training. The staff members are also encouraged to undertake external training and GRID provides a professional development allotment for all staff so that they can continue developing skills that are relevant to their positions.

All staff members undergo an annual review that examines their goals and performance. All departments have regular meetings and staff check-ins with their managers to establish and assess short-term departmental goals.

System Design

Systems are primarily designed by the construction staff, and in some cases the project managers. Another staff member checks the design using a design review checklist to ensure they are checking all of the relevant pieces. The design review protocol is a list of more than 30 items to be checked in the following categories.[4]

[4] GRID Alternatives Quality Control Checklist.

- EPBB Calculator – includes check of equipment, orientation, tilt, shading, and design correction.
- Economic Analysis Spreadsheet – includes check that energy efficiency savings are included, system size, homeowner cash flow, incentive level, and gap financing.
- Single-Line Diagram – includes check of voltage, breaker, disconnects, wires, interconnection/grounding electrode, and client name and address.
- Site Plan – includes check of equipment; location of modules, inverter, disconnects, and main service; setback requirements; module layout; and inverter location.

GRID reports that they attempt to standardize the equipment and the drawing format; however, some differences result from municipal requirements for drawings or installation requirements. GRID has licensed engineers on staff, as well as staff certified by the North American Board of Certified Energy Practitioners (NABCEP).

Program Statistics

In May 2009, the CPUC approved the SASH Handbook and approved GRID Alternatives to begin accepting applications for the program. This section provides statistics from GRID's SASH program database as of November 1, 2010. In most cases, the analysis herein focuses on projects completed through September 30, 2010, to facilitate quarterly comparisons.

Completeness of Data

Navigant's initial analysis of GRID's database revealed some inconsistencies regarding the completeness of data that warranted specific mention. For example:

- Twenty projects that have either Installation or Inspection Completed dates entered are still assigned a Status of Approved-Construction, Approved-Outreach, or Pre-Screened Qualified (only one of the latter). This means the status of these projects was never updated once systems were installed. While a few are either recent installations (October or early November) or have future dates for purportedly scheduled installations, many are projects that were completed as far back as April 2010. These errors could affect reporting of completed projects as well as analysis of per-project costs and other metrics.

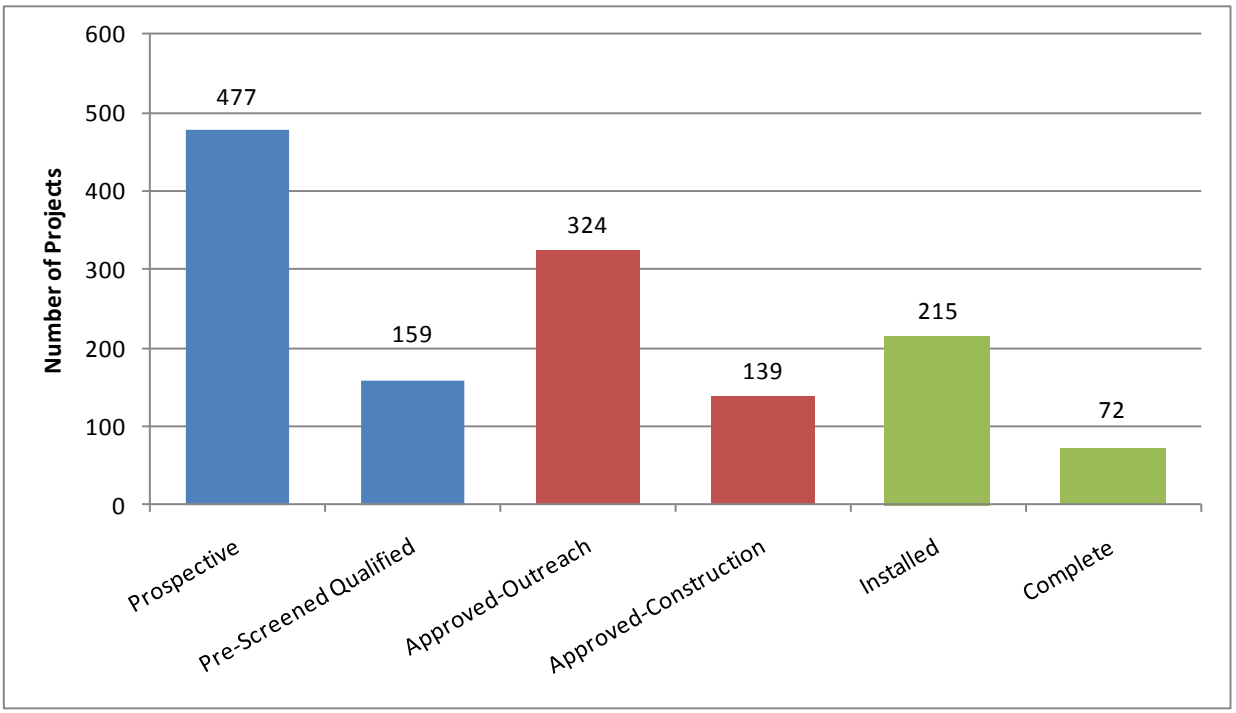
- Many projects in the Installed or Completed status categories are missing date entries for various steps in the application review, project design, and installation process, resulting in inconsistent population sizes for comparing the average duration of various project steps.

The team was able to address or work around most issues, but determined that more consistent and complete record keeping would facilitate improved accuracy and transparency of GRID's program reporting. Navigant included explanatory notes in the below analysis where it encountered specific inconsistencies or data-related issues.

Project Status

Figure I-2 provides an overview of the status of projects in GRID's database through October 31, 2010. Thus far, 287 projects have been installed or completed, with 463 projects approved and "In Process."

Figure I-2. SASH Projects by Status

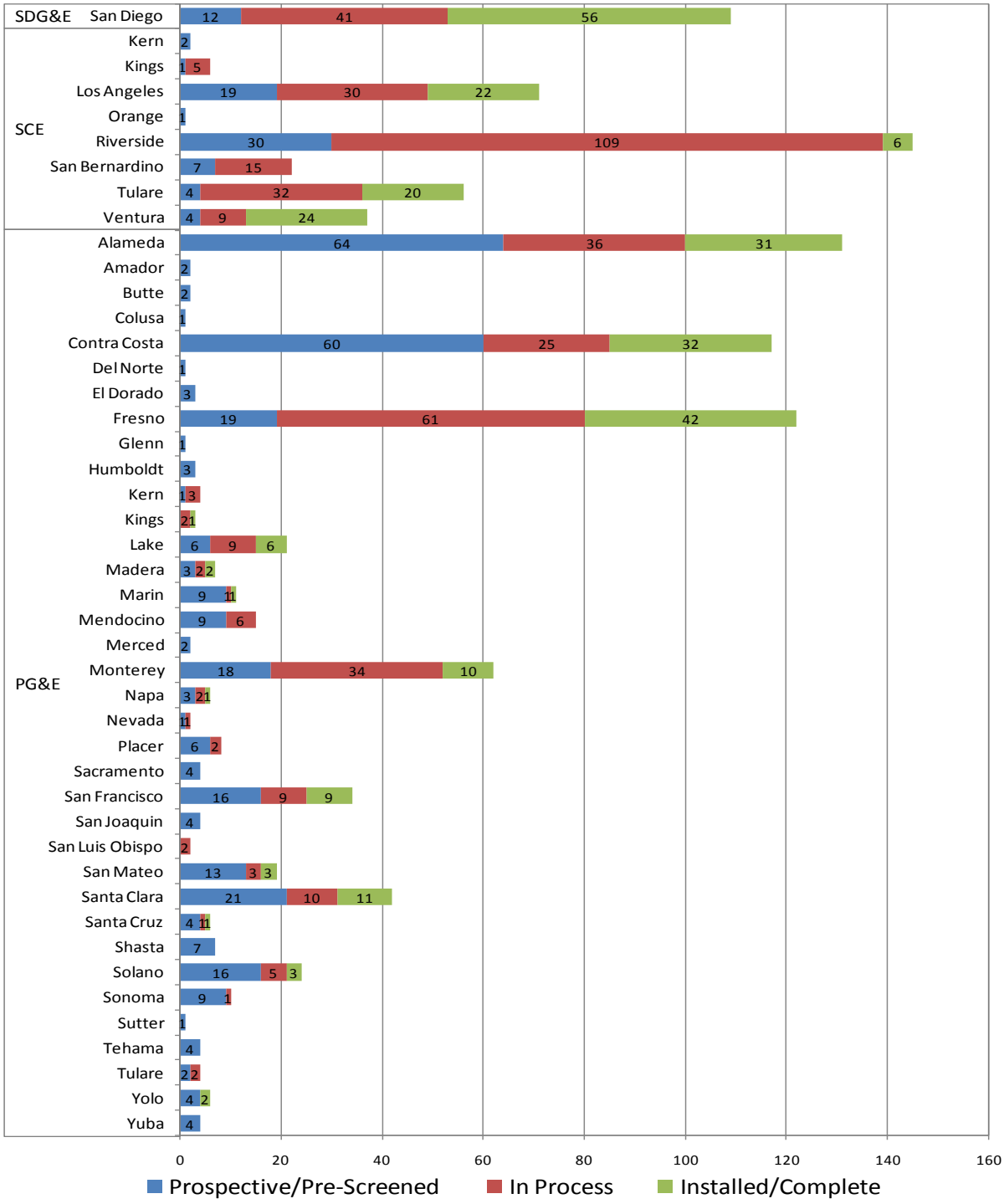


Source: SASH Program Data through November 1, 2010.

Geographic Distribution

Figure I-3 on the following page shows a distribution of projects by county in each of three general project status categories (Prospective/Pre-Screened; In-Process; and Installed/Completed). In-process projects are those for which applications have been approved, but for which installation has not occurred. Seven counties (Alameda, Contra Costa, Fresno, Los Angeles, San Diego, Tulare, and Ventura) account for 80 percent of the projects installed or completed to date.

Figure I-3. SASH Projects by County and Status*



**Source: SASH Program Data through November 1, 2010.*

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Project Cost Data

The following analysis provides insight into average costs for projects categorized as Installed or Completed in the SASH program database.

Distribution of Incentive Amount per Project

The average incentive level for the 215 installed projects for which incentives had been received through Q3 2010 is $16,799, as shown in Table I-2. The calculation was derived directly from the SASH program database by associating calculated incentive amounts with projects for which an "Incentive Received" date was recorded. An analysis of incentives and project funding gaps is discussed in the System Funding section.

Table I-2. SASH Incentive and Inspection Cost Data

Quarter	Installations Completed in Quarter	Incentives Received (#) for Projects Installed in Quarter	Incentives Received ($) in Quarter (per SASH Expense)	Incentive Costs Allocated to Projects Installed Each Quarter	Average Incentive Received per Installed Project	Inspection Expenditures (Invoiced)	Inspections Completed	Average Cost per Inspection
Q4 2008	0	0	$ -	$ -		$ -	0	
Q1 2009	0	0	$ -	$ -		$ -	0	
Q2 2009	3	3	$ 19,240	$ 42,193	$ 14,064	$ 600	2	$ 300.00
Q3 2009	24	24	$ 232,922	$ 299,869	$ 12,495	$ 3,600	19	$ 189.47
Q4 2009	51	50	$ 754,337	$ 766,790	$ 15,336	$ 9,260	57	$ 162.46
Q1 2010	56	51	$ 645,569	$ 804,865	$ 15,782	$ 14,245	46	$ 309.67
Q2 2010	78	61	$ 833,035	$ 1,169,325	$ 19,169	$ 22,025	48	$ 458.85
Q3 2010*	71	26	$ 1,325,374	$ 528,720	$ 20,335	$ -	82	$ -
Total	**283**	**215**	**$ 3,810,476**	**$ 3,611,762**	**$ 16,799**	**$ 49,730**	**172**	**$ 289.13**

*Inspection expenditure data for Q3 2010 was not provided. That quarter's inspections were excluded from the average calculation.

Source: SASH Program Data through November 1, 2010 and SASH Quarterly Reports to the CPUC.

Project Inspection Costs

Table I-2 also includes estimated per-project costs for third-party inspections based on GRID's reported direct costs for such activity and the number of projects in GRID's database for which field inspection dates had been recorded each quarter. Based on these estimates, direct costs for third-party inspections represent less than one-quarter of one percent of per-project costs (see Total Cost per Project in next section), excluding additional GRID staff time to administer the third-party inspection process. The time span for the completion of third-party inspections subsequent to system installation is addressed in the Project Management section.

Factoring in GRID Alternatives' Administrative Costs

Navigant reallocated GRID's recorded administrative costs for program implementation to reflect the delay between administrative expenditures and the final installation and completion of projects. Administrative costs include Implementation Planning, General Administration, Marketing and Outreach, and Evaluation tasks. The reallocation was based on the average duration between the date of GRID's receipt of project applications and the date projects were completed, and included only projects with a recorded "Installation Date." In general, Navigant found:

- 14.2% of applications for installed projects are installed in the same quarter.
- 43.1% of applications for installed projects are installed in the next quarter.
- 31.4% of applications for installed projects are installed in two quarters.
- 11.3% of applications for installed projects are installed in three quarters.

Navigant applied these percentages to reallocate GRID's recorded quarterly administrative expenditures across current and subsequent quarters. The results of this reallocation appear in Table I-3. A portion of the costs for each quarter in 2010 ($576,143 total) remain to be allocated to projects installed in Q4 2010 and future quarters based on the above percentages.

Table I-3. Summary of GRID Administrative Expenses and Quarterly Allocations

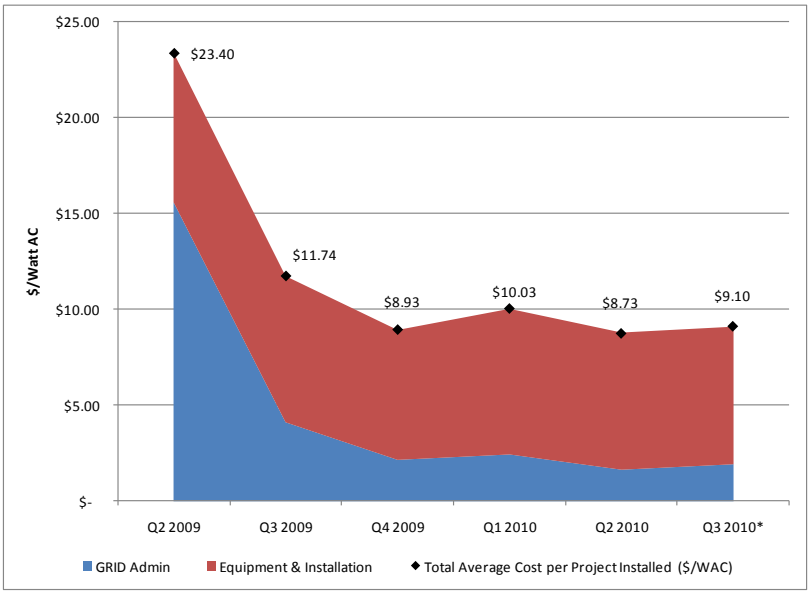
Quarter	Task 1 - Implementation Plan Total	Task 2 - Admin Total	Task 3 - Marketing Total	Task 4 - Evaluation Total	Total GRID Expenditures	Quarter Expenditures Allocated (%)	GRID Costs Allocated to Projects Installed Each Quarter
Q4 2008	$ 14,478	$ 12,292	$ 1,203	$ 2,376	$ 30,348	100%	$ 4,309
Q1 2009	$ -	$ 97,681	$ 33,610	$ 7,765	$ 139,057	100%	$ 32,826
Q2 2009	$ -	$ 185,865	$ 21,488	$ 7,857	$ 215,210	100%	$ 100,023
Q3 2009	$ -	$ 254,453	$ 39,371	$ 13,642	$ 307,467	100%	$ 183,509
Q4 2009	$ -	$ 216,015	$ 84,049	$ 39,118	$ 339,181	100%	$ 263,971
Q1 2010	$ -	$ 267,848	$ 51,964	$ 53,938	$ 373,750	89%	$ 320,123
Q2 2010	$ -	$ 286,346	$ 53,099	$ 34,993	$ 374,438	57%	$ 355,503
Q3 2010*	$ -	$ 292,088	$ 94,155	$ 49,683	$ 435,926	14%	$ 378,969
Total	**$ 14,478**	**$ 1,612,588**	**$ 378,937**	**$ 209,373**	**$ 2,215,376**	**74.0%**	**$ 1,639,233**

*Q3 2010 Admin Expenses estimated until CPUC approves expense report.
Source: SASH Program Data through November 1, 2010 and SASH Quarterly Reports to the CPUC.

Total Cost per Watt

Navigant combined the equipment and installation cost data recorded for projects installed through Q3 2010 with the above quarterly allocations of GRID's administrative costs to estimate quarterly per-project costs. Following an initial ramp-up period, the total cost-per-Watt$_{AC}$ for installed projects has decreased substantially since program inception to an average of $9.47/W, with approximately $2.29/W of this cost arising from GRID administrative costs. As seen in Figure I-4 and Table I-4, GRID's per-project administrative costs have generally decreased, while equipment and installation costs have fluctuated less dramatically.

Figure I-4. SASH Average Project Cost per Watt ($/Watt$_{AC}$), n=283



Source: SASH Program Data through November 1, 2010 and SASH Quarterly Reports to the CPUC.

Table I-4. Summary of SASH Average Cost per Watt ($/Watt$_{AC}$)

Quarter	GRID Admin: Costs Allocated to Projects Installed Each Quarter	Equip & Install: Costs for Projects Installed Each Quarter	Total Costs Allocated to Projects Each Quarter	Installations Completed in Quarter	kW (AC) Installed	GRID Admin: Average Cost per Project Installed ($/WAC)	Equip & Install: Average Cost per Project Installed ($/WAC)	Total Average Cost per Project Installed ($/WAC)
Q4 2008	$ 4,309	$ -	$ 4,309	0	0.00	$ -		$ -
Q1 2009	$ 32,826	$ -	$ 32,826	0	0.00	$ -		$ -
Q2 2009	$ 100,023	$ 50,064	$ 150,087	3	6.42	$ 15.59	$ 7.80	$ 23.40
Q3 2009	$ 183,509	$ 339,350	$ 522,859	24	44.55	$ 4.12	$ 7.62	$ 11.74
Q4 2009	$ 263,971	$ 826,893	$ 1,090,864	51	122.20	$ 2.16	$ 6.77	$ 8.93
Q1 2010	$ 320,123	$ 994,979	$ 1,315,102	56	131.11	$ 2.44	$ 7.59	$ 10.03
Q2 2010	$ 355,503	$ 1,528,648	$ 1,884,151	78	215.87	$ 1.65	$ 7.15	$ 8.73
Q3 2010*	$ 378,969	$ 1,406,367	$ 1,785,336	71	196.18	$ 1.93	$ 7.17	$ 9.10
Total	**$ 1,639,233**	**$ 5,146,301**	**$ 6,785,533**	**283**	**716.33**	**$ 2.29**	**$ 7.18**	**$ 9.47**

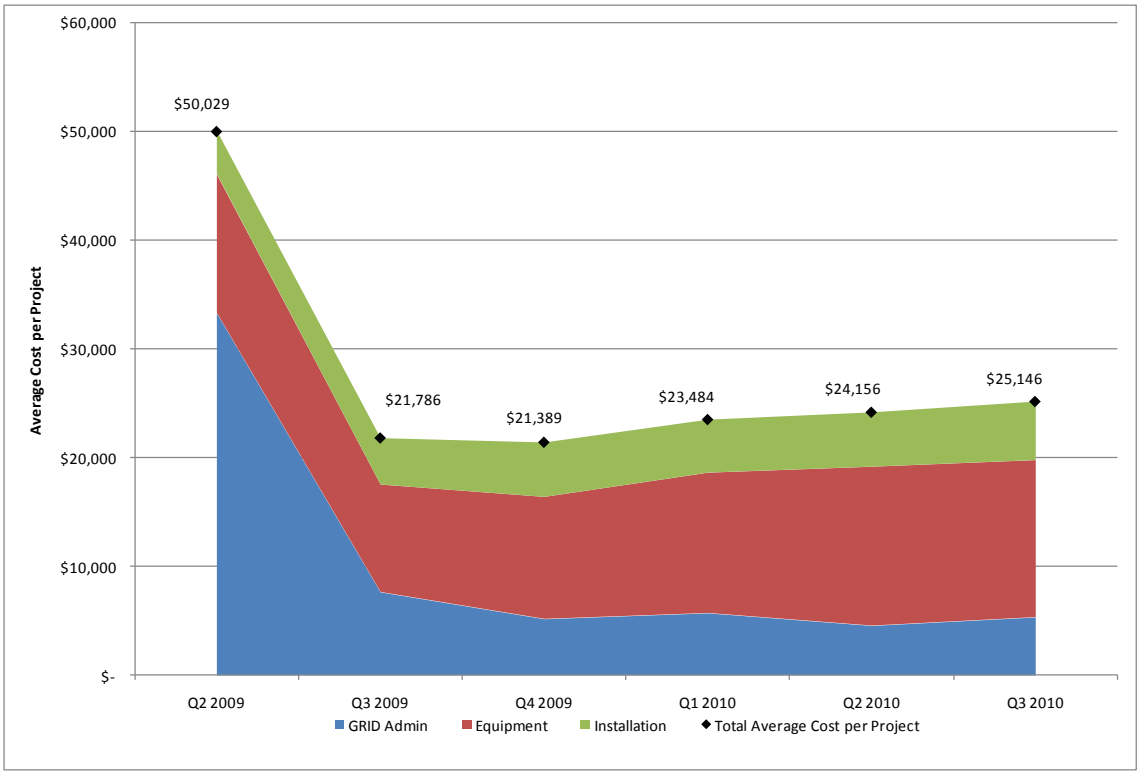
*Q3 2010 Admin Expenses estimated until CPUC approves expense report.
Source: SASH Program Data through November 1, 2010.

Total Cost per Project

Following the initial ramp-up period, average costs for SASH projects installed through Q3 2010 approached $21,000 and then slowly climbed each quarter past $25,000. As shown in Figure I-5, and as detailed in Table I-5, the project cost increases since Q3 2009 appear to be driven primarily by increasing equipment costs. GRID administrative costs have generally decreased over time, likely due to learning curves and economies of scale associated with the implementation of new programs. The Market

Assessment will further investigate SASH equipment and installation costs relative to the general market CSI and from national sources.

Figure I-5. SASH Average Cost per Project, n=283



Source: SASH Program Data through November 1, 2010 and SASH Quarterly Reports to the CPUC.

Table I-5. SASH Average Cost per Project

Quarter	GRID Admin: Costs Allocated to Projects Installed Each Quarter	Equipment Costs for Projects Installed Each Quarter	Installation Costs for Projects Installed Each Quarter	Total Costs Allocated to Projects Each Quarter	Installations Completed in Quarter	GRID Admin: Average Cost per Project	Equipment: Average Cost per Project	Installation: Average Cost per Project	Total Average Cost per Project
Q4 2008	$ 4,309	$ -	$ -	$ 4,309	0	$ -			$ -
Q1 2009	$ 32,826	$ -	$ -	$ 32,826	0	$ -			$ -
Q2 2009	$ 100,023	$ 38,174	$ 11,890	$ 138,197	3	$ 33,341	$ 12,724.65	$ 3,963.33	$ 50,029
Q3 2009	$ 183,509	$ 237,180	$ 102,170	$ 420,688	24	$ 7,646	$ 9,882.48	$ 4,257.09	$ 21,786
Q4 2009	$ 263,971	$ 572,093	$ 254,801	$ 836,064	51	$ 5,176	$ 11,217.50	$ 4,996.09	$ 21,389
Q1 2010	$ 320,123	$ 722,645	$ 272,334	$ 1,042,768	56	$ 5,716	$ 12,904.38	$ 4,863.11	$ 23,484
Q2 2010	$ 355,503	$ 1,139,750	$ 388,898	$ 1,495,252	78	$ 4,558	$ 14,612.17	$ 4,985.88	$ 24,156
Q3 2010*	$ 378,969	$ 1,025,185	$ 381,182	$ 1,404,153	71	$ 5,338	$ 14,439.22	$ 5,368.76	$ 25,146
Total	**$ 1,639,233**	**$ 3,735,025**	**$ 1,411,276**	**$ 5,374,258**	**283**	**$ 5,792**	**$ 13,197.97**	**$ 4,986.84**	**$ 23,977**

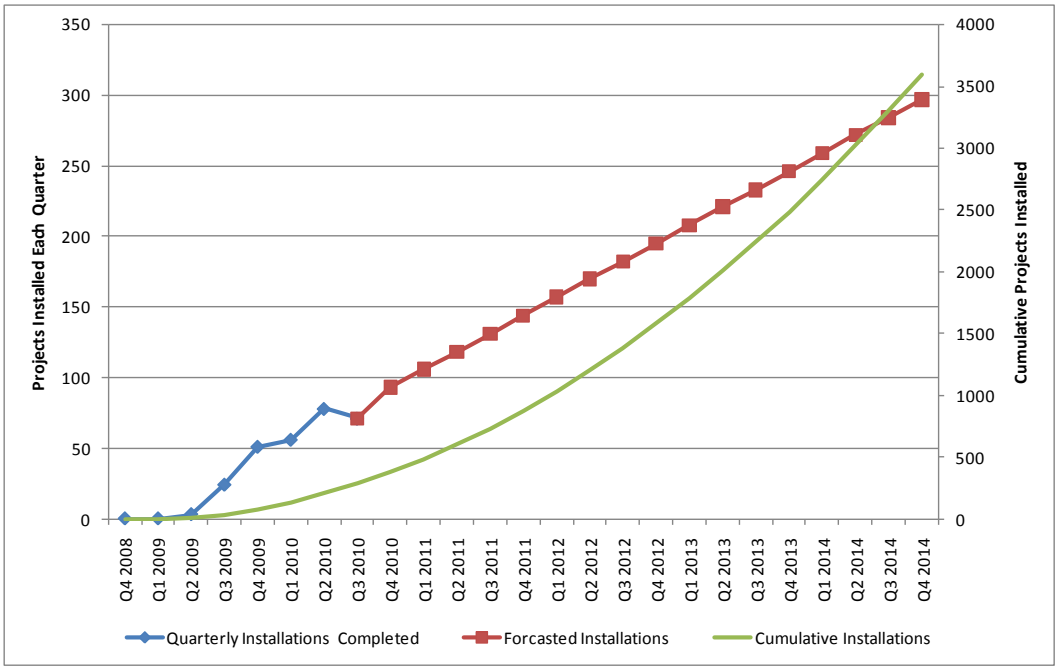
*Q3 2010 Admin Expenses estimated until CPUC approves expense report.

Source: SASH Program Data through November 1, 2010 and SASH Quarterly Reports to the CPUC.

Program Budget "Burn Rate" and Forecast

Based on the total per-project costs outlined above, Navigant forecasted the expected budgetary requirements for GRID to achieve various SASH program installation goals. Figure I-6 forecasts GRID's quarterly installations through the end of 2014, assuming growth follows a linear trend based on GRID's to-date progress. Under this assumption, GRID can be expected to achieve the 1,000-installed-project milestone sometime in Q1 2012. This assumption does not account, however, for the effects of the Subcontractor Partnership Program (SPP) that GRID has recently begun leveraging to increase its installation bandwidth. Given this uncertainty, projecting past this point is challenging; however, assuming GRID maintained this growth rate (installing 150 to 300 projects per quarter statewide), the SASH program could achieve 3,500 cumulative installations by the end of 2014.

Figure I-6. SASH Installations Completed/Forecast Each Quarter



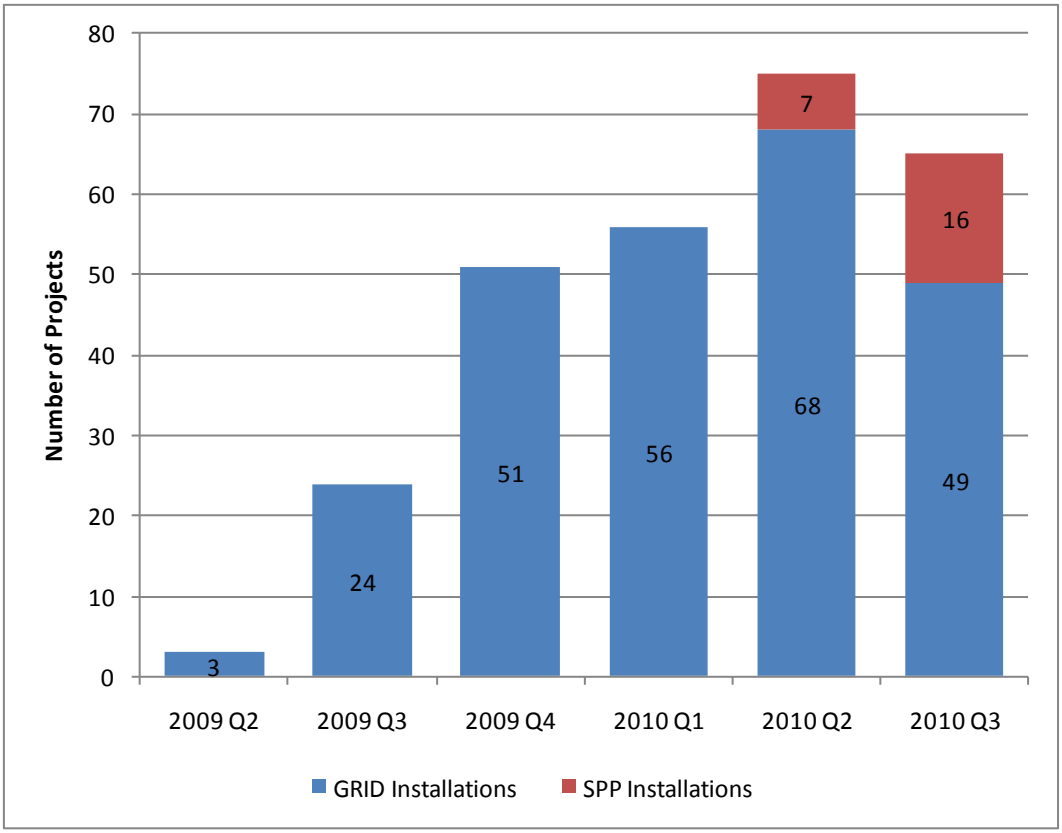
Source: SASH Program Data through November 1, 2010.

From a budgetary standpoint, GRID's per-project average costs of nearly $24,000 suggest that the above milestones can be met within the current budget of $108 million. Using this average under a simple per-project forecast suggests that GRID will have spent nearly $25 million of the program budget to reach the 1,000-project milestone in Q1 2012, and just more than $86 million to reach 3,500 projects by the end of 2014. These forecasts do no account for inflation, fluctuating equipment costs, or any programmatic changes that might require a shift in resources, incentives, or per-project efforts by GRID.

Project Installations and the Subcontractor Partnership Program

GRID has only recently begun subcontracting installations through the SPP, but anticipates increasing the volume and percentage of projects installed through third-parties. Figure I-7 summarizes GRID and SPP project installations by quarter[5]. Sixty percent of the projects categorized as "In Process" (those approved for the program, but not yet installed) are designated as subcontractor installations. Of those, more than 75 percent (246 projects) have already been assigned to a specific SPP contractor.

Figure I-7. Summary of SASH Project Installations by Quarter, n=274



Source: SASH Program Data through November 1, 2010.

Energy Efficiency Status and Activity of Program Participants

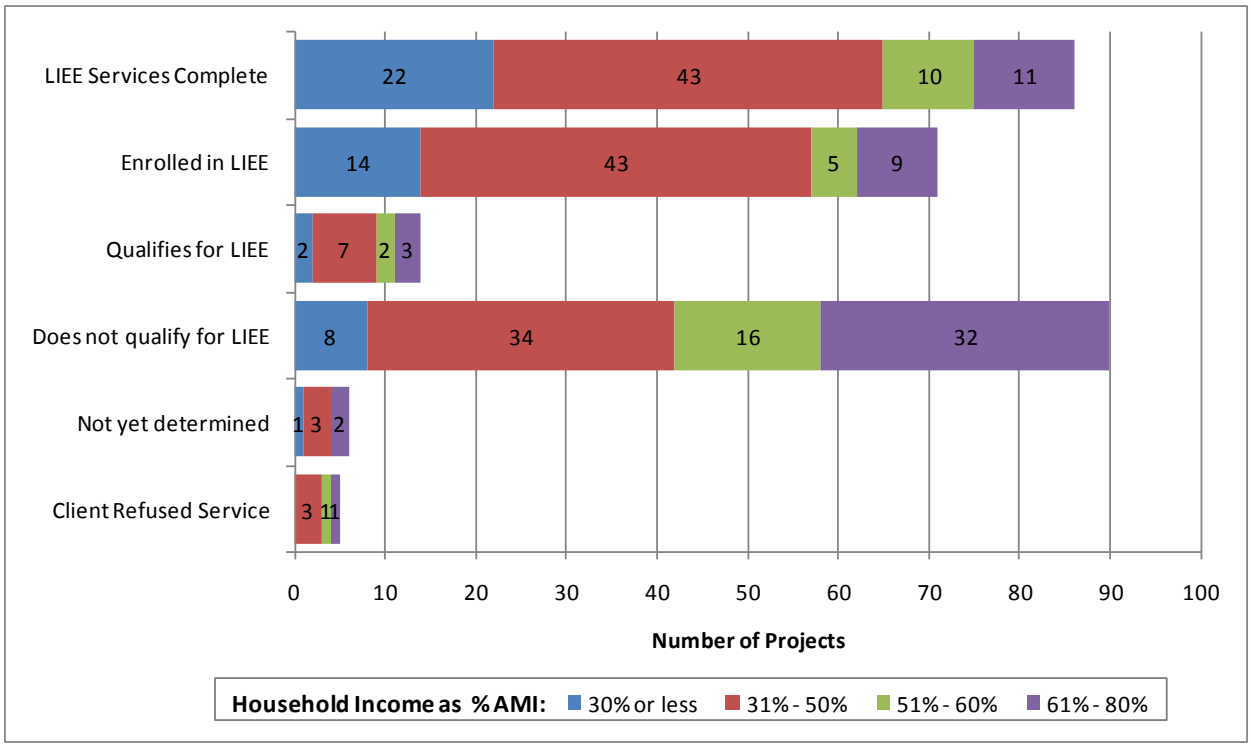
Figure I-8 below shows the number of projects installed or completed for each category of energy efficiency status designation[6]. Each bar also reveals the number of program participants at each

[5] Nine of the 283 projects in the database with Installation Dates during or before Q3 2010 had Status records other than Installed or Complete and were left out of the following figures (n=274).

[6] Two projects were missing energy efficiency status data, while 13 were missing AMI%. (n=272). GRID indicates that missing AMI information is common for newer construction projects, such as Habitat For Humanity, where eligibility and income cannot be confirmed until the property sale is final and tax documents are provided by the owner.

qualifying income level by percentage of area median income (AMI). The majority of system recipients either qualifies for or is enrolled in LIEE programs.

Figure I-8. Installed/Completed Projects by Participant EE Status and Income Level (%AMI), n=272



Source: SASH Program Data through November 1, 2010.

According to GRID's records, a majority of program participants in each of the three utility territories were already paying CARE electric rates prior to involvement with the SASH program. As shown in Table I-6 (which includes both Installed/Completed and In Process projects), at least 45 homeowners have switched to CARE rates from regular residential rates over the course of their interaction with GRID; however, missing entries for additional customers' original rate schedules suggest that total could be as high as 85 homeowners.

Table I-6. Summary of SASH Participants' Electric Rate Changes

Utility	Low Income Rate Prior to SASH Participation	Retained Standard Rate	Switched from Standard Rate (E-1 or D) to Low Income Rate (E-1 CARE or D-CARE)	No Record for Original Rate; New Rate Recorded as Low Income Rate (E-1 CARE or D-CARE)	Total
PGE	212	32	28	2	274
SDG&E	55	7	2	1	65
SCE	67	3	15	37	122
Total	334	42	45	40	461

Source: SASH Program Data through November 1, 2010.

Project Management

An initial analysis of the duration of each step in the process of approving, installing and completing a SASH project revealed substantial inconsistencies in the recording of dates in GRID Alternatives' database. In many cases, dates were not recorded for steps occurring between other milestones, resulting in varying sample sizes for evaluating the duration (in calendar days) of each project step (Table I-7). In other cases, it appears that for some projects, some steps were either conducted (or mis-recorded as completed) in an incorrect order. For example, in at least one case, an application was recorded as approved more than three months after the contract was signed on-site with the customer. For this reason, median (rather than mean) durations were calculated to lessen the effect of outliers.

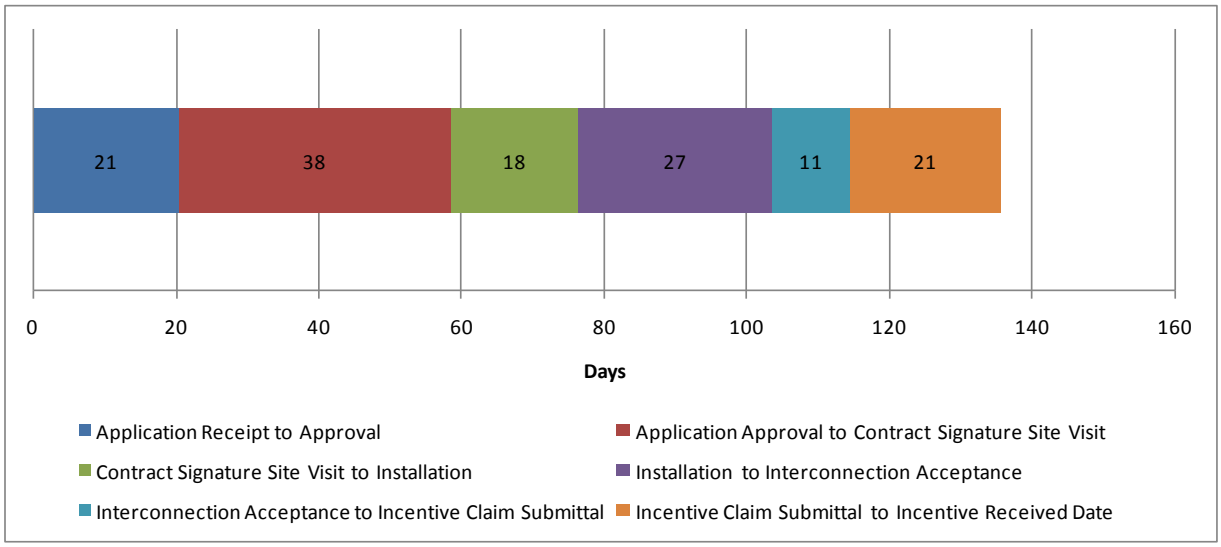
Table I-7. Project Step Durations for All Installed/Completed Projects

Project Step	Duration (Days)			Project Count
	Median	Min	Max	
Application Receipt to Approval	21	-19	239	276
Application Approval to Contract Signature Site Visit	38	-135	242	235
Contract Signature Site Visit to Building Department Inspection	34	-10	199	230
Contract Signature Site Visit to Interconnection Submittal	23	0	166	222
Contract Signature Site Visit to Permit Pulled	8	-165	165	232
Contract Signature Site Visit to Installation	18	-5	183	235
Installation to Field Inspection	24	-6	149	270
Installation to Interconnection Acceptance	27	-2	134	262
Interconnection Acceptance to Incentive Claim Submittal	11	-62	142	245
Incentive Claim Submittal to Incentive Received Date	21	-5	94	215
Installation to Warrantee pkg Site Visit	107	-7	420	120

Source: SASH Program Data through November 1, 2010.

Figure I-9 shows the relative duration between subsequent project milestones (green-shaded steps from Table I-7) using this data.

Figure I-9. Median Duration of Key SASH Project Milestones for All Completed/Installed Projects



Source: SASH Program Data through November 1, 2010.

In an attempt to minimize the effects of data-entry error on the evaluation, Navigant recalculated project step durations using only Installed/Completed projects for which all relevant dates were recorded in the database (n=170). Table I-8 provides detailed duration information for each step, with green-shaded steps illustrated below in Figure I-10. Negative duration values still exist for what could reasonably be assumed to be subsequent steps, indicating the likely extent of record-keeping errors or inconsistent approaches to project management. Also noteworthy is the 107-day median time to GRID's follow-up site visit to deliver training and warrantee packages to system recipients. Field inspections are generally completed within three weeks (~22 days) of system installation, but given that inspections appear to occur in parallel to interconnection requests to the utilities, it is unlikely that the inspection requirement alone is delaying the project's final completion and GRID's receipt of utility incentive disbursements.

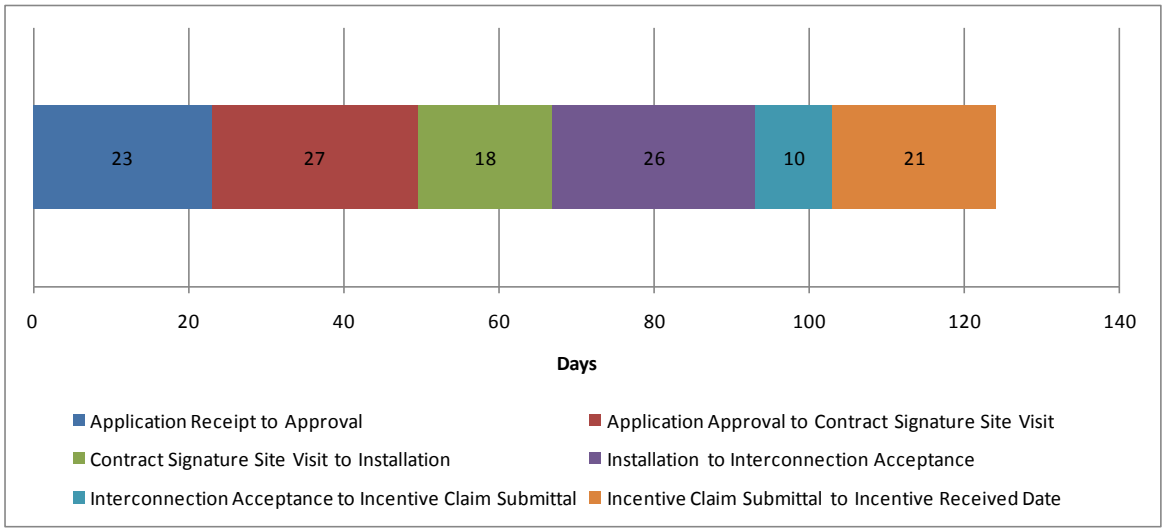
Table I-8. Project Step Durations for Installed/Completed Projects with All Dates Entered, n=170

Project Step	Duration (Days)			Project Count
	Median	Min	Max	
Application Receipt to Approval	23	0	239	170
Application Approval to Contract Signature Site Visit	27	-133	234	170
Contract Signature Site Visit to Building Department Inspection	33	7	199	170
Contract Signature Site Visit to Interconnection Submittal	20	1	166	170
Contract Signature Site Visit to Permit Pulled	7	-165	165	170
Contract Signature Site Visit to Installation	18	1	183	170
Installation to Field Inspection	22	2	73	170
Installation to Interconnection Acceptance	26	3	112	170
Interconnection Acceptance to Incentive Claim Submittal	10	-62	142	170
Incentive Claim Submittal to Incentive Received Date	21	-5	94	170
Installation to Warrantee pkg Site Visit	107	-7	420	86

Source: SASH Program Data through November 1, 2010.

The average time between project application approval and system installation is 45 days. On the backend, the most substantial project step is utility acceptance of interconnection requests (26 days), followed by utility disbursement of incentives in response to GRID's incentive applications (21 days).

Figure I-10. Median Duration of Key SASH Project Milestones for Installed/Completed Projects with All Dates Entered, n=170



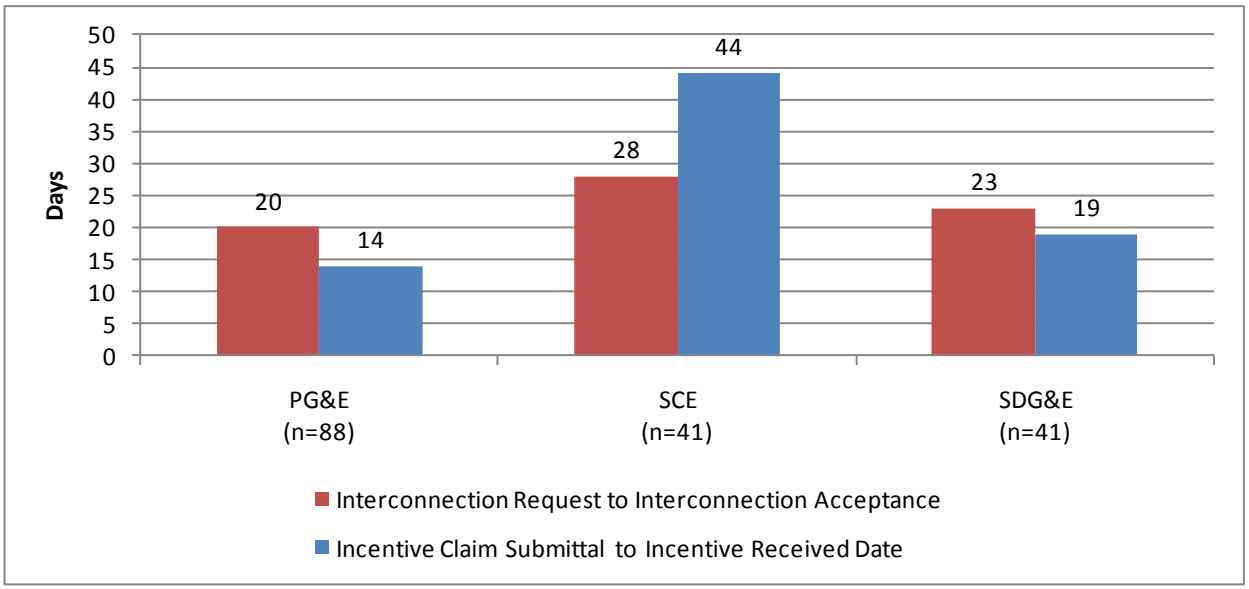
Source: SASH Program Data through November 1, 2010.

Interconnection and Incentive Payments: Utility Response Rates

Looking more closely at the duration of steps between project installation and final completion (receipt of utility incentive payments), clear differences arise between the response rates of each of the three utilities. In particular, Southern California Edison's (SCE's) response rate for project incentive claims (44 days) is

more than twice as long as that of the other two utilities. SCE's response to interconnection requests is also slower than either PG&E or SDG&E, but to a less significant degree. Figure I-11 illustrates the relative duration of these two steps for each utility, with additional detail provided in Table I-8.

Figure I-11. Duration of Utility-Dependent Interactions for SASH Projects, n=170



Source: SASH Program Data through November 1, 2010.

Figure I-12. Detailed Duration of Utility-Dependent Interactions for SASH projects, n=170

Project Step	Duration (Days)			Project Count
	Median	Min	Max	
Interconnection Request to Interconnection Acceptance				
PG&E	20	-11	126	88
SCE	28	8	98	41
SDG&E	23	-10	48	41
Incentive Claim Submittal to Incentive Received Date				
PG&E	14	-5	64	88
SCE	44	24	94	41
SDG&E	19	5	74	41

Source: SASH Program Data through November 1, 2010.

Program Administration

The SASH budget for administration and marketing is $15.16 million. GRID reports that they have been able to work within this budget, and that the budget seems to be sufficient.

GRID reports that they provide more services with the administrative budget than a traditional utility program administrator. They are using the funds for homeowner education and outreach.

GRID has a co-funding agreement with each utility for paying incentives. SCE has contracted for SASH, so they provide GRID with administrative funds. GRID and SCE have an agreement for GRID to receive advance payment for their administrative work. There were some initial delays when the procedure was first implemented; however, GRID and SCE have worked through the process.

Utility Partnerships

GRID partners with the utilities on LIEE and CARE, and has a process developed with each utility to enroll SASH clients in LIEE. GRID sends a list every month to each utility of SASH clients who they believe qualify for LIEE.

- PG&E reported to GRID that they were sending SASH clients out for service delivery right away.
- SCE has a dedicated staff member who receives LIEE referrals from GRID. SCE makes up to three calls to contact the SASH customer to enroll the customer in LIEE. SCE has recently made an agreement with GRID that if SCE has difficulty contacting the customer, GRID will attempt to contact the customer about LIEE.
- GRID's San Diego office works directly with SGD&E on LIEE referrals. SDG&E checks eligibility and previous treatment, informs GRID of the customer's LIEE status, and places the SASH customer on the LIEE referral list with priority. SDG&E also calls or emails their implementation contractor to inform them of the SASH lead.

There is no formal process for GRID to track LIEE status or completion; however, GRID can call the utilities for updates on the status of LIEE service delivery.

SASH project interconnections follow the same process as the general market CSI. GRID does not have a special arrangement with the IOUs for expedited interconnection for SASH projects. The interconnections take 45 to 60 days on average; however, one of the utilities sometimes takes two to three months. Interconnection time can vary, depending on how busy the utility is.

Other Partnerships

GRID is interacting with the MASH PAs through the PA working group. GRID attends working group meetings and coordinates presentations with MASH, where appropriate. For instance, they attend the same affordable housing conferences as the MASH PAs and they coordinate their presentations.

GRID refers multifamily leads to MASH and the utilities have referred some single-family homeowners to GRID for SASH.

Invoicing

GRID's headquarters generates all of the SASH invoices. GRID sends a spreadsheet and invoice for the incentive portion of the system cost to the utilities after the project is completed. When GRID signs the contract with the client, the client signs a release on the rebate form, so that the rebate can be paid directly to GRID or another third-party. As a result, there are no out-of-pocket costs for the client. The original language in the program decision stated that the incentive check would go directly to the client. However, GRID had this changed early in the implementation so that the homeowner could assign the check to GRID.

For SPP projects, GRID pays the SPP contractor 80 percent of the system cost after the installation is completed, and the additional 20 percent after interconnection. In most cases, GRID has received the incentive payment from the utilities by the time of interconnection.

Subcontractor payment is a big cash-flow issue for GRID. GRID had a small line of credit prior to working SASH; however, they have switched to a mission-based community bank that was willing to give them a bigger line of credit because GRID's work is funded through a multiyear contract with the state.

Databases

GRID tries to use the program database for tracking project information. The databases are updated throughout the process. GRID is also finding the database useful for quality assurance. GRID has required fields that must be completed before the project can move forward.

All of GRID's staff members are responsible for different parts of database updating. Each department fills in the information related to their part of the process. The Outreach Coordinators update the database after site visits and applications, and these updates trigger the next step for one of the SASH team to review the application.

The project status codes that are tracked are as follows.

- Prospective Client – The client record is created when GRID conducts outreach with the client or the client contacts GRID. The Outreach Coordinator creates the contact in the database and enters expected client eligibility and the estimated income bracket.
- Prescreened Qualified – GRID has spoken to the client and believes that the client should qualify for SASH based on income, but the backup documentation has not yet been collected. In most cases, GRID checks that the client lives in qualified affordable housing before checking the client's income. GRID obtains a list of addresses from the government or housing developer, and adds the address to the SASH database. All mailers and outreach are directed to those on this list. The Outreach Coordinator confirms that the client is at the address the first time that they

talk. Some clients learn about SASH through other means, and in this case GRID would need to confirm the affordability housing requirement.

- Approved Outreach – The Outreach Coordinator conducts the outreach site visit and completes the application with the client. The Outreach Coordinator then updates the database with the date of application, application information, and eligibility data.
- Approved Construction – The construction team visits the home, examines the shading, determines if a system meets the 95% design factor requirement, and determines if a new roof if needed. If a new roof is needed, GRID works to find the resources needed. They begin working on the system design and move the status to approved construction. When the installation is scheduled, the installation date is entered.
- Installed – After the installation, the construction team checks the modules and the costs and then changes the project status to installed. They update the database for the building and safety inspection when the third-party inspector goes out. After the building department has approved the project, interconnection is complete, and a third-party inspection has been conducted, the status is moved to Installed in the database the project is ready to be invoiced. The final step is sending out the request to the utility to pay GRID.
- Complete – A month or two after the system is installed and the customer receives the new electric bill, the Outreach Coordinator visits the client to make sure that the client understands how to read the new bill and maintain the system, and provides the homeowner with the warranty package.

The database reports (generated through the SASH program database) that GRID monitors monthly are as follows.

- Number of applications per month
- Number of installations per month
- Megawatts (MW) installed
- Dollars reserved
- Length of time from one status to another (to assess the presence and location of any bottlenecks)
- County-level statistics
- Status distribution (to assess continuity of client flow)

At the highest level, GRID examines the growth trajectory overall, or by utility or office. At the departmental level, they examine how many homeowners each Outreach Coordinator brought in, how many installs the construction manager completed, and the time elapsed for the system to be installed.

The statistics that they use to monitor program performance are:

- Reservations

- Project cost
- Incentive amount
- Gap funding by project and by the different incentive levels

If the funding gap is not large, GRID will use other organization funds to fill that gap. They track the gap funding in the SASH database to make sure that it is sustainable.

When GRID finds a new piece of information that they want to report on, they add a field to the database and train their staff on how to use that new field.

GRID is audited every year. Working with the CPUC, GRID agreed that a portion of their annual organizational audit would focus on SASH. The CPUC asked for specific information from the audit. It was more involved than what GRID normally had done in their audit, but was not overly burdensome because GRID was already tracking all of the information.

Program Eligibility

To participate in SASH, an applicant must meet four criteria:

1. The project's Site must be within the service territory of, and receive electric service from PG&E, SCE, or SDG&E.
2. The residence must be occupied by the homeowner/applicant.
3. The household's total income must be 80% of the area median income (AMI) or less based on the most recent available income tax return.
4. The residence must meet the California Public Utilities (P.U.) Code 2852 affordable housing requirement.

The definition of "affordable housing" as outlined in P.U. Code 2852 has expanded since the inception of the SASH program. The changes made have addressed challenges that GRID encountered in identifying and reaching eligible households. GRID asserts that these changes have created a pool of eligible households that is sufficient for meeting its installation targets. Table I-9 identifies the areas in which changes have been made, highlighting the original requirement, the issue that prompted the change, the date that the change to P.U. Code 2852 occurred, and the substance of the change.

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Table I-9. Changes to Affordable Housing Requirement

Original Requirement	Issue	Date	Change
The housing unit must be part of a development, and at least 20 percent of the development must be low-income.	Single family units are, by definition, not necessarily part of a development. In addition, municipalities had different thresholds of low-income tenants (often lower than 20%) for classifying a development as affordable.	October 2009	Removed requirement that the single family units be part of a development.[a]
Resale restriction required to be documented in deed.	In affordable housing, the resale restriction is not necessarily documented; it can be a presumed resale restriction.	October 2009	The deed restriction was changed to a resale restriction, but it was still interpreted rigidly.[b]
Client must have document that states there is a "resale restriction" for the home.	The Code required that the words "resale restriction" be used in writing, but such language is not always used in practice. Some agreements use alternate language with the same intent (e.g., loan recapture). In other cases, the unit is located in an empowerment zone, which means that it will be sold to another low-income household at a reduced price.	June 2010	Homes with recapture restrictions, one form of a resale restriction, became eligible.[c]

Notes:
[a] AB1551
[b] Navigant interview with GRID Alternatives
[c] Navigant interview with GRID Alternatives

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Comparison between SASH and Related Program Definitions of Eligibility

A variety of energy-related programs serve segments of the low-income population, though each program uses a different definition of the term "low-income." Part of GRID's role is to direct its participants to these related programs as appropriate. In some cases, it is possible that GRID could receive referrals from the other programs as well. Table I-10 summarizes the alignment between the four types of SASH eligibility criteria (as outlined earlier in this section) and the eligibility standards for three related low-income energy assistance programs. The related programs have additional eligibility requirements, but they are not included in order to simplify things.

Table I-10. Summary of Energy-Related Low-Income Program Eligibility

Program Name	Brief Description	Alignment with SASH Eligibility Requirements			
		Served by three major IOUs	Owner-Occupied	Income <80% AMI	Complies with P.U. Code 2852
Family Electric Rate Assistance Program (FERA)	Participants are billed at a lower rate for energy use within certain levels of energy usage	Yes	No	Yes*	Not required
California Alternative Rates for Energy (CARE)	Provides up to a 35% discount on monthly energy bills	Yes#	No	Yes*	Not required
Low-Income Energy Efficiency Program (LIEE)	Provides no-cost weatherization services to low-income households that are eligible for CARE				

* The income threshold for each of these three programs is often lower than that established for SASH, but the income thresholds are different for FERA than they are for CARE and LIEE.
# CARE and LIEE are available to customers from a broader set of utilities beyond PG&E, SCE, and SDG&E, including PacifiCorp, Southern California Gas, Alpine Natural Gas, Bear Valley Electric, Sierra Pacific, Southwest Gas, and West Coast Gas.
Source: CPUC. "Low Income and Assistance Programs." Available: http://www.cpuc.ca.gov/PUC/energy/Low+Income/ (Accessed November 8, 2010)

The remainder of this section outlines the overlap among these programs from the income perspective, which is the most nuanced component of eligibility.

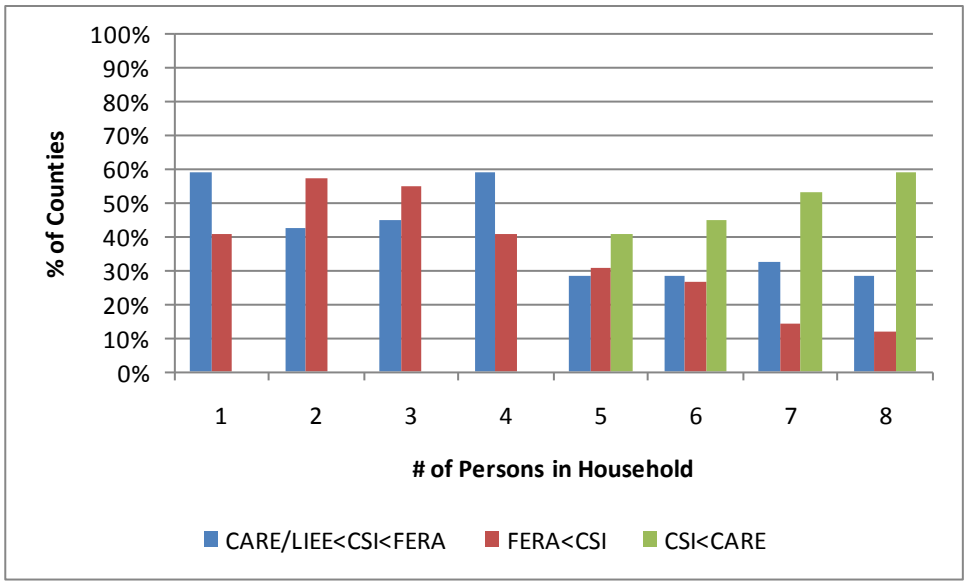
Whereas the CARE/LIEE and FERA income thresholds are set at the state level, the CSI income threshold is set at the county level. The CSI income threshold is based on the area median income (AMI), which the U.S. Department of Housing and Urban Development (HUD) establishes annually at the county level. AMI takes into account variations in the cost of living at the county level. FERA's income threshold is set at 125% of the CARE/LIEE income threshold for each household size.

The degree of difference in income threshold between SASH and CARE/LIEE and FERA varies by county and by household size.

- In smaller households (1-4 persons), SASH's thresholds are uniformly higher than those for CARE/LIEE and higher than those for FERA in about half of the counties that are served at least in part by PG&E, SCE, and SDG&E.
- For larger households (5-8 persons), there is a wider variation in the differences. In about half of the county-household size combinations in the eligible counties, SASH income limits are higher than those set by CARE/LIEE. In many counties, SASH's income thresholds drop off more quickly than FERA's as the household size increases; as a result, the share of counties in which the SASH income threshold is higher than the FERA thresholds drops from 31% in a five-person household to just 12% in an eight-person household.
- In larger households (5-8 persons), the SASH threshold is often lower than those for CARE/LIEE and FERA. This occurs in 41% of the counties for five-person households and 59% of the counties for eight-person households.

Figure I-13 summarizes the relationship between the income thresholds for eligibility in SASH compared to CARE/LIEE and FERA. Additional detail on variations by county is included in Appendix C.

Figure I-13. Differences in Income Threshold between SASH and CARE/LIEE and FERA, by County



Sources: California Department of Housing and Community Development (http://www.hcd.ca.gov/hpd/hrc/rep/state/incNote.html). CPUC (http://www.cpuc.ca.gov/PUC/energy/Low+Income/).

These different definitions of "low-income" create some challenges in marketing and in deploying energy efficiency. The differences in income thresholds prevent these programs from jointly recruiting participants or sharing participant information for marketing purposes because a household that is eligible for one program may not be eligible for another. The differences also result in the different levels

of energy efficiency measures installed by SASH-eligible households in advance of program participation and those installed in connection with the SASH program. Some households that participate in SASH will have already received energy efficiency services through LIEE; other households that are not eligible for LIEE may not have installed any energy efficiency measures. For those households in the latter category that decide to participate in CSI, additional assistance for installing energy efficiency measures may not be available. This may mean that a PV system is installed without first taking advantage of energy-saving opportunities.

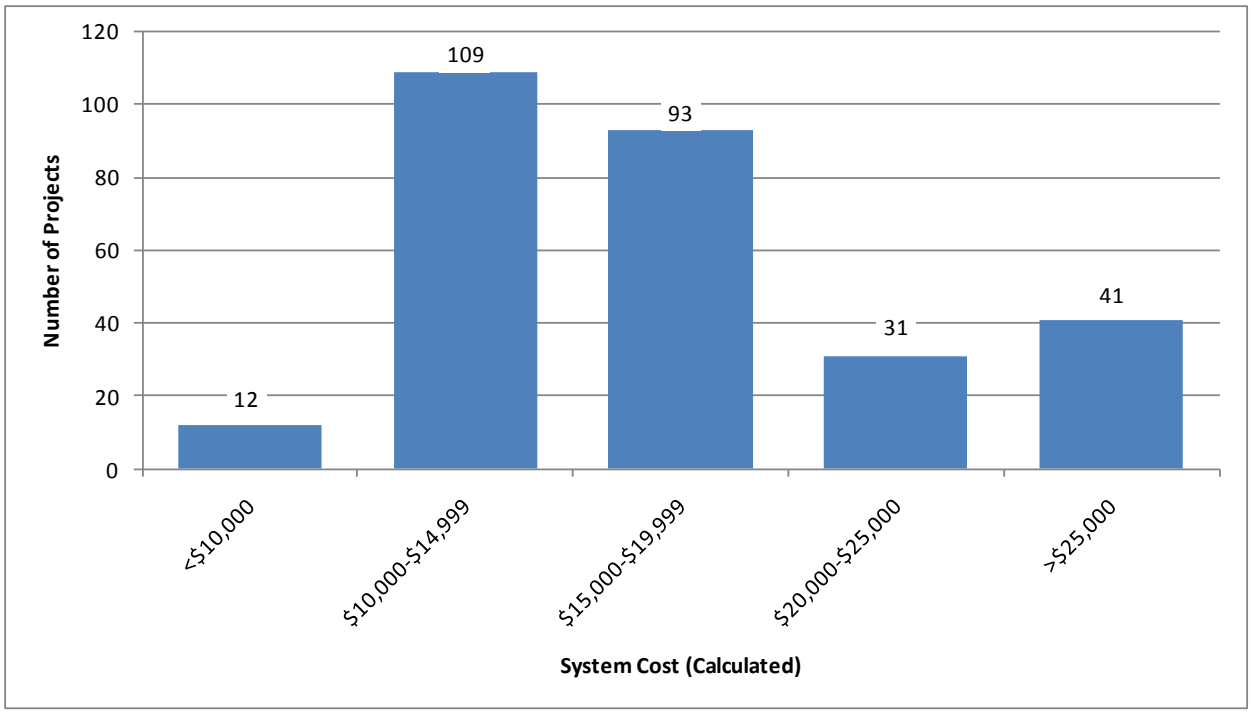
Despite these challenges, GRID staff considers the income threshold for SASH appropriate. Most importantly, the SASH income threshold matches that used by the affordable housing community, which is an important partner in identifying and contacting potential program participants. Because of the high cost of living in California, GRID maintains that the federal standard used by some low-income programs would not make sense for SASH. Further, GRID reports that there is a high barrier to adoption in this population; it is difficult to educate and "sell" solar to this demographic, which makes it a good target for a focused program such as SASH.

System Funding

Overall system costs (estimated equipment and installation costs) for installed or completed projects were presented in the Program Statistics section, revealing a to-date average of $18,185 per project (excluding GRID administrative costs). Figure I-14 illustrates the distribution of estimated system costs for these projects, with more than 70 percent of projects falling between $10,000 and $20,000.[7]

[7] One of the 287 installed/completed projects in the GRID database did not include system cost data.

Figure I-14. Calculated System Cost for Installed/Completed Projects, n=286



Source: SASH Program Data through November 1, 2010.

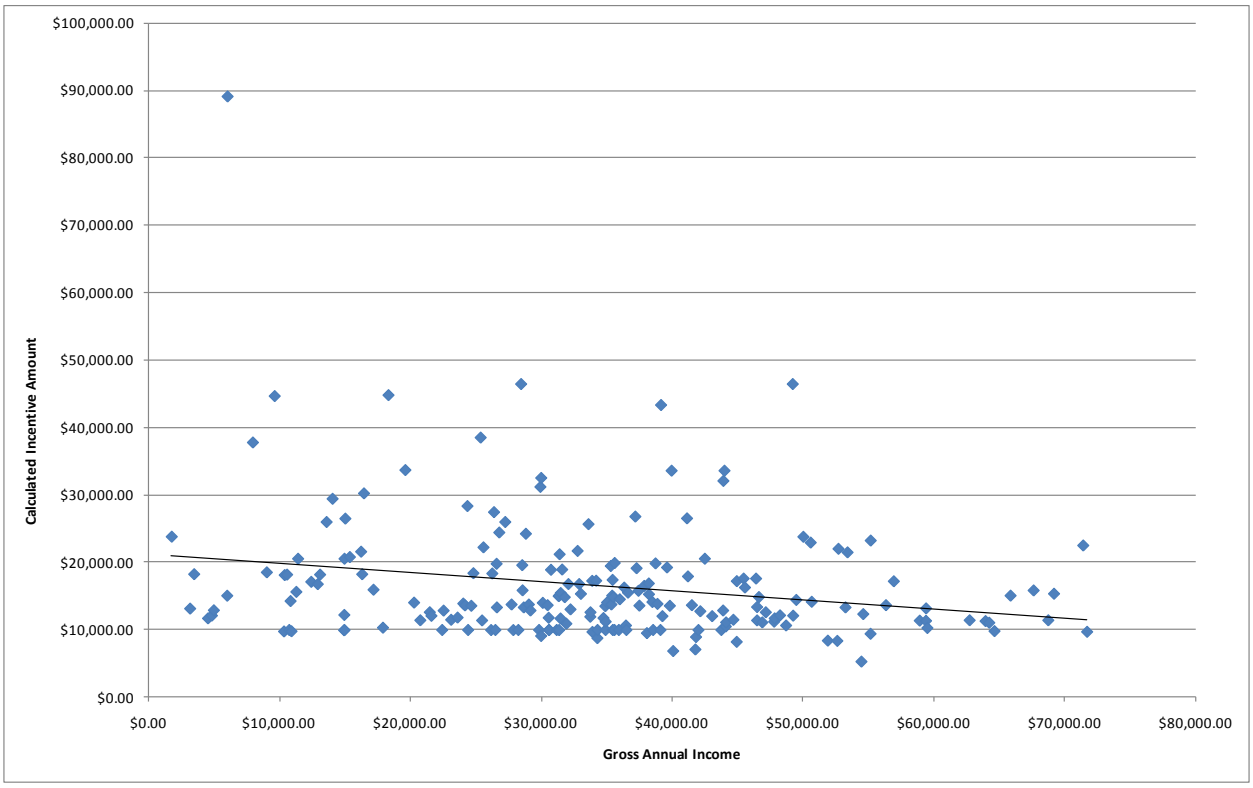
Incentive Levels and Participant Income

According to program rules, GRID uses a combination of a homeowner's CARE eligibility and tax liability to determine appropriate incentive categories and amounts in Table I-1. SASH Incentive Levels ($/Watt). A review of eligibility data and assigned per-Watt incentive levels recorded in the database for installed projects demonstrated that GRID is generally applying the program rules appropriately; however, tax liability data was unrecorded for 20 installed projects (all but four of which were reported as CARE eligible).

In an effort to evaluate the program rules' effectiveness at allocating incentives across income levels, Navigant ran additional analyses comparing incentive levels to other income-related information in the database. Generally speaking, the incentive levels allocated by GRID to each project decrease as the reported gross annual income of the homeowner increases (Figure I-15).[8]

[8] Of the 215 installed/completed projects with a record for "Incentive Received Date," eleven (11) were missing accurate information for either one or both Gross Annual Income or Incentive Level.

Figure I-15. Incentive Amount for Installed/Completed Projects Compared to Homeowner Gross Annual Income, n=204

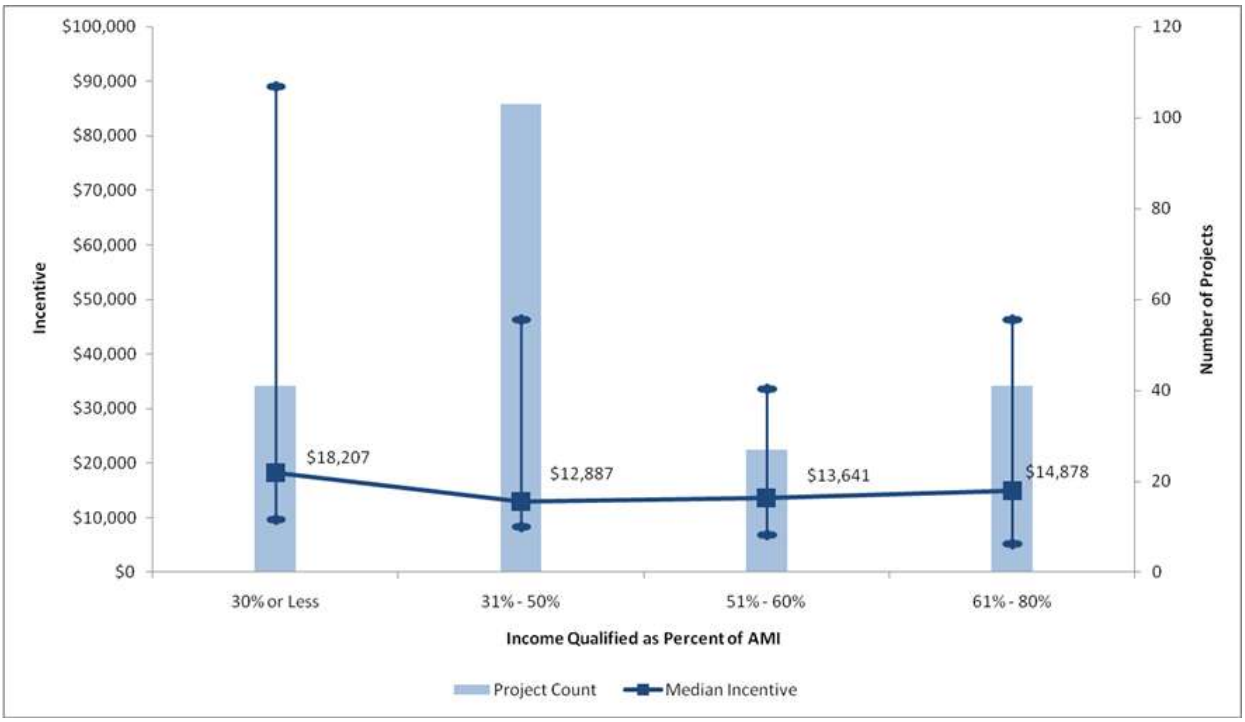


Source: SASH Program Data through November 1, 2010.

The average incentive amount received by homeowners in each AMI category for income level does not follow this trend. For each AMI category, Figure I-16 illustrates the distribution of installed projects and the average incentive dollar amount applied to cover system equipment and installation costs.[9] The error bars represent the minimum and maximum incentive dollar amount applied in each income category. While homeowners in the lowest AMI category (30 percent or less) have received the highest average incentives, homeowners who fall in the 31- to 50-percent AMI range (the majority of participants), received lower average incentives than those in higher categories.

[9] Of the 215 installed/completed projects with a record for "Incentive Received Date," three (3) were missing accurate information for either one or both Income Qualified as AMI% or Incentive Level.

Figure I-16. Project Count and Incentive Statistics by Income AMI Category for Completed/Installed Projects That Have Received an Incentive, n=212



Source: SASH Program Data through November 1, 2010.

The upper limit of the error bar for the 30 percent or less income category is for a 12.9kW system, with 72 panels, that was installed in July 2010. The nearly $90,000 incentive was calculated at the $7.00 per Watt level and covered the entire installation cost. Although this participant's income was 30 percent or less of AMI, the high incentive amount is over five times the average incentive amount of $16,799 (Table I-2). Table I-11 shows the distribution of incentive amounts across all income levels.

Table I-11. Installed and Completed SASH Projects by Incentive Amount

Incentive Amount	Installed/Complete				In Process			
	# Projects	Cumulative # Projects	Total kW	Cumulative kW	# Projects	Cumulative # Projects	Total kW	Cumulative kW
<$10,000	26	26	36.0	36.0	19	19	23.8	23.8
$10,000-$19,999	183	209	388.8	424.8	75	94	163.0	186.8
$20,000-$20,999	37	246	137.6	562.5	25	119	94.6	281.4
$30,000-$30,999	14	260	69.5	631.9	15	134	79.1	360.5
$40,000-$50,000	7	267	46.5	678.4	2	136	12.6	373.0
$50,000-$60,000	0	267	0.0	678.4	0	136	0.0	373.0
$60,000-$70,000	0	267	0.0	678.4	2	138	19.6	392.6
$70,000-$80,000	0	267	0.0	678.4	0	138	0.0	392.6
$80,000-$90,000	1	268	12.9	691.3	0	138	0.0	392.6

Source: SASH Program Data through November 1, 2010.
Note: Of the 750 Installed/Complete or In Process projects in the SASH database, only 406 had incentive amounts listed. The Prospective/Pre-Screened projects are not included in this table because only 4 of these projects listed an incentive amount.

With the exception of the one large project mentioned above and two projects in process, all of the SASH projects have an incentive level under $50,000. The cumulative kW column illustrates that little capacity is gained from projects with incentives above $50,000.

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SASH Goal Scenario Analysis

To determine the potential ramifications of providing high incentives to SASH participants, the Navigant team completed a brief scenario analysis of the SASH goals relative to the incentive budget. GRID's internal target for the SASH program is to complete 6,000 projects delivering 16 MW of capacity. Per CPUC Decision 07-11-045, the SASH incentive budget is $92,089,000. SASH projects vary in size, but to achieve 16 MW across 6,000 projects, the average project size would need to be 2.67 kW. Table I-12 shows the average project incentive for a 2.67 kW system at the various incentive levels along with the total incentive needed to reach 6,000 projects if all of the projects were completed at that incentive level. While not all SASH projects have been paid at the same incentive level, this table illustrates that as the incentive level and incentive paid per project increases, the total incentive budget required exceeds the SASH budget of $92,089,000.

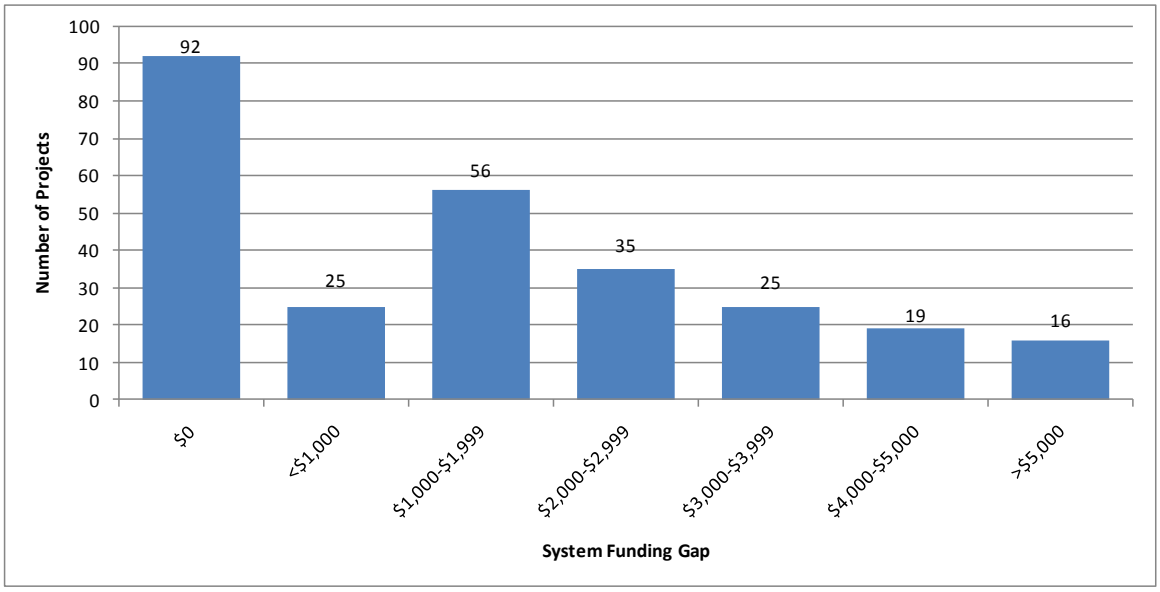
Table I-12. SASH Goal and Budget Scenario Analysis

SASH Incentive Level		Average Project Incentive at 2.67 kW/Project	Total Incentive Budget Needed to Reach 6,000 Projects
CARE-Eligible	$7/watt	18,667	112,000,000
	$6.5/watt	17,333	104,000,000
	$6/watt	16,000	96,000,000
Non-CARE Eligible	$5.75/watt	15,333	92,000,000
	$5.25/watt	14,000	84,000,000
	$4.75/watt	12,667	76,000,000

Gap Funding

In many cases, the incentive levels determined by GRID are insufficient to cover calculated system costs for program participants, giving rise to a funding gap. For installed and completed projects, Figure I-17 shows the gap between calculated system costs and incentives received.[10]

Figure I-17. Calculated Gap between System Cost and Incentive for Installed/Completed Projects, n=268

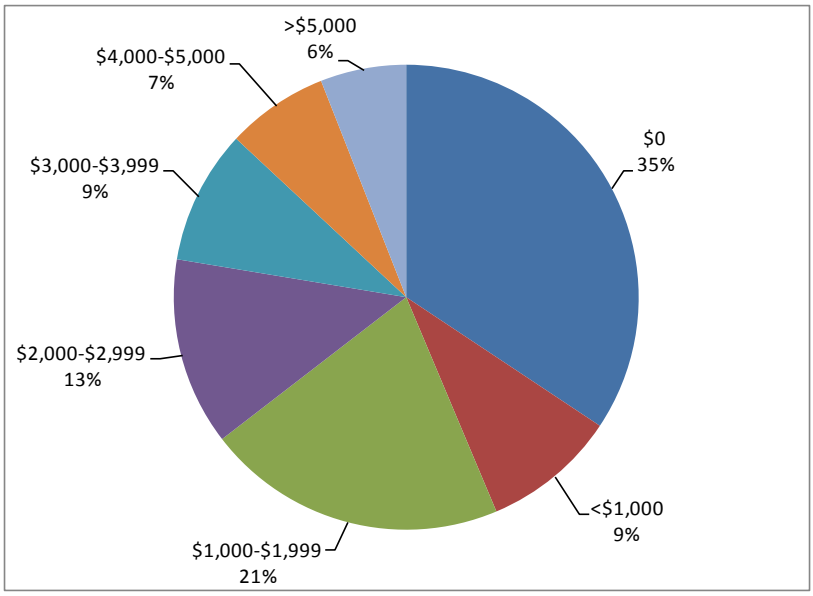


Source: SASH Program Data through November 1, 2010.

The pie chart in Figure I-18 shows the relative size of each funding gap range. Generally speaking, about one-third of installed projects had no funding gap, while nearly one-third had a gap of less than $2,000.

[10] Of the 287 installed/completed projects, 19 were missing data for their calculated incentive level.

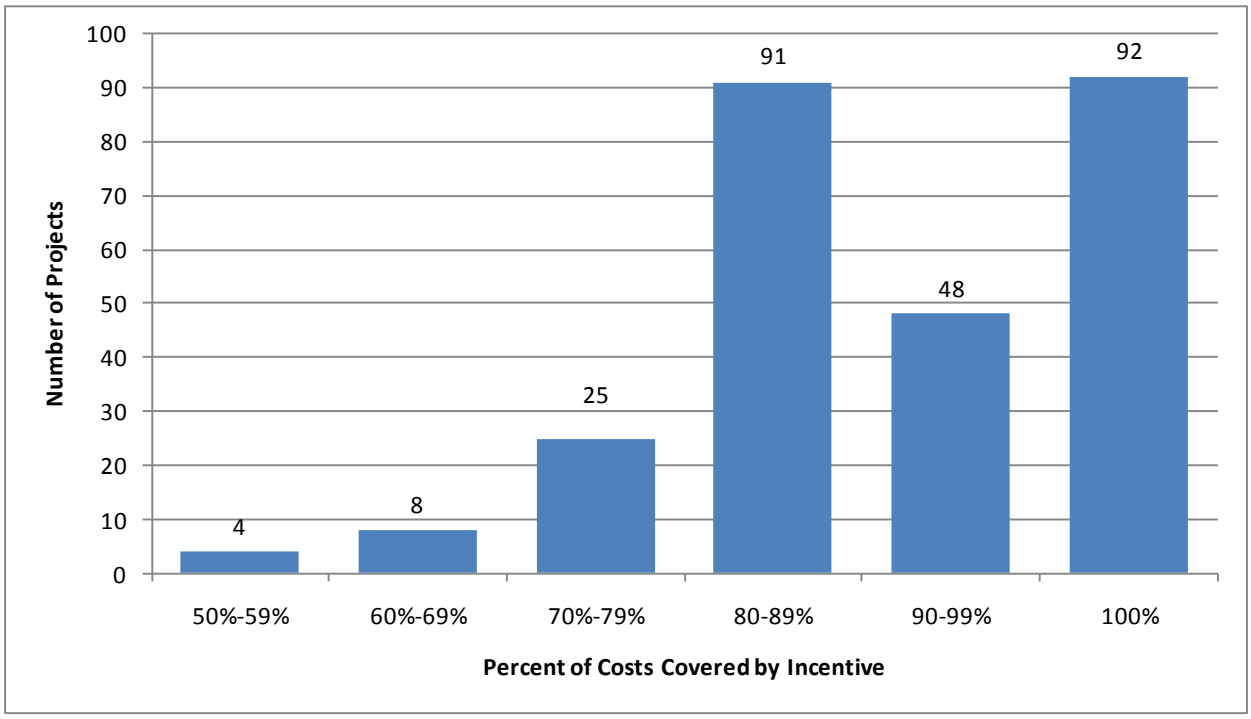
Figure I-18. Distribution of Project Funding Gap Amounts for Installed/Completed Projects, n=268



Source: SASH Program Data through November 1, 2010.

Adding the perspective of varying system sizes and costs, Figure I-19 shows the percent of system costs covered by incentives for installed projects. More than half of installed projects are 90- to 100-percent covered by incentives, with 86 percent of projects more than 80-percent covered by incentives.

Figure I-19. Percent of System Costs Covered by Incentive for Installed/Completed Projects, n=268



Source: SASH Program Data through November 1, 2010.

Sources of Gap Funding

GRID has reported that the economic downturn has greatly reduced homeowners' ability and willingness to take on the burden of filling the funding gap directly, although at least two homeowners have personally contributed to fill funding gaps. In one case, the homeowner wanted a larger system than that GRID proposed and paid the difference from his own savings.

In cases where a funding gap exists, GRID attempts to raise funds on a project-by-project basis. In cities where GRID has a grant, it can use general fundraising to help homeowners afford systems with relatively small funding gaps (e.g., $100). For larger gaps (e.g., $6,000), GRID will ask the homeowner to contribute to the system cost before turning to the local city government to try to secure additional funds. If no immediate funding is available, the project is put on hold while GRID staff works on other projects. On-hold projects are revisited periodically to determine if enough general fundraising has occurred to meet the gap funding need.

In addition to general GRID fundraising, other sources used to cover project funding gaps have included local governments, Habitat for Humanity, and the Environmental Protection Agency (EPA). In addition, GRID's general fundraising draws upon donations from foundations and corporations to cover administrative, program management, and direct project (i.e. gap funding) costs. Over ten organizations have provided gap funding for 30 installed or completed SASH projects. Two organizations have provided funding for eight projects, one organization has funded four projects, and three organizations

have funded two projects each. The gap funding provided by these organizations is generous with the average by organization ranging from a high of $6,550 to a low of $1,500.

While GRID staff is uncertain that the project-by-project fundraising approach will always succeed in filling funding gaps, they report relative success and limited difficulties to date. If gap financing remains unavailable for some customers, installations may begin to skew toward higher incentive level projects.

Marketing and Outreach

Marketing and outreach are two central activities for GRID's implementation efforts because of the distinct eligibility criteria and the hard-to-reach nature of the eligible population. This section reviews GRID's marketing and outreach efforts using a framework that is traditionally used to analyze marketing efforts – the "four Ps" of marketing.[11] Figure I-20 depicts how the combination of a product, its price, its promotion in the marketplace, and its placement through distribution channels combine to form the marketing mix that defines a product's marketing strategy. The remainder of this section addresses each of those four elements in turn.

Figure I-20. Marketing Mix: The Four Ps of Marketing

Product

GRID's product is multi-faceted. First and foremost, GRID offers the ability for qualifying low-income homeowners to decrease their energy costs by receiving power from a PV system. GRID can also offer comprehensive energy efficiency retrofits to a subset of its clients. Beyond that, however, GRID offers a way for a low-income homeowner to be seen as a leader in her community through the installation of a state-of-the-art PV system and by engaging her neighbors in the installation of the PV system. This combination of products and experiences has proved to be a compelling package for GRID's customers to date.

[11] McCarthy, E.J. 1975. *Basic Marketing: A Managerial Approach: Fifth Edition*. Richard D. Irwin, Inc.

Price

The price of the PV systems that GRID's clients receive is a combination of "in kind" contributions and the portion of the system funded by the client. While GRID cannot require homeowners to provide sweat equity under SASH, voluntary in-kind contributions range from installation assistance (from both the homeowner and her friends and family) and meals for the volunteers who install the system. The in-kind contributions are difficult to quantify, but anecdotal evidence indicates that many clients enjoy and appreciate the opportunity to assist with the installation of their system or to provide hospitality to those volunteers who install the system. These offerings create a sense of ownership of the project for the client.

The portion of the system funded by the homeowner is the most substantial indicator of the "price" that is paid for the product that GRID provides. The best indicator for this contribution is the "gap amount," or the part of the system cost which is not covered by SASH incentives. As indicated in the section on System Funding, the gap amount was than $1 for over one-third of the projects installed by GRID through September 29, 2010. For roughly half of all installed systems, the gap amount was more than $1 but less than 20% of the project cost. The remaining 13% of installed systems had gaps of more than 20% of the system cost.

When considered relative to a household's annual gross income, the gap between SASH incentives and project cost can be significant. As seen in

Table I-13, just over one-fifth of the installed or completed projects have gaps greater than 0 but less than five percent of the client's annual household gross income; this is equivalent to a typical low-income household's[12] expenditures on apparel and services.[13] An additional 5 percent of those projects have gaps between 5 and 10 percent of the client's annual household gross income; in the absence of SASH, a typical low-income household spends this amount on health care.[14] For 13 percent of the completed or installed projects, the gap amount was between 10 and 25 percent of the household's gross annual income; a typical low-income household spends the same fraction of their income on food.[15] For another 3 percent of these projects, the gap amount was more than one-quarter of the household's annual gross income.

[12] In this case, a "typical" low-income household is intended to reflect a household income of $46,100, which is the income level calculated by the U.S. Department of Labor in the Consume Expenditure Survey to reflect the income level of the third quintile of U.S. households. Source: U.S. Department of Labor: Bureau of Labor Statistics. 2010. "Consumer Expenditure Survey, 2009." Available: http://www.bls.gov/cex/#tables

[13] U.S. Department of Labor: Bureau of Labor Statistics. 2010. "Consumer Expenditure Survey, 2009." Available: http://www.bls.gov/cex/#tables

[14] *Ibid.*

[15] *Ibid.*

Table I-13. Gap Amount as Percent of Client's Household Income and Comparison to Existing Expenditures

Gap Amount as % of Annual Gross Income	% of Completed / Installed Projects	Comparable Expenditure for Household Earning $46,000
≤ 0%	32.8%	N/A
0%-4%	22.4%	Apparel and Services
5%-9%	23.9%	Healthcare
10%-24%	13.1%	Food
25%-49%	2.2%	Housing
50%-99%	0.4%	No single category represents more than 50% of gross income
No Gross Income Reported	5.2%	N/A

Note: In this case, a "typical" low-income household is intended to reflect a household income of $46,100, which is the income level calculated by the U.S. Department of Labor in the Consume Expenditure Survey to reflect the income level of the third quintile of U.S. households.
Source for Completed/Installed Projects: GRID database.
Source for Comparable Expenditures: U.S. Department of Labor: Bureau of Labor Statistics. 2010. "Consumer Expenditure Survey, 2009." Available: http://www.bls.gov/cex/#tables

The information about gap amount relative to household income indicates that further information is needed to determine the target market's willingness and ability to fund part of the system cost. In most cases, the gap amount competes for funding with basic necessities. Carving out the money to make a one-time payment is unlikely. Thus, some type of financing is likely required.

Initial research indicates that loans for SASH's target population are either too expensive or unavailable. The SASH program was designed to take advantage of low-interest lending from local governments, but the economic downturn has reduced local government budgets. In addition, GRID reports that homeowners are generally less willing or able to take out loans than before the economic downturn for a variety of reasons: inability to qualify, interest rates that are considered too high, or funding gaps that are smaller than minimum loan amounts. For example, GRID has spoken with Ecology Action about leveraging the PACE program, but a $5,000 minimum loan and 6- to 7-percent interest rate are similar deterrents.

GRID has reported that requiring homeowners to take out a loan would become another barrier to solar adoption by low-income households. Rather than spending time (and money) convincing the customer why a loan for the system makes sense, GRID has focused efforts on fundraising to address gaps and on developing the homeowner's sense of personal investment in the process. This is achieved through intensive education about solar, energy efficiency, and how to reduce electricity usage.

Further investigation into the willingness of SASH program participants to finance their systems will be conducted as part of the Market Assessment.

Placement (Distribution)

GRID has taken a hands-on approach to distribution of its product. Only GRID staff are currently empowered to meet with potential clients to determine their interest in and eligibility for SASH incentives. Using information from cities and affordable housing developers, GRID staff determines which residents are most likely eligible for the program and then target them directly. Since the inclusion of enterprise zones in the eligibility criteria, GRID can also access public records about homeownership in the enterprise zones, the entire area of which is designated as affordable housing for the purposes of SASH. By spending the time up front to identify eligible residents, GRID reduces the amount of time required to "screen out" a large number of interested but ineligible residents.

GRID subcontracted with the California Housing Partnership Coalition (CHPC) to develop a database of eligible clients. CHPC reached out to create additional partnerships beyond those that GRID had already formed and to obtain deeds and confirmation of addresses that qualify for SASH. The CHPC went to every city, with the understanding that some cities will not have eligible residents. CHPC completed its work in the SCE and SDG&E territories twice (repeating its effort after the eligibility definition changed) and, as of December 2010, has reached out to every city in PG&E's territory. Following CPUC's second revision of the affordable housing criteria, GRID will have their affordable housing partner contact every city again and ask them for their list of qualifying addresses using the new criteria. As soon as GRID receives the addresses, all of the addresses will receive mailers. Some of the cities are harder to obtain lists from, but GRID reports that they have made a very reasonable attempt at locating all eligible clients.

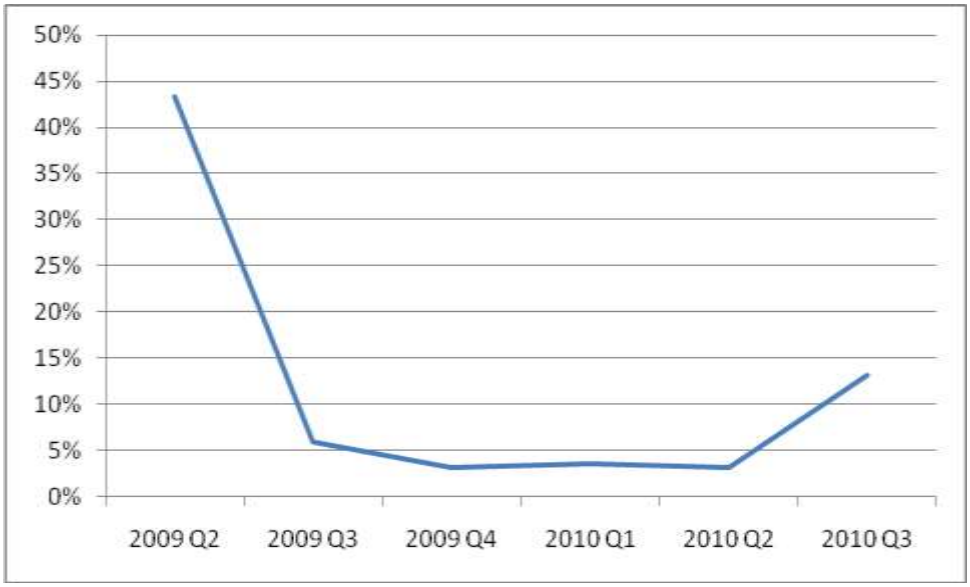
Using the database of eligible homes, GRID staff canvass the neighborhoods to hang mailers and provide initial information about the program to those who are at home. In some cases, GRID may also ask cities or affordable housing agencies to send out an initial letter about the program. These initial efforts lead to follow-up calls from interested individuals, and GRID meets with interested homeowners to further assess their eligibility. GRID maintains control over this process in order to ensure that the clients who move to the next step in the process (submitting an application) are indeed eligible for the program. Again, this tight control reduces the amount of staff time spent reviewing applications by ineligible homeowners and enables GRID staff to focus on those clients who are eligible.

By maintaining control over the distribution channel, GRID seeks to address a major hurdle to successful distribution of PV systems among the target population: trust. Developing trust within the neighborhoods and with the clients is a critical part of the project development process. In some cases, the low-income population has been taken advantage of, and the community is wary of outsiders. GRID's *Outreach Manual* provides a very detailed approach to working with clients, ensuring that the Outreach Coordinators take the steps necessary to make the clients feel comfortable. Any breach of trust with an individual homeowner puts at risk the projects in development in the entire neighborhood. By maintaining control over the channels of distribution, GRID reduces the risk that an outside partner might (even inadvertently) jeopardize the work done to develop trust and to ensure GRID achieves fairly

low sales force costs as a percent of total project costs. This is a traditional metric applied to marketing departments and can be used to indicate the effectiveness of sales staff.[16] The cost of the time that GRID staff have billed to Task 3 (marketing and outreach) is the best proxy for sales force costs; Task 3 includes charges from Outreach Coordinators as well as Regional Directors and the program's executive staff. Total project costs were considered for all projects with a status of Installed or Complete; the figures for these categories of projects are considerably more accurate than those projects in earlier stages of development. This analysis attempts to match sales force costs with actual installations, realizing that many projects are not "sold" and installed in the same quarter. See the Program Statistics section for more details about the method used to allocate labor costs.

As expected, the sales force costs as a percent of total project costs have decreased significantly since the program began. Initial startup costs skewed the ratio in the early part of the program, but the ratio became more reasonable once project installations began. The spike in the third quarter of 2010 may be because the database did not include all installations from that quarter at the time that the data was provided to the evaluation team.

Figure I-21. Sales Force Cost as a Percent of Total Project Costs



Source: GRID Quarterly Reports (Sales Force Cost) and GRID Database (Total Project Costs).

GRID sees a low attrition rate once a client commits to the program. GRID's *Outreach Manual* outlines significant prescreening activities before a homeowner submits an application; by the time GRID receives a completed application, most are eligible and have suitable sites. Only about 30 clients completed an application and became ineligible for SASH, mostly when the construction staff found that the project could not meet the EPBB Design Factor requirement. Only a few eligible clients dropped out because they

[16] Kotler, P. and K.L. Keller. 2006. Marketing Management Twelfth Edition. Pearson Prentice Hall: New Jersey.

changed their mind about participation.[17] One was persuaded by a family member and one was afraid of the homeowners' association.

Promotion

GRID has used a variety of methods to promote its offering. By reaching the target homeowners through a variety of means, GRID strives to address three main challenges: GRID's emerging connection to the neighborhoods, clients' lack of awareness of the technology and its benefits, and concerns about the broader implications of the system installation for either the homeowners association or the city inspectors. The portfolio of promotional materials includes the following:

- **Brochures and Mailers** – The brochures and mailers are often the first point of contact with a potential client. The brochures are glossy, in color, and translated into six different languages (all on one mailer) to grab the recipient's attention and to increase the likelihood that they will read and understand it. The brochure asks the clients to call GRID. GRID targets sending out brochures every three to four months. GRID also works with cities and developers to write a letter to introduce GRID. In some cases, cities and developers are unwilling to provide GRID with specific names and addresses due to privacy concerns; in these cases, the partner organization will mail the letter directly.

- **Telephone Calls and Home Visits** – GRID follows up the targeted mailers with phone calls and door-to-door outreach. These efforts are typically prioritized when GRID staff have the capacity to do so and do not have a long waiting list. In some cases, GRID staff use the door-to-door outreach at the time of a new installation, leveraging their presence in the neighborhood to reach out to potential clients who may have a connection to the existing client; door hangers may be left in the event that no one answers the door.

  One challenge that this approach has faced is the need to re-visit neighborhoods each time the eligibility criteria change. In addition to updating the database, GRID re-visits neighborhoods when staff have time available. This is less than efficient but necessary due to the changing requirements.

- **Community Meetings** – GRID attends community meetings in church basements, at community halls, and at homeowners associations. Sometimes, one client in the neighborhood will take the lead and hold a meeting in his/her home. In some cases, GRID has asked the first adopters in a neighborhood to outreach to their neighbors.

- **Partnerships** – Community organizations have provided lists of qualified homes and have helped with outreach. They have helped GRID to build trust with clients in their neighborhoods. Sometimes a city or a local Habitat for Humanity will send out a letter to introduce GRID and the SASH program.

[17] This is anecdotal evidence from GRID. The database does not report the status of projects as "Discontinued" or "Canceled."

Indian tribes have played a much more direct role in outreach. GRID has trained them on what types of documents are needed, and the tribes are doing most of the direct outreach because it is more effective. GRID has one subcontractor on some of those projects who has been working with the tribes for a while.

GRID is working with developments of affordable housing. They do installations on one or two homes on the block, and then word spreads and the neighborhood is interested. This method speeds acceptance of solar technology.

- **General Advertising and Public Relations** – GRID uses traditional advertising methods (e.g., television and print ads) and public relations efforts (e.g., news coverage of new installations) to create a broader awareness about the SASH program. For example, one of GRID's staff members received an award on *Good Morning America* for her work with low-income families. This type of general publicity builds awareness in the broader marketplace about the benefits of SASH and also builds awareness in the target community. The disadvantage of these types of efforts is that such stories often generate false leads for SASH; the interested parties do not necessarily meet the eligibility requirements, and SASH must still spend time and resources following up with them.

- **Social Networking –** GRID reports that the most effective outreach comes after GRID installs a system in a neighborhood and the neighbors talk to one another. Sometimes qualified homes, such as the Habitat for Humanity homes, are clustered in neighborhoods, providing a fertile ground for recruitment. This social networking stems from the clients' satisfaction with the service provided by GRID and successfully addresses the issue of trust in these communities.

Currently, the four percent budget for marketing and outreach seems to be sufficient. GRID has been using some administrative funds for outreach. GRID's word for homeowner education and marketing is "outreach", but they don't just do outreach, they do the application and work that crosses the line into administration.

Community Partnerships

The CPUC Decision that established SASH stated that the SASH Program Administrator should partner with community-based organizations for outreach.[18] GRID reported that they have worked with the following community organizations.

- Habitat for Humanity
- U.S. Department of Housing and Urban Development's (HUD's) regional energy office, and HUD-funded local government agencies that run rehabilitation and affordable housing for low-income households.

[18] CPUC Decision 07-11-045, Opinion Establishing Single-Family Low-Income Incentive Program Within the California Solar Initiative, November 16, 2007, page 21.

- CA Housing Partnership Corporation (CHPC)
- Local government entities
- Nonprofit housing developers
- Job-training organizations

With the introduction of SASH, GRID is working with many more community organizations, and they have closer relationships with the organizations that they work with. GRID has developed partnerships with the following additional organizations.

- Additional job-training organizations
- Subcontractors
- LIEE program
- Additional government agencies
- Tribal authorities
- Additional nonprofit housing developers

Some of these relationships are different than they were before the introduction of SASH. Prior to SASH, GRID worked with subcontractors as volunteers. Companies would send their volunteers out, or would provide a corporate sponsorship, but GRID was not subcontracting any work. Now, GRID has business relationships with the installers. GRID previously referred clients individually to LIEE; however, now they have a much more structured process for the referrals where GRID sends a list of names directly to the LIEE departments.

GRID relies on the cities and affordable housing developers who they have partnerships with to provide addresses of their qualifying affordable housing. This was instrumental with the original definition of affordable housing. GRID needed to work with government entities and nonprofit organizations to identify homes that would meet the criteria. The city and developer levels of cooperativeness vary. If they are very cooperative, the city or developer will talk to the homeowners and provide an introduction for GRID.

Some of the Habitat for Humanity affiliates have helped GRID by providing GRID with a list of all their homes built in the last 20 years, sending letters to all of the families, or walking around the neighborhood with GRID's Outreach Coordinator and providing an introduction. Some cities have also worked with GRID in this manner.

GRID has been working with some of the tribal authorities, and just finished their third tribal home. They have more tribal homes lined up, and they have a lot of interest from the tribes. The initial tribes that connected with GRID didn't have a lot of homes that qualified; however, they introduced GRID to the network of other tribes across the state. Also, GRID can go back to the tribes now and see if more homes qualify under their expanded definition of affordable housing.

The other area where partnerships have benefitted the program is in identifying gap funding that can be leveraged to help make the project happen. Habitat for Humanity is one of the organizations that has provided gap financing for SASH homes in their program.

Materials Procurement

GRID has three main suppliers for the modules; however, they change their vendors periodically as they obtain better prices from other sources and the supply chain evolves. GRID does not have any signed agreements with suppliers, but they give projections to different suppliers about their expected volume, as this helps with discounted pricing.

GRID receives preferred pricing from their suppliers. The suppliers charge GRID as if they purchased a larger volume than they currently do because they see GRID's growth potential. It is high-profile work, and they know the systems are going to low-income clients. Some of the manufacturers provide GRID with discounted modules or equipment, or donate equipment. Smaller contractors may not obtain the best prices because of their low volume; however, these contractors may be willing to mark down their prices because they are trying to enter the market.

Periodically, a supplier will provide a donation to GRID. The most recent example is that one supplier donated a system worth of panels to GRID to use wherever they need. GRID is using these panels to help with the gap when the incentive doesn't cover the whole amount of the system.

SPP contractors can procure materials themselves or work through GRID. Most of the subcontractors have procured their own materials. Many have their own relationships with the suppliers. GRID recently had their first project where GRID provided the materials for an SPP project.

Workforce Development

GRID reported that all of their projects have a workforce development component. Many volunteers come to GRID because they hope to obtain a job in the industry and many companies send potential hires to GRID to receive training.

When GRID sets up an installation, a GRID staff member is the foreman or forewoman. This staff member makes sure that everything is done correctly and does the final connection. There is also a team leader (from industry or a volunteer who has worked on a handful of projects) and laborers (either volunteers or job trainees).

GRID sets aside 20 percent of their installations for organizations who are training hard-to-reach low-income workers in the construction trade and solar installation. The other 80 percent of GRID's projects use the same model, but allow anyone, including job-training volunteers. If the job-training organization cannot fill a whole house with their trainees, GRID will provide volunteers to complete the number of laborers needed. Job Train is an example of an organization that is training a workforce to enter the solar industry. They provide classroom training and teach basic job skills.

GRID is not able to quantify the number of employees who have been hired as a result of their workforce training component. GRID is working to improve their ability to track the number of projects that have been dedicated as workforce development. They are talking to some of their partners about how many and what percentage of their students get placed; however, job placement is difficult to track.

The colleges and training programs that GRID coordinates with are listed below:[19]

- Alliance for West Oakland Development
- Applied Professional Training
- California Conservation Corps
- California State University - Fresno
- City College of San Francisco
- College of the Sequoias
- Construction Craft Training Center
- Dr. J. Alfred Smith Training Academy
- Employment and Community Options
- Engineers Without Borders - San Diego
- Fresno City College
- Fresno County Economic Opportunities Commission Local Conservation Corps
- Fresno County Regional Workforce Investment Board
- Green Team Fresno
- Greenfield YouthBuild
- International Brotherhood of Electrical Workers (IBEW) Local 100
- IBEW Local 595
- International Rescue Committee - San Diego
- JobTrain
- LA CAUSA YouthBuild
- LA Conservation Corps
- Marin City Community Development Corporation
- Oakland Green Jobs Corps - Cypress Mandela Training
- Center and Laney College
- Proteus
- San Francisco Conservation Corps
- Solar Richmond/RichmondBUILD
- South Bay Workforce Investment Board
- Swords to Plowshares
- Treasure Island Job Corps
- Tulare County Office of Education
- Young Community Developers

[19] GRID Alternatives SASH website http://www.gridalternatives.org/ourprojects/partners.

Subcontractor Workforce Development

GRID requires that all contractors hire a job trainee on their SASH projects. This provides trainees with an opportunity to network and to potentially obtain jobs. GRID has some guidelines for the trainees, including a minimum of 40 hours of classroom training and hands-on hours, as documented in the SPP application. At the time of the interview, GRID had completed approximately 5 projects through SPPs, with an additional 20 projects under contract to be installed and another 20 or more projects in the bid process or in contracting statewide.

Each of the workforce training installations utilizes 10 to 15 trainees and each SPP project requires at least job trainee. GRID will complete approximately 6,000 installations in SASH, about half through GRID and half subcontracted through the SPP. In total, GRID's projects will provide workforce development benefits to job trainees to 9,000 to 12,000 job trainees, as estimated in Table I-14 below. This number does not include job trainees who volunteer on regular GRID installations, so this number may be higher.

Table I-14. Estimate of SASH Job Trainee Benefits

<table>
<tr><th>GRID Workforce Development Program</th><th>SPP Projects</th></tr>
<tr><td>3,000 projects through GRID</td><td>3,000 projects through SPP</td></tr>
<tr><td>20% of projects use job trainees</td><td rowspan="2">At least 1 job trainee on each project</td></tr>
<tr><td>Projects use 10-15 trainees</td></tr>
<tr><td>6,000-9,000 job trainees</td><td>3,000 job trainees</td></tr>
<tr><td colspan="2">9,000 – 12,000 job trainees</td></tr>
</table>

GRID Volunteers

GRID volunteers are required to fill out an application and come to a two- to three-hour volunteer orientation; however, no prior experience with solar is required. The orientations are heavily focused on safety, and they explain solar and do a step-by-step slide show of an installation. A variety of GRID staff conduct the trainings, including members of GRID's construction staff, volunteer training associates, regional directors, project managers, and one of GRID's cofounders. GRID's development staff conduct the training sessions for their funders.

GRID does not have to recruit volunteers, and they often have to turn people away because they have too many volunteers. The volunteers find GRID through referrals, Internet searches, and job-training programs. Some of the Habitat for Humanity volunteers also volunteer for GRID. GRID has conducted some trainings and information sessions at local schools or community events to get volunteers at some of their newer offices.

GRID gives preference to volunteers who are looking for job training. GRID has anecdotal data on GRID volunteers who moved on to green jobs and believe that it would be useful to quantify this benefit. They feel that this is important because the goal of CSI generally is market transformation, which includes a variety of different skill sets, not just the project installation.

GRID has a team leader program as a way to help volunteers obtain project management experience. The team leader is an experienced volunteer (who has been on at least five installs) or a professional volunteering on the project. Team Leaders are required to attend an additional two-hour training session. Installations usually have a ground team leader and a roof team leader. The construction supervisor moves back and forth between the two leaders to troubleshoot issues and provide quality control.

GRID reported that the barrier to improving the workforce development component is the need for job creation within the solar industry. GRID does not face barriers in providing training because there are many individuals who want the hands-on experience.

Energy Efficiency

The energy efficiency requirements for the SASH program are listed below:[20]

- Applicants must enroll in LIEE if eligible.
- They must have all feasible LIEE measures installed prior to receiving a solar incentive or be on the waiting list for installation.
- Applicants must include an energy efficiency audit with their incentive application.
- Incentives shall not be paid until feasible LIEE measures are installed, the applicant is on the waiting list for LIEE installation, or an energy efficiency audit is completed.

Energy Education

Client education begins during the application visit. GRID stresses that solar does not mean free energy for life.

GRID's outreach staff conducts a walkthrough with the homeowners. If the customer has Internet access, the outreach staff will complete the online energy audit at the client's home. If not, the outreach staff will collect the audit inputs on-site and complete the online audit after returning to GRID's office. GRID staff members use the audit tool on the home energy saver website (Hes.lbl.gov/consumer). The audit printout, signed by the client, is part of the application materials.

Outreach Coordinators print out the audit outputs and conduct training with the homeowners. When the customer signs the installation contract, GRID presents the audit results. GRID staff members discuss the audit again at the training that is conducted six weeks after system installation.

[20] CSI handbook, available on the Go Solar California website: http://www.gosolarcalifornia.org/documents/csi.php, p. 187.

The audit mainly recommends measures, rather than behavioral changes, that the customer can take. Some recommendations are for upgrades that can be made when replacing appliances (for instance, to buy an ENERGY STAR appliance when the refrigerator breaks.) The Outreach Coordinators are trained on behavior changes and educate clients on how they can reduce their energy usage. They encourage clients to turn off lights, not to run the air conditioner when the windows are open, and provide other basic education on an ongoing basis. GRID does not know what percentage of customers take actions as a result of the audit. They are not currently capturing this information; however, they are talking about adding this to their follow-up survey.

LIEE

The LIEE program offers qualified low-income customers free installation of a variety of EE measures. GRID estimates that about 30 percent of their clients that are eligible for LIEE upon installation have not yet been served by the program. If the homeowner is eligible for LIEE, GRID works with the utilities to enroll the client in LIEE. Each month GRID sends a list of SASH clients who they believe qualify for LIEE to each utility. LIEE lead times vary by utility but GRID typically receives updates from the utility within two to three months.

The majority of SASH clients receive LIEE measures before the solar is installed. If the SASH installation has not been done and GRID finds out that the customer declined LIEE services, then GRID would postpone the installation until the customer enrolls in LIEE.

GRID determines the system size with the assumption that efficiency measures will be installed. They err on the conservative side, by designing systems that typically provide 90 to 100 percent of the client's estimated post-LIEE usage.

GRID does not track the LIEE measures that are installed for participants. An LIEE evaluation reported[21] that typical LIEE measures save approximately 7% of a households annual kWh and GRID uses this assumption when sizing the PV system.

Some of the SASH clients are not eligible for LIEE. GRID is thinking about how to fund efficiency measures for these clients. At the current time, the non-LIEE-eligible customers only receive education. With the increase in Weatherization Assistance Program (WAP) eligibility, some of these clients who don't qualify for LIEE now qualify for the WAP, and GRID is looking to send these customers to WAP.

Service Delivery

GRID initiated SASH in all three utility territories in May 2009. Although their largest office and headquarters were in PG&E territory, they opened up offices in San Diego, LA, and Fresno, which allowed GRID to accept applications in all areas. By May 2009, all offices were up and running. The SPP is also expanding GRID's reach.

[21] APPRISE & Fisher, Sheehan and Colton. Ratepayer-Funded Low Income Energy Programs: Performance and Possibilities. Appendix State Report – CA. July, 2007.

GRID reports that they are not having difficulty reaching any part of the state. Given the initial affordable housing restrictions, many of the qualified addresses they first received were near the Oakland office, where the affordable housing stock existed. Some areas of the state have more affordable housing than others. The LA area has increased its activity; however, it was slow to find eligible housing in LA originally because they don't do as much affordable housing there. This is another reason why the enterprise zones are important, because they are located across the state.

The size of GRID's waiting list varies over time. Since the SPP has been introduced, GRID is able to subcontract projects with completed applications and reduce the waiting list.

Outreach staff spend about ten hours interacting with the clients. This time includes the introduction, application, energy efficiency audit and education, and follow-up training. The installation takes two to three days.

Application and Enrollment Process

The Outreach Coordinator meets with clients to obtain SASH applications. They provide information and education about SASH. If the client is interested, the Outreach Coordinator will complete the application with the client, collect documentation, and conduct the energy efficiency audit.

GRID reviews and approves applications at the regional level, and the SASH headquarters team double-checks the applications. GRID maintains scanned copies of the applications on their server and enters the data into the SASH database.

SASH staff members check all completed applications before the construction staff designs the system. The required documents are as follows.

- Federal tax form 1040, if applicable
- Tax exemption form
- Completed and signed application
- Proof of home ownership
- Utility bill
- LIEE and CARE applications, if applicable
- Documented affordable housing

CARE enrollment can be quickly verified online through the utility accounts. Approximately 80 percent of SASH clients are on CARE. The customer utility bill indicates CARE enrollment and the qualifications are straightforward. Income is verified from tax form 1040 and the client is signed up to CARE if eligible and not already enrolled. Tax liability is found on the client's previous year tax form.

Applications are processed in the order received and installations are prioritized based on distance from the GRID offices, construction staff schedules, group install opportunities, and gap financing options available.

System Design

When designing and sizing the solar systems, GRID examines the customer's historical electric use and adjusts the numbers to match with the expected installation of LIEE measures.

In most cases the clients receive LIEE; however, GRID doesn't always receive information about what measures were installed. PG&E provides the measure lists to GRID, which then uses this information to project savings and subtracts the savings from the historical usage. The solar system size can be more than 90 percent of the post-LIEE energy usage, but never more than 100 percent. That is the maximum size for the system.

The construction staff conducts a site visit to examine the electrical system and check for shading. They select modules that are preferred based on pricing and supply. They usually have two options, a lower cost option and a higher cost option. If there is limited roof space, they will use the more expensive, but more efficient option. The roof drawing shows the layout of modules and where the inverter will go. The single-line drawings show the schematic of the different pieces. GRID performs the calculations to confirm that the modules work with the given inverter.

Some jurisdictions have other requirements that GRID must meet. GRID calls the city to find out whether there are special rules.

GRID staff members enter the orientation, tilt, and shading from the SunEye tool into the EPBB calculator to calculate the expected output and the Design Factor. They sometimes have to change the design to meet the Design Factor requirement. GRID also has their own economic analysis spreadsheet that predicts the electric savings for the homeowner, the expected incentive, the gap amount, and the costs for the modules and inverters.

When this step is completed, another GRID staff member checks everything using their two-page checklist. After approval, the project is moved to approved construction status. All of the information is entered into the SASH database.

Installation and Inspection

Once the system is installed, the SASH database generates the EPBB calculation and the work sheet that the third- party inspector follows. The third-party inspector confirms what was documented in the design documents is up on the roof.

The third-party inspectors that GRID works with are CCSE in SDG&E territory and Burnham Energy in SCE and PG&E territory. GRID received quotes from several companies, recommended those two to the

CPUC, and the CPUC approved them. GRID contracts directly with the third-party inspectors and pays them through the SASH administrative budget.

After the inspection, the construction staff makes changes and updates the database. When they move the project to the installed status, they make sure that all of the information is accurate, including the EPBB.

GRID stated that the removal of the geographic correction from the Design Factor, via CPUC decision, was very important. Without such removal a great number of projects would not have met the 95 percent EPBB requirement.

Most SASH systems do not use Performance Monitoring and Reporting Service (PMRS) services. All inverters have instantaneous and cumulative production reporting. Feedback mechanisms to correct problems include the GRID inspection immediately following installation.

Client Education

GRID conducts a follow-up with the client after they receive their first utility bill after the system installation, which provides the following information to the client.

- How the inverter works.
- How to check if the system is on and working.
- The importance of the switch beneath the inverter being in the on position.
- How to reset the disconnect switches if needed.
- To call GRID right away if the red light is on.
- To record the message on the screen and call GRID Alternatives if the inverter is on but something seems to be wrong.
- How to check kWh.
- How to check kWh per day and to date.
- How to clean the solar panels—wash twice a year with water, especially before summer. If the roof is too high, it's important to be safe and water from the ground.
- System warranties.
- The utility bill and how to read it. How much energy they have produced and saved and what they should be paying.

GRID still conducts this training if it is an SPP project. SPP contractors only do installations. All of the outreach and education is through GRID. On the SPP projects, GRID will follow up with the customer immediately after the installation so they know how the contractors are doing.

GRID also conducts a homeowner survey as part of the training package. They don't often get the survey back, so they are trying to figure out ways to increase that.

Statewide, GRID has had only one had failure to date. The shading issue had changed over the course of the design, but this has been remedied. To date, no SASH client has reported theft or vandalism.

The time for the process is as follows.

- Application to installation – 90 days
- Install to interconnect – 26 days
- Interconnection to rebate received – 24 days

GRID suggested that this time could be reduced by eliminating the third-party Application Inspection (removed by CPUC beginning July 1, 2010).

GRID also noted that the project time depends on how long interconnection takes, and that is outside of GRID's control. The best-case scenario is 30 days, and the worst case is several months.

Barriers to Installation

Only a couple of customers have dropped out after completing the SASH application. The most common home repairs that are needed are roof repairs and electrical system upgrades and repairs. Sometimes the electrical panels need to be upgraded or trees need to be moved. GRID can sometimes work the cost of the repairs into the cost of the system. If the roof structure needs to be reinforced, GRID can do that.

There are instances where the client needs to have the roof replaced prior to installation. If the roof is old, GRID helps the client work with the local city that might have a low-income home rehabilitation program that would allow them to finance the roofing, or GRID may be able to help the client with the roof while they are doing the system.

If the roof is halfway between old and new, it is sometimes difficult for a client to decide whether to install the system or wait five years when they replace the roof. Sometimes the client decides to proceed with the installation because of SASH incentives. In cases where the roof is bad enough, GRID will tell the customer that they can't do the project until they get a new roof because it is likely to leak.

GRID has not seen that many roofing or construction-related problems because the affordable housing definitions have pushed them to the newer housing stock. With the new interpretation of the deed restriction, they expect that they will be qualifying older homes and will run into more home problems.

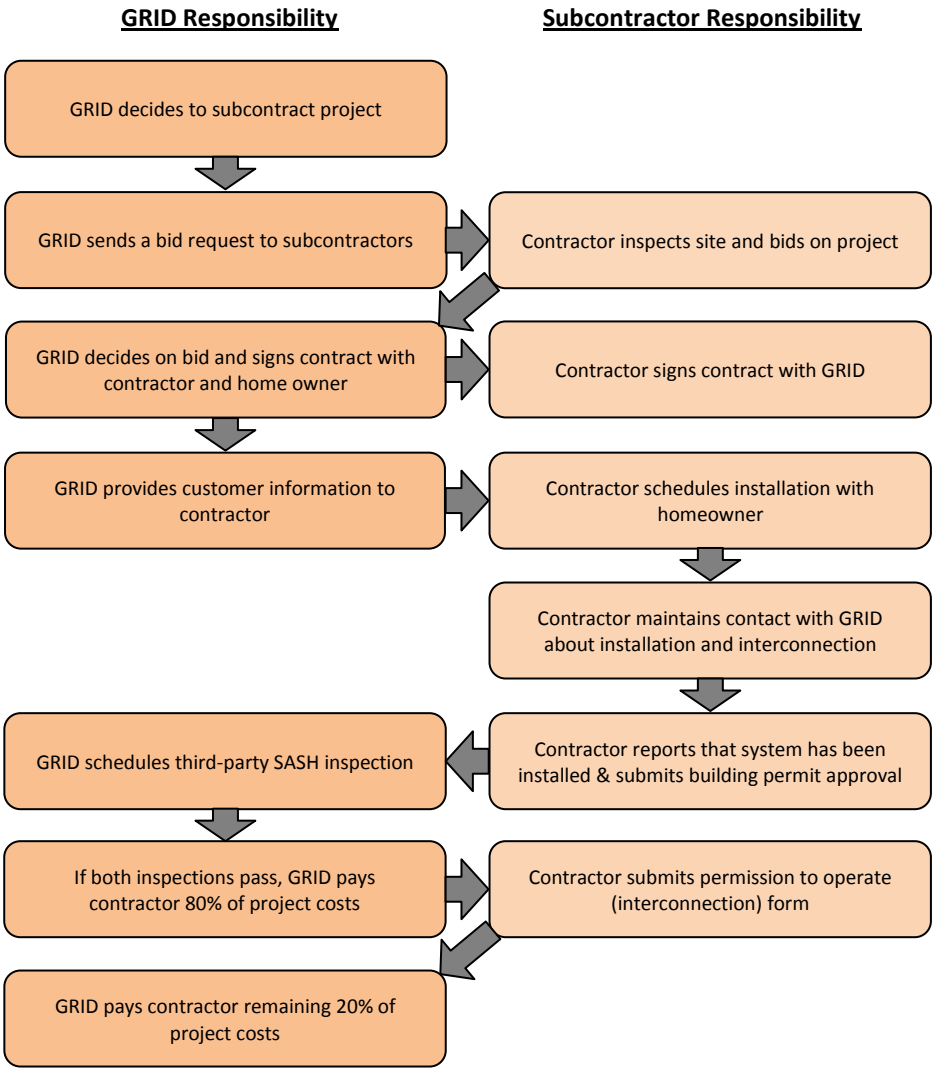
Subcontractors

The SPP was developed by GRID to bring in additional resources to increase the number of SASH projects than can be completed through GRID alone. By leveraging the skills of experienced solar

contractors, the SPP can provide a level of expertise to projects that are too technically complex to be completed by volunteers (i.e. when the roof is too steep for the installation to be safely completed by volunteers).

Participating installers must meet GRID's cost structure and accept a reduced project scope. GRID maintains responsibility for recruitment and education of the customers, completing and processing the rebate application, and securing gap funding, if necessary. The contractor is responsible for scheduling the installation with the customer, securing all equipment, and permits, and installing the equipment. This model reduces the contractor's expenses for marketing, sales, and rebate paperwork, while leveraging GRID's strengths in customer outreach and education. Figure I-22 below outlines the division of responsibility between GRID and the contractor on SPP projects.

Figure I-22. GRID versus Subcontractor Responsibilities



Source: Navigant Consulting based on GRID Alternative Interview June 2010.

The SPP was designed to give every participating contractor an opportunity to bid on projects in their geographic areas. Contractors are invited to bid on projects on a rotating basis. Once an SPP contractor is selected to install a project, GRID moves to the next contractor on the list.

SPP Roll Out and Status

The SPP was announced in late 2009. It was promoted through GRID's website, the SASH Program Handbook, and through industry partners including CalSEIA. The first project bids were sent to SPP contractors in spring 2010, and the first installation complete in the summer of 2010. By June 2010 34 contractors had been accepted into the SPP and by November 1, 2010 that number had grown to 69.

SPP Implementation Issues

Since the role out of the SPP in early 2010, GRID has encountered significant issues with administering the SPP. Processing the high volume of initial contractor applications has created a significant administrative burden. The applications must be reviewed for completeness and insurance levels, contractor license, and PV installation experience must be confirmed. The GRID Program Director holds a conference call with every contractor to set expectations about the SASH project process and GRID installation standards; this upfront effort helps to screen the contractors and mitigate misunderstandings later in the project development process.

Working through the initial project installation is another investment of staff resources. Each contractor must be properly trained on the SASH program, the SPP bidding process, the division of responsibilities between GRID and the SPP contractor, running an EPBB calculation, and taking accurate measurements of tilt, azimuth and shading. GRID must also work with the contractor to make sure that the GRID installation standards are understood and being implemented properly. These include proper grounding points, equipment standards, and labeling of the system components.

Bringing each contractor on board and up to speed is a significant investment for GRID but necessary for ensuring quality system installations that comply with the SASH Program and maintain high client satisfaction. However, the initial SPP design required that the next contractor on the list be allowed to bid on the next project and the process begins again. If the number of SPP contractors on the list continues to grow, then it's conceivable that the contractors who have been trained on the process and standards won't receive subsequent projects.

As a result of these issues, GRID is closing program to new contractors as of November 1, 2010. GRID will work with the existing contractors but plans to winnow the list down to a more manageable number of reliable and cost-competitive providers. GRID predicts that the optimal number will range from 12 to 20 statewide, with the number of SPP contractors in each geographic area determined by program demand.

Navigant agrees that it is reasonable to close the SPP to new contractors. This will allow GRID to manage program administrative costs and effort. It will also provide GRID the opportunity to work through the existing list of SPP contractors to identify and remove any non-performers. Because the remaining SPP contractors will likely be awarded a good number of projects through SASH, GRID should consider tightening the requirement to hire job trainees on SASH projects. This requirement could be expanded to require multiple job trainees on a project or other enhancements.

Quality Control

Currently, all projects must receive a third-party inspection. GRID has a quality control checklist and a SASH verification checklist that they complete prior to sending the project out to the third-party inspector. GRID works with CCSE in SDG&E territory and Burnham Energy in SCE and PG&E territory. Initially, GRID inspected the subcontracted projects but transitioned this function to the third-party inspectors who conduct extra quality checks on the SPP projects.

The SASH inspection verifies that the equipment (modules and inverters) as installed is the same make and model as documented on the CSI's EPBB form for each project. The SASH field inspection also verifies that the manners of installation (array tile, array azimuth, and shading) are accurate, and that the Design Factor is above 95 percent, as required by SASH.

The quality assurance inspection is performed by Burnham for the subcontracted projects, and includes a 40-point QA inspection that provides GRID with an independent, verifiable record of the subcontractor's installation quality as well as a detailed set of photos, and a set of recommendations.

To date, the SASH inspection pass rate is over 99 percent for first-time inspections. The quality assurance inspections have aided GRID in working with their subcontractors to maintain consistency across SASH installations.

The inspections have also provided a reminder of documentation that needs to be done. The biggest issue has been last-minute equipment changes. If they make slight changes to planned system components, GRID has to change their records before they request the third-party inspection.

SASH Requirements

Table I-15 displays the SASH requirements and an assessment of whether the PAs have met these requirements and the challenges they have faced.

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Table I-15. SASH Program Requirements[22]

SASH Requirement	Description	Requirement Met?	Notes
Implementation Time Line	1,000 installs within 2.5 years	Expected	Changed from original date of December 2010 to 2011 because of delay in program implementation
	Made reasonable efforts to identify and contact the eligible population by the end of 2010?	Yes	Completed twice in SCE and SDG&E territory (because of eligibility changes) and for 25% of PG&E. Will need to contact clients again given most recent eligibility change.
	All funds encumbered by December 2015	Expected	GRID expects to complete approximately 6,000 projects. They expect that 50-60 percent of the installations will be done by subcontractors.
Eligibility	Customer of PG&E, SCE, or SDG&E. Residence occupied by homeowner/applicant. Income at or below 80% of area median income. Home meets 2852 definition of affordable housing.	Yes	Affordable housing criteria have been updated over time. Recent changes greatly expand the availability of eligible housing stock.
System Size	Minimum size is 1 kW. Size is capped based on an estimate of household load assuming energy efficiency measures are installed.	Yes	GRID sizes the systems to meet on average 90 to 100 percent of the post-LIEE usage.
Design Factor	95% of the Design Factor	Yes	GRID noted that this is one of the program requirements that has been a challenge. Some homes cannot meet the Design Factor. The system design must be revised on some homes to meet this requirement.
Energy Efficiency	Energy efficiency audit. Enroll in LIEE if eligible. Have LIEE measures installed or be on waiting list for LIEE.	Yes	GRID performs an online audit and conducts education with the client. No energy efficiency is available for clients who are not eligible for LIEE.
Inspections	100% of installations must be inspected.	Yes	GRID conducts a more detailed, quality assurance inspection on their subcontracted projects.

[22] Decision 07-11-045, Opinion Establishing Single-Family Low-Income Incentive Program Within the California Solar Initiative, November 16, 2007, and CSI handbook, available on CPUC website: http://www.cpuc.ca.gov/NR/rdonlyres/14CD3F07-7B87-49AB-8505-D5F09403A833/0/CSIProgramHandbookJune2010v3_2.pdf.

Challenges

The challenges that GRID has faced are as follows.

- The original affordable housing definition
- Changes in the definition of affordable housing
- The Design Factor requirement
- Finding gap financing to cover the difference between the system cost and the SASH incentive
- Selling the project to the customer and overcoming customer concerns

The Design Factor has been a challenge for GRID. They will sometimes spend a lot of time on the application, the project comes in with a Design Factor of 94.9 percent, rendering the project ineligible. This home will not qualify for SASH. There are other projects where they reach 95 percent by tweaking the design. This may require the system to be tilted up to gain output, where they normally would have left it flush with the roof for improved aesthetics. In that case, the homeowner would have to approve the design. Such a design also triggers more scrutiny in the permitting process.

Challenges that are faced in "selling" the project are as follows.

- Educating the client about the technology, including what the system will look like, how much will it lower the electric bills, whether it will make the roof leak, and whether the building inspector will examine other things in home when the system is inspected.

- Resistance from the homeowners' association. There was legislation that was supposed to solve the problem, but the homeowners association still must approve the installation.[23]

- Some of the clients feel that SASH may be too complicated to deal with, given all of the other problems they have.

- Some clients wait to see if the neighbor installs solar and if they recommend the program.

The concerns that customers have are as follows.

- The incentive gap, if the customer has to pay something.
- What the system will look like.
- How much the system will lower the bills.
- Whether the system will make the roof leak.
- Whether the building inspector looks at other things in the home.

[23] The New Solar Rights Act, AB 2473, Wolk.

- The homeowners association.
- System maintenance and what happens if something goes wrong with the system.

These concerns do not cause customers to drop out of SASH very often. However, the clients are sometimes slow in getting the applications in.

Feedback

GRID reports that client feedback has been overwhelmingly positive and that most clients have been very satisfied with their systems and with GRID's services. GRID has received cards and calls from clients who received their first bill and were amazed at the reduction. Many report that they share this information and help to promote energy efficiency and renewable energy.

Program Administrator Recommendations

The changes that GRID would like to make to SASH are as follows:

- Reduce third-party SASH inspections to 15 percent of completed projects.
- Reduce the EPBB Design Factor requirement.

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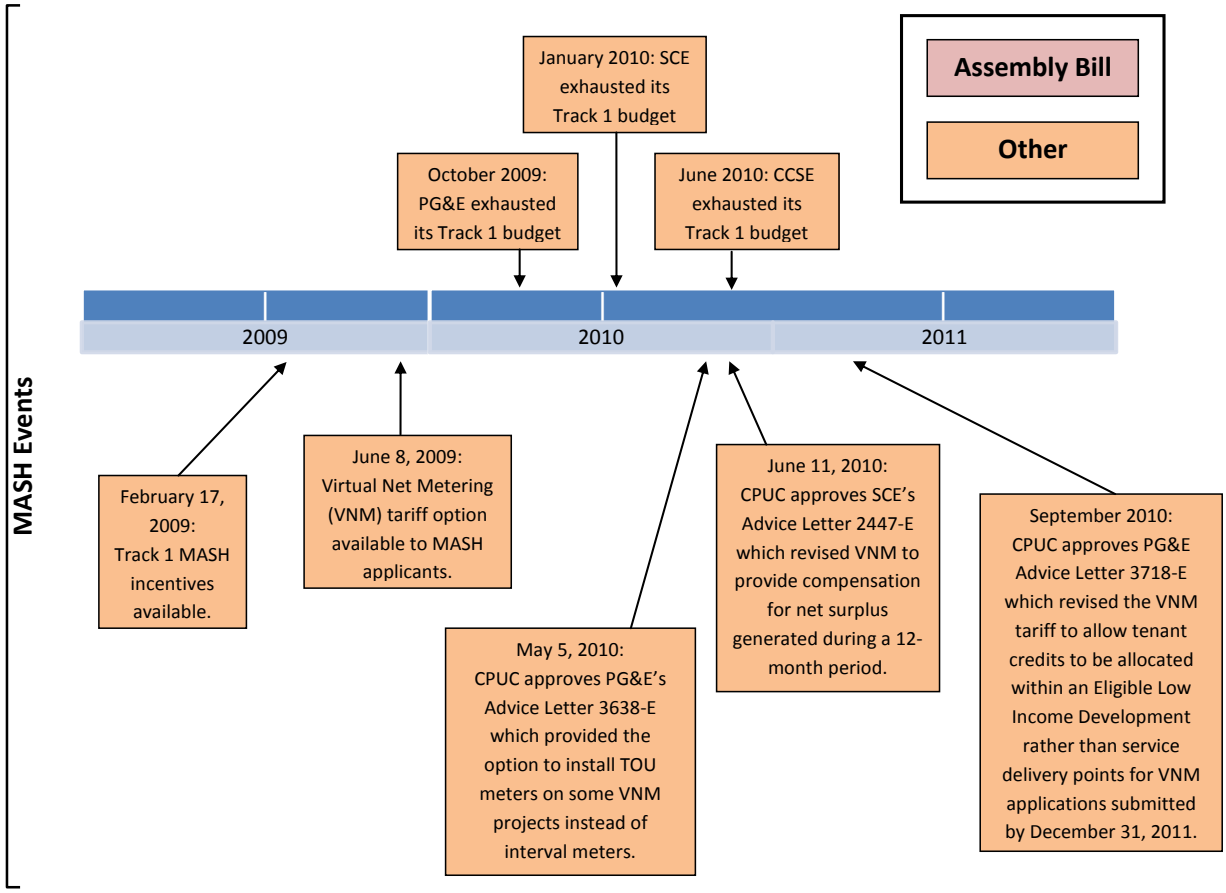
II. MASH Assessment

The Multifamily Affordable Solar Housing Program, a component of the California Solar Initiative, provides financial assistance for the installation of solar photovoltaic generating systems on low-income multifamily housing. MASH is managed by three Program Administrators—California Center for Sustainable Energy in the service territory of San Diego Gas and Electric, Pacific Gas and Electric, and Southern California Edison.

MASH Overview

On October 16, 2008, in Decision 08-10-036, the CPUC established the $108.34 million MASH program. Track 1 incentives were first available on February 17, 2009. By June 8, 2009, the virtual net metering (VNM) tariff option was available to MASH applicants. On May 2010, the CPUC approved an advice letter filed by PG&E which would allow the use of time-of-use (TOU) meters on qualifying VNM projects, instead of the more expensive interval meter. An advice letter filed by SCE was approved in June of 2010 and revised their VNM tariff to provide compensation for net surplus generated during a 12-month period. In September 2010, the CPUC authorized the allocation of VNM tenant benefits in PG&E territory to be allocated within an Eligible Low-Income Development, rather than the service delivery point for systems that submit a VNM interconnection by December 31, 2011. Figure II-1 depicts these key milestones graphically.

Figure II-1. Key Milestones in the MASH Development and Implementation



The goals of MASH are the following:[24]

- Stimulate the adoption of solar power in the affordable housing sector.
- Improve energy utilization and overall quality of affordable housing through the application of solar and energy efficiency technologies.
- Decrease electricity use and costs without increasing monthly household expenses for affordable housing building occupants.
- Increase awareness and appreciation of the benefits of solar among affordable housing occupants and developers.

[24] CPUC Decision 08-10-036, October 16, 2008, page 7.

Multifamily buildings in PG&E, SCE, and SDG&E service territories that meet the definition of low-income affordable housing established in Public Utilities Code 2852 are eligible for program incentives. The code states that the housing must fall into one of the follow categories:

- A multifamily residential complex financed with low-income housing tax credits, tax-exempt mortgage revenue bonds, general obligation bonds, or local, state, or federal loans or grants, and for which either of the following applies.
    - The rents of the occupants do not exceed those prescribed by deed restrictions or regulatory agreements.
    - The affordable units have been or will be initially sold at an affordable housing cost to a lower income household and are subject to a resale restriction or equity-sharing agreement.
- A multifamily residential complex in which at least 20 percent of the total housing units are sold or rented to lower income households and either of the following applies:
    - The rental housing units targeted for lower income households are subject to a deed restriction or affordability covenant with a public entity or nonprofit housing provider that ensures that the units will be available at an affordable rent for a period of at least 30 years.
    - The housing units have been or will be initially sold at an affordable cost to a lower income household and those units are subject to a resale restriction or equity-sharing agreement.

MASH provides incentives for PV installation based on the EPBB, a one-time lump-sum payment after verification of system installation and proposed activities for Track 2 projects. The program is divided into two components.

- Track 1 provides a fixed incentive level based on whether the benefits are credited to the common area electric load or the tenant load.
    - Track 1A provides an incentive of $3.30 per Watt for offsets of the common area load.
    - Track 1B provides an incentive of $4.00 per Watt for offsets of tenant area load.
- Track 2 is a competitive application process that allows applicants to compete for higher incentive levels for projects that demonstrate additional tenant benefits such as energy education and green job creation.

A VNM tariff was approved for the three utilities to facilitate the provision of solar PV with tenant offsets. This tariff was instituted to provide the benefits of solar to low income tenants without requiring the system to be physically connected to each tenant meter. VNM allows the owner to install one system and designate a set percentage of the solar output to each tenant based on the relative tenant unit sizes.

The budget for MASH was established at five percent of the CSI Program budget, $108.34 million. It has been allocated between the program components and program administration, as show in Table II-1.[25]

Table II-1. MASH Budget Allocation ($Millions)

	CCSE	PG&E	SCE	Total
Budget %	10.3%	43.7%	46%	100%
Track 1	$7.76	$32.92	$34.66	$75.34
Track 2	$2.06	$8.74	$9.20	$20.00
Administration	$1.34	$5.68	$5.98	$13.00
Total	$11.16	$47.34	$49.84	$108.34

Source: *MASH Semi-Annual Progress Report*, July 26, 2010.

Program Statistics

The MASH program statistics in this section draw primarily from Power Clerk data exported for CCSE and SCE on November 12, 2010, and acquired from PG&E on November 17, 2010. Each Program Administrator (PA) also provided supplementary data, including monthly administrative expenditures and Track 2 information. In most cases, the following analysis focuses on the aggregate status of active Track 1 reservations (excluding those that have been cancelled or withdrawn) through early November; however, several budgetary and project management-related statistics appear as quarterly comparisons through Q3 2010.

Capacity and Budget Overview

Figure II-2 presents a snapshot of the expected incentive costs and capacity of both completed and active MASH reservations for Tracks 1 and 2. Presently, more than 1.4 MW of capacity have been installed, with an additional 19.5 MW of capacity expected from active reservations. None of the awarded Track 2 projects had been installed as of the writing of this report.

[25] *MASH Semi-Annual Progress Report*, July 26 2010.

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Figure II-2. Summary of MASH Program Activity – November 12, 2010

	PG&E	SCE	CCSE	Total
Track 1 Reservations: Completed and Incentive Paid				
Number of Applications	**16**	**7**	**1**	**24**
Incentives Paid	$2,782,707	$2,496,375	$75,198	$5,354,280
Capacity of Completed Projects (kW)	792	656	20	1,467
Track 1 Reservations: Active				
Number of Applications	**147**	**129**	**29**	**305**
Incentives Allocated	$28,962,465	$28,992,580	$7,662,858	$65,617,903
Capacity of Allocated Reservations (kW)	8,015	8,223	1,976	18,214
Track 2 Reservations: Active				
Number of Applications	**7**	**4**	**1**	**12**
Incentives Allocated*	$2,600,000	$4,733,376	$412,000	$7,745,376
Capacity of Allocated Reservations (kW)	513	699	62	1,274
TOTALS				
Number of Active of Complete Applications	170	140	31	341
Incentives Paid or Allocated	$34,345,172	$36,222,331	$8,150,056	$78,717,559
Capacity of Allocated Reservations (kW)	9,319	9,577	2,058	20,955

*Track 2 Incentive Allocations are based on the MASH Semi-Annual Progress Report Date July 26, 2010

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010; Track 2 incentive allocations based on the MASH Semi-Annual Progress Report, July 26, 2010.

Figure II-3 provides a detailed analysis of program budgets and expenditures for each program administrator. Track 1 incentives remain mostly allocated to active reservations, however, some reservation cancellations and withdrawals may have freed up some funds that the PAs have yet to reallocate to waitlisted applications. Collectively, more than $4M in Track 1 and $12M in Track 2 incentives remain to be allocated to reservations. Each of the PAs has expended less than eight percent of its administrative budget although future costs are expected to be higher due to inspection costs associated with 100% inspection requirement and field verification costs for MASH VNM projects.

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Figure II-3. Summary of Program Budgets and Expenditures

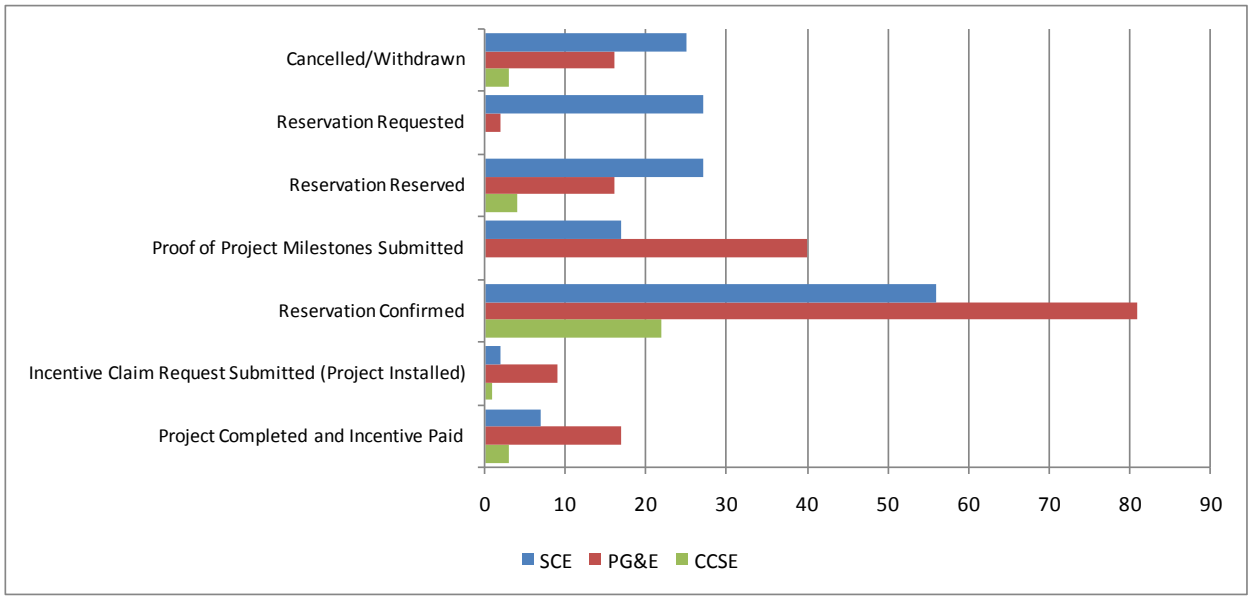
PG&E					
Category	**Budget**	**Spent**	**Reserved**	**Unallocated**	**% Remaining**
Track 1A and 1B	$ 32,923,230	$ 2,765,689	$28,962,465	$ 1,195,077	**3.6%**
Track 2	$ 8,740,000	$ -	$ 2,600,000	$ 6,140,000	**70.3%**
Administration (12%)	$ 5,681,350	$ 407,037	$ -	$ 5,274,313	**92.8%**
Total	**$ 47,344,580**	**$ 3,172,726**	**$31,562,465**	**$12,609,390**	**26.6%**
SCE					
Category	**Budget**	**Spent**	**Reserved**	**Unallocated**	**% Remaining**
Track 1A and 1B	$ 34,656,032	$ 2,496,375	$28,992,580	$ 3,167,077	**9.1%**
Track 2	$ 9,200,000	$ -	$ 4,733,376	$ 4,466,624	**48.6%**
Administration (12%)	$ 5,980,368	$ 345,138	$ -	$ 5,635,230	**94.2%**
Total	**$ 49,836,400**	**$ 2,841,513**	**$33,725,956**	**$13,268,931**	**26.6%**
CCSE					
Category	**Budget**	**Spent**	**Reserved**	**Unallocated**	**% Remaining**
Track 1A and 1B	$ 7,759,938	$ 75,198	$ 7,662,858	$ 21,882	**0.3%**
Track 2	$ 2,060,000	$ -	$ 412,000	$ 1,648,000	**80.0%**
Administration (12%)	$ 1,339,082	$ 378,820	$ -	$ 1,263,884	**94.4%**
Total	**$ 11,159,020**	**$ 75,198**	**$ 8,074,858**	**$ 2,933,766**	**26.3%**
TOTAL					
Category	**Budget**	**Spent**	**Reserved**	**Unallocated**	**% Remaining**
Track 1A and 1B	$ 75,339,200	$ 5,337,262	$65,617,903	$ 4,384,036	**5.8%**
Track 2	$ 20,000,000	$ -	$ 7,745,376	$12,254,624	**61.3%**
Administration (12%)	$ 13,000,800	$ 1,130,995	$ -	$12,173,428	**93.6%**
Total	**$ 108,340,000**	**$ 6,089,436**	**$73,363,279**	**$28,812,087**	**26.6%**

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010; Track 2 incentive allocations based on the MASH Semi-Annual Progress Report, July 26, 2010.

Reservation Status

The following analysis focuses on the Track 1 reservations tracked in the Power Clerk database. Figure II-4 provides a snapshot of the reservations at each stage by PA, with details provided below in Table II-2. PG&E and CCSE have made the greatest degree of progress moving projects through the process, with installations complete for 14 and 12 percent of reservations for the two PAs, respectively. Each has reservations confirmed for an additional 67 and 45 percent of reservations, respectively. SCE had only 40 percent of its reservations at or beyond the confirmation stage, and has also experienced a relatively greater number of cancelled or withdrawn reservations (15.5 percent). The greater share of projects in SCE's reservation request and review stages likely include a number of applications recently added from their waitlist to take the place of cancelled and withdrawn reservations.

Figure II-4. MASH Reservation Status by Program Administrator, n=375



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Table II-2. Summary of MASH Reservation Status

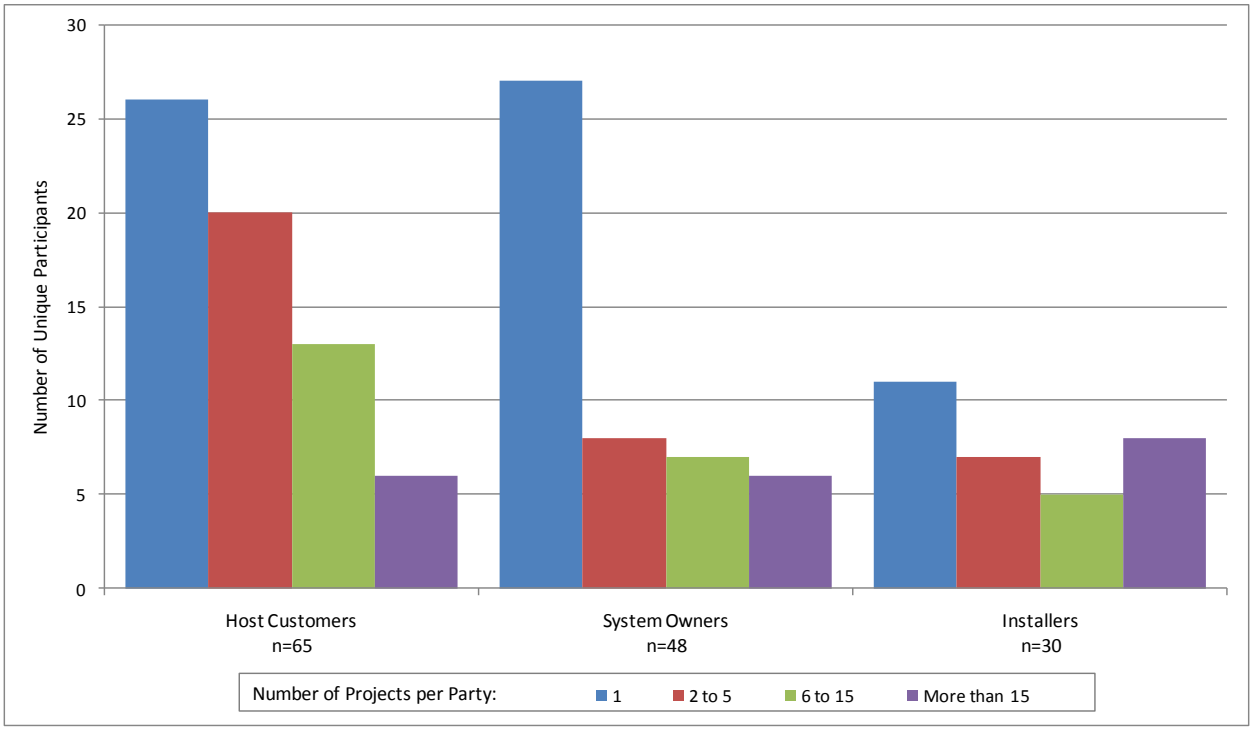
Status	CCSE	PG&E	SCE	Total
Cancelled/Withdrawn	3	16	25	**44**
Reservation Requested	0	2	27	**29**
Reservation Reserved	4	16	27	**47**
Proof of Project Milestones Submitted	0	40	17	**57**
Reservation Confirmed	22	81	56	**159**
Incentive Claim Request Submitted (Project Installed)	1	9	2	**12**
Project Completed and Incentive Paid	3	17	7	**27**
Total	**33**	**181**	**161**	**375**

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Program Participant Analysis

As shown above in Table II-2, the program data currently includes 375 Track 1 reservations. With the 44 cancelled or withdrawn reservations excluded, the total number of active (including completed) reservations stands at 331. In an effort to understand more about those participating in the MASH program, Navigant analyzed the composition of unique host customers, system owners and installers listed for these reservations. Figure II-5 presents a snapshot of the number and involvement of program participants in each of these categories. For the 375 MASH reservations, there are only 65 unique host customers, 48 unique system owners, and 30 unique installers participating across the state.

Figure II-5. Summary of Unique Parties Involved in Active MASH Reservations, n=375



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Table II-3 provides additional details to help characterize these program participants. As shown, less than half of the 65 unique host customers have only a single active MASH reservation, accounting for seven percent of the total. Conversely, the six largest host customers account for 156 reservations (42 percent of the total). An even greater disparity exists among system owners. While 27 system owners have a single reservation, only six unique organizations are listed as system owner for more than two-thirds of active MASH reservations (265 of the 375 reservations). The largest single owner is listed for 103 reservations (27 percent of the total).

Table II-3. Details of Unique Party Participation in Active MASH Reservations, n=331

Participant Category	Unique Parties	Number of Reservations per Party				Range of Reservations per		
		1	2 to 5	6 to 15	More than 15	Min	Max	Median
Host Customers	65	26	20	13	6	1	52	3
% of projects		7%	18%	34%	42%			
System Owners	48	27	8	7	6	1	103	1
% of projects		7%	6%	16%	71%			
Installers	30	11	7	5	8	1	114	4
% of projects		3%	5%	14%	78%			

Source: SCE and CCSE data exported from Power Clerk November 12, 2010
PG&E data acquired from PG&E November 17, 2010.

The above statistics reveal the degree to which large affordable housing organizations, third-party financiers, and solar integrators are involved in the MASH program. While many of these participants have secured reservations for numerous sites, it requires noting that individual projects often require multiple MASH reservations to accommodate separate buildings at a single project site. This is illustrated in
Table II-4, which provides summary statistics for the 27 reservations for projects that have already been completed. As shown, only 11 unique hosts and 16 individual sites exist for the 27 reservations.

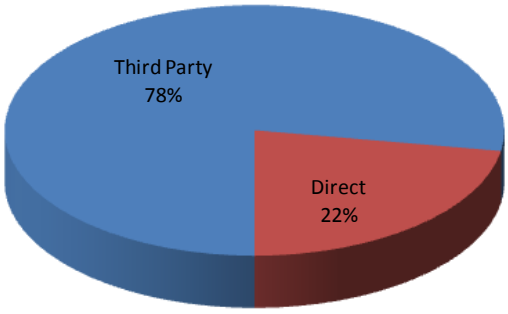
Table II-4. Summary Statistics for Completed Projects

Completed Projects	
Total Applications	27
Unique Host Locations	16
Max Applications per Project	5
Average Applications per Project	1.69
Unique Host Customers	11
Applications with Direct Ownership	11
Applications with Third Party Ownership	16

Source: SCE and CCSE data exported from Power Clerk November 12, 2010;
PG&E data acquired from PG&E November 17, 2010.

As mentioned, third-party financing plays a large role in the development of MASH projects and the securing of incentive reservations.
Figure II-6 illustrates the division of ownership structures for active MASH reservations based on differences in last name between the host customer and system owner listed for each reservation.

Figure II-6. Ownership Structure for Active MASH Reservations, n=331

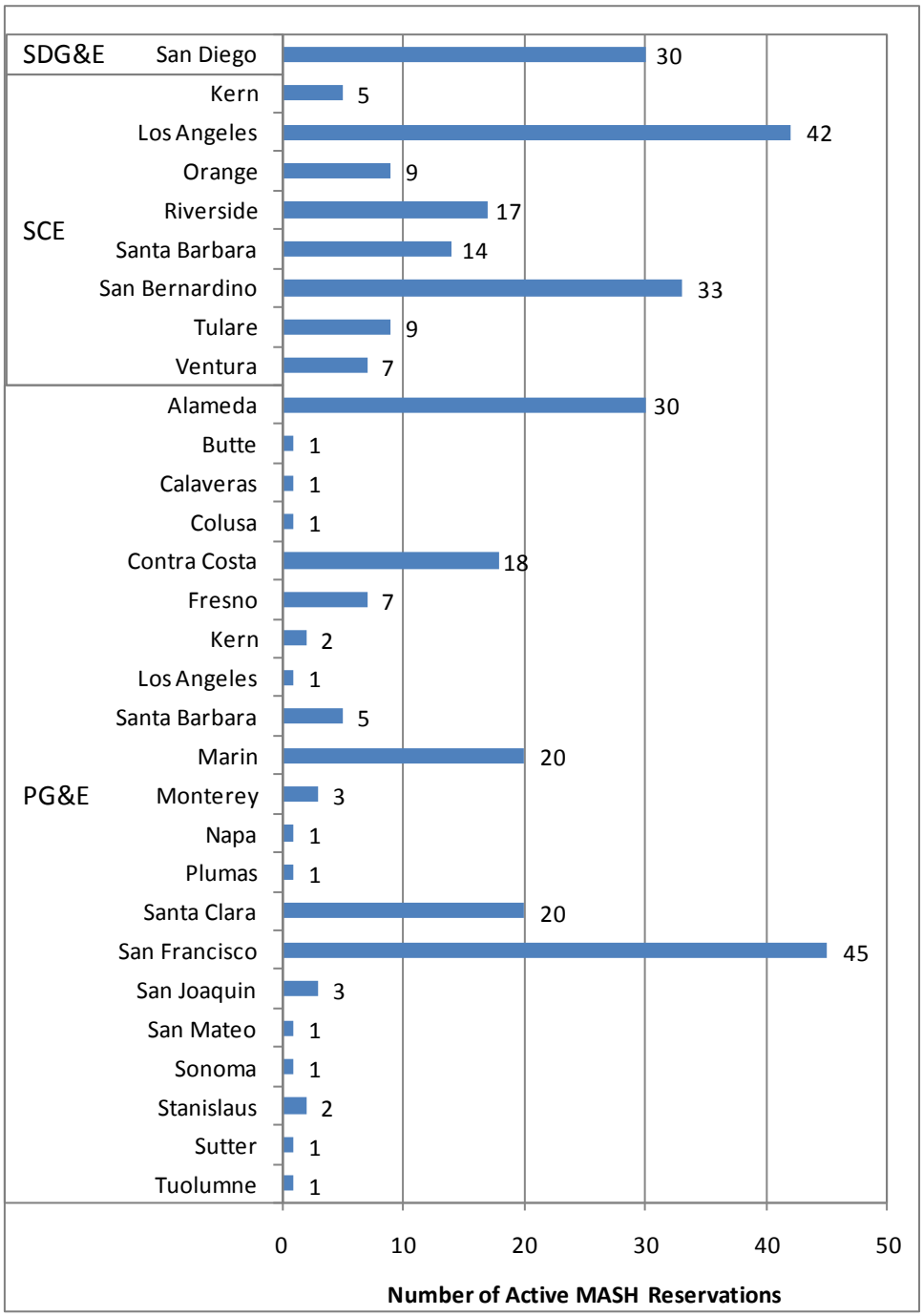


Source: SCE and CCSE data exported from Power Clerk November 12, 2010
PG&E data acquired from PG&E November 17, 2010.

Geographic Distribution

Figure II-7 shows the distribution of active MASH reservations by county. The top five counties (San Francisco, Los Angeles, San Bernardino, San Diego, and Alameda) account for nearly 55 percent of active MASH reservations, while the top ten (through Riverside County in the below figure) represent 83 percent of reservations.

Figure II-7. Number of Active MASH Reservations by County, n=331



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

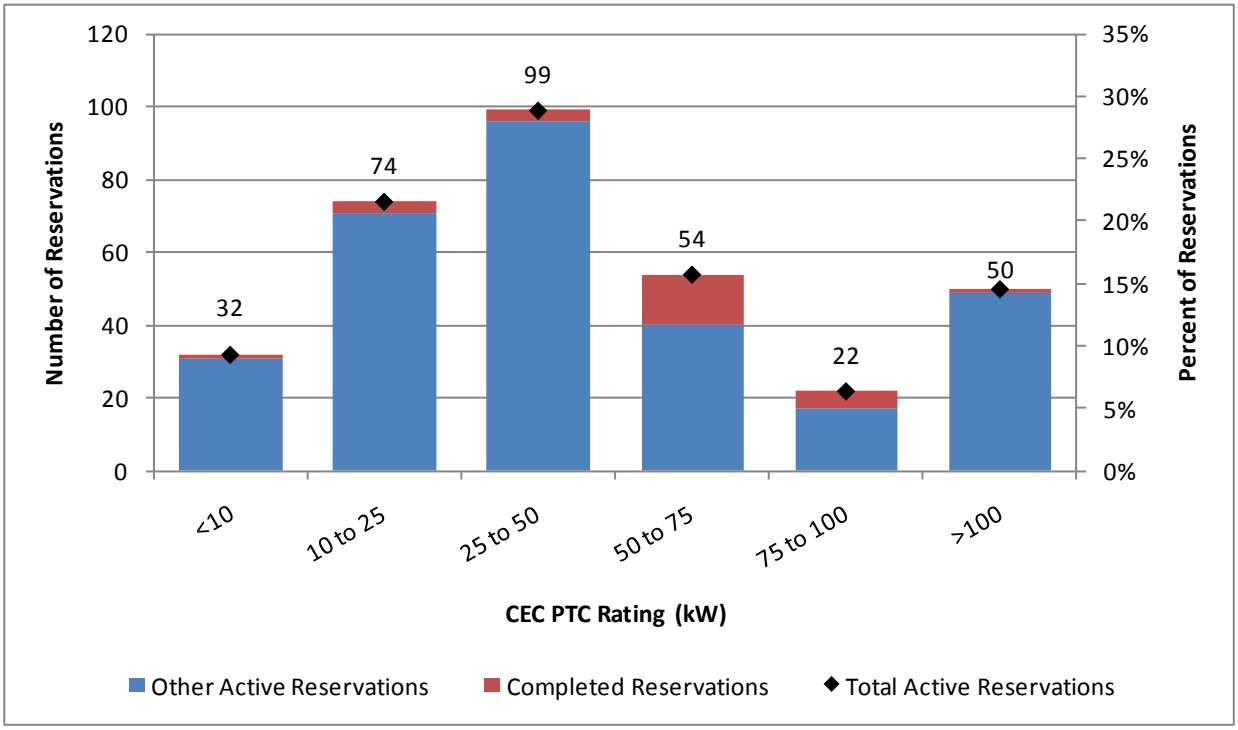
System Size and Cost Data

The following analysis provides insight into the distribution of capacity sizes as well as system and incentive costs for both completed and remaining active MASH reservations from Power Clerk data through mid-November 2010.

System Capacity

Figure II-8 summarizes the distribution of system capacity ratings for active MASH reservations, revealing 30 percent of all active systems falling in the 25 to 50 kW range. However, for completed reservations, installed system capacities have trended higher, with most falling in the 50 to 75 kW range. System size appears to mostly follow a normal standard distribution, but with a more significant number of reservations for larger systems (>100 kW). Table II-5 provides additional system capacity statistics.

Figure II-8. Distribution of System Capacity Rating for Active MASH Reservations, n=331



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Table II-5. System Rating Statistics (kW)

Minimum*	1.51
Maximum	525.69
1st Quartile	21.85
Median	39.13
3rd Quartile	70.84

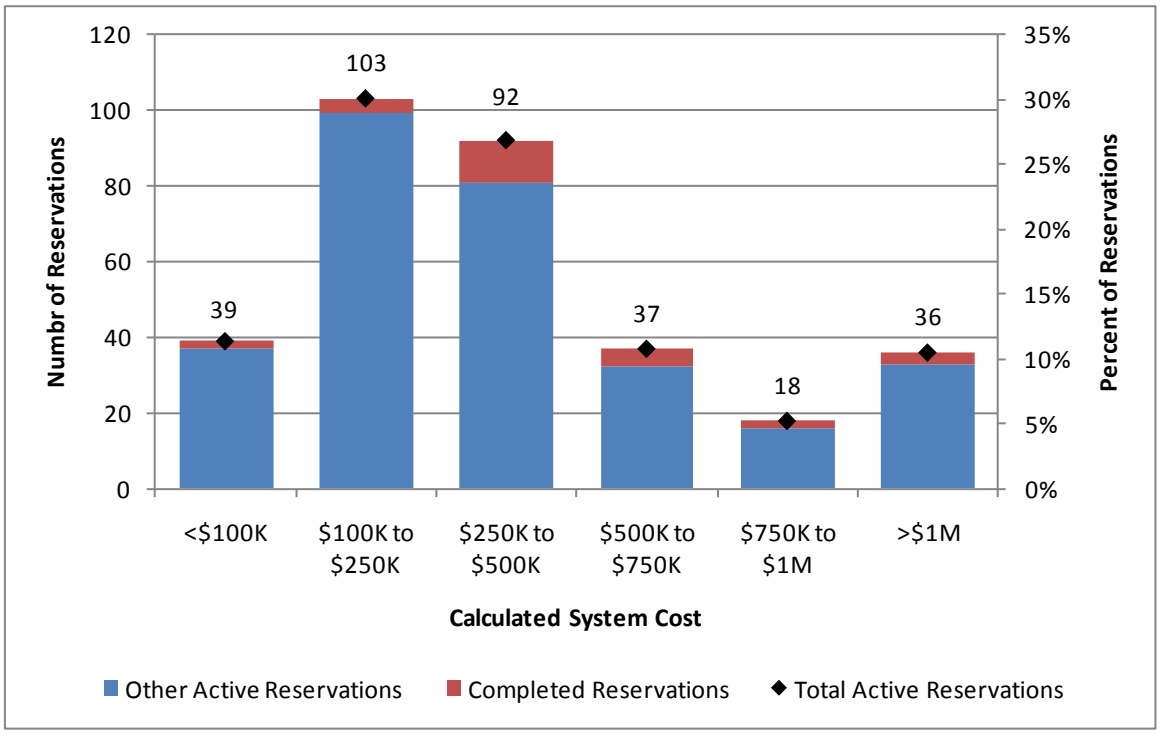
*Excludes two projects that had no recorded system cost

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Calculated System Cost

Figure II-9 illustrates the distribution of calculated system costs for active MASH reservations, with summary statistics presented in Table II-6.[26] Similar to the above system capacity statistics, while 31 percent of all active reservations fall in the $100,000 to $250,000 range, the costs for systems installed and categorized as completed have tended to fall in the $250,000 to $500,000 range. The median calculated system cost for all active reservations is $301,875; however, several multi-million dollar systems fall in the >$1M category.

Figure II-9. Distribution of Calculated System Cost for Active MASH Reservations, n=325



[26] Six active projects were excluded for missing system cost data.

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Table II-6. System Cost Statistics

Minimum*	$12,500
Maximum	$6,749,720
1st Quartile	$156,198
Median	$301,875
3rd Quartile	$554,014

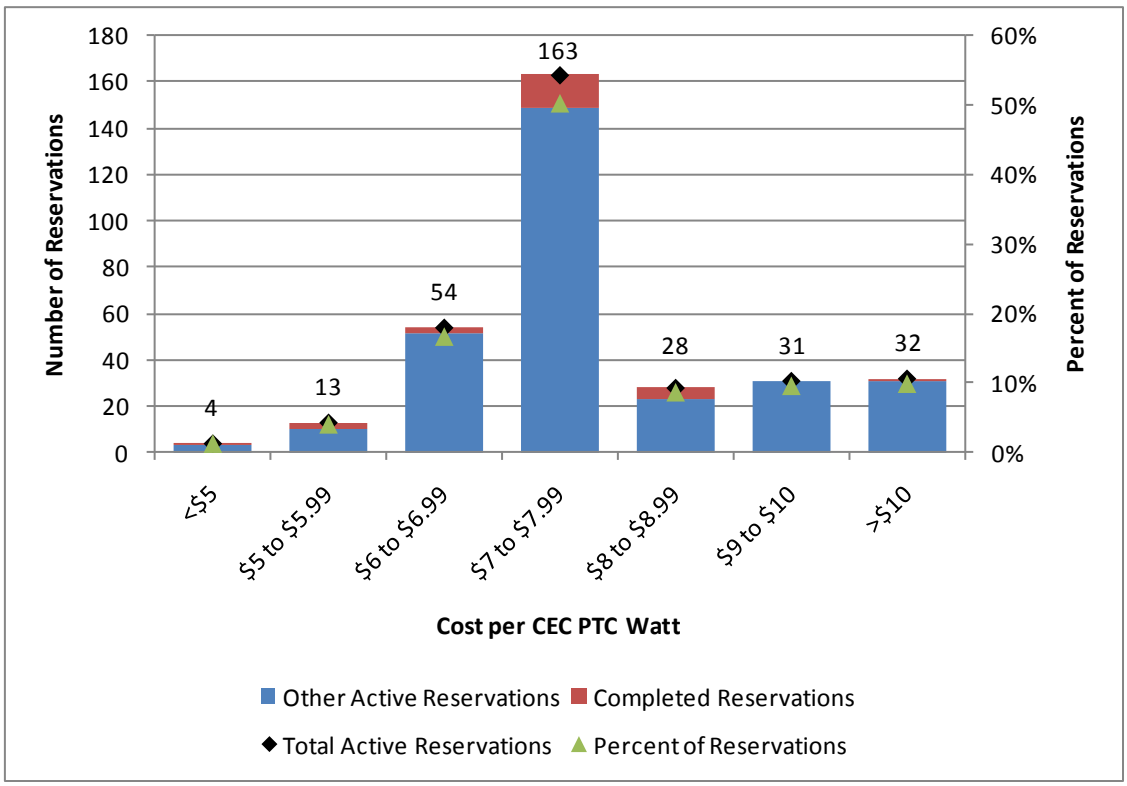
*Excludes six projects that had no recorded system cost

Source: SCE and CCSE data exported from Power Clerk November 12, 2010
PG&E data acquired from PG&E November 17, 2010.

System Cost per Watt

Combing the two proceeding analyses, Figure II-10 shows the distribution of per-Watt system costs for all active MASH reservations, with additional statistics provided in Table II-7.[26] Many (49 percent) calculated system costs fall between $7/W and $8/W, with a median of $7.44/W. As a point of comparison, Table I-5 shows that the average cost of installed SASH systems is also between $7/W and $8/W at $7.18/W.

Figure II-10. Distribution of System Cost per Watt for Active MASH Reservations, n=325



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Table II-7. Per-Watt System Cost Statistics

Minimum*	1.44
Maximum	233.94
1st Quartile	7.15
Median	7.44
3rd Quartile	8.11

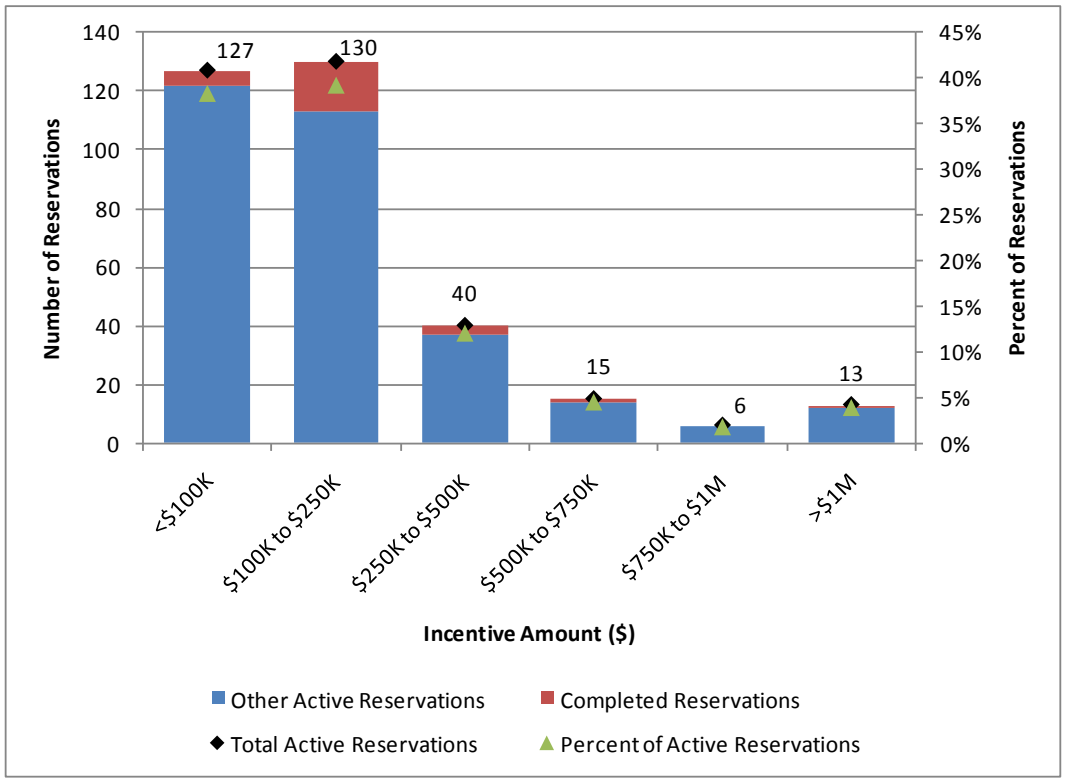
*Excludes six projects that had no recorded system cost

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Incentive Amount

Figure II-11 illustrates the distribution of per-system incentive amounts for all active MASH reservations, with additional statistics provided in Table II-8. More than 77 percent of incentives fall below $250,000, with a median calculated incentive of $134, 198.

Figure II-11. Distribution of Incentive Amounts for Active MASH Reservations, n=331



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Table II-8. Incentive Cost Statistics

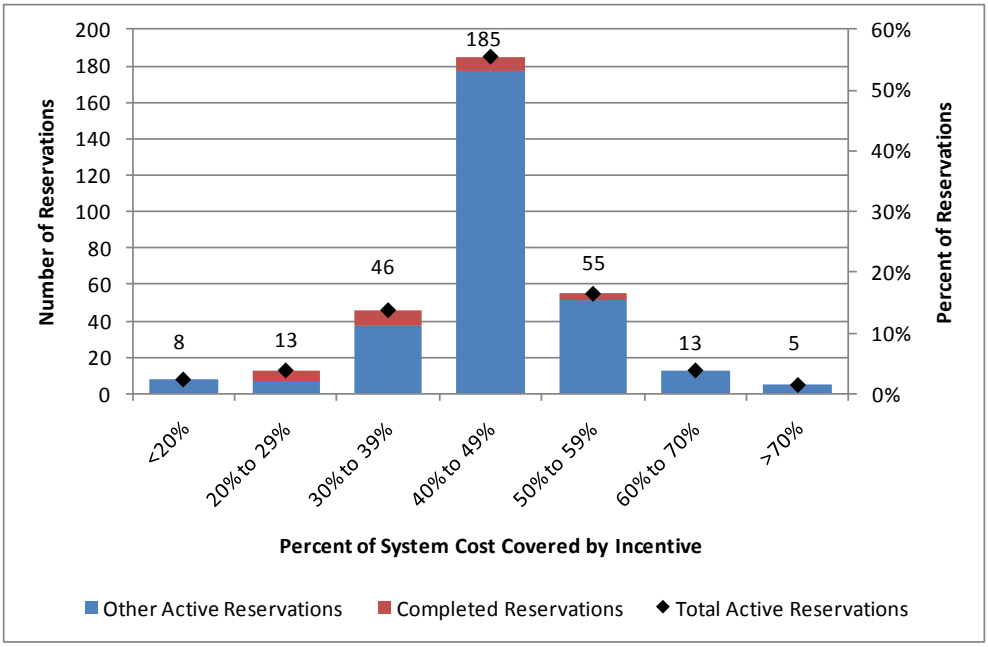
Minimum	$4,221
Maximum	$2,084,080
1st Quartile	$70,771
Median	$134,198
3rd Quartile	$226,506

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Incentive Coverage

Figure II-12 illustrates the distribution of incentive coverage of system costs across all active MASH reservations.[26] Nearly 57 percent of systems have between 40- and 50 percent of their total costs covered by their MASH incentive reservation. Only 22 percent of active MASH reservations have incentives that cover greater than 50 percent of the expected total system cost. Incentive coverage is discussed further in the subsequent Marketing and Outreach section.

Figure II-12. Distribution of System Costs Covered by Incentive, n=325

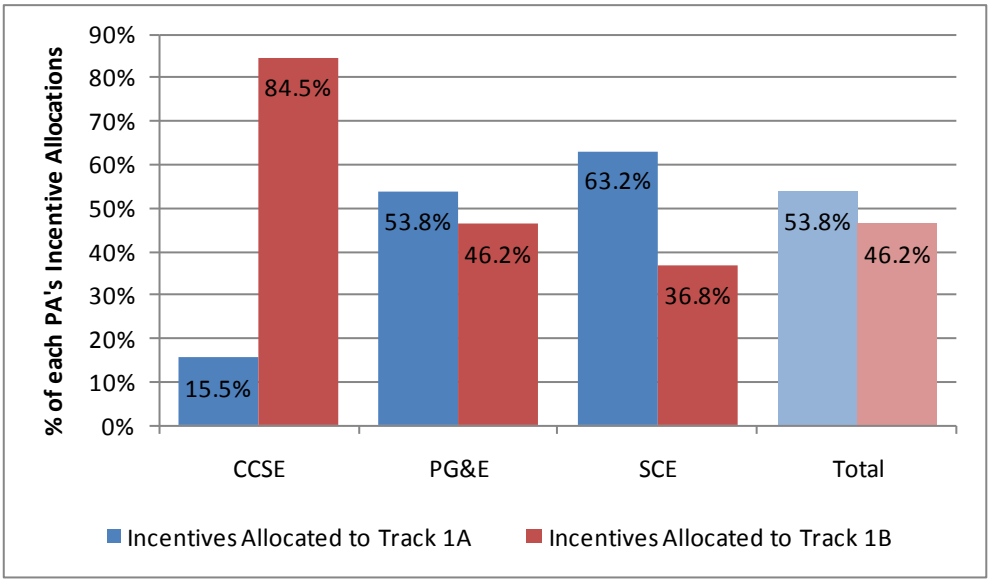


Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Incentive Allocation between Tracks 1A and 1B

As shown in Figure II-13, the overall allocation of Track 1 incentives is fairly evenly split between Tracks 1A and 1B, with slightly more allocated to Track 1A. However, breaking out the allocations by program administrator presents some clear disparities. While both PG&E and SCE have allocated more incentives to Track 1A, CCSE has allocated more than 84 percent of its to-date incentive dollars to Track 1B.

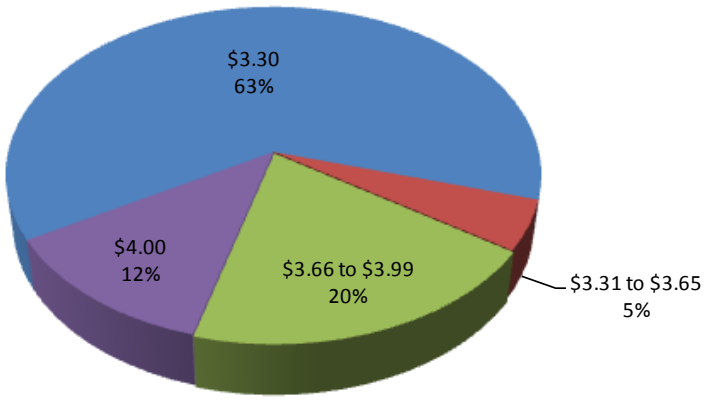
Figure II-13. Track 1 Incentive Allocations by Program Administrator



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Based on the allocation of each reservation's PV system capacity to either Track 1A or 1B, an overall system incentive rate can be calculated. Figure II-2 shows the distribution of this calculated incentive rate across all active MASH reservations. The majority (63%) have a calculated incentive of the $3.30/W lower limit.

Figure II-14. Distribution of Calculated Incentive Rate ($/W) for Active Reservations, n=331



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Capacity Forecast under Varying Incentive Levels

The current forecast for aggregate installed and reserved capacity for MASH projects (for both Track 1 and Track 2) was highlighted at the beginning of this section, with just under 21 MW of capacity expected from currently allocated incentives. This section explores the theoretical additional capacity that might be achievable should the CPUC wish to change the incentive levels for Track 1. The below calculations are for illustrative purposes only, and assume a reduction in incentive step for Track 1A and 1B to $2.30/W and $2.80/W, respectively. For the purpose of calculating a revised per-Watt cost under the new incentive levels, the forecast also assumes that all presently reserved projects (or new projects with similar size and cost distributions) would be completed under the new incentive levels.

Table II-9 on the following page illustrates two theoretical situations for increasing the installed capacity from MASH projects under the current incentive budget. The first assumes that all currently reserved projects (excluding those already completed) were reallocated incentives based on the reduced incentive steps. While such a change would certainly encounter resistance from program participants whose projects would not remain viable, the point is to demonstrate the additional capacity the CPUC could expect from the MASH program if similar projects were installed under the reduced incentive levels. The second situation assumes that currently unallocated portions of each PA's Track 1 and Track 2 budgets were reallocated to Track 1 under the reduced incentive levels. Expected capacity calculations for each of the two situations apply an average incentive cost of $2.50/W based on the reallocation of incentives against the system size characteristics of existing MASH reservations.

Under these assumptions, the CPUC could potentially expect the MASH program to achieve an additionally 6.65 MW (for a total of 27.6 MW) if presently unallocated incentive budgets for both Tracks were reallocated to Track 1 under the reduced incentive levels mentioned above.

Table II-9. Theoretical Capacity Forecast Calculations for Reduced Incentive Steps

	PG&E	SCE	CCSE	Total
Track 1 Projects Completed and Paid	**16**	**7**	**1**	**24**
Incentives Paid	$2,782,707	$2,496,375	$75,198	$5,354,280
Capacity of Completed Projects (kW)	792	656	20	**1,467**
Track 1 Reservations Outstanding	**147**	**129**	**29**	**305**
Calculated Incentive Amount	$28,962,465	$28,992,580	$7,662,858	$65,617,903
% Track 1A	59.8%	69.6%	17.5%	59.6%
% Track 1B	40.2%	30.4%	82.5%	40.4%
Theoretical Cost Expectations Under Reduced Incentive Steps				
Cost of Outstanding Track 1A Reservations at $2.30/W	$11,022,826	$13,164,655	$795,565	$24,983,045
Cost of Outstanding Track 1B Reservations at $2.80/W	$9,021,860	$6,997,063	$4,564,975	$20,583,898
Total Incentive for Outstanding Track 1 Reservations with Reduced Incentive	$20,044,686	$20,161,718	$5,360,540	$45,566,944
Average $/W Under Reduced Incentives	$2.50	$2.45	$2.71	$2.50
Theoretical Additional Capacity if Incentives were Reduced for Existing Reservations				
Additional Budget Available as a Result of Reduced Incentives	$8,917,778	$8,830,862	$2,302,318	$20,050,959
Additional Capacity Afforded using Average $2.50/W (MW)	3.56	3.53	0.92	**8.01**
Thoerteical Additional Capacity from Unallocated Track 1 & Track 2 Incentive Budgets				
Unallocated Budget for Track 1 and Track 2 Incentives	$7,335,077	$7,633,701	$1,669,882	$16,638,660
Additional Capacity Afforded using Average $2.50/W (MW)	2.93	3.05	0.67	**6.65**
Comparative Analysis of Expected Program Capacities				
Presently Expected Capacity of All Track 1 Reservations (MW)	8.81	8.88	2.00	**19.68**
Presently Expected Capacity of All Track 2 Reservations (MW)	0.51	0.70	0.06	**1.27**
Total Theoretical Capacity if Current Reservation Incentives are Reduced	12.88	13.11	2.98	**28.97**
Total Theoretical Capacity with Reduced Incentives Applied to Unallocated Budgets (Track 1 and Track 2)	12.25	12.63	2.73	**27.61**
Total Theoretical Capacity with Both Situations Combined	15.82	16.16	3.65	**35.62**

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010; Track 2 incentive allocations based on the *MASH Semi-Annual Progress Report*, July 26, 2010.

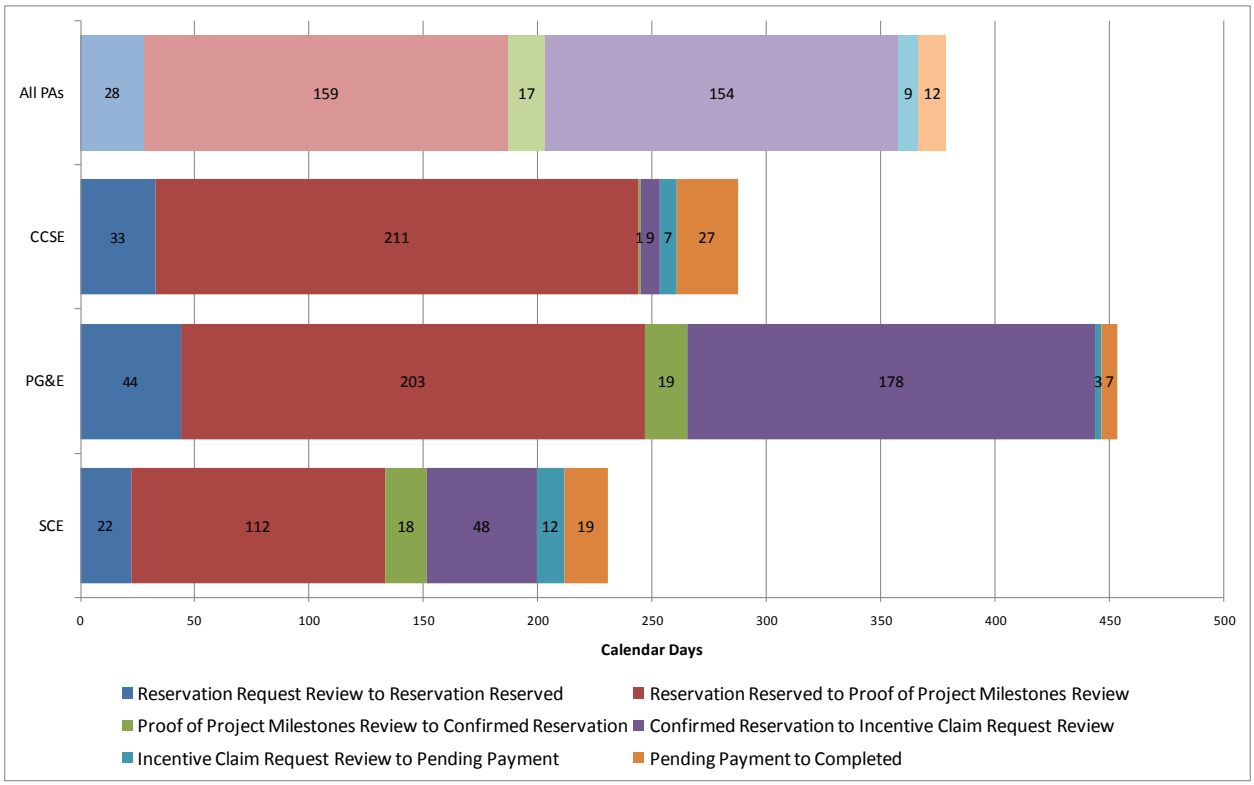
Project Management

Opportunities for statistical analysis of the PA's approaches to managing MASH project reservations were somewhat limited due to the types of data captured by Power Clerk and the relatively small number of projects that have been completed. Figure II-15 illustrates the relative median duration between each subsequent project date recorded in Power Clerk.[27] The two most substantial steps—Reservations Reserved to Proof of Project Milestone (PPM) Review and Confirmed Reservation to Incentive Claim Request Review—primarily describe steps under the control of program participants. Given the overall duration of projects (379 days) thus far, the relative differences between individual

[27] Due to the small number of completed projects, duration data was calculated from the entire population of reservations for each project step. This resulted in different sample sizes for each program step, but was necessary to have a large enough population to accurately represent differences in PA's approaches.

steps for each PA do not likely hold much significance. The PA's different approaches and treatment of entering data into Power Clerk, as well as PG&E's earlier start on reviewing reservations (see Figure II-16), may also create inconsistencies that would undermine such comparisons. Furthermore, while online submittal dates appear in some of the MASH data, these data fields exist to record the date of participant's online submittal of reservation requests, PPMs, and incentive requests, a process which has not yet been adopted by the MASH program and are not consistently used by the PAs[28]. CCSE's data was missing these dates for several projects, and PG&E's online submission dates were missing altogether. Table II-10 on the following page provides detailed statistics to support Figure II-15.

Figure II-15. Median Duration of MASH Reservation Phases by PA for All Records



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

[28] In the CSI General Market PowerClerk data the online submission date represents the date when the applicant completed the applicable milestone form in PowerClerk and indicated the intention to mail hardcopies of the supporting documents to the PAs. The MASH PA's have not approved the use of completing the MASH milestone forms online in PowerClerk. The online submission date appears in the MASH data if the PA did not delete this status before updating the data and advancing the application status to a review status.

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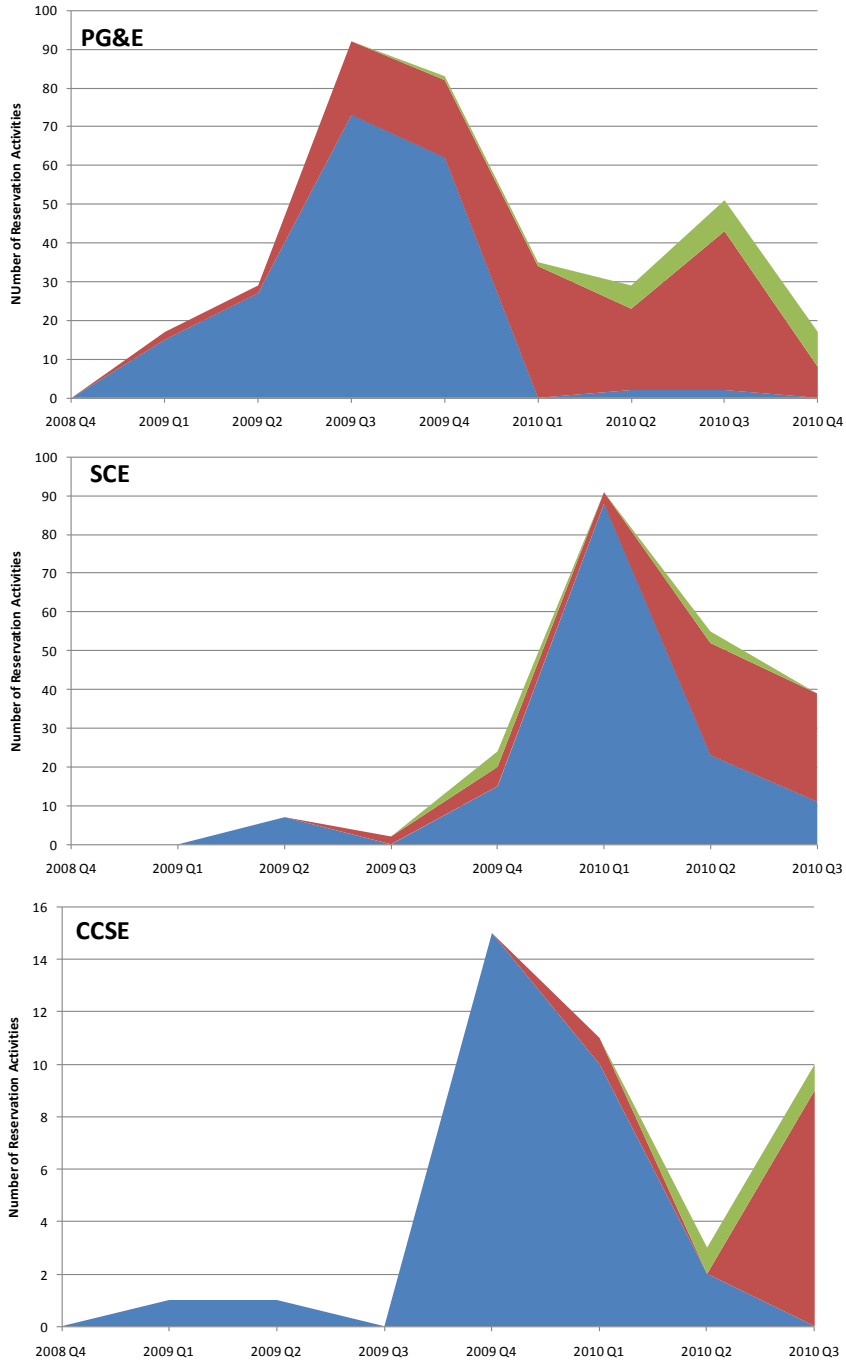
Table II-10. Detailed Statistics for Duration of MASH Reservation Phases by PA for All Records

All PAs				
Project Step	Median	Min	Max	n
Reservation Request Review to Reservation Reserved	28	0	398	327
Reservation Reserved to Proof of Project Milestones Review	159	-60	417	254
Proof of Project Milestones Review to Confirmed Reservation	17	0	298	194
Confirmed Reservation to Incentive Claim Request Review	154	0	553	38
Incentive Claim Request Review to Pending Payment	9	0	100	27
Pending Payment to Completed	12	4	65	27
CCSE				
Project Step	Median	Min	Max	n
Reservation Request Review to Reservation Reserved	33	0	398	32
Reservation Reserved to Proof of Project Milestones Review	211	41	417	25
Proof of Project Milestones Review to Confirmed Reservation	1	0	27	23
Confirmed Reservation to Incentive Claim Request Review	9	0	23	4
Incentive Claim Request Review to Pending Payment	7	0	15	3
Pending Payment to Completed	27	12	29	3
PG&E				
Project Step	Median	Min	Max	n
Reservation Request Review to Reservation Reserved	44	2	117	168
Reservation Reserved to Proof of Project Milestones Review	203	-60	397	147
Proof of Project Milestones Review to Confirmed Reservation	19	0	298	106
Confirmed Reservation to Incentive Claim Request Review	178	34	553	25
Incentive Claim Request Review to Pending Payment	3	0	100	17
Pending Payment to Completed	7	4	42	17
SCE				
Project Step	Median	Min	Max	n
Reservation Request Review to Reservation Reserved	22	0	63	127
Reservation Reserved to Proof of Project Milestones Review	112	20	324	82
Proof of Project Milestones Review to Confirmed Reservation	18	0	56	65
Confirmed Reservation to Incentive Claim Request Review	48	44	269	9
Incentive Claim Request Review to Pending Payment	12	4	33	7
Pending Payment to Completed	19	8	65	7

Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

As mentioned above, PG&E's MASH-related activity began earlier than that of either CCSE or SCE. Figure II-16 on the following page illustrates the relative levels of quarterly MASH program activity undertaken by each PA. Each of three primary program-related activities (Reservation Request Review, Proof of Project Milestone Review, and Incentive Claim Review) is depicted in a different color to illustrate the types of program activities being undertaken each quarter. While PG&E ramped-up program activity gradually, SCE and CCSE appear to have moved fairly quickly into reservation request reviews, and subsequently ramped up their PPM reviews in Q1 and Q2 of 2010, respectively.

Figure II-16. Quarterly MASH Activity Level by PA



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Program Administration

Each of the PAs has one or two staff members who are responsible for handling MASH customer contacts and application intake, review, and processing, due to the small size of the program. One of the PAs described the role as including project management from the reservation through the installation and the final inspection. The same staff member manages the program budget, and conducts marketing and outreach, workshops, panels, conferences, and public education. The other PAs have the broader MASH management role assigned to another staff member. One of the PAs used a contractor to help with the initial program marketing and outreach. Two of these PAs have the MASH staff involved in the general market CSI program. There has been some turnover in the staffing of the MASH management and administrative positions over time at two of the three Program Administrators.

SCE noted that during the first six months of MASH, they received just a few applications. Then they hired a consultant who worked with the low-income community to determine the financial model that would work for almost all low-income building owners. This was the PPA model. They invited the low-income industry, HUD, low-income stakeholders such as the Local Initiative Support Corporation (LISC), an organization that deals with affordable housing and has a large network of connections in affordable housing, property owners, banks, and power purchasers to meetings where their consultant shared the financial model and explained how it worked. They believe these meetings were instrumental, as MASH was fully subscribed within the second half of the year. At that point, they didn't need to do more Track 1 marketing and outreach.

MASH and CSI Synergies

The PAs report many synergies between MASH and the general market CSI program. One example was that the programs follow the same guidelines, including the following.

- Energy efficiency requirements
- Eligible panels and inverters
- Monitoring and reporting requirements
- Final inspection requirements
- Contractor verification
- Project completion time lines

Other MASH/CSI synergies that were mentioned included the following.

- Application steps
- Interconnections
- Incentive payments
- Contracts with third-party inspectors

One PA noted that MASH is different from CSI because MASH has one point of contact who is responsible for all customer interactions on all of the applications, whereas applications in the general market CSI program move through different stages to different staff members. Having one staff member

process applications was feasible in MASH because of the small program size. The program size also allowed for a more hands-on customer relationship. The staff member talks to every applicant and sometimes meets with them in person.

All of the PAs felt that the synergies with CSI helped them to implement MASH in a quick and cost-effective manner and the program is successful. The staff had the experience needed to implement the program efficiently.

All three administrators said that the MASH budget for administration is sufficient under the current program rules. However, administrative costs could increase due to potential future program changes.

Coordination with SASH
Two of the PAs said that MASH was not coordinated with SASH. One PA said that they talked with SASH about cross-marketing the programs to the extent possible. The SASH program distributes MASH fact sheets and MASH distributes SASH fact sheets. MASH will promote SASH if they have the opportunity and they expect SASH to do the same. The major focus on coordination was marketing the programs together.

Program Referrals
PAs reported that they refer ineligible customers to other programs. Specific programs that were mentioned included the following.

- SASH
- New Solar Homes Partnership (NSHP)
- General market CSI
- Utility energy efficiency programs
- LIEE
- CARE

They provide contact information for the program manager and information on the eligibility requirements if possible. They discuss different programs in training sessions and they provide literature for all of the programs.

Application and Intake
MASH applications are received through the mail so they can be prioritized by order of receipt. Subsequent communication can be received by email or fax.

There are three steps to the application process. The host customer has 18 months in total to complete the project; however, most projects do not require that much time.

1) Reserve the funds. The PA adds the project to their tracking spreadsheet and enters the project into Power Clerk. When the application process is completed and they can reserve funds, they send the applicant notification of the reservation.

2) Provide the contract. The applicant has 240 days to send in the contract. The project has a conditional reservation until the PA receives the contract.

3) File the incentive claim form. After the installation and interconnection approval, the applicant sends in the incentive claim form. The incentive claim form captures the payee and updated project information, which may include changes to the system and/or involved parties that were provided in previous milestones. Then the PA has the third-party inspector schedule the inspection. All MASH projects are inspected. After the inspection, the PA's review the inspection results and inform the customer of any discrepancies between the incentive claim documents and the inspection. When the discrepancies are addressed the check is processed. If there are no discrepancies, the check is processed after the inspection report is reviewed. (CCSE would first invoice SDG&E with backup information, and then after they received the check from SDG&E, they send a check to the customer.)

The applications are reviewed and verified. One PA noted that they call and interview the applicant. The following information is checked.

- Customer installation site address (street, city, zip code)
- Customer account and meter numbers
- The two-year occupancy permit
- Consumption data (to verify the proposed system size is not oversized)
- The EPBB calculation for the incentive level
- The eligibility of the system components
- The contractor's license to ensure it's valid and in active status
- Low-income documentation to make sure the housing complex meets the low-income housing statute. PUC 2852 code specifies that the property is at least 20 percent low income and puts restrictions on the types of eligible properties. Applicants usually submit a notarized deed restriction or regulatory agreement that will state that x percent of the units are allocated to households at or below 80 percent of the area median income and the restriction is in place for at least 30 years.
- Energy efficiency audit and disclosure form. The disclosure form provides information on what measures have or will be taken at the property.
- The applicant is an electric customer of the utility to which they are applying.

CCSE also requires the following information.

- Authorization letter (allows CCSE to access one year of consumption data through the customer's account on SDG&E's public website)

CCSE can obtain the information that is on the customer bill from SDG&E's website. If CCSE cannot access the data on SDG&E's website, usually because the zip code is incorrect, they will ask SDG&E to send the consumption report.

If something is missing from the application package, the PA notifies the applicant and suspends the project. The applicant has 20 calendar days from the date of notification to submit the additional information, according to the CSI Program Handbook.

PAs had not had many projects completed at the time of the interviews, so it was difficult for them to say how long projects were taking. However, their estimates ranged from 12 to 18 months.

When asked how the total application processing time could be reduced, two PAs said that there was not a need to reduce the time. One PA said that they think that the length of time is reasonable, based on the debt structure and the program requirements that must be understood. However, it was noted that verifying the difference between the system size the customer wants to install and their historical consumption can take time at the reservation stage. Financing, which is not within the control of the PAs, is also the part where the project slows down or projects drop out. One PA noted that the time could be reduced if the information submitted in the Reservation Request, Proof of Project Milestone, and Incentive Claim milestone packets are complete, so there is not a need to request additional information from the applicant.

Coordination with Applicants

Much of the coordination with the applicants is related to the application and other paperwork. If the application is missing information or additional clarification is needed, the PA will follow up. The PA will discuss any changes in system size, ownership, or any other project changes with the applicant. The applicant is the main contact for scheduling site inspections. If the contractor is not the applicant, then there is not much contact between the PA and the contractor unless there is something wrong with the contract or if the inspection fails.

Procurement

Each contractor procures the installation materials for their installs. There is an eligible list of equipment that the contractors are required to use. Most of the contractors understand the program and the materials that are eligible for the incentive, so this has not been an issue. This list of eligible materials includes panels, inverters, and the PMRS. These are statewide solar program eligibility guidelines, and are documented on the Go Solar California website.[29] Customers can be exempt from having a PMRS if the service amount is more than one percent of the total system cost for systems less than 30 kW and more than 0.5% of the total cost for systems over 30 kW.

Incentive Payments

The applicant sends the Incentive Claim form to the PA with the other required information. After this information is received, the PA schedules and conducts the inspection (CCSE) or contacts the third-party inspector to do so (PG&E and SCE).

The installation contractor is permitted to accompany the inspector and ask questions. The inspectors provide a report that reviews and compares the information in the field to the information on the

[29] http://gosolarcalifornia.com/equipment/.

incentive claim form. If the project falls outside the pre-established installation tolerances, they will generate new EPBB calculations based on what they find and recalculate the incentive.

The PA checks with the generation and interconnection team to confirm that the system was interconnected. If the project is enrolled in the VNM tariff, they verify which meters are connected and check if it matches the allocation that was on the VNM application form. On the VNM application form, the applicant will list the benefitting meters from the system and the percentage of the generation that is allocated to each meter. They compare this to the incentive that was reserved and the incentive on the claim form and verify that it matches.

After the inspection, the PA sends a notification to the host customer and the applicant to inform them of the inspection results, whether or not the payment is approved, and to whom the payment is going. The payee can be any designated party and is identified on the incentive claim form. The PA's process the payment after notifying the host customer and applicant.

MASH Databases

The PAs use a MASH-modified version of the General Market CSI Power Clerk database application tool. Power Clerk contains the contact information for the host customer, applicant, and the solar installer. It includes the project status, the dates of the status changes, the customer contacts, and notes about the project. Power Clerk recalculates the incentive amount when the panels or the inverter quantity is changed. The percentages that are allocated to the common area or tenant load can also be updated and the incentive will be recalculated. This database is also used to examine project statuses and create program reports. The PAs noted that they update the database when there are changes to a project, and that this is not difficult because of the small size of the program.

PowerClerk was not available when the MASH program launched. Each of the PAs created Excel spreadsheets to track application data. Each of the PAs continues to use the spreadsheets for the following purposes:

- To allow public viewing of the MASH status until MASH is incorporated in the California Statistics site;
- For managing the incentive budgets. Power Clerk does not provide a clear history of the reserved amount, and the spreadsheet helps them to track this. This is important, as changes to the application can increase the calculated incentive amount above the reserved amount, causing the program to go over budget;
- To ensure that no more than 80% of the Track 1 incentive is used by Track 1A or Track 1B;
- To monitor waitlist applications in Track 1;
- To track and monitor Track 2 applications; and
- To track and report data to the Energy Division such as VNM tenant units reserved and interconnected.

None of these capabilities currently exist in the Power Clerk database.

Statistics Monitored
One PA provided a printout with the statistics that they monitor. They update these statistics on a monthly basis. The statistics include the following.

- Number of projects reserved
- Number of projects under review
- Total reserved capacity (total, Track 1A, Track 1B, Track 2, wait list)
- Total under review capacity
- Total reserved incentives (total, Track 1A, Track 1B, Track 2, wait list)
- Total under review incentives
- Number of projects paid (total, Track 1A, Track 1B, Track 2, wait list)
- Total incentives paid (total, Track 1A, Track 1B, Track 2, wait list)
- Number of projects wait-listed
- Total wait-listed incentives
- Average project costs ($/watt)
- Total master-metered projects (reserved)
- Total individually metered projects (reserved)
- Total MASH VNM tenant units (reserved)
- Total MASH VNM net-metering tenant units interconnected

The other two PAs focus on the incentives, system size, and turnaround time. They separate the incentives by Track 1A, 1B, and 2 to make sure that no program component is oversubscribed.

The PAs reported that they had not had a MASH audit and had not been informed of one.

Marketing and Outreach

The marketing mix implemented by the MASH PAs has differed from the marketing mix used by GRID. In large part, this is due to the fact that reservations for Track 1 incentives were fully subscribed soon after program implementation began: after eight months for PG&E, 11 months for SCE, and 16 months for CCSE. PAs continue to accept applications for the remaining Track 2 budget, which is about half of the total budget allocated for Track 2.

This section analyzes the marketing mix used by the PAs for MASH. It is organized around the four components of that mix: product, price, promotion, and placement.

Product

The product offered by the MASH PAs is an incentive that enables the owner of a multi-family residential building with some affordable housing residents to serve part or all of the building load with renewable energy provided by a PV system. MASH requires several types of complementary market actors to successfully distribute this product, including contractors, PPA providers, equipment providers, and others. Yet, these partners could not provide their products at attractive prices without the MASH

incentive. The main benefit provided by this incentive is reducing the price of these complementary products to the building owners to host a PV system.

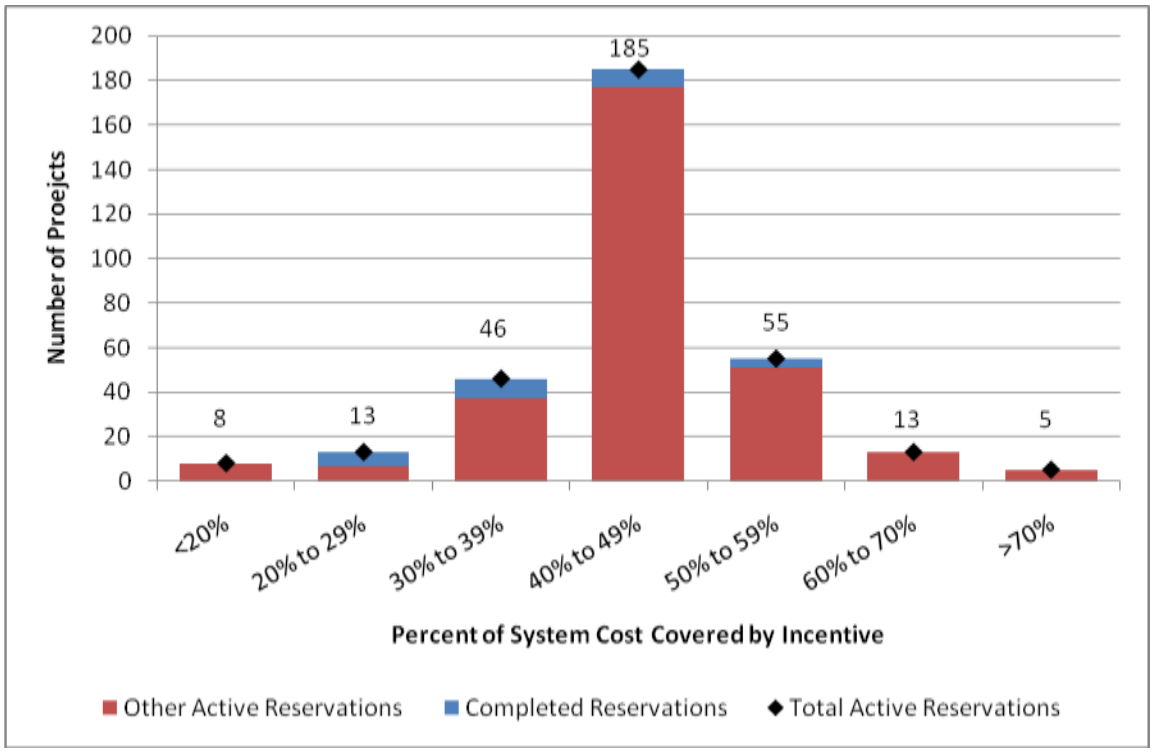
This definition of the product is provided as context for the remaining discussion about marketing and outreach. Other parts of this report provide more in-depth analysis of the product.

Price

The rapid pace of subscription for incentives through MASH Track 1 indicates that the price set was too low. In this case, the "price" to the customer was the system cost less the MASH incentive. This is the result of an imbalance between supply and demand. Demand for the incentives was higher than expected in the early months of implementation, but the supply of incentives remained constant (as defined in the decision instituting MASH). In a competitive market, this would have resulted in an increase in the price in order to bring supply and demand back into balance. The General Market CSI program made provisions to address such an imbalance with its step-down incentive approach. Since the price was fixed, however, demand was unrestrained, and the incentives were fully subscribed less than 18 months into what was supposed to be a seven-year program.

Over half of the applications for MASH Track 1 qualify for incentives that will cover 40-45 percent of the project's total cost (as shown in Figure II-17).

Figure II-17. Percent of System Cost Covered by MASH Incentive



Source: SCE and CCSE data exported from Power Clerk November 12, 2010; PG&E data acquired from PG&E November 17, 2010.

Applicants for MASH incentives are likely taking advantage of other incentives, which combine to create a low price for program participants. The separation of System Owner and System Host enables a project to structure its ownership to maximize the ability to take advantage of the incentives available to it. Projects in the size range supported by MASH are generally owned by an entity that can take advantage of a variety of incentives that are available at the federal level:

- The ***Investment Tax Credit (ITC) / Treasury Cash Grant*** enables the system owner to receive 30% of the capital cost of the system (after incentives) if the system is placed into service during 2009, 2010, or 2011 or if it begins construction during one of those years and is placed into service after December 31, 2011.[30]
- ***Bonus Depreciation*** allows the system owner to depreciate 100% of the taxable basis[31] of the system in the year that it was placed in service, provided that it was placed in service between September 9, 2009 and December 31, 2010.[32] Prior to the 100 percent bonus depreciation, system owners could depreciate 50 percent of the taxable basis of the property in the first year if the system was placed into service in 2008, 2009, or in 2010 prior to September 8.
- ***Modified Accelerated Cost Recovery System (MACRS)*** is also known as accelerated depreciation. In the first two years after a system is placed in service, the system owner can reduce its tax liability by about 50%[33] of the taxable basis[34] of the system. This is in addition to the Bonus Depreciation, but the taxable basis must first be adjusted for the bonus depreciation.

Table II-11 demonstrates how these federal incentives combine with the MASH incentive for a typical project.

[30] U.S. Department of the Treasury. January 24, 2011. Recovery Act: 1603 Program: Payments for Specified Energy Property in Lieu of Tax Credits." Available: http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx (Accessed February 2, 2011)

[31] Taxable basis varies from one system to another, but it is often the cost of the system, less 50% of the value of the ITC/Treasury Cash Grant, less any non-taxable incentives received.

[32] Database of State Incentives for Renewable Energy and Energy Efficiency (DSIRE). "Modified Accelerated Cost Recovery System + Bonus Depreciation." Available: http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US06F&re=1&ee=1

[33] The exact amount depends on accounting conventions used by the system owner.

[34] The taxable basis for MACRS is typically the taxable basis for Bonus Depreciation, less the amount of Bonus Depreciation.

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Table II-11. Summary of Typical Financial Incentives for a MASH-Eligible System

	Incentive	Taxable Basis	Cost to System Owner
System Cost			$100,000
ITC/Cash Grant	30%		($30,000)
Taxable Basis for Bonus Depreciation		$85,000	
Bonus Depreciation	100%		($29,750)
Taxable Basis for MACRS		$0	
First-Year MACRS	0%		($0)
MASH Incentive	40%		($40,000)
First-Year Cost to System Owner			**($250)**
Key Assumptions: - MASH incentive is taxable. - System Owner has sufficient taxable income to take advantage of tax incentives. - System is placed in service in between 9/9/2010 and 12/31/2011.			

Table II-11 demonstrates that the owner of a project that receives MASH Track 1 incentives may be able to nearly recover the full cost of the system in its first year of operation through a combination of MASH incentives and federal incentives; this simple accounting exercise does not take into account any additional tax benefits at the state level. In addition to these incentives, it is likely that the project owner has signed a PPA with the system host, enabling that system owner to further enhance the profitability of a project. This creates a strong business case for the projects, which likely drove interest in the MASH program. Lastly, under these assumptions, the projects must be installed between September 9, 2010 and December 31, 2011 to take advantage of the ITC and Bonus Depreciation, so this scenario does not hold for projects installed beyond 2011.

Placement (Distribution)

The PAs relied almost exclusively on contractors and affordable housing community for grassroots distribution of their offering under MASH's Track 1. Early in the program, the PAs held workshops for contractors to familiarize them with the MASH program. All of the PAs report that almost all of the projects came in through these contractors or based on recommendations by the affordable housing community. Customers who came directly to the PAs were still able to participate in the program, but it was a less common way to enter the program. Since the PA databases do not track information about how applicants heard about the program, the Market Assessment will ask participants how they first heard about the MASH program.

In the early months of program implementation, the PAs started to form partnerships with affordable housing and community organizations. The PAs intended to leverage such partnerships to identify low-income units in order to target marketing materials. Since the applications for Track 1 incentives were fully subscribed so quickly, however, the PAs did not have time to fully develop such partnerships, and they were not leveraged for distribution of the Track 1 offering.

To distribute the offerings for Track 2, the PAs have relied mainly on program staff. Contractors are not the best vehicle for Track 2 outreach because the application and project implementation requirements go beyond their traditional areas of expertise. In their place, program staff has had to be more active in generating interest in the program. PG&E invited input from the affordable housing community during the design of the Track 2 incentives.

Promotion

The PAs' promotional activities should advance all of all of the program's goals. These goals include increasing adoption of solar power in the affordable housing sector, decreasing energy use and costs, and increasing awareness and appreciation of the benefits of solar among affordable housing occupants and developers. This section summarizes the PAs' performance in promotion in the area of two of the program goals:

- stimulate program participation and
- increase the adoption of energy efficiency behaviors and technologies.

Stimulate Program Participation. The PAs used three main promotional approaches to stimulate program participation: education and outreach to contractors, the MASH program brochure, and the PAs' and program websites. The education and outreach to the contractors was the most important for Track 1, as this training empowered the contractors and affordable housing community to serve as the distribution channel (and effectively, the sales force) for the MASH program. Given that the incentives for Track 1 are fully subscribed, this approach was successful. The simple, two-page brochure provided basic information about the program and incentive levels; it provided important collateral material for the contractors to share, but it would not serve as a piece of collateral for direct marketing to property owners. Similarly, the PAs' websites provided information about the program once an interested party reached their pages, but the websites were not concisely targeted at convincing a visitor to participate in MASH.

To stimulate participation in Track 2, the PAs deployed a broader set of promotional approaches. Prior to the full subscription of Track 1 funds, the PAs would include some information about Track 2 in all of their public speaking engagements. Following the full subscription of Track 1 funds, the PAs jointly hosted a webinar to discuss the Track 2 requirements and application scoring; in addition, CCSE held two workshops to provide information about the program. Attendees at the workshops and webinars have included applicants, solar contractors, housing authorities, and management companies. The PAs also sent out information to their contact lists about the Track 2 program. On the program website, information about Track 2 was separated from Track 1; each PA has its own website, but the rest of the marketing was conducted statewide. PAs are continuing their marketing on Track 2.

There appears to be a disconnect for PG&E and CCSE between the PAs' expectations of Track 2 applications and the content of the applications that are submitted. SCE requested additional funding to support Track 2 applications received during the second quarter of 2010 due to multiple successful proposals; instead of $1.84 million for the quarter, SCE awarded $4.7 million with approval from CPUC.

PG&E, on the other hand, indicates that the applications that it has received under Track 2 are not as innovative as staff had anticipated; accordingly, PG&E staff have not awarded the full amount of the budget available in either of the first two quarters. Finally, CCSE awarded the full amount of funding available during the first Track 2 funding cycle but did not allocate any funding in the second cycle because no applications were received.

Despite the lack of suitable proposals for PG&E and CCSE, the PAs have not provided specific guidance on what makes a winning proposal. The PAs indicate that this approach is intended to maximize innovation in the development of the proposals. Taking this approach, however, may create a reputation that it is very difficult to win funding through Track 2; the resulting frustration may result in a continuing deficiency in the number and quality of proposals submitted under Track 2.

Initial outreach to affordable housing organizations has, however, been leveraged to build awareness about the Track 2 incentives. CCSE has collaborated with the U.S. Department of Housing and Urban Development (HUD), the San Diego Housing Federation, the San Diego Community Housing Corporation (a community-based nonprofit housing manager and owner), the San Diego Housing Commission, and low-income developers and property owners. SCE has collaborated with the Southern California Association for Nonprofit Housing (an association of affordable housing developers), LISC, Southern California Forum, and HUD. PG&E has not yet worked with outside entities.

Energy Efficiency. The PAs do not appear to have dedicated many resources to promoting energy efficiency as a part of MASH.[35] None of the materials provided to the evaluation team were solely focused on energy efficiency. In several presentations, energy efficiency received only a brief mention in the discussion of the MASH program goals; PG&E, however, used at least one of its presentations to promote its LIEE program. Similarly, the fact sheet mentions some benefits of energy efficiency and informs the audience that an energy efficiency audit is required, but that coverage is less than 10% of the total fact sheet.

The treatment of energy efficiency on the PAs' websites varies:

- PG&E provides links to "Additional Energy Efficiency Programs" on the front page of its Low Income Solar Programs website. The links indicate the target audience (e.g., property owners and managers or tenants). This group of links is clearly labeled and easy to identify on the first page that a visitor visits to learn about the program.

- SCE rovides a link to low income energy efficiency programs in its web pages that are dedicated to MASH. Like PG&E, it provides information about the required energy efficiency audit.

- CCSE's website links to information about energy efficiency offerings in the sidebar of the first MASH web page. In its MASH web pages, however, the only mention of energy efficiency is in

[35] It is unclear how much attention energy efficiency received during the presentation of the PowerPoint files and the ensuing discussion.

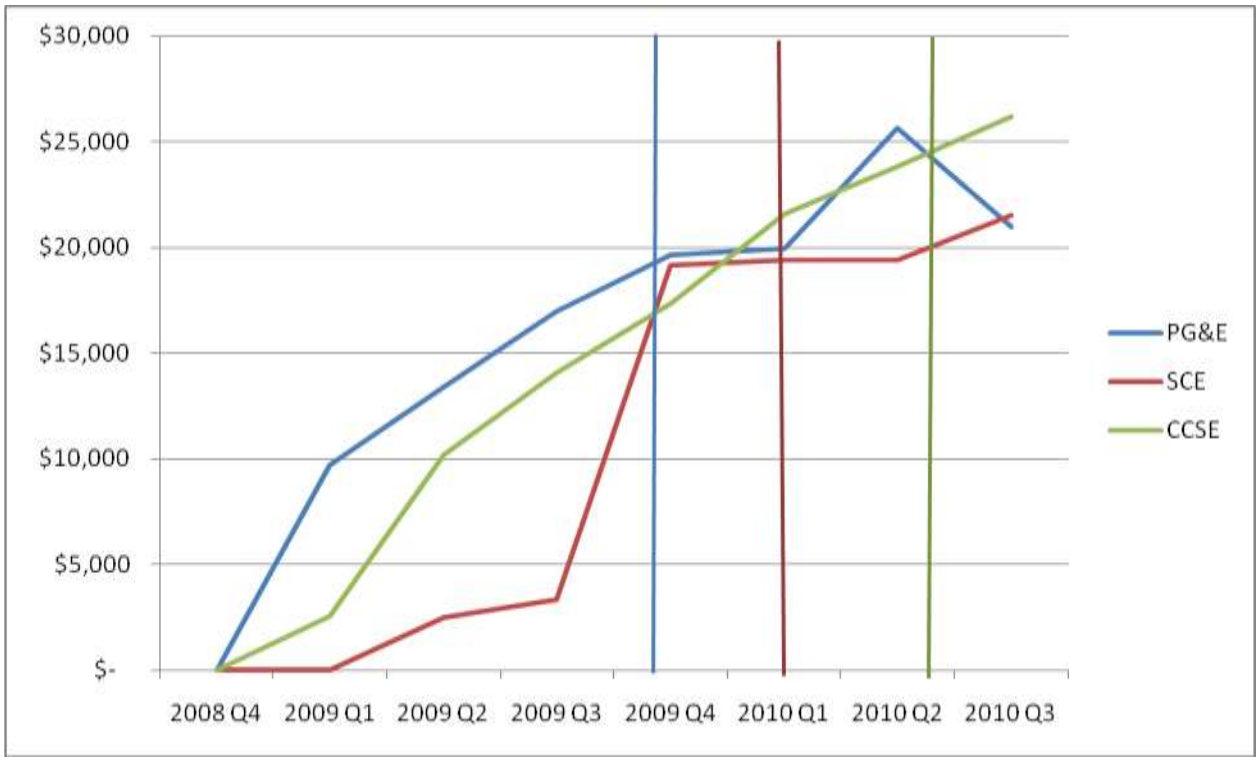
the requirements for application; there is also one article in the News section about contractors helping affordable housing developments to access both solar and energy efficiency programs.

Overall, the documentation indicates that increasing the adoption of energy efficiency is not a primary goal for the PAs' promotional activity. Although the PAs have complied with the EE requirements for the MASH program, the efforts to date are small relative to the amount of promotional material dedicated to informing potential participants about the MASH program itself. In general, the materials that reach out to the target population are not presented to encourage them to read the energy efficiency-related content.

Spending

PA staff spent minimal time engaged in marketing and outreach efforts during the first two years of program implementation. The total cost of staff time spent on M&O totals to 1.1 percent of program budget; CCSE is higher than this at 5.8% of its program budget. Program staff report that this is due, in large part, to the early subscription of the Track 1 incentives; since the queues were filled within 17 months of the start of program implementation, additional marketing effort to encourage program participation in Track 1 was not required. Since the Track 1 incentives were fully subscribed in June 2010, there has been minimal drop-off in expenditures for M&O activities by the PAs.

Figure II-18. Spending on Marketing and Outreach (Cumulative) by Utility by Quarter



Source: SASH Quarterly Reports to the CPUC.

The PAs reported that the MASH marketing and outreach budget is sufficient. Some noted that they had not spent their full marketing budget because Track 1 filled up so quickly.

System Funding

Funding sources that were used in addition to the MASH incentive were the federal tax credit, the net energy metering credit, government grants, and American Recovery and Reinvestment Act of 2009 (ARRA) funds. One PA noted that the property owners enter into Power Purchase Agreements (PPAs) if the property owners do not have the funding. PAs provided different estimates on the percentage of the system cost that remained after utilizing these funding sources. One PA stated that the property owners were responsible for about half of the costs, another PA estimated that it was only 10 to 15 percent of the costs, and the third PA did not have an estimate.

PPAs appeared to be an important method for initiating projects. The PPA provider owns the system and sells the output to the building owner. Some of the PPAs are contractors, and some are businesses that specialize in financing. The PPA providers take care of the paperwork and the installation. One of the PAs noted that they encouraged the use of PPAs by making sure the PPA providers were involved in the workshops.

The PAs stated that the MASH incentives are "appropriate", "healthy" and "generous", and caused the contractors to jump on the opportunity. SCE stated that they felt the incentives were about the right amount, based on the fact that initial Track 2 applications proposed incentives that were a little higher, although these projects provided added benefits, such as energy efficiency. One PA stated that there was an appearance that the incentives were too high because MASH was fully subscribed so quickly; however, they opine that a lower incentive may mean that property owners and developers wouldn't install the systems. If the incentive was lower, the PAs would have had to do more marketing and the customers would have needed more sources of funding.

Energy Efficiency

The original energy efficiency requirements that were listed in the MASH order were as follows.

- Applicants must comply with energy audit information and disclosure requirements, unless they have complied with Title 24 requirements for newly constructed buildings in the past three years.
- Building owners are required to provide LIEE information to tenants to encourage their participation.
- Building owners are required to allow eligible and willing tenants to participate in LIEE programs to the extent feasible.

However, the CSI MASH Handbook only requires that the host customer submit documentation that they have completed an energy audit and sign an energy efficiency disclosure form, which says that they have read the energy audit report. The disclosure form provides an option to list any energy efficiency

measures that the host customer is planning to do. These documents must be submitted with the MASH application.

The audit used by the applicants is a generic online tool. One PA noted that they are working on enhancing the tool. They believe it takes the customer's usage into account and they need to have their bill in front of them. The audit provides generic recommendations for tenant and common areas, not customized to the building. If the applicant is installing solar for the common area only, they can limit their audit to the common area.

Host Customers are not required to check measures on the disclosure form and the MASH program does not require that energy efficiencies are installed. Energy efficiency impacts are not taken into account when approving the system size. PAs did not have information as to whether applicants were taking energy efficiency actions or installing measures, but said that they could look at the applications to see what was listed. None of the PAs were tracking the measures.

When asked about the most common measures that were installed, two PAs stated that they did not know and one stated that it was lighting, refrigerator replacements, and weather stripping.

There was no knowledge of whether any energy efficiency resulted in reduced system sizes. One PA noted that MASH does not require applicants to implement energy efficiency, only to complete an audit. The handbook requires that the customer's historical consumption for systems greater than 5 kW per meter. If that is the case, the PAs look at the most recent 12-month consumption history and ensure that the system's estimated annual kWh does not exceed the recent 12 month consumption.

The PA's offer energy efficiency resources on their Website and some offer energy efficiency information over the phone. The PA's will educate customers on the available resources when they receive inquiries. One PA noted that some contractors are Home Energy Rating System (HERS) certified and that the contractors are starting to get more in-house certified employees that will be able to assess what measures can be taken. Some contractors are preparing for the launch of the Property-Assessed Clean Energy (PACE) program, which will focus on energy efficiency, so they are starting to hire employees that are knowledgeable about energy efficiency or they are obtaining the training themselves.

Another PA noted that through fact sheets, websites, and communications with the host customer, they tell every customer that they should do all energy efficiency before installing solar because energy efficiency is more cost effective and will reduce the cost of the system that they need.

The PAs stated that they did provide some materials about energy efficiency. One PA stated that they have information on the energy efficiency programs, how to obtain the incentives, and what steps customers can take to decrease their load. Another PA stated that they have a fact sheet that provides an overview of available programs and where to get additional information. The third PA stated that they provide a contact for their energy line so customers can contact them if they have questions about their bills or about energy efficiency.

Energy Education About the Energy Bill and Solar Savings
The applicant is the main contact for the MASH application. In cases where the applicant is different than the host customer, the applicant will relay the information relating to the MASH application between the host customer and the PA. One PA stated that they provide education if the customer asks and that they are always available to provide resources. The PAs generally stated that by the time they receive the MASH application, the host customer has agreed to a project of a specific system size proposed by a contractor. The PAs are unclear on how energy efficiency is factored into the system size. There is a question if contractors focus less on energy efficiency in order to sell a larger-sized system.

Energy Education About Monitoring and Maintaining the Systems
The PAs stated that any education about system monitoring and maintenance would be provided by the contractors. One PA noted that the contractors discuss optimal system performance, south/southwest facing, the benefit of reduced shade, and the need to keep the system clean.

Contractors

The PAs stated that a handful of new contractors began to do installations for them with the introduction of MASH. They were not aware how many staff members these contractors had working on the program installations.

The only training that was provided to contractors by the PAs were the workshops to market the program.

The PAs stated that the contractors were not assessed outside of the project inspections. To date, the PAs have been satisfied with the contractors. None of the MASH contractors had been banned from the program.

Service Delivery

The PAs began accepting MASH Track 1 applications in February 2009, conducted the first round of Track 2 application evaluations in the second half of 2009, and offered a VNM utility tariff option in early 2010.

The PAs reported that they had their service territories covered and did not have difficulty reaching certain areas. However, the low-income housing is concentrated in some areas.

Systems are designed and installed by the contractors. The MASH application includes the contractor's name and license number. The PA looks up the contractor on the California State License Board (CSLB) website. This website shows if the contractor is current on the license and if they are bonded. The contractor is required to have an A, B, C10, or C46 license to do the installation.

Necessary building repairs do not appear to be a big issue for the installations. However, the PAs did not have information on this issue.

Meters
A third party is usually contracted when a PMRS is required. The PAs have an eligible list of providers. Many of the customers opt out of the PMRS because costs are more than one percent of the system cost for systems less than 30 kW or more than 0.5% for systems greater than 30 kW. One PA noted that they require five percent accuracy meters for performance monitoring. If the system is VNM the applicant is required to pay all the costs for installation of a revenue grade meter for the Generator Account since the data is used for billing purposes. The account owner is responsible for all costs associated with installing a meter for the Generator Account.

Recommended Maintenance
When asked about information provided to MASH customers about system maintenance, the PAs stated that this was up to the contractor and that there were no guidelines on this issue. One PA stated that they had considered becoming involved in this issue and that they do remind customers to install an optimally performing system and of the importance of keeping their system clean. The PAs have an interest in maintaining the systems that are installed and receive MASH incentives.

MASH Follow-up
The PAs reported that there is no customer follow-up after the incentive is paid. One PA stated that they will evaluate and see if there needs to be additional follow-up.

The PAs stated that they had not heard of any problems or malfunctioning systems to date. They also were not aware of any theft or vandalism on the systems.

Track 2

The PAs stated that they invited input from the affordable housing community when they were developing Track 2. One PA stated that they met with the affordable housing community in the development process. They met with stakeholders and asked how the program could be most effective and used materials from the affordable housing community when developing Track 2 materials and outreach.

Track 2 Application Scoring
The PAs coordinated to develop scoring criteria and weights for Track 2 applications. The sections and weights are described below.

- Cost reducing benefit that is shared with the tenant (45%) – The applicant needs to explain how the project will reduce monthly expenses for the tenants and other programs that are leveraged. The PAs look for a reduction in the rent, any energy efficiency that the applicant will install, and how that will affect usage. The applicant could have a percentage of the common load offset too, for example community centers provide tenant benefit.
- Outreach and education and/or job creation or training (20%) – The PAs examine whether the applicant will be leveraging any external programs that will train and educate tenants on opportunities, and whether the tenants will receive certification from any of these programs. One example is that an applicant created a full time job for one of the tenants who will monitor the system, and five tenants will be paid by the contractor to assist with the installation.

- Population served (15%) – The PAs look at the percent of the building that is designated as affordable and the area median income designation.
- Cost effective use of MASH funds (10%) – The PAs assess the scale and scope of the project, whether benefits delivered are at least as large as the amount of ratepayer dollars, and other sources of funding to reduce MASH funds needed.
- Experience and track record (5%) – The PAs evaluate the team that is applying.
- Completeness and clarity of proposal (5%)

PAs only accept MASH Track 2 applications in the first and third quarters of the year. Applications are evaluated and they make the award in the second and fourth quarters.

Track 2 Applications Received

Two of the PAs reported that initial Track 2 applications did not meet the standard that they had expected. In the first round of Track 2 applications, they had the following results.

- CCSE received two projects and awarded one. They felt they had a difficult choice because both applications were very good and they would have approved both of the applicants if they had more funding. The one that they chose showed more tenant benefits.
- SCE received 3 applications. The applications were not clear in terms of the direct tenant benefit. In some cases, the incentives per watt were pretty high. They did not award any projects.
- PG&E received 22 applications and accepted one. Several of these Track 2 applications were from customers that were on the Track 1 waitlist. Some were from customers with active Track 1 reservations and were requesting higher funding.

The second round of applications had the following results.

- CCSE did not receive any applications.
- SCE received five applications and awarded four. SCE worked with the applicants from the first round and discussed what they were looking for. Two of the previous round applicants resubmitted and were awarded. However, SCE sometimes found it difficult to put a hard dollar value to soft benefits.
- PG&E received 15 applications and they planned to award 6. These awards will not reserve the full budget for the quarter.

If an applicant has Track 1 funding and is then approved for Track 2, the applicant usually withdraws the project from Track 1 and proceeds with Track 2 instead. PG&E has two projects that will switch from Track 1 to Track 2 in cycle 2. Some are providing additional tenant benefits in Track 2, in the form of energy efficiency that they will implement, based on the higher incentive levels.

While one PA stated that Track 2 has led to innovative models for solar energy systems on affordable housing projects, the other two PAs stated that the applications had not met their expectations. One PA stated that the applications had not been overly innovative. They had seen green jobs, education and outreach to the tenants, and performance monitoring in some projects, but nothing really innovative.

Another PA stated that the proposals did not meet the spirit of Track 2 in terms of providing direct tenant benefits, or benefits that were much different than Track 1.

One PA stated that they need to do more Track 2 marketing, and that potential applicants are still finding out about Track 2. They are trying to educate and to simplify the process and there should be more interest in Track 2, now that all of the Track 1 funding has been reserved. Another PA reported that they worked with the applicants and provided more education and outreach about Track 2. The third PA stated that they were not sure if more education would drive an increase in the type of proposals that they are looking for. They have a schedule of workshops and webinars where they describe the different areas that Track 2 is scored on. They don't provide specifics because they don't want to limit creativity in the proposals.

When asked whether some Track 2 funding should be reallocated to Track 1, one PA said that they wanted to see how the next round went, one PA said they are open to reallocation but could go either way, and the third PA said that they do believe that if they allocated funding from Track 2 to Track 1 and reduced the incentive amounts, they may serve a larger population and more tenants would benefit. All PAs stated that it is also a challenge for the PAs to verify that the other activities that the Track 2 applicants include in the proposals are completed. They plan on conducting some oversight on the additional activities, but the extent to which they will do so is still to be determined. For the previous cycle, the PA asked the awarded applicant to provide an update on the progress they have made on the additional activities. But the Track 2 projects are paid when the system installation and all proposed Track 2 activities are complete.

Track 2 Benefits

The reasons that Track 2 applicants provided for seeking higher incentive levels than offered in Track 1 included the following.

- Installation of energy efficiency projects.
- Green job creation. Training or hiring residents or members of the local community.
- Installing a monitor to broadcast energy consumption.
- Tenant education. Holding workshops or seminars for the residents at the housing development.
- Working with other programs or local agencies that focus on energy efficiency or water conservation.
- Implementing sustainability programs.

On one approved project, the applicant proposed to provide more extensive energy efficiency measures than what is usually included on MASH projects. While the property owners usually focus on lighting, this applicant proposed to install low flow showerheads, toilets, and HVAC systems. Another project offered to provide $1.7 million in energy efficiency improvements. One PA noted that the low-income households include disabled individuals and seniors.

MASH Virtual Net Metering (VNM)

The CPUC required each investor-owned utility to file a rate tariff for VNM. VNM was intended to provide the benefits of net metering to the tenants of MASH-eligible low income housing without requiring that a costly inverter be installed on each tenant meter. As implemented, VNM has encountered issues from both the utility and project perspective. This section explores the benefits and costs of VNM for MASH.

MASH VNM participation by Program Track

The two incentive levels available under Track 1 provide a higher incentive to projects that offset tenant load (Track 1B) than to projects that offset common area load (Track 1A). Although VNM participation is not a requirement to receive the higher Track 1B incentive, because both support projects that provide tenant benefits, one would expect a high correlation between VNM and Track 1B incentives. Table II-12 presents the percentage split of projects between Track 1A and 1B for VNM and non-VNM projects, and for projects overall for PG&E and CCSE. The split between Track 1A and 1B for SCE VNM projects is also provided.

Table II-12. Track 1A and 1B Incentives by VNM Participation

	% Track 1A (Common Area)	% Track 1B (Tenant Load)
CCSE		
CCSE VNM Projects*	13.6	87.3
CCSE Non-VNM Projects*	59.1	40.9
CCSE Overall*	24.2	76.5
PG&E		
PG&E VNM Projects*	30.7	69.9
PG&E Non-VNM Projects*	54.9	43.8
PG&E Overall*	53.3	45.6
SCE		
SCE VNM Projects#	16.9	83.1

* Source: PG&E and CCSE "MASH Stats" spreadsheets downloaded November 17, 2010. SCE data provided by SCE November 2010.

For all PAs, the VNM projects are weighted toward Track 1B incentives, supporting the positive correlation between VNM and Track 1B incentive. CCSE has the highest proportion of Track 1B incentives overall, while their non-VNM projects provide only 41% of tenant load benefit.

PG&E indicated that 11 out of their 183 projects were participating in VNM, while CCSE's records indicate that 23 out of 30 projects are participating. Navigant notes that this disparity may be the result of the PA's awareness of VNM status of in-progress projects rather than a difference in the actual percentage of projects participating in VNM. There is no specific time requirement for submitting VNM applications; therefore, MASH participants can apply for VNM at any point during the installation

process.. Because CCSE has a smaller number of projects, they are possibly able to monitor each project's status closely and therefore know the VNM status.

Tenant Benefits in Track 2

Track 2 was designed as a competitive grant-style application process. Through Track 2, applicants can request and may "receive a higher incentive level than Track 1 provides, if they can justify the need for a higher incentive and prove the system will provide a 'direct tenant benefit.'"[36]

Table II-13 summarizes the tenant and common area benefit of the Track 2 projects accepted as of the writing of this report. Overall, the Track 2 projects provide a high level of tenant benefits, generally outpacing the tenant benefit of the Track 1 projects. Three of the twelve projects provide 100% tenant benefits, and all projects transferred the majority of the system's benefits to the tenants. In their project application, SCE Project 1 asserted that, although 15% of the system's output offset common area loads, the tenant portion of the system would cover 100% of their tenant's electricity needs.

[36] CPUC Decision 08-10-036, October 16, 2008

Table II-13. Track 2 Tenant and Common Area Benefit

Track 2 Project	% Tenant Benefit	% Common Area Benefit
SCE Project 1	85%	15%
SCE Project 2	76%	24%
SCE Project 3	80%	20%
SCE Project 4	100%	0%
PG&E Project 1	51%	49%
PG&E Project 2	100%	0%
PG&E Project 3	72%	28%
PG&E Project 4	90%	10%
PG&E Project 5	90%	10%
PG&E Project 6	90%	10%
PG&E Project 7	90%	10%
CCSE Project 1	100%	0%
Overall	85%	15%

Source: MASH Track 2 applications approved as of November 2010.

VNM Costs on Utility Billing Systems

Implementing VNM requires reprogramming of the utility billing systems. Until the utility billing systems can be reprogrammed, the utilities report that they are manually billing their VNM customers. Each benefiting tenant account must be billed individually, therefore, the level of billing effort and cost can vary for each MASH project depending on the number of benefiting tenant accounts.

In their interviews, the utilities had widely varying estimates of the costs of modifying their billing systems to accommodate VNM. SCE said that they estimated that it would cost $1.4 million for the programming, and that there will also be ongoing maintenance that they could not estimate the costs of. However, these costs are currently charged to the general market CSI budget. They said that the costs of the manual billing, until the billing system was reprogrammed, are $300,000 per year to calculate the VNM credits and do the allocation for their 20 projects. Each one of the projects has 50 to 100 units, so there is a lot to be calculated and they needed to hire two to three people to do the manual billing. There were also costs to develop and write the tariff, but these costs will not be charged to MASH.

PG&E utility said that the programming cost was $470,000 to do billing through the billing system that handles special accounts (such as net metering, direct access, etc.) and that this amount was charged to

the general market CSI budget. There will be additional one-time costs for setting up the accounts of future customers and converting all associated accounts to the new VNM billing system. Finally, there are ongoing costs in generating the monthly bills, which will be higher than the standard billing cost because of the more complicated billing arrangements. It is more expensive to process any accounts that are not able to be programmed into the standard billing system. These costs will be recovered in rates.

During their interview, SDG&E reported that they didn't know how much the changes would cost. Their estimate in the MASH proceeding was $600,000.

The utilities provided the breakdown of VNM billing costs in Table II-14 in a data request subsequent to their interviews.

Table II-14. Utility-Reported Breakdown of VNM Implementation Costs

Description	SDG&E	PG&E	SCE	Unit
VNM Set up in Billing System				
Billing system set up/modification	$361,251	$467,152.33	Approx. $1.4M	Total
Project set up in billing system	$361,251	*$36/ account	TBD	Per project
Monthly processing in billing system	$15.00 per project per month (estimated)	*$10-$15 / account	TBD	Per project
Interim Manual Billing Costs				
Cost of temporary or interim billing outside of billing system	$1,330.00 per project per month	*$20-$30 / account	*$15.51/account	Per project

Source: Data in this table was provided by PAs in response to a data request in November 2010.
* These costs provided by PG&E and SCE are on a per-benefitting-account basis and not per project/application.

After the initial billing system reprogramming, the per-account costs are expected to be the same for each added account and, therefore, total costs can be expected to vary in a linear function. However, PG&E points out that the effort necessary to maintain the modifications to the billing system may increase as more customers are enrolled; increasing costs more than a modest level of participation. Costs to bill MASH-eligible and New Solar Home Program VNM participants are expected to be the same as for MASH VNM customers.

VNM Costs Paid by Applicants

There were different estimates of the costs borne by the applicants for the meters that were needed. One PA said that it was about $1,000 for the meter. However, they may require several meters, rather than one, depending on how many service delivery points they have. A generator output meter and an inverter is required for each service delivery point. The customer does not understand how many

meters/inverters they will need when applying for MASH. The applicants now understand the VNM requirements better, but they cannot figure out their costs because the utility will not provide the exact cost per meter until the end of the project. They provide a range of between $800 and $4,000 for the cost of a meter. When the applicant sends the interconnection application after the system installation, they can request a quote.

SCE stated that the largest applicant cost is the generation output meter. Depending on the age or how the electrical service is configured, they can do the installation in the spare circuit or in a metering cabinet. Other costs are to relist the gear panels if they had to make modifications to interconnect and taking care of outages. There is a wide range of costs, depending on number of buildings, the number of meters needed, and the condition of the electrical panel. SCE conducts site visits up front, so the customers can go to their electricians and obtain an estimate of the costs. This approach has been very well received by the SCE VNM customers.

VNM Allocation

CCSE stated that they need to verify the percentage split between the tenants. The allocation depends on the size of the unit and they need to verify that the split is what is documented on paper. The reservation application and the other program documentation show the allocation. If there are credits going to the tenant, the PA has to confirm the percentage is accurate, based on square footage. One contractor made the tenant allocation the same for every tenant, but CCSE knew that there were different size apartments in the complex, so they requested square footages for all units from the applicant to determine the correct allocation for each tenant.

SCE reported that the interconnection application package provides the allocation and that the tenant allocation is divided among the tenants by square footage. This was an issue that was debated at the initial workshop. Some thought that those with more sun and greater air conditioning costs should have a greater allocation. SCE checks that the allocation between common and tenant matches MASH 1A and 1B proportions. When the applicant submits the incentive claim, the PA looks at that allocation and compare. The allocation does not have to be exactly based on square footage according to the VNM tariff. It could be related to the number of bedrooms, or another indicator that is related to square footage.

PG&E stated that the applicant is responsible for providing the tenant square footage and they do not verify the allocation between the different tenants based on square footage. When verifying tenant benefitting systems under VNM, they aggregate the tenant allocation and compare it to what was on the incentive claim form. If the average system size is greater than 5 KW per tenant, they check to see if the system is oversized by reviewing the previous twelve months of usage for each tenant. This is consistent with the CSI program's verification policy, where streamlined processing is available for systems under 5 kW.

VNM Challenge – Allocation to Different Buildings

Some of the MASH applicants initially had a misconception about how VNM would work. They thought they could install solar at a different location in the MASH site and apply the kWh against the units in a building on a separate service delivery point. The PAs stated that since the systems are using the utility

grid to move the power from the point of production to the point of consumption under this type of arrangement, it constitutes a form of retail wheeling, and as a result the recipient accounts should pay for the costs of the grid. Even though the distances may be relatively short, it would be an undesirable precedent to allow for grid use without compensation – in which case all other customers would have to bear these costs. In response to suggestions that the wheeling charges could reflect the distances between the generator and load, the PAs stated that calculating grid cost responsibility based on the distance between the generator and load would be a significant departure from Commission and set an undesirable precedent. As a result, the Commission-approved tariffs provide that production can only be applied to the units in the building at the service delivery point where the solar is installed. Therefore, if an objective of a particular MASH project is to ensure that the benefits are distributed equitably to tenants in different buildings, each building would need to have a solar system[37].

Other VNM Challenges

Other challenges that the PAs faced with VNM to date are as follows.

- The cost of having one meter for each service delivery point.
- VNM eligibility varies by utility:
    - SCE's VNM tariff specifies that the project must be a MASH project;
    - PG&E's tariff requires the need to participate in MASH or be MASH-eligible; and
    - SDG&E's tariff references Public Utilities Code 2852 to determine VNM eligibility.
- Transmission and distribution costs fairly allocated to all of the customers. Expanding VNM beyond the service delivery point means that the project is using utility assets to distribute power without paying for the distribution capacity. The PAs are concerned that this constitutes an inappropriate subsidy.
- The utility cannot bill a fractional kWh. The tariff has the prices out to 5 decimals, but they can only bill whole kWh. They must truncate the portion of the kWh and put it in the bank at the generator level and save those pieces to the next month. The programming is very complicated.
- How to display the VNM on the bill so that it makes sense to the tenant. There are many pieces of information and it needs to be meaningful to the customer.

There were a few other complicated issues that were raised.

- In a multifamily building that is only partly low-income, there is no relationship between the allocation and whether or not the tenant is low-income. They are allocating the credits regardless of whether the tenant is low-income. This raises the issue of fairness, where a subsidy is created to serve one community (low income) but the subsidy may not stay with the target community.

[37] In September of 2010, the CPUC approved an advice letter filed by PG&E that would relax this requirement and allow the generation to be netted by common area and tenant meters beyond the service delivery point of the installed generator within a defined Eligible Low Income Development through the end of 2011.

- If a unit becomes uninhabitable, they need to develop a revised allocation. The owner is permitted to reallocate the annual credit but must leave the reallocation in place for at least 12 months.
- When the building has very little load, but has room for system installation. In this case, several upgrades may be needed to provide for a safe interconnection.
- Sometimes an interval meter is needed because there may be tenants in the same building who have time of use rate structures that don't coincide. If all of the tenants are on the same time of use schedule (or non-time differentiated rates), they can use a time of use meter. This is less expensive for the customer than an interval meter.

Program Administrator Recommendations for Changes to VNM

The PAs had some recommendations for changes to VNM.

- CCSE believes that the meters should be a responsibility of the utility (the financial part) because it is the property of the utility.
- CCSE also believes that VNM should be made available to the general market in the near future because it can benefit a lot of projects that aren't taking advantage of the program. Some residential complexes are not going forward with solar because it is too expensive to obtain a separate system for each tenant. However, not all PAs are in agreement with this recommendation.
- Although not a MASH PA, SDG&E opined that there should be a minimum tenant benefit achieved before a project can participate in VNM. The costs that ratepayers must bear for the implementation of VNM may not be prudent when tenants receive very little benefit.
- SDG&E also points out that it has been very expensive to create the new and different billing systems for different programs and a simpler and less costly method for executing VNM should have been considered. For instance, the utility could send the building owner a check every month and allow them to allocate the VNM benefits to their tenants.

One PA stated that there was not enough data to provide many recommendations yet. VNM works very well for MASH, and it was necessary, because they would not have participated if they had to buy individual inverters. However, the PA wanted to have time to study VNM and understand it better, and then determine whether to make a recommendation to expand VNM.

Another PA stated that the tariff they have developed and that was approved is the right way to implement VNM.

The PAs provided extensive input regarding VNM as part of their comments on Phase 1 issues in the ongoing CPUC proceeding on CSI and distributed generation issues (R. 10-05-004). Initial comments were filed on December 6, 2010 with reply comments following on December 20, 2010.

Quality Control

Inspections are conducted on all MASH projects. Third-party inspectors conduct the inspections for the utility PAs and CCSE conducts the inspections on the MASH projects in SDG&E territory. The following are checked during the inspections.

- Number of panels and inverters
- Manufacturer
- Shading, using the SunEye analysis. If there are no obstructions, they don't need to conduct the shading analysis.
- Tilt
- Azimuth
- Generation meter
- Output on the inverters. This is to assess how the system is functioning.

One of the PAs noted that the inspections are time consuming to conduct and report on due to multiple buildings, multiple stories, and the large size of the systems. The PAs would like to assess the failure rate and consider whether it is necessary to inspect 100 percent of MASH installations.

Feedback Mechanisms

One PA planned to provide a formal letter to let the contractor know what, if anything, was wrong. The letter will clearly state the difference between what was in the claim form and what was seen in the field, if that was the issue. The contractor has a chance to correct the problem. If the contractor does not correct the difference, the PA will change the incentive to what was seen in the field. The contractor can fail if what was in the field was completely different than what was on the claim form. In that case, the applicant would not receive the incentive. The quantity or shading can be adjusted, but it is a problem if the inverter is different than what was documented. If it is a different manufacturer, but one that was on the approved list, the applicant would need to submit a new incentive claim form.

Another PA reported that they invite the solar contractors to attend the inspections so the contractors can understand what the inspection involves, what is measured, and ask questions. They notify the contractor if any discrepancies are found. If measures are outside the tolerance levels, they update EPBB calculations, notify the contractor and applicant about what was found and the discrepancy, and provide a copy of the inspection report if the contractor requests it.

The two PAs who had completed inspections stated that they had not seen issues. There were only some minor adjustments and small changes in the incentives.

MASH Requirements

Table II-15 displays the MASH requirements and an assessment of whether the PAs have met these requirements and the challenges they have faced.

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Table II-15. MASH Program Requirements[38]

MASH Requirement	Description	Requirement Met?	Notes
Implementation Time Line	Implement MASH within 4 months following Commission order.	Yes	Track 1 is fully subscribed.
	Make reasonable efforts to identify the eligible population by the end of 2010.	Yes	PAs reached out to the affordable housing community and to key stakeholders. These efforts were abandoned because the program was fully subscribed very quickly. However, some outreach about Track 2 continues.
	Complete 50 projects by the end of 2012.	Expected	PAs expect to far exceed this goal.
Eligibility	In PG&E, SCE, or SDG&E service territory. Have an occupancy permit for at least 2 years. Building must meet the definition of low-income residential housing as defined in PUC 2852.	Yes	PAs initially were challenged in determining whether the building met the 2852 definition. They report that they have worked through these issues.
System Size	1 kW–5 MW. System must be sized so that the amount produced is not higher than the previous 12-month usage. Systems that are 5 kW or less or that average 5 kW or less per tenant are not required to have the size substantiated.	Yes	Potential energy efficiency is not factored in to the system size calculation.
Energy Efficiency	Energy audit and disclosure form	Yes	Appears to be a formality
Track 2 Development	PAs must work together to develop review criteria.	Yes	Generally speaking, applications to date from two of the PAs have not met PA expectations for innovation or tenant benefit.
Virtual Net Metering	Utilities must file VNM tariffs that allow MASH participants to install a single solar PV system per service delivery point.	Yes	The billing system modifications required from VNM have not yet been completed. These modifications are very costly and complex for the utilities to implement and require integration with utility billing systems.
Inspections	100% of projects inspected	Yes	Too early to tell if projects have been meeting requirements. Projects inspected to date have met requirements.

[38] Decision 08-10-036, Decision Establishing Multifamily Affordable Solar Housing Program Within the California Solar Initiative, October 16, 2008, and CSI handbook, available on CPUC website: http://www.cpuc.ca.gov/NR/rdonlyres/14CD3F07-7B87-49AB-8505-D5F09403A833/0/CSIProgramHandbookJune2010v3_2.pdf.

Challenges

The initial challenges that the PAs faced in MASH implementation were as follows:

- Educating the community about MASH
- Finding eligible projects
- Developing interest in MASH
- Understanding the low-income definition, the low-income qualification documentation, and learning how to conform within the bounds of the statutes
- Modifying the Power Clerk database for MASH

These problems were worked through. Eventually the contractors realized that MASH was such a good opportunity that they could bring customers into the program. One PA reported that once the first project came in, they were fully subscribed one or two months later. After they provided education on program eligibility, the contractors did the bulk of the marketing.

The PAs hold regular meetings and discuss documents and their internal interpretation of the MASH statute with respect to program eligibility. One PA consulted with their legal department and asked the cities or counties for verification of the building status. They have seen different types of qualifying documents and are learning and getting a better understanding of these documents. There is a standard template for the tax credit allocation. Once they understood this template, they can go to the specific sections of the deed and determine whether a building is eligible.

The MASH decision required the PAs to use the Power Clerk database that they had used for the general market CSI program; however, they needed to modify the database to fit the MASH program. One PA reported that they are continuing to modify the database. The database is working, but it still is being modified for additional functionality and to create reports for MASH. The reporting capabilities that are needed are specific to MASH.

Program Administrator Recommendations

The PAs had the following recommendations for modifying MASH:

- All of the PAs would like to increase the funding that is available for the program. PG&E and SCE stated that funds should be moved from SASH to MASH. PG&E also suggested moving funds from Track 2 to Track 1.
- CCSE recommends increasing the energy efficiency component by requiring the installation of energy efficiency measures prior to installation of the solar system.
- Simplify the definition of low-income housing eligibility.
- SCE believes that track 2 is a good method for determining where the true market prices are. Keeping a MASH component where the market bids on incentives is a good strategy. However, there will not be much innovation in Track 2.
- SCE also believe that using a loan or a grant might provide more benefit for the dollars spent, because the customer would not have to pay taxes on the benefit.
- PG&E would be interested in a study on how lowering incentives would affect the program.

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III. Findings and Recommendations

This section of the report provides findings and recommendations.

SASH Findings

Program Accomplishments

- Through September 29, 2010, the SASH program reports that 287 projects have been installed or completed, with 463 projects approved and "In Process."

Program Administration

- Overall, GRID is providing effective implementation of the SASH program.
- GRID's program strategy, which includes client education, referral to LIEE for eligible clients, support of job training programs, and community education through volunteers has the potential to provide benefits beyond PV generation capacity.
- As a nonprofit organization focused on the delivery of affordable solar energy to low-income households, GRID appears to have provided many advantages for the administration of SASH. GRID's mission was aligned with the SASH program and they were positioned to deliver services in a way that engaged low-income clients and provided them with the benefits.
- GRID had existing relationships with community organizations that work on affordable housing prior to the introduction of SASH. As GRID became involved in SASH, and is providing services statewide, they have increased the number of community organizations with which they work. These organizations include nonprofits, the U.S. Department of Housing and Urban Development, local government entities, nonprofit housing developers, tribal authorities, and job-training organizations.

Program Eligibility Requirements

- Recent clarifications to program eligibility will make outreach and recruitment easier and will reduce the time and effort spent working with customers who ultimately are ineligible.
- The program's initial affordable housing requirement was very restrictive, mandating that the housing unit was part of a two or more unit complex (the unit had to be part of a development), that at least 20 percent of the tenants were low-income, and that the property was deemed for low-income households. The first change in eligibility removed the multi-family element so that single-family homes could be targeted. Next a clarification was made that a recapture restriction qualifies as resale restriction. However, with each of these changes, GRID was required to update their marketing lists and conduct additional canvassing in areas that they had previously covered.

Outreach and Recruitment

- GRID's outreach and recruitment methods are effective and appropriate for targeting the population of eligible customers. Mass market approaches would not be appropriate for a program with narrow eligibility criteria.

- GRID used a variety of methods to recruit SASH participants, including brochures and mailers, telephone calls, home visits, community meetings, partnerships with community organizations, and general advertising. It appears that the most effective outreach is through word of mouth from clients to neighbors.

- Clients express some concerns about installing solar through SASH. The concerns include the gap between the system cost and the SASH incentive, how the system will look, the impact of the system on electric bills, whether the system will cause the roof to leak, whether the solar inspector will find other issues in the home that must be addressed, objections from the homeowners' association, system maintenance, and the potential need for system repairs.

Program Implementation

- Program records indicate that there is room for improvement in the areas of application and records processing. Some examples include:

    - Twenty projects that have either Installation or Inspection Completed dates entered are still assigned a Status of Approved-Construction, Approved-Outreach, or Pre-Screened Qualified (only one of the latter);

    - Many projects in the Installed or Completed status categories are missing date entries for various steps in the application review, project design, and installation process;

    - Many projects with an Installed or Completed status indicate that gap funding is required but do not have a funding source indicated.

- GRID initiated SASH in all three utility territories in May 2009. By July 2010, they had 226 projects that were installed or completed, and approximately 400 additional projects in process.[39]

- The initial challenge for GRID was to locate eligible housing units. GRID has been able to locate eligible units by working with community organizations. Changes in the affordable housing definition have increased the pool of eligible households.

- GRID had a waiting list that developed prior to the implementation of the Subcontractor Partnership Program (SPP). With the addition of the SPP they should be able to serve those who were on the waiting list.

[39] SASH database provided by GRID, July 2010.

- SASH had a slow start due to the initial challenge of locating affordable housing units. GRID asserts that they will be able to meet the goal of allocating all SASH funds by the end of 2015 and completing the installations one year later. They estimate this will be approximately 6,000 homes. It is difficult to assess their ability to meet this goal, given the relatively small amount of time that has passed since the affordable housing definition has been changed, the SPP component was introduced, and the program implementation has been in full swing.

Project Funding

- Identifying sources of funding to cover the gap between SASH incentives and system costs has been effective at securing program participation. However, this may not be a feasible model over the long term and other methods for covering this gap should be investigated and developed.

- The original SASH design envisioned the use of community financing to cover the gap between the full solar system cost and the SASH incentive, this model did not prove feasible. Given the recession and the tight credit market, loans were less readily available than they were at the time the program was designed. Clients may have also been less willing to take on debt to participate in SASH given the downturn in the housing market.

- The average SASH incentive for an Installed or Completed project is $16,799. Incentives for all Installed or Completed projects are under $50,000, with the exception of a single project with an incentive of nearly $90,000.

Energy Efficiency and Energy Education

- The one-on-one contact by the Outreach Coordinator provides an opportunity for energy education and referrals to the LIEE program.

- GRID reports that they provide extensive client education, beginning with the outreach visit. GRID conducts the energy audit with the client and discusses actions that the client can take to reduce their energy usage.

- GRID has worked to develop linkages with the utility LIEE departments and send referral lists of clients that they have found to be eligible, but have not yet received LIEE services.

- The energy efficiency component for non-LIEE-eligible clients is minimal. GRID reports that they provide significant energy education to all clients. However, there is no provision for energy efficiency services for the SASH participants who are not eligible for LIEE.

- The SASH implementation strategy includes a follow-up visit with the client six weeks after interconnection to educate the client on how the system works, how to check if the system is on and working, what to do if they find a problem, how to read the system's production, how to maintain the system, and how to read their electric bill. GRID conducts this training on GRID installations and on SPP projects.

- However, additional EE benefits can be made through better follow up with the LIEE program to ensure participation and developing a solution for implementing EE for non-LIEE eligible clients.

Subcontractors

- The Subcontractor Partnership Program was announced in October 2009 and began accepting applications in November 2009. Sixty nine contractors had been accepted to the program as of November 1, 2010 when the program was closed to new contractors.

- Managing the high number of applicants to the SPP required a significant amount of administrative effort and project installation oversight.

- Closing the SPP to new contractors will allow GRID to manage program administrative costs and effort and monitor the participating subcontractors to ensure the installation standards set by GRID are being met. It will also provide GRID the opportunity to work through the existing list of SPP contractors to identify and remove any non-performers.

- Because the remaining SPP contractors will likely be awarded a good number of projects through SASH, GRID should consider tightening the requirement to hire job trainees on SASH projects. This requirement could be expanded to require multiple job trainees on a project or permanent hiring of job trainees.

Program Performance and Quality Control

- All projects must receive a third-party inspection. GRID has a QC checklist and a SASH verification checklist that they complete prior to sending the project to the third-party inspector. GRID works with CCSE in SDG&E territory and Burnham Energy in SCE and PG&E territories. Initially, GRID will check the subcontracted projects; however, it is planning that eventually the third-party inspectors will conduct extra quality control work on the subcontracted projects.

- GRID reports that, the SASH inspection pass rate is more than 99 percent for first-time inspections.

SASH Recommendations

Key recommendations based on the SASH PA Assessment are summarized below.

Program Implementation

- GRID staff should recognize that the SASH database is not only a project tracking tool but also a program reporting database. The CPUC relies on the program data to assure that ratepayer funds are used in a prudent manner. GRID should develop procedures around application processing and data management. These processing procedures should include:

    - Process flow diagrams and a "file" checklist to ensure that all of the required documentation is being gathered and all data fields are populated in the SASH database;

- Validations on fields of the SASH database so that status codes cannot be updated without date fields being populated and dates must be entered sequentially (for instance, the installed date cannot occur before the application approval date);

- A back-end file and database review conducted by staff not involved in the project's implementation; and

- Maintenance of all project forms and documents in a central location, whether a physical file or an electronic depository.

Project Funding

- Securing non-incentive gap funding to provide no-cost solar systems for low-income households may be necessary. The CPUC should encourage the use of other available financing programs to help clients cover the gap between the system cost and the SASH incentive. If necessary, the CPUC should allow the use of additional program funds to help GRID locate funding sources and conduct their own fundraising to fill the gap.

- The SASH incentive should be capped at $50,000. Although the vast majority of incentives for Installed or Completed SASH projects are under $50,000, a single project was granted an incentive of nearly $90,000. A cap on the incentive available per project will allow more households to participate in SASH and increase the likelihood that the program will achieve its goals within the incentive budget.

Energy Efficiency

- SASH clients who are not eligible for LIEE do not receive energy efficiency services. GRID, the CPUC, and the utilities should investigate how they can provide energy efficiency services to SASH clients who are not eligible for LIEE.

Subcontractors

- GRID should increase the job training requirements for the SPP contractors. A smaller pool of SPP contractors will provide more SASH projects to each contractor so GRID should use this leverage to further promote job training and workforce development.

Challenges and Successes

- GRID should develop a system to track and document job trainees used on SPP projects, and attempt to track the jobs that trainees obtain in the solar industry once they leave the program so that they can be claimed as a benefit or impact of the program. A benefit of SASH is the vast amount of workforce training and development that is associated with the program. GRID provides this benefit by working with job-training programs on 20 percent of their installations and by the SPP requirement that the subcontractors utilize job trainees on their installations. However, GRID has not developed a system to track the amount of training and experience that is provided or the number of jobs that are created.

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MASH Findings

Key findings based on the MASH PA Assessment are summarized below.

Accomplishments

- More than 1.4 MW of capacity have been successfully installed through Track 1, with an additional 19.5 MW of capacity expected from active reservations.
- Over $7 million and 1,274 kW of capacity have been successfully awarded through Track 2.

Resources and Requirements

- Each PA has one or two staff members responsible for MASH customer contacts and application intake, review, and processing, due to the small size of the program. One of the PAs described the role as including project management from the reservation through the installation and the final inspection.
- MASH requires participating building developments to meet a restrictive affordable housing definition. PAs reported that they initially had difficulty understanding the low-income definition, understanding the low-income qualification documentation that was required, and learning how to conform within the bounds of the statutes.

Program Management

- All of the PAs felt that the synergies with CSI helped them to implement MASH in a quick and cost-effective manner and that MASH is a successful program. The staff had the experience needed to implement the program efficiently.
- A MASH tool was developed within the Power Clerk database application used for the general market CSI program. Program reports are created from this database. The PAs also record information in an Excel spreadsheet and use both tools to track the status of MASH.

Outreach and Recruitment

- The PAs reported that the MASH marketing and outreach budget is sufficient. Some noted that they had not spent their full marketing budget because Track 1 filled up so quickly.
- MASH was oversubscribed so quickly that the PAs did not do as much marketing and outreach as they expected to, or would have liked.
- One effective outreach strategy was to work closely with the affordable housing community. Another was working with Power Purchaser Agreements (PPAs).

Track 2

- Track 2 was designed to potentially provide greater incentive levels in exchange for increased tenant benefits and energy efficiency through a competitive application process. Although the RFP describes direct tenant benefits, education and outreach, and green job creation/training as examples of tenant benefits, proposers are allowed to identify and propose their own.

- Some PAs expressed that a lack of detailed scoring criteria, lack of clear objectives and guidance on desired outcomes has likely contributed to the poor quality proposals received. In addition, at the time of the interviews, the PAs did not have a strategy for verifying all of the proposed activities beyond the installation of the PV system. The duration of some benefits, such as computer labs and green jobs, cannot be ensured without ongoing reporting or verification activities.

Implementation

- The PAs began accepting MASH Track 1 applications in February 2009, conducted the first round of Track 2 application evaluations in the second half of 2009, and offered a MASH VNM utility tariff option in mid 2009.

- Although the PAs initially had difficulty understanding and working within the affordable housing requirements, they reported that they had worked through these issues and that Track 1 was fully subscribed.

- The PAs reported that they were able to cover their service territories and did not have difficulty reaching any specific areas.

- MASH Track 1 is fully subscribed and Track 2 is 40 percent reserved. The PAs should not have a problem meeting the MASH goal of completing installations by December 31, 2016, as stated in the MASH order.[40]

Project Funding

- The PAs stated that the MASH incentives are "appropriate", "healthy" and "generous", and caused the customers and third party financiers to jump on the opportunity. Funding sources that were used in addition to the MASH incentive were the federal tax credit, the net energy metering credit, government grants, and American Recovery and Reinvestment Act (ARRA) funds. PPAs were an important source of financing.

Service Delivery

- There are three steps to the application process – reserving the funds, providing the contract, and filing the incentive claim form. The applicant has 18 months in total to complete the project, but most projects do not require that much time.

[40] Decision 08-10-036, Decision Establishing Multifamily Affordable Solar Housing Program Within the California Solar Initiative, October 16, 2008.

- PAs had not had many projects completed at the time of the interviews: therefore, it was difficult for them to estimate the time needed to complete projects. Estimates ranged from 12 to 18 months. The PAs noted that the availability of financing had a big impact on how long it took to complete the project.

Energy Efficiency

- The only MASH energy efficiency requirements for Track 1 are the energy audit and the disclosure form, which states that the applicant had completed and reviewed the energy audit. The disclosure form provides an option to list any energy efficiency measures that they plan to implement. These documents must be submitted with the MASH application.

- The audit used by the applicants is a generic online tool. Applicants are not required to check measures on the disclosure form and there is no follow-up conducted to verify that any energy efficiency measures were installed. Energy efficiency impacts are not taken into account when approving the system size. PAs did not have information as to whether applicants were taking energy efficiency actions or installing measures. None of the PAs tracked the measures.

Energy Education

- The PAs were not involved with educating MASH participants customer electrical usage and system maintenance. However, the PAs did provide a certain level of energy efficiency awareness and MASH program specifics.

Virtual Net Metering

- PAs estimates of the percent of projects that will opt for MASH VNM range from 15 to 58 percent.

- MASH customers are required to have one generator output meter for each service delivery point[41]. This makes it difficult for customers to obtain estimates of the costs of VNM at the outset of the project. There is a wide range of costs, depending on number of buildings, the number of meters needed, and the condition of the electrical panel. One PA conducts site visits up front, to help customers estimate the cost.

- PAs were not consistent in their verification of the allocation of benefits among tenants. Although one PA stated that they verify the percentage split between the tenants, which is based upon the size of the unit, the other PAs did not report that they conducted this check.

- Implementing VNM for MASH will require utility billing system reprogramming, temporary billing while the system is being programmed, account set-ups, and ongoing billing complexities. The utilities did not have estimates of all of these costs at the time of our interviews but provided estimates in a subsequent data request.

[41] In September of 2010, the CPUC approved an advice letter filed by PG&E that would relax this requirement and allow the generation to be netted by common area and tenant meters beyond the service delivery point of the installed generator within a defined Eligible Low Income Development through the end of 2011.

Program Coordination

- The major focus on coordination with SASH was marketing the programs together. The programs distribute one another's fact sheets and promote the other program where they have the opportunity to do so.

- Customers who are not eligible for MASH are referred to other programs including SASH, New Solar Homes Partnership, general market CSI, energy efficiency, LIEE, and CARE.

Contractors

- Many of the contractors providing MASH services had worked with the PAs in the general market CSI program. However, there were a handful of new contractors in MASH.

- Contractors are not assessed outside of the third-party inspections. To date, the PAs have been very satisfied with the contractors.

Program Performance and Quality Control

- Inspections are conducted on all MASH projects. The utility PAs have third-party inspectors and CCSE conducts the inspections on the MASH projects in SDG&E territory.

- Although there had not been many completed inspections at the time of the PA interviews, those that had been completed had not found serious issues.

MASH Recommendations

Key recommendations based on the MASH PA Assessment are summarized below.

Project Funding

- The short time in which the MASH Track 1 program became fully subscribed suggests that the incentive levels may be higher than needed. The incentive levels should be lowered if new Track 1 funding becomes available. The Market Assessment will investigate the appropriate incentive levels to move the market.

- The current incentive strategy promotes projects that provide tenant benefits and should be maintained.

Track 2

- If Track 2 is continued, the project objectives and associated scoring criteria should be limited to providing direct tenant benefits, in the form of verifiable bill reductions (such as through a VNM agreement) and the installation of comprehensive energy efficiency retrofits in tenant spaces, unless clear and quantifiable objectives and scoring criteria can be developed for education and outreach, and job creation and training. This will ensure that the proposed activities are verifiable, the benefits accrue directly to tenants, and that complex or ongoing verification efforts are not required.

- If Track 2 is continued, certain changes should be made to the requirements to pinpoint the desired outcomes and give clear direction to proposers on what is likely to be a successful proposal. These changes include: Objectives should be limited to direct tenant benefits, and energy-related education, outreach, and job creation;

- Tenant benefits should be limited to direct, and quantifiable tenant benefits, such as bill reductions (such as through a VNM agreement) and the installation of comprehensive energy retrofits in tenant spaces;

- Energy-related education, outreach, and job creation efforts should include a quarterly reporting requirement for the duration of the funding;

- The PAs should develop cost proposal worksheet that provides a detailed breakdown of the requested funds. The breakdown should show the costs for PV installation, energy efficiency upgrades, education, outreach, and job creation. Onetime costs, such as for the installation of PV or energy efficiency, and ongoing costs should be clearly identifiable, as should the duration of the ongoing costs;

- Details around other aspects of the proposal should also be specificed so the PAs can calculate the various costs and benefits and compare these to other proposals or to a minimum threshold. These include:

    - PV capacity so that the cost per Watt is clear;
    - Number of tenants receiving PV and energy efficiency benefits; and
    - Number of education and outreach activities to be conducted.

Energy Efficiency

- If additional funds are made available for MASH, the energy efficiency requirement should be increased to include an onsite audit by a qualified energy efficiency services provider. Energy efficiency requirements in MASH are minimal and, in Navigant's opinion, are not effective. The only requirement is to conduct an online audit and submit a disclosure form that states whether the applicant will install any energy efficiency measures. The audit appears to be viewed as just another form that needs to be submitted with the application.

MASH Virtual Net Metering

- PAs have different verification procedures for VNM tenant allocations. Such differences could be a frustration for developers working across utility territories. PAs should use the same requirements when verifying the VNM splits between tenants.

- Virtual Net Metering for MASH applies the same benefits to low-income and non-low-income residents of the participating buildings. Under the current tariffs, the benefits are applied to the residents based on apartment size, and not on whether or not the household has income at or below

80 percent of area median income. The CPUC and the utilities should consider applying the benefits from the low-income program only to the low-income tenants.

- Although an analysis of general market for PV was beyond the scope of this evaluation, there seem to be benefits to expanding VNM to general market multi-family buildings or tenant spaces. Spreading the VNM set up costs in the utility billing systems over a greater number of projects would reduce the average cost per account. However, the utilities should look for a more efficient solution for conducting the monthly, ongoing VNM billing to reduce the per account costs further.

Program Tracking

- A uniform template should be developed for reporting MASH statistics to the public and CPUC. Updates to the data should be made quarterly with a standard cutoff date. Track 2 should be included with project status information included.

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IV. Appendix A: CSI LI SASH PA Interview Guide

CSI LI SASH PA Data Request

Documents

1. Final SASH implementation plan
2. Installation protocols and procedures
3. Grid Alternatives organizational chart, job descriptions, person years/month
4. SASH training materials
5. Subcontractor guidelines
6. Subcontractor agreements
7. Co-funding agreements
8. SASH application
9. SASH database reports used for program management
10. SASH marketing and outreach plan
11. SASH program brochures and marketing materials, bill inserts
12. SASH marketing and outreach calendar
13. SASH presentations, conference attendance, and papers
14. SASH education materials
15. Workforce development and job training plan
16. RFP and Proposal response for Grid Alternatives to become the SASH program administrator

Data

1. Participant Data through June 30, 2010 and again through July 31, 2010:
    - Customer contact information
    - Application status – approved, not approved, or pending
    - Application status reason – why not approved
    - System Description
    - System Costs
        - Panel
        - Inverter
        - Permitting
        - Other
    - Incentives Pending
    - Incentives Paid
    - Other Job Funding

- Customer Contribution

2. Project status and tracking data through June 30, 2010 and again through July 31, 2020
3. Program administrator budget and expenditure data through July 31, 2020::
   - Administration
     - Labor and direct expense
   - Application processing
     - Labor and direct expense
     - Number of applications processed at each stage
   - Marketing
     - Labor and direct expenses

CSI LI: SASH PA Interview Guide

Background

1. How and when was Grid Alternatives founded? What is GRID's background prior to becoming PA for SASH?
2. What is the mission of your organization? Has it changed with the addition of the SASH program?
3. What percent of Grid Alternative's work is in solar installation?
4. *What percent of the solar work is in low-income homes?*
5. How does the CSI SASH program fit into your company's operations?
6. *What partnerships have you developed with community organizations prior to becoming a SASH contractor?*
7. *What additional partnerships have you developed with your work on the SASH program?*
8. How have these partnerships been valuable in the program?
9. How have you built your organizational capacity to meet the demands of a statewide program?

Program Management

1. Who are the Grid Alternatives managers and staff who work on SASH and what are their responsibilities?
2. What is your administrative budget and is it sufficient?
3. Do you think there will be any major adjustments in the administrative budget, e.g. increase or decrease in the next year?
4. What types of coordination is required between Grid Alternatives and the utilities? How has this coordination worked?
5. How do you inform the utilities that customers should be awarded their incentive payments?
6. Do you receive advisement when the utilities pay the customers their incentives for the system?
7. *How is information coordinated between Grid Alternatives staff and your SASH subcontractors?*

8. *Do you use a single supplier of materials for SASH? Has this enabled you to bring down the material cost of system installation? Do you receive discounted equipment, e.g solar panels?*
9. What are the procedures for updating program databases?
10. What types of reports are generated and reviewed as part of SASH program management?
11. What statistics do you use to monitor program performance? Do you monitor those statistics on a regular basis?
12. Has Grid Alternatives had an annual audit for the SASH program? If yes, what did this entail? How difficult was it to get the information together that was needed for the audit?

Workforce Component

1. *How does the Workforce Component of the SASH program work?*
2. *How many employees have been hired through the workforce component of the program?*
3. *How do you track workforce training and hiring?*
4. *Which colleges or solar programs do you coordinate with to develop a job pool?*
5. *How many workforce training employees are used on SASH projects?*
6. *How do you recruit volunteers for SASH installations?*
7. *How many volunteers are hired by GRID for SASH installations?*
8. *What are the barriers in improving this component of the program?*

Customer Recruitment

1. *How many applications have you received for SASH? How many of those have been eligible for the program?*
2. *What methods have you used for marketing and outreach?*
3. *How have you targeted your marketing and outreach to customers who are eligible for SASH?*
4. *What role have community based organizations played in SASH outreach?*
5. *Is the 4% budget for marketing and outreach sufficient? How often do you send out brochures, etc?*
6. *How have you found eligible households?*
7. *How much time (average) is spent with individual clients?*
8. *Has it been a challenge to find eligible households?*
9. *Is there sufficient demand among eligible customers?*
10. *To what extent would a larger pool of eligible applicants increase demand?*
11. *How could eligibility be expanded to achieve higher levels of demand?*
12. *How do customers hear about SASH?*
13. *What has the level of interest in the program been?*
14. *What challenges do you face when "selling" the job to the customers?*
15. *What concerns do potential customers have about participating in SASH? How often do these concerns cause the customer to drop out of the program?*
16. *What languages do your staff speak?*

17. *What percent of SASH potential customers that you have spoken to have a first language other than English? How do you deal with these customers?*
18. *Do you expect to be able to meet program targets by December 31, 2015, as noted in the Commission order?*

Program Implementation

1. When did the SASH program begin implementation?
2. *What types of challenges were initially faced?*
3. *How have these challenges been overcome?*
4. Do you think you will reach the goal to complete 1,000 installations by the end of 2010?
5. *Will you have "made reasonable efforts to identify the eligible population across the state within the PG&E, SCE, and SDG&E territories, and have attempted to contact them about the program" by the end of 2010? Do you believe that you identified the eligible population? What is your estimate of the size of the eligible population? Do you think you will reach the goal of contacting these customers?*
6. *What barriers have you faced identifying eligible SASH homeowners in the past 6 months?*
7. Do you think that SASH will be able to meet its MW goal within the available budget? What do you predict will be the total MW of the installed systems under SASH?
8. *Did you begin the program in one part of the state, and then phase in other parts of the state? If yes, how was the phase-in scheduled, and how has it worked?*
9. *What level of coverage do you have across the utility service territories? Are there certain parts that have been difficult to reach? If so, why?*

System Design and Inspection

1. What feedback mechanisms are in place to correct problems found with the solar installations after the 3rd party inspections?
2. What are the background/qualifications of the personnel designing and installing the solar systems?
3. What are the background/qualifications of the 3rd party inspectors?
4. What process is used for designing/sizing the solar systems?

System Funding

1. What percent receive different levels of funding per watt under SASH?
2. *What percent of total job costs have been covered by SASH incentives?*
3. *What are the funding sources other than SASH that are used on these jobs?*
4. *What costs have the customers been responsible for?*
5. *What is the payback period for the low-income customer contribution?*
6. *How do low-income households finance these costs?*
7. *Has Grid Alternatives identified new private sector financing providers and packages?*
8. *What percent of SASH customers have received loans through banks or housing agencies?*

9. *What percent of SASH customers are invited to contribute "sweat equity"? What percent of SASH customers actually contribute "sweat equity"? How many hours of work does this typically entail?*
10. *Is the "sweat equity" a route into a solar job for some of these customers?*

Service Delivery

1. What are the application and intake procedures?
2. Who reviews completed applications? What do they check for?
3. *What information do you collect and review to determine CARE eligibility and tax liability?*
4. How are completed applications processed?
5. How do you prioritize the applications?
6. *What is the length of time from application approval to system installation?*
7. How long does a system installation typically take?
8. *What is the time of the entire process from the time that the customer fills out the application to the time that the job is completed?*
9. *Do you have any ideas about how this time can be reduced?*
10. *What percent of customers drop out at some point during the process? At what point in the process do customers typically drop out?*
11. *What percent of customers require roof repair/installation prior to system installation? What percent of these customers drop of out the program?*
12. *What other types of work is frequently required before the system can be installed? Are these issues a barrier to job completion?*
13. Have you been able to bring in other partner agencies and/or funding sources to deal with housing rehabilitation issues?
14. *What are the system sizes that you are installing for SASH?*
15. What kinds of meters are included in the installed systems?
16. How do you ensure that the jobs achieve the minimum performance requirement equal to .95 of the Estimated Performance Based Buydown (EPBB) Design Factor used to calculate up-front incentive payments? How often do you need to disqualify homes because it is not possible to meet this requirement?
17. Do you believe that the removal of the geographic correction from the Design Factor was important?
18. *How do SASH customers differ from other customers that you serve overall?*
19. What follow-up do you conduct with SASH customers after system installation is complete?
20. What is the recommended maintenance for the systems? Is this the responsibility of the customer? Does Grid Alternatives contact customers to check if they have completed required maintenance?
21. What percent of projects have required follow-up visits due to malfunctioning systems?
22. Have your customers experienced any theft or vandalism on their systems?

23. *What are the total dollars in incentives that have been paid out to date? What are the total dollars in pending incentives?*

Energy Efficiency

1. *What are the current requirements with respect to energy efficiency measures for SASH participants?*
    - *Applicants must enroll in LIEE if eligible.*
    - *They must have all feasible LIEE measures installed prior to receiving a solar incentive or be on the waiting list for installation.*
    - *Applicants must include an energy efficiency audit with their incentive application.*
    - *Incentives shall not be paid until feasible LIEE measure are installed, the applicant is on the waiting list for LIEE installation, or an energy efficiency audit is completed.*
2. *How are these requirements enforced?*
3. *Do all SASH participants first receive an energy audit?*
4. *What percent take actions as a result of the audit?*
5. *What are the most common measures that are installed? Would you like additional measures for SASH participants?*
6. *To what extent do these measures reduce the system size that is needed?*
7. *How do you take into account the potential savings from future LIEE services (or measures if they were eligible for LIEE) when sizing the system?*
8. *Do you do any tracking of the energy efficiency measures that SASH participants install?*
9. *Have you been able to get priority for potential SASH customers for LIEE installation?*
10. *What percent of SASH customers are on the waiting list for LIEE when their solar system is installed?*
11. *How long do these customers wait for LIEE services?*
12. *How do you assist customers who are not eligible for LIEE services to obtain energy efficiency measures? Do you help them find financing? Do you help them find providers?*

Energy Education

1. *What energy education is provided to SASH customers by Grid Alternatives about how to understand their energy bill and solar savings?*
2. *What education is provided to SASH customers by Grid Alternatives about how to obtain federal tax credits?*
3. *What education is provided to SASH customers by Grid Alternatives about how to monitor and maintain their solar systems?*
4. *What education is provided to SASH customers about how to reduce energy usage through behavior change?*
5. *What energy education do your subcontractors provide to these customers?*
6. *Are any materials provided by the utilities for the education?*

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Program Coordination

1. *What type of coordination have you done through LIEE and CARE program managers at the utilities?*
2. *What percent of SASH potential customers had already received LIEE? Of those who have not, what percent are eligible? Are all of these customers who are eligible but have not received LIEE referred to the program?*
3. *What percent of SASH customers are on CARE? Of those who are not, what percent are eligible? Are the eligible non-participants referred to the program?*
4. *What percent of SASH customers are LIHEAP recipients? Of those who are not, what percent are eligible? Are the eligible non-participants referred to the program?*
5. *Are SASH jobs coordinated with LIEE or any other low-income programs? If yes, how is the coordination done? How often does it happen?*
6. *Does LIEE currently collect information during the audit that would allow you to determine whether customers are eligible for SASH?*
7. *What are the barriers to program coordination?*
8. *What referrals are made to the SASH customers?*
9. Do SASH customers ask for additional types of assistance?

Grid Alternatives Staff

1. What qualifications do you look for in potential staff?
2. Do you offer any training programs to potential staff? How are these funded?
3. What training do you provide to your staff?
4. How do you assess your staff?
5. How many additional staff members have you hired to do work on SASH?
6. What are the levels and salary ranges of these jobs?
7. Do you believe that you will have enough work to maintain these staff members after the SASH program is complete?

Subcontractors

1. *How many existing subcontractors did you have available to do SASH work for you?*
2. *How many new subcontractors did you hire to work on SASH?*
3. How many total staff members do these new subcontractors have to work on SASH?
4. How are SASH subcontractors recruited and hired?
5. *What are the qualifications and experience that you require for subcontractors?*
6. Does Grid Alternatives provide training to subcontractors? If yes, what does that training entail?
7. *How do you assess your contractors?*
8. *What has been your experience with the performance of your subcontractors?*
9. Have you had to terminate relationships with subcontractors due to inadequate performance?
10. Is there any approval process by the utilities or the CPUC for these subcontractors?

11. *Do you recruit customers for your subcontractors? At what point in the process do you hand the job over to the subcontractor?*
12. How do subcontractors report on completed jobs and invoice Grid Alternatives for their work?
13. *How do you allocate jobs between your staff and your subcontractors?*
14. *What percent of SASH jobs have been done by subcontractors to date? What percent do you expect it to be overall in the SASH program?*
15. How soon do you expect subcontractors to complete jobs?
16. *Do the subcontractors procure their own materials?*

Program Performance

1. *What types of feedback have you received from customers?*
2. Have you conducted a customer satisfaction survey? If yes, what were the results?

Quality Control

1. What percent of jobs done by Grid Alternatives staff does Grid Alternatives do a final inspection on?
2. What percent of jobs done by subcontractors does Grid Alternatives do a final inspection on?
3. What do you look for during these inspections?
4. What have been the findings from the inspections?
5. Have you done any self-evaluation of your work on the SASH program? If yes, what have been your findings?
6. What percent of jobs receive third party inspections? Who conducts these inspections? What have these inspections found?

Overarching

1. What advantages do you think Grid Alternative offers over utilities for the administration of SASH? How important have these advantages been in the implementation of the program?
2. What are the barriers that you have faced in SASH?
3. What are the program guidelines that cause the most difficulty?
4. What changes would you like to make to the program?
5. Which programs do you see as your peers outside of California?
6. Is it possible for the SASH market to sustain itself without support from CSI? If so, under what conditions would that be possible?

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V. Appendix B: CSI LI MASH PA Interview Guide

CSI LI: MASH PA Data Request

Documents:

Final MASH implementation plan

Installation protocols and procedures

MASH training materials

Contractor guidelines

Contractor agreements

Co-funding agreements

MASH applications – Track 1 and Track 2

Track 2 application review criteria

MASH database reports used for program management

MASH marketing and outreach plan

MASH program brochures and marketing materials, bill inserts

MASH marketing and outreach calendar

MASH presentations, conference attendance, and papers

MASH semi-annual progress reports

MASH semi-annual administrative expense reports

VNM tariff used for MASH projects

Data:

Participant Data through July 31, 2010

Customer contact information

Application status – approved, not approved, or pending

Application status reason – why not approved

System Description

System Costs

Panel

Inverter

Permitting

Other

Incentives Pending

Incentives Paid
Other Job Funding
Customer Contribution

Project status and tracking data through July 31, 2010

Program administrator budget and expenditure data through July 31, 2010:
Administration
Labor and direct expense
Application processing
Labor and direct expense
Number of applications processed at each stage
Marketing
Labor and direct expenses

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CSI LI: MASH PA Interview Guide

Program Management

1. Who are the staff members at your utility (or the California Center for Sustainable Energy (CCSE) for SDG&E) who are responsible for MASH and what are their responsibilities?
2. Are these same staff members responsible for the general market CSI program?
3. What other synergies did you have between MASH and the existing CSI administrative structures?
4. Did these synergies help you to implement MASH in a quick and cost-effective manner?
5. How have you allocated the 10% administrative budget to administration, marketing, and outreach?
6. Is this administrative budget sufficient for MASH?
7. What types of coordination is required between you and your contractors? How has this coordination worked?
8. How do your contractors inform you that customers should be awarded their incentive payments?
9. Do you advise the contractors when you pay the customers their incentives for the system?
10. Do you use a single supplier of materials for MASH or is each contractor required to procure materials?
11. What are the procedures for updating program databases?
12. What types of reports are generated and reviewed as part of MASH program management?
13. What statistics do you use to monitor program performance? Do you monitor those statistics on a regular basis?
14. Have you had an annual audit for the MASH program? If yes, what did this entail? How difficult was it to get the information together that was needed for the audit?

Customer Recruitment

1. How many applications have you received for MASH? How many of those have been eligible for the program?
2. What methods have you used for marketing and outreach?
3. Have you coordinated the marketing and outreach with "entities with experience in affordable housing"?
4. What role have community based organizations played in MASH outreach?
5. How have you targeted your marketing and outreach to customers who are eligible for MASH?
6. Is the budget for marketing and outreach sufficient?
7. How have you found eligible customers?
8. To what extent would a larger pool of eligible applicants increase demand?

9. How could eligibility be expanded to achieve higher levels of demand?
10. How do customers hear about MASH?
11. What has the level of interest in the program been?
12. What concerns do potential customers have about participating in MASH? How often do these concerns cause the customer to drop out of the program?
13. Do you expect to be able to meet program targets by December 31, 2015, as noted in the Commission order? Do you expect to meet them before this date, given the great interest in the program?

Program Implementation

1. When did the MASH program begin implementation?

   Began accepting Track 1 applications in February 2009

   Conducted first round of Track 2 application evaluations between July and December 2009

   Offered a VNM utility tariff option in June 2009
2. What types of challenges were initially faced?
3. How have these challenges been overcome?
4. Did you reach the goal to provide applications for Track 1 incentives to the public and create statewide application for Track 2 incentive proposals within four months of the Commission's MASH order (dated 10/16/08)?

   Track 1 was launched on 2/17/09.
5. Did you "make reasonable efforts to identify the eligible population in your service territory and attempt to contact them about MASH by the end of 2010?

   In the first 6 months after launch, the PAs held workshops, served on panels in statewide and local affordable housing conferences, and met with representatives of the affordable housing community.

   The PAs also reached out to the US HUD and non-profit developers.
6. Do you think you will reach the goal to complete 50 installations by the end of 2012?
7. Do you think that MASH will be able to meet its MW goal within the available budget? What do you predict will be the total MW of the installed systems in your service territory under MASH?
8. What level of coverage do you have across your service territories? Are there certain parts that have been difficult to reach? If so, why?

System Design and Inspection

1. What are the background/qualifications of the 3rd party inspectors?
2. What feedback mechanisms are in place to correct problems found with the solar installations after the 3rd party inspections?
3. What are the background/qualifications of the personnel designing and installing the solar systems? (If known)

Job Funding

1. What percent of total job costs have been covered by MASH incentives?
2. What are the funding sources other than MASH that are used on these jobs?
3. What percent of the costs have the building owners/managers been responsible for?
4. How do building owners finance their share of the costs?
5. To what extent are PPAs being used? Which entities are providing the PPAs?

Program Applications

1. Most or all of the program funds under Track 1 were reserved by the end of 2009. Do you think the Track 1 incentives were too high? What incentive price would have been optimal for the MASH Program?
2. How many projects are currently on the Track 1 waitlist?

   As of 12/2009 it was 63 projects for PG&E and 1 project for CCSE.
3. Track 2 is a competitive process where applications are to be judged based on incentive level sought, the amount of direct tenant benefit to be shared, the method and timing to provide direct tenant benefits, and the reasonable use of program funds. How do you assess Track 2 applications?
4. Did the utilities coordinate to develop consistent criteria to evaluate Track 2 applications?
5. What role did the affordable housing community have in the Track 2 development process?
6. Do you feel that the Track 2 process has led to innovative models for solar energy systems on affordable housing projects? Describe.

   The January 2010 semi-annual progress report states that while 179 Track 1 applications were reserved, only 1 Track 2 application had been reserved in 2009.
7. How many Track 2 applications have been denied?

   The January 2010 semi-annual progress report states that the submitted applications generally did not provide the tenant benefits required to receive incentives about the Track 1 level. Do you think more explanation is needed in the Track 2 application package?
8. Did you receive Track 2 applications that provided greater tenant benefits in the following funding cycle?
9. Do you think you need to do additional marketing focused on Track 2 to receive more Track 2 applications?
10. Do you think some of the Track 2 funding should be reallocated to Track 1?
11. What are the reasons that Track 2 applicants provide for seeking higher incentive levels than offered in Track 1?
12. What percent of capital costs and ongoing operation and maintenance costs have been awarded to Track 2 applications (a PA can award up to 100% of capital costs of the project as well as ongoing operation and maintenance costs.)

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Service Delivery

1. What are the application and intake procedures?
2. How are completed applications processed?
3. Who reviews completed applications? What do they check for?
4. What information do you collect and review to determine MASH eligibility?
5. How do you prioritize the applications?
6. What is the length of time from application approval to system installation?
7. How long does a system installation typically take?
8. What is the time of the entire process from the time that the customer fills out the application to the time that the job is completed?
9. Do you have any ideas about how this time can be reduced?
10. What percent of customers drop out at some point during the process? At what point in the process do customers typically drop out?
11. What percent of customers require roof repair/installation prior to system installation? What percent of these customers drop of out the program?
12. What other types of work is frequently required before the system can be installed? Are these issues a barrier to job completion?
13. Have you been able to bring in other partner agencies and/or funding sources to deal with building rehabilitation issues?
14. What kinds of meters are included in the installed systems?
15. How do you ensure that the jobs achieve the minimum performance requirement equal to .95 of the Estimated Performance Based Buydown (EPBB) Design Factor used to calculate up-front incentive payments? How often do you need to disqualify homes because it is not possible to meet this requirement?
16. Do you believe that the removal of the geographic correction from the Design Factor was important?
17. How do MASH customers differ from general market solar customers?
18. How do the average system costs and incentives under Track 2 compare to those under Track 1?
19. What follow-up do you conduct with MASH customers after system installation is complete?
20. What is the recommended maintenance for the systems? Is this the responsibility of the customer? Does the utility or the contractor contact customers to check if they have completed required maintenance?
21. What percent of jobs have required follow-up visits due to malfunctioning systems?
22. Have your customers experienced any theft or vandalism on their systems?

Energy Efficiency

1. What are the current requirements with respect to energy efficiency measures for MASH participants?
2. Applicants must comply with energy audit information and disclosure requirements, unless they have complied with Title 24 requirements for newly constructed buildings in the past three years.
3. Building owners are required to provide LIEE information to tenants to encourage their participation.
4. Building owners are required to allow eligible and willing tenants to participate in LIEE programs to the extent feasible.
5. How are these requirements enforced?
6. Do all MASH participants first receive an energy audit?
7. What percent take actions as a result of the audit?
8. What are the most common measures that are installed?
9. To what extent do these measures reduce the system size that is needed?
10. Do you do any tracking of the energy efficiency measures that MASH participants install?
11. How do you assist customers to obtain energy efficiency measures? Do you help them find financing? Do you help them find providers?

Energy Education

12. What energy education is provided to MASH customers about how to understand the energy bill and solar savings?
13. What education is provided to MASH customers about how to obtain federal tax credits?
14. What education is provided to MASH customers about how to monitor and maintain their solar systems?
15. What energy education do your contractors provide to these customers?
16. Does your utility provide any materials for the education?

Virtual Net Metering

17. How common is VNM on MASH jobs?
18. What impact has VNM had on your billing system?
19. What costs has your utility borne as a result of VNM? Have these costs been recovered from the administrative budget for the general market CSI program, as directed in the MASH order?
20. How much would it cost the utility to expand VNM to: 1) MASH-eligible projects and 2) the general (non-MASH) multi-tenant market?
21. What costs have building owners/managers borne for installing generator output meters required to insure appropriate customer credits? How often are new meters needed?
22. What information does the building owner send you when documenting the VNM allocation?
23. What are the challenges faced with VNM?

24. Do you have recommendations for changes to Commission regulations in this area?

Program Coordination

1. How had MASH been coordinated with SASH?
2. How have you worked with community stakeholders to develop training strategies for reaching disadvantaged communities, to incorporated green job creation into the MASH program?
3. What referrals are made to the MASH customers?
4. Do MASH customers ask for additional types of assistance?

Contractors

1. Did you hire any new contractors to work on MASH? If so, how many? For what program functions? (If not, skip to "Program Performance")
2. How many total staff members do these new contractors have to work on MASH?
3. How are MASH contractors recruited and hired?
4. What are the qualifications and experience that you require for contractors?
5. Does your utility provide training to contractors? If yes, what does that training entail?
6. How do you assess your contractors?
7. What has been your experience with the performance of your contractors?
8. Have you had to terminate relationships with contractors due to inadequate performance?
9. Is there any approval process by the CPUC for the contractors?
10. If contractors perform a customer function, ask:
11. Do you recruit customers for your contractors? At what point in the process do you hand the job over to the contractor?
12. How do contractors report on completed jobs and invoice you for their work?
13. How do you allocate jobs between your contractors?
14. How soon do you expect contractors to complete jobs?

Program Performance

1. What types of feedback have you received from customers?
2. Have you conducted a customer satisfaction survey? If yes, what were the results? If no, then will you be considering something similar?

Quality Control

1. What percent of jobs do you do a final inspection on?
2. What do you look for during these inspections?
3. What have been the findings from the inspections?

4. Have you done any self-evaluation of your work on the MASH program? If yes, what have been your findings?
5. What percent of jobs receive third party inspections? Who conducts these inspections? What have these inspections found?

Overarching

1. What are the barriers that you have faced in MASH?
2. What are the program guidelines that cause the most difficulty?
3. What changes would you like to make to the program?
4. Which programs outside of California do you see as your peers?
5. Is it possible for the MASH market to sustain itself in the absence of CSI?

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VI. Appendix C: Differences in Income Threshold for Eligibility for SASH compared to CARE/LIEE and FERA, Detail by County

County	% of AMI	Income limit by # of persons in household							
		1	2	3	4	5	6	7	8
Alameda	80%	$45,100	$51,550	$58,000	$64,400	$69,600	$74,750	$79,900	$85,050
Amador	80%	$38,050	$43,450	$48,900	$54,300	$58,650	$63,000	$67,350	$71,700
Butte	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Calaveras	80%	$36,050	$41,200	$46,350	$51,500	$55,650	$59,750	$63,900	$68,000
Colusa	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Contra Costa	80%	$45,100	$51,550	$58,000	$64,400	$69,600	$74,750	$79,900	$85,050
Fresno	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Glenn	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Humboldt	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Imperial	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Inyo	80%	$33,750	$38,550	$43,350	$48,150	$52,050	$55,900	$59,750	$63,600
Kern	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Kings	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Lake	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Los Angeles	80%	$46,400	$53,000	$59,650	$66,250	$71,550	$76,850	$82,150	$87,450
Madera	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Marin	80%	$60,200	$68,800	$77,400	$86,000	$92,900	$99,800	$106,650	$113,550
Mendocino	80%	$31,650	$36,200	$40,700	$45,200	$48,850	$52,450	$56,050	$59,700
Merced	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Mono	80%	$38,000	$43,400	$48,850	$54,250	$58,600	$62,950	$67,300	$71,650
Monterey	80%	$37,050	$42,350	$47,650	$52,900	$57,150	$61,400	$65,600	$69,850
Napa	80%	$45,100	$51,550	$58,000	$64,400	$69,600	$74,750	$79,900	$85,050
Nevada	80%	$38,750	$44,300	$49,850	$55,350	$59,800	$64,250	$68,650	$73,100
Orange	80%	$52,050	$59,450	$66,900	$74,300	$80,250	$86,200	$92,150	$98,100
Placer	80%	$40,950	$46,800	$52,650	$58,500	$63,200	$67,900	$72,550	$77,250
Riverside	80%	$36,400	$41,600	$46,800	$52,000	$56,200	$60,350	$64,500	$68,650
Sacramento	80%	$40,950	$46,800	$52,650	$58,500	$63,200	$67,900	$72,550	$77,250
San Benito	80%	$45,100	$51,550	$58,000	$64,400	$69,600	$74,750	$79,900	$85,050
San Bernardino	80%	$36,400	$41,600	$46,800	$52,000	$56,200	$60,350	$64,500	$68,650
San Diego	80%	$44,000	$50,250	$56,550	$62,800	$67,850	$72,850	$77,900	$82,900
San Francisco	80%	$60,200	$68,800	$77,400	$86,000	$92,900	$99,800	$106,650	$113,550

County	% of AMI	Income limit by # of persons in household							
		1	2	3	4	5	6	7	8
San Joaquin	80%	$35,350	$40,400	$45,450	$50,500	$54,550	$58,600	$62,650	$66,700
San Luis Obispo	80%	$40,600	$46,400	$52,200	$58,000	$62,650	$67,300	$71,950	$76,600
San Mateo	80%	$60,200	$68,800	$77,400	$86,000	$92,900	$99,800	$106,650	$113,550
Santa Barbara	80%	$41,450	$47,400	$53,300	$59,200	$63,950	$68,700	$73,450	$78,150
Santa Clara	80%	$56,500	$64,600	$72,650	$80,700	$87,200	$93,650	$100,100	$106,550
Santa Cruz	80%	$54,050	$61,800	$69,500	$77,200	$83,400	$89,600	$95,750	$101,950
Shasta	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Solano	80%	$44,350	$50,700	$57,050	$63,350	$68,450	$73,500	$78,600	$83,650
Sonoma	80%	$45,050	$51,450	$57,900	$64,300	$69,450	$74,600	$79,750	$84,900
Stanislaus	80%	$33,350	$38,100	$42,850	$47,600	$51,450	$55,250	$59,050	$62,850
Sutter	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Tehama	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Trinity	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Tulare	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500
Tuolumne	80%	$33,450	$38,200	$43,000	$47,750	$51,600	$55,400	$59,250	$63,050
Ventura	80%	$48,300	$55,200	$62,100	$68,950	$74,500	$80,000	$85,500	$91,050
Yolo	80%	$40,600	$46,400	$52,200	$58,000	$62,650	$67,300	$71,950	$76,600
Yuba	80%	$31,550	$36,050	$40,550	$45,050	$48,700	$52,300	$55,900	$59,500

Key: FERA Threshold = 125% of CARE/LIEE Threshold

CARE/LIEE and FERA Thresholds > **CSI Threshold**

CARE/LIEE Threshold < **CSI Threshold** < (125% of CARE/LIEE Threshold) or FERA Threshold

(125% of CARE/LIEE Threshold) or FERA Threshold < **CSI Threshold** ≤ (150% of CARE/LIEE Threshold) or (120% of FERA Threshold)