SOLAR ON MULTIFAMILY AFFORDABLE HOUSING PHASE II REPORT

Submitted to:
California Public Utilities Commission

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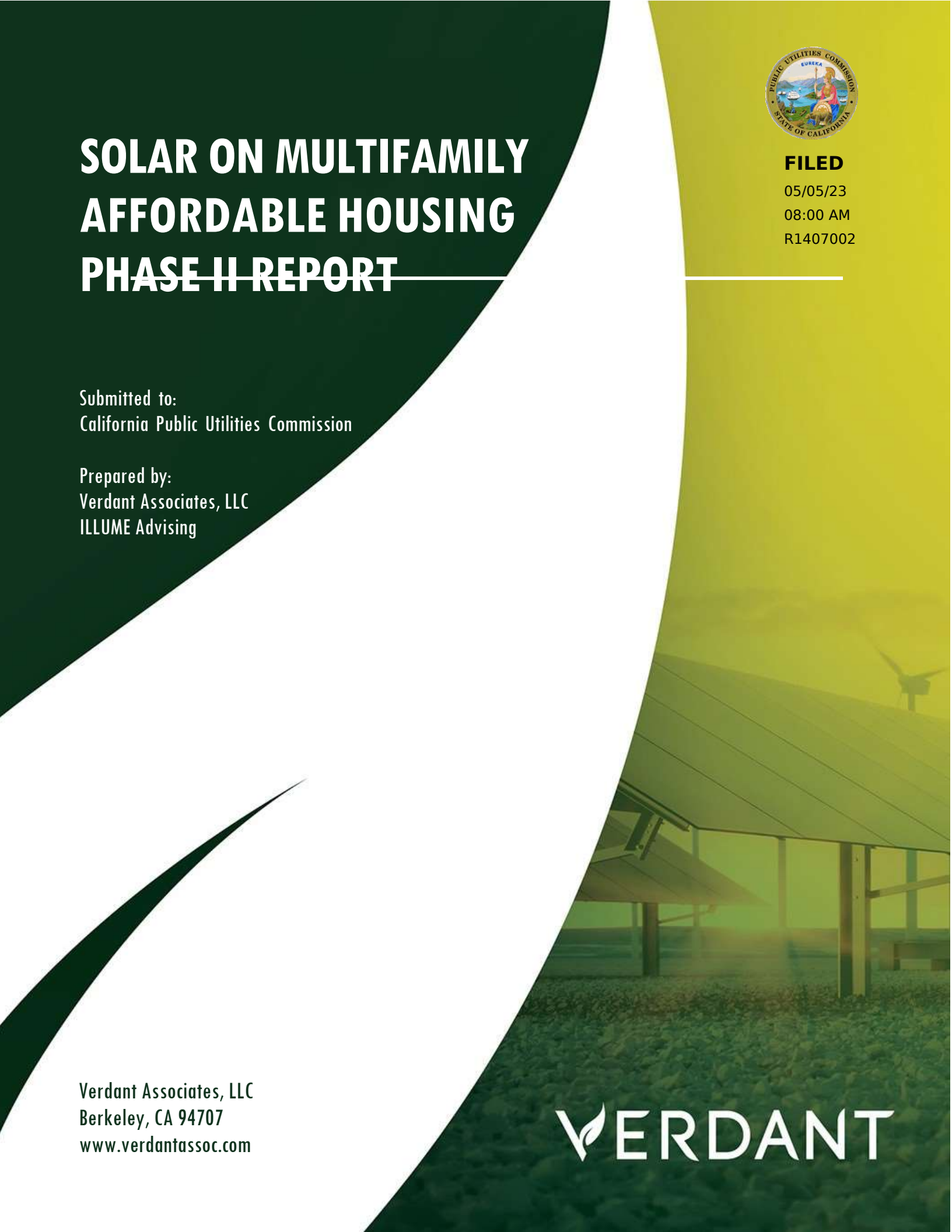

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1 EXECUTIVE SUMMARY

This report represents the second[1] Solar on Multifamily Affordable Housing (SOMAH) Program evaluation. The evaluation is divided into two phases as defined by the SOMAH Evaluation Research Plan.[2] This Phase II evaluation report is focused on estimating program impacts (energy, environmental, and economic), finalizing program metrics and key performance indicators (KPIs), and collecting and analyzing data from SOMAH Program participants (solar contractors and property owners).

1.1 BACKGROUND

California State Assembly Bill (AB) 693 directed the California Public Utilities Commission (CPUC) to institute a new program intended to make qualifying solar energy systems accessible to low-income and disadvantaged communities (DAC).[3] In December 2017, the CPUC issued Decision (D.) 17-12-022 creating the SOMAH Program and establishing program goals and eligibility requirements. The primary goal of this program is to install solar energy systems that have a generating capacity equivalent to at least 300 MW (CEC-AC) on qualified multifamily affordable housing properties through December 31, 2030[4] and to increase workforce development and training activities to support economic development in underserved communities.

The SOMAH Program provides significant subsidies for the installation of solar photovoltaic (PV) systems on qualifying multifamily affordable housing properties (i.e., multifamily housing financed with low-income housing tax credits, tax-exempt mortgage revenue bonds, general obligation bonds, or local, state, or federal loans or grants). To qualify for SOMAH incentives, properties must be existing deed restricted properties, have at least five units, and separately metered tenant units. They must also satisfy either having A) 80% of their total tenant households with incomes at or below 60% of the area median income or B) be in a DAC that scores in the top 25% of census tracts statewide, as identified by the Office of Environmental Health Hazard Assessment (OEHHA) on behalf of the California Environmental Protection Agency (CalEPA).

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1 Final Phase I report: https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/s/6442465840-somah-phase1-evaluation-final-report.pdf

2 Final 2020 SOMAH Process and Impact Assessment Research Plans: https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/2/6442464842-2020-somah-process-and-impact-assessment-research-plan.pdf

3 California AB 693. Multifamily Affordable Housing Solar Roofs Program. Eggman, 2015. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB693

4 This program is funded by Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas and Electric (SDG&E), Liberty Utilities, and PacifiCorp, collectively the investor-owned utilities or IOUs.

1.2 RESEARCH AREA AND EVALUATION APPROACH

Table 1-1 presents the primary areas of research for Phase II of the SOMAH evaluation along with an overview of the approach employed by the evaluation team to conduct this research. A comprehensive overview of the evaluation methods used is provided in Section 3 of this report.

TABLE 1-1: RESEARCH FOCUS AND EVALUATION APPROACH

Research Focus	Evaluation Approach
Development of metrics and KPIs to measure SOMAH's success across various dimensions in future evaluations	Collaborative effort with key program stakeholders to review and assess the list of potential program metrics and KPIs developed in Phase I of the evaluation
Program Participation Assessment to quantify and characterize SOMAH projects to date across key attributes such as current status, location, ownership type, financing, contractor, etc.	Comprehensive analysis of SOMAH application and project data stored in the PowerClerk program tracking database
Program Process Assessment to identify primary motivations and barriers to SOMAH participation, satisfaction with SOMAH and program elements, and gather feedback on areas for improvement	Interviews and web surveys with participating and non-participating contractors and property owners and members of the SOMAH PA to assess experiences with the SOMAH Program to date
Program Impact Assessment to quantify the estimated energy (MWh), peak demand (MW), greenhouse gas (GHG), and economic (bill savings and avoided costs) impacts resulting from SOMAH applications to date	Analysis of proposed PV systems in program tracking data in order to simulate PV system generation, and estimate future program impacts in combination with CAISO and IOU peak demand data, marginal IOU emissions, tariff structures, avoided costs, and Virtual Net Energy Metering (VNEM) provisions

1.3 SOMAH PROGRAM ACCOMPLISHMENTS TO DATE

SOMAH program accomplishments to date must be viewed in the context of two key events:

- The SOMAH program was first implemented in July 2019. Shortly thereafter the program administrator received a very large volume of applications. The program was immediately oversubscribed at three of the five participating IOU service territories. This resulted in the program having to waitlist a significant number of applications until additional funding became available. The waitlist for SDG&E was so long that the program closed the waitlist to additional applications.

- During early 2020 California's economy began to shut down in response to the COVID-19 pandemic. This shutdown resulted in significant lockdowns that impacted tenants, property owners, contractors, government offices (that process permit applications), and supply chains essential for solar construction projects.

The remainder of this report, specifically program accomplishments to date, should be viewed in light of these COVID-19 impacts, many of which are just starting to dissipate nearly a year and a half after they started. Since the SOMAH Program inception in June 2019, a total of 534 applications have been

submitted, representing roughly 93 MW_{AC} of future generation capacity. This capacity represents 31 percent of the overall program goal of 300 MW_{AC}. However, throughout the past two years, 124 applications were found to be ineligible or infeasible and thus were cancelled, so the current reserved capacity has dropped to 68 MW_{AC} (23 percent of the overall program goal). As of April 29th, 2021, one SOMAH project has been completed and the SOMAH incentive has been paid. An additional three SOMAH projects have their solar system installed and have recently submitted their incentive claim with the SOMAH PA. Currently, of the $411M in SOMAH incentive funding that is available statewide, $126,238 has been paid, $106M has been reserved (i.e., projects that have received Reservation Request Approval), $43M is pending reservation (i.e., projects with Reservation Request in process), and $261M is available for additional SOMAH applications.

1.4 KEY EVALUATION FINDINGS

This section presents a summary of the key findings stemming from the impact and process evaluation of the SOMAH Program. A comprehensive presentation of the evaluation's findings, along with actionable recommendations for program improvement, are presented in Section 7 of this report.

1.4.1 Participation and Process Assessment Findings

Analysis of program tracking data allowed the Verdant team to conduct a thorough assessment of SOMAH participation to date. SOMAH Program interest started out very strong, resulting in the program reaching its capacity within the first week. Application volumes have since declined after satisfying pent-up demand. Project application review and approval timelines have been long, with few projects completed two-years after the program launch. Application processing and approval timelines have been lengthened due to the impact COVID-19 has had on developers, property owners, and government agencies who are responsible for project permitting. At the time of this report, approximately one-quarter of active applications are for properties located in a DAC, which aligns with the percentage of DAC eligible properties. SOMAH eligible contractors located near DACs appear to be limited which could present a future barrier to increasing DAC participation. On average, the rated capacity of SOMAH solar PV projects has been more than double that of MASH projects, likely due to SOMAH's significantly higher tenant area incentives. The Track A application track that supports property owners in need of supplemental technical assistance has received few applications and has experienced a higher-than-average rate of cancellation.

Participation has been dominated by a few large contractors and affordable housing organizations who have submitted multiple applications. Contractors reported that program rules and participation requirements are onerous, presenting a significant administrative burden, and thus are a primary barrier to participation Contractor barriers also include project financing and solar feasibility related issues. Despite these barriers, participating contractors report SOMAH is an important program that is having a

large impact on low-income multifamily solar projects and that few of their projects would be completed without the program. Contractor satisfaction with the program was moderate and primarily reduced due to the burden resulting from program requirements.

SOMAH awareness amongst participating property owners primarily stems from prior solar program experience (primarily MASH or CSI) and direct contractor outreach. Property owner stated motivations to participate in SOMAH are primarily financial, tenant equity, or environmental. SOMAH participation provides other significant perceived benefits to tenants and property owners such as increased ability to pay rent and fund property upgrades or tenant services due to reduced energy bills, making older buildings more comparable to newly constructed properties, and establishing good will from local government agencies who fund and permit projects. Property owners' primary barriers to participation are related to the lack of time and financial resources required to participate, physical site issues, distrust in either a contractor or the program, and a lack of prioritization amongst other affordable housing priorities.

System ownership has been dominated by Power Purchase Agreements (PPA), which made up two-thirds of active applications. Most PPA projects, unlike Host Customer Ownership (HCO) projects plan to leverage the Investment Tax Credit (ITC), which decreases the SOMAH incentive by one-third, extending the incentives available for future SOMAH projects. PPA projects plan to pair the SOMAH PV with behind-the-meter (BTM) storage more frequently than HCO projects (however, it should be noted that pairing BTM storage with in-front-of meter VNEM/SOMAH PV poses technical and regulatory challenges that have yet to be worked out). PPA ownership has been essential for many property owners as it eliminates upfront out-of-pocket costs and future operation and maintenance (O&M) related expenses and concerns. PPA ownership has only been offered by two of the ten participating contractors. Determining project financing and ownership is one of the most difficult and time-consuming components of SOMAH participation for contractors and property owners. Appropriately setting SOMAH incentives is essential to encourage participation amongst a diverse set of participants. At this time, the SOMAH Program appears capable of achieving its 10-year goal of installing 300 MW of solar PV. Achieving this goal will require the SOMAH PA continue their focus on marketing and outreach activities that effectively build a pipeline of new and engaged program applicants, while simultaneously working to address participation barriers faced by property owners and contractors.

1.4.2 Impact Assessment Findings

Given data availability limitations arising from the lack of a sufficient number of completed projects, this evaluation is limited to presenting simulated ex-ante impacts across currently active SOMAH applications. This evaluation estimated the ex-ante energy and demand, greenhouse gas and customer bill impacts

anticipated from current SOMAH PV system applications. The evaluation research suggests the following impacts:

- **Energy/Demand Impacts:** Annual estimated ex-ante electric generation across SOMAH applications is 118,816 MWh. Active SOMAH applications would have contributed approximately 43.3 MW and 4.9 MW of generation during the CAISO 2020 gross and net peak hours, respectively.

- **Greenhouse Gas Impacts:** SOMAH projects are expected to reduce greenhouse gas emissions by 23,670 metric tons during their first year of operation using 2020 emission rates.

- **Bill Impacts:** SOMAH projects are expected to reduce common area monthly bills by $2-$2.5K (roughly 70 percent of previous bills) and tenant monthly bills by round $50/tenant (roughly 80 percent of previous bills). The SOMAH Program is intended to offset a portion of the CARE[5] funding provided by ratepayers. Tenants who receive CARE discounts on their bills will experience slightly smaller SOMAH related bill reductions ($35/month per tenant) but these reductions account for a larger percentage (roughly 92 percent) of their previous bills.

Once projects are completed and interconnected, the program will have a better understanding of final system configurations (e.g., storage pairing plans). We recommend that future program evaluations leverage actual metered data and customer bills to validate the ex-ante findings presented in this report and shed light on reasons for significant deviations from expected performance if found.

[5] California Alternative Rates for Energy Program (CARE) provides discounts on gas and electricity bills to participants who qualify through income guidelines or enrollment in certain public assistance programs.

2 INTRODUCTION

The Solar on Multifamily Affordable Housing (SOMAH) Program offers incentives to applicants for the installation of solar photovoltaic (PV) energy systems on multifamily affordable housing as a means of increasing access to solar energy and bill savings among low-income households and disadvantaged communities (DACs) throughout California. The SOMAH Program also engages in workforce development and training activities to support economic development in underserved communities.

Verdant Associates (Verdant) and ILLUME Advising (ILLUME) (the "evaluation team") have been contracted by San Diego Gas and Electric (SDG&E) on behalf of the California Public Utilities Commission (CPUC) to evaluate the process and load impacts of the SOMAH Program, as directed by CPUC Decision (D.) 17-12-022. The evaluation of the SOMAH Program was conducted in two phases. Phase I efforts (completed in August of 2020) focused on early feedback on the program's goals, design, evaluability, and initial program performance. A program theory and logic model (PTLM) and a comprehensive set of recommended SOMAH Program metrics and key performance indicators (KPIs) were key Phase I outputs and helped to assess the program's performance in Phase II of this evaluation as well as future program evaluations. The Phase I report represented the initial deliverable of the SOMAH Program's first evaluation study and thus was a critical step towards setting up the program for successful evaluations. This Phase II report represents the culmination of the initial SOMAH evaluation and provides findings from data collection activities conducted with program participants (contractors and property owners) and the results of the first program impact evaluation measuring the program's energy (kWh and kW), greenhouse gas (GHG), and economic (bill savings) impacts.

This report also fulfills the SOMAH reporting requirements as directed by Public Utilities (PU) Code 913.8. A matrix of the SOMAH reporting requirements and the evaluation team's fulfillment of these requirements is provided in Appendix A.

2.1 BACKGROUND

California State Assembly Bill (AB) 693 directed the CPUC to institute a new program intended to make qualifying solar energy systems more accessible to low-income and DACs.[6] The goal of this program is to install solar energy systems that have a generating capacity equivalent to at least 300 MW (CEC-AC) on

[6] California AB 693. Multifamily Affordable Housing Solar Roofs Program. Eggman, 2015. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB693

qualified multifamily affordable housing properties through December 31, 2030.[7] In accordance with AB 693, the CPUC issued D.17-12-022 on December 14, 2017, creating the SOMAH Program and establishing program goals and eligibility requirements. On April 23, 2020, the CPUC issued D.20-04-012 that determined revenues are available and that there is adequate participation and interest in SOMAH Program. That decision continued authorization of allocation of funds to the SOMAH Program through June 30, 2026.

The SOMAH Program is jointly administered statewide by a single program administrator (PA) team made up of the Association for Energy Affordability (AEA), Center for Sustainable Energy (CSE), GRID Alternatives (GRID), and the California Housing Partnership Corporation (CHPC). The program has distinct rules and eligibility requirements, including an increasing focus on serving properties in DACs. In compliance with the terms of AB 693, the SOMAH Program provides significant subsidies for the installation of solar photovoltaic (PV) systems on qualifying multifamily affordable housing properties (i.e., multifamily housing financed with low-income housing tax credits, tax-exempt mortgage revenue bonds, general obligation bonds, or local, state, or federal loans or grants). The SOMAH Program serves utility and community choice aggregator customers in the territories of PG&E, SCE, SDG&E, Liberty Utilities, and PacifiCorp. To qualify for SOMAH incentives, properties must also be occupied by residents with incomes at or below 60% of the area median income or be in a DAC, as identified by the Office of Environmental Health Hazard Assessment (OEHHA) on behalf of the California Environmental Protection Agency (CalEPA).

There are two tracks that can be used to participate in SOMAH: Track A and Track B.

- **Track A** is designed for property owners who would like to receive no-cost technical assistance services from the SOMAH PA to help them assess the solar potential at their property and to identify eligible contractors for their project, if requested. Track A Upfront Technical Assistance provides applicants an assessment of their property's energy needs and educational, technical, and financial resources to help them understand information pertaining to energy efficiency upgrades and solar installation for their property. Track A participants who decide to move forward with an application are required to collect at least three bids from a SOMAH eligible contractor for their project.

- **Track B** is designed for applicants (contractors or property owners) who do not require technical assistance to submit a project reservation. Track B participants are typically a contractor with knowledge of the program or a property owner who has identified an eligible contractor they plan to work with for their project. While Track B applicants do not receive Track A Upfront Technical Assistance, standard Technical Assistance services from the SOMAH PA are available throughout the project lifecycle.

[7] This program is funded by Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas and Electric (SDG&E), Liberty Utilities, and PacifiCorp, collectively the investor-owned utilities or IOUs.

Section 4.1 of D.17-12-022 directs the SOMAH PA to annually evaluate the incentive levels and decrease them to ensure they stay in line with the actual market cost of solar. The annual incentive step-down, as documented in the SOMAH Handbook, calls for reducing the SOMAH incentive levels "either by 5% or by the annual percent decline in residential solar costs as reflected by National Renewable Energy Lab's cost analysis (whichever is less)." The SOMAH Program incentives were stepped-down on July 1, 2020 and were slated to be stepped-down again July 2021, however the SOMAH PA has requested (and been granted) an extension to implement the annual SOMAH Program incentive step-down on October 29th, 2021. This request was issued due to a delay in the release of the NREL cost analysis report. The incentive step-down is discussed in further detail in Section 5.4.2 of this report.

As of April 29, 2021, the program had received 534 applications, of which 124 have been cancelled by property owners or were determined to be ineligible. The active application capacity is 68 MW_{AC}. The total submitted/reserved incentive amount for completed and active projects is currently $152,000,000.[8]

2.2 PHASE I RESEARCH

This study, which was divided into two phases (Phase I and Phase II), represents the SOMAH Program's first impact and process evaluation study—critical for setting up the program for successful evaluations immediately and in the future. Phase I of this evaluation, completed on August 4, 2020,[9] focused on foundational process evaluation activities, which allowed the evaluation team to quickly gain a better understanding of how the program is currently working and identify areas in need of improvement.[10]

2.2.1 Phase I Research Questions and Activities

The Phase I evaluation report addressed the following researchable questions:

1. What is the underlying program theory? Is the program operating in a manner to support this model?
2. What metrics are needed to determine the program's impact?

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8 This total represents the reserved incentive, or the submitted incentive amount if the reserved was missing from the program tracking database.

9 Phase I was designed to be completed in time to inform the CPUC's July 30, 2020 report to the California Legislature regarding the CPUC's assessment of the SOMAH Program.

10 Final Phase I 2020 SOMAH Process and Impact Assessment Report. Itron, Verdant, and Illume, August 2020. https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/s/6442465840-somah-phase1-evaluation-final-report.pdf

3. Is the program collecting the appropriate data in the correct formats to support the measurement of performance during the program's implementation?
4. Is the program evaluable based on best practice methods for solar program evaluations? If not, what program design and data collection activities need to be put in place to ensure that it is?
5. Are the program actors aligned for success?

2.2.2 Phase I Key Findings

Through in-depth interviews with the SOMAH PA, IOUs, and the CPUC, along with a detailed review of the SOMAH PA tracking database, we found during Phase I of the evaluation that the SOMAH PA and stakeholders are broadly aligned and operationally set up to achieve SOMAH Program goals. Through iterative stakeholder interviews and document review, we found that the SOMAH PA, the IOUs, and the CPUC Energy Division are aligned regarding the SOMAH Program's role in delivering solar and solar benefits to low-income and disadvantaged communities through incentivizing affordable solar energy. A subset of key findings which emerged from the Phase I evaluation and helped to shape the Phase II research are presented below. The order in which these findings are presented does not reflect any prioritization or level of importance of the findings.

1. The program would benefit from additional consensus with respect to which communities are the focus of economic and workforce development activities, and where it is presumably the intention of the legislation not to foster economic growth solely in disadvantaged communities as defined by CalEPA, but rather more broadly among underserved communities.
2. The SOMAH Program aims to drive economic development and job training opportunities in underserved communities, yet ambiguity exists around the extent to which the SOMAH Program seeks to identify and engage trainees that reside in the communities the program aims to serve.
3. The SOMAH Program was designed to encourage diverse contractor participation and create opportunities for small contractors and host customers to participate in the program; however, existing efforts need to be augmented to bring about broader, more diverse program participation.
4. We found that almost one-third of applications (28 percent) qualified as serving a DAC low-income multifamily property. The remaining applications (72 percent) qualified based on the 80% tenant threshold alone.
5. There are several data elements in the SOMAH Program application portal that are stored within forms or program correspondence documents within the portal and cannot be easily queried. This makes evaluating the current state of some program aspects difficult and onerous to track.
6. We found opportunities for improvement in the content and formatting of the IOU data. For example, some consumption datasets lacked timestamps that would allow the SOMAH PA to associate the values with specific billing periods.

After completing Phase I of the evaluation, Verdant and Illume reassessed the Phase II research activities based on the Phase I findings. The revised Phase II research questions are presented in the section below.

2.3 PHASE II RESEARCH QUESTIONS

The following research questions were the primary focus of Phase II of the SOMAH evaluation. The order in which they are presented below does not denote any prioritization of the research questions.

- Which metrics developed in Phase I are best suited to measure the program's success across various dimensions in successive evaluations?
- Are there barriers in the implementation and administration of the program that may impact its success? If so, how might they be addressed?
  - Is the program reaching the properties and customers that it originally intended to reach?
  - Is there a reason why certain cohorts or potential participant types are not submitting applications? Why are prospective building owners cancelling or withdrawing applications?
  - What is the typical project timeframe from application submittal to approved interconnection and delivery of tenant bill benefit? Is the time elapsed from application submittal to project interconnection reasonable and expected? Are there opportunities for the program to expedite this process?
- How many SOMAH projects have been installed since program inception and what are the characteristics of these projects? How have applicants changed from the first to the second year of the program?
- What are the total program and project costs to date for the SOMAH Program? How do project costs and benefits differ between host customer and third-party owned systems? What role do Federal tax credits play in the project costs?
- What are the SOMAH Program's total energy (MW and MWh), greenhouse gas (GHG), and economic (bill savings) impacts to date?

Within the Phase II report we will further examine these questions and present comprehensive findings and recommendations from this analysis.

2.4 REPORT ORGANIZATION

The remaining sections of this report are organized as follows:

- **Section 3: Evaluation Data and Methods.** This section provides an overview of the evaluation methods utilized in Phase II of this study to answer the primary process and impact research questions. It includes a summary of the of the data collection activities, sample sizes, and quantitative analysis completed.

- **Section 4: Participation Assessment.** This section provides a summary and assessment of SOMAH participation to date.

- **Section 5: Process Assessment.** This section presents the results of the SOMAH process assessment activities conducted as part of this evaluation.

- **Section 6: Impact Assessment.** This section presents the results of the first SOMAH impact assessment. It includes estimated energy and demand, greenhouse gas, and customer bill impacts.

- **Section 7: Findings and Recommendations.** This section presents a comprehensive overview of the findings and recommendations from the participation, process, and impact assessments of the SOMAH Program. It also includes recommendations for future research.

- **Appendix A: PU Code 913.8 Reporting Requirements.** This section presents a table documenting the PU Code reporting requirements for the SOMAH Program and where the reporting results are located.

- **Appendix B: SOMAH Metrics and KPI Memo and Assessment.** This section includes the memo written by the evaluation team documenting the recommended SOMAH Metrics and KPIs developed in collaboration with the SOMAH PA and CPUC staff. This process was finalized in December of 2020. This section also assesses the current state of the SOMAH Program using the defined metrics and KPIs.

- **Appendix C: Contractor and Property Owner Interview Guides and Survey Instruments.** This section includes the data collection instruments developed for Phase II of the evaluation.

- **Appendix D: Interim Targets for MW Installed.** This section includes the estimated maximum MW installed per year as presented in the SOMAH Program Implementation Plan.

3 EVALUATION DATA AND METHODS

Phase II of the evaluation built on the lessons learned during Phase I, expanded upon the process evaluation framework developed in Phase I, and provides initial estimates of the program's gross impacts. This section summarizes the research activities, data sources, and impact analysis methodologies used in Phase II of the SOMAH evaluation.

Phase II included the following core research activities:

- Evaluability consulting to review the SOMAH PA's methods of assessing metrics relating to contractor, property owner, and tenant barriers and satisfaction.
- A continuation of the Phase I program assessment, defined by metrics such as the characteristics of SOMAH first-year projects, first-year program and project costs, and an assessment of program goals and accomplishments to date.
- Interviews with program contractors and property owners.
- Development of a set of comprehensive process flow charts (PFC).
- Estimation of SOMAH's first-year gross impacts, including:
  - Electrical load impacts (MW and MWh).
  - Economic impacts, including bill savings for program participants and reductions to utility CARE budgets resulting from SOMAH projects.
  - Program GHG reduction impacts.
- Final reporting, including a draft report released to the public, a draft report webinar, and a subsequent final report submitted to the CPUC Energy Division.

3.1 ESTABLISHING PROGRAM METRICS AND INDICATORS

Identifying the best metrics and key performance indicators (KPIs) for measuring a program's success requires finding the right intersection between available data, program goals, and program operations. In Phase II of this study the evaluation team refined the expansive range of metrics developed in Phase I (based on the Program Theory and Logic Model created by the evaluation team) to a subset of the most appropriate metrics on which to evaluate the SOMAH Program in the future. It should be noted that a number of these metrics align with the metrics that the SOMAH PA currently reports on in their Semi-

Annual Progress Reports). A listing of the recommended metrics and KPIs are provided in Appendix A. Appendix B provides the evaluation team's assessment of the SOMAH Program based on these metrics.

3.2 PHASE II PRIMARY DATA COLLECTION

The primary data sources used in this evaluation included a mix of pre-existing data sources that were leverage for the participation, process, and impact assessments, and data collected during evaluation research activities:

Pre-existing data sources:

- The SOMAH PowerClerk Project Database[11] managed by the PA – this dataset includes all SOMAH application data from PG&E, SCE, SDG&E, PacifiCorp, and Liberty Utilities service territories that quantify the characteristics of the SOMAH applications to date. It was also the basis of creating the sample frame for the contractor and property owner interviews and web surveys.

- Contractor diversity database – this database contains a listing of all SOMAH eligible contractors along with firmographic data for these contractors that can be used to assess their experience, size, and diversity.

- Eligible property database – this database feeds the SOMAH eligible properties map that is available on the SOMAH website.[12] This database includes multifamily affordable properties in California along with additional data elements such as the number of units per property, whether the property has an active SOMAH application, the SOMAH eligibility criteria (DAC or 80% low-income units) and can be used by contractors to identify potential SOMAH properties.

- IOU and CAISO 2020 hourly load from the CAISO Open Access Same-time Information System (OASIS) website.[13]

- Marginal greenhouse gas (GHG) emissions signal developed by WattTime[14] - The real-time marginal carbon dioxide (CO_2) emissions signal represents the compliance signal used for CPUC's Self-Generation Incentive Program (SGIP). The WattTime data are considered a reliable approximation of actual conditions during a particular year.

[11] Accessed March 3, 2021 for purposes of the impact analysis. Accessed April 29, 2021 for all other research.

[12] https://calsomah.org/eligible-somah-properties-map

[13] http://oasis.caiso.com

[14] http://sgipsignal.com

- The California Energy Commission (CEC) PV Module List[15] - The CEC maintains a list of solar equipment that meets established national safety and performance standards. The PV Module List includes information about PV modules such as manufacturer, model number, and nameplate capacity.

- Interval load data and historical rates for a sample of SOMAH applicants (including tenants and common areas) provided by IOUs for the 2020 calendar year.

- The 2021 CPUC Avoided Cost Calculator which includes hourly utility avoided costs by climate zone.

Data from research activities:

- In-depth interviews (IDIs) with participating and non-participating SOMAH contractors, conducted by Verdant professional evaluation staff.

- IDIs with affordable housing property owners who have submitted one or more SOMAH applications since the program's inception, conducted by Verdant professional evaluation staff.

- Web surveys with SOMAH participating property owners who were not included in the sample of IDIs.

The data collected during the research activities outlined above enabled the evaluation team to learn about SOMAH participants' experiences with the SOMAH Program. In particular, the IDIs with participating and non-participating contractors provided perspectives on key drivers, barriers, and difficulties faced by these solar professionals with respect to participating in the SOMAH Program. The IDIs and web surveys with property owners who had submitted a SOMAH application were used to obtain feedback on the factors influencing their decision to install solar, the role and influence of the SOMAH Program and solar contractors in their decision-making, and their experiences to-date participating in the SOMAH Program.

Additional Tools:

- The PVWatts API[16] developed by the National Renewable Energy Lab - PVWatts estimates electricity production of grid-connected PV systems based on a few inputs, including the system size, location, tilt, and azimuth.

- The Net Energy Metering (NEM) 2.0 Lookback Model developed by Verdant - In 2020, Verdant completed a cost effectiveness study[17] of PG&E, SCE, and SDG&E's NEM 2.0 tariffs. In support of this

[15] https://www.energy.ca.gov/programs-and-topics/programs/solar-equipment-lists

[16] https://developer.nrel.gov/docs/solar/pvwatts/v6

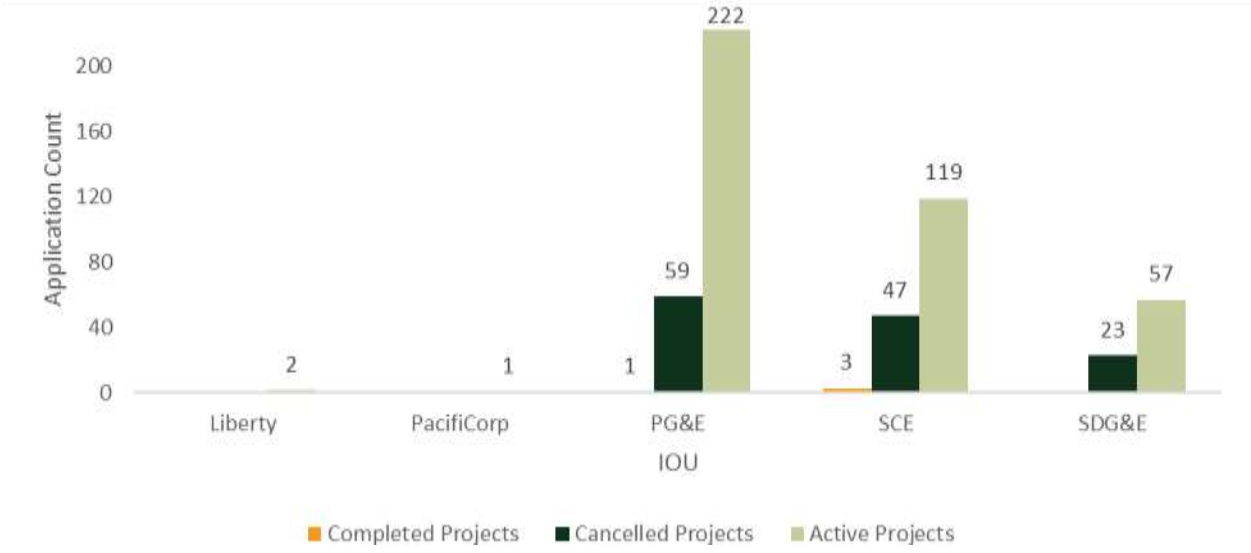
[17] Details on the NEM 2.0 Lookback study can be accessed here:
https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/net-energy-metering/net-energy-meeting-nem-2-evaluation

study, Verdant created a model that includes a bill savings module that calculates customer's total bill payments under various NEM 2.0 tariffs.

SOMAH PowerClerk Project Database

A copy of the SOMAH statewide project database was downloaded from www.calsomah.powerclerk.com on April 29, 2021.[18] All submitted SOMAH applications (active and cancelled) since the program's inception are included in this evaluation. However, where applicable, program participation summaries may be disaggregated by project status to provide more clarity into how projects are moving through the program application process. The SOMAH Program has received a total of 534 applications, and the breakout of completed projects, and active and cancelled[19] applications, by IOU, is shown in Figure 3-1 below. As of April 29, 2021, most projects are in one of the active stages of the application process, and four projects have been completed. Cancelled projects include those found ineligible, withdrawn, or were duplicative applications.

FIGURE 3-1: SOMAH PROGRAM APPLICATIONS BY PROJECT STATUS AND IOU



Contractor and Property Owner Interviews and Web Surveys

In Phase II of the evaluation, participating and non-participating contractors and property owners were targeted for data collection that included a mixture of in-depth interviews and web surveys. These data collection efforts were coordinated with the SOMAH PA to ensure they did not overlap with PA planned data collection activities. These interviews and web surveys served to increase our understanding of

[18] A separate copy of the database was downloaded on March 3, 2021 for purposes of the impact analysis.

[19] Cancelled projects includes all cancelled projects (124) and withdrawn applications (5).

participation in the program to date, with a focus on the participation timeline, and identify any areas where the program needs to improve in the near term to increase long term program participation. The interviews also explored barriers to program participation faced by applicants who have cancelled their projects, non-participants who have yet to submit a SOMAH application, and participating customers who have additional properties which are not currently participating in the program. They also gathered additional data to assist with the finalization of the process flow charts (PFC). The goal of the PFCs is to document the "cradle-to-grave" operations and administration of the SOMAH Program. Collecting feedback from participants who have gone through the SOMAH application process will allow them to be practical, rather than just theoretical, and therefore more likely to be able to provide knowledgeable and applied program experience and recommendations to improve processes.

The SOMAH PA fielded a survey among non-participating contractors who have gone through the SOMAH training but have not yet applied to the program (the SOMAH PA's "Barriers to Entry" web survey). The SOMAH PA also fielded web surveys to non-participating property owners to understand why they have not applied to the program and their intentions for the future. The evaluation team requested access to the results of these surveys to ensure the perspectives of non-participants could be included in this report.

Table 3-1 below outlines the Phase II data collection activities. Further details on each of these research efforts are provided in the sections below.

TABLE 3-1: PHASE II CONTRACTOR AND PROPERTY OWNER DATA COLLECTION ACTIVITIES

Program Actor	Group	Type	Sample	Completes	Research Objectives
Contractor	Participant	In-depth Interviews	9	4	Process flow chart, program participation experience, satisfaction, areas for program improvement, barriers to reaching program goals, impact of COVID-19 on program participation
	Non-Participant	In-depth Interviews	105	2	Experience with the program, participation in other solar programs, plans for future participation, barriers to participation, areas for additional support and program improvement
		"Barriers to Entry" survey (PA)	119	34	
Property Owner	Active SOMAH Project	In-depth Interviews and web surveys	69 Total 56 Active 31 Cancel	19 Total 18 Active 11 Cancel	Process flow chart, program participation experience, satisfaction, areas for program improvement, drivers/barriers to participation, likelihood of future participation, impact of COVID-19 on program participation
	Cancelled SOMAH Project				Reasons for cancellation, likelihood of future participation, recommendations for program improvement
	Non-Applicants	Web survey	3,427*	40	Reasons for not applying to the program, likelihood and timing of future program participation, help overcoming barriers to solar adoption, recommendation for program improvement

*Many affordable housing organizations are responsible for multiple SOMAH eligible properties and thus this sample quantity does not represent the unique number of eligible property owners.

3.2.1 Contractor Interviews

SOMAH participating and non-participating contractors were interviewed by phone by ILLUME professional staff. Contractor interview questions covered topics such as:

- Motivations to participate in the SOMAH Program,
- Adequacy of SOMAH onboarding and training activities,
- Experience with the application process and program requirements,
- Financing and system ownership types offered to property owners interested in the SOMAH Program,
- Barriers/challenges faced by contractors to (or during) SOMAH Program participation, and
- Recommendations for SOMAH Program improvements.

These interviews included open-ended questions that allowed detailed descriptions of each contractor's experiences and enabled follow-up questioning depending on the answers provided. Appendix C.1 presents the interview guide used for the contractor interviews.

The sample for the contractor interviews was designed to gather feedback from contractors who have submitted the majority of SOMAH applications to date, participating contractors who have submitted only a few applications, and eligible contractors that have not yet applied to the program.

3.2.2 Property Owner Interviews and Web Surveys

Interviews were completed with 13 of the 75 unique property owners who had applied to the SOMAH Program as of March 3, 2021. The sample of property owners interviewed represented a diverse set of SOMAH Program participants including for profit, non-profit, and government run (public housing agencies) organizations, Track A and Track B participants, prolific property owners who have submitted 15 or more applications and those who have submitted only a single application, property owners who partnered with both large and small SOMAH contractors, and those who are using power purchase agreements (PPA) and host customer owned (HCO) financing. Most of the property owners had not completed an entire SOMAH project at the time of the interview (only 2 of the 13 property owners either had the incentive check issued for their project or had submitted their incentive claim). The property owners interviewed represented a large share of the applications that had been submitted at the time the sample was drawn (206 of the 538 applications submitted, or 38 percent). The evaluation team reached out to the property owner contact listed in the program tracking data and requested to conduct an interview with the individual most familiar with their organization's participation in the SOMAH Program. As the table below shows, the individuals surveyed had a variety of titles but primarily fell into one of five departments: executive, sustainability, housing development, asset management, or an external consultant. It is interesting to note that the cancellation rate varied by the respondent's department within their organization, with those focused on sustainability (and the external consultant) having the lowest cancellation rate (11 percent) and those in asset management having the highest cancellation rate. The implications of this will be discussed later in the report. At the time of the interviews 50 of the respondents' 206 applications had been cancelled (24 percent).

TABLE 3-2: PROPERTY OWNER INTERVIEWEES

Department	Title	Interviews	Completed Projects	Active Applications	Cancelled Applications	% Active
Executive	CEO	1	0	8	8	0%
Sustainability	Director of Sustainable Design Sustainability Manager	3	1	57	7	89%
Housing Development	Director of Construction Portfolio Rehabilitation Manager Director of Real Estate Development Senior Project Manager Project Manager Housing Development Specialist	6	1	55	20	74%
Asset Management	Director of Asset Management Senior Asset Manager Asset Manager	3	0	19	13	59%
External	External Consultant	1	0	15	2	88%
Total	All	13	2	154	50	76%

A shortened version of the in-depth interview guide was fielded to the remaining participating property owners (those that had not been interviewed as part of the property owner in-depth interviews) in late April 2020. Invitations to complete the web survey were distributed via email using the email address included in the program tracking database. Appendix C.2 and C.3 present the property owner interview guide and web survey instrument.

The number of currently active and cancelled applications, grouped by the number of applications submitted, as of March 3, 2021, is shown in Table 3-3 below. As this table shows, only five percent of program applications correspond to a property owner who had submitted a single SOMAH application (27 unique host customers) and nearly two-thirds of SOMAH applications were submitted by a property owner who had submitted 10 or more program applications. It is interesting to note the variation in the project cancellation rate across the number of submitted application categories.

TABLE 3-3: PROPERTY OWNER APPLICATION DISTRIBUTION (AS OF 3/3/2021)

Applications Submitted by Property Owner	Unique Property Owners		Total Applications Submitted		Cancelled Applications Non-Duplicate / Duplicate	Cancellation Rate With/Without Duplicates	Property Owner Interviews
1	27	35%	27	5%	9 / 3	44%/ 38%	3
2 – 9	37	47%	159	30%	65 / 5	44%/ 42%	5
10 or more	14	18%	348	65%	43 / 4	14%/ 13%	5
Total	**78**	**100%**	**534**	**100%**	**117 / 12**	**24%/ 22%**	**13**

3.3 PROGRAM IMPACT ESTIMATION DATA AND METHODOLOGY

A key component of Phase II of the SOMAH evaluation is a comprehensive impact assessment of the SOMAH Program. As of March 3, 2021, when the impact assessment analysis began,[20] only one SOMAH project had been completed and reached the incentive payment stage. As a result, Verdant used program application data to develop ex-ante estimates of electrical generation (MWh), coincident peak demand generation (MW), GHG emission impacts, and customer bill impacts. A reference year of 2020 was used, when necessary, for coincident peak demand impacts, GHG impacts, bill savings calculations, and avoided costs.[21]

A snapshot of the SOMAH Program tracking database was taken on March 3, 2021, from PowerClerk; there were 516 SOMAH projects listed in the database at that time. Verdant excluded 135 projects from the impact analysis for the following reasons: 119 were cancelled projects, four were unsubmitted test projects, and nine had no PV system information included in the database. An additional three projects were excluded from the impact analysis due to small project counts submitted for the program administrator (Liberty Utilities - two projects and PacifiCorp - one project), to preserve anonymity. The final number of SOMAH projects included in the impact analysis, by program administrator, is shown in Table 3-4 below.

TABLE 3-4: PROJECT COUNT INCLUDED IN IMPACT ANALYSIS BY UTILITY SERVICE AREA

Utility Service Area	# Projects
PG&E	202
SCE	121
SDG&E	58
Total	**381**

3.3.1 Annual Electrical Generation

Verdant developed estimates of typical-year SOMAH project solar PV production based on the PV system characteristics as submitted in the application documents. We simulated hourly PV generation using the API for the National Renewable Energy Laboratory's (NREL) PVWatts calculator.[22] PVWatts estimates

[20] The data used for the impact assessment was pulled prior to the data used for the participation assessment as the impact analysis activities required a longer time to complete. The evaluation team wanted the participation assessment to represent a snapshot of the program as recent as possible and thus an updated dataset was pulled exclusively for the participation assessment.

[21] As it is the most recent full year of data available, 2020 was used as the reference year. While there may be some outlying behaviors due to the COVID-19 pandemic, the effect of on the ex-ante results would be minor relative to the direction and magnitude of the findings.

[22] PVWatts API Documentation: https://developer.nrel.gov/docs/solar/pvwatts/v6

electricity production of grid-connected PV systems based on a few inputs. The API requires the following inputs to simulate hour-by-hour output over a period of one year for any PV system: nameplate capacity (DC), tilt, azimuth, address, array type (fixed – open rack, fixed – roof mounted, 1-axis, 1-axis backtracking, or 2-axis), desired climate dataset, and module type (standard, premium, or thin film). Table 3-5 shows the list of inputs required for the PVWatts API simulation along with the value or source of value used for this evaluation.

TABLE 3-5: PVWATTS API REQUIRED INPUTS WITH VALUE OR SOURCE USED

PVWatts API Input	Value/Source
Nameplate Capacity (DC)	[Referenced by Manufacturer/Model against CEC PV Module List]
Tilt	[Program Tracking Data]
Azimuth	[Program Tracking Data]
Address	[Program Tracking Data]
Array Type	Fixed – Roof Mounted
Desired Climate Dataset	NREL Physical Solar Model Typical Meteorological Year from National Solar Radiation Database
Module Type	Standard

The system's DC nameplate capacity was determined by referencing the manufacturer and model of each project module listed in the program tracking data against the California Energy Commission (CEC) PV Module List.[23] Table 3-6 shows the total capacity for all SOMAH projects and the average capacity per project for each PA. The tilt, azimuth, address, and array type used in PVWatts were taken from the SOMAH Program tracking data. All SOMAH projects listed in the program tracking data were fixed arrays and modeled in PVWatts as roof mounted. PVWatts uses the system's address to choose the appropriate weather data from the selected climate dataset; for this study, we used the NREL Physical Solar Model (PSM) Typical Meteorological Year (TMY) data from the NREL National Solar Radiation Database (NSRDB).[24] All PV systems were modeled in PVWatts as standard modules. We used the default values in PVWatts for DC to AC ratio (1.2), ground coverage ratio (0.4), inverter efficiency at rated power (96 percent), and system losses (14 percent).

[23] The CEC maintains lists of solar equipment that meets established national safety and performance standards. The PV Module List includes information about PV modules such as manufacturer, model number, and nameplate capacity. The PV Module List can be accessed from this location: https://www.energy.ca.gov/programs-and-topics/programs/solar-equipment-lists

[24] Further information about the NREL PSM TMY NSRDB can be found here: https://nsrdb.nrel.gov/about/tmy.html

TABLE 3-6: TOTAL AND AVERAGE PV DC NAMEPLATE CAPACITY OF SOMAH PROJECTS BY UTILITY SERVICE AREA

Utility Service Area	# Projects	Total PV DC Nameplate Capacity (kW)[25]	Average PV DC Nameplate Capacity per Project (kW)
PG&E	202	36,755	182.0
SCE	121	26,093	215.6
SDG&E	58	12,498	215.5
Total	**381**	**75,346**	**197.8**

Some SOMAH projects in the tracking database contained modules with different models, tilt, and/or azimuth. For this reason, each module was simulated individually with PVWatts, and the hourly generation for a given project was calculated as the sum of each module's output within the hour. The annual electrical generation for each project was calculated from the results of the PVWatts simulations.

Verdant calculated the annual capacity factor of these SOMAH projects based on the estimated annual electrical generation estimates. Capacity factor is a metric of system utilization and is defined as the amount of energy generated during a given period divided by the maximum possible amount of energy that could have been generated during that period. Annual capacity factors are useful when comparing utilization across technology types or project sizes. The annual DC capacity factor was calculated as the sum of hourly electric output during all 8,760 hours of a typical year divided by the product of the project's DC nameplate capacity and 8,760.

3.3.2 Coincident Peak Demand Generation

Coincident peak demand impacts are defined as generation from SOMAH PV systems during hours of CAISO or IOU peak demands. The single largest annual CAISO or IOU peak hours provide brief snapshots of program coincident demand impacts. However, analyzing peak demand over the top 200 peak hours can provide a greater insight into how SOMAH projects impact the grid during the hours of highest load. By coincidentally generating during CAISO or IOU peak hours, participating SOMAH customers allow their electric utility to avoid the purchase of high-cost wholesale energy. At the same time, the electric utility reduces its transmission and distribution losses during hours of high system congestion. It should be noted however, that these hours are not necessarily when SOMAH PV systems have their highest output.

Coincident peak demand impacts were estimated at the utility and CAISO system level based on PV simulations that were performed at the hourly level. IOU and CAISO load data were obtained from the CAISO OASIS website. We used 2020 as the reference year to estimate peak demand impacts.

[25] DC nameplate capacity is a necessary input to the PVWatts model. Note that by definition the DC nameplate capacity is higher than the CEC AC Rating, which is used elsewhere in this study.

3.3.3 Greenhouse Gas Impacts

The greenhouse gas (GHG) impact analysis is limited to carbon dioxide (CO_2) emissions impacts associated with SOMAH PV systems. The scope of this analysis includes the operational impacts of SOMAH PV systems and does not account for the lifecycle emissions impacts that occur during the manufacturing, transportation, and construction of SOMAH PV systems. To estimate GHG impacts, Verdant leveraged marginal carbon dioxide (CO_2) emissions data developed by WattTime as part of the Self-Generation Incentive Program (SGIP) GHG signal.[26] The WattTime data are considered a reliable approximation of actual conditions during a particular year. Carbon dioxide emission impacts were calculated as the avoided emissions that would have occurred in the absence of the program. The hourly marginal emissions rates and the hourly simulated PV generation were combined to estimate avoided emissions in metrics tons of CO_2. We used 2020 as the reference year to estimate GHG impacts.

3.3.4 Customer Bill Impacts

Customer bill impacts were calculated using Verdant's NEM 2.0 Lookback Study[27] model (NEM model) which has a bill calculator module to estimate customer bills while accounting for all VNEM tariff provisions. To calculate bill savings, we estimated the difference between customer bills with and without PV benefits during the first year (with 2020 as the reference year). Inputs required for the bill calculator include hourly PV system generation[28], hourly customer load shapes, and customer tariff selection pre- and post-system installation. Common area and average-tenant bill savings were estimated for each SOMAH project.

Tenant and common area load allocations reported in the SOMAH tracking data were used to apportion the simulated hourly PV generation output from PVWatts. The allocated tenant PV generation was equally divided across the total number of tenant units, to estimate the average tenant PV generation for each project. The NEM model was used to estimate bill savings for the average tenant for each SOMAH project.

Historical interval usage data from 2020 for a sample of SOMAH projects in the PG&E and SCE service areas were used to develop customer load shapes. Tenant load shapes were developed for each climate zone represented in the PG&E and SCE service areas. Common area load shapes were created at the utility service area level. SCE interval data was used to develop the SDG&E load shapes, as interval usage data

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26 http://sgipsignal.com/

27 The Verdant NEM 2.0 Lookback Study final report, model, and load shapes can be accessed here: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/net-energy-metering-nem/nemrevisit/nem-2_lookback_study.pdf

28 The NEM model was modified to incorporate the hourly PV generation as a separate input, instead of estimating PV generation as part of the model's simulation processes.

was not available for that service area. The PG&E, SCE, and SDG&E load shapes were matched, by climate zone where applicable, to each SOMAH project. The common area and tenant annualized kilowatt-hour usage reported in the SOMAH Program tracking data was used, along with the load shapes, to create individual load profiles to represent each project's common area and average tenant.

The final required input to the NEM model is the customer's selected tariff before and after the PV system installation. Since there were only a few SOMAH projects that had installed PV systems at the time project tracking data was acquired, and historical tariff information was not readily available for applicants, Verdant made a number of assumptions with respect to the rates tenants and common areas would be on before and after the PV system is installed.[29] Table 3-7 below describes the four scenarios modeled for tenant bill savings and the two scenarios modeled for common area bill savings. SOMAH participants are not required to switch to Time of Use rates following installation of the PV system.

TABLE 3-7: TENANT AND COMMON AREA BILL SAVINGS SCENARIOS

Customer Type	Customer Tariff Before PV System Installation	Customer Tariff After PV System Installation
Tenant	Tiered Rate	Tiered Rate
	Tiered Rate	Tiered Time of Use Rate
	CARE: Tiered Rate	CARE: Tiered Rate
	CARE: Tiered Rate	CARE: Tiered Time of Use Rate
Common Area	Tiered Rate	Tiered Rate
	Tiered Rate	Tiered Time of Use Rate

Two of the tenant bill savings scenarios explore the bill savings associated with customers participating in California Alternate Rates for Energy (CARE). CARE energy bill discounts are available to utility customers whose total household income is at or below 200% percent of Federal Poverty Guidelines based on household size.[30] Information regarding which customers were currently participating in CARE was not available, therefore separate bill savings scenarios were modeled for tenants with and without CARE.

3.3.5 Avoided Costs

The first-year avoided costs due to SOMAH PV Systems were calculated using Verdant's NEM 2.0 Lookback Study model, as described above. The avoided costs in the NEM model were calculated based on the CPUC 2021 Avoided Cost Calculator (ACC) v1b. The analysis includes all components of the avoided costs in the

[29] The historical interval data provided by PG&E included the customer's tariff. This data confirmed Verdant's assumptions about the most popular tiered and tiered time of use rates for SOMAH participants in the PG&E service area which were used in the NEM model scenarios.

[30] CARE Bill Discount Program overview can be accessed at https://www.cpuc.ca.gov/care/

2021 ACC, including: Cap and Trade, greenhouse gas (GHG) adder, GHG rebalancing, energy, generation capacity, transmission capacity, distribution capacity, ancillary services, losses, and methane leakage.

4 PARTICIPATION ASSESSMENT

During Phase I, the evaluation team analyzed the available SOMAH Program participation data to independently assess and verify participation in the program to date. This section presents an updated SOMAH participation assessment based on the program tracking as of April 29th, 2021. Results are organized thematically by:

- *Current Application Status,* i.e., cumulative application growth since program inception, percentage of applications that have been cancelled over time, and how long have projects taken since application submittal to progress through the application process.
- *Key Characteristics of SOMAH Participants,* i.e., who are the primary contractors and property owners participating in the SOMAH Program including an assessment of their diversity, what are the primary system ownership types being used for SOMAH PV systems.
- *Key Characteristics of SOMAH Projects*, i.e., size of proposed SOMAH solar PV systems, proportion of system benefitting tenants versus common areas, plans to pair with energy storage.
- *SOMAH System Costs*, i.e., what are the typical self-reported costs of installing solar, the percentage of costs covered by the SOMAH incentives and estimated ITC contributions by ownership type.
- *SOMAH Program Expenditures to date,* i.e., total SOMAH spending since program inception in 2018 by budget category.

4.1 CURRENT APPLICATION STATUS

This subsection of the report discusses the status of SOMAH Program applications from program inception through the time of reporting. As presented below in Figure 4-2, from July 1, 2019 (the SOMAH Program's inception) through April 29, 2021, the SOMAH Program received 534 applications statewide (which includes all eligible IOU territories), representing roughly 93 MW_{AC} of generation capacity. This capacity represents 31 percent of the program goal of 300 MW_{AC}. Over the course of the past two years, 124 applications have been cancelled (and an additional five withdrawn[31]) and the current reserved capacity

[31] Applications that are voluntarily withdrawn by an applicant are placed in "Withdrawn" status for 14 days. During this 14-day period the applicant can re-submit a Reservation Request Package to retain sole rights to the original reservation. If they fail to do this during the 14-day period the application is officially terminated by the SOMAH PA and the application status is changed to "Cancelled". At this time the reserved incentive funding is released and the application deposit (if paid) is forfeited. To date, no withdrawn projects have resubmitted during the 14-day period.

has dropped to 68 MW_{AC} (23 percent of the program goal).[32] The cumulative project application count by month was nonlinear throughout the first year, with almost half of all applications being received at program inception (July 2019), followed by substantial increases in December of 2019 and June of 2020 (immediately preceding the 2020 incentive step-down). Since June 2020, newly submitted applications have increased at a tepid pace and the program has seen an increase in the number of cancelled applications.

FIGURE 4-1: CUMULATIVE SOMAH APPLICATIONS AND CAPACITY SINCE PROGRAM INCEPTION

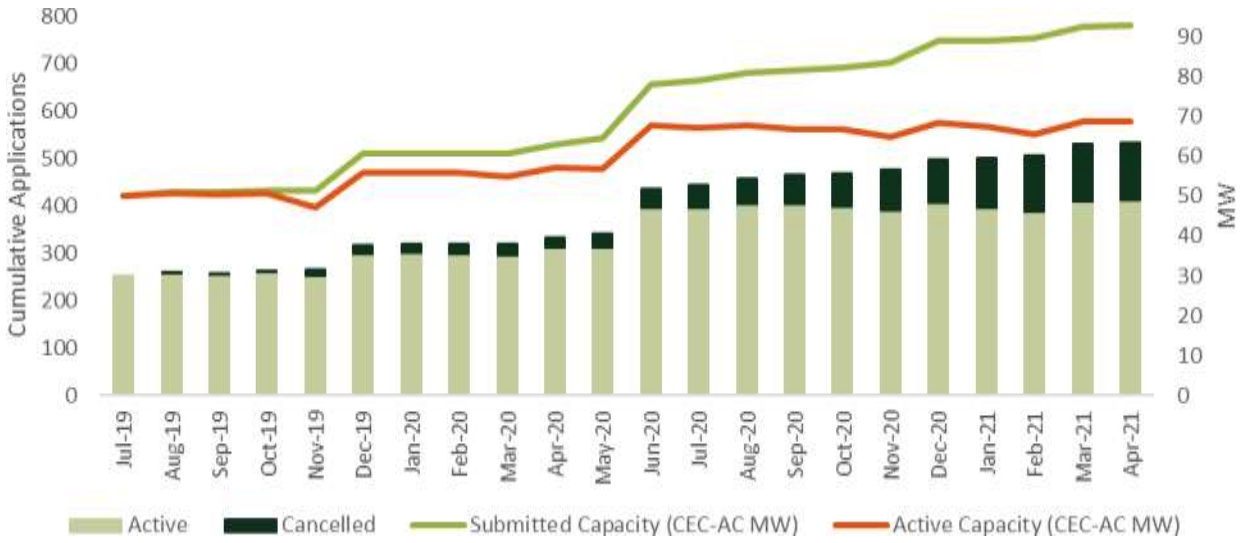


Table 4-1 presents the total number of project applications, along with the count and distribution of applications by IOU. As presented above, the program has experienced a 20 to 30 percent cancellation or withdrawn rate from program inception through April 2021. As of April 29, 2021, there are 405 active applications within the queue, representing roughly 68 MW_{AC} of capacity. PG&E represents the largest percentage of total projects and capacity, followed by SCE and SDG&E.[33] While there is some variability in project size across IOUs, the average PV system capacity is 170 kW_{AC} at the statewide level (including all IOU territories). This is significantly higher than the average system capacity of MASH projects (which averaged 77 kW[34]). The dramatic increase in project size relative to MASH projects is likely due to the significant increase in the percentage of SOMAH solar capacity that is being allocated to tenants versus

[32] This reduction in capacity is also due to the original capacity (93 MW) being somewhat inflated as not all of the projects had been adjusted for system sizing.

[33] The program eligibility database indicates there are 2,002 eligible properties in PG&E territory, 1,071 in SCE territory, and 338 in SDG&E territory, indicating participation levels generally align with eligibility.

[34] SOMAH Public Forum Slide Deck, October 25, 2019. Slide 13. https://calsomah.org/sites/default/files/docs/SOMAH_public-forum-slide-deck_Oct19.pdf

common areas (the current SOMAH tenant/common area split is around 88%/12% versus MASH which had splits of 60%/40% for Mash 1.0 and 45%/55% for Mash 2.0). This illustrates how SOMAH's tiered incentive levels, with tenant area incentive levels being significantly higher than common area incentive levels, is achieving its desired outcome (larger systems benefiting tenants). MASH also had tiered incentive levels however the differential between the tenant area and common area incentive was 63 percent (i.e., tenant incentive level was 63 percent larger than the common area incentive level) versus SOMAH's differential which was 220 percent in the first year of the program (absent any tax credits).

TABLE 4-1: SOMAH PROGRAM APPLICATIONS BY IOU AS OF APRIL 29, 2021

IOU	Total Number of Applications	Active Applications		PV System Capacity (kW_{AC})[35]	
		Count	% Active¥	Total Active Capacity	Average Capacity
Liberty Utilities	2	2	100%	169	84
PacifiCorp	1	1	100%	149	149
Pacific Gas and Electric	282	223	79%	33,980	154
Southern California Edison	169	122	72%	23,878	197
San Diego Gas and Electric	80	57	71%	10,179	179
Total	**534**	**405**	**76%**	**68,354**	**170**

¥ "% Active" excludes applications that were cancelled or withdrawn.

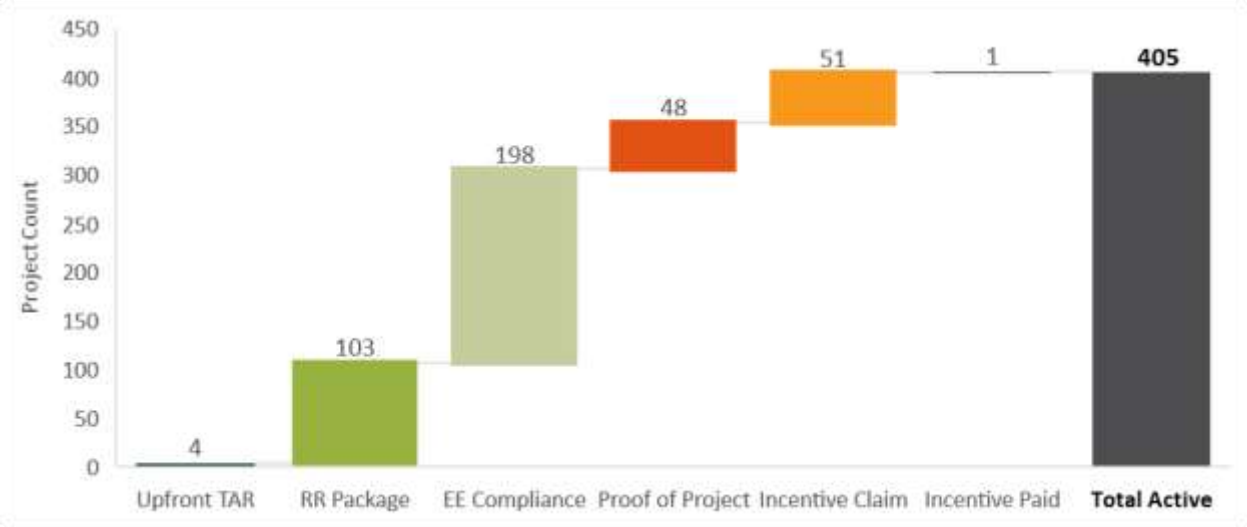
The SOMAH application process consists of a series of discrete steps that each application must go through to participate in the program and claim the SOMAH incentive. The discrete steps are the following:

- **Upfront Technical Assistance Request (Track A only):** Applicant must submit reservation request package within three months to continue to have incentive funds reserved for their project.
- **Reservation Request Package:** Culminates in a Reservation Approval Notice.
- **Energy Efficiency Compliance Milestone:** Must be submitted within 60 days of receiving the Reservation Approval Notice – culminates in an Energy Efficiency Compliance Notice.
- **Proof of Project Milestone:** Must be submitted within 240 days of receiving the Reservation Approval Notice.
- **Incentive Claim Package:** Submitted after the PV system has been purchased, installed, and interconnected.

[35] The accuracy of this estimate has not been verified by the evaluation team. It is the capacity submitted by the applicant.

The 405 active projects are all within different stages of the application process (Figure 4-2). Most projects (198 in total) have passed the Reservation Request Approval phase and are currently working toward the energy efficiency compliance milestone. Forty-eight projects have completed EE compliance and are working toward their proof of project milestone. Fifty-one projects have completed their proof of project milestone and are working toward their incentive claim. Three of the 51 have completed their incentive claim package but have not been paid. One project has been completed and has received their incentive (having purchased, installed, and interconnected their PV system).

FIGURE 4-2: CUMULATIVE SOMAH ACTIVE APPLICATIONS BY PROGRAM STATUS



* TAR = Technical Assistance Request. RR = Reservation Request. EE = Energy Efficiency.

Figure 4-3 presents the status of each project within the application process as of the time of reporting and provides some longitudinal data – the time from application submission to when the applicant entered the current step.[36] Application date is mapped on the horizontal axis and the current status date is mapped on the vertical axis. Most of the projects in the Reservation Request step ("RR Package" dark green marks) have also applied more recently. Most of the projects that have been cancelled applied at program opening, which is indicated by the stack of gray marks to the left of the figure. Applications submitted at program opening experienced cancellations or withdrawals as early as August of 2019 and as recently as April of 2021.

[36] There are two additional Track A applications that are currently in the Upfront Technical Assistance Request step.

FIGURE 4-3: PROJECT STATUS BY APPLICATION DATE AND DATE ENTERING STEP

* RR = Reservation Request. EE = Energy Efficiency.

Figure 4-4 presents the distribution of application status by the number of days from application submission to current status. Key takeaways are summarized below.

- **Upfront Technical Assistance Request (Track A only):** There are two applications currently in this step.

- **Reservation Request Package:** There are 103 applications currently in this step. These applications were submitted between 7/1/2019 and 4/7/2021. There have been 298 applications that have received Reservation Request Approval and the average time to obtain approval from the application submittal is 458 days. The evaluation team investigated whether the time it took to clear this step was decreasing as the program matured. We found that on average applications submitted in the first year of the program (7/1/2019-6/30/2020) did not receive reservation request approval for 471 days (283 applications) versus 226 days for those who those submitted their application in the second year of the program (7/1/2020-present). This indicates a significant reduction in the time from application submittal to reservation request approval as a result of contractors, property owners, and the SOMAH PA gaining more experience with the program and the program having adequate program funding such that applications are no longer being waitlisted. [37]

- **Energy Efficiency Compliance Milestone:** There are 198 applications that have received Reservation Request Approval and are currently in the EE Compliance Milestone step. The average time to this step from application submission is 401 days. However, the range is quite significant – from 123 days to well over 18 months. The program requires that the EE Compliance Milestone be submitted within

[37] A total of 168 SOMAH applications were waitlisted before they could start their Reservation Request. The average time on the waitlist was 169 days.

60 days of reservation approval. The average time since reservation approval to the EE Compliance Milestone for these 198 applicants is 72 days.

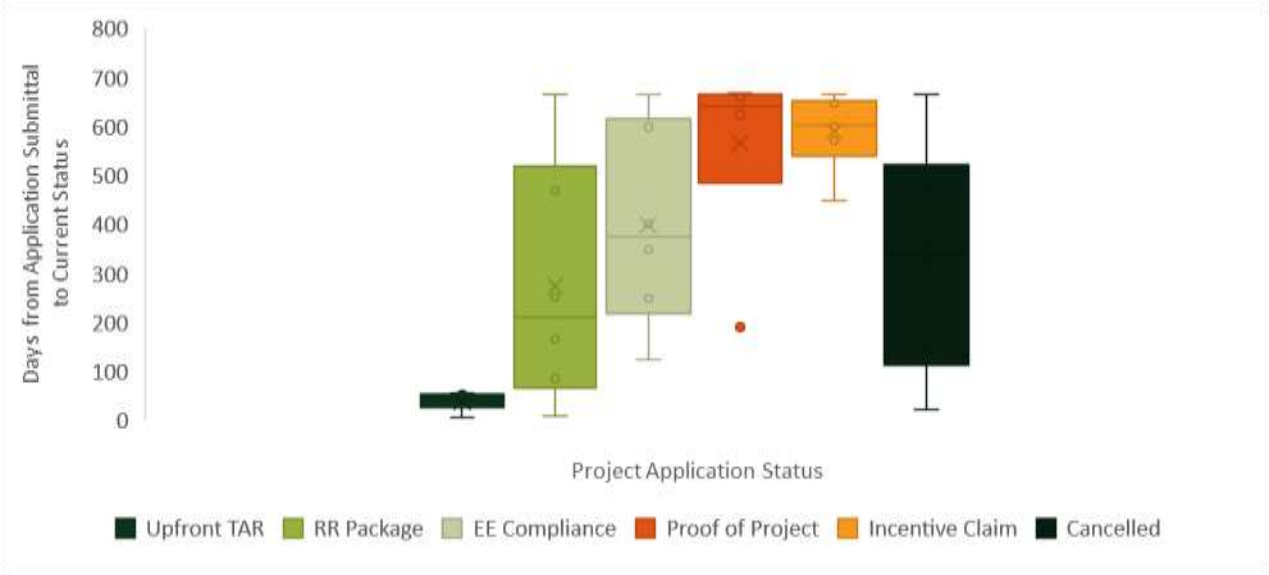
- **Proof of Project Milestone:** There are 48 applications that are currently in the Proof of Project Milestone step. The average time to this step from application submission is 583 days. The range is from 262 days to 668 days. The program requires that the Proof of Project Milestone be submitted within 240 days of reservation approval. The average time since reservation approval for these 48 applicants is 250 days.

- **Incentive Claim Package:** There are 51 projects that have reached this step as of April 29, 2021. These projects have received their Proof of Project Milestone approval. Three of these projects have completed the solar installation and have submitted the ICF but have not yet had their incentive paid. The average time to this step from application submission is 599 days. The range for these for applications is far narrower than other steps – from 448 days to 666 days. The average time since reservation approval for these 51 applicants is 306 days.

- **Incentive Claim Paid:** There is one project that has reached this step as of April 29, 2021 and has been completed and incentive has been paid.

- **Cancelled Applications:** There are 129 applications that have been cancelled, were duplicates, or withdrawn. The average time to cancellation from application submission is 317 days and the range is quite significant – from 21 days to well over 18 months.

FIGURE 4-4: DAYS FROM APPLICATION SUBMITTAL TO CURRENT STATUS

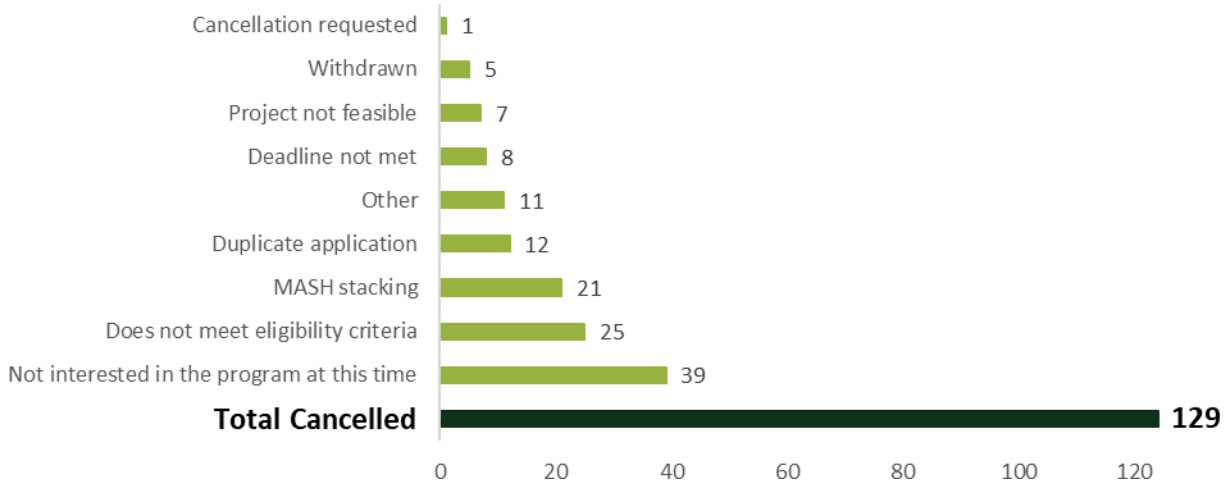


* TAR = Technical Assistance Request. RR = Reservation Request. EE = Energy Efficiency.

Figure 4-5 provides a high-level summary of reasons for cancellation. Some reasons are largely administrative, like missing deadlines and submitting duplicative applications, while others are specific to

failed program eligibility. For example, on June 5, 2020, the CPUC released Resolution E-5054.[38] The Resolution directs the SOMAH PA to 1) cancel the SOMAH applications that have already received a MASH incentive; and 2) notify the Applicants with active MASH applications that they will need to provide documentation indicating that their corresponding MASH application has been cancelled or withdrawn. The most frequent cancellation reason was a lack of interest in the program at the time (39 applications). Of the 129 cancelled applications, half (65 applications) are "non-recoverable" cancellations (i.e., they are very unlikely to become a future SOMAH project as the application was a duplicate, the project had already received a MASH incentive, or the project did not meet program eligibility requirements).

FIGURE 4-5: CUMULATIVE SOMAH CANCELLED APPLICATIONS



4.2 KEY CHARACTERISTICS OF SOMAH PARTICIPANTS

This subsection of the report discusses key characteristics of SOMAH participants (property owners and contractors).

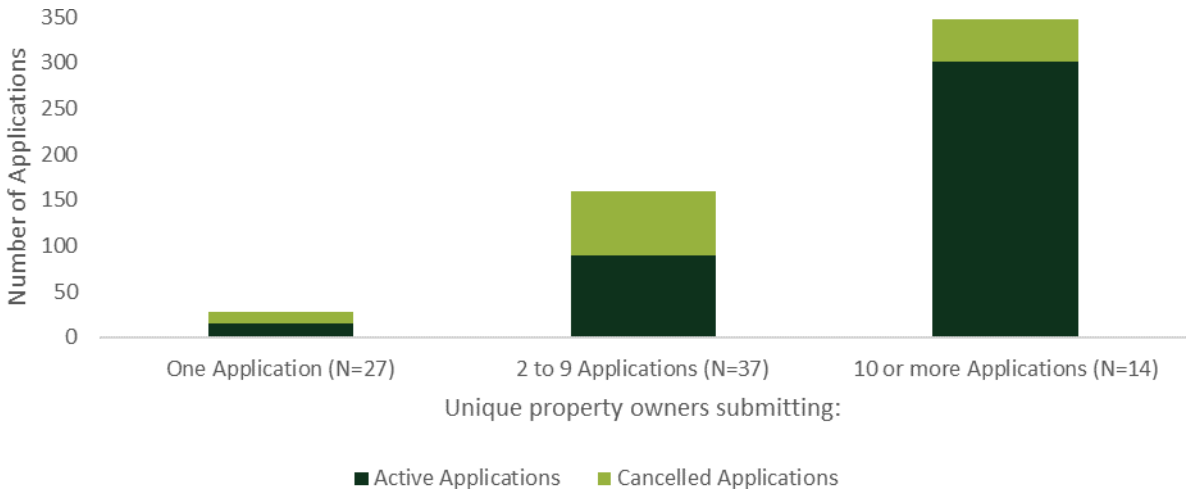
4.2.1 Property Owner Characteristics

Research completed by the evaluation team found that most program applications were submitted by property owners who own or manage a portfolio of low-income properties. As shown in Figure 4-6 below, 65 percent of SOMAH Program applications were submitted by 14 unique property owners who had submitted 10 or more applications (out of the 78 total unique property owners who have submitted SOMAH applications). Only five percent of applications were submitted by a property owner who had

[38] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M339/K436/339436949.PDF

submitted a single application to the program, even though they represent 35 percent of the unique property owners.[39] Furthermore, application cancellations were highest amongst property owners who had submitted lower numbers of applications which may indicate that these applicants are less familiar with the program eligibility requirements or have more limited capability to take on a solar installation project and therefore may need additional assistance from the SOMAH PA. The cancellation rate for property owners who had submitted a single application is 44 percent and the rate for those who have submitted two to nine applications is 47 percent—which is significantly higher than the rate for those who have submitted 10 or more applications (14 percent).

FIGURE 4-6: DISTRIBUTION OF PROPERTY OWNERS AND APPLICATIONS



Within the available SOMAH tracking data there is a field "Umbrella Company" that indicates if a property is part of a larger affordable housing portfolio. This field was not always populated as it was added to the program tracking data after the program launch. When it was missing the evaluation team used the Host Customer contact information to identify if the project was part of an umbrella company. Table 4-2 below presents the 14 umbrella companies that have submitted 65 percent of program applications to date. National CORE, a non-profit affordable housing developer, submitted the largest share of applications to date (11 percent).

[39] Property owners who have only submitted a single application to the program may have more properties in their portfolio that they have not submitted SOMAH applications for at this time.

TABLE 4-2: DISTRIBUTION OF APPLICATIONS ACROSS UMBRELLA COMPANIES

Umbrella Company	Applications Submitted	Applications Cancelled
National CORE	60	9
Burbank Housing Development Corporation	44	1
MidPen Housing	39	10
BRIDGE Housing	36	2
The Michaels Organization	26	1
EAH Housing	20	0
ROEM Corporation	19	7
Jamboree Housing Corporation	17	2
Affirmed Housing	16	8
Self-Help Enterprises	16	0
HumanGood	15	3
Eden Housing	14	1
Related California	13	1
Retirement Housing Foundation	13	2
Less than 10 applications submitted (64 unique companies)	186	82
Total	**534**	**129**

An additional property owner characteristic that could shed light on participating property owners is their for-profit versus non-profit status organization type. According to the SOMAH PA's 2021 ME&O plan, only 2 of the 159 applications submitted in 2020 were submitted by for-profit organizations. The remainder were submitted by housing authorities (7) or non-profit organizations (150). There is a field in the program tracking database titled "Ownership Type" that takes the values: For-Profit, Non-Profit, or Hybrid. This field was blank for more than half of applicants and for those not missing it seemed to indicate the contractor's status not the property owner's and so did not help with this ownership characterization. The SOMAH PA should either backfill and update this field as needed or should add an additional field to identify the type of organization (for-profit, non-profit, housing authority, etc.) each application falls under.

4.2.2 Property Eligibility Characteristics

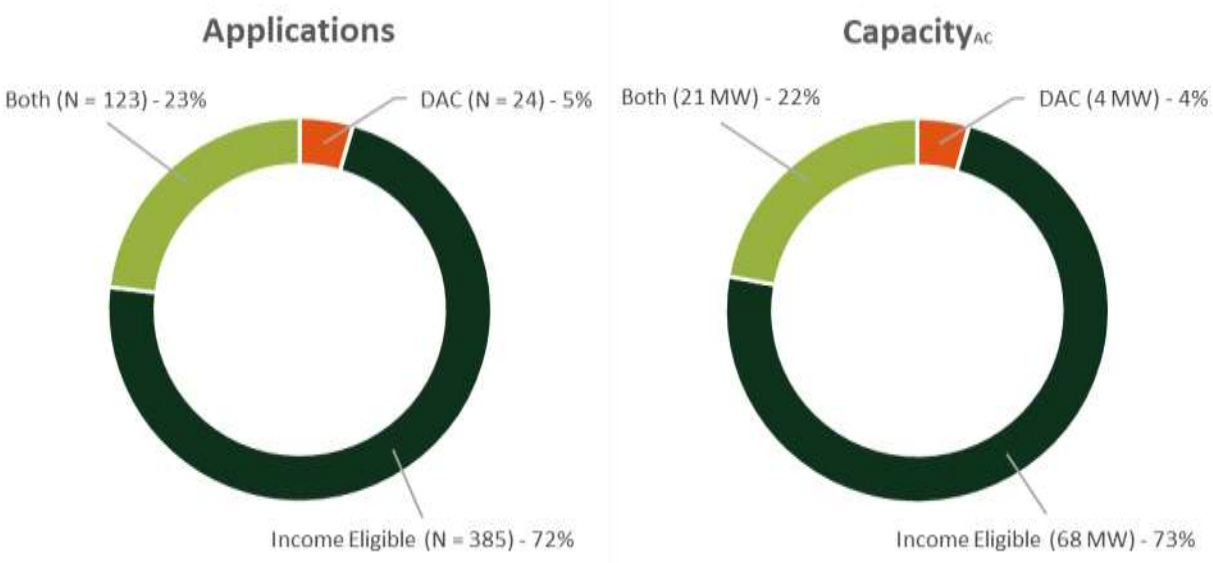
For a property to be eligible for SOMAH, the property must be deed restricted with at least 10 years remaining on the term, be a property with at least five units (and tenant units must be sub-metered), and they must meet one of the following two criteria:

- Eighty percent of property residents must have incomes at or below 60 percent of the Area Median Income (AMI) as determined by the Department of Housing and Community Development (HCD) or,

- The property must be located in a DAC as defined by CalEPA pursuant to Health and Safety Code Section 39711. For the SOMAH Program, this is defined as DACs that score in the top 25 percent of census tracts statewide in the CalEnviroScreen. It also includes the 22 census tracts that are in the highest five percent of the CalEnviroScreen's Pollution Burden.[40]

The distribution of submitted applications falling into one or both SOMAH eligibility criteria is presented below in Figure 4-7. Approximately 28 percent of current SOMAH applications by count and 26 percent by capacity are located within a DAC. According to the SOMAH PA, there are roughly 3,400 eligible SOMAH properties across the state (inclusive of properties that have already applied to the program) and approximately 544 MW of potential solar capacity. The SOMAH PA estimates roughly 1,100 of these eligible properties are located in DACs (32 percent) and the potential solar capacity is 195 MW (36 percent of total). The SOMAH PA is currently focused on increasing participation in DACs, however, due to the location of these properties, the smaller potential PV capacity, and the limited contractor pool, increasing DAC participation may require the program to explore other options such as creating higher DAC incentives to encourage participation or hiring a contractor or contractors to use more of a "direct-install" type of program delivery to get solar installed at DAC properties.

FIGURE 4-7: DISTRIBUTION OF SOMAH PROJECTS AND SYSTEM CAPACITY IN DISADVANTAGED COMMUNITIES

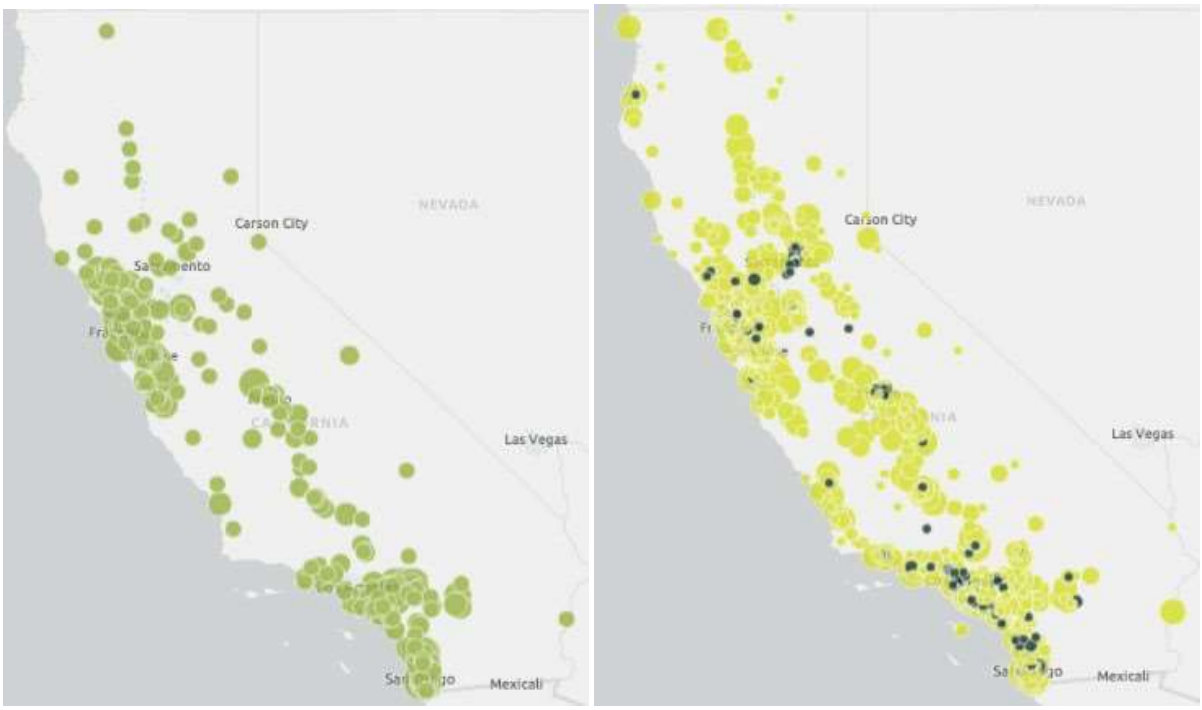


The left image in Figure 4-8 below presents the distribution of the zip code centroids corresponding to SOMAH applications and the right image shows the distribution of eligible SOMAH contractors (small green dots) and SOMAH eligible properties (larger yellow dots). As this figure shows, current participation

[40] There are currently more than 22 census tracts that fall into the highest five percent of the CalEnviroScreen's Pollution Burden.

is very clustered around urban centers (the San Francisco Bay area, Los Angeles, and San Diego) and somewhat along the central valley (California State Route 99 corridor) which aligns closely with the location of currently eligible contractors. There is lower participation along the central coast and northeastern California. Participation in the central valley appears low compared to the number of eligible properties in this region which is noteworthy as the central valley is where many DAC communities are found. An assessment of the volume of eligible contractors in this region may indicate the need for more participating contractors in this area if the program hopes to increase the number of properties located in DACs.

FIGURE 4-8: ZIP CODES OF APPLIED PROPERTIES (LEFT) AND CONTRACTORS AND ELIGIBLE PROPERTIES (RIGHT)



The left image presents the distribution of the zip code centroids corresponding to SOMAH applications. The right image shows the distribution of eligible SOMAH contractors (small green dots) and SOMAH eligible properties (larger yellow dots).

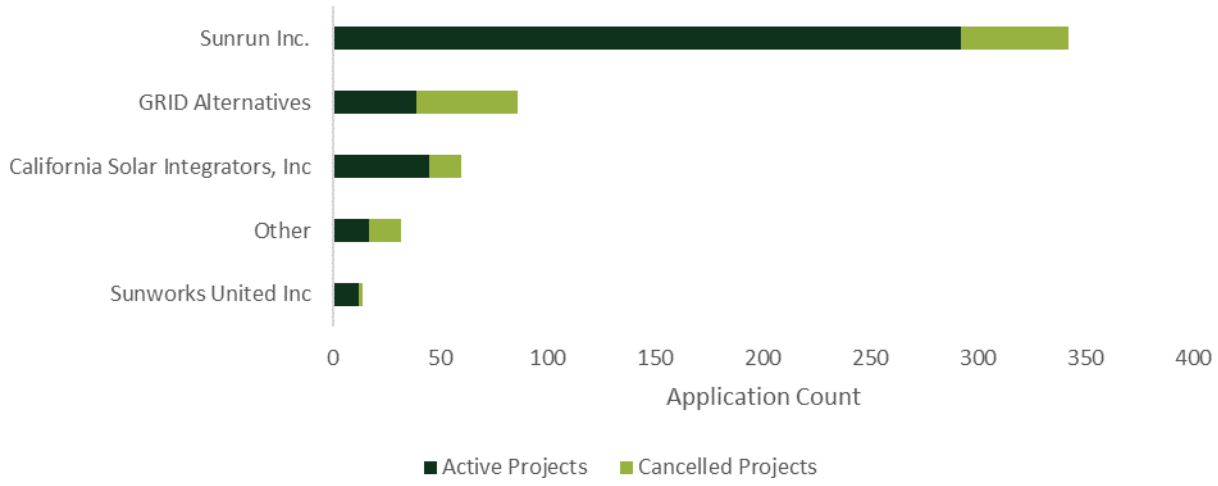
A recommended area of further research is to assess the statewide coverage of SOMAH-eligible contractors based on data included in the Online Bidding Tool database.[41] This data includes the location of each SOMAH-eligible contractor and the maximum travel distance from this location they will travel for a project. Overlaying this data on the eligible property data found on the SOMAH website could help identify any potential issues that exist with contractor availability for SOMAH-eligible properties.

[41] This database is used to provide a list of SOMAH eligible contractors to those using the Online Bidding Tool.

4.2.3 Participating Contractor Characteristics

The distribution of solar contracting companies across the submitted applications is shown in Figure 4-7. The top solar contracting company by count is Sunrun, Inc. with roughly 64 percent of submitted program applications to date. The top four contractors account for 94 percent of all application contractors.[42] The figure also provides the distribution of active versus cancelled or withdrawn applications. While Sunrun was the contractor with the most cancelled applications at 50, this represents a small percentage of their overall submitted applications (15 percent). GRID Alternatives[43] was the contractor for 47 cancelled applications, which represents over 50 percent of their submitted applications.

FIGURE 4-9: DISTRIBUTION OF SOLAR CONTRACTING COMPANIES



During Phase II, the evaluation team received an updated file from the SOMAH PA containing a listing of the solar contractors that were eligible to participate in the SOMAH Program. This file contained a total of 117 unique contractors. An additional contractor was added to the file as they had recently submitted an application according to the program tracking database. Of these 118 contractors (as of the time of reporting) only 10 had an active application in the program. The contractor file included self-reported estimates of the number of solar installations the contractor had completed, the number of staff employed by the company, and whether they were a minority-owned or women-owned business. This contractor firmographic data contains key variables necessary to assess the diversity, size, and solar experience level of the contractors participating in the program, as well as those who have expressed

[42] The "Other" category represents all other contractors with less than 10 applications submitted.

[43] GRID Alternatives has distinct business units that implement solar programs and install solar systems. To ensure no conflict of interest within the SOMAH Program, a firewall was implemented at GRID between the SOMAH PA team and GRID's installation teams, and operations of the SOMAH PA team are governed by a Conflict of Interest policy that was approved by the CPUC in Resolution E-4987.

interest in the program. This file was compared with the SOMAH application dataset (excluding cancelled or withdrawn applications) to assess how representative the applications received to date reflect the SOMAH-eligible contractor pool. As shown in the tables below, the contractors for the submitted applications to date are not representative of the pool of eligible SOMAH contractors in the following ways:

- Most SOMAH applicants have selected a contractor with significant solar installation experience (84 percent of active applicants' contractors have installed 100 or more PV systems) which is not representative of the pool of eligible contractors (only 25 percent have installed more than 100 PV systems). Conversely, 27 percent of eligible contractors have very little solar installation experience (< 25 projects), but only one application has come from this pool of contractors.

- Most (72 percent) of active applicants are using a large contractor (250 or more employees), but these large contractors only make up three percent of the eligible contractor pool. Forty-five percent of the pool of eligible contractors are small, employing 25 or fewer employees, however only eight active applicants have selected a small contractor (2 percent).

- Twenty percent of SOMAH-eligible contractors reported they were minority-owned (24 contractors in total); only three active applications are from one of these contractors (1 percent).

- Ten percent of SOMAH eligible contractors reported they are women-owned (12 contractors in total); only one active application is from a women-owned contractor.

TABLE 4-3: SOLAR INSTALLATION EXPERIENCE, APPLICATIONS VS. SOMAH ELIGIBLE CONTRACTORS

Number of Solar Installations	SOMAH Applications to Date		Eligible SOMAH Contractors	
	#	%	#	%
0 – 25	1	0%	32	27%
26 – 50	7	2%	14	12%
51 – 75	0	0%	7	6%
76 – 99	1	0%	5	4%
100 or more	339	84%	30	25%
N/A or Blank	57	31%	30	25%
Total	**405**	**100%**	**118**	**100%**

TABLE 4-4: NUMBER OF CONTRACTOR EMPLOYEES, APPLICATIONS VS. SOMAH ELIGIBLE CONTRACTORS

Number of Contractor Employees	SOMAH Applications to Date		Eligible SOMAH Contractors	
	#	%	#	%
25 or less	8	2%	53	45%
26 – 99	47	12%	23	19%
100 – 249	1	0%	5	4%
250 or more	292	72%	4	3%
N/A or Blank	57	14%	33	28%
Total	**405**	**100%**	**118**	**100%**

TABLE 4-5: DIVERSITY STATUS OF PARTICIPATING CONTRACTORS VS. SOMAH ELIGIBLE CONTRACTORS

Diversity Status	SOMAH Applications to Date		Eligible SOMAH Contractors	
	#	%	#	%
Women-owned	1	0%	12	10%
Minority-owned	3	1%	24	20%
Non-Women/Minority-owned	402	99%	89	75%
Total	**405**	**100%**	**118**	**100%**

4.2.4 Participant Solar PV System Ownership Type

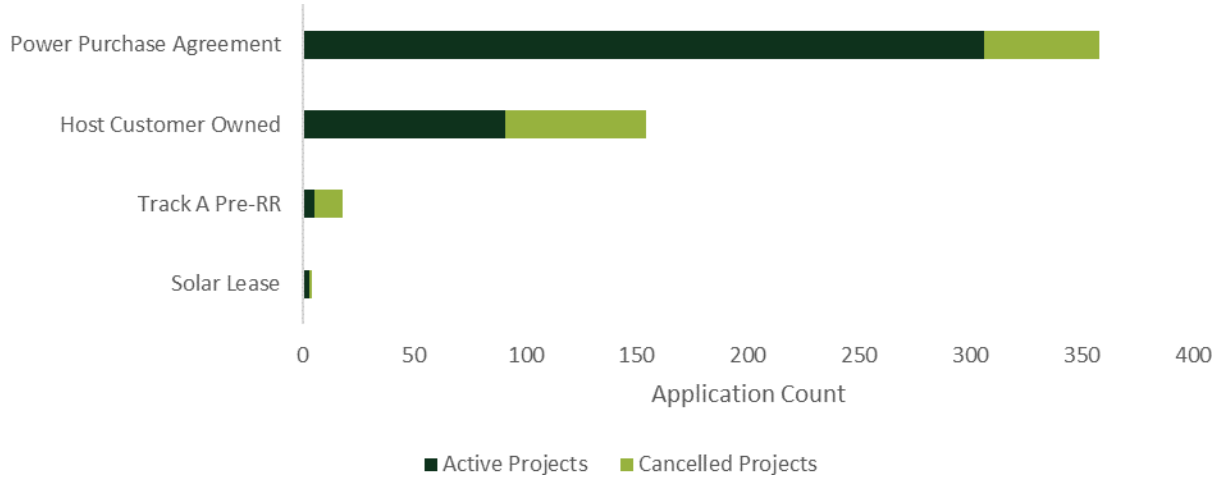
The SOMAH Handbook and program tracking data list three possible ownership options for SOMAH participation: Host Customer Owned (HCO), Power Purchase Agreement (PPA), and Solar Lease.[44] The Handbook does not currently include information on Solar Services Agreements (SSA), however property owners whose tracking data indicates they are using a PPA often reported they are using an SSA. This report uses the terminology included in the Handbook for the ownership types (PPA, HCO, and Solar Lease). A recommendation has been included in Section 7 of the report to clarify PPA versus SSA ownership in the Handbook and add SSA as an option to PowerClerk.

During the Reservation Request step SOMAH projects indicate an ownership type, using either a PPA, HCO, or a Solar Lease. At the time of reporting, 67 percent of program applicants have utilized a PPA. Approximately 30 percent (150 applications) are HCO—however nearly 41 percent of these submissions

[44] HCO systems are purchased outright by the property owner. PPA and Solar Leases are two Third Party Ownership (TPO) options. TPO can be used if a property owner does not have access to the capital required to buy the system outright or the time to operate and maintain the system. With a Solar Lease the property owner pays a fixed amount monthly to the system owner. With a PPA the property owner pays the system owner monthly for each kilowatt hour of energy produced by the system.

are no longer active. Four applications were initiated for solar lease systems and three of these are still active. The remaining applications were either cancelled prior to the reservation request phase or are currently moving through that phase.

FIGURE 4-10: DISTRIBUTION OF PROGRAM SUBMISSIONS BY SYSTEM OWNERSHIP TYPE



*RR = Reservation Request.

4.3 KEY CHARACTERISTICS OF SOMAH PROJECTS

This section of the report provides more project-specific characteristics. Here we present information about the solar system capacities (CEC PTC kW), the number of units in the multifamily dwellings, information on PV generation allocation between tenant and common areas, and information regarding whether these properties will be paired with on-site energy storage.

Figure 4-11 presents the distribution of proposed or installed AC PV system size from 516 project submissions. Eighteen of the 534 application total were either cancelled prior to the reservation request phase or are currently moving through that phase so no data on PV size is available.

FIGURE 4-11: DISTRIBUTION OF PROPOSED PV SIZING[45]

4.3.1 Size of Applicant Properties

The evaluation team compared the size of each PV system to the total number of tenant units at the property. As expected, there is a positive correlation between the PV system size and the number of units—larger PV systems accompany properties with more tenant units. However, a review of the data also found a relationship between the average system size and the project ownership type. As shown in Table 4-6, the overall solar capacity of properties under a PPA is highest at 179 kW, compared to 141 kW for HCO projects and 101 kW for Solar Leases. The average solar capacity per tenant unit ranges from 2.2 kW for PPAs, to 1.8 kW for Host Customer Owned systems and 1.5 kW for Solar Lease systems. The program tracking data currently does not have the square footage of tenant units and so it is difficult to draw any conclusions about this variation in system size per unit beyond what is presented in the table below. The solar sizing tool includes a field to capture the total gross square footage of the building. Capturing and including data on overall (and tenant versus common area if collected elsewhere such as the during the EE audit) could help future evaluations further assess correlations between project capacity, ownership type and building area.

[45] This includes projects that have not yet received their RR Approved and thus the project sizing has not yet been validated.

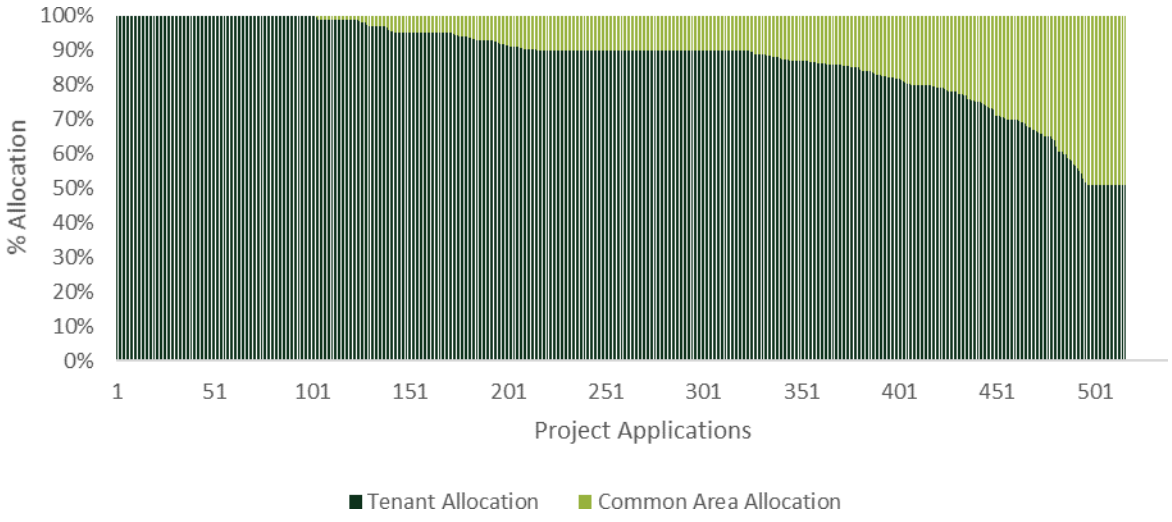
TABLE 4-6: PROJECT SIZE (PER TENANT UNIT AND OVERALL) VERSUS OWNERSHIP TYPE

Ownership Type	# of Projects	# of Tenant Units	Total kW for Projects	Average kW per Tenant Unit	Average kW per Project
Host Customer Owned	91	7,042	12,828	1.8	141.0
Power Purchase Agreement	306	25,260	54,807	2.2	179.1
Solar Lease	3	205	302	1.5	100.8
Total	**400**	**32,507**	**67,938**	**2.1**	**169.8**

4.3.2 Tenant versus Common Area PV Allocation

The SOMAH Program currently requires that at least 51 percent of each project's electrical output directly offset the tenant's load. Figure 4-12 presents the distribution of tenant area versus common area allocations for all SOMAH applications received to date. The average tenant allocation across submitted applications to date is 88 percent (weighted by estimated PV production) which is significantly higher than the tenant allocations seen in the MASH 1.0 and MASH 2.0 programs (60 percent and 45 percent of the installed capacity was allocated to tenant areas, respectively). The PV generation benefits being allocated to the tenants ranges from the allowable minimum of 51 percent to a maximum of 100 percent. The tenant versus common area allocation varied only slightly by ownership type ranging from a low of 87 percent average tenant allocation across PPAs to a high of 91 percent for solar leases.

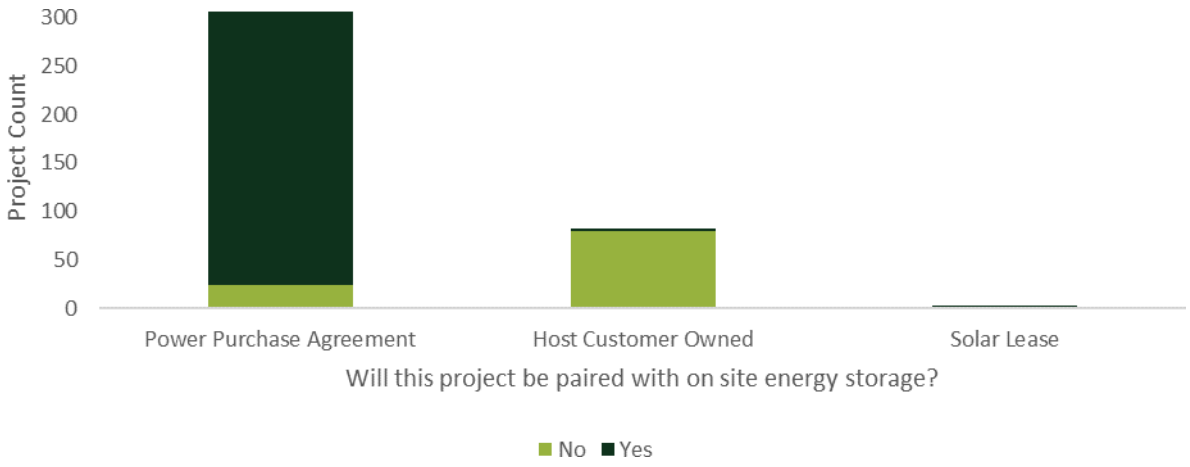
FIGURE 4-12: TENANT VERSUS COMMON AREA ALLOCATION



4.3.3 Paired with Storage

The program tracking database also has a field which details whether applicants plan to install on-site energy storage. This project tracking data field is based on project self-reported data and has not been verified. This field is populated in 433 of the 534 applications submitted to date. Installing battery storage on site at a SOMAH project location was much more common for PPA projects (92 percent) than HCO projects (2 percent). It should be noted that SOMAH projects paired with battery storage typically have BTM storage, due to difficulties with the existing VNEM tariffs. Section 5.6.2 discusses the issues related to battery storage for SOMAH participants.

FIGURE 4-13: APPLICATIONS PAIRED WITH BTM ENERGY STORAGE



4.4 KEY PROJECT COST CHARACTERISTICS

In the first year of the program, nearly two-thirds of SOMAH projects were financed using a third-party ownership model as opposed to ownership of the system by the Host Customer. The majority of third-party owned systems utilized a Power Purchase Agreement (PPA) as opposed to a solar lease. As previously discussed in Section 4.2, this trend continued into the second year of the program.

SOMAH participants who elect to purchase their solar PV system can elect to take advantage of the Federal Investment Tax Credit (ITC) or the Low-Income Housing Tax Credit (LIHTC) to offset a portion of their solar installation costs if they are eligible to do so. The ITC was 30 percent for systems installed in 2019 and declined to 26 percent in 2020. It was slated to fall to 22 percent in 2021 but the 26 percent level was extended through 2022. The LIHTC is an indirect Federal subsidy used to finance the construction and/or rehabilitation of low-income affordable rental housing. These tax credits are awarded to

affordable housing developers and then typically sold by the developers to private investors in order to obtain funding to finance the project. Once the project is placed in service (i.e., rentable) the investors can claim the LIHTC over a 10-year period.

SOMAH incentive rates ($ per AC Watt) vary based on whether the applicant is planning to claim the federal ITC or receives LIHTCs. As shown in Table 4-7, SOMAH incentives are reduced by 30 percent if a project takes advantage of one of these tax credits and by 50 percent if it takes advantage of both of the tax credits. The SOMAH PA is working to get a process in place to verify a projects ITC status with the IRS for the small subset of projects that are for-profit organizations that report they are not applying for the ITC.

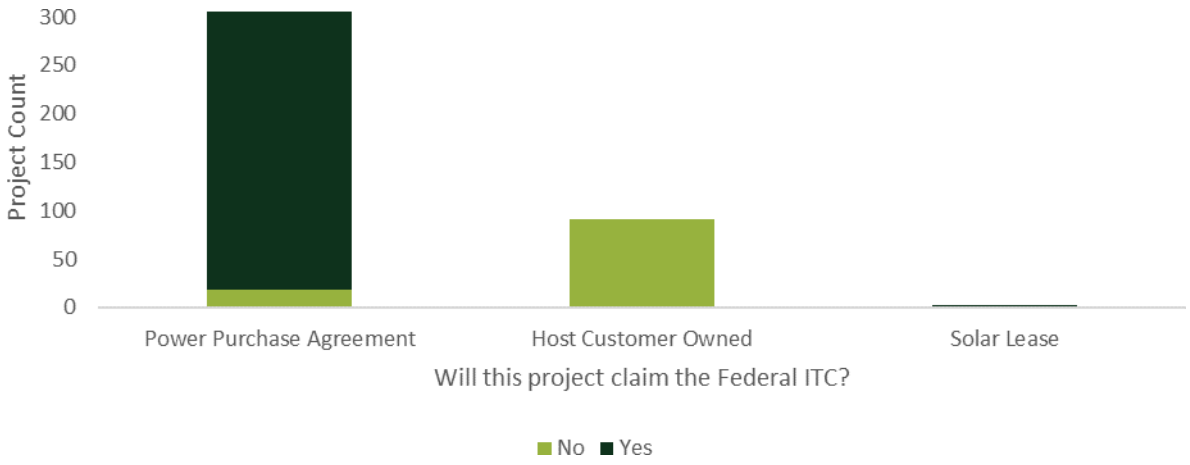
TABLE 4-7: SOMAH INCENTIVE RATES

ITC Tax Credit	LIHTC Tax Credit	Tenant $ per AC Watt		Common Area $ per AC Watt	
		7/19-6/20	7/20-6/21	7/19-6/20	7/20-6/21
No	No	$3.20	$3.04	$1.10	$1.04
Yes	No	$2.25	$2.14	$0.80	$0.76
No	Yes	$2.25	$2.14	$0.80	$0.76
Yes	Yes	$1.60	$1.52	$0.60	$0.57

To date, roughly two-thirds of the active applications have indicated that they planned to claim the ITC and less than 2 percent plan to use LIHTC. The one-third of projects not planning to claim the ITC illustrates the unique differences in claims by ownership type. The ITC is a one-time credit on federal taxes and can be used to offset a portion of the total PV system cost. Because it is a tax credit, it cannot be claimed by non-profit organizations. As a result, it is common for non-profit organizations to utilize a PPA or Solar Lease ownership model so the ITC can be placed with a for-profit third-party entity to help offset a portion of the system cost (Figure 4-14).[46] It is important to note that projects that elect to utilize a PPA ownership type do not add costs for the building tenants, as they are not directly linked to the agreement. Under a SOMAH PPA, the property owner (host customer) is responsible for paying the per kilowatt hour charges to the system owner. Additionally, program rules forbid property owners from increasing tenant bills due to costs they may incur due to the solar system being installed.

[46] Other types of organizations besides non-profit organizations have also applied using PPA ownership model as this is more of a “turnkey” solution offered by project developers.

FIGURE 4-14: SHARE OF SYSTEMS RECEIVING FEDERAL ITC BY OWNERSHIP TYPE



The evaluation team reviewed the total project costs and SOMAH incentives across the project applications that have been submitted to date. Attention was paid to the correlation between costs and incentives and system ownership type. Figure 4-15 below shows—across the three primary ownership types—the average project incentive, the average expected ITC, and the average cost not covered by the program (which is either paid for or financed by the property owner or included in the PPA or Solar Lease payments). The figure also provides three lines indicating the average incentive per Watt (black line), non-incented cost per Watt (grey line) and total project cost per Watt (red dotted line) for each of the ownership types. As this figure shows, the total system cost per Watt is slightly higher for PPAs and solar leases, however the average SOMAH incentive for these projects is lower as these ownership types typically leverage ITC funding to cover a portion of the project cost thereby decreasing the SOMAH incentive dollars paid out for those projects.

FIGURE 4-15: SYSTEM COSTS AND INCENTIVES PER WATT BY OWNERSHIP TYPE[47]

A breakdown of the system costs by ownership type is shown in the table below for projects where disaggregated data was available. Of the 360 PPA projects submitted, only 24 had disaggregated data, as did one of the two solar lease projects.[48] The total costs of HCO and PPA systems may not be comparable due to the costs included in the Balance of System (BoS) costs.[49] BoS costs for PPAs may include allowable costs such as system design or feasibility study costs which increase the total system cost and ultimately the cost basis for the ITC. This cost summary of the program tracking data has not been verified by the evaluation team, nor have reasons for cost differences between ownership types been explored. The evaluation team recommends further study to determine whether this SOMAH application cost data, after being independently verified, could be used alongside or in lieu of the NREL cost data to determine current costs of installing solar on multifamily affordable housing.

[47] The average expected ITC is estimated as the percentage of active projects that stated they would claim the ITC times the average total cost ($) times the current ITC incentive of 22 percent.

[48] PPA ownership type applications typically have $1 entered into all cost fields except the total system cost field until they reach the PPM step at which time they are required to provide the disaggregated costs. As more applications reach this step the number of PPA with disaggregated data will increase.

[49] Balance of System (BoS) costs include the parts of the solar PV system that are not modules and inverters. This includes the wiring to connect modules to eachother and the inverter(s), framing to support the modules, and all other hardware.

TABLE 4-8: SYSTEM COMPONENT COSTS BY OWNERSHIP TYPE FOR PROJECTS WITH DISAGGREGATED DATA

Average Costs	Host Customer Owned	Power Purchase Agreement	Solar Lease
Number of Applications	154	24	1
Average Project Cost	$473,153	$806,979	$416,487
Average PV Module Cost	$120,631	$128,707	$35,272
Average Inverter Cost	$78,151	$97,130	$29,440
Average PMRS Cost	$29,278	$4,902	$12,950
Average Carport Cost	$141,084	$119,759	
Average Permitting Fees	$17,545	$1,934	$9,658
Average Balance of System Costs	$196,352	$788,469	$372,825

4.5 TOTAL PROGRAM EXPENDITURES TO DATE

SOMAH has an annual budget of up to $100 million annually. The SOMAH PA compiles and submits a Semi-annual Expense Report that tracks expenditures by category, including program incentives and administration expenses for the SOMAH PA, CPUC Energy Division, and the IOUs.[50] Administrative costs are capped over the lifetime of the program to not exceed 10 percent of the total available funds, but there is flexibility as to when funds can be utilized.[51]

The following table shows the total expenditures through December 31, 2020.[52]

[50] SCE holds the SOMAH contract. A single invoice is submitted by CSE to SCE on behalf of all four organizations that make up the PA.

[51] D.19-03-015 Ordering Paragraph 1

[52] Semi-annual Expense Report: July 1, 2019 – December 31, 2020.
https://www.californiadgstats.ca.gov/static/documents/somah/SOMAH_Semiannual_Expense_Report_January2021.xlsx

TABLE 4-9: TOTAL PROGRAM EXPENDITURES FOR 2018, 2019, AND 2020

Budget Category	2018	2019	2020	Total
SOMAH Program Administration	$1,896,345	$3,361,236	$4,007,467	$9,265,048
SOMAH Marketing, Education, & Outreach (ME&O)	$412,041	$1,681,468	$2,158,198	$4,251,707
SOMAH Workforce Development	$22,049	$282,027	$497,327	$801,403
SOMAH Technical Assistance	-	$232,941	$186,594	$419,535
SOMAH California Public Utilities Commission (CPUC) Expenditures*	$169,496	$174,648	$155,339	$499,483
Investor-Owned Utility (IOU) Expenses	-	$1,410,785	$1,631,647	$3,042,432
Total Program Admin Expenditures	**$2,499,932**	**$7,143,105**	**$8,636,572**	**$18,279,609**

The Semi-annual Expense Report tracks all the incentive budget and actual and forecasted incentive payments. The following table shows the annual incentive budget and actual incentive payments through December 31, 2020, and the forecasted incentive payments through December 2022. As this table shows the budget for incentives at this time far exceeds the forecasted incentive payments.

TABLE 4-10: TOTAL PROGRAM BUDGET AND INCENTIVE PAYMENTS (TO DATE AND FORECASTED)

Budget Category		2017 - 2018	2019	True-Up	2020	2021	2022	Total
Incentive Budget		$95.2M	$81.4M	$84.5M	$42.3M			$308.5M
Incentive Payments	Actual				$126k			$126k
	Forecasted					$5.2M	$70.2M	$75.4M

5 PROCESS ASSESSMENT

This section presents findings from the primary data collected through in-depth interviews of participating and non-participating contractors and property owners. Interview topics covered program participation experience, including: what did and did not work well; questions, concerns, and difficulties navigating and/or completing the process; adequacy of program-related materials and assistance; and suggestions for improvements. Results are organized thematically by:

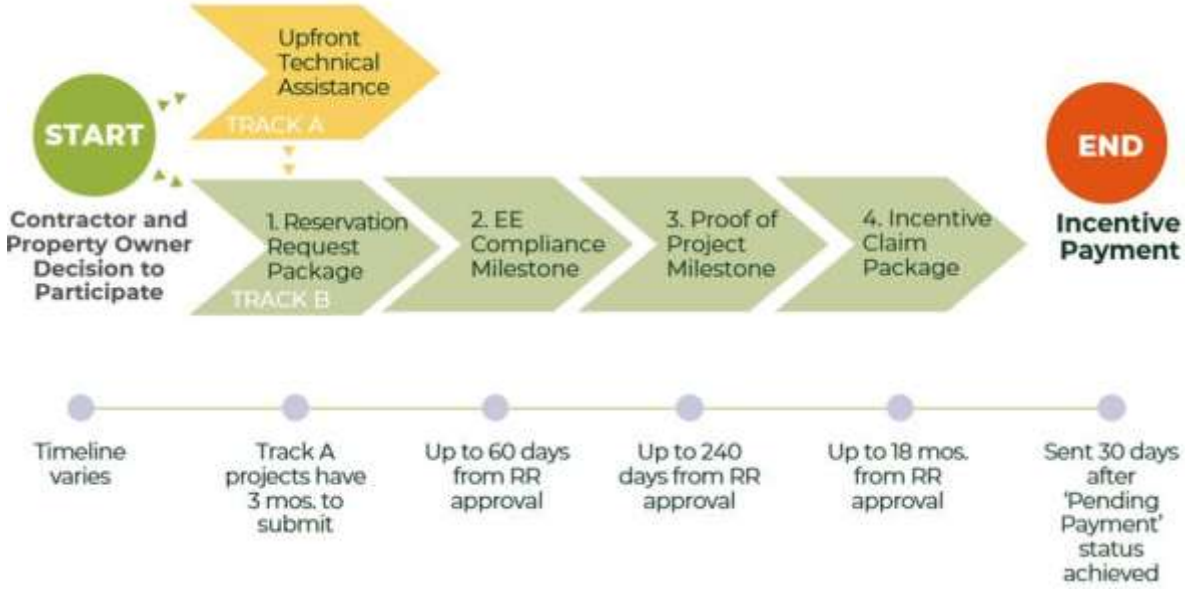
- *Contractor Motivations and Decision to Participate*, i.e., what factors motivate contractors to participate in the SOMAH Program and likelihood of future participation.
- *Property Owner Awareness and Decision to Participate*, i.e., affordable housing organization's primary sources of program awareness, motivations, and barriers to SOMAH participation and solar adoption, and likelihood of expanding participation to additional properties in the future.
- *Application Process and Program Experience,* i.e., contractor and property owner's assessment of the adequacy of the Track A Technical Assistance provided, participant experiences throughout the course of the SOMAH application process, and process findings related to system financing, ownership type, and program incentives.
- *Satisfaction and Effectiveness of the SOMAH Program,* i.e., what is the level of satisfaction contractors and property owners have with the SOMAH Program overall and program elements (eligibility requirements, application process and timeline, program administrator, incentives, etc.) and how effective has the program been in achieving SOMAH Program goals and extending participation to other programs.
- *SOMAH Marketing, Education and Outreach,* i.e., what approaches are being used to reach eligible properties, and adequacy of program education and assistance.

Data and analysis from the contractor and property owner interviews and web surveys are presented as they pertain to each section.

5.1 OVERVIEW OF PROCESS FLOW

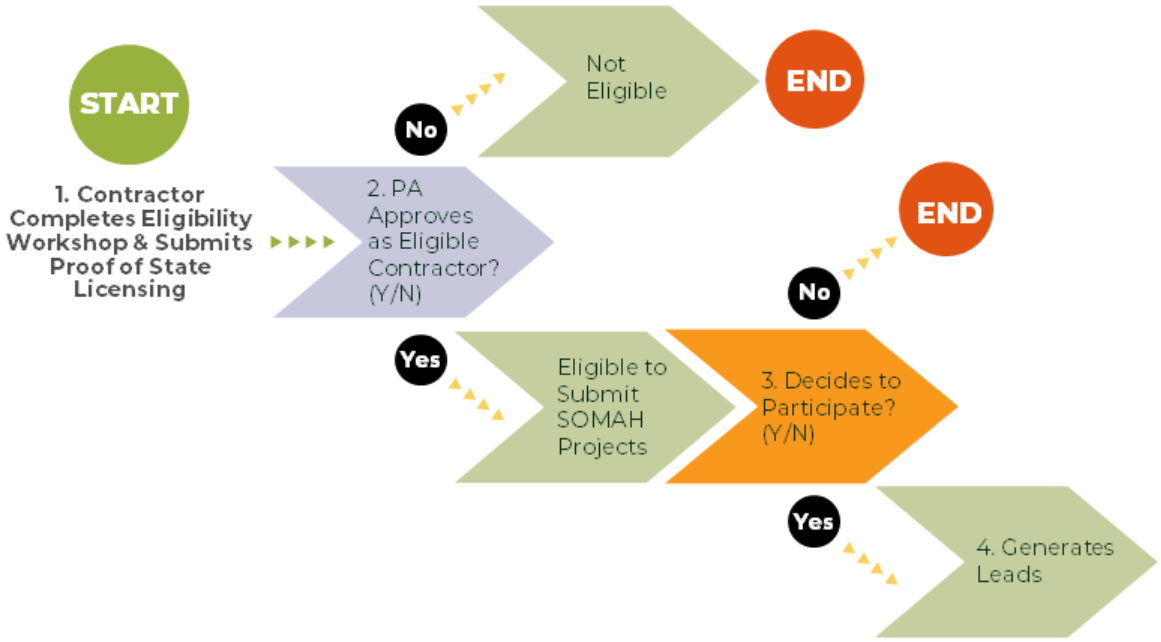
To better understand the feedback and input we received during the contractor and property owner interviews, it will be helpful to have a general overview of the SOMAH process flow. SOMAH projects must go through a series of steps to receive an incentive payment. A high-level overview of the SOMAH application process is shown below, with each step further detailed in the following sub-sections. The application process consists of four core steps, including the (1) Reservation Request Package, which reserves incentive dollars and provides key project details to the PA; (2) Energy Efficiency Compliance

Milestone, which explores opportunities for building efficiency; (3) Proof of Project Milestone, which provides the PA with documentation of ownership and proof of system purchase; and finally (4) Incentive Claim Package, which is submitted post-installation and interconnection and brings together final documentation of meeting the project requirements.



5.2 CONTRACTOR MOTIVATIONS AND DECISION TO PARTICIPATE

The contractor decision to participate in the SOMAH Program is outlined in the diagram below. Contractors first must (1) complete an Online Eligibility Workshop offered by the SOMAH PA and submit proof of state licensing. Upon approval (2), eligible contractors decide whether to participate in the program (3) and begin to generate leads (4). Despite being eligible, some contractors may ultimately decide not to participate and submit projects.



Key Issues & Barriers

- 118 contractors approved as eligible to participate, but just nine have submitted a project application to-date
- High administrative burden may be to too much to overcome for many contractors, even if they are eligible
- Some contractors unsure how to generate leads within the system
- Some have faced difficulties due to Covid-19

The following subsections further explore contractor motivations, barriers, and the decision to participate in the SOMAH Program.

5.2.1 Motivations and Barriers to Contractor Participation

Interviews were completed with four participating contractors (see Table 3-1). The contractors stated that they were motivated to participate in SOMAH because it aligns with their mission or company-related goals, and/or because multifamily housing makes up a large portion of their work and SOMAH will benefit their customers. One contractor noted that they have a company commitment to add more renewables to the grid, while two others specified that SOMAH fills the market gap of solar in the low income and affordable housing sector. All four participating contractors interviewed had previous experience with other solar programs, predominantly with the Multifamily Affordable Solar Homes (MASH) program.

Contractors noted several barriers to participation, primarily related to the administrative burden of the program. In general, contractors require dedicated and large teams to manage SOMAH projects. All four

participating contractors interviewed noted that they have multiple staff people—and in some cases whole teams—focused on managing SOMAH. A typical team structure can vary depending on company size, and the small (25 or fewer employees) to medium sized contractors (26-100 employees) tend to wear multiple hats throughout the project lifecycle. In contrast, one larger contractor (101 or more employees) noted that they have a team of 50 employees who solely focus on SOMAH projects. One other large contractor noted that they held internal working groups with over a dozen team members engaged over the course of six months to prepare for the SOMAH launch, with teams focused on areas of financing, application rules, design, and operations and project management. A typical SOMAH project team structure may include a business development and sales staff tasked with lead generation, financing, and proposals, a project management and administrative staff who track projects and program application requirements over the project lifecycle, engineering staff who are dedicated to project design, and a construction team that focuses on project installation.

Participating contractors were asked if they had any concerns about participating in the SOMAH Program. Their concerns are summarized below:

- **Too much administrative burden**. Two of the four participating contractors noted that their primary concerns about the program were the administrative and documentation requirements.

- **Property and design limitations**. One contractor stated that older multifamily sites may only be able to support smaller solar installations due to property design limitations or the inability to make electric service upgrades, and as a result may not be a good fit for SOMAH.

- **Financial barriers**. One contractor noted concerns that some multifamily owners still may face financial barriers despite the incentives. Financial barriers ranged from needing capital for other building expenses like replacing a roof,[53] to financing the construction costs.

The evaluation team also interviewed two non-participating contractors to provide additional insights into the barriers that contractors face. Both are eligible for SOMAH but have chosen not to participate. The following barriers to participation were highlighted by the contractors interviewed:

CONTRACTOR BARRIER #1: Too much administrative burden. Similar to participating contractors, both non-participants noted that there was too much effort required prior to knowing whether a project might receive an incentive. One of the contractors said that they have encountered projects that might have been eligible to participate, but they ultimately decided that it was not worth the additional administrative burden to apply.

[53] Roof replacement can be covered by the SOMAH incentive if the roof is where the PV will be placed.

Recommendations to address barrier #1:

- **Services to assist with application submittal.** Many property owners and contractors reported the application process was "onerous" or "burdensome." The SOMAH PA could consider providing services to assist contractors or property owners by completing or prefilling portions of the application and helping with other time-consuming steps such as researching local zoning codes (that could significantly impact project plans), acquisition of property billing data, or assistance with project permitting. As part of a forthcoming SOMAH Vendor Assessment the evaluation team will be conducting additional research on the program dollars spent on various administrative tasks (such as application processing, workforce development, and technical assistance) in order to determine whether there is a need to refocus or shift PA spending to areas that will help to alleviate some of the participation burdens reported by property owners and contractors.

CONTRACTOR BARRIER #2: Perceived lack of opportunities for smaller contractors or contractors that are not as familiar with the program process. One contractor mentioned that because they have a smaller team, they do not always have the capacity to read all the program communications in detail, and the incentive dollars seem to get allocated quickly. They suggested that a certain portion of dollars could go towards smaller contractors and that communications be more targeted and direct so that they do not miss their chance to submit a project. Another recommended that contractors be assigned to specific regions of the state to open up project opportunities for more contractors.

Recommendations to address barrier #2:

- **Help smaller contractors identify opportunities to act as subcontractors to larger contractors.** The SOMAH PA could potentially increase contractor diversity in the program by providing services to help small contractors identify subcontracting opportunities on SOMAH projects. This would allow the smaller contractors to gain experience with the program, thereby increasing their likelihood of submitting future applications and ensuring program contracting opportunities are dispersed amongst a wider diverse set of contractors. It could also help to expand the pool of contractors located in or around DAC where the prevalence of eligible contractors appears to be lacking.[54]

- **Review/Update SOMAH Eligible Properties Map.** The evaluation team reviewed the underlying data in the eligible property map and had concerns related to the estimates of available solar capacity. These capacity estimates have since been removed due to data issues. Including estimates of solar

[54] Many contractors will only install solar PV systems within a limited distance from their facilities to minimize travel time and costs. On average, participating contractors self-report in their applications a service radius of just under 50 miles from their primary office. Some of the participating contractors have multiple offices to cover more territory. This includes the most prolific contractor that has offices throughout the state to cover the majority of California. However, the majority (80 out of 119) of participating contractors self-report a service radius of only 25 miles.

potential at eligible properties that can be used by contractors and the SOMAH PA to target properties for program participation.

- **Track diversity of subcontractors.** Participating contractors reported employing smaller subcontractors on SOMAH projects. Requiring program contractors to track their subcontractor use (for project engineering and installation activities) and diversity status (whether they are certified small or diverse businesses) will allow the SOMAH PA to assess overall diversity in the program. The SOMAH PA currently tracks the diversity of SOMAH eligible contractors, but the full extent of contractor diversity cannot be known unless it includes subcontractors.

- **Workforce development.** Contractors noted work should be done to broaden the pool of job trainees and the SOMAH PA should provide more assistance to contractors to help them meet program job training requirements. According to the SOMAH PA they do offer job trainee placement assistance, however not all contractors seemed to be aware of the availability of this assistance. The PA could work on strengthening ties with the organizations that that provide job trainees to better understand what they can do to increase the pool of job trainees.

CONTRACTOR BARRIER #3: Confusion over how SOMAH Program incentives can be used. One of the contractors noted that if the incentives were opened to additional technologies or project needs, the program may be able to reach more multifamily properties. The contractor mentioned that in many cases, an aging roof may also need to be replaced or electrical service upgraded. Additionally, incentivizing complimentary technologies – such as co-generation, energy storage, air conditioning technologies, or EV charging may also be desirable and cast a larger net. According to the SOMAH PA and Handbook the SOMAH incentive can be used to pay for roof replacement expenses necessary for SOMAH projects, electrical service upgrades directly associated with the installation of the energy generating equipment, and solar that will be used for EV charging. This indicates that not all participating contactors fully understand how the SOMAH incentives can be used.

Recommendations to address barrier #3:

- **Clarify allowable expenses that can be paid for with program incentives**. Currently program incentives can be used to cover the majority of project costs including financing costs and construction management and project development costs. Ensuring all eligible contractors fully understand the wide range of allowable expenses[55] may reduce some of the financial barriers to participation thereby helping more properties apply to the program and lessening future project cancellations.

[55] According to the SOMAH Handbook Section 3.3.1 allowable expenses include the costs associated with the following: solar equipment purchase, engineering, and design (including feasibility studies), construction and installation, interconnection, building permits, warranty and maintenance contracts, sales and use tax, PMRS equipment, mounting surface (roof or carport directly under the PV modules), construction management and project development, cost of capital.

In addition to the interviews completed by the evaluation team with non-participating contractors, the SOMAH PA also launched a "Barriers to Entry" survey to non-participating contractors in the fall of 2020 to assess the barriers they face to participating in the SOMAH Program. A total of 34 out of 119 eligible contractors responded.[56] The evaluation team reviewed the survey results and concurred with the key findings documented in the December 2020 Semiannual Progress Report[57] which included:

- Two-thirds of non-participating contractors surveyed reported experiencing difficulties in participating in SOMAH. The primary difficulties were lead generation (52 percent), financial barriers (43 percent) and confusion about SOMAH Program requirements (43 percent).

- Multiple contractors also noted challenges related to meeting program requirements, which is consistent with the contractor interviews. These difficulties included confusion about the requirements (9) or the application process (6), a limited number of staff to submit applications (5), and uncertainty about incentive amounts/funding availability (5).

QUESTION: "Please indicate if you have experienced any of the following challenges to participation in the SOMAH Program (select all that apply)" (n=21)	**Number of Respondents**
Lead generation	11
Financial barriers	9
Confusion about program requirements	9
Confusion about the application process	6
Limited number of staff available to submit applications	5
Uncertainty about incentive amounts and funding availability	5
Lack of experience with multifamily installations	2
Other, please specify	4

- Just less than half of non-participating contractors surveyed (46 percent) reported having previous experience participating in a solar incentive program (the MASH program represented the majority of experience, 62 percent) indicating a lack of prior solar program experience is a key barrier that needs to be addressed. Contractors without prior program experience might need additional assistance from the PA to enable their participation in the program.

Phase I of this study included an initial discussion regarding the adequacy of contractor diversity[58] in the program. At the time of the Phase I report, 114 contractors were eligible to participate in the program but only 10 had submitted a SOMAH application. This limited contractor participation has continued, and the

[56] In total there were 234 contractor contacts the web survey was mailed to, but these contacts were associated with 119 unique companies.

[57] Semiannual Progress Report: July 1, 2020 – Dec. 31, 2020. https://www.californiadgstats.ca.gov/static/documents/somah/SOMAH_Semiannual_Progress_Report_January2021.pdf

[58] Contractor diversity is self-reported by contractors during eligibility process.

program continues to be dominated by a few large contractors (as of April 29, 2021, four contractors have submitted 94 percent of the applications). One larger contractor reported their organization has implemented a company wide diversity policy to encourage the use of small and diverse subcontractors. The SOMAH PA currently tracks the diversity across SOMAH eligible contractors but the full extent to which contractor diversity exists in the program cannot be known unless the program tracks the work being completed by subcontractors. According to the SOMAH PA, documentation of subcontractor participation is required as part of the Proof of Project Milestone step. At the time of this report, 52 projects have passed this step and thus the extent to which this data will be sufficient to report on subcontractor diversity is still to be determined. Requiring SOMAH contractors to track and report on the degree to which they use subcontractors on SOMAH projects for solar engineering and installation activities, and whether the subcontractors are certified small or diverse businesses (woman, minority, veteran, or other diverse segment owned) would allow the SOMAH PA to track and more accurately assess the overall contractor diversity that exists in the program and the level at which SOMAH contracting opportunities are being dispersed across a diverse workforce.

The SOMAH PA also reported they are currently considering if the program can support increased contractor diversity in the program by playing a more active role in helping match up the larger contractors who have submitted the majority of SOMAH applications with smaller contractors who have met the SOMAH eligibility requirements but have not yet submitted an application. Creating a portal to facilitate "match making" between contractors could identify opportunities for smaller non-participating contractors to work as subcontractors on SOMAH projects. This would allow them to gain experience with SOMAH and potentially increase their likelihood of submitting future applications on their own.

5.2.2 Contractor Onboarding and Engagement

Contractors must complete a Contractor Eligibility Workshop delivered by the SOMAH PA and have an active license with the California Contractors State Licensing Board[59] to be eligible to participate. All four participating contractors interviewed attended the PA trainings, and two noted that they had multiple people from their teams attend. Contractor feedback on the onboarding training was generally positive, as listed below:

- One contractor mentioned that the onboarding training was helpful in that it provided a good summary of how the program currently operates.

[59] Per the SOMAH Handbook, solar installation contractors must have an active A, B, C-10, or C-46 license for photovoltaic systems.

- Another contractor noted that the trainings did not have much information outside of what is already in the program handbook, so their primary motivation in attending was to fulfill the eligibility requirements.

- A third contractor mentioned that offering trainings periodically is helpful, as they have come up with new questions after gaining more experience with the program. Trainings are held every other month and sometimes monthly, with a total of eight trainings in 2020.

None of the contractors interviewed had additional suggestions for the program onboarding or trainings. However, survey results presented in the previous section note some confusion among eligible contractors about the program requirements (9 out of 21) and the application process (6 out of 21). This suggests that the SOMAH PA should continue to offer periodic trainings on SOMAH Program requirements and the application process, and continue to look for opportunities to clarify, simplify, and provide support.

The SOMAH PA's survey also asked eligible non-participating contractors what resources could be provided to help them participate in the SOMAH Program. Respondents most frequently mentioned providing free marketing materials (17), financing resources (14), and technical assistance services (14).

QUESTION: "What resources, if any, can the SOMAH Program administrator provide to help you participate in the SOMAH Program (select all that apply)" (n=34)	Number of Respondents
Free marketing materials for customers	17
Financing resources	14
Technical assistance services	14
Online forum for contractors to connect	12
Educational webinars	11
Job training resources	6
Business capacity support (i.e., Injury Prevention Program template)	6
Tenant education resources	5

All participating contractors interviewed noted that the SOMAH PA has been very responsive to their questions and requests and have been good to work with. One contractor mentioned that the SOMAH PA is always willing to help them navigate the program requirements. Another noted that there were some miscommunications early in the program which have been since resolved.

5.2.3 Generating Project Leads

Participating contractors interviewed noted that the most frequent way of generating SOMAH project leads was through existing client contacts. In other cases, they have relationships with affordable housing staff who approached them to learn more about SOMAH. One contractor reported generating leads through offering webinars and developing in-house marketing materials about SOMAH. Contractors

mentioned that working with larger customers with several multifamily properties is often easier and more efficient, as communications and decision points can apply to multiple sites.

Contractors interviewed did not flag generating leads as a barrier to participation in SOMAH – however, contractors surveyed by the SOMAH PA chose generating leads as the most common barrier faced (11 out of 21 who said they faced difficulties in participating). Open-ended comments suggest a variety of challenges related to generating leads, from a lack of understanding or capacity, to difficulties in communicating the value of the program to sales staff.

- One contractor noted that they are "not sure how to generate leads within the system. Door knocking is not an option for us."
- Another said, "the difficulty with participating in the program has been mainly with my sales team and getting them to understand the value of the program. When COVID hit, we had many layoffs and now I (just) have two people on my sales team."
- Another mentioned, "Having access to decision makers and tenants is another challenge."

Participating contractors interviewed were all aware of the eligible properties map[60] produced by the SOMAH PA and reported they use the map in addition to other sources, such as affordable housing lists, to determine property eligibility. One contractor noted that in some cases they have found that the map is out of date (i.e., including properties that have installed solar and are thus ineligible for SOMAH).

SOMAH Eligible Properties Map

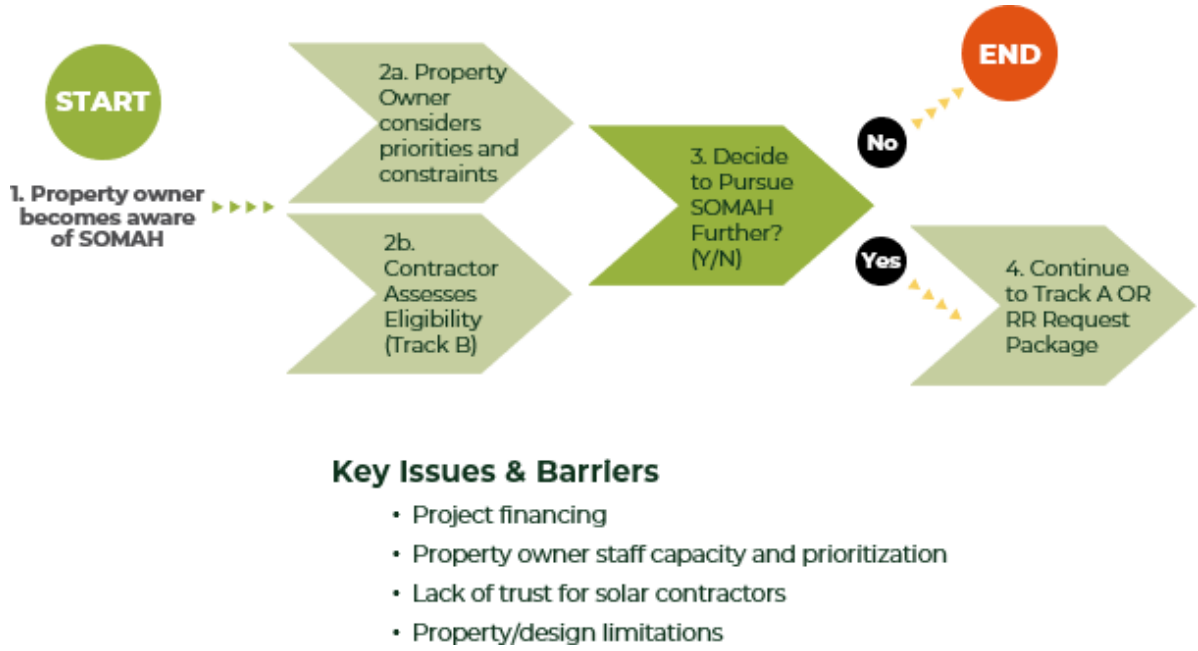
The SOMAH eligible properties map includes a listing of SOMAH eligible properties that can be easily segmented by electric utility, legislative district, climate zone and disadvantaged community tier (top, middle, and bottom tier). The map includes the address of the properties and the number of eligible units at each property. The map also included an estimate of the solar potential (kW) at each site until recently as there were concerns with the validity of these estimates. Including the solar potential of projects within this map is helpful to contractors using these data to target eligible properties. The SOMAH PA indicated they are in the process of updating this component of the map and the evaluation team recommends further analysis of this tool once that transition has occurred.

5.3 PROPERTY OWNER AWARENESS AND DECISION TO PARTICIPATE

Property owner's motivations and barriers to participating in the SOMAH Program and installing solar PV are discussed in this section. The chart below shows the path of property owner awareness and decision

60 https://calsomah.org/eligible-somah-properties-map

to participate in SOMAH. Upon becoming aware of the program (1), the property owner will typically consider how SOMAH could help them to achieve certain priorities or goals, like increasing property value. Constraints are also identified and considered that may get in the way of participation (2a). At the same time, most property owners engage a contractor who will assess the properties' eligibility for SOMAH (2b). Property owners then must decide whether to pursue SOMAH further (3) and could either continue onto submit a Track A application if they have not engaged a contractor or submit a Reservation Request package if they have (4).



Property owner's motivations and barriers to participating in the SOMAH Program and installing solar PV are discussed further in the following sections.

5.3.1 Primary Sources of SOMAH Program Awareness

Property owners interviewed were asked how their organization became aware of the SOMAH Program. Many reported knowing about the program well before it started as they are "plugged into these items" and had previously participated in MASH or LIWP (Low-Income Weatherization Program). Others reported they learned about the program through existing relationships with solar contractors from prior solar or solar thermal projects or through SOMAH specific outreach from program contractors. A few mentioned they had also learned about SOMAH from peers in the affordable housing community. One property owner recommended the SOMAH PA work with affordable housing trade associations such as Housing California or the Southern California Association of Non-profit Housing (SCANPH) as these organizations

are trusted sources of information for many affordable housing organizations and provide information to members through email blasts. The SCANPH website also includes a *Members Spotlight* page which showcases issues pertinent to members including funding that members have received through various programs.[61] It should be noted that the SOMAH PA works closely with both of these associations however their engagement with them should be assessed to ensure that it is resulting in members heightened awareness and knowledge of the SOMAH Program. This same property owner also reported their organization is currently consulting to a number of smaller affordable housing organizations to share their SOMAH Program experiences and lessons learned and indicated a willingness to expand upon this outreach by developing case studies on one or more of their SOMAH projects.

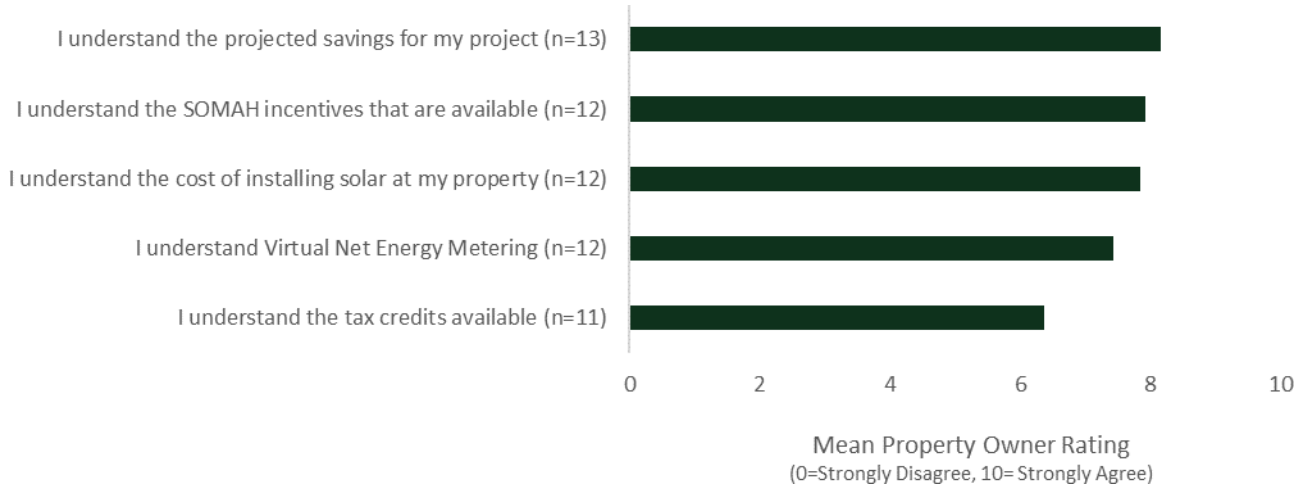
Program tracking data indicated participation amongst municipal housing authorities was low.[62] One participating housing authority was interviewed as part of this evaluation and was unsure how their organization became aware of the program (respondent stated he was told to investigate SOMAH participation from his management and submitted Track A application to utilize the SOMAH PA assistance). Housing authorities may require more targeted outreach through organizations that interact with these agencies and may also benefit from case studies that showcase successful SOMAH participation at these properties.

To gauge property owner's knowledge level on the SOMAH Program, interviewed and surveyed property owners were asked to rate their level of agreement (on a 0 to 10 scale, where 0 is strongly disagree and 10 is strongly agree) with a number of statements regarding their understanding of various financial program elements. The average ratings for these elements are provided in the figure below. As this figure shows, property owners reported fairly high levels of knowledge about their project's projected savings, the available incentives, and the total cost of installing solar, but were less knowledgeable about VNEM and the tax credits available.

[61] According to the SOMAH 2021 ME&O Plan the SOMAH PA co-marketed a number of events with a variety of affordable housing organizations including SCANPH. Marketing through these organizations should be continued and expanded to include case studies if possible.

[62] The 2021 SOMAH ME&O Plan reported 7 of the 159 (four percent) applications submitted in 2020 were submitted by local housing authorities.

FIGURE 5-1: PROPERTY OWNER UNDERSTANDING OF SOMAH FINANCIAL PROGRAM ELEMENTS



5.3.2 Property Owner Motivations and Barriers to Participation

Affordable housing organization's motivations to participate in the SOMAH Program were driven by a mix of financial, tenant equity, and environmental benefits provided by SOMAH Program participation. Some participating property owners specifically called out their organization's focus on the "triple bottom line"[63] but that while tenant and environmental benefits were important, the primary drivers to participation were financial in nature. The table below shows the primary motivations reported by property owners.

Benefit Type	Property Owner Motivation
Financial Benefits	Reduction in common area operating expenses Ability to install solar at near zero cost Get property out of the red by reducing utility costs No upfront capital costs
Tenant Equity Benefits	Desire to reduce the cost of living for their residents Alignment in utility costs between new and old properties Organization is mission driven to help tenants in any way possible
Environmental Benefits	Organization commitment to making properties more efficient and sustainable Participation in Better Buildings Challenge (not solar) A step towards achieving company sustainability goals

63 The *triple bottom line* expands the traditional definition of bottom-line performance of an organization (financial or economic) to include social equity (in this case tenant benefit and equitable access to solar) and environmental (GHG reductions) factors.

Affordable housing property owners reported that participating in the SOMAH Program resulted in additional benefits for their organizations such as:

- Increases to a tenant's disposable income led to a greater ability for them to pay their rent.
- Reductions to properties' operating expenses (namely common area utility bills) increased the money they have available to make energy efficiency upgrades or other needed repairs at their properties.
- SOMAH was an important "equalizer" to help their older properties be more comparable to new construction properties that were typically more energy efficient.
- Affordable housing organizations often rely on city and local government for funding or need their approval for things such as permitting, and they believe being viewed by these municipalities as "green" is beneficial as they increase their focus on local solar generation and carbon reductions to help meet their sustainability goals.

Solar Installation Decision Influences

Property owners were asked to rate on a 0 to 10 scale the importance of several factors in their decision to install solar through the SOMAH Program. The mean score for each factor is presented in the table below. Overall, the two most important factors in their decision to install solar through SOMAH were that it allowed them to install low or no-cost solar at their property (mean score 9.4) and has allowed them to reduce their tenant's energy bills (mean score 8.9). As this table shows, the importance of the four financial factors varied significantly. While low/no-cost solar and reduced common area bills were very important, increased property value and a good return on their investment[64] were not very important. Across the three "triple bottom line" categories, financial factors rated highest, followed by equity factors and lastly environmental factors. The primary sentiment heard from property owners across the board was that while environmental benefits are "a nice to have," they are not a primary motivator to install solar.

[64] Property owners who were getting zero cost solar and had no out of pocket costs were still asked to rate their "Return on Investment" as the return on their participation (i.e., do they need to benefit financially from the project). One respondent stated "it just has to pay for itself" which was fairly representative of what we heard from many of the property owners.

TABLE 5-1: IMPORTANCE OF FACTORS TO INSTALLING SOLAR

On a scale of 0 to 10, please rate the importance of the following factors in your organization's decision to install solar through the SOMAH Program?		n	Mean Score
Financial	Low or no-cost solar	10	9.4
	Reduced energy bills for common areas	10	7.8
	Good return on investment	9	5.4
	Increased property value	11	3.4
Equity	Reduced energy bills for tenants	10	8.9
	Equitable access to solar for all community members	10	7.4
Environmental	Compliance with company sustainability goals	7	7.9
	Clear air and public health reasons	7	6.6
	Reduced CO2 emissions	9	6.1
Other	Free technical assistance	4	6.8
	Energy independence	9	4.8

Property Owner Barriers to Participation

Participating property owners were asked during in-depth interviews and web surveys whether a number of issues were barriers to participation for their organization. The responses provided are shown in Table 5-2 below. As this table shows, the primary barriers reported were related to the lack of resources (both staff time and financial) they felt were required to participate in the program. An inability to identify a solar contractor was not reported to be a barrier by any respondent. Most respondents were Track B participants who had learned about SOMAH from a contractor and thus this result is likely not representative of non-participating eligible property owners. Lack of solar system knowledge was also not reported to be a barrier for most property owners (75 percent).

TABLE 5-2: PROPERTY OWNER REPORTED BARRIERS TO SOLAR INSTALLATION

Barriers to Solar Installation	n	% Reporting it was a Barrier
Financial barriers	17	77%
- Lack of capital or access to financing to cover cost of solar installation	11	82%
- Lack of upfront capital or bridge funding	9	78%
Time required by staff to manage solar installation project	12	75%
Lack of Solar PV system knowledge	16	25%
Inability to identify a solar installation contractor	9	0%

Respondents were also asked an open-ended question regarding the barriers they faced allowing them to elaborate on their organization's participation challenges. The barriers reported were numerous. A summary of property owners' barriers and recommendations to address them are presented below.

PROPERTY OWNER BARRIER #1: Not their top priority. A common theme mentioned by many of the affordable housing organizations interviewed was that while they were very much in favor of increasing their reliance on sustainable resources and saving their tenants money, this was not their top priority. The housing crisis in California is immense, and therefore their #1 priority is to house people. While they view solar as a "nice to have," it competes with other important organization priorities such as tenant job placement and training,[65] mental health services, and recently COVID assistance. A few property owners directly stated that solar is not the top priority for anyone in their organization and that "there are only so many hours in the day." A few mentioned that while their senior management were in favor of SOMAH participation, it was made clear that it cannot take away from other priorities or slow anything else down.

PROPERTY OWNER BARRIER #2: Lack of staff to manage a solar installation project. Many property owners reported they did not have adequate staff available to manage a lengthy and complex solar program application and solar installation project. One property owner reported that other solar programs, such as LIWP, were easier for their organization to participate in. They felt SOMAH was administratively burdensome which is supported by the fact that the top SOMAH contractors reported having large staff dedicated to working on SOMAH projects. However, one affordable housing organization was fortunate enough to be able to bring on a part-time consultant to manage their SOMAH participation on their behalf.

PROPERTY OWNER BARRIER #3: Property owner organizational structure. Barriers #1 and #2 above are exacerbated by the fact that many affordable housing property owners are also affordable housing developers. These organizations are often structured such that one division of the organization is focused and skilled in construction and construction management (and thus are more knowledgeable and staffed to manage larger capital improvement projects—such as a solar installation), and a different division is focused on asset management. Because new construction projects are not eligible for SOMAH, many SOMAH-eligible properties fall under the jurisdiction of the asset management division which is less capable (from a skill sets and bandwidth perspective) to manage a major construction project such as SOMAH.

[65] It should be noted that while the SOMAH program offers job training for tenants at SOMAH properties, only one property owner called out SOMAH's tenant job training as an added benefit of program participation. It is possible the property owners are not fully versed on this program "benefit" if most of their program information is coming from their contractor.

Recommendations to address barriers #1, #2, and #3:

- **Expanded technical assistance offering.** The SOMAH PA is currently evaluating additional technical assistance (TA) services to address the barriers property owners continue to face with SOMAH participation. However, there is a bit of a 'catch-22' at this time for adding these additional SOMAH TA services; due to property owners lack of capacity to apply for and utilize the current SOMAH offerings, the current TA services are significantly underutilized (creating no apparent need for more assistance). But if additional, highly focused TA services could be put in place, it could be possible to reduce the participation burden experienced by the property owner. These could include:

  - **Services to augment property owner staff capacity.** Many property owners reported the lack of staff availability and bandwidth as a barrier to participation. The SolSmart Program funded by the U.S. Department of Energy Solar Energy Technologies Office (www.solsmart.org) helps local governments and regional organizations install solar, "*our goal is to make it faster, easier, and more affordable to go solar*." The SolSmart Program has a SolSmart Advisors offering[66] that provides "fully-funded, experienced staff recruited to help communities achieve designation." A staff member at the SOMAH PA who had prior experience with the SolSmart Advisors offering reported the advisors can be embedded within an affordable housing organization to provide additional short-term staffing capacity to help navigate the application process. The SOMAH program should investigate their ability to mimic the SolSmart Program's embedded advisor offering.

  - **Services to assist with LIHTC applications.** The LIHTC re-syndication process is quite complex but may provide an opportunity for some additional technical assistance to better leverage both LIHTC and SOMAH funding to get solar projects approved. Currently there is a "chicken and egg" issue as the SOMAH PA cannot provide TA to a property if it does not have at least 10 years left on the regulatory agreement. However, if the SOMAH PA waits until the property has been re-syndicated and the regulatory agreement extended, it can be too late to get the SOMAH project the additional funding needed. The SOMAH PA may be able to assist properties going through re-syndication and create a robust proposal to bring to the LIHTC--improving their likelihood of getting the funds needed to offset any non-SOMAH covered expenses.

PROPERTY OWNER BARRIER #4: Project financing. Project financing, primarily up front and out of pocket costs, was a primary barrier for most property owners. Several property owners reported it was their inability to figure out the project financing that led to them to cancelling submitted SOMAH applications. Affordable housing reserves are very slim and typically already spoken for. Many SOMAH projects planned to utilize a PPA ownership type in order to eliminate upfront out of pocket costs and/or the need to secure bridge financing to cover project costs until the SOMAH incentive is paid out. While PPAs typically eliminated out of pocket costs for property owners, PPAs were not preferred or utilized by all interviewees. One customer reported distrusting PPA structures based on a prior bad experience in which their tenants' bills went up (rather than down as projected) and the property owner was unable to provide

66 https://solsmart.org/how-we-help/advisor-profiles/

the tenants information on why this had occurred. Another reported that rules surrounding their property's financing disallowed them from pursuing anything other than an HCO model. Some participants using HCO worried that they would find out after their solar system was installed that the SOMAH incentive would not cover the anticipated portion of the total project cost. Property owners using HCO and PPA models reported trying to find the optimal balance between maximizing program incentives (by increasing tenant space allocations which receive higher incentives) and saving enough money on common area bills to cover their SOMAH monthly costs (PPA and HCO) and ongoing maintenance costs (HCO only). In 2021 the SOMAH PA rolled out the Progress Payment Pathway (described in more detail in Section 5.4.2 below) to ease some of the project financing burden. Contractors reported this helped somewhat but the first progress payment was still paid out very late in the project timeline.

Recommendations to address barrier #4:

- **Bridge loan assistance.** The SOMAH PA is looking into whether SOMAH could engage a bridge loan provider who could assist contractors or property owners to cover gaps in funding from the start of the application process until the SOMAH incentive is paid. We also discussed if there was a way to leverage the millions of SOMAH dollars that are currently available (not reserved) to serve as bridge loans for participants. However, the SOMAH PA currently is not set up to facilitate such transactions or the legal staffing that would be required if funds are not paid back. There are a number of additional other financial tools being investigated by R.20-0-022[67] which could also help SOMAH participants address the project financing barriers they currently face.

- **Maintain current program incentive levels as appropriate.** Other programs, such as LIWP, have found program incentives are often the most useful carrot available to increase affordable housing participation. Currently the SOMAH legislation provides little flexibility to the SOMAH PA to adjust program incentives to target certain participant populations or to increase interest in the program. COVID-19 has shifted the priorities of property owners and slowed down participation in the program. Increasing incentives could help to bring attention back to SOMAH and get contractors excited and reengaged in the program. A further discussion of program incentive levels is included in Section 5.4.2 of this report.

PROPERTY OWNER BARRIER #5: Distrust in solar contractors marketing the program. One property owner interviewed reported that affordable housing organizations often have a cultural fear of someone who is trying to "sell" them something. There is distrust that "free solar" is too good to be true and organizations can be confused or worried that solar contractors are trying to cheat them. This skepticism is leading some property owners to approach the program cautiously and often limits the number of applications they initially submit so they can "test the waters." The distrust seems to be minimized for organizations having existing relationships with a solar contractor through previous solar projects on new construction or retrofit properties. Along these same lines, one property owner reported he thinks there

[67] https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M346/K361/346361154.PDF

is a lack of confidence that the program will work as advertised. While current utility bills can be substantial for affordable housing organizations, current utility bills are a known and understood reality—whereas solar, which may be a better alternative, is an unknown. Effectively breaking down this barrier likely needs to come from trusted sources within the affordable housing community. Developing and publicizing SOMAH case studies that explain and document real examples of how other organizations have participated, as well as increased program outreach from affordable housing trade organizations could provide credibility and increase trust in the program and the SOMAH eligible contractors.

Recommendations to address barrier #5:

- **Additional third-party nonbiased project support.** The SOMAH PA is currently reviewing what additional technical assistance services could be offered to ensure property owners have the program knowledge they need to feel secure in their participation decision making. Getting information through a CPUC-sponsored third-party (such as the SOMAH PA, as opposed to the SOMAH contractor which currently provides the majority of SOMAH information to property owners) who has no financial stake in the SOMAH project could potentially increase their confidence in the participation process. Similar services are currently provided to Track A participants, but less so to Track B participants who primarily interact with and get information through their SOMAH contractor. These services could be provided to Track B participants through SOMAH's existing Standard TA offering – however this would require that Track B participants were made aware of how to request Standard TA.

- **Increase co-marketing with IOUs or local governments**. Related to the issue of distrust, some property owners reported they have limited knowledge or awareness of what SOMAH is and their limited knowledge has come from a contractor. While the SOMAH PA currently markets the program through a number of channels, some property owner's awareness of the SOMAH PA's co-marketing of the program with entities that affordable housing organizations are very familiar with is low.[68] One member of the SOMAH PA reported their organization has had past success by co-marketing new lesser-known programs (such as SOMAH) with IOUs or local governments as those entities can lend credibility to the program so they are taken more seriously. The SOMAH PA has discussed this with some of the IOUs but have received resistance as the IOUs do not have a SOMAH program marketing budget. Additionally, increasing local government's interaction with the program could potentially help to improve the difficult permitting process experienced in some locations, and also draw positive attention to the property owners installing solar - spotlighting them for their role to help the community make progress towards their local sustainability goals. The SOMAH PA reported they did

[68] The SOMAH PA reported that they actively co-market the program with AH associations. CHPC reported they have co-hosted at least three webinars with SCANPH, and they try to co-market other SOMAH events with them as well. Housing CA hasn't been responsive to exploring co-marketing. The SOMAH PA has explored co-marketing with some success with NPH, SDHF and CCRCH. Increasingly the challenge is keeping the program information relevant by discussing solar as part of broader discussions and presenting program information in a way that is not "salesy".

expand their government outreach in February of 2021 after pausing it in 2020 due to COVID-19 being a higher priority issue.

PROPERTY OWNER BARRIER #6: Property physical site issues. Many property owners interviewed reported barriers related to physical aspects of either their buildings or their properties. These barriers included items such as issues relating to the age or condition of the roof or adequacy of space available for solar panels. Details on these issues described by properties owners are provided below.

- **Age and condition of the roof**. Many property owners interviewed reported that prior to installing solar they needed to address issues relating to the age and condition of the roof on the property. While most reported they had replacement reserves to cover items such as roof replacements, it was unlikely they could fund both the roof repair/replacement and the costs associated with completing the solar project. One property manager reported having a difficult time getting several of their current applications to pencil out financially as the roofs on these properties are approximately 10 years old and have a 20-year warranty. They cannot justify replacing the roofs prior to installing solar as they are still in good condition. They determined if a roof needed to be replaced during the life of the solar equipment, their two options would be to either remove the solar temporarily so the roof could be redone (which the property owner reported was "cost prohibitive") or replace the roof with the solar panels in place. Their research into this option found that to do so would require the use of a different type of membrane material which increases the cost of the roof replacement by about 50 percent. This property owner reported they would likely cancel their current active applications if they cannot find a way to address this property-related financial issue.

  One contractor reported encountering roofing issues on some projects and have employed a process to evaluate the roof conditions of all projects early on. Their process involves an initial assessment of the roof's age and the amount of time remaining on the roof's warranty. This is followed by a detailed pre-solar installation inspection (conducted by the roofing contractor who installed the roof whenever possible to ensure the roof warrantee is not voided). If the property has opted to use a PPA and it is determined that a roof replacement may be necessary during the 20-year contract period, the contractor can work with the property owner to structure the PPA to include removing the panels for a predefined period (often 30 days) at no cost to the property owner so the roof can be replaced. This contractor also reported that if the roof needs to be replaced prior to the solar install, and cannot be covered by the property's replacement reserves, they will work with the property owner to help identify other potential sources of funding such as tax equity funds, or contract structures, that can be used to offset SOMAH related expenses such as roof replacements.

- **Inadequate space for solar panels.** Several issues relating to properties having inadequate space for solar panels were brought up during property owner interviews. One property owner reported that many of their eligible buildings are high rise towers and thus had limited roof surface area available for the installation of solar panels. Participation would also likely necessitate the installation of carports (which would be an added expense for the project) and would either reduce the number of parking spots onsite or decrease the width of the parking spots by a few inches. The property owner

reported that parking related issues can be difficult to get approval on by local authorities.[69] Other property owners reported they had either older solar panels or solar thermal installed onsite and so had limited space available for new solar. One property owner reported their property was initially deemed ineligible for SOMAH due to an old existing PV system on that was installed. The previous system was outdated, inefficient, and significantly smaller than the system they planned to install through the SOMAH Program. They felt that disallowing a replacement SOMAH system unfairly penalized property owners who were "early adopters" of solar on multifamily affordable housing. This project was later deemed allowable. The program should review program rules on existing solar or VNEM to ensure they are not unfairly punishing early solar adopters while also judiciously managing program funds.

- **Site level construction logistical issues.** Some properties reported having site specific solar construction related logistical issues. One property owner reported not having adequate parking onsite for construction projects and utilizing tenant parking may result in tenant dissatisfaction. "*Projects that lead to a hassle for anyone, be it staff, tenants, or management, will tend to be put off*."

Recommendations to address barrier #6:

- **Expand allowable expenses that can be paid for with program incentives**. As recommended to address contractor barrier #3, expanding the project related expenses that program incentives can be used for can help property owners find ways to participate in the program.

- **Ensure SOMAH eligibility does not unfairly penalize "early adopters".** Program rules should be reviewed to ensure the population of eligible properties is maximized and properties that have old and outdated systems that are at the end of their life can be replaced with newer SOMAH systems that have significantly larger capacities and can provide maximum benefits to low-income tenants.

PROPERTY OWNER BARRIER #7: Application burden and Property ownership structure. Many affordable housing organizations own numerous properties within their portfolio and typically each of these properties functions as its own corporation or Limited Liability Partnership (LLP). Each property can have a unique set of rules it must abide by and distinct partners who need to approve participation in programs like SOMAH. What is allowable can vary from property to property and must be reviewed and approved separately for each entity. This unfortunately limits the scalability and efficiency of submitting numerous applications across a portfolio as each application must go through its own participation and approval process.

Recommendations to address barrier #7:

- **Property owner project dashboard.** Many property owners have submitted multiple project applications and can be overwhelmed trying to track the current status of each of the applications.

[69] This issue should be included in the streamlining legislation (SB 617) that is being proposed if possible. SB617 is discussed further in section 5.4.4.

One property owner reported having difficulty tracking project issues and reporting project status to senior management due to the number of applications that have been submitted and the lack of a clear and concise reporting tool. He stated having access to a project dashboard would be a "game changer" and would ease the burden of participation experienced.

- **Property owner email opt-out.** Participating contractors take the majority of the participation burden off of property owners. Property owners, however, can still be burdened by the large number of emails that are exchanged between the SOMAH PA, the contractor, and the property owner. Many of these emails are discussing issues with an application submittal or documenting a timeline extension and will be handled directly by the contractor. If the property owner needs to be involved the contractor will communicate directly with them detailing specifically what they need to do. As such, giving property owners the ability to opt-out of non-essential emails from the SOMAH PA will likely lessen the burden and confusion they currently experience.

The SOMAH PA fielded two non-participant property owner surveys in 2020 to assess non-participating property owners' interest in SOMAH. One survey was fielded to property owners who are in the SOMAH email subscriber list but who had not submitted an application. The second survey was distributed through SOMAH co-marketing partners (i.e., non-profit housing associations) and through industry conferences. In total, around 40 non-participating property owners responded to these surveys that focused on understanding the challenges property owners face to SOMAH participation. The evaluation team's review of the PA survey response data found only one property owner in the SOMAH email subscriber list reported they were no longer interested in participating in the SOMAH Program (out of 21 respondents, 5 report). This respondent said the reason they were no longer interested was "*The program rules are really complicated and the hassle of dealing with it is not worth the marginal financial gain. Also, I do not want to disrupt my properties to provide free solar unless there is a meaningful financial gain for my property... We put together complex financial transactions and construct apartment buildings. [SOMAH] seems like a lot of hassle for very little benefit.*" The primary barriers reported by the remaining non-participating property owners were either financial in nature (44 percent) or due to a lack knowledge about the application process (33 percent).

Application Cancellations

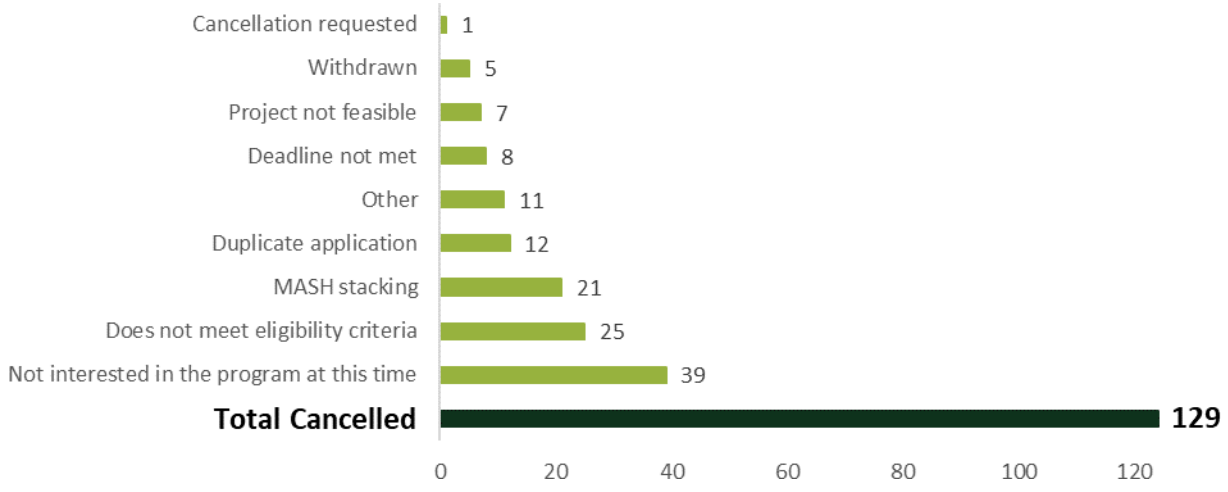
Since program inception, a total of 124 applications have been cancelled or withdrawn (23 percent of all applications submitted). These cancellations represent 24 MW of lost solar production and nearly $58M in incentives that are no longer being reserved. Cancellations are unfortunate as they represent lost solar opportunity and often significant time expenditures for both contractors, property owners and the SOMAH PA. Future projects are unlikely if the time investment is viewed as a waste. For applications submitted at program opening and ultimately cancelled, cancellations occurred as early as August 2019 and as recently as April 2021. The cancellation rate rose significantly since the Phase I report[70] (at which

[70] Program tracking data for the Phase I report was pulled on May 4, 2020.

time only 7 percent of applications had been cancelled or withdrawn) as submissions progressed through the SOMAH application process. This rate continues to be much lower than the cancellation rate reported for the MASH Program (57 percent),[71] even when including any forthcoming additional cancellations.

The Phase I evaluation recommended the SOMAH PA add a field to the tracking database to capture the reason applications were being cancelled. This would allow the SOMAH PA to better understand cancellations and make programmatic changes, if necessary, to reduce the volume of cancellations. The SOMAH PA has since added this field and it is populated for roughly two-thirds of the cancelled applications. The figure shown below (and also in Section 4.1) provides the distribution of cancellation reasons found in the program tracking data. More than half of the cancellations that provided a reason that indicates the project application is unlikely to be resubmitted as they were cancelled due to program ineligibility, an overlap with MASH, project infeasibility, or because they were a duplicate application. The data captured in the "Reason for Cancellation" field could be enhanced by expanding the cancellation reasons to include additional information on the underlying rationale. For example, the "Not interested in the program at this time" and "Deadline not met" do not shed light on why the applicant is no longer interested or did not meet the application deadline (i.e., financial reasons, lack of available staff, etc.).

FIGURE 5-2: CUMULATIVE SOMAH CANCELLED AND WITHDRAWN APPLICATIONS



The 13 participating property owners interviewed for this evaluation submitted 206 of the 538 applications submitted (38 percent). Forty-nine of the 206 applications submitted by these 13 property

[71] This figure was taken from the Multifamily Affordable Solar Housing Semiannual Progress Report dated July 31, 2019. https://www.californiadgstats.ca.gov/archives/somah_progress_report/ The data source is listed as PowerClerk and DGStats from 10/16/2018 – 6/30/2019.

owners have been cancelled or withdrawn (24 percent). Many current SOMAH applications are in the Reservation Request step (26 percent) and project details may not yet be finalized—increasing their risk of dropping out of the program. The property owners interviewed reported an additional 10 applications were likely to be cancelled in the future which would increase proportion of applications cancelled or withdrawn to 29 percent. Property owners who had cancelled one or more SOMAH applications were asked why the applications were cancelled. The responses provided by property owners suggested a variety of reasons:

- **Lack of financial or staff capacity.** The primary cancellation reason reported by property owners was due to a lack of financial or staff resources available to complete the projects.

- **Site issues.** A few property owners reported applications were submitted after a cursory first inspection that relied on site characteristics determined from Google maps. Subsequent site visits determined the projects were ineligible for reasons such as metering issues that could not be identified online.

- **Utility bill payment issues.** One property owner was disappointed many of their projects were cancelled due to ineligibility since they are responsible for paying their tenants utility bills—a practice not allowed by SOMAH participants. Residents at these properties are formerly homeless or youth populations who are either unable to establish electrical service on their own due to credit issues or have historically had difficulty reliably paying for utilities which results in disconnected service. This property was very interested in SOMAH as the job training opportunities were well aligned with their tenant population. This organization is a non-profit with a low operating budget and saving on tenant bills allows them to offer tenant services that are otherwise unaffordable. The property owner was also frustrated about the considerable time invested in the project prior to ineligibility being determined.

- **Unaware of applications:** One property owner was unaware that any applications had been submitted (or cancelled) for their properties. They questioned whether contractors encourage staff to submit applications without owner approval to reserve program funds.

Most property owners interviewed reported they were highly unlikely to resubmit an application for their cancelled projects. The exception to this was for the two projects that were cancelled as repairs were needed (such a roof upgrades) prior to installing solar.

Analysis of the program tracking data found the project cancellation rate has varied across the SOMAH ownership options (HCO, PPA, lease) and participation tracks (Track A and B). As the tables below show, the cancellation rate for host customer owned systems was more than double that of PPAs and the cancellation rate for Track A was roughly double that of Track B. The SOMAH PA reported that they are starting to see some cancelled Track A projects reapply under Track B. If this is starting to occur more

frequently the SOMAH PA should begin to track it and reach out to these applicants to find out the rational for their switch from Track A to Track B.

TABLE 5-3: CANCELLATION RATE ACROSS OWNERSHIP TYPE

Ownership Type	Number of Cancellations	Number of Applications	Percent of Cancellations
Power Purchase Agreement	52	358	15%
Host Customer Owned	62	154	40%
Solar Lease	0	4	0%
Missing	10	22	45%

TABLE 5-4: CANCELLATION RATE ACROSS PROGRAM TRACK

SOMAH Participation Track	Number of Cancellations	Number of Applications	Percent of Cancellations
Track A	10	20	50%
Track B	114	514	22%

In 2020, 24 SOMAH applications were cancelled due to the projects previously receiving incentives through the MASH program.[72] One contractor reported that absent the additional SOMAH incentive, some of these projects are now in a poor financial position (i.e., underwater). Property owners interviewed seemed less concerned by the SOMAH cancellation. One property owner reported their organization had little involvement with the SOMAH application as it was primarily driven by the contractor. It is possible that problematic MASH/SOMAH projects were not included in the sample of property owners interviewed. The SOMAH PA reported they are reviewing these cancelled projects as part of their standard technical assistance offering to determine if any additional funding sources (such as LIWP) could be leveraged to improve their financial situation.

5.3.3 SOMAH Property Eligibility

Property owners were generally satisfied with SOMAH property eligibility requirements, however a few noted that their organization had properties they would like to enroll in the SOMAH Program but are ineligible under current SOMAH Program rules. These included the following property types:

- **Individually metered properties where the property owner pays the utility bills**. One property owner had a number of project applications submitted to the program that were eventually cancelled as the

[72] As noted above, the tracking data shows only 6 applications were cancelled due to MASH/SOMAH stacking, but a member of the SOMAH PA reported the actual number was 24.

utility bills were not paid for directly by the tenants. These properties primarily (or in some cases entirely) housed former homeless or youth residents. According to one member of the SOMAH PA, the LIWP program encountered a similar issue in which former homeless residents' lack of credit resulted in their inability to get utility services set up in their name, and thus it was necessary for the property owner to become responsible for tenant utility bills. LIWP, acknowledging this issue expanded program eligibility to account for properties where this was the case. In doing so, while the direct utility bill savings went to the property owner, additional benefits stemming from the solar installation reached the tenants as the non-profit property owner had additional funds for the significant wrap-around services needed for formerly homeless residents. LIWP shows a precedence for these types of program eligibility requirement changes that should be further explored for the SOMAH Program.

- **Properties located outside participating IOU service territories.** Some property owners reported they were not aware of solar programs equivalent to SOMAH for properties located outside of the participating IOU service territories (such as those located in municipal utilities). These participating property owners had additional properties within their portfolios located in non-eligible regions where they wanted to install solar, but reported they were unable to without a program such as SOMAH.

- **New construction properties.** A number of participating property owners were disappointed SOMAH Program eligibility excluded properties that were under construction or had not yet had tenants residing in them. These owners pointed out that completing a solar project was much easier to complete at the time of construction and when the building is unoccupied. While the evaluation team understands that the building code now requires solar to be installed on most new construction, programs such as SOMAH could still support affordable housing developers by providing technical assistance (if it is not being provided through another program) to ensure the solar systems are appropriately sized and configured to maximize tenant benefits.

A complaint mentioned by a few SOMAH property owners was the time it took to determine ineligibility of a property. They were frustrated by the time, both on the part of the property owner and contractor, that was "wasted" working on projects that were later determined to be ineligible for the SOMAH Program. Determining program eligibility earlier on in a project would limit the amount of time spent on these projects that are eventually cancelled.

5.3.4 Likelihood of Future Participation at Other Properties

Participating property owners were asked their likelihood for submitting an additional SOMAH application for other eligible properties within their portfolio. As the table below shows, more than 60 percent reported they were Very Likely or Somewhat Likely to do so. The remaining 40 percent were Not at all Likely, Unsure, or had no additional SOMAH eligible properties.

TABLE 5-5: LIKELIHOOD OF SUBMITTING FUTURE SOMAH APPLICATION (N=18)

Likelihood of Submitting Future SOMAH Application	Number of Respondents	Percent of Respondents
Very Likely	7	39%
Somewhat Likely	4	22%
Not at all Likely	4	22%
Unsure	1	6%
No additional eligible projects	2	11%

Those who reported being Unlikely were asked to elaborate on their answer, and the barriers for future projects they identified were similar to those reported for projects in general: Lack of staff capacity; administrative burden; and concerns with project funding. Some cited their current experience with SOMAH or changes in their organization's staffing as reasons for not submitting future applications:

- One respondent said for them to participate the program "*it must be easy and SOMAH has been hard*". SOMAH involves "*lots of work, many moving parts, if program could be streamlined*" they would be more likely to participate again.

- Another respondent reported the staff person who managed their existing project recently left the organization and will not be replaced due to funding.

- Most of the property owners interviewed had active SOMAH applications that had not received SOMAH funding and were concerned that the SOMAH incentive would not cover the costs of their existing project(s).

- Covering project costs until the incentive is paid—which can take a long time even after installation – was difficult for some property owners. One property owner stated their current SOMAH projects "*are impacting their operating budget, their ability to purchase additional properties, and thus they have to consider the time value of money and whether they could use it more effectively elsewhere*."

5.3.5 SOMAH Contractor Selection

Overall, property owners reported very high levels of satisfaction with their SOMAH contractor (average satisfaction score for contractors was 8.8 out of 10 with the lowest score being an 8, n=10). They also reported their contractor has a moderately high level of influence on their decision to participate in SOMAH (average influence of contractors was 7.7 out of 10, n=10). SOMAH property owners were asked to rate the importance of several factors on their SOMAH contractor selection. The table below shows the factors that were rated Very Important, Moderately Important and Not Very Important. As this table shows, the most important factors were the contractors prior experience installing solar on MF affordable housing properties, their reputation, and any prior experience the property owner had with the

contractor. One property owner reported the key factors for their organization when making a contractor selection was their non-profit status and focus on workforce training.

TABLE 5-6: IMPORTANCE RATING OF CONTRACTOR SELECTION FACTORS

Very Important	Moderately Important	Not Very Important
Experience installing solar on MF affordable housing	Experience with the SOMAH Program	Solar system design (including system components)
Reputation of contractor	Warranties or guarantees offered by contractor	
Prior experience working with contractor	Ownership/financing options offered	

Property owners spoke at length about criteria they considered when selecting their contractor. Their top considerations were the contractor's size, their experience and competency with MF solar, access to financing, project management capabilities, and prior experience working with them. Their feedback is summarized below.[73]

- **Size of contractor**
  - *SOMAH is long, complex and requires a large contractor to manage. Additionally, most property owners want it to be managed entirely by their contractor and want as little to do with it as possible.*
  - *We want to work with a larger contractor that is not going to disappear overnight.*
  - Need a large enough contractor that the project can be completed in a timely manner; "*Some contractors can get the project installed in 5 months, whereas others can't even get the supplies onsite in 5 months"*
  - A contractor's ability to deal with other related issues such as roof replacement or repairs. One property owner stated that their contractor had purchased a roofing company so they could take care of the entire project.
  - One property owner reported they choose their contractor because "*they were a top company, had done the most projects, were not fly by night or likely to disappear, had prior experience with MASH, offered them a competitive bid at zero cost to their organization.*"
  - Another property owner reported that their contractor "*drives urgency and makes sure applications are submitted on time… they make it run on autopilot… their organization would not have nearly the number of projects in the pipeline without them*." They also stated, "*the key is*

[73] Some of the feedback provided below is paraphrased rather than being a direct quote and so while italicized they are not included in quotes.

outsourcing to a large organization who is capable of taking on the entire SOMAH application and construction process."

- **Contractor experience and competency installing solar on MF affordable housing**
  - Technical competency of the contractor is *essential to correctly specify large multifamily solar design and perform a high-quality installation*.
  - Ability to deal with utilities and interconnection issues that arise. One property owner said they had projects that have been installed and sitting non-connected for 18 months due to the contractor's inability to work with the utility to get the system interconnected.
- **Contractor financing and project management capabilities**
  - A contractor's ability to access capital that can make the project zero cost was very important to many property owners.
  - Property owners need it to be "*easy and with no upfront costs,*" and therefore selected a contractor who could provide them such an offering. One contractor stated, "*honestly we don't want to know too much about project as their primary focus is affordable housing*." They believe *solar people should focus on solar and housing people should focus on housing*. Finding a partnership where both parties can focus on their own core competencies is essential.
- **Existing contractor relationships**
  - A significant number of respondents reported they had previously installed solar through MASH or LIWP and thus had existing relationships with a solar contractor.

5.4 APPLICATION PROCESS AND PROGRAM EXPERIENCE

SOMAH application processing represent roughly 5 percent of the program spending through the end of 2020 (SOMAH application processing expenditures for 2018-2020 were reported to be $887,388 according to the Semiannual Expense Report published in January of 2021). This report does not include a deep dive into the application processing expenditures as they will be reviewed in more detail in a SOMAH Vendor Assessment Study that will be conducted in the second half of 2021.

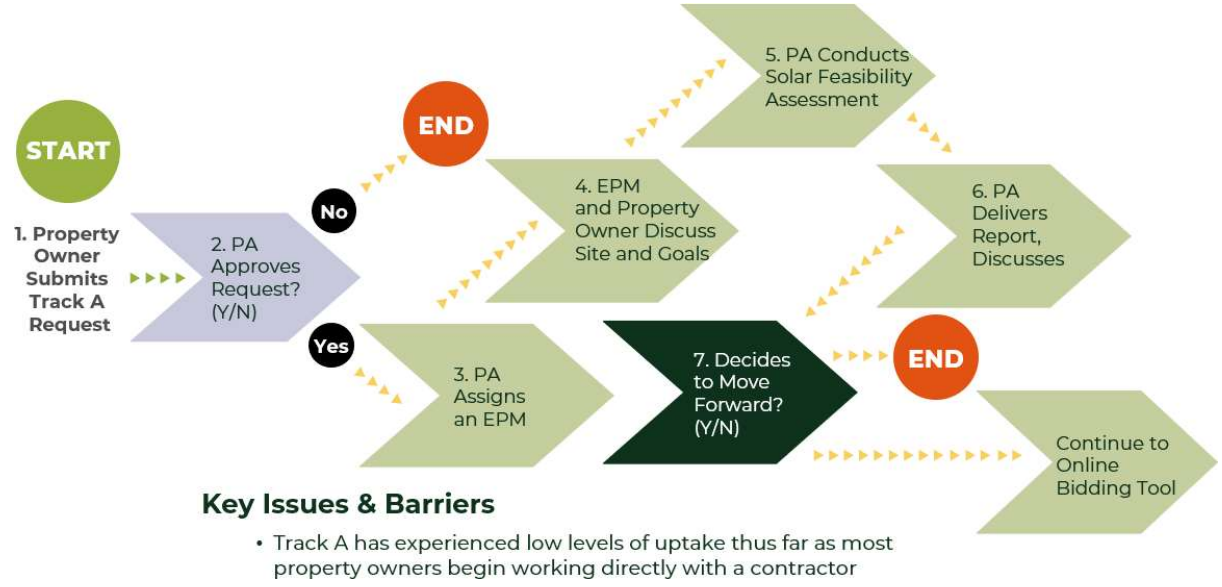
At the time of the participating contractor interviews in January and February of 2021, only one of four had made it through the entire application process and received payment. Of the other three contractors, one made it to the Energy Efficiency Compliance Milestone, while the other two were preparing to submit Incentive Claim Packages.

We will walk through the different steps of the application process in the following sub-sections.

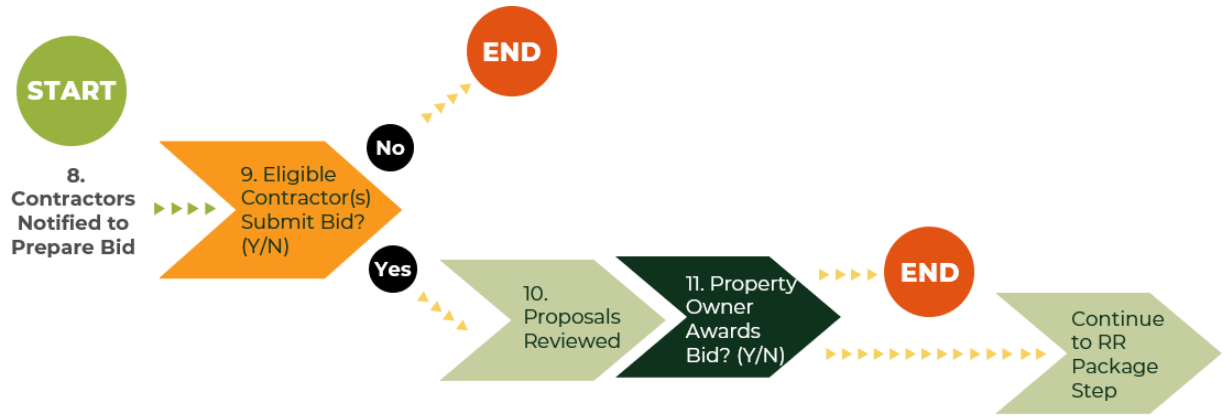
5.4.1 Track A Participation

SOMAH has two participation tracks that can be used to apply for a SOMAH incentive: Track A and Track B. Per the SOMAH Handbook, "*Track A is intended for property owners who would like to receive technical assistance services from the PA to help assess the solar potential at their property, and/or identify eligible contractors for their project. Track B is designed for property owners who do not require technical assistance to submit a project reservation and have identified an eligible contractor they would like to work with for their project*."

The Track A process is illustrated in the two diagrams below. After property owner application submittal (1) and PA approval (2), the PA assigns an Energy Project Manager (EPM) (3). The EPM will meet with the property owner to discuss the site and their goals for the project (4). Soon after this meeting, the PA will conduct a solar feasibility assessment (5) and deliver the report to the property owner (6). If the property owner decides to move forward (7), they enter project details and upload other supplemental documents to the online bidding tool.



The process continues in the diagram below where contractors are notified to prepare a bid (8). After bids are submitted (9), the property owner and PA will review the proposals (10) and the property owner makes a decision on whether to move forward with one of them (11).



Key Issues & Barriers

- Contractors report short timelines and not being able to submit multiple types of bids

Track A Technical Assistance Application Submittal

SOMAH Technical Assistance activities (both Track A and standard technical assistance offered to all participants) made up 2.3 percent of the program spending through the end of 2020 (SOMAH TA expenditures for 2018-2020 were reported to be $419,535 according to the Semiannual Expense Report published in January of 2021).

As noted previously, there has been very limited Track A participation to-date. As of April 29, 2021, only 20 Track A applications have been submitted to the SOMAH Program, making up less than 5 percent of all SOMAH applications submitted. At this time, 10 of the 20 Track A applications have been cancelled (50 percent) which is roughly double the overall program cancellation rate (23 percent).

A property owner must submit the following documents to apply for Track A Technical Assistance:

1. Documentation of multifamily low-income housing eligibility
2. Coversheet of low-income housing documentation
3. Letter of authorization to receive customer information or act on a customer's behalf
4. List of addresses (meter numbers required for SDG&E applications)

Track A applications submitted through the SOMAH PowerClerk portal are first reviewed for program eligibility and, if qualified, are assigned to an Energy Project Manager (EPM) that works with them through the Upfront Technical Assistance (TA) process. The first step in this process is a meeting between the property owner and the EPM to learn about the proposed SOMAH project site, review the property owner's project goals and constraints, and field any general questions about the SOMAH Program. The property owner may also work with the EPM to understand other energy efficiency, demand response,

distributed energy resource (solar, storage), electric vehicle, or electrification programs that their property may be qualified for.

The Track A property owners interviewed were asked about their experience with Track A and why they chose that participation track. One Track A property owner reported selecting Track A as they had no previous solar experience and knew little about the SOMAH Program. They reported that project financing was a major stumbling block for their organization, and the TA they received illustrated how a SOMAH project could work and convinced them to move forward and submit a program application.

Solar Feasibility Assessment

The next step in the Upfront TA process involves the SOMAH PA conducting a virtual site assessment utilizing the property's historical energy consumption, online satellite imaging, and Helioscope, a web-based design tool. This virtual assessment is used to remotely estimate the solar potential at the site so that a Solar Feasibility Assessment can be created by the SOMAH PA. This assessment report provides estimates on the size of the solar PV system that could be installed at the site and, based upon the property owner's desired allocation of solar benefits for tenant versus common areas, provides estimates of the SOMAH Program incentive and costs for the different SOMAH ownership types (HCO, PPA, lease).

Track A property owners and contractors interviewed had the following feedback about the Solar Feasibility Assessment reports:

- One contractor expressed dissatisfaction with the Track A Technical Assistance—namely the Solar Feasibility Assessment —as they thought it provided property owners with unrealistic expectations regarding solar potential at project sites and made it difficult for contractors to provide project proposals that can be successful. They also reported the financial scenarios presented are not representative of what the property owner would likely find in the market, and that the Study did not account for other project expenses (such as trenching and carport repairs) that could lead to additional project costs.[74]

- One Track A applicant reported they had not received the Track A Solar Feasibility Assessment but acknowledged receiving TA from the SOMAH PA organization responsible for TA for a potential solar project at one of their sites. The respondent was unsure if the TA was provided by the SOMAH Program and indicated the AEA staff member was helping them assess whether their project was better suited for SOMAH or Electric Program Investment Charge (EPIC) grant funding.

[74] The Solar Feasibility Assessments utilize web-based tools to assess the properties, as opposed to onsite audits to reduce the costs of the studies. As a result, not all onsite issues can be accurately determined.

- To date, only two Track A applications have received a Solar Feasibility Assessment for their project.[75] Both of these projects progressed through the application process and have had their Reservation Request approved. Two additional projects are currently evaluating their options and may progress to the Solar Feasibility Assessment in the future.

As part of this study, the evaluation team reviewed one of the Solar Feasibility Assessments that has been completed and offer the following recommendations to improve communication and expand the value they provide to Track A participants:

- **Provide additional clarity on ownership options available.** The feasibility study reviewed by the evaluation team laid out cost forecasts for Lease/SSA and PPA options. While there was a cost to purchase the system in the study, a cost forecast illustrating the costs to finance the portion of the project not covered by the SOMAH incentive (as well as financing of the total project cost prior to the incentive being paid) was not included. Contractor feedback on these studies also indicated some of the offerings presented in the studies do not represent what a property owner is likely to find in the market. The SOMAH PA should meet with participating contractors to review the studies being provided to ensure they are representative of feasible program offerings.

- **Provide information on other typical costs and benefits associated with ownership types.** The feasibility study reviewed by the evaluation team did not include information on the other key costs or benefits that typically accompany each of the other ownership types (O&M costs, performance guarantees, financing charges, upfront costs, etc.).

Online Bidding Tool

The Online Bidding Tool allows eligible SOMAH contractors to submit proposals in response to property owner requests. Use of the Online Bidding Tool to date has been low, data provided by the PA shows that only three Track A applications have used the tool thus far. The bidding tool has been structured to be accessible by all but includes a section where an application number can be input to indicate the project is associated with an active SOMAH application. The SOMAH PA is working on a warning message for contractors to check for an application number to confirm the project has entered the SOMAH queue and make them aware that SOMAH eligibility is not vetted for projects without an application number.

Contractors and property owners interviewed as part of this evaluation provided the following feedback regarding on the Online Bidding Tool:

[75] One of the Track A projects, had four feasibility assessments prepared. Three were light previews prepared to showcase potential design options (i.e., with or without carports) and how various allocation splits impact the overall cost and estimated SOMAH incentive. Once a design was selected, a full assessment was prepared.

- **Complicated and not accepting of multiple ownership type bids.** Contractors indicated that the tool should be simplified (no further feedback provided) and should allow for a contractor to submit bids for multiple ownership types if desired.

- **Short timeframe to submit a bid.** One contractor noted that the timeline to respond to the bid was unrealistic and too short. The contractor reported it did not give them adequate time to get staff to the project site (which was remote and required travel) to enable them to submit a quality bid for the project. One property owner also reported that the online bidding tool timeframe was too short. They reported the timeframe caused difficulties as one of the contractors they selected declined to submit a bid which left them scrambling to find an alternate contractor to bid their project within the allotted timeframe. According to the SOMAH PA, the funding can only be earmarked for 90 days from the Technical Assistance until Reservation Request which is the primary reason the bidding timeline is restricted. The SOMAH PA should determine whether this timing can be adjusted by proposing a Handbook update or whether it is part of the decision.

5.4.2 Reservation Request Package

As noted in Section 4.1.1 there are currently 103 applications at the Reservation Request stage that have not yet received approval and 298 active applications that have completed this stage and have received their Reservation Request Approval. Analysis of the program tracking data found that the average time from Reservation Submittal to Reservation Request Approval was 471 days (based on the 298 applications that have received approval). A significant portion of this time for many applicants was time spent to the waitlist (168 applications were waitlisted for an average of 169 days).

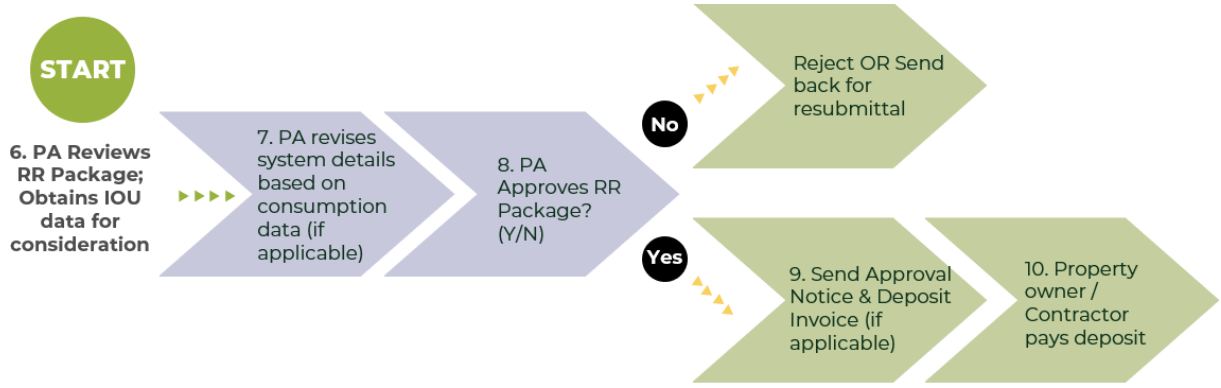
The two charts below walk through the Reservation Request Package step. Prior to submitting a package, the contractor and the property owner discuss the project (1), including the system type, the design, incentives through SOMAH, eligibility requirements, system costs, financing needs and different ownership types, and other project-specific topics. The contractor then produces and submits a proposal (2) to the property owner, which is reviewed and considered with property stakeholders,[76] as applicable (3). The property owner must then decide to submit a Reservation Request Package (4) and work closely with the contractor to gather and submit the required forms and documentation (5).

[76] Many affordable housing properties are set up as Limited Liability Partnerships (LLPs) and thus have a number of partners who have to agree and signoff on the project.

Key Issues & Barriers

- Project planning may uncover additional barriers related to financing, system design or property limitations, etc.
- The number of forms and signatures required is burdensome to contractors and property owners.

Upon receipt, the SOMAH PA will review the package and obtain building energy consumption data to confirm application details (6). Upon review of consumption data, application details may be revised (7). If approved (8), the SOMAH PA will send an approval notice to the property owner and an application deposit invoice (9), which is paid by the property owner or contractor (10) to finalize the reservation.



Key Issues & Barriers

- The consumption data received by the PA may be different than the data used for the application due to the time period pulled
- This may affect the incentive level and ability to finance the system
- Paying a fee prior to being under contract and fully knowing that the project will succeed gives some property owners and contractors pause
- The deposit amount can also be a barrier ($1,250 to $20,000)

In the subsections below we review contractor and property owner discussions about project costs and financing leading up to the Reservation Request Package, along with the submittal of the Reservation Request Package.

Project Costs and Financing

Contractors and property owners both noted that substantial time is spent discussing project costs, financing, and ownership options prior to finalizing a SOMAH project's reservation request. Contractors report that they provide property owners with information on the project payback period, energy costs and other expenses over time, total out of pocket costs, and cost comparisons between a customer owned system and the PPA option (if applicable).

Ownership Types

The SOMAH Handbook and program tracking data list three possible ownership options for SOMAH participation: Host Customer Owned (HCO), Power Purchase Agreement (PPA), and Solar Lease. The Handbook does not currently include information on Solar Services Agreement (SSA), however discussions with property owners whose tracking data indicates they have selected PPA ownership often reported they are using an SSA. We discussed this discrepancy with one contractor who reported that SSAs work in a similar fashion to PPAs and are more often used for affordable housing solar projects. This contractor stated that PPAs are typically geared towards residential and commercial installations and include provisions that can be difficult for affordable housing providers to comply with. The program tracking data does not include an SSA option and thus it is not possible for the evaluation team to differentiate between SSA and PPA system ownership types.

Another place the evaluation team found confusion with respect to ownership type options was in the Track A Technical Assistance Report. The evaluation team reviewed one report that included an SSA as an option but grouped it with solar leases (which have a fixed monthly payment for typically a 6–10-year term and a payment that is not tied to system generation). It is our understanding that the SSA should be grouped with a PPA as they work much like a PPA, and typically have a 20-year term with payments tied to a per-kWh rate and a pre-agreed upon PPA rate escalator. The evaluation team recommends that SSAs be added to the SOMAH Handbook and that the Track A Solar Feasibility Assessment more clearly state the available ownership options and include—in additional detail—the types of services (such as operations and maintenance, guarantees, etc.) that typically accompany each of the ownership types. Within this report we refer to projects with PPA ownership in the tracking data as PPAs while we understand many of them may actually be SSAs.

As presented in Section 4: Participation Assessment, to date, roughly two-thirds of SOMAH projects are opting for a third-party ownership model as opposed to host customer ownership.[77] The percentage of PPAs has increased slightly since the Phase I report (in Phase I the application split was 60 percent PPA, 37 percent HCO, and 3 percent Solar Lease).

Contractors interviewed provided the following information on solar ownership types.

- Three of the contractors interviewed reportedly offered both HCO and PPA ownership types, while the remaining contractor only worked with property owners that wanted to own their systems.
- Of the three contractors that offered both PPA and HCO systems, one contractor stated that about 60 percent of systems are HCO, while the remainder have a PPA. This contractor added that if the system can be entirely paid for with the incentive, property owners will typically opt to own the system outright. The PPA option is then pursued for projects where the incentive will not cover the whole system cost.
- Another contractor noted that almost all their systems are HCO, while the final contractor said that almost all their customers choose the PPA option.

Table 5-7 below shows the distribution of ownership types used by each contractor for current active SOMAH applications. As this table shows, most contractors currently are only using a single ownership type for their projects. Of the two that have used multiple forms of ownership, only one has done a substantial number of both HCO and PPA. This exhibit may illustrate that some contractors have difficulty using a PPA model for their projects and might need additional assistance from the SOMAH PA to provide their customers with this financing option. This is an important finding as many of the property owners interviewed reported that the use of a PPA was essential to their participation as they were unable to cover any amount of out of pocket or upfront costs associated with participation and were also unable and uninterested in dealing with ongoing operations or maintenance costs of the system.

[77] According to data in DG Stats, 69 percent of MASH 1.0 projects and 48 percent of MASH 2.0 projects were third-party owned.

TABLE 5-7: DISTRIBUTION OF PARTICIPATING CONTRACTOR OWNERSHIP TYPES

Ownership	Contractor	Applications	% HCO	% PPA	% Lease
Single	Contractor A	1	100%		
	Contractor B	1	100%		
	Contractor C	1	100%		
	Contractor D	1			100%
	Contractor E	1	100%		
	Contractor F	2	100%		
	Contractor G	7	100%		
	Contractor H	14	100%		
	Contractor I	86	100%		
Multiple	Contractor J	60	67%	33%	
	Contractor K	342	0.3%	98.8%	0.9%

The evaluation team discussed with contractors the benefits that different ownership types offer to affordable housing property owners. These benefits are highlighted in the table below. Leases were not specifically discussed with contractors as they represent a small portion of projects.

TABLE 5-8: PROPERTY OWNER BENEFITS FROM HCO VERSUS PPA OWNERSHIP

HCO Ownership Benefits	PPA Ownership Benefits
Increased property value	No upfront capital costs
Access to federal investment tax credit for organizations with tax liability	Access to federal investment tax credit for organizations with no tax liability
Reduced energy costs for tenants and common areas by selling solar back to the utility	Reduced energy costs for tenants and common areas via lower, fixed electricity rates for a set period
Reduced complexity of getting limited liability partnership (LLP) partners' approval of entering into a contract with third-party	Solar provider performs O&M services and provides system guarantees

The majority of property owners reported they had discussed the pros and cons of the various ownership types with their contractor, however there were a couple of instances where the evaluation team found the property owner did not fully understand the ownership options available to them and financing implications associated with each of the ownership types. For instance, one property owner who was using the HCO option was not aware of the PPA option nor the fact the leveraging the tax credits would reduce their SOMAH incentive levels. Overall, property owners interviewed reported similar system ownership benefits to those reported by participating contractors. Prior to Reservation Request approval it could be beneficial to require/request property owners who have not previously participated in the program to meet with the SOMAH PA so the PA can summarize the program rules and eligibility requirements, answer any questions about program participation the property owner may have, and review the contractor's proposal to ensure the property owner is making a fully informed decision. This

would also help the SOMAH PA build a relationship with the property owner which could be beneficial to encourage additional program participation.

- **Property Owner Reported Benefits of PPA Ownership**
  - **Zero cost solar and reduced operating expenses for owner and tenants.** Under PPA ownership, several property owners reported they were getting solar with no upfront costs, reductions in common area operating expenses by 40 percent, and significant reductions for tenants in their electric bills (~$40/month).
  - **Contractor assumes responsibility for operations and maintenance (O&M) of system.** Many property owners reported they do not have the time or money for the O&M that is required for solar systems. One property owner said they researched the annual cost of O&M for an HCO system and found it would "eat into all of HCO savings".
  - **Contractor retains ownership of panels.** In the event that the solar panels get damaged or stolen (one property owner reported some of their panels were stolen) it is the contractor's responsibility to replace them.
  - **Peace of mind.** The property owner does not have to take on the risk of the "clawback" provision,[78] nor do they have to be concerned if panels are stolen, vandalized, or broken. With third-party ownership that risk is owned by the contractor.
  - **Provides added room for SOMAH negotiations with contractor.** Several property owners reported they were able to bring money back to the property to do other necessary work (i.e., repair or replace roof).
- **Property Owner Reported Benefits of HCO Ownership**
  - **Ownership of the system outright.** One property owner reported that ownership gives them better control over and information on the system and system benefits.
  - **Low cost solar.** One property owner said their PV system was nearly free with the SOMAH incentive as they allocated 92 percent of system benefit to their tenants and their contractor agreed to cover project costs prior to the incentive being paid (including the SOMAH deposit) so no out of pocket costs were required.
  - **No extended contracts with a third-party.** One property owner said partners in the property's LLP would never agree to an PPA. They are leery of long-term (20-year) financing arrangements with third parties and thus they were forced to only consider the HCO option.

[78] The SOMAH PA reserves the right to "clawback" all or part of a paid incentive if the system fails to comply with a list of initial and ongoing program requirements as laid out in the SOMAH Program Handbook.

In addition to the benefits reported by contractors and property owners above, tracking data analysis highlights three additional benefits of PPA ownership. As shown in the table below these benefits include:

- **Increased leveraging of the federal ITC to reduce SOMAH incentive requirements.** Program tracking data indicates PPA projects more often leverage the ITC which decreases the SOMAH incentive by approximately 30 percent (current tenant and common area incentives are $2.14 and $0.76 per/watt if ITC is leveraged versus $3.04 and $1.04 per/watt if the ITC is not leveraged). The lower SOMAH incentives paid out for PPA projects increases the availability of these SOMAH funds for additional SOMAH projects. Further analysis of SOMAH incentive levels with and without the ITC are presented later in this section of this report.

- **Increase property resiliency.** Tracking data also indicates that PPA projects more often plan to pair the installed solar with BTM battery storage to increases the resiliency of these properties. As noted by property owners, adding resiliency to these properties is very important as many tenants are older and/or have health issues. Access to backup power during PSPS events or other power shutdowns can help to ensure the property can keep medicines cold, medical equipment operational, and provide cooling to those most in need. It should be noted that there currently is an interconnection challenges with pairing VNEM (in front of meter) with battery storage (behind the meter) for purposes of providing resiliency. At the time of this evaluation it is unclear how the myriad projects that indicated pairing with battery storage will be implemented. As projects move through the SOMAH application process they may abandon plans to integrate their PV system with battery storage.

- **Decreased project cancellations.** The project cancellation rate calculated based on program tracking data indicates that PPA projects have been cancelled far less frequently than HCO systems. This is important since not only do cancelled projects reserve program funds from other potential projects but may also require a significant time investment on the part of the property owners prior to cancellation and so can turn them off from future solar projects if they feel their time has been "wasted". Analysis of program tracking data showed that on average across the 129 cancelled or withdrawn applications the average time from application submission to cancellation is 317 days (it ranged from a minimum of 21 days to well over 18 months).

Table 5-9 below provides a quantification of these additional benefits based on an analysis of SOMAH Program tracking data.

TABLE 5-9: NOTABLE TRACKING DATA DIFFERENCES BETWEEN OWNERSHIP TYPES

Ownership Type	N	% of Applications	% Leveraging ITC	% Pair with Storage	% Cancelled
PPA	328	69%	94%	92%	15%
HCO	101	30%	0%	2%	40%
Lease	4	1%	100%	75%	0%
Overall	**516**	**100%**	**66%**	**71%**	**22%**

Barriers in Financing Project Costs

Two of the participating contractors interviewed mentioned that they and their customers face challenges with financing project expenses prior to the incentive payment. One of these contractors noted that issues with obtaining construction financing have caused delays in many of their projects thus far, and as a result some may not continue past the Reservation Request milestone. This is consistent with results from the Program Administrator's survey of contractors, where nine of 21 contractors said financial barriers were a reason they had difficulty participating. One contractor further elaborated on the financial barriers faced: "Many low-income owners do not have (the) ability to fully fund the project and then wait for (a) SOMAH incentive payment after. A Phase Payment process is VERY much needed ASAP."

The SOMAH PA recently[79] added a Progress Payment Pathway to the participation process to partially offset these financial barriers. Applicants can request a Progress Payment after the system is purchased and installed to receive 60 percent of the total reserved incentive amount. Interviewed contractors suggest that this is a step in the right direction, but more could be done:

- All four contractors noted that the addition of the Progress Payment Pathway would help somewhat and appreciated the Program Administrator's willingness to adapt and seek stakeholder input.

- Two contractors said that the proposal could have gone further to include additional payments that align more closely with where expenses arise over the course of a project. They stated that because the Progress Payment will arrive relatively late in the process, construction loans are still necessary, and interest will be accrued that adds to costs. One contractor estimated the financial savings from adding the Progress Payment could be as little as $700 out of a total of as much as $20,000 in interest that is accrued prior to the SOMAH incentive being paid. So, while it helps, it is not a significant reduction and does not eliminate this as a barrier.

Currently PG&E is piloting a Residential Financial Assistance program within SGIP. This pilot program splits the SGIP incentive into two parts. The first 50 percent is paid out to the SGIP contractor after the SGIP Reservation Request Form has been approved. The remaining 50 percent is paid to the contractor when the project is complete. This pilot also has rules that disallow the contractor from taking any money from the host customer and limits the number of active applications a contractor can have at a time to minimize the risk by reducing the financial assistance provided to a single contractor. To secure this financing the contractor must sign an agreement with PG&E ensuring the project will be completed within a given timeframe and requiring them to repay the project advance if a project is not completed. The typical SGIP incentive is from $12k to $66k, far under the typical SOMAH incentive. The SOMAH PA should, in coordination with the CPUC, research the feasibility of developing a similar pilot which could leverage the

[79] On 12/22/2020 ED disposes of CSE's AL 118-E-A that updates the SOMAH Handbook to implement an optional two-payment incentive structure that may be selected by program participants.

$260M in unreserved incentives currently available. This could drastically help smaller contractors who are less likely to be able to cover projects costs prior to incentives being paid.

As reported previously, one of the largest barriers property owners face to SOMAH Program participation is project financing. Working through the project financing was reported to be a very difficult and time-consuming part of the application process. One property owner who has submitted a large number of applications said it can take from 6 to 8 months to figure out and come to agreement on project financing that works for all parties (contractor, property owners, investors, etc.). Property owners report that most of this work falls on the SOMAH contractor, which is also a participation barrier for smaller contractors who do not have the time or the resources to manage the solar project or shoulder program costs for participants. As part of the SOMAH Vendor Assessment the evaluation team will research whether there are any additional application steps the SOMAH PA could provide further assistance on in order to reduce the burden on program contractors. As mentioned previously, property owners also must contend with the fact that individual properties within an affordable housing organization's portfolio are each their own LLP, and as such, have a unique set of partners who often have consent requirements, which can lead to difficulties coming to agreement on SOMAH financing arrangements.

Adequacy of Program Incentives

Section 4.1 of Commission Decision (D.) 17-12-022 directs the SOMAH PA to annually evaluate the incentive levels and decrease them to ensure they stay in line with the actual market cost of solar. The basis for this annual incentive step-down is documented in the SOMAH Handbook as:

> "To reflect changes in actual market costs, SOMAH incentive levels are reduced annually either by 5% or by the annual percent decline in residential solar costs as reflected by National Renewable Energy Lab's cost analysis (whichever is less). The annual reduction occurs at the 12-month point from the program launch date, which is July 1."

On May 7, 2021, the SOMAH PA submitted a requested to the CPUC asking for an extension to implement the annual SOMAH Program incentive level step-down for the 2021-2022 program year which is scheduled to go into effect on July 1, 2021. This request was issued due to a delay in the release of the NREL cost analysis report. On May 24th, 2021, this request was granted and the new deadline to implement the annual step-down has been pushed back to October 29th, 2021. This impending step-down increases the pertinence of the evaluation team's assessment of the adequacy of SOMAH's incentive levels.

Table 5-10 below presents the SOMAH incentive levels for the 2019-2020 and 2020-2021 program years. As this table shows, at the end of the first program year, the SOMAH Program incentives were decreased by roughly 5 percent across the board.

TABLE 5-10: SOMAH INCENTIVE LEVELS FOR THE 2019-2020 AND 2020-2021 PROGRAM YEARS

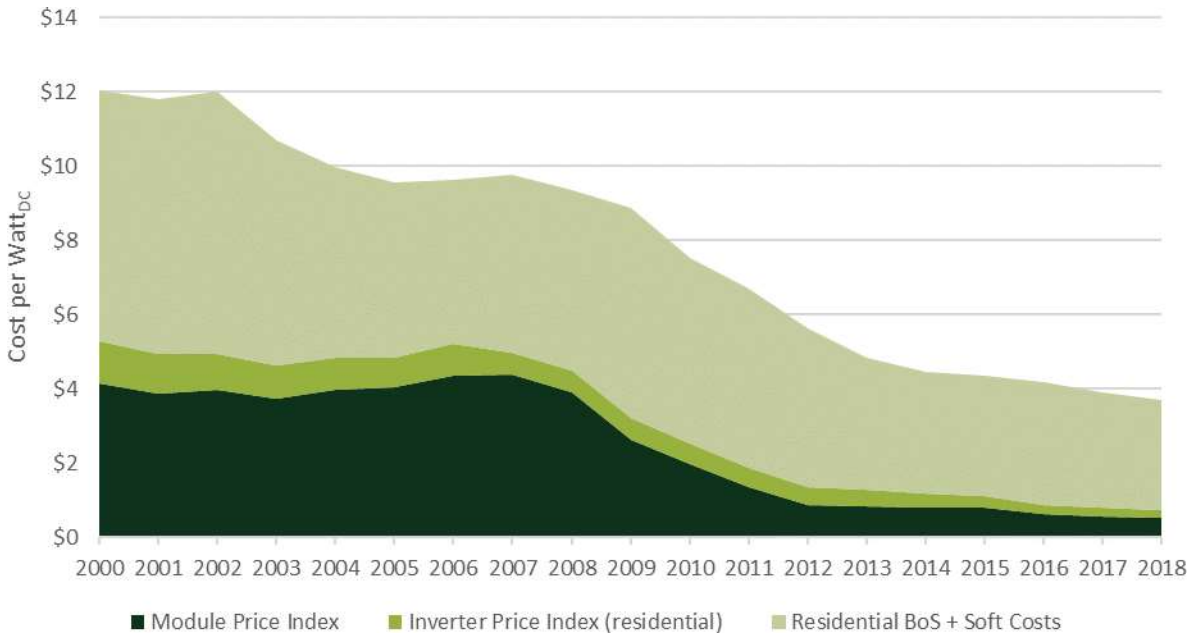
ITC Tax Credit	LIHTC Tax Credit	Tenant $ per AC Watt		Common Area $ per AC Watt	
		2019-2020	2020-2021	2019-2020	2020-2021
No	No	$3.20	$3.04	$1.10	$1.04
Yes	No	$2.25	$2.14	$0.80	$0.76
No	Yes	$2.25	$2.14	$0.80	$0.76
Yes	Yes	$1.60	$1.52	$0.60	$0.57

The evaluation team discussed the program incentive levels with both the contractors and property owners interviewed for this evaluation. All four participating contractors interviewed were concerned about the incentive step-down and how it could impact future project viability. The following feedback was provided:

- One contractor noted that while 5 percent does not sound like too much, the economics for these projects are tight so it is not an insignificant drop.
- Another contractor mentioned that the step-down has made it harder for smaller contractors and has led more property owners to use PPA ownership rather than own the system outright, because they could not afford systems with the lower incentives.

The evaluation team wants to emphasize the importance of, and the attention that should be paid to, correctly setting the incentive level for the SOMAH Program. The evaluation team is somewhat concerned that the primary data source for calculating the annual step-down is the residential section of the NREL cost report. This is concerning since residential solar installations, and the associated costs, are not representative of the entirety of costs incurred to install solar on multifamily properties. While the costs of solar panels have declined significantly over time, many of the cost drivers for solar installations on both single and MF properties are associated with Balance of System (BoS costs include wiring, racking, etc.) and Soft Costs (such as customer acquisition, significant solar engineering, and installation costs due to the complexity of the required systems, carport construction, trenching, etc.) have not decreased at the same rate. Figure 5-3 shows the proportion of solar project costs overtime that stem from equipment costs versus BoS and Soft Costs. In 2001, modules composed 34 percent and BoS and Soft Costs comprised 56 percent of installed system costs. By 2018, modules accounted for only 14 percent and BoS and Soft Costs had risen to 81 percent of total costs.

FIGURE 5-3: RESIDENTIAL SOLAR COST COMPONENTS (NATIONWIDE)[80]



The evaluation team ran three scenarios to assess the maximum megawatts of solar the program could incentivize at various levels and how that compares to the program's goal of installing 300 MW of solar over 10 years. The three incentive level scenarios were: 1) the original 2019/2020 incentive levels, 2) the reduced 2020/2021 incentive levels, and 3) the reduced 2020/2021 incentive levels assuming the ITC as claimed on all projects (currently one-third of SOMAH applications are planning to claim the Federal ITC). All scenarios assume the annual program budget is $100M and 90 percent of the budget is allocated to program incentives and the remaining 10 percent is allocated to program administration. Additionally, all scenarios assume a 90%/10% tenant/common area solar allocation (the current the tenant/common area solar allocation is 88%/12% across all submitted applications). As Table 5-11 below shows in Scenario #1, if the program were to leave incentives at the original level across the 10-year SOMAH period, the program could incentivize 301 MW of solar (100 percent of the program goal). On the other extreme (Scenario #3), if the program were to consistently set the incentive levels for the 10-year program period at the current 2020/2021 levels, assuming the projects were also claiming the Federal ITC, the program could incentivize 428 MW of solar (143 percent of the program goal). While we realize the program should not strive to spend the entire program budget if it is not necessary as those funds can be allocated to other beneficial initiatives, this exercise illustrates that even under a conservative scenario (original incentive levels and

[80] From LBNL's Tracking the Sun Report 2019.

ITC not leveraged) the program would be capable of reaching its ambitious goal of installing 300 MW of solar within the existing program budget.

TABLE 5-11: SOMAH INCENTIVE LEVELS MAXIMUM PRODUCTION SCENARIOS

	Scenario #1 2019/2020 Incentives	Scenario #2 2020/2021 Incentives	Scenario #3 2020/2021 Incentives with ITC
Annual SOMAH Budget (A)	$100,000,000	$100,000,000	$100,000,000
Admin Costs (B)	10%	10%	10%
Annual Incentives(C)	$90,000,000	$90,000,000	$90,000,000
Tenant Incentive/watt	$3.20	$3.04	$2.25
Common Area Incentive/watt	$1.10	$1.04	$0.80
Tenant/Common Area Split	90%/10%	90%/10%	90%/10%
Blended Incentive/watt (D)	$2.99	$2.84	$2.11
Annual MW (E = C/D)	30.1 MW	31.7 MW	42.8 MW
10 Year Max MW (E * 10)	301 MW	317 MW	428 MW
% of Program Goal	100%	106%	143%

Proposing the optimal incentive level for SOMAH is out of the scope of this evaluation, however the evaluation team recommends the CPUC consider sponsoring a cost study to better understand the true costs of installing solar on multifamily affordable housing. The cost study should include a detailed assessment of participant costs including the influence of all tax credits and the financing mechanisms proposed by developers. This analysis would go beyond high-level reports that simply report aggregated installed costs and fail to capture the nuances of financing and installing solar PV on low-income multifamily buildings. Additionally, the evaluation team offers the following considerations regarding determining the appropriate incentive levels for SOMAH going forward.

- **Availability of Non-Reserved Incentives.** At the time of reporting, after the incentive true-up, there is more than $260M in available program incentive funding that have not been reserved. Stepping down the program incentive further, when program funds are not spent, could slow application growth negatively impacting the program's ability to achieve its main goals for 300 MW of solar installation, tenant bill savings, and stimulating local economic and workforce development.

- **SOMAH is not a Market Transformation program.** Incentive step-downs are typically used for market transformation programs that strive to increase demand for a technology and consequently drive down costs for that technology and therefore the incentives required. The affordable housing properties that the SOMAH Program was developed to serve are reliant on program incentives to install solar, and there is no reason to believe that the need for incentives is going to change over the life of the program or after the program has ended. It is too soon to tell whether the balance of system and soft costs to install solar on multifamily affordable housing, which differ from those of typical

residential or commercial installations, will decline over the timeframe of the SOMAH program. Given the likely trajectory of installed system costs for SOMAH projects and the significant barriers to multifamily low-income solar adoptions that have been presented in this report, the incentives are and will continue to be crucial.

- **Limited participation of small contractors.** As shown in Section 4, SOMAH participation amongst smaller and diverse contractors is currently quite low. Further reductions to SOMAH incentive levels will likely make it more difficult for smaller contractors to participate in the program as the projects may become harder to sell to property owners and may not provide smaller contractors with the funding to take on the significant administrative burden associated with SOMAH projects.

- **Extension of the ITC.** The current federal administration recently announced plans to extend the ITC for an additional 10-years. Leveraging the ITC can help extend the reach of SOMAH Program incentives and thus reduce the necessity to decrease incentive levels.

- **Significant application cancellation rate.** The SOMAH cancellation rate at the time of reporting was 23 percent and is expected to continue to rise based on feedback received from participating property owners who have current applications submitted that they are likely to cancel. Further reductions to program incentive levels will make it more difficult for future projects to pencil out.

- **Incentive levels can influence DAC participation**. The SOMAH PA is currently focused on increasing SOMAH participation for properties located in DACs. Doing so may require incentives for these projects to increase rather than decrease. Another low-income program, LIWP, increased incentive levels for homeless shelters, another HTR prior population, to ensure participation within this priority market segment. Introducing DAC-specific incentive levels could help DAC communities participate in SOMAH and reap the multitude of benefits provided by the program.

- **Further analysis needed on low-income multifamily installation costs.** Costs for low-income multifamily solar systems, which are different than typical residential and commercial systems, need additional research. They often include a significant amount of labor, the cost of which continues to rise and is higher in California than in other parts of the country. The evaluation team recommends further study of the SOMAH application cost data to determine whether these data, post-verification, could be used to support or supplement the NREL cost data currently used to estimate the costs of installing solar on multi-family affordable housing.

- **SOMAH incentives encourage high levels of tenant benefit**. Comparison of SOMAH to MASH, its predecessor program, shows that the increased incentive levels SOMAH offers for solar allocated to tenant spaces has led to a significantly higher proportion of the program solar benefiting tenants (roughly 90 percent for SOMAH vs 60 percent or less for MASH). A property owner's ability to install solar on their properties and increase the percentage allocated to tenants is only possible if the program effectively pays the entire cost of the tenant allocated solar and a large enough share of the common area solar that the costs to the property owner can be recouped in a reasonable amount of time.

- **Future SOMAH projects likely to increase in cost.** The initial SOMAH projects completed within the first few years of the project are likely to be the "low hanging fruit". For understandable reasons, contractors are likely to start with projects that are the easiest and provided the biggest "bang for your buck". As shown within the participation assessment, many of the early applications are for properties that are part of larger affordable housing portfolios. So, while each project requires its own application, solar design and financing, there is an inherent efficiency across a portfolio of projects in that the marketing and sales efforts required by a contractor can result in multiple program applications. Contractors may also be able to "pool" projects together across a portfolio such that more costly or challenging projects can pencil out if the portfolio also includes some easier less costly projects. Interviewed contractors mentioned that working with larger customers with several multifamily properties is often easier and more efficient, as communications and decision points can apply to multiple sites. As the program progresses and the "low hanging fruit" is picked, the projects may get harder, more remote, smaller, or not part of a larger portfolio of properties and thus lower incentives for these more costly projects may be inadequate to encourage participation.

- **Incentive levels allow for other SOMAH-necessary upgrades.** Many property owners reported needing to repair or replace their roof or install carports prior to being able to install solar on their properties. Higher SOMAH incentive are beneficial as they can sometimes help offset some of the costs for these repairs or additions that need to be done as part of the PV install. According to the property owners we interviewed, trying to finance rehabs is really challenging right now. One property owner reported "the tax credit pool is oversubscribed and so unless you have local funding you need to start looking at other ways of financing needed retrofits. One option we have considered is trying to cover cost of reroofing with a portion of the SOMAH rebate. This will mean we have to surrender some of the savings from SSA." This may require the property owner to pay a higher rate per kWh in the SSA (it could go to 4 cents versus 1 cent) which reduces the savings over time for their common area (could fall from 40 percent to 20 percent) but it provides a means of paying for a needed capital improvement they otherwise may have difficulty affording. This is an example of another non-energy benefit the SOMAH Program can provide to affordable housing providers. Marketing of this co-benefit could help to increase participation in SOMAH.

Tax Credits

SOMAH project incentives were set to reflect the possibility that a project leverages one or more of two available tax credits: The Federal Investment Tax Credit (ITC) and the Low-Income Housing Tax Credit (LIHTC). Projects that take advantage of one or both receive lower SOMAH incentives to account for the tax credits they receive.

As of the time of reporting, 66 percent of active or completed SOMAH projects plan to leverage the ITC. Three of the participating contractors interviewed noted that their customers do not claim Federal ITC, as they are typically non-profit organizations with no tax liability. The fourth contractor noted that their organization does claim the federal ITC, as 98 percent of their customers opt for an PPA system. This contractor reported they have been able to form partnerships with outside investors (for-profit organizations) who they can place the ITC with. This approach allows these investors to put their tax dollars directly into a place that aligns with their mission, improve the financials of the SOMAH projects,

and is beneficial to SOMAH as it reduces the incentives paid and thus extends the reach of the program. Currently the ITC is scheduled to phase out over the next two years, however President Biden's recent infrastructure proposal would extend the ITC for an additional 10 years.

To date only four of the projects are planning to leverage the LIHTC. This was discussed with the SOMAH PA and a participating contractor who report it can be difficult for a SOMAH project to leverage the LIHTC as it requires that the SOMAH project timing align with the property's re-syndication process (when they receive additional funding for rehab projects) and thus can allocate some of the LIHTC funding to offset the cost of solar.

Reservation Request Package Submittal

The Reservation Request (RR) Package is comprehensive and serves multiple purposes. It establishes eligibility, affirms tenant economic benefits of solar, creates VNEM allocations, establishes consent to receive customer data/information, provides equipment and system information, calculates the incentive level, and finally, reserves an incentive amount for the project.

The required documents that must be included in the Reservation Request Package are included in the table below.

Reservation Request Required Documents
Cover sheet for multifamily low-income housing documentation (Track B only)
Reservation request form
List of addresses on site for ESA program referral template
Affidavit ensuring 100 percent tenant economic benefit
Affidavit ensuring SOMAH income levels
Multiple bid waiver (Track B only)
Letter of authorization to receive customer information or act on a customer's behalf (Track B only)
VNEM load allocation form
Host customer data disclosure consent form

All participating contractors interviewed stated that they led the application process rather than the property owner. Contractors stated that they gathered the information and necessary forms and brought the property owner into the process typically only as needed or to obtain the necessary signatures.

Contractors interviewed highlighted a couple of key areas where they have faced challenges in submitting the RR package, as noted below:

- **Administrative Tasks**. One contractor said that this step in the process did take some "getting used to" due to the amount of documentation and signatures required. Another highlighted that contractors specialize in solar installations, and this is what they are good at. However, they are not

necessarily good at all the paperwork and coordination necessary for SOMAH applications, which is substantial. As mentioned previously, the SOMAH Vendor Assessment will include research to determine whether there are any additional application steps the SOMAH PA could provide further assistance on to reduce the burden on program contractors.

- **Utility Load Data**. Two contractors mentioned occasionally having difficulty getting access to property load data needed to provide a project bid on a timely basis. They also mentioned that in some cases the load data they receive is not well aligned with the data the SOMAH PA uses to confirm the system is properly sized[81] (within the Solar Sizing Tool) as the two sets of data may originate from two sources or cover different time periods. This can result in changes to the proposed system size that affects incentive levels, project finances, and can be costly for the contractor. This issue was discussed with the SOMAH PA and they stated that AB802 allows contractors to get whole building data with permission from the property owner. These data aggregate the tenant and common area load data, however the tenant load can be deduced by backing out the common area load which the property owners should have access to. The SOMAH PA reported it was very common that systems are resized after the IOU load data request.

While the majority of the RR step is competed by contractors, a number of property owners reported areas where they felt the process could be less burdensome. These include:

- Reducing the amount of paperwork required and the number of signatures at each step of the process. It is onerous and should look to be reduced and/or streamlined.

- Minimizing changes to program forms. One property owner reported they had filled out the forms but had to redo them because the forms were updated.[82]

The evaluation team offers up the following recommendations to streamline and reduce the administrative burden of the Reservation Request step of the application process. These recommendations include:

- **Assist contractors in gaining access to property load data**. The SOMAH PA could help contractors by working with utilities to develop an efficient method by which contractors can get access to load data for potential projects – limiting cancellations and avoiding redesigns. PG&E reportedly has recently created a web portal from which aggregate site-level data can be pulled by the SOMAH PA with property owner authorization. The SOMAH PA cannot pull this data without a Letter of Authorization (LOA) which is currently collected at RR, however it should be explored if a LOA could be provided by the property owner prior to the RR so that it can be used to develop project bids.

[81] One of the SOMAH IOUs stated that projects with all of the property meter numbers (which can be obtained by simply walking the property) should have no issues obtaining tenant billing data for 100 percent of the units.

[82] According to the SOMAH PA applicants have not been required to redo forms from older versions unless they used the sample documents or were using very outdated documents that were no longer linked to PowerClerk.

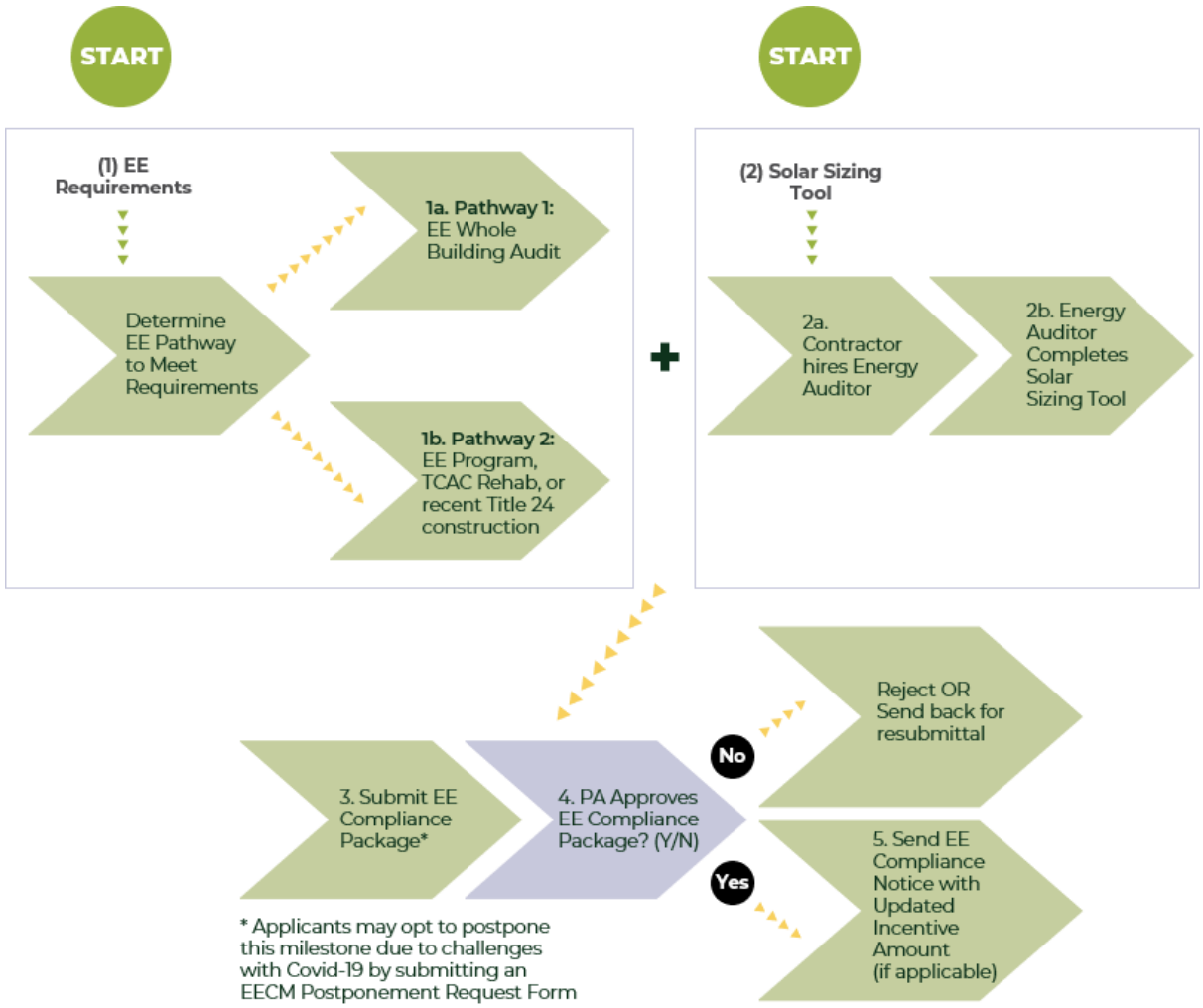
- **Review Solar Sizing Tool tolerance issues.** The SOMAH PA should work with program contractors to understand the difficulties they face with respect to system sizing tolerances to determine if changes could be made to avoid system redesign resulting from discrepancies between the IOU Load Data and the consumption data used by the contractor to design, size, and bid the project.

After the Reservation Request package and application deposit are submitted (if applicable), the SOMAH PA reviews the package for completeness and eligibility requirements. If approved, the SOMAH PA sends an approval notice and funding is reserved for 18 months.

5.4.3 Energy Efficiency Compliance Milestone

At the time of reporting there were 198 active projects at the Energy Efficiency Compliance Milestone (EECM) step, and an additional 100 that have completed it. Analysis of the program tracking data found that the average time from Reservation Request Approval to EECM Approval was 72 days.

The EECM process is shown in the following chart. The contractor and property owner must choose one of two pathways to meet the requirements, including (1a) completing an energy efficiency whole building walk-through audit (ASHRAE Level I or higher) no more than three years prior to the SOMAH application, or (1b) recent participation in an approved whole building energy upgrade program, documentation of a recent California Tax Credit Allocation Committee (TCAC) rehabilitation, or documentation that the property was completely constructed under a recent version of Title 24. In addition, the contractor must hire an energy auditor (2a) to complete the Solar Sizing Tool (SST) (2b). The SST identifies the maximum system size for the project site, considering annual load data and no-cost energy efficiency measures that can be installed on the property. After the package is submitted (3) and approved (4), the PA sends a notice to the applicant (5), which may include an adjustment to the incentive amount.



Key Issues & Barriers

- Contractors note this step can be time consuming and too complex
- The Solar Sizing Tool can be disruptive if it suggests a smaller maximum system size, which can affect the incentive level and project viability
- Many contractors have opted to postpone this milestone, which could cause delays later

Due to the COVID-19 pandemic, the SOMAH PA has allowed applicants to postpone this step until the Incentive Claim Package Milestone, recognizing that it may not be feasible to conduct on-site audits and upgrades at this time. The applicant must submit a request form to the SOMAH PA to postpone this step. As of September 13th, the SOMAH PA will turn off the option to postpone EECM in PowerClerk and applications will no longer be able to request postponement. Projects that have already requested the postponement will have their EECM documents due at the Incentive Claim step.

All four contractors interviewed noted challenges with the EECM and took advantage of the opportunity to postpone where possible. Contractors highlighted that this step can be very time consuming to complete, and specifically noted that the SST was too complex. Contractors also stated that the SST could be disruptive to the process, because if the tool recommends a smaller maximum system size, this can reduce the amount of the incentive and cause projects to no longer be viable. At least one contractor reported they had to hire an energy auditor to complete the EECM step (the SST specifically) which was an added expense and takes additional staff time to coordinate.

One property owner reported being disappointed that the SST did not account for future increases in electricity consumption resulting from the installation of electrification measures or EV charging stations. The evaluation team reviewed the SST and found it has the capability to account for planned future electric load increases (which was confirmed by the SOMAH PA). Applicants who include these measures in the SST during the EECM step must present documentation prior to finalizing their Incentive Claim Package (can also be submitted at PPM) to show they have made significant progress towards adopting the fuel switching measures. This documentation can include enrollment in a program or signed contracts for their future installation. As of this time only four projects have completed the Incentive Claim Package (ICP) step, thus it is too soon to tell how this documentation requirement will impact projects that are claiming future electrification projects. This should be studied in future evaluations.

The evaluation team offers up the following recommendations to improve the EECM step of the application process. These recommendations include:

- **Closely monitor projects fulfillment of the EECM step.** As stated above, most projects requested a postponement of the EECM step due to COVID-19. As a result, few projects have completed the EECM requirements. As active projects begin to complete this step the SOMAH PA should monitor it closely to identify bottlenecks or difficulties encountered and areas where the EECM could be simplified or streamlined.

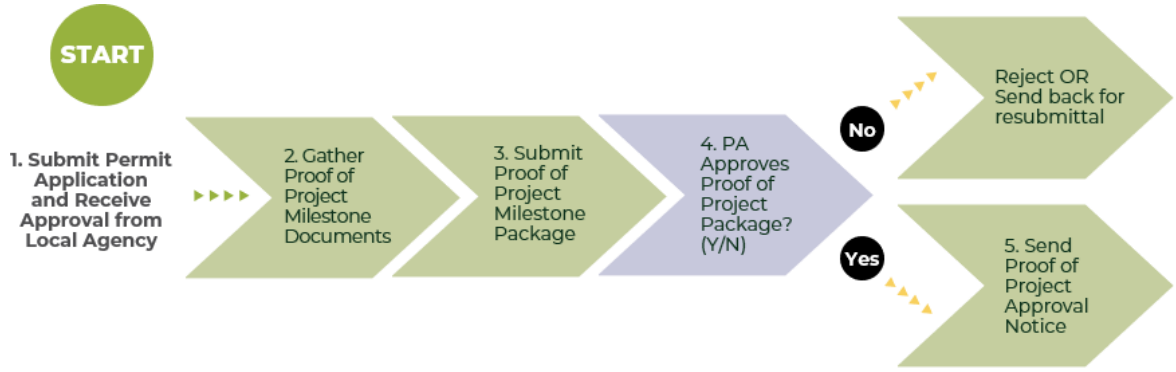
- **Ensure contractors understand the SST capacity to account for future electrification projects and electrification measure documentation requirements.** Confusion regarding the SST's ability to account for future electrification measures could stem from limited exposure to the SST due to COVID-19 deferrals. However, as projects move through this step the SOMAH PA should ensure contractors clearly understand not only the SSTs ability to account for electrification measures, but also SOMAH's documentation requirements for electrification measure adoption prior to finalizing the Incentive Claim Package.

5.4.4 Proof of Project Milestone and Incentive Claim Package

At the time of reporting, there were 48 active projects in the Proof of Project Milestone (PPM) and the average time to this step from application submission is 583 days. An additional 51 project were in the

Incentive Claim Package (ICP) step, three of which had submitted their ICP but had not had it approved. As of April 29, 2021, one project had their ICP approved and has received their SOMAH incentive. This completed project took 545 days from application submittal until they received the incentive.

The PPM process is shown below. This step may run parallel to the local permitting process (1). Once the contractor and property owner have executed a contract for the purchase and installation of the system (2) and submitted the required materials (3), the PA will review and approve the package (4) and send a notice to the applicant (5).



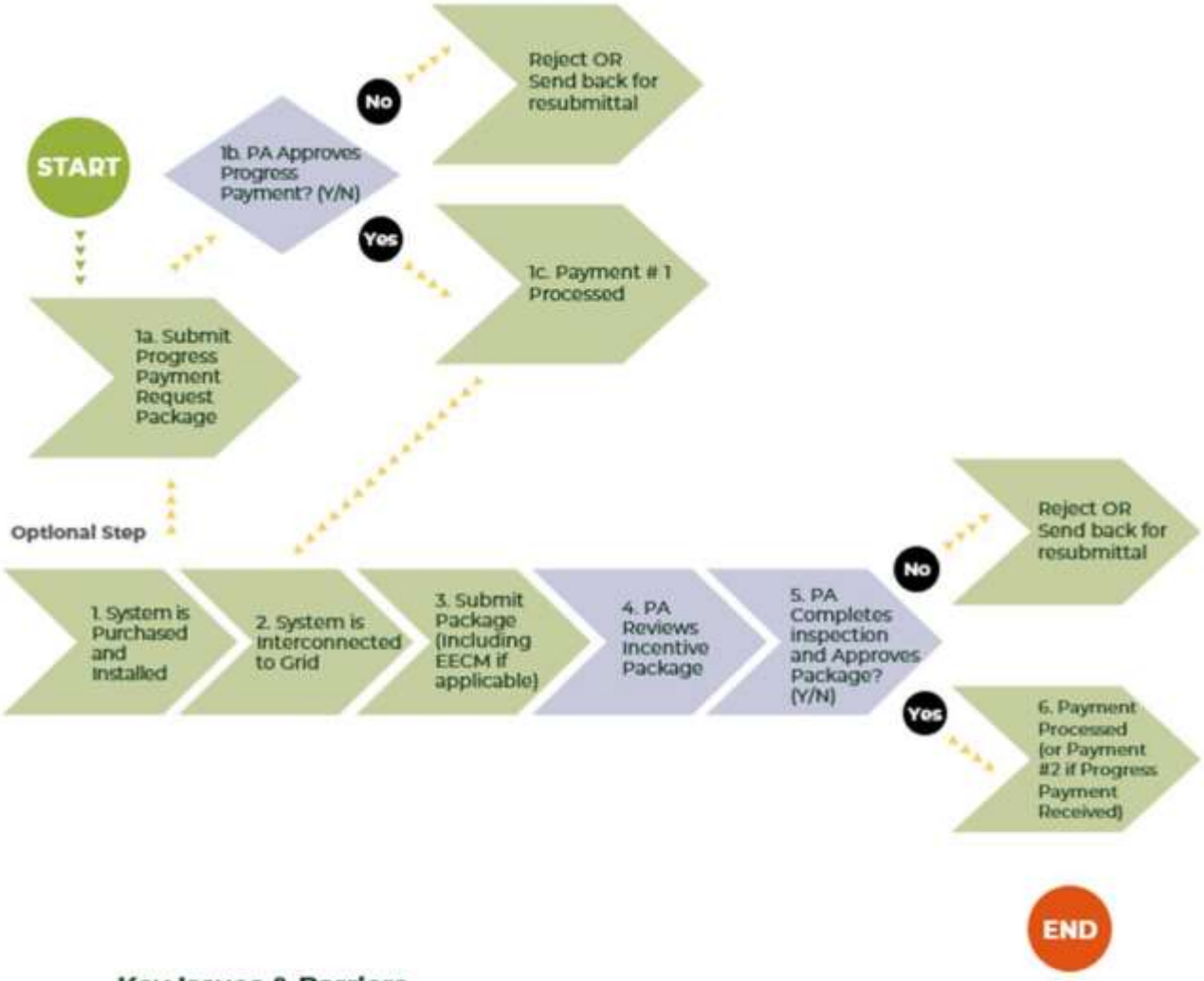
Key Issues & Barriers

- Local permitting may run parallel to other participation steps, but a permit must be obtained prior to construction
- Property owners note slowdowns in permitting due to Covid-19

As noted, the PPM is submitted once the solar system is contracted for purchase and installation. The following documents must be provided:

1. Certification of compliance with SOMAH performance requirements for third-party owned systems (for third-party owned systems only)
2. Copy of executed contract for system purchase and installation

The ICP process is shown in the figure below. Once the system is purchased and installed (1) and interconnected to the local utility's electric grid (2), the applicant may submit the full incentive package (3). Note that the applicant may take the optional intermediary step of applying for a progress payment after installation but prior to interconnection (denoted in steps 1a to 1c). Once the system is interconnected and the full package is submitted, the PA will review the ICP to ensure that all requirements have been met (4) and complete a site inspection (5) prior to approval and processing the final incentive amount (6).



Key Issues & Barriers

- Contractors note that the progress payment still comes too late to avoid additional costs like interest payments
- Contractors have faced challenges in finding job trainees, which could delay/impair meeting final requirements
- Many contractors have postponed EECM submittal, which may add further delays to final payment

The documentation required for a Progress Payment Request (which if approved results in the payment of 60 percent of the total incentive) and the Incentive Claim Package is provided in the table below.

Progress Payment Request Documentation	Incentive Claim Package Documentation
Progress payment request form	Incentive claim form
Tenant Education affidavit	Job training affidavit
Supporting documentation for virtual walkthrough (optional)	Tenant Education affidavit
Electronic payment set up form	Documentation of load additions (if applicable)
	Electronic payment set up form
	Final VNEM allocation form filed with the utility

Contractor experience with the PPM, optional Progress Payment Request, and the ICP was limited at the time of the interviews, though no serious concerns were raised about the documentation required. The one contractor that had a completed project at the time of the interviews encountered issues with obtaining the VNEM application from the utility, which led to delays in project completion and some customer confusion. However, this project was one of the first in the program to be completed and the issue has since been resolved.

Issues raised by contractors regarding difficulties they encountered during the PPM step, specifically related to project permitting, and SOMAH's job training and tenant education requirements are discussed in the sub-sections below.

Project Plan Review and Permitting

SOMAH contractors expressed frustration regarding the cost and speed at which some municipalities review SOMAH project plans and process the required permits. According to one contractor this process varies drastically from one locality to another, with some entities processing permits at the counter for a few hundred dollars while others take months to review with costs in the tens of thousands of dollars. Property owners and contractors both mentioned the process for getting new carports permitted could be extremely difficult as they can require reductions in either the number of onsite parking spots or the width of individual parking spots.

Legislation has recently been introduced to help streamline the permitting process in California for standard residential PV systems which may also help to streamline the process for SOMAH applications. In April 2021, the Senate Governance and Finance Committee unanimously passed Senate Bill 617, the Solar Access Act, which requires building departments to adopt automated permitting for standard residential PV and PV + storage systems. While this bill still hasn't been fully passed as of yet, it would require building departments to adopt SolarAPP+ (or similar software) allowing solar contractors to enter system information and subsequently receive a permit in real time. SB 617 also allows the California Energy Commission (CEC) to create a program that will provide building departments with grants and technical assistance to comply.

Job Training Requirements

The Incentive Claim Package requires that a Job Training Affidavit be submitted, which includes the names of the eligible job training program used, job trainee contact information, types of job tasks completed by the trainee(s), hours worked, and wages paid. Job Training Programs are offered by several organizations, including California Community Colleges, local government workforce development programs, non-profits, private training organizations, and the electrical workers union. Eligible work tasks align with the North American Board of Certified Energy Practitioner's Photovoltaic Specialists Job Task Analysis.

The SOMAH Handbook specifies the number of trainees a contractor must hire and hours that must be worked based on the size of the solar system.

System Size	Number of Trainees and Hours
0-50 kW	1 trainee and no less than 40 hours
50-100 kW	2 trainees and no less than 40 hours each
100 kW and greater	2 trainees and no less than 80 hours each

The SOMAH PA provides several resources to support contractors in meeting the Job Training requirements, including a Job Training Portal which has a resume bank, a job board to post open positions, and a job training organization directory. SOMAH Workforce Development activities make up nearly 5 percent of the program spending through the end of 2020 (SOMAH Workforce Development expenditures for 2018-2020 were reported to be $801,403 according to the Semiannual Expense Report published in January of 2021).

Three of the four contractors interviewed reported facing difficulties meeting SOMAH's workforce development requirements. Contractors noted that these challenges have not affected project completions yet but may in the future. Contractor feedback regarding SOMAH's job training requirements is presented below.

- One contractor reported that the requirements are "more stringent than is practical, particularly with COVID," and all three stated that the pool of available trainees is small. Another contractor noted that they have had difficulty in finding reliable trainees and some have quit.

- Several contractors reported they could use more help from SOMAH PA to fulfill the program's job training requirements. One contractor also noted that work should be done to broaden the training pool. Currently the SOMAH PA is marketing a job training webinar they are hosting for contractors in early June. They understand this program requirement is complicated and a barrier for some contractors. The SOMAH PA reported they have a workforce team, led by GRID Alternatives and Rising Sun, that can help contractors find trainees for their project. This assistance includes recruitment, onboarding, and training to ensure safe work environments. This SOMAH PA offering has reportedly

been available to contractors since program inception but has not been widely marketed and so has remained fairly unknown.

- COVID-19 has caused several issues with respect to meeting SOMAH's workforce training requirements and contractors suggested that the SOMAH PA consider relaxing the training requirements, at least temporarily during the COVID-19 pandemic. They did note that to date the SOMAH PA has been flexible when issues have arisen and have worked with participating contractor to identify workarounds to ensure the program's job requirements do not lead to SOMAH project delays. According to the SOMAH PA they do not currently have a blanket exception policy but can review projects on a case-by-case basis. Examples of COVID-19 related issues that have occurred include delays in background checks and a reduced number of active cohorts completing job training programs offered by their partners lessening the available trainee resources. According to the SOMAH PA, to date they have not had any issues filling a job, however these issues have required trainees in some instances to travel outside of their county to fill an available role.

The SOMAH PA has considered other ways in which they could increase the availability of job trainees and lessen the burden on contractors and are currently considering extending the eligibility of trainees to beyond a year from when they received their training. This could be especially helpful in light of the impact COVID-19 has had on project timelines and reduced training cohorts. Additionally, as reported recently in an article published by Canary Media, there is a lack of solar training opportunities that exist in some neighborhoods.[83] This article points out the lack of solar or clean-technology courses available through local community colleges and training schools in some regions and this issue can impact SOMAH's ability to equitably draw from all communities. The SOMAH PA currently reaches out to active job training organizations in California (there are between 80 and 100 that are SOMAH Program eligible statewide) and they are starting to better understand the geographic gaps in training availability. They are considering how, in the short-term, they can provide support to overcome this training barrier by employing tactics such as offering transportation stipends to individuals who reside in areas where training is current unavailable. They are also exploring options to encourage and increase non-installation job training opportunities and improve communication channels between job trainees and the program. Due to the current status of SOMAH projects and the impact of training disruption associated with COVID-19, it is too soon to thoroughly evaluate many of these issues, but to date these efforts seem to be on-track and they should be researched further within future evaluations.

While most property owners are not heavily involved in SOMAH's job training requirements, one property owner reported that her organization was very interested in SOMAH's job training opportunities due to the tenant population they service (many are youth or formerly homeless residents who are in need of employment). The majority of property owners surveyed were unaware of SOMAH's workforce training

[83] Lobet, Ingrid. *Probing the lack of solar training opportunities in some of L.A.'s historically Black neighborhoods.* Canary Media, 10 May 2021, www.canarymedia.com/articles/l-a-s-most-african-american-neighborhoods-are-a-solar-training-desert/. Accessed 15 May 2021.

requirements as this was typically managed by their project contractor. According to one member of the SOMAH PA, to date there has been only one SOMAH tenant that has worked on a SOMAH project at their residence, however few SOMAH applications have reached this step in the project. The SOMAH PA is reportedly tracking the number of tenants fulfilling the SOMAH job training opportunities and future evaluations should assess the success of this aspect of the program when more data is available.

Tenant Education Requirements

A tenant education affidavit must be provided as a part of the Incentive Claim Package, certifying that all tenants received SOMAH approved materials in appropriate languages. These materials must be provided to tenants by mail or direct delivery and one additional means (i.e., email or community meeting) within 60 days of project commencement.[84] Due to the status of the majority of SOMAH projects at this time, very few projects have experience with the program's tenant education requirements. Many of the interviewed property owners reported their contractor was responsible for dealing with this SOMAH Program requirement. One property owner who had a project that had reached the ICP step felt their contractor was doing little beyond sending the tenant education materials to onsite property management in order to check the education requirement box. This property owner has since requested greater involvement in future tenant education to ensure that prior to PV installation all tenants have received accessible project information that allows them to fully understand how the project was funded, who it will benefit, and how will it impact them directly. The SOMAH website explain the bill credits tenants should expect from the solar system and who to contact if these credits do not appear on their bill. The SOMAH PA reiterated the need for property owner involvement in tenant education to ensure their tenants are receiving meaningful program communications.

The evaluation team offers up the following recommendations to improve the PPM and ICP steps of the application process. These recommendations include:

- **Track the implementation of SB 617 and identify other areas of support to expediate solar plan review and permitting.** The SOMAH PA should closely follow SB 617 to ensure that it will also help to expedite SOMAH project reviews and reduce SOMAH permitting fees. The SOMAH PA should consider whether any additional ME&O activities could be provided to help government agencies understand best practices in solar plan review and permitting.

- **Raise awareness of job trainee assistance amongst contractors.** The SOMAH PA should work with participating contractors to ensure they are aware of the services they offer to help contractors find job trainees for their project.

[84] This was recently extended from 30 to 60 days in Handbook AL 114.

- **Further assessment is needed on tenant engagement.** The effectiveness of SOMAH tenant education materials and activities should be evaluated in future studies after more projects have reached this step.

5.4.5 Impact of COVID-19 on Participation

Contractors and property owners were asked about the impact COVID-19 has had on their SOMAH Program participation. Some reported experiencing no impacts or minimal impacts in the early days of COVID-19, reporting that they found ways to keep their projects moving. Those who reported experiencing impacts primarily reported project delays which resulted in extended project timelines or financial impacts. The project delays encountered included:

- **Project permitting delays** - COVID-19 restrictions meant many municipal planning departments were either closed, staffed at reduced capacity, or working remotely which led to permits not getting turned around in normal timeframes.

- **Supply chain delays** - Disruptions in the supply chain meant project materials, such as steel from China needed for carports construction/upgrades, often took much longer lead times than normal.

- **Onsite delays** – Additional onsite procedures were necessary to ensure the health and safety of residents and contractors, in particular if the project required materials to be brought in through the buildings (for high rises, etc.).

Most contractors and property owners who reported delays due to COVID-19 also stated they appreciated the SOMAH PA's flexibility and extensions granted to participation timelines.

COVID-19 financial impacts reported by property owners and contractors included:

- Contractors or property owners who had to secure financing for their SOMAH projects faced increased financing costs as the delays lengthened project timelines and the time until the SOMAH incentives were paid. The increased interest costs for some projects were substantial.

- One property owner reported COVID-19 resulted in huge financial impacts for their organization as rent collection from tenants became "a 24-hour round-the-clock job". Tenants were either not paying their rent or paying reduced rent at irregular times and so cash flow was poor. Additionally, properties had to hire additional staff to assist with rent collection. One property owner said that at the time of the interview they had over one million dollars in unpaid tenant rent. Staff time that could have been spent on SOMAH participation had to be redirected to deal with COVID related issues.

The SOMAH PA also conducted research to assess the impact COVID-19 had on participating contractors and property owner. Results of these efforts were reported on in the Semiannual Progress Report released in January 2021 and aligned with evaluation team's findings: *"Survey responses showed an array of*

impacts, with some respondents experiencing no COVID-related impacts on their business or SOMAH applications, while other respondents reported complete operational standstills and application delays." According to this research the most substantial experienced or anticipated COVID-19 related impacts were meeting job trainee requirements (reported by 46 percent of those surveyed), issues related to on-site installations (46 percent reported), and completing the Energy Efficiency Compliance Milestone program requirements (38 percent). As stated above, the SOMAH PA were aware of these delays and granted extensions as necessary to ease application related COVID burdens.

It should be noted that COVID-19 also impacted the SOMAH PA's ability to market the program. According to the SOMAH PA:

> *"…. outreach efforts during the reporting period were substantially impacted due to the COVID-19 pandemic and associated shelter-in-place. The majority of the SOMAH outreach for 2020 was planned to be in-person. Once shelter-in-place requirements began the PA couldn't do any face-to-face outreach, nor could contractors. There was a several-month period where the PA and SOMAH contractors were reconfiguring outreach efforts to adapt to a purely virtual environment. Beyond the PA's outreach abilities, all of the major SOMAH audiences faced barriers to engaging with SOMAH. For contractors this included industry and financial uncertainty, with noted layoffs and companies going out of business, in addition to significant slowdown in solar construction efforts. Property owners faced crisis response issues like delayed rents, and implementing safety protocols leading, along with financial uncertainties that drove them from considering any non-essential expenditures which generally included solar. Stakeholders, including local governments, CCAs, and investor-owned utilities, faced local, state, and federal regulatory changes and ongoing uncertainty which impacted their interest in co-marketing or promotional efforts. While the PA maintained its outreach efforts to each of these audiences, responses and engagement were limited."*

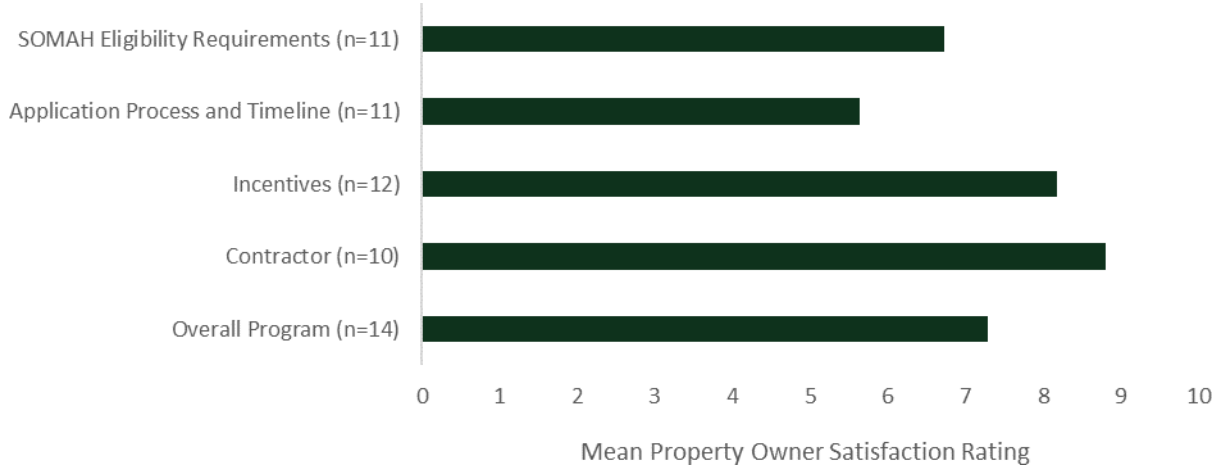
5.5 PROGRAM SATISFACTION

Contractors believe that SOMAH is an important program that has a large impact on the completion of solar projects on low-income multifamily properties. Three contractors noted that either none or a minimal number of their projects would have gone forward without the program.

Contractors were asked to rate their satisfaction with the SOMAH Program on a scale of zero to 10, with 10 being extremely satisfied. Ratings of nine, six-and-a-half, six, and five were given, a mixed response. Three contractors noted that the general participation timeline is fine and said that they would rate their interactions with the Program Administrator highly. Contractors reiterated, however, that the level of work required for program participation is too burdensome.

Property owners were asked about their satisfaction with the SOMAH Program and various SOMAH Program elements. The figure below presents the average reported satisfaction ranking on a scale of 0 to 10, where 0 is not at all satisfied and 10 is extremely satisfied. As this figure shows, participants on average reported the highest level of satisfaction with their SOMAH contractor (8.8 out of 10) and the lowest satisfaction with the program's application process and timeline. Three additional program elements property owners were asked to rate their satisfaction with were: 1) the SOMAH PA, 2) the tenant education requirements, and 3) the technical assistance. The majority of property owners were unable to provide a satisfaction rating for these elements as they reported having little experience with them. They reported they wanted and needed their contractor to "run the whole show" and manage the application process and as a result they had little reason to interact with the SOMAH PA (a few did report they were pleased that the SOMAH PA showed flexibility regarding COVID related delays). Similarly, the majority of interviewees were Track B participants and had not reached the point in a project where they had to provide educational materials to their tenants. As a result, they knew little about the technical assistance services or the tenant education materials and thus were unable to provide a satisfaction rating for these elements. Not all property owners interviewed provided satisfaction rankings to all questions (primarily due to interview time constraints) and thus the number of respondents was typically less than 19 (which was the total number of property owners interviewed or surveyed).

FIGURE 5-4: PROPERTY OWNER SATISFACTION WITH SOMAH PROGRAM AND PROGRAM ELEMENTS



Property owners who were not satisfied with certain elements of the program were also asked to explain why they were dissatisfied. These comments are summarized in the table below.

TABLE 5-12: PROPERTY OWNERS RATIONAL FOR DISSATISFACTION

Program Element	Rational for Dissatisfaction Rating
Eligibility Requirements	Somewhat dissatisfied as new construction projects and properties located in municipal utilities were not eligible
Application Process and Timeline	Application process is overwhelming and has too many moving processes Length of time it takes to participate is long Amount of paperwork required and the number of signatures at each process is onerous and should look to be reduced Had to fill out all of the forms twice – once in the beginning and then again as all of the forms got updated
SOMAH Program Overall	Nagging issue is there is rebate $$ sitting on table but program is not running smoothly and allowing affordable housing organizations to participate

5.6 CROSS PROGRAM PARTICIPATION

One stated goal of the SOMAH Program is to provide greater program accessibility via coordination with other low-income programs. Cross participation in the ESA program and the SGIP Program (which offers incentives for the installation of onsite battery storage) are discussed below.

5.6.1 ESA Program Participation

D.17-12-022 (Section 3.3.3) includes the requirement for SOMAH projects to undergo energy efficiency audits and notify tenants about the availability of the IOUs' Energy Savings Assistance (ESA) Program. As part of the Reservation Request Package, SOMAH applicants are required to submit a list of all tenant addresses that can be shared with the IOUs and used by them for ESA Program referral. The utilities are required to process ESA Program referrals from the SOMAH Program. At the time of reporting there has been no verification that the IOUs who have received ESA Program referrals have acted upon them as the SOMAH PA is only able to request ESA data from the IOUs on an annual basis and no data was received last year. The SOMAH PA plans to send out their next annual data request in June 2021. The evaluation team recommends future evaluations compare ESA Program enrollment across the IOUs to ascertain the effectiveness of these referrals.

5.6.2 Onsite Battery Storage

As part of this evaluation, participating property owners were asked if their organization planned to install behind-the-meter energy storage at their SOMAH properties.[85] The majority of those surveyed reported

[85] On September 12, 2019, the CPUC issued D. 19-09-027 that established an equity resiliency budget, modified existing equity budget incentives, approved the transfer of unspent funds to the budget, and approved funding to support the San Joaquin Valley Disadvantaged Community Pilot Projects within the Self-Generation Incentive

they either planned or were in the process of installing battery storage onsite. As discussed in Section 4.2.3, 71 percent of currently active SOMAH projects plan to be paired with storage.[86] Significant variation in storage pairing was seen within the SOMAH tracking data. The majority of projects using a third-party ownership model (PPA) had plans to pair with storage (92 percent) compared to only two percent of projects using a host customer ownership model.

Property owners who planned to install battery storage reported being aware of the SGIP incentives available for onsite storage and most planned (or had already) to submit an application to the SGIP. Those reporting they planned to install storage were asked about their primary use case for storage and the majority reported wanting it for resiliency. Property owners reported many properties house older residents who are more likely to have health issues and thus providing backup power to common areas and to power essential medical equipment during PSPS events or other power outages is a top concern. A few property owners also mentioned the desire to have onsite storage to be able to use excess solar capacity in peak hours to further lower their electric bills.

The challenges in leveraging SGIP incentives for SOMAH/VNEM projects were recently discussed in CPUC Decision D.21-06-005.[87] In this decision, the CPUC states that application of the current VNEM tariff to SGIP multifamily buildings is confusing. The VNEM tariff entails installation of in-front-of the meter renewable generation. Further, there is not much clarity as to whether some or all utilities' VNEM tariffs preclude in-front-of the meter storage systems on a VNEM tariff from providing power to a building's on-site load.

At the time of this evaluation it is unclear how the myriad projects that indicated pairing with battery storage will be implemented. As projects move through the SOMAH application process they may abandon plans to integrate their PV system with battery storage. Alternatively, rules and regulations may

Program (SGIP). To help deal with critical needs resulting from wildfire risks in the state, D. 19-09-027 set-aside a budget for vulnerable households located in Tier 2 and Tier 3 high fire threat districts, critical services facilities serving those districts, and customers located in those districts that participate in low-income/disadvantaged solar generation programs like SOMAH. D.19-09-027 authorizes the use of SGIP incentives for systems that interconnect to the local electric utility's distribution system under the requirements of the VNEM tariff. Rule 21 addresses the safety requirements of equipment connected to the grid, and the parameters for its safe connection and disconnection, but does not address the question of how buildings taking service under a VNEM tariff might set up islanding for energy storage systems.

[86] This variable is entered as part of the Reservation Request Package and can be updated during of the Proof of Project Milestone step. This variable is not a required field and thus we found it was blank for a large share of current SOMAH applications.

[87] CPUC Decision D. 21-06-005. June 3, 2021. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M387/K064/387064243.PDF

change allowing for streamlined pairing of SOMAH VNEM systems with battery storage. Future evaluations should explore this topic further as additional projects are completed and issued incentives.

5.7 SOMAH MARKETING, EDUCATION, AND OUTREACH

SOMAH ME&O activities represent a large portion of the programs annual expenditures making up 24 percent of the program spending through the end of 2020 (SOMAH ME&O expenditures for 2018-2020 were reported to be $4,251,707 according to the Semiannual Expense Report published in January of 2021). This evaluation included a very cursory assessment of the SOMAH ME&O activities, as there is a forthcoming SOMAH Vendor Assessment that will explore in detail SOMAH's ME&O activities and spending that have occurred to date. Suggestions from property owners regarding improvements to SOMAH's ME&O activities are included above in Section 5.3.1 (Primary Sources of SOMAH Program Awareness).

The SOMAH Semiannual Progress report (published in January 2021) stated SOMAH's top two outreach strategies in 2020 were the following:

- **Promoting Track A Services.** According to the progress report "*ME&O efforts focused largely on promoting Track A and its services in order to achieve a balanced pipeline of projects. New strategies were implemented to ensure property owners could easily and properly submit an Upfront Technical Assistance Request*."

    - **FINDING:** Despite this focused effort, participation in Track A continued to be low with only two Track A projects having been approved to submit a SOMAH Reservation Request to date. The evaluation team will conduct a more detailed analysis of the program resources dedicated to, and the effectiveness of, the support in the upcoming Vendor Assessment.

- **Outreach to DAC Property Owners.** Another SOMAH PA ME&O priority in 2020 included "*Outreach to property owners with properties in DACs was a priority for the SOMAH PA to address geographic gaps in project density and prioritize DAC participation across the state. The SOMAH PA conducted targeted outreach to property owners and property management companies in the Central Valley and Los Angeles County to enroll a larger number of DAC properties into the pipeline. Of the 124 new property owners reached, about 70 of them had properties located in a DAC*."

    - **FINDING**: As of the time of reporting (April 29, 2021), approximately 28 percent of applications have come from properties located within a DAC. The SOMAH PA estimates that approximately 1,100 of the 3,400 (32 percent) SOMAH eligible properties are located in DACs, indicating, at the time of the reporting period, DAC participation has room for some growth.

6 IMPACT ASSESSMENT

This section summarizes the ex-ante estimates of the Phase II impact assessment. The results are presented as follows:

- Energy and Demand Impacts
- Greenhouse Gas Impacts
- Customer Bill Impacts

6.1 ENERGY AND DEMAND ESTIMATED IMPACTS

This section describes the ex-ante electrical impacts for SOMAH PV system applications. We are referring to them as "ex-ante" as they are estimates of the expected future impacts if and when the projects are installed. Section 3.5 discusses which projects are in-scope for this impact analysis. This section presents the estimated future annual and lifecycle program impacts, as well as the impacts by Utility Service Area, for the projects in the sample. Electric energy impacts for PV systems are defined as the kilowatt-hours that SOMAH PV systems generate onsite. The electricity generated from these projects displaces electricity from the grid.

6.1.1 Annual Estimated Electric Generation

The annual estimated electric generation total by Utility Service Area is present in Table 6-1 below. This table also shows the average annual estimated electric generation per SOMAH project and the annual DC capacity factor by Utility Service Area.

TABLE 6-1: ANNUAL ESTIMATED ENERGY IMPACT BY UTILITY SERVICE AREA

Utility Service Area	2020 Estimated Annual Energy Impact (MWh)	# Projects	Average Annual Estimated Energy Impact per Project (MWh)	Annual Capacity Factor (DC)
PG&E	56,358	202	279	17.5%
SCE	42,400	121	350	18.5%
SDG&E	20,059	58	346	18.3%
SOMAH Total	**118,816**	**381**	**312**	**18.0%**

As seen in Table 6-1, though PG&E's annual capacity factor and average estimated impact per project is the lowest across Utility Service Area, the high project count allows PG&E to contribute the largest proportion of estimated energy generation with 47 percent of the SOMAH total. PG&E's projects' lower annual capacity factor is due to inherent differences in climate and typical available solar irradiance between Northern California (PG&E) and Southern California (SCE and SDG&E). SCE projects contribute the second largest estimated generation proportion, making up about 36 percent of the total estimated annual electricity generation. SDG&E projects constitute the remaining 17 percent of the total estimated electricity generation.

6.1.2 Estimated Coincident Peak Demand Generation

Estimated coincident peak demand impacts are defined as generation from SOMAH PV systems during hours of CAISO or IOU peak demands. The single largest annual CAISO or IOU peak hours provide brief snapshots of program coincident demand impacts. However, analyzing peak demand over the top 200 peak hours can provide a greater insight into how SOMAH projects impact the grid during hours of highest load.

By coincidentally generating during CAISO or IOU peak hours, participating SOMAH customers allow their electric utility to avoid the purchase of high-cost wholesale energy. At the same time, the electric utility reduces its transmission and distribution losses during hours of high system congestion. It should be noted however, that these hours are not necessarily when SOMAH PV systems have their highest output (i.e., during the middle of the day when irradiance peaks).

In this section, we examine ex-ante estimates of generation during CAISO and IOU annual peak load hours as well as their top 200 load hours. Table 6-2 presents the hours and magnitudes of CAISO and IOU peak demands in the reference year 2020.

TABLE 6-2: 2020 CAISO AND IOU PEAK HOURS AND DEMANDS (MW)

IOU	Peak Demand (MW)	Date	Hour Beginning (Local Time)
CAISO (Gross)	46,967	August 18, 2020	3:00 PM
CAISO (Net)	43,144	September 6, 2020	6:00 PM
PG&E	20,763	August 14, 2020	5:00 PM
SCE	23,267	August 19, 2020	3:00 PM
SDG&E	4,397	September 30, 2020	4:00 PM

CAISO Peak Hour Impacts

Using simulated generation from the SOMAH sample of projects, the generation that would have been coincident with the gross and net CAISO annual peak hours in 2020 is shown by Utility Service Area in

Table 6-3. The estimated generation from SOMAH projects of 43.3 MW, that would have been coincident with the 2020 gross CAISO peak hour, is equivalent to 0.09 percent of the 2020 gross CAISO peak load.

PG&E projects contribute the largest proportion of the gross CAISO peak hour generation, followed by SCE, then SDG&E. The net CAISO peak hour generation follows a similar trend. PG&E also had the highest peak hour capacity factor during the Gross and Net CAISO peak hours, in comparison to SCE and SDG&E. The estimated contribution to the net CAISO peak hour is substantially lower than the estimated contribution to the gross peak hour due to lower energy production during the 6 PM hour.

TABLE 6-3: 2020 ESTIMATED GROSS AND NET CAISO PEAK HOUR GENERATION BY UTILITY SERVICE AREA

Utility Service Area	Gross			Net		
	Estimated Peak Hour Generation (MW)	Percent of Total	Estimated Peak Hour Capacity Factor	Estimated Peak Hour Generation (MW)	Percent of Total	Estimated Peak Hour Capacity Factor
PG&E	21.7	50%	59.0%	3.2	64%	8.7%
SCE	14.6	34%	55.9%	1.2	24%	4.5%
SDG&E	7.0	16%	56.3%	0.6	12%	4.6%
Total	**43.3**	**100%**	**57.5%**	**4.9**	**100%**	**6.6%**

IOU Peak Hour Impacts

Estimated peak hour impacts that would have been coincident with IOU annual peak hours for 2020 are shown below in Table 6-4. The 2020 PG&E peak hour generation occurred on August 14th between 5 and 6 PM. During this hour, SOMAH projects in PG&E's system are estimated to have the potential to generate 11.6 MW with an estimated peak hour capacity factor of 31.6 percent. SCE's peak hour was on August 19th between 3 and 4 PM, where estimated coincident generation would have been 14.7 MW with an estimated peak hour capacity factor of 56.5 percent. Projects that are anticipated to be interconnected to SDG&E's electrical system are estimated to have the potential to generate 3.0 MW with an estimated peak hour capacity factor of 24.3 percent during the peak hour of September 30th, 2020 between the hours of 4 and 5 PM.[88] The estimated peak hour capacity factors vary widely across IOUs, as PV system utilization is highly dependent on the solar position which varies by time of day and time of year.

[88] The defined peak hours are all in local time.

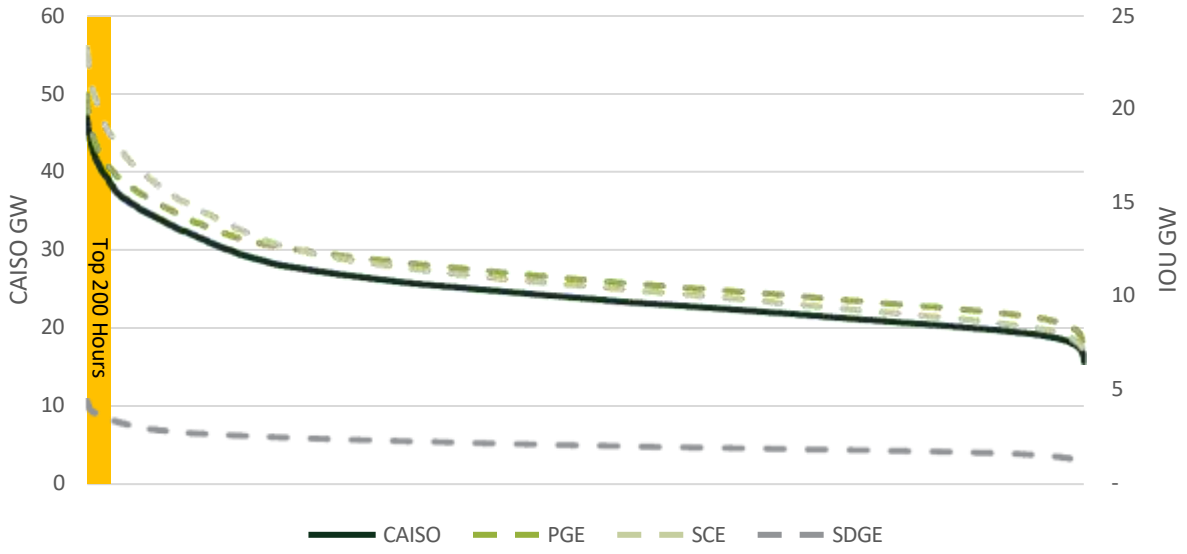
TABLE 6-4: IOU ESTIMATED PEAK HOUR GENERATION

IOU	Estimated Peak Hour Generation (MW)	Estimated Peak Hour Capacity Factor
PG&E	11.6	31.6%
SCE	14.7	56.5%
SDG&E	3.0	24.3%

Top 200 Peak Hours

The estimated CAISO and IOU annual peak hour coincident generation is a snapshot of beneficial program impacts. Analyzing the top 200 peak hours results in a more robust measure of impacts during CAISO and IOU peak grid loads. Representing just 2.3 percent of all the hours in a year, the top 200 peak hours capture the steepest part of load distribution curves. Figure 6-1 shows the 2020 CAISO and IOU load duration curves and indicates the 200-hour mark as the solid orange bar on the left side.

FIGURE 6-1: 2020 CAISO AND IOU LOAD DURATION CURVES



* Axes are scaled on the left for CAISO and on the right for the IOUs

The distribution of the top 200 hours over the course of a year differs across CAISO and the three IOUS. While generally late summer weekday afternoon occurrences, a top 200 hour can occur on weekends and into October. Table 6-5 and Table 6-6 display the distribution of the top 200 peak hours for months and weekday types in 2020.

TABLE 6-5: 2020 TOP 200 PEAK HOUR DISTRIBUTIONS BY MONTH

	May	June	July	August	September	October
CAISO	0	3	23	120	42	12
PG&E	16	31	27	97	27	2
SCE	0	1	24	118	44	13
SDG&E	0	0	0	99	58	43

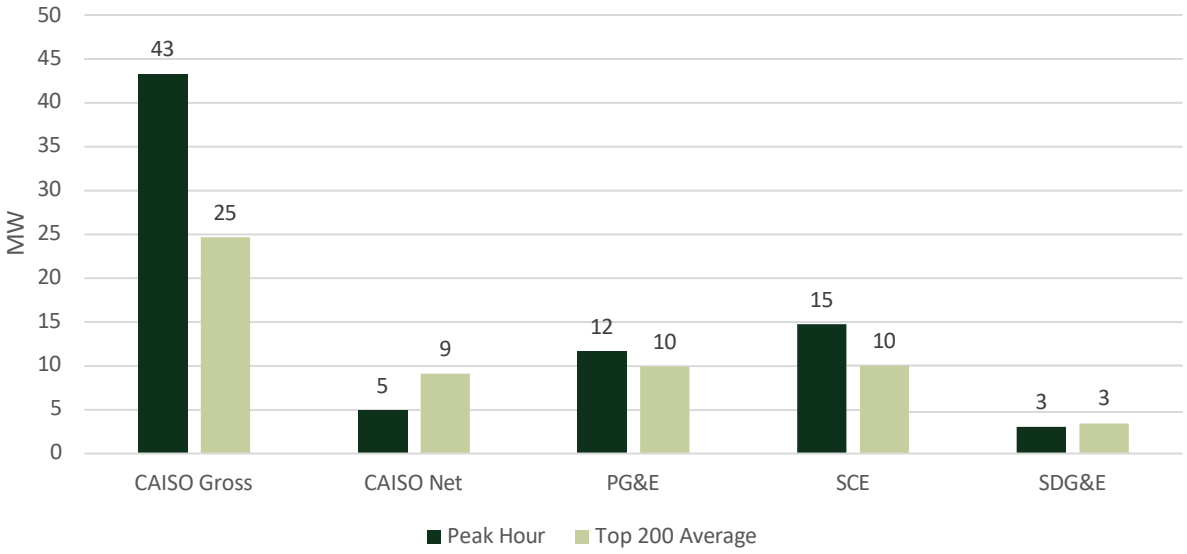
TABLE 6-6: 2020 TOP 200 PEAK HOUR DISTRIBUTION BY WEEKDAY

	Weekday	Weekend
CAISO	143	57
PG&E	155	45
SCE	146	54
SDG&E	152	48

During 2020, the top 200 peak hours occurred mostly in August, with a significant number of hours occurring in September. For CAISO and all IOUs, weekdays dominated top hours, but some top hours also occurred during the weekend. Between 23 percent and 29 percent of peak hours were weekend hours in 2020.

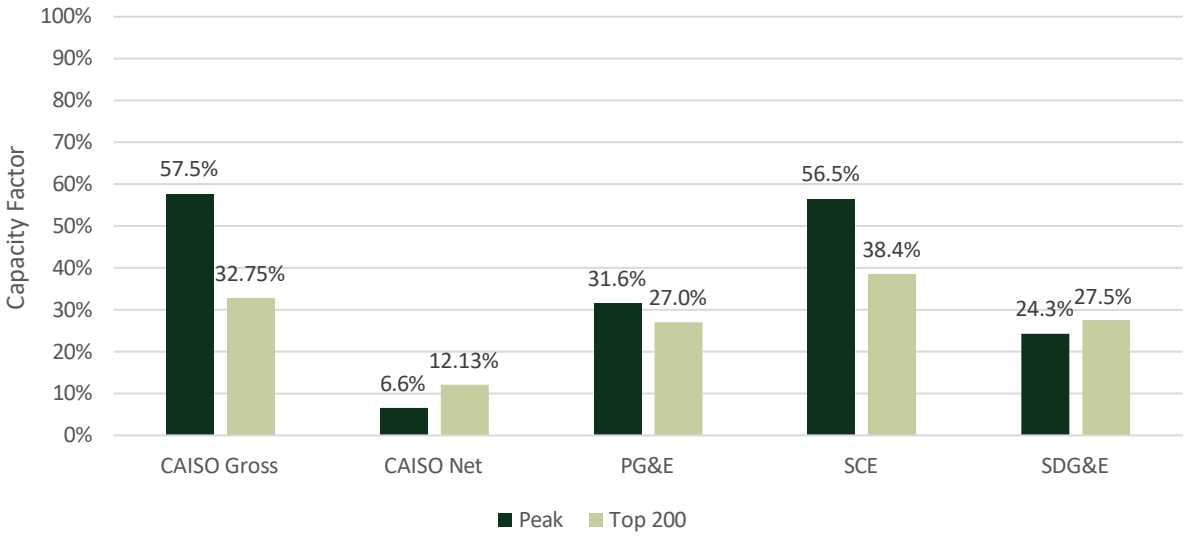
Figure 6-2 shows total program estimated ex-ante generation coincident with the three IOUs and CAISO gross and net 2020 peak hours, alongside average program ex-ante generation coincident with the 2020 top 200 peak hours. Whether the peak hour generation is close to the top 200 average is dependent on how peak and top hours are distributed in relation to the daily solar maximum.

FIGURE 6-2: 2020 CAISO AND IOU PEAK AND TOP 200 PEAK HOUR SOMAH PROJECT GENERATION



Higher utilization coincident with CAISO and IOU peak hours yields higher benefits to the grid than during other hours. Figure 6-3 shows the estimated capacity factors during the 2020 CAISO and IOU peak hour and top 200 hours. Across IOUs, SCE has the highest peak and top 200-hour capacity factors. PG&E had the lowest top 200-hour capacity factor and SDG&E had the lowest peak hour capacity factor across the three IOUs.

FIGURE 6-3: 2020 CAISO AND IOU PEAK AND TOP 200 PEAK HOUR CAPACITY FACTORS



6.2 GREENHOUSE GAS IMPACTS

This section discusses the estimated ex-ante greenhouse gas (GHG) impacts of the SOMAH PV systems in reference year 2020. Emission impacts are calculated as the difference between the emissions generated by SOMAH PV systems and baseline emissions that would have occurred in the absence of the program. This evaluation relies on avoided grid emissions rates developed by WattTime as part of the SGIP GHG Signal efforts.[89]

SOMAH PV systems are estimated to have the potential to reduce GHG emissions by 23,670 metric tons of CO_2 using 2020 emission rates in their first year of operation. Table 6-7 shows the distribution of estimated GHG impacts by Utility Service Area. PG&E contributed the largest proportion of estimated GHG savings at 49 percent, followed by SCE at 33 percent, and SDG&E at 17 percent.

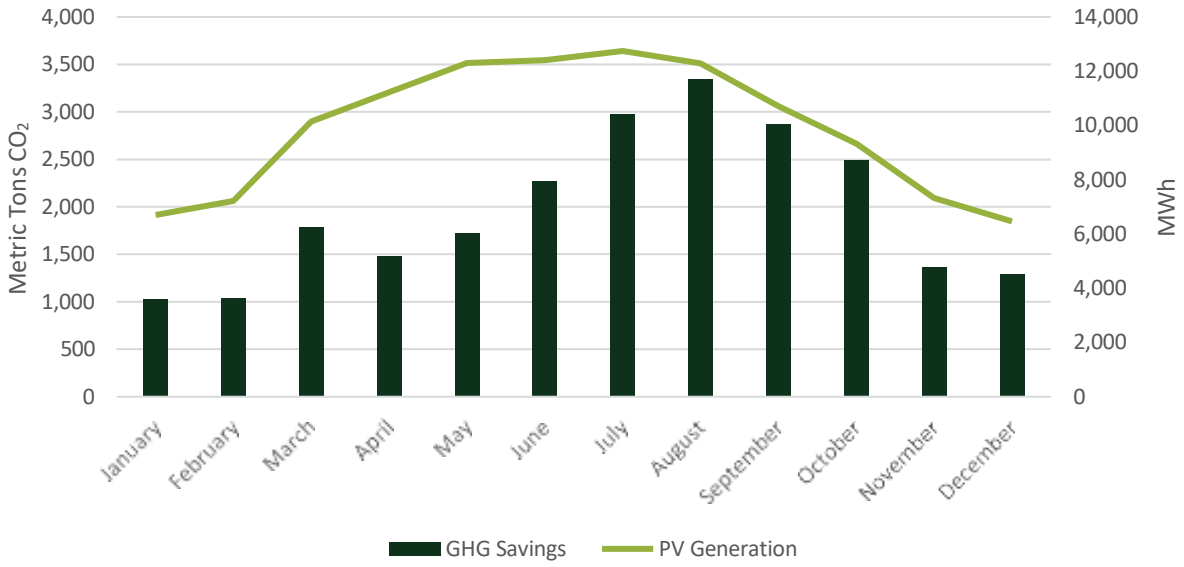
TABLE 6-7: GREENHOUSE GAS FIRST-YEAR IMPACTS BY UTILITY SERVICE AREA

Utility Service Area	Estimated GHG Impact (Metric Tons of CO_2)	% of Total
PG&E	11,688	49%
SCE	7,907	33%
SDG&E	4,074	17%
Total	**23,670**	**100%**

Figure 6-3 shows estimated GHG savings by month along with the estimated total PV system generation from SOMAH projects. Note that the magnitude of GHG savings is not directly aligned with the PV system generation alone. More GHG savings result from specific months due to the source-mix of the avoided electricity that would have been provided by the electric utility. August was the month with the highest share of top 200 demand hours and is also the month that provides the most GHG savings from SOMAH PV systems.

[89] The real-time marginal GHG emissions signal developed by WattTime represents the compliance signal for SGIP. These data are publicly available at: https://sgipsignal.com/.

FIGURE 6-4: ESTIMATED GREENHOUSE GAS IMPACTS AND SOMAH PROJECT GENERATION BY MONTH



Per California Air Resources Board reporting requirements, the estimated lifetime GHG emissions reductions attributable to proceeds used in 2020 can be found in Appendix E. The statewide estimated annual GHG emissions reductions attribution to 2020 auction proceeds exceeds 20,000 $MTCO_{2e}$ and the estimated lifetime GHG emissions reductions attribution to 2020 auction proceeds exceeds 475,000 $MTCO_{2e}$.

6.3 CUSTOMER BILL IMPACTS

Customer bill impacts were calculated using the Verdant bill calculator developed as part of the NEM 2.0 Lookback Study (as described in section 3.3.4). Given the ex-ante nature of this analysis Verdant simulated two scenarios to determine first year bill savings for common areas, tenants, and CARE program tenants. The first scenario assumes that the customer's tariff before and after PV system installation was a tiered volumetric rate (Tier to Tier). The second scenario assumes that the customer's tariff before PV system installation was a tiered volumetric rate, and the customer's tariff after PV system installation was a tiered time of use rate (Tier to Tiered-TOU).

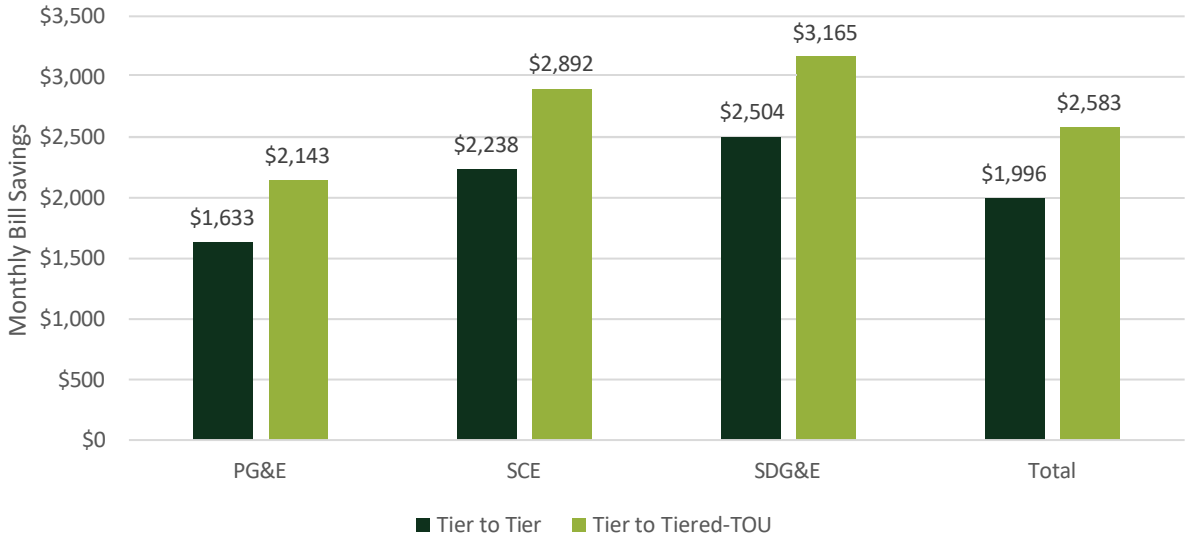
6.3.1 Common Area Bill Savings

It is important to note the bill savings reported here are the savings the property owner will receive on their utility bill and do not account for additional costs the property owner may face to cover financing or PPA related charges. Several the property owners interviewed for the process assessment indicated they anticipated approximately a 40 percent reduction on their net electrical costs which include both the

utility bill savings as well as additional financing costs of the project. This section is limited to the discussion of first year utility bill savings for the common area.

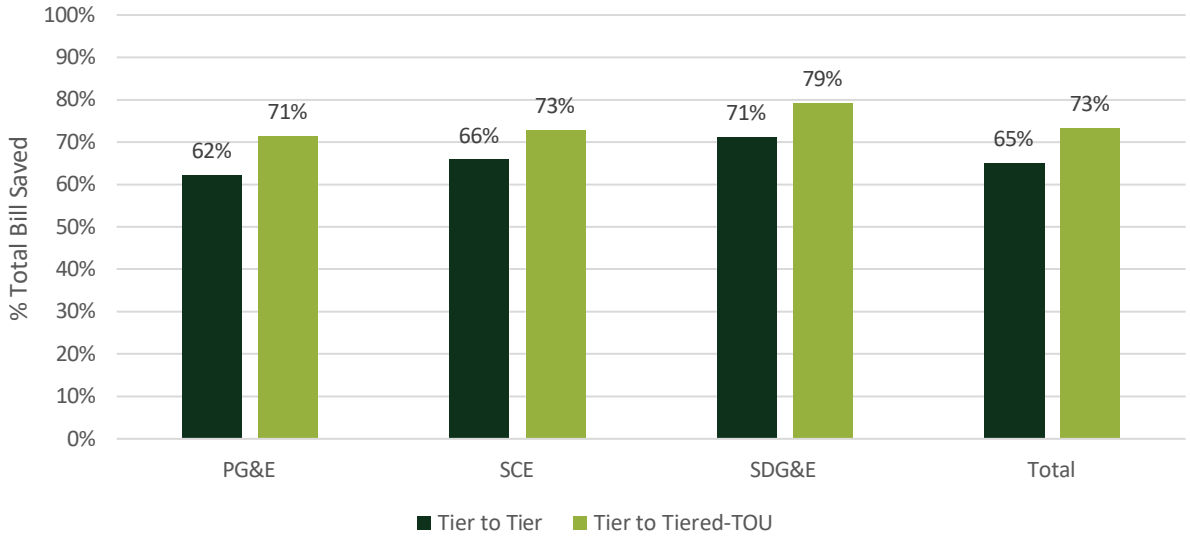
Figure 6-5 below shows the average monthly common area first year bill savings for the two modeled scenarios. The monthly bill savings ranged from $1,633 to $2,504 in the Tier to Tier scenario. In the Tier to Tiered-TOU scenario savings were higher, ranging from $2,143 to $3,165 per month, suggesting that property owners would benefit by switching to a tiered-TOU rate after installing the PV system. It should be noted that PG&E, SCE and SDG&E all require common area meters to go on a TOU rate to utilize VNEM, but PacifiCorp and Liberty do not have such a requirement.

FIGURE 6-5: AVERAGE COMMON AREA MONTHLY BILL SAVINGS BY UTILITY SERVICE AREA



The average first year bill savings as a percentage of the common area's total bill was also calculated for each scenario. As shown in Figure 6-6, the Tier to Tier scenario resulted in savings of 62 percent to 71 percent of the common area's bill, while the Tier to Tiered-TOU scenario resulted in higher proportional savings ranging from 62 percent to 71 percent.

FIGURE 6-6: AVERAGE COMMON AREA SAVINGS AS PERCENTAGE OF TOTAL BILL BY UTILITY SERVICE AREA



6.3.2 Tenant Bill Savings

The average first year bill savings per tenant is shown in Figure 6-7 below for the two modeled scenarios. The per-tenant monthly bill savings ranged from $48.95 to $60.91 in the Tier to Tier scenario. Savings were slightly lower in the Tier to Tiered-TOU scenario in the SCE and SDG&E service territories and slightly higher in the PG&E service territory. Per-tenant bill savings in the Tier to Tiered-TOU scenario ranged from $45.03 to $57.13 per month.

FIGURE 6-7: AVERAGE PER-TENANT MONTHLY BILL SAVINGS BY UTILITY SERVICE AREA

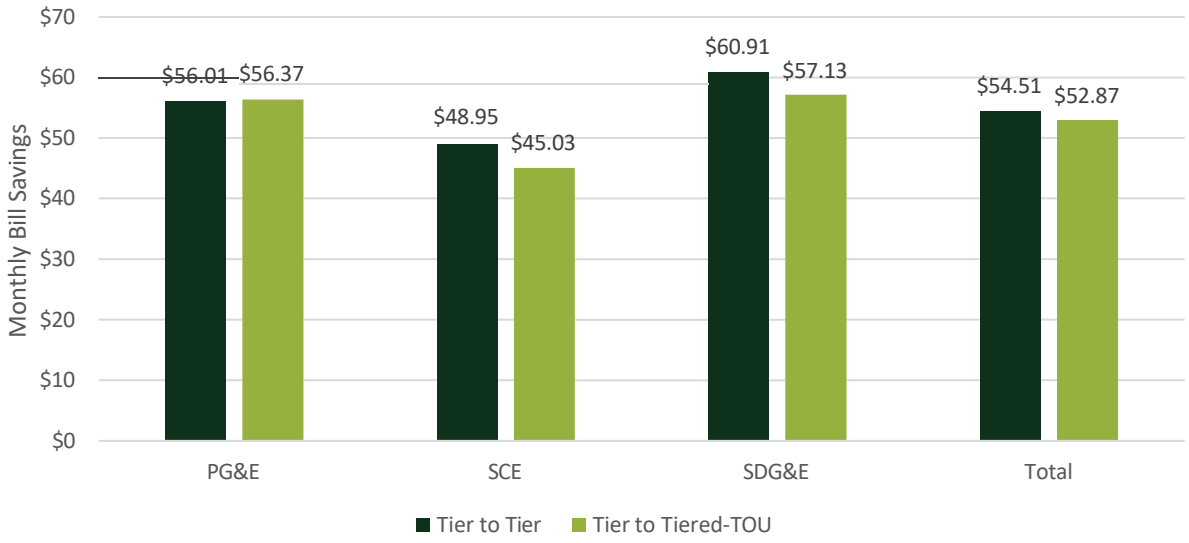
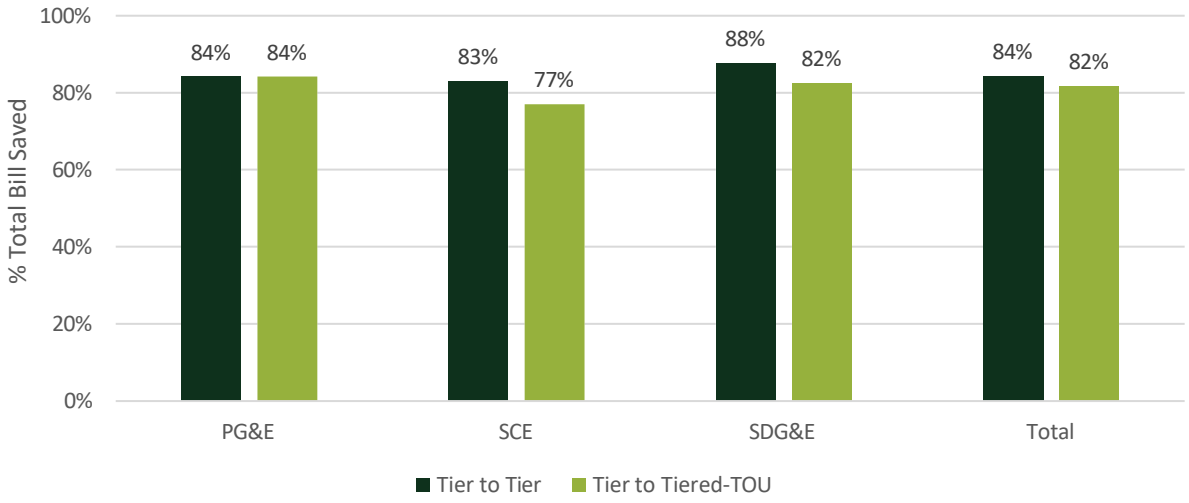


Figure 6-8 shows the average first year bill savings as a percentage of the tenant's total bill for each scenario. The Tier to Tier scenario resulted in savings of 83 percent to 88 percent of the tenant's bill, while the Tier to Tiered-TOU scenario resulted in savings ranging from 77 percent to 84 percent.

FIGURE 6-8: AVERAGE PER-TENANT SAVINGS AS PERCENTAGE OF TOTAL BILL BY UTILITY SERVICE AREA



Bill Savings for California Alternate Rates for Energy (CARE) Program Customers

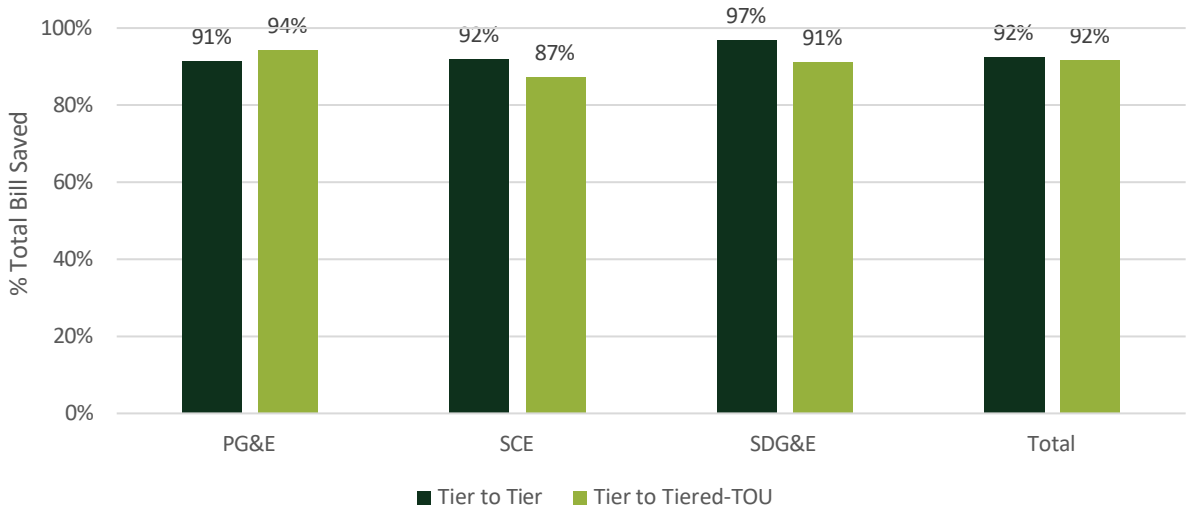
The two customer tariff scenarios were also modeled under the assumption that tenants were California Alternate Rate for Energy (CARE) customers. CARE rates are made available to customers whose total household income is at or below specified income limits set by household size. Customers may also be eligible for CARE if they are enrolled in certain public assistance programs.

The average first year bill savings per CARE program tenant is shown in Figure 6-9 below. The monthly bill savings ranged from $34.58 to $40.47 in the Tier to Tier scenario. In the Tier to Tiered-TOU scenario savings were slightly lower in the SCE and SDG&E service territories and slightly higher in the PG&E service territory. Savings in the Tier to Tiered-TOU scenario ranged from $32.60 to $38.53 per month.

FIGURE 6-9: AVERAGE CARE PROGRAM PER-TENANT MONTHLY BILL SAVINGS BY UTILITY SERVICE AREA

Figure 6-10 shows the average first year bill savings as a percentage of the CARE program tenant's total bill for each scenario. The Tier to Tier scenario resulted in savings of 91 percent to 97 percent of the tenant's bill, while the Tier to Tiered-TOU scenario resulted in savings ranging from 87 percent to 94 percent. Note that though CARE program tenants save less money on their monthly bill in comparison to non-CARE program tenants, the savings as a proportion of their overall bill is much higher.

FIGURE 6-10: AVERAGE CARE PROGRAM PER-TENANT SAVINGS AS PERCENTAGE OF TOTAL BILL BY UTILITY SERVICE AREA



6.4 AVOIDED COSTS

The average first year avoided costs per project and per kilowatt of capacity are presented in Table 6-8 below, by Utility Service Area. Across the three Utility Service Areas, the average first year avoided cost per project is highest in SCE ($19,538) and lowest in PG&E ($14,379). Though the average first year avoided costs per kilowatt of capacity in SDG&E and PG&E are both approximately $75.75, the average avoided costs per project in the SDG&E service area is higher due to larger average system sizes per project.

TABLE 6-8: AVERAGE SYSTEM FIRST YEAR AVOIDED COSTS BY UTILITY SERVICE AREA

Utility Service Area	Average First Year Avoided Costs per Project	Average First Year Avoided Costs per kW Capacity
PG&E	$14,379.44	$75.75
SCE	$19,538.31	$89.17
SDG&E	$16,913.67	$75.79
Total	**$16,490.12**	**$80.35**

7 FINDINGS AND RECOMMENDATIONS

As this is the first comprehensive process and impact assessment for the SOMAH Program, the Verdant team recognizes the need to present both detailed key findings stemming from the evaluation, and actionable recommendations focused on easing the participation burden placed on contractors and property owners to improve their participation experience. The significance of these learnings could be amplified if SOMAH becomes a model for a national low-income multifamily solar program.

In this section we summarize the key participation, process, and impact findings presented throughout this report, and offer recommendations to increase the future effectiveness of this important program.

7.1 PARTICIPATION AND PROCESS FINDINGS AND RECOMMENDATIONS

The section below presents a summary of the Verdant team's findings and recommendations from the Phase II SOMAH participation and process evaluation. Section 4 and Section 5 of this report present detailed results from the comprehensive participation and process assessment activities. Findings in this section are preceded with a square bullet (▪) and recommendations are preceded by a dash (-). Not all findings have an associated recommendation. The findings and recommendations are organized by topical area below.

Program Performance Findings:

- **The SOMAH Program appears capable of achieving its 10-year goal of installing 300 MW of solar PV.** Achieving this goal will require the SOMAH PA continue their focus on marketing and outreach activities that effectively build a pipeline of new and engaged program applicants, while also working to address participation barriers faced by property owners and contractors.

- **Program interest started strong but has declined after satisfying pent-up demand.** SOMAH's first year funding was nearly fully subscribed on day one of the program (July 1, 2019). More than 250 applications were submitted during the first week (representing $157 million in incentives and 50 MW_{AC}). Since that time, an additional 300 applications have been submitted representing roughly 93 MW_{AC} of solar. Year two of the program received roughly half the number of applications as year one. Year two of the program fell during the height of COVID-19 which impacted the program's ME&O activities, contractor/property owner staffing, and project progression.

- **Roughly a quarter of SOMAH applications were ineligible or cancelled due to owner disinterest.** This has resulted in 129 SOMAH applications being cancelled or withdrawn and the reserved capacity dropping to 68 MW_{AC}. This cancellation rate is likely to rise as submitted projects encounter additional barriers to project completion. This cancellation rate is significantly lower than the cancellation rate of SOMAH's predecessor program (MASH) which had a 57 percent cancellation rate. The top three

reasons for cancellation were: 1) disinterest in the program, 2) project ineligibility, and 3) overlap with the MASH Program.[90] Greater outreach from the SOMAH PA to applicants can help to identify potential cancellations before they occur allowing the PA an opportunity to offer solutions to combat the barriers to participation they are facing.

- **SOMAH participation has varied across service territories proportionally to the volume of SOMAH eligible properties.** PG&E represents the largest share of total projects, capacity, and eligible properties, followed by SCE and SDG&E. PacifiCorp and Liberty Utilities participation has been small (3 applications total), however this is on par with eligible properties in these territories.

- **The average SOMAH project PV capacity is 170 kW_{AC}, more than double that of MASH projects due to significantly higher tenant area incentives.** PV system capacity has varied widely across applications, ranging from 6 kW_{AC} to more than 1 MW_{AC}. The average SOMAH PV system capacity is 170 kW_{AC} (average tenant units per project is 81 and average capacity per unit is 2.1 kW_{AC}). This is significantly higher than the average capacity of MASH projects (77 kW), likely due to the substantial increase in PV capacity allocated to tenant areas across SOMAH applications (88% tenant/12% common area for SOMAH versus 60%/40% and 45%/55% for MASH 1.0 and 2.0). The SOMAH incentive for tenant areas was intentionally set at a much higher level to encourage and offset the cost of solar benefitting property residents.

- **SOMAH participation leads to other significant benefits for tenants and property owners**. Additional benefits include increased ability to pay rent; reductions in operating expenses increasing funds available for property upgrades, repairs, or other tenant services; helping to equalize old and newly constructed properties; and favorable viewing by local government agencies who often fund and permit projects.

- **The SOMAH Program is not a market transformation program.** D.17-12-022 directs the SOMAH PA to annually evaluate the incentive levels and decrease them to ensure they stay in line with the actual market cost of solar PV. It is important to recognize that the SOMAH Program is not a market transformation program. Incentive step-downs are typically used for market transformation programs that strive to increase demand for a technology and consequently drive down costs for that technology and therefore the incentives required. The affordable housing properties that the SOMAH Program was developed to serve are reliant on program incentives to install solar PV, and there is no reason to believe that the need for incentives is going to change over the life of the program or after the program has ended. It is important that future incentive levels are appropriately set to encourage participation amongst a diverse set of contractors and property owners.

Track A and DAC Participation Findings and Recommendations:

- **Track A application volumes have been low and have experienced high levels of cancellation.** Only 20 Track A applications have been submitted to date and half of these have been cancelled. Two Track

[90] Resolution E-5054 directed the SOMAH PA to cancel SOMAH applications that had received a MASH incentive.

A applicants have received a Solar Feasibility Assessment for their project. Use of the Online Bidding Tool has also been low with only three applicants using it to date.

- **Improvements to Track A Solar Feasibility Assessments**. The SOMAH PA should update the solar feasibility assessments to provide additional clarity on the ownership options available (including the costs and benefits of each type) and ensure the studies present offerings property owners are likely to find in the market from program contractors.

- **Improvements to Online Bidding Tool.** The SOMAH PA should ensure the bid timeline is sufficient to ensure contractors are able to submit high quality bids and should modify the bidding tool to allow contractors to submit bids for multiple ownership types.

- **More than one-quarter of applications are for properties located in a DAC at the time of this report.** This percentage is expected given the number of DAC eligible properties. **SOMAH eligible contractors located near DACs appear to be limited.** Insufficient contractors available to install solar in DACs could be a barrier to SOMAH's goal of increasing DAC participation.

  - **Expand and/or activate the pool of contractors serving DACs.** The SOMAH PA should continue to focus on discovering and eliminating barriers for small and diverse contractors to encourage program participation.

Program Participation and Eligibility Findings and Recommendations:

- **Participation has been dominated by multi-application property owners.** To date, 65 percent of SOMAH applications were submitted by 14 property owners who each submitted ten or more applications. Only five percent of applications were submitted by single application property owners.

  - **Provide additional support to smaller or newly participating property owners**. These applicants may need additional assistance from the SOMAH PA to successfully move through the application process.

- **SOMAH Program eligibility currently excludes properties that could benefit from SOMAH.** These properties include individually metered properties where the property owner pays the utility bills, properties with existing solar, and other properties serving low-income residents that are located within a DAC.

  - **Examine SOMAH's eligibility criteria to identify modifications that could extend the program's reach**. Currently excluded properties include individually metered properties where the property owner pays utility bills due to tenant difficulties (formerly homeless or youth) and properties with existing solar that is outdated.

  - **Provide additional upfront project assistance to contractors to identify ineligible projects sooner.** Helping contractors determine project eligibility sooner, potentially through a SOMAH PA "pre-screen", could help to minimize wasted time for both property owners and contractors.

Contractor Diversity Findings and Recommendations:

- **Diversity of participating contractors is low due to the complexities and burdens of participation**. Only 11 of the 118 eligible SOMAH contractors have submitted an application. A single contractor accounts for two-thirds of submitted applications; four contractors have submitted 94 percent of all applications. Participating contractors tend to be large (employing > 250 people) and lack ownership diversity (women or minority owned).

  - **Increase SOMAH PA program support for subcontractors.** The SOMAH PA can increase contractor diversity in the program by helping small contractors identify subcontracting opportunities on SOMAH projects. This allows subcontractors to gain experience with the program, thereby increasing their likelihood of submitting future applications and ensuring program contracting opportunities are dispersed amongst a diverse set of contractors.

  - **Track diversity of subcontractors.** Requiring program contractors to track subcontractor use and diversity status will help to assess the full extent of contractor diversity in the program.

Program Awareness and Motivations to Participate Findings and Recommendations:

- **SOMAH Program awareness is primarily from prior program participation or contractor outreach**. Most participating property owners were aware of SOMAH before it launched due to their participation in previous solar or solar thermal programs or prior relationships with program contractors. Others reported becoming aware of SOMAH via direct contractor outreach.

  - **Increase SOMAH co-marketing with IOUs, CCAs, or other local government organizations**. The SOMAH PA markets SOMAH through numerous channels but should ensure sufficient co-marketing of the program with known and trusted organizations (including the IOUs) that lend credibility to the program. Increasing local government program interactions can help to improve project permitting and can draw positive attention to property owners installing solar and helping to achieve local sustainability goals. Increasing marketing from trusted organizations within the affordable housing community and leveraging their outreach channels can raise program awareness, knowledge, and trust amongst their membership.

  - **Raise SOMAH Program awareness within city and county housing authorities.** SOMAH participation amongst city and county housing authorities has been low. The SOMAH PA should ensure ME&O activities targeting housing authorities are sufficient to raise awareness and increase participation amongst these entities.

  - **Utilize SOMAH case studies to showcase and promote completed SOMAH projects.** Case studies that illustrate the benefits SOMAH provides to property owners and tenants can build trust in the program via testimonials from peers within the affordable housing community. Case studies should highlight participating organizations of all sizes from small single site property owners to large affordable housing developers.

- **Property owners' motivations to participate in the SOMAH Program were primarily financial, tenant equity, or environmental.** Property owners' highest rated factors for installing solar through the SOMAH Program were that it allowed them to install low or no-cost solar and reduce their tenants' energy bills. They also reported that SOMAH participation allowed them to make progress towards achieving their company's sustainability goals or commitments to improving the efficiency and sustainability of their properties.

- **Contractors' motivations to participate included alignment with their organizational goals or mission and the benefits it provides to their customers.** The SOMAH program helps them add more renewables and fill the market gap of solar in the affordable housing sector.

Barriers to Program Participation Findings and Recommendations:

- **Property owners' barriers to participation are primarily related to a lack of time and financial resources required to participate in SOMAH.** Additional barriers include physical site issues, contractor or program distrust, and lack of prioritization against other affordable housing priorities.

  - **Recommendations to address property owner barriers.** The table below lists primary barriers to participation faced by property owners and recommendations to help address these barriers.

Property Owner Barriers	Recommendations to Address Barriers
Solar is not top priority	Services to augment property owner staff capacity Services to assist with application submittal Services to assist with LIHTC applications
Lack of staff to manage a solar installation project	
Property owner organization structure	
Access to project financing	Bridge loan assistance Ensure adequacy of program incentive levels
Physical site issues (roof condition, inadequate space, construction logistics)	Expand allowed costs covered with SOMAH incentives Ensure program eligibility doesn't penalize early adopters
Application burden	Property owner project dashboard Property owner email opt-out
Contractor or Program distrust	Additional 3rd party nonbiased program support Co-marketing with IOUs or local government groups

  - **Additional third-party nonbiased project support.** The SOMAH PA is reviewing additional technical assistance offerings to ensure property owners have the program knowledge they need to feel secure in their SOMAH participation decision making. Getting information from the SOMAH PA, a CPUC-sponsored third-party, could serve to increase property owners' confidence in program participation. Similar services are provided to Track A participants, but less so to Track B participants who primarily receive program information from their contractor.

- **Contractors' primary barriers to participation are administrative in nature.** SOMAH Program rules and participation and documentation requirements are onerous, present a significant administrative burden to contractors and as a result are a barrier to participation. Participating contractors typically

require large, dedicated teams to manage SOMAH projects, including sales, project management, engineering, and construction staff. Filling this multitude of roles can be difficult for small contractors. Non-participating contractors reported difficulty generating project leads and confusion over program requirements and the application process. Contractor barriers also include financial and solar feasibility concerns, such as property owners' inability to cover up front costs or secure bridge funding. Contractors also reported difficulties carrying project costs for extended times prior to incentive payment.

- **SOMAH PA support services to assist with application submittal.** The SOMAH PA could consider providing services to assist contractors or property owners by completing or prefilling portions of the application and helping with other time-consuming steps such as researching local zoning codes (that could significantly impact project plans), acquisition of property billing data, or assistance with project permitting.

- **Reassess and update SOMAH Eligible Properties Map.** Including accurate estimates of the solar potential for projects within this map is helpful to contractors who use these data to target eligible properties. The SOMAH PA indicated they are in the process of updating this component of the map and the evaluation team recommends further analysis of this tool once that transition has occurred.

- **Provide additional workforce development support.** The SOMAH PA should provide more assistance to contractors to help them meet program job training requirements and broaden the pool of job trainees.

- **Research feasibility of leveraging SOMAH unreserved incentives help contractors address financial barriers.** The SOMAH PA should, in coordination with the CPUC, research how the $260M in unreserved incentives could be leveraged to help contractors and property owners cover projects costs prior to incentives being paid. At least one utility has recently conducted a related pilot within the SGIP. Reviewing results from this pilot could shed light on the contractual obligations and resulting benefits associated with leveraging unallocated program funding.

- **Clarify allowable expenses that can be paid for with program incentives**. Program incentives can be used to cover the majority of project costs including financing costs and construction management and project development costs. Ensuring all contractors understand the wide range of allowable expenses may reduce some of the financial barriers to participation thereby helping more properties apply to the program and lessening future project cancellations.

Program Satisfaction, Cancellations, Future Participation Findings and Recommendations:

- **Property owners reported high levels of satisfaction with the SOMAH Program, incentive levels, and SOMAH contractors.** Property owners were less satisfied with the program's eligibility requirements and the application process and timeline. Dissatisfaction with the application process was primarily related to its complexity and length.

- **Contractors' satisfaction with the SOMAH Program was mixed.** According to contractors, SOMAH is an important program that is having a large impact on low-income multifamily solar projects and absent the SOMAH Program none or few of their SOMAH projects would be completed. Despite this, contractors rated their satisfaction with the program as moderate primarily due to the level of work required to participate being overly burdensome. Contractors rated their interactions with the Program Administrator highly.

- **Primary reasons for application cancellations were related to program ineligibility or infeasibility and thus are unlikely to result in future application resubmittal.** The cancellation rate for Track A projects was double that of Track B projects, and the cancellation rate for HCO systems was nearly three times higher than for PPA systems.

- **Project cancellations were highest amongst property owners submitting few applications.** These applicants may be less familiar with program eligibility requirements or have limited capability to manage a solar installation project and thus may need additional assistance from the SOMAH PA.

  - **SOMAH PA meetings with newly participating property owners.** After a reservation request has been submitted for a new project, it would be beneficial for the SOMAH PA to schedule a meeting with the property owner to discuss program rules, eligibility requirements, and to answer questions they have about program participation. Building a relationship between the SOMAH PA and the property owner can help the PA identify participation challenges that arise and can potentially be solved through PA intervention and assistance. Receiving feedback early, prior to project cancellation, may reduce the volume of projects cancelled.

- **Moderate likelihood of future participation amongst current participating property owners.** Roughly 60 percent of participating property owners reported they were either very or somewhat likely to submit a future SOMAH application for another one of their properties. Those who were unlikely to participate reported lack of staff capacity, administrative burden, and project funding concerns as their primary barriers for future projects. The recommendations to overcome these barriers are the same as those presented to the property owner barriers presented above.

- **Property owners' SOMAH contractor selection was largely based on contractors' prior experience installing solar on multifamily affordable housing, reputation, and property owners' prior working relationship.** Many property owners preferred larger contractors due to the program's complexity; fear smaller contractors may disappear prior to project completion; ability to deal with related roof repairs; and ability to complete projects in a timely manner. A contractor's ability to access capital to make the project zero cost to the property owner was also very important.

Project Ownership Findings and Recommendations:

- **Most contractors use a single ownership type for all projects.** Most participating contractors have utilized HCO ownership and only two are using a PPA which may indicate they are difficult for some contractors to facilitate. Many property owners reported PPA ownership was essential to their

participation in SOMAH as it eliminated upfront out of pocket costs and operations and maintenance costs during the life of the system.

  - **Identify opportunities to help all contractors offer PPA ownership to customers.** The SOMAH PA should identify what assistance they could provide to eligible contractors to allow them to offer all ownership options to potential SOMAH property owners.

- **Determining project financing and ownership is one of the most difficult and time-consuming components of SOMAH participation for contractors and property owners.** Contractors provide property owners with information on the project payback period, energy costs and other expenses over time, out of pocket costs, and cost comparisons between customer owned systems and third-party owned PPAs.

  - **Provide additional financing support**. The SOMAH PA should assess how they can lessen the barrier that project financing presents to property owners and contractors. This could include additional technical assistance offerings to help smaller contractors provide third-party ownership options to property owners or examining ways to make host customer ownership more feasible for property owners by providing bridge loan or low-interest financing support for SOMAH projects.

- **System ownership has been dominated by Power Purchase Agreements (two-thirds of active applications) and was highly correlated with SOMAH contractor.** Host Customer Ownership accounted for 30 percent of applications and only four solar lease applications have been submitted. Most PPA projects, unlike HCO projects, plan to leverage the Investment Tax Credit which decreases the SOMAH incentive by about one-third, extending the incentives available for future SOMAH projects.

- **Not all participating property owners were aware of ownership options.** Some property owners reported not knowing about PPA ownership, the financing implications associated with various ownership types, nor the fact the leveraging tax credits reduces SOMAH incentive levels. There was also confusion amongst parties regarding the difference between a PPA and an SSA (Solar Services Agreement).

  - **SOMAH PA meetings with newly participating property owners.** As mentioned above, scheduling a meeting between the SOMAH PA and the property owner could have many benefits. These benefits could also include a review of SOMAH ownership options and the proposal they received from their contractor to ensure they are making a fully informed decision. This meeting would also allow the SOMAH PA to get an understanding of any additional properties owned or managed by the property owner that may be eligible for the SOMAH program.

  - **Update the SOMAH Handbook to include Solar Services Agreements (SSA).** To address confusion regarding SSA offerings, including those in the Track A Technical Assistance materials, the SOMAH PA should review program materials to ensure they clearly present all available ownership options (including SSAs), and expand explanations of the benefits various ownership types provide to properties owners.

Application Processing Findings and Recommendations:

- **Project timelines have been long with few projects completed to date due to a long application and installation process exacerbated by COVID-19 and permitting related delays.** The SOMAH Program launched nearly two years ago and at the time of reporting only one project has been completed and received the program incentive. An additional three projects have submitted the Incentive Claim. These four projects total 983 kW. The interim target for MW installed from the SOMAH Program Implementation Plan (included in Appendix D) ranged from 37 to 54 MW_{AC} for 2019 and from 39 to 57 MW_{AC} for 2020. To date $126K in SOMAH incentives have been paid, around $150M has been reserved, and more than $250M is available for future projects.

  - **Assist contractors with the acquisition of property electrical consumption data.** Contractors reported challenges acquiring building consumption data sufficient for the creation of project proposals. Ensuring contractor consumption data aligns with the IOU data request can reduce contractors need to redo project designs and bids and shorten project timelines.

  - **Offer greater support to streamline project permitting process**. Project permitting varies significantly across municipalities and can be problematic for all solar installations (not only for SOMAH affordable housing projects). Legislation recently introduced to streamline permitting in California for standard residential PV systems (SB 617) may also streamline the process for SOMAH projects. The SOMAH PA should closely follow SB 617 to ensure it includes SOMAH and also implement ME&O activities that help contractors and local authorities understand best practices in solar plan review and permitting.

- **Reservation Request Approval has taken nearly nine months but is showing signs of speeding up as the program matures and experience with the program grows.** The Reservation Request Package step has taken the longest to complete. Projects submitted during the first year of the program (7/1/2019-6/30/2020) took 287 days on average to get approval—which is nearly three months longer than those submitted during the second year of the program (192 days).

  - **Consider dividing the Reservation Request Package into more manageable steps.** Obtaining reservation request approval takes an average of nine months. This step establishes eligibility, affirms tenant economic benefits of solar, creates VNEM allocations, establishes consent to receive customer data/information, collects equipment and system information, and reserves project incentives. This step requires significant effort for contractors prior to being assured the project will receive an incentive. Breaking this one step into more steps can help to add certainty thus reducing the application burden. During this assessment the SOMAH PA should also review the Reservation Request documents that must be completed to identify opportunities to streamline program participation requirements.

- **Confusion exists regarding sizing SOMAH PV systems to account for future electrical consumption increases.** Not all property owners were aware of SOMAH program rules that allow the Solar Sizing Tool (SST) to account for planned electrification activities or EV charger installations. A clear understanding of the program rules regarding system sizing may encourage property owners to make

additional electrification investments to their properties that can benefit from their SOMAH solar installation.

- **Increase education on solar sizing to include future electrification and EV charging measures.** Ensure contractors and property owners understand the program rules and requirements that allow for PV systems to be sized to account for future electrification and EV measure adoption.

- **Plans to pair SOMAH PV with BTM storage have varied by system ownership.** Roughly 92 percent of active PPA projects plan to pair their PV with BTM storage, whereas only two percent of HCO projects include storage in their program applications. As noted earlier, pairing BTM storage with in-front-of meter VNEM/SOMAH PV poses technical and regulatory challenges.

  - **Track the number of SOMAH PV systems that are paired with BTM storage.** The SOMAH PA should carefully track the actual attachment rate of BTM storage with SOMAH PV systems and highlight case studies of successful implementation.

- **Leveraging BTM storage with in front of the meter solar can be difficult and confusing due to VNEM Tariff requirements.** Pairing BTM battery storage and IFOTM solar can pose interconnection challenges for the purposes of providing resiliency (the primary use case for installing storage reported by property owners). While property owners reported being aware of SGIP battery storage incentives available, challenges leveraging SGIP incentives for SOMAH/VNEM projects exist. Further, there is uncertainty as to whether some or all utilities' VNEM tariffs preclude in-front-of the meter storage systems on a VNEM tariff from providing power to a building's on-site load.

  - **IOUs should reassess their VNEM tariff language to clarify requirements for solar and storage pairing**. The SOMAH PA should also ensure SOMAH contractors are fully aware and knowledgeable of SGIP requirements and have the materials necessary to educate property owners on how solar and storage pairing operates and the benefits it can provide to the property. Projects may abandon plans to integrate their PV system with battery storage if rules and regulations are not changed to streamline the pairing of SOMAH VNEM systems with battery storage.

Program Tracking Data Findings and Recommendations:

- **PowerClerk tracking database is robust and effective.** The SOMAH PowerClerk program tracking database is robust and effective for tracking applications through this complex program. The evaluation team's use and detailed review of this database recommends two updates to improve its usefulness.

  - **Updates to program tracking database.**

    - The variable "Ownership Type" takes the values: For-Profit, Non-Profit, or Hybrid. This field was blank for more than half of applicants and where populated seems to indicate the contractor's status not the property owner's and so is not helpful to characterize property ownership.

- The PA should require the collection of all project component costs earlier in the process. Currently these costs are collected in the PPM for all projects but to date only HCO system are providing these disaggregated costs earlier in the process.

7.2 IMPACT FINDINGS AND RECOMMENDATIONS

Impact Findings: As mentioned in Section 6, this evaluation estimated the ex-ante energy, demand, greenhouse gas, and customer bill impacts resulting from SOMAH PV system applications. We refer to these impact estimates as "ex-ante" as they are estimates of the expected future impacts if and when the projects are installed. The evaluation's ex-ante SOMAH impacts suggest that:

- The annual estimated ex-ante electric generation across the analyzed SOMAH applications is 118,816 MWh (on average 312 MWh per project across all utility service areas). The annual DC capacity factor associated with these projects is 18 percent.

- Active SOMAH applications would contribute approximately 43.3 MW and 4.9 MW of generation during the CAISO 2020 gross and net peak hours, respectively. The estimated peak hour capacity factors associated with these gross and net estimates are 57.5 percent and 6.6 percent. The IOU peak hour ex-ante impacts range from a low of 3.0 MW for SDG&E to a high of 14.7 MW for SCE.

- SOMAH projects are expected to reduce greenhouse gas emissions by 23,670 metric tons during their first year of operation using 2020 emission rates. Evaluation results indicated that August is the month for which SOMAH projects are estimated to provide the most GHG savings (3,349 metric tons of CO_2 reduced).

- SOMAH projects are expected to reduce monthly bills as follows:

  - Common area bill savings of $2-$2.5K (around 70 percent of pre-SOMAH monthly bills)

  - Tenant bill savings around $50/tenant (roughly 80 percent of pre-SOMAH monthly bills)

  - CARE tenant bill savings around $35/tenant (roughly 92 percent of pre-SOMAH monthly bills)

Given data availability limitations arising from the lack of a sufficient number of completed projects, this evaluation is limited to presenting simulated ex-ante impacts across currently active SOMAH applications. Once projects are completed and interconnected, the program will have a better understanding of final system configurations (e.g., storage pairing plans).

Impact Recommendations:

- It is recommended that future program evaluations leverage actual metered data and customer bills for a minimum of one-year post-installation to validate the ex-ante findings presented in this report and shed light on reasons for significant deviations from expected performance if found.

- Tracking tenant and common area rates (including CARE) pre and post installation would help ensure the accuracy of the common and tenant area bill savings estimates calculated by program evaluators.

- As part of SOMAH's application process the IOUs provide the SOMAH PA with historical consumption data for the tenant and common area meters associated with a SOMAH project (IOU data request). Retaining the account numbers or meter numbers used to complete the IOU data request queries would ease the burden of pulling the interval data needed for future impact evaluations.

7.3 RECOMMENDATIONS FOR FURTHER RESEARCH

This section presents recommended areas for further SOMAH research. This research was not conducted during this evaluation as it was either deemed outside the scope or at this time there was insufficient data available to complete this research.

- **Assess the statewide coverage of SOMAH-eligible contractors** using data included in the Online Bidding Tool database. This database includes the location of SOMAH-eligible contractors and the maximum distance they are willing to travel for a project. Overlaying this data on the eligible property data will allow for the identification of any potential issues related to insufficient contractor availability for SOMAH-eligible properties.

- **Average self-reported project costs vary by system ownership type and should be researched further as more cost data becomes available.** Initial cost and incentive data indicate that on average the project cost per watt is highest for PPA projects while the incentive per watt is the lowest for these projects. It is too soon to conduct any formal analysis of project cost data due to the limited number of projects with verified cost data in the program tracking database. This SOMAH application cost data, after being independently verified, could be used alongside or in lieu of the NREL cost data to determine current costs of installing solar on multifamily affordable housing.

- **Study ESA Program enrollment across the IOUs** to ascertain the effectiveness of SOMAH's ESA referrals process. At the time of reporting the SOMAH PA did not have ESA Program data as it can only be requested annually, and no data was received in 2020.

- **Evaluate SOMAH's fuel substitution and fuel switching documentation requirements** to determine how they are impacting projects that have included future electrification measures within the Solar Sizing Tool to expand the size of the solar installed and incentivized through the program.

- **Conduct a comprehensive cost study** to better understand detailed project costs related to financing and installing solar on multifamily low-income properties. This assessment can assist the SOMAH PA to estimate future changes in installed system costs and inform recommendations on how incentives should be set in the future.

- **Assess the success of SOMAH job training opportunities**, including the number of tenants leveraging these opportunities. This should also include non-installation job training opportunities and the communication channels that exist between job trainees and the SOMAH PA.

- **Study the degree to which the SOMAH tenant education materials and requirements are achieving program goals** after more projects have begun solar installation and completed SOMAH projects.

- **Track VNEM effectiveness and timelines for tenants to receive bill credits and the impact these bill credits have on tenant occupancy rates and bill arrearages.** This key program benefit to tenants should be assessed in future evaluations to ensure it is occurring in a timely manner.

APPENDIX A PU CODE 913.8 REPORTING REQUIREMENTS

The Public Utilities (PU) Code Section 913.8 includes a list of reporting requirements that must be addressed by the SOMAH evaluation. The table below provides a summary of these reporting requirements and how and where they are addressed by within the Phase I and Phase II SOMAH reports. As of the final data download for this report (April 29, 2021) only four solar PV systems have been installed through the program (one has received the SOMAH incentive payment and the other three have submitted the SOMAH incentive claim form but have not received their incentives) and thus some the PU Code reporting requirements, as indicated below, are based upon ex-ante estimates of program performance rather than actual performance data.

PU Code 913.8 Reporting Requirement	Phase II Reporting Status
The number of qualified MF affordable housing property sites that have a qualifying solar energy system.	As of April 29, 2021, one SOMAH project has been completed and received the SOMAH incentive. An additional three projects have filed their Incentive Claim Package. A summary of the status of active SOMAH applications is included in Section 4.1 of this report.
The dollar value of the award and the electrical generating capacity of the qualifying renewable energy system.	As of April 29, 2021, the PV system capacity of the 405 active SOMAH applications is 68 MW_{AC}. This is a reduction from the 81.6 MW_{AC} reported in the Phase I report primarily because of the 124 SOMAH applications have been cancelled or were ineligible. The total value of the submitted/reserved SOMAH incentive for completed and active projects is $152M.
The bill reduction outcomes of the program for the participants.	There has been an insufficient number of SOMAH projects completed to allow for the calculation of ex-post bill impacts for program participants resulting from the SOMAH Program at this time. Phase II of the SOMAH evaluation *estimated* the ex-ante bill impacts for 381 SOMAH projects which had submitted a SOMAH application as of March 3, 2021. The estimated ex-ante bill impacts are provided in Section 6.3 of this report.
The cost of the program.	Section 4.5 of the Phase II report provides the total program expenditures, budget, and incentives paid through December 31, 2020.
The total electrical system benefits.	There has been an insufficient number of SOMAH projects completed to allow for the calculation of ex-post electrical system benefits of the SOMAH Program at this time. Phase II of the SOMAH evaluation *estimated* the ex-ante energy and demand impacts for 381 SOMAH projects which had submitted a SOMAH application as of March 3, 2021. The estimated ex-ante energy and demand impacts are provided in Section 6.1 of this report.
The environmental benefits.	There has been an insufficient number of SOMAH projects completed to allow for the calculation of ex-post environmental benefits resulting from the SOMAH Program at this time. Phase II of the SOMAH evaluation *estimated* the ex-ante greenhouse gas impacts for 381 projects which had submitted a SOMAH application as of March 3, 2021. The estimated ex-ante GHG impacts are provided in Section 6.2 of this report.

PU Code 913.8 Reporting Requirement	Phase II Reporting Status
The progress made toward reaching the goals of the program.	**Goal 1) Expanding access to solar generation and its benefits to low-income customers in multifamily housing, where it is typically limited.** As detailed in Section 7 of the Phase I report[1], the evaluation team found the SOMAH PA, the IOUs, and the Energy Division are broadly aligned in their understanding of the SOMAH Program's role in delivering solar to disadvantaged and low-income communities through incentivizing affordable solar energy in multifamily affordable housing. Section 3.2.3 provides details on the benefits of the program across a diverse group of tenants, property owners, job seekers, and contractors. **Goal 2) Incentivizing the installation of at least 300 MW of solar generation capacity.** Section 4.1 of the Phase II report presents analysis of the SOMAH applications submitted through April 29, 2021. As this analysis shows, the PV system capacity of the 405 active SOMAH applications is 68 MW_{AC} which is 23 percent of the overall program goal of 300 MW_{AC}. This is 4 percent lower than estimated during Phase I of this study due to project cancellations and ineligibility since the Phase I was completed. **Goal 3) Ensuring financial benefits accrue primarily and directly to tenants, and are not recaptured by other means.** Section 4.2.3 of the Phase II report presents analysis of the program tracking data through April 29, 2021. While the SOMAH Program requires a minimum 51 percent of a project's electrical output be allocated to offset tenant's load, currently on average across SOMAH non-cancelled applications, the tenant allocation (both on an application and system capacity weighted basis) is 88 percent. **Goal 4) Providing greater accessibility to the program for applicants through a single point of contact, full service technical assistance, and coordination with other low-income programs.** Section 4.1.4 of the SOMAH Phase I report provides details on how the SOMAH Program is coordinating with other low-income programs. **Goal 5) Promoting local economic development through job training requirements and hiring practices.** Section 3.3.2 of the SOMAH Phase I Report and Section 5.4.4 of the Phase II report provide details regarding SOMAH workforce development activities. **Goal 6) Facilitating efficient program administration by a single, statewide administrator**. Section 7 of the SOMAH Phase I report presented the evaluation findings one of which was that the SOMAH PA is clear and internally aligned on the goals and objectives of the program and is working in the spirit of the legislation. Research conducted for Phase II of the evaluation further

1 CPUC SOMAH Phase 1 Report (August 2020): https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/s/6442465840-somah-phase1-evaluation-final-report.pdf

PU Code 913.8 Reporting Requirement	Phase II Reporting Status
	supported this finding. Contractors rated their interactions with the SOMAH PA highly. Both contractors and property owners rated their satisfaction with the SOMAH Program around a seven (on a scale of 0-10) primarily due to the program participation requirements being overly burdensome which is evident by the program's limited distribution of program incentives to date.
The program's impact on the California Alternate Rates for Energy (CARE) Program budget.	Section 6.3.1 estimates ex-ante bill impacts for customers in the CARE Program based on submitted applications through March 3, 2020.
Recommendations for improving the program to meet its goals.	A summary of the findings and recommendations for program improvements to help ensure the program met its stated goals are provided in Section 7 of this report.
Analysis of pending program commitments, reservations, obligations, and projected demands for the program to determine whether future ongoing funding allocations for the program are substantiated.	As detailed in Section 4.1 of the Phase II report, to date a total of 534 SOMAH applications have been received. Of these: 2 are currently in the Upfront Technical Assistance Request step; 103 are in the Reservation Request step; 198 are in the Energy Efficiency Compliance Milestone step; 48 are in the Proof of Project Milestone step; 4 are in the Incentive Claim Phase (of which one has received the SOMAH incentive); and 129 have been cancelled, withdrawn, or were ineligible
A summary of the other programs intended to benefit disadvantaged communities, including, but not limited to, the Single-Family Affordable Solar Homes Program established by the commission in Decision 07-11-045, the Multifamily Affordable Solar Housing Program established by the commission in Decision 08-10-036, and the Green Tariff Shared Renewables Program.	This summary is provided in Appendix F of the Phase I Report which can be found here: https://www.cpuc.ca.gov/-/media/cpuc-website/files/legacyfiles/s/6442465840-somah-phase1-evaluation-final-report.pdf
Additional DAC Reporting Requirement	**Phase II Reporting Status**
Number and percentage of applications received for projects located in a DAC	As presented in Section 4.2.2 of the Phase II report, as of April 29, 2021, a total of 147 submitted project applications are within a DAC (28 percent of all applications)
Number and percentage of applications for projects located in a DAC that are approved	95 of the 147 submitted projects in a DAC have been approved as of April 20, 2021 (18 percent of all submitted applications)

APPENDIX B SOMAH METRICS AND KPI ASSESSMENT

A key component of Phase II of the evaluation was to finalize a set of SOMAH Program metrics and key performance indicators (KPIs) that can be used to track program performance over time against the programs stated goals. A memo was delivered in December of 2020 that laid out the metrics and KPIs proposed by the evaluation team. These metrics and KPIs are presented in the tables below, along with their focus, associated goals, and the measurement approach. The sections that follow present the evaluation team's assessment of these metrics and KPIs.

TABLE B-1: SOMAH PROGRAM METRICS

#	Metric	Metric Focus	Associated Goal(s)	Measurement Approach
1	Applicant Projects with Reservation Request Approval, Milestone Status, and Incentive Package Submitted in Track A and Track B	Successful Installations	1, 2, 6	#, % of total, △
2	Number of job trainees who complete training per number of projects completed	Workforce Development	5	#:#
3	SOMAH-sponsored Job Trainings Conducted and Attendees	Workforce Development	5	#, △
4	SOMAH Projects with Reservation Request Approval, Milestone Status, and Incentive Package Submitted benefiting tenants who are income qualified and/or live in a DAC.	Distribution of Program Benefits	1, 3, 4	#, % of total, △
5	SOMAH Projects with Reservation Request Approval, Milestone Status, and Incentive Package Submitted in HUD & USDA Housing	Distribution of Program Benefits	1, 4, 6	#, % of total, △
6	Applicants Satisfied with Technical Assistance	Technical Assistance	4	#, % of total, △

The KPIs presented below are categorized by the program year in which they need to progress to meet the program's eventual goals, with short-term KPIs occurring within the first year of the program, midterm occurring in years 1 through 3 of the program, and long-term occurring in year 3 or later.

TABLE B-2: SOMAH PROGRAM KEY PERFORMANCE INDICATORS (KPIS) R.14-07-002 et al. ALJ/VUK/fzs

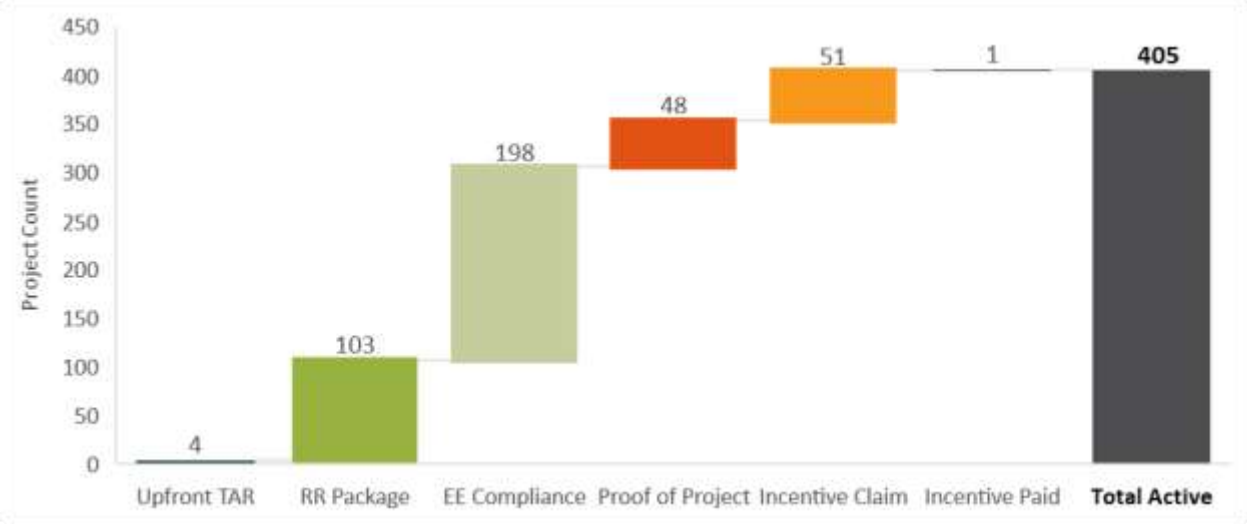
#	Timing	KPIs	KPI Focus	Associated Goal(s)	Measurement Approaches
1	Within 1 year	SOMAH Projects with Reservation Request Approval, Milestone Status, and Incentive Package Submitted by Capacity (0-50kW, 50-100kW and over 100kW), Budget, and IOU territory	Successful Installations	2, 4, 6	#, % of total, △
2		Targeted Audiences Aware of SOMAH	ME&O Effectiveness	1	% aware, △
3	1-3 years	CBOs Participating in SOMAH	ME&O Effectiveness	6	#, △
4		MW of Installed Capacity in MF Affordable Housing	Successful Installations	1, 2	#, △
5		Reduced Electricity Bill Costs among SOMAH Tenants	Economic Development	1, 3	% of total, △
6		SOMAH Trainees Hired for Solar Jobs	Economic Development	5	#, % of total, △
7		Program cost and impact on the California Alternate Rates for Energy (CARE) program budget	N/A	N/A	#, △
8		Energy Savings Assistance (ESA) Program enrollment among SOMAH tenants	Economic Development	1, 3	#, % of total, △
9	3 or more \ years	Avoided CO_2 emissions (tons)	Environmental Benefit	2	#, △

B.1 SOMAH METRIC ASSESSMENT

The evaluation team's assessment of the proposed SOMAH metrics is provided in the section below.

Application Status Summary

The focus of Metric #1 is the degree to which the program is leading to the successful installation of solar on multifamily affordable housing properties. This is measured by the number of applications currently at each stage of the SOMAH application process. The figure below shows the distribution of the 405 active projects as of the time of reporting. As this this exhibit shows, three-quarters of the active projects (298) have received approval of their Reservation Request and are working towards a later project milestone. Three projects completed their incentive claim package but have not yet received their SOMAH incentive and one additional project has received their SOMAH incentive.



Workforce Development Summary

The focus of Metrics #2 and #3 are the degree to which the program is assisting the development of a solar workforce via SOMAH's job trainee activities and hiring requirements. This metric has been adjusted during Phase II to better reflect the program's job training activities and the job training data being tracked by the program. The SOMAH Program does not conduct SOMAH job "trainings" events on its own, rather it partners with organizations that provide job training (such as trade schools, community colleges, or other organizations such as the California Conservation Corp). The SOMAH Program then provides opportunities for these students to get "on the job" experience. As a result, Metrics #2 and #3 have been updated to remove the quantification of the number of "SOMAH Job Trainings" conducted and the number of trainees in attendance. Instead, they focus on the number of SOMAH job training opportunities made available to students who have received job training (via a partner organization) or who reside in a SOMAH property.[2] The table below quantifies a number of important SOMAH workforce development statistics including:

- Number of individuals who have completed the SOMAH Job Trainee Intake Form.[3] This form captures whether the individual is a resident of a SOMAH property and/or a recent graduate of a partner job training program, as well as other demographics which can be analyzed to assess the degree to which the program is recruiting local or diverse hires (such as female, minority, on government assistance, felons, ESL, formerly homeless, unemployed or under-employed).

2 Tenants of SOMAH properties are eligible to participate in these job training opportunities without the completion of a job training program.

3 https://www.ca-somah.org/jobportal/s/self-register?locale=us

- Number of SOMAH job training opportunities that have been made available (to-date and forecasted based on applications in progress). The required minimum number of job trainees and the job trainee hours used on a project varies by project size (0-<50 kW 1 trainee and >=40 hours/trainee, 50-<100 kW 2 trainees and >= 40 hours/trainee, 100 kW or greater 2 trainees and >=80 hours/trainee). It should be noted that these "opportunities" do not represent the number of unique individuals as one trainee can fill a number of job opportunities.

- Number of job trainees who have been hired for a SOMAH job. This metric should be reviewed in light of the number of SOMAH projects that have completed the Incentive Claim Package (ICP) as that is where projects submit their job training affidavit to certify they have met the program's job training requirements. To date only one project has submitted that form.

- Number of job trainees who have been hired for a permanent position within the solar industry. As this time, it is too soon to determine the number of SOMAH job trainees that are getting hired for longer-term positions within the solar industry. The SOMAH PA has plans to conduct post-project surveys with contractors and job trainees after more SOMAH projects have been completed to start determining the longer-term impact of SOMAH's workforce development efforts.

TABLE B-3: SOMAH WORKFORCE DEVELOPMENT SUMMARY (AS OF 5/28/2021)

Workforce Development Activities	Number	%
SOMAH Job Trainee Intake Form Applicants	296	N/A
- Applicants residing in a SOMAH Property	10	3.4%
- Applicants completed a Job Training program	275	93%
- Minority applicants	227	77%
- Applicants receiving government assistance	109	37%
- Applicants that reside in DACs	113	38%
SOMAH job training opportunities available through May 24. 2021	759	N/A
SOMAH job training hours available through May 24, 2021	51,640	N/A
Number of trainees who have been hired for a SOMAH project	7	N/A
- Number of SOMAH Projects completing the ICF step	5	N/A
Number of trainees who have been hired for a position in the solar industry	TBD¥	N/A

¥ No data available at this time. This information will be collected in post-project contractor surveys.

Distribution of Program Benefits

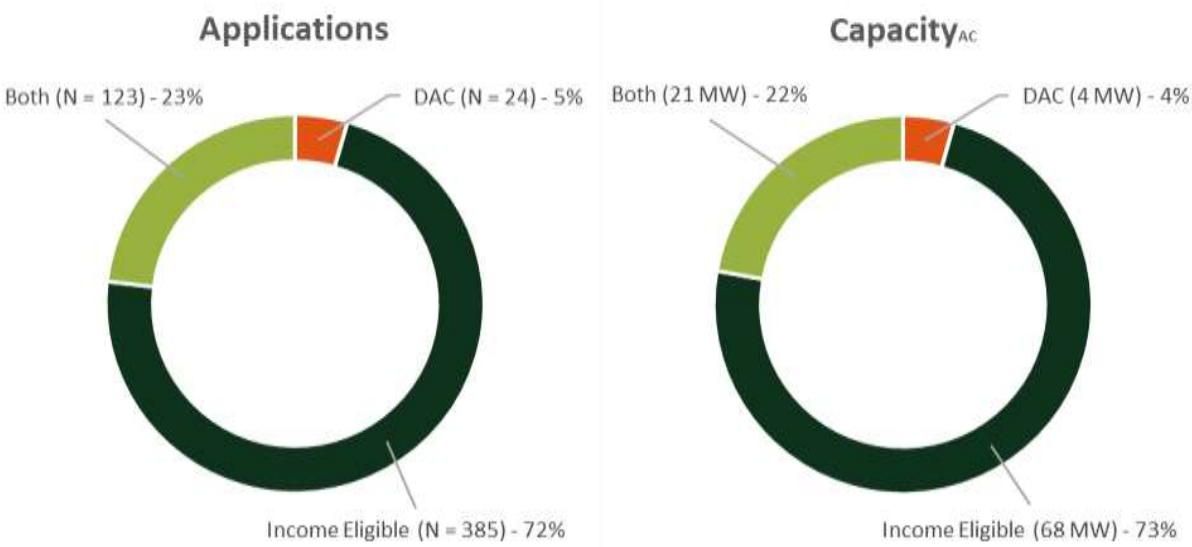
The focus of Metrics #4 and #5 are the degree to which the program is distributing program benefits to low-income residents and/or individuals residing in DACs, as well as individuals residing in HUD or USDA housing. Table B-4 shows the number and percentage of active applications and system capacities across the various regulatory agreement types found in the program tracking data. One limitation of this data is that there is only one "Regulatory Agreement" field in the tracking data and a property may receive funding from various regulatory agencies. The field may be populated by the predominant regulatory agreement type of the project, but that has not been confirmed by the evaluation team. As this table shows, the majority of active applications have TCAC regulatory agreements (67 percent of applications and 71 percent of project capacity). USDA makes up 3 percent of the total and HUD makes up just under 10 percent.

TABLE B-4: SOMAH DISTRIBUTION OF PROGRAM BENEFITS ACROSS ACTIVE APPLICATIONS

Regulatory Agreement Type	Total Active Applications	%	Total MW	% MW	Average Size kW
Housing Authority, or City/County in the case of a project funded by HUD HOME Funds	21	5%	2.3	3%	112
Redevelopment Agency (RDA) or RDA successor agency	17	4%	3.1	5%	192
California Debt Limit Allocation Committee (CDLAC)	4	1%	1.6	2%	393
California Department of Housing and Community Development/ The California Housing Finance Agency (HCD/CALHF)	14	3%	1.6	2%	113
California Tax Credit Allocation Committee (TCAC)	274	67%	48.5	71%	178
City or County in the case of a project funded by a local bond measure	9	2%	1.2	2%	133
U.S. Department of Agriculture (USDA)	14	3%	1.8	3%	127
U.S. Department of Housing and Urban Development (HUD)	36	9%	4.7	7%	131
Unknown	21	5%	3.2	5%	164

Figure B-2 below shows the distribution of SOMAH applications falling into one or both of SOMAH's eligibility criteria. As this figure shows, roughly 28 percent of the current SOMAH applications by count and 26 percent by capacity are located within DACs. This proportion is only slightly higher than the percentage of California's population that falls into the DAC designation (25 percent).

FIGURE B-2: DISTRIBUTION OF SOMAH PROJECTS AND SYSTEM CAPACITY IN DISADVANTAGED COMMUNITIES



Satisfaction with Program Technical Assistance

The focus of Metric #6 is the applicant's satisfaction with the technical assistance they have received through the program. To date, the amount of technical assistance (both upfront and standard) provided through the program has been low. As of April 29, 2021, only four Track A applications have been approved to receive Upfront Technical Assistance through the program, two of which have received a Technical Assistance Report for their project that provides an estimate of the space (roof or other) that is suitable for solar and the PV generation potential, a cost analysis for the project inclusive of the SOMAH incentive, and analysis of the project-level utility billing data including electric consumption and rate structure. Two property owners who received Upfront Technical Assistance were interviewed as part of the evaluation and both reported being satisfied with the technical assistance they received. One of these Track A property owners has since submitted a Reservation Request and the other is currently reviewing the options available to their organization to fund the installation of solar at their property.

According to the SOMAH PA, there have been 28 properties that have requested SOMAH standard technical assistance. The majority of these (24) had their SOMAH application cancelled as they had participated in MASH (MASH/SOMAH overlap) and thus were looking to the SOMAH PA to determine if other sources of funding were available to cover the funding gaps that existed on some of these projects. The evaluation team did not assess the satisfaction of those receiving standard technical assistance.

B.2 SOMAH KPI ASSESSMENT

The evaluation team's assessment of the proposed SOMAH KPIs is provided in the sections below.

Successful Installations

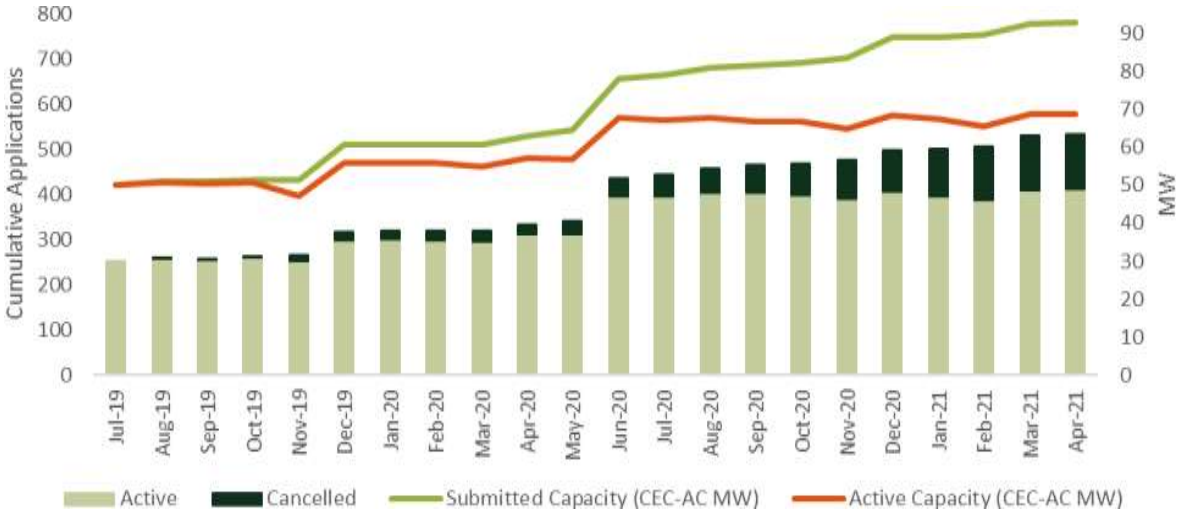
Within 1 Year

KPI #1 tracks whether the program is encouraging program participation across a variety of property types which may be reflected in the distribution of project capacities, costs, and locations. Section 4 of the Phase II report presents a comprehensive assessment of participant and project characteristics.

1-3 Years

KPI #4 tracks SOMAH's progress towards meeting its goal of installing 300 MW of solar capacity to ensure that adequate progress is being made towards that goal. As presented in the figure below, as of April 29, 2021, the PV system capacity of the 405 active SOMAH applications is 68 MW_{AC} which is 23 percent of the overall program goal of 300 MW_{AC}.

FIGURE B-3: CUMULATIVE SOMAH APPLICATIONS AND CAPACITY SINCE PROGRAM INCEPTION



ME&O Effectiveness

Within 1 Year

KPI #2 tracks the percentage of SOMAH's targeted audience that is aware of the SOMAH Program. The most recent ME&O plan developed by the SOMAH PA calls for surveys and focus groups with the program's targeted audience to assess a number of topics including their level of program awareness.

1-3 Years

KPI #3 tracks the number of Community Based Organizations (CBOs) Participating in the SOMAH Program. This is being tracked by the SOMAH PA but at this time the evaluation team has not received access to this data.

Economic Development

Within 1 Year

KPI #5 tracks the reduction in electricity costs for tenants residing in a SOMAH property. Section 6.3.2 of the Phase II report presents the estimated ex ante tenant bill savings resulting from the SOMAH program. The average monthly tenant bill savings varied slightly by utility service territory and the type of rate the tenant was on post-SOMAH installation (a tiered rate or a TOU-rate). On average across utility service territories tenant bills were estimated to come down around $54/month (an 84 percent reduction) for customers not on CARE rates.[4] For those on CARE rates, the average per-tenant monthly bill savings was estimated to be $36/month (a 92 percent reduction).

[4] California Alternative Rates for Energy Program (CARE) provides discounts on gas and electricity bills to participants who qualify through income guidelines or enrollment in certain public assistance programs.

1-3 Years

KPI #6 tracks the number of individuals that are fulfilling the SOMAH workforce development training opportunities. According to the SOMAH PA, as of May 24, 2021 a total of 275 applicants have completed a SOMAH approved Job Training program and 759 SOMAH job training opportunities have been made available. In total 7 SOMAH job trainees have been hired onto a SOMAH project.

KPI #8 tracks the number of tenants residing at a SOMAH property who have been enrolled in the Energy Savings Assistance (ESA) Program.[5] At the time of reporting there has been no verification that the IOUs who have received ESA Program referrals have acted upon them as the SOMAH PA is only able to request ESA data from the IOUs on an annual basis and no data was received last year. The SOMAH PA plans to plans to send out their next annual data request in June 2021. The evaluation team recommends future evaluations compare ESA Program enrollment across the IOUs to ascertain the effectiveness of these referrals.

Environmental Benefits

3+ Years

KPI #9 tracks the avoided tons of CO2 emissions. As part of this study the Verdant team estimated the ex-ante greenhouse gas (GHG) impacts of the SOMAH PV systems in reference year 2020. The emission impacts are calculated as the difference between the emissions generated by SOMAH PV systems and baseline emissions that would have occurred in the absence of the program. This analysis estimated the SOMAH PV systems would have reduced GHG emissions by 23,670 metric tons of CO_2 in 2020.

Other

1-3 Years

KPI #7 tracks the cost[6] of the SOMAH program and the impact on the California Alternate Rates for Energy (CARE) program budget. Section 4.5 of the Phase II Report presents the total program expenditures to date. Table 4-9 shows the SOMAH Program expenditures through December 31, 2020 were just under $18 million. Section 6.3.2 of the Phase II report presents the estimated ex-ante tenant bill savings resulting from the SOMAH program. The average CARE program per-tenant monthly bill savings across all utility service areas was approximately $36/month (a 92 percent reduction). The total impact on the CARE budget is not known at this time as data on which customers are on CARE rates was not provided to the evaluation team.

[5] The Energy Savings Assistance (ESA) program provides no-cost weatherization services and energy-efficient appliances to eligible renters and homeowners who receive electric or gas service from a California energy service provider through a residential meter.

[6] Program costs to be defined by evaluator and PA based on the data that is currently available (or could be made available in the future).

APPENDIX C CONTRACTOR AND PROPERTY OWNER INTERVIEW GUIDES AND WEB SURVEYS

C.1 SOMAH CONTRACTOR INTERVIEW GUIDE

SOMAH ContractorGuide_FINA

C.2 SOMAH PROPERTY OWNER INTERVIEW GUIDE

SOMAH Property Owner Survey Intervie

C.3 SOMAH PROPERTY OWNER WEB SURVEY

SOMAH Property Owner Web_Survey.d

APPENDIX D INTERIM TARGETS FOR MW INSTALLED

The table below provides the estimated maximum MW installed per year based on 100 percent of system benefits allocated to tenants and 51 percent allocated to tenants (the minimum amount required to be allocated to tenants) as presented in the SOMAH Program Implementation Plan.[7] Because the incentive paid for solar allocated to tenant spaces is higher than that allocated to common area spaces the incentives needed to reach program goals is higher under the 100% Tenant Load scenario and thus the estimated maximum MW installed per year is lower under this scenario than it is in the 51% Tenant Load allocation (which is the program minimum allocation to tenants) which represents the minimum incentives needed to reach program goals.

TABLE D-1: ESTIMATED MAXIMUM MW INSTALLED PER YEAR

Year	100% Tenant Load (MW)	51% Tenant Load (MW)
2019	37	54
2020	39	57
2021	41	60
2022	30	45
2023	32	47
2024	34	50
2025	36	52
2026	37	55
2027	39	58
2028	41	61
TOTAL	**367**	**539**

7 Revised SOMAH Program Implementation Plan.

APPENDIX E CALIFORNIA AIR RESOURCES BOARD GREENHOUSE GAS SAVINGS

The estimated lifetime greenhouse gas (GHG) emissions reductions attributable to proceeds used in 2020 were also calculated per the California Air Resources Board (CARB) requirements. The CARB GHG Benefits Estimation Tool[8] was used to develop these estimates, as presented in Table E-1 below. All projects were modeled with a 25-year expected project lifetime and a 0.5 percent annual degradation factor.[9] The CARB GHG Benefits Estimation Tool uses an emissions factor of 0.21182 $MTCO_2e$ per MWh. The percentage of SOMAH projects funded with auction proceeds was calculated at the total SOMAH program level as the sum of the total (submitted or reserved) incentives for the in-scope impact projects and the total program expenditures through December 31, 2020 divided by the total project costs for the in-scope impact projects (net estimated ITC and LIHTC payments).

TABLE E-1: ESTIMATED CARB GHG BENEFITS BY UTILITY SERVICE AREA

Utility Service Area	Percentage of SOMAH Projects' Funding from Auction Proceeds (%)	Total Annual Production (MWh/year)	Estimated Annual GHG Emissions Reductions Attributable to 2020 Auction Proceeds ($MTCO_2e$)	Estimated Lifetime GHG Emission Reductions Attributable to 2020 Auction Proceeds ($MTCO_2e$)
PG&E	80.8%	56,358	9,640.41	225,392.90
SCE	80.8%	42,400	7,252.72	169,568.59
SDG&E	80.8%	20,059	3,431.15	80,220.38
TOTAL	**80.8%**	**118,816**	**20,324.29**	**475,181.87**

8 https://arb.ca.gov/cc/capandtrade/allowanceallocation/ghg_benefits_estimation_tool.xlsx

9 The GHG Benefits Estimation Tool recommends a default annual degradation factor of 0.5 percent for solar PV projects.

(End of Attachment)