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California Multifamily Affordable Solar Housing Program

Benefitting both owners and tenants



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California's Multifamily Affordable Solar Housing (MASH) program has brought solar energy to thousands of multifamily building owners and tenants across the state, allowing them to reduce carbon pollution and benefit from lower energy costs. MASH uses financial incentives and an innovative billing arrangement to help overcome the challenge of motivating building owners to invest in energy solutions for tenant units where the tenants pay their own utility bills—a barrier typically referred to as a “split incentive.”

MASH—overseen by the California Public Utilities Commission (CPUC) and operated within the service territories of three California investor-owned utilities—provides an up-front rebate to offset the costs of installing and maintaining new solar energy systems for qualified, existing multifamily low-income housing. The program also offers a “virtual net metering” tariff that allows all tenants to benefit from the lower electricity bills that result from energy generated by the building's solar energy system.

From its inception in 2008 through 2015, MASH has led to the installation of more than 23 megawatts (MW) of solar capacity across nearly 360 solar projects on multifamily buildings serving more than 6,500 low-income households statewide. MASH solar photovoltaic (PV) systems avoided more than 27,450 tons of CO₂ emissions from 2011 to 2013, equivalent to one year of energy-related emissions from about 2,600 homes. In buildings that have implemented virtual net metering, tenants' electricity bills have fallen by an average of about \$480 in the first year.

Together, the rebate and virtual net metering allow both owners and tenants to benefit from solar energy by reducing the high up-front capital costs incurred by building owners and giving direct financial benefits to renters in the form of lower energy bills, addressing two common challenges faced by low-income multifamily renewable energy projects. The demand for MASH incentives has far exceeded available resources, and the current program is fully subscribed.

Fast Facts

Program scope: Provides up-front incentives to offset the cost of installing solar energy systems on multifamily affordable housing developments in California; also allows tenants to benefit from lower energy bills.

Budget: Total funding is \$162.5 million, made available on a first-come, first-served basis.

Staff: The utilities and nonprofit that run the program each employ 1–2 full-time staff and up to 5 part-time staff.

Community types served: Building owners and tenants of qualified multifamily affordable housing in the service territories of California's three investor-owned utilities.

Key Partners: Southern California Edison, Pacific Gas and Electric, Center for Sustainable Energy, California Public Utilities Commission.

Making It Happen

California Senate Bill 1, signed into law in 2006, authorized the CPUC to create the ratepayer-funded California Solar Initiative (CSI), a rebate program for solar PV and solar thermal technologies on existing homes and on existing or new commercial, agricultural, government, and nonprofit buildings. Legislation required the CPUC to ensure that not less than 10 percent of funds directed to the CSI be used for installation of solar energy systems on low-income residential housing.¹ As part of this requirement, the CPUC created the MASH program in 2008, allocating \$108 million to provide incentives that would offset the costs of installing solar power on multifamily low-income housing in the state. At the same time, the CPUC created the Single-family Affordable Solar Housing program (SASH), which offers fully or highly subsidized solar energy systems to qualified low-income homeowners.

In addition to encouraging the adoption of carbon-free solar power in the low-income housing sector and lowering utility bills and electricity use for low-income building occupants, the overall goals of the MASH program are to:

- Improve the overall quality of low-income housing through application of solar and energy efficiency technologies.
- Increase awareness and appreciation of the benefits of solar energy among low-income housing occupants and developers.

In 2013, the California Legislature extended MASH until 2021 and set the following new policy goals for the program:

- Require participants who receive MASH rebates to enroll in the state's Energy Savings Assistance program, which provides no-cost weatherization services and installation of energy-efficient appliances to households that meet income guidelines.
- Provide job training and employment opportunities—available to anyone, including members of low-income communities—in the solar energy and energy efficiency sectors of the economy.
- Maximize the overall benefit to ratepayers.



Financial Incentives for Building Owners

The MASH program provides rebates to owners of multifamily low-income residences for qualifying solar energy systems, which are paid in a one-time lump sum using the Expected Performance-Based Buydown (EPBB) methodology. EPBB, which was originally established under CSI, calculates a solar energy system's generating capacity based on verified characteristics such as location, system size, tilt, shading, and orientation. The capacity is then multiplied by a design factor (which compares the system's estimated performance with that of an optimal system at the same location) to determine the total rebate amount. The rebates are intended for eligible systems up to the first 1 MW of generating capacity, and generally cover 30 to 40 percent of the system's installation costs. The MASH program is designed to combine the administrative ease of a one-time rebate disbursement with an incentive structure that awards a higher rebate for systems that benefit tenants through lower electric bills.

Building owners can reduce their up-front capital costs for installation of the solar energy systems through the rebates, which the program offers in two tracks: 1) a rebate of \$1.10 per watt for PV systems that serve the building's common areas (such as hallways, stairwells, elevators, and laundry facilities, where electricity use is generally covered by the building owner) or master metered buildings (buildings where multiple users share a common meter); and 2) a \$1.80 per watt rebate for systems that primarily serve tenant units (50 percent or more of the energy savings must be retained by the building's tenants). MASH projects range from less than 10 to more than 300 kilowatts (kW) in capacity; most are in the range of 25–50 kW with total installed costs at roughly \$150,000–\$300,000 before rebates.

While the rebates combined with utility bill savings from the PV system are attractive on their own, interest in MASH picked up dramatically when third-party project developers began offering financing arrangements to building owners. For example, if project developers choose to bundle MASH rebates with federal tax credits and other incentives, such as Renewable Energy Certificates (RECs), they can offer very competitive power purchase agreements in which the PV system is installed and maintained at little to no up-front cost to building owners, who then pay the system owner for electricity at a considerably lower rate than what they had been paying their utility. This has been an especially good option for nonprofit owners of multifamily housing, who cannot take advantage of tax credits.²

Virtual Net Metering for Tenants

The CPUC added a virtual net metering tariff to MASH in 2009 as a way to ensure that tenants can benefit from solar energy systems installed on their buildings. Virtual net metering has



reduced participating tenants' electricity bills by an average of about \$480 a year per unit. Under virtual net metering, a PV system generates enough electricity to cover the load of both common areas and tenant units. All of the electricity generated by the system feeds directly into the utility grid. The utility then credits the kilowatt-hours generated by the PV system to the building owner's and tenants' individual accounts, based on a pre-arranged allocation agreement. Virtual net metering results in decreased electricity costs for all tenants in a low-income housing complex without requiring the PV system to physically connect to each tenant's meter. It also avoids significant hardware and installation costs, lowering the total cost of the system.

While not all building owners participating in MASH choose to extend the electricity from the building's PV system to tenant units (adding tenant units is not always cost-effective), those that do must enroll their tenants automatically in virtual net metering in order to receive the higher rebate. Automatic enrollment removes potential barriers to participation.

Initially, the CPUC enacted the virtual net metering tariff only for the purposes of implementing the MASH program. Based on the positive response from program participants and other stakeholders, the CPUC later created a similar virtual net metering tariff that is applicable to solar energy systems on all types of multifamily and multi-metered buildings (not just low-income).

Eligibility Requirements

MASH program eligibility requirements include:

- Multifamily residential complexes must meet a statutory definition of low-income residential housing.³
- Building owners must be current electricity customers of a participating utility in the territory where the project will be installed. Other eligible program participants include solar project developers and equipment sellers.
- Each project must provide at least one student or graduate of a job training program with at least one full paid day of work for each 10 kW of the solar energy system's capacity (up to 50 kW). The training(s) can be completed on either the MASH solar installation at the MASH project site, or in a support role on the overall MASH project.



- Multifamily low-income housing complexes that want to participate in MASH must conduct an energy-efficiency walkthrough audit (at their own expense) or provide proof of enrollment in a whole-building multifamily energy efficiency program. The energy audit must have been conducted no more than three years prior to the date of the application to MASH.

Key Partners

The CPUC, which used a public process to develop the MASH program design, is responsible for overseeing the program as well as tracking and evaluating its progress. Two utilities—Pacific Gas and Electric Company and Southern California Edison—administer the MASH program in their respective service territories. The nonprofit Center for Sustainable Energy, which has prior experience in operating other CPUC renewable energy incentive programs in the San Diego area and in other utility territories throughout the state, administers MASH in San Diego Gas & Electric’s service territory.

Funding Sources

In 2008, the CPUC adopted a 10-year total budget of \$2.17 billion for the California Solar Initiative, 10 percent of which (\$217 million) was directed toward low-income incentives—divided equally between the MASH and SASH programs. Given the high demand for both programs, the California Legislature authorized an additional \$108 million for MASH and SASH in 2013, extended the program to 2021 or until exhaustion of the new funding, and established several new program goals—bringing the total apportioned to MASH to \$162.5 million. Of the \$54 million allocated to MASH in 2013, 93 percent or \$50 million was for incentives and 7 percent for administration, evaluation, and marketing. When this most recent round of funding became available in August 2015, more than 300 candidates submitted project applications representing over 50 MW of solar capacity and amounting to well beyond the allocated funding amount. The program is currently fully subscribed and not accepting new applications.

Achievements

The MASH program has helped make carbon-free solar energy more accessible to many low-income residents in California that otherwise would not have access. The program also benefitted building owners by reducing their capital costs and energy bills.



- According to a third-party evaluation of the program,⁴ the MASH solar energy systems avoided more than 27,450 tons of CO₂ emissions from 2011 to 2013—equivalent to one year of energy-related emissions from about 2,600 average American homes.⁵
- According to CSI's official public reporting, the MASH program has completed nearly 360 solar projects statewide since its inception in 2008 through December 31, 2015, providing more than 23 MW of electricity-generating capacity.⁶ There are an additional 216 projects in the pipeline, with a collective capacity of nearly 36 MW.
- The virtual net metering tariff, added to the program in 2009, has allowed participating tenants to reduce their electricity bills by an average of about \$480 in the first year (based on 2011–2013 data) because they have direct access to electricity credits accrued from the solar energy systems installed on their buildings.⁴ As of December 31, 2015, there were more than 6,500 tenant units enrolled in the MASH virtual net metering tariff.⁷

Keys to Success

The following program elements and strategies have been especially important to MASH's success in benefitting low-income communities through solar energy:

- **Statewide mandates.** California made it a statewide priority to install 3,000 MW of distributed solar energy capacity in the state by the end of 2016, and legislation required that not less than 10 percent of funds directed to the California Solar Initiative (the umbrella program that houses MASH) be used for installation of solar energy systems on low-income residential housing.
- **Attractive incentives.** The primary motivation for participating in MASH was the appealing financial benefit, which effectively allowed the program to sell itself—especially via project developers, who played a major role in promoting and securing commitments from building owners by using third-party financing to offer power purchase agreements and leases. The utilities also marketed the program in their service territories through workshops, events, websites, and news releases, and leveraged the communications networks of existing partner organizations (including the California Solar Initiative).
- **Benefits for tenants in addition to building owners.** The virtual net metering component of MASH enables the tenants of low-income housing to benefit financially from solar-generated energy by paying less for their electricity.

- **Requirements for transparency and data reporting.** The California Solar Initiative includes requirements for collecting energy data from the participating utilities and reporting results to the public.⁸ The transparency and frequency of updated data have been critical in ensuring that the CPUC, and others, can track progress in meeting the program's objectives.

Replication and Sustainability Tips

Other organizations could follow the general approaches described below to create, implement, and sustain a program similar to MASH within their particular contexts:

- **Develop solutions that benefit both owners and tenants.** Programs with strategies to ensure that building owners relay the economic benefits realized from solar energy systems to the buildings' tenants will be more effective. Including objectives in the program charter or legislation that focus on ensuring benefits for low-income tenants—rather than on just the amount of solar-powered energy generated—will also contribute to the long-term sustainability of the program. Systems designed in this way can support a broad distribution of the benefits of solar energy across low-income tenants, property owners, and ratepayers alike.
- **Defray upfront costs.** Installing solar energy systems can be expensive, and programs that are able to defray or reduce these costs will gain traction with owners and project developers. MASH was able to reduce the upfront capital costs of solar energy systems, overcoming a common barrier for building owners. Project developers were able to use the MASH incentives in conjunction with tax credits and third-party financing to offer owners even more attractive power purchase agreements at little to no upfront cost.
- **Make enrollment in cost-reducing measures automatic.** Tenants in buildings that employed virtual net metering were enrolled automatically, ensuring they received the benefits of lower energy bills without having to go through an application process, a common barrier to participation.

For More Information

- Multifamily Affordable Solar Housing Program Handbook, First Edition, 2015. Available at: http://www.gosolarcalifornia.com/documents/MASH_Handbook.pdf.



- California Solar Initiative – The solar rebate program for California consumers that are customers of Pacific Gas and Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E): <http://www.gosolarcalifornia.com/about/csi.php>.
- California Solar Statistics – The official public reporting site of the California Solar Initiative: <https://www.californiasolarstatistics.ca.gov/>.

¹ While “affordable housing” is not necessarily low-income housing, MASH uses the terms interchangeably; the MASH program is specifically aimed at multifamily *low-income* residential housing. See the Eligibility Requirements section in this case study for more information.

² In order for a solar project stakeholder to make solar energy marketing or usage claims, the stakeholder must own and retain the associated Renewable Energy Certificates (RECs). Sale of or third-party ownership of the project’s RECs can limit claims.

³ As defined by the California Public Utilities Code. See Section 2.1.5 (General Eligibility Requirements) of the [MASH Handbook](#) for details.

⁴ Navigant, 2015. California Solar Initiative—Biennial Evaluation Studies for the Single-Family Affordable Solar Homes (SASH) and Multifamily Affordable Solar Housing (MASH) Low-Income Programs Impact and Cost-Benefit Analysis Program Years 2011–2013. Prepared for California Public Utilities Commission.

⁵ Estimated using EPA’s [Greenhouse Gas Equivalencies Calculator](#).

⁶ [California Solar Statistics](#). Application status page, MASH program.

⁷ California Public Utilities Commission, 2015. [Multifamily Affordable Solar Housing Semiannual Progress Report, July 31, 2015](#).

⁸ See [California Solar Statistics](#).