

SUCCESSFUL SOLAR INCENTIVE PROGRAMS GROW SOLAR PENETRATION WITHIN LOW-INCOME COMMUNITIES #203

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ABSTRACT

Installing solar in residential communities has long been perceived as only “for the wealthy.” For example, incentives related to tax credits, by nature, exclude low & middle income homeowners who lack the tax liability to take advantage of them. In order to grow the solar market beyond early adopters, new market segments must be identified and targeted with policies, programs, and financing options that are more inclusive than the existing programs. Shifting perspectives to intentionally include these segments is a useful approach to design future solar programs. Shattering these existing perceptions will increase the industry’s ability to obtain wide adoption that is needed to attain decreased expenses for customer acquisition, permitting, workforce development, and equipment. This paper will highlight two programs that have been successful increasing solar penetration in low-income communities:

1. California’s innovative Single-family Affordable Solar Homes (SASH) Program
2. District of Columbia’s Renewable Energy Rebate Program for low-income single family homes

1. INTRODUCTION

Solar is a well-known and increasingly affordable renewable energy technology. Deliberate state policies supporting solar quickly result in growing numbers of installations and development of related businesses. Manufacturers, distributors, installers and financing entities are currently available nationally and globally and gear up quickly to support the new state initiatives.

New solar installations in the residential market have consistently started with the wealthier residents. Getting beyond that market to where solar is available to all state residents, or true market transformation, takes conscious policies, education, marketing, outreach and creative incentive and financing solutions. Both the state of California and the District of Columbia are working towards this market transformation. Reaching low-income residents has been a critical success since 2006 with the long established California solar programs and is shaping the initial strategies of the newly launched District of Columbia solar programs. Sharing these two successful approaches to growing participation in low-income communities frames the discussion of this paper.

2. CALIFORNIA’S INNOVATIVE SINGLE-FAMILY AFFORDABLE SOLAR HOMES (SASH) PROGRAM

2.1 Background

In 2006, the California Legislature created the groundbreaking 10-year, \$2.2 billion California Solar Initiative (CSI) with the goal of creating a transformative and sustainable solar market in California. The Legislature set aside 10% of the CSI budget (or \$216M) with the explicit goal of enabling low-income families and communities to become solar adopters. Subsequently, the California Public Utilities Commission (CPUC) established two low-income programs: the Multi-family Affordable Solar Housing Program (MASH) and the Single-family Affordable Solar Homes Program (SASH). These programs were designed to maximize ratepayer benefit while providing appropriate incentives that would encourage solar adoption within low-income

communities, a customer segment traditionally left out of solar incentive programs.

GRID Alternatives, a non-profit solar contractor, was selected to administer the SASH Program throughout California. GRID's volunteer-based installation model allows the SASH Program to integrate an innovative workforce development component that allows students in local job training programs to get valuable hands-on solar installation experience as they seek new careers in the solar industry. To date, GRID has installed PV-solar systems for over 3,000 families.

When designed appropriately, a low-income solar program not only benefits families and communities in need, but can also be a platform for innovative solar program designs that can have a lasting impact on the broader industry.

2.2 The Basics of SASH and MASH

The goals of the SASH and MASH Programs are to:

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

To achieve these goals the SASH and MASH Programs provided aggressive incentives to encourage the solar adoption by new market entrants, low-income customers. The MASH Program's incentives ranged from \$1.90 per AC-Watt for systems offsetting common loads to \$2.80 per AC-Watt for systems offsetting tenant loads. The MASH Program will serve around 350 multi-family affordable housing complexes.

The SASH Program's incentives ranged from \$4.75 to \$7.00 per AC-Watt depending on the customers utility rate schedule and tax liability (i.e. incentives were higher for customers who could not take advantage of the federal investment tax credit). The SASH Program will serve 5,000-6,000 families living in SASH-eligible affordable housing.

Both programs experienced rapid growth since 2009 and have created broad interest in low-income families and communities going solar. Program funding is anticipated

to be fully reserved by 2014, well ahead of their 2015 sunset date.

2.3 Why Low-Income Solar Makes Sense

Solar policies and programs are typically driven by renewable energy's broad community benefits, including environmental, local jobs and in-state economic growth, private investment in local industries, reduced electricity demand during peak periods, a diversified energy resource mix, and stabilizing the energy supply infrastructure. Making solar investments in low-income communities can help maximize many of these benefits since these communities often are the hardest hit with environmental challenges, high unemployment, and lack of private investment. Well-designed solar programs can provide broad reaching benefits for low-income families and communities. Fig. 1 represents 34 families in an affordable housing development in Templeton, CA which received solar through SASH.



Fig.1 34 Solar installations in a low-income community in Templeton, CA.

At the household level, low-income families pay a higher percentage of their income toward their monthly utility bills than higher income customers. Families participating in the SASH Program reduce their monthly electricity bills by an average of ~80%, and these savings will continue for 20+ years over the life of the solar system. These savings are critical to helping families project their long term energy expenses and allows their limited budgets to stretch to cover their other basic family needs, like food, children's education, mortgage payments, and so on. Solar can provide significant energy savings to the families who need them most.

Low-income communities often have high rates of unemployment and limited economic growth. California's solar policies have created a growing industry that has the potential to increase solar installation jobs by over 40% by 2015. GRID Alternatives has partnered with over seventy job training organizations throughout California to help train their students, the solar industry's future workforce. As the solar and the clean energy industries grow, they will continue to provide much needed career opportunities for families in disadvantaged communities.

At the policy and regulatory level, there continues to be growing interest to design policies and programs that would allow low-income families and communities to directly benefit from renewable energy. Since most state mandated or utility run solar programs are funded by all tax/ratepayers, including low-income families, legislators and regulators are often interested in making sure all tax/ratepayers have the opportunity to participate in these programs. In the SASH and MASH Programs, low-income solar adoption was achieved by providing a higher rebate structure for low-income participants in order to make the front end economics of solar work for these families. Inclusive policies and regulations like these are the cornerstone for innovative low-income solar programs to be successful.

At the environmental and environmental justice level, high pollution areas are often areas where low-income families live, including areas where traditional power plants are sited and areas where child asthma rates are high. Siting clean energy projects in these communities achieves an overdue environmental justice objective while also providing a unique opportunity for the community to engage in the environmental discourse that directly affects their families' and communities' long-term health.

Photovoltaic (PV) solar should no longer be an exclusive technology for the wealthier "early adopter" only. With reduced costs and new financing models, solar's accessibility has expanded to a much larger consumer base, albeit those customers are still the higher income or low credit risk customers. The 2010 Census data shows that 146 million people or 48% of the U.S. population is considered low-income or poor. Solar will not be accessible to these low-income families, as past experiences have proven, without programs and incentives that encourage their participation in our clean energy economy. As PV solar progresses toward being a mainstream technology, solar policies need to reflect broad inclusivity and focus on growing solar markets to all of our communities.

2.4 Creative Program Design

California's low-income solar programs were designed to be more than simple rebate programs and achieved benefits beyond simple installed-capacity (MW) targets. They were designed to be comprehensive energy solutions that would allow low-income families and communities to participate in the state's growing clean energy economy. These programs also provided an opportunity for thinking outside-the-box to bring creative elements into solar program design.

For example, the Multi-family Affordable Solar Housing (MASH) Program became the test bed for Virtual Net Energy Metering (VNEM) in California. A VNEM tariff was created by each of the participating utility companies which allowed MASH participants to allocate credits from one solar system across multiple accounts in an affordable housing complex, something not done before in California. The creation and success of VNEM in the low-income program led to it being available to all multi-tenant or multi-metered properties, thus making solar accessible to entirely new market segments, like rental complexes, cooperative housing, and condo owners.

Likewise, the SASH Program provided legislators, regulators, and industry an opportunity to create a program that achieved more than installed-capacity targets. SASH provided an integrated approach to providing a broad range of services to low-income families, including energy efficiency services, low-income utility tariff discounts, workforce development and green jobs training opportunities, comprehensive consumer education about solar and energy efficiency, and community engagement both with low-income communities and with the broader community. SASH integrated many other utility run low-income energy programs, thus increasing efficiencies of those programs as well.

In implementing the SASH Program, GRID Alternatives provides opportunities for job trainees and local volunteers to assist with installations, to engage their communities, and to participate in the California solar and energy efficiency programs. SASH provides a foundation for promoting and building a sustainable solar industry in California by incorporating workforce development and job training into the program. The SASH Program will provide solar installation opportunities to job trainees and volunteers throughout California, totaling over 1 million hours of hands-on solar installation experience. Currently, GRID Alternatives has over 10,000 volunteers and job trainees that have worked to bring solar to over 3,000 families. Fig. 2 shows several teams involved in completing multiple installations in a low-income neighborhood.



Fig. 2: The team of installers, volunteers and trainees involved in a community low-income solar installation.

Finally, the SASH Program promotes partnerships between private solar contractors and local workforce development programs by including a job training requirement for all sub-contracted SASH projects. This becomes a double benefit to low-income communities since many green-collar job trainees come from the same communities that the SASH Program aims to serve.

A commitment to make solar accessible to low-income families will inevitably force all stakeholders to think creatively and innovatively to design new solar program structures. These innovations will not just benefit the low-income customer segment but can provide long term benefits to a growing solar industry.

2.5 Elements of a Successful Low-Income Solar Program

A successful low-income solar program presumes that the state's foundational solar policies are well established, including net metering, interconnection, and incentives. Obviously, without these 'must-have' policies in place, the solar industry would not grow or flourish, including low-income. Otherwise, establishing a new low-income solar program is not much different than establishing any other new program but does require some special considerations.

Like any solar program, it should have a clear goal of establishing a long-term market. A successful low-income solar program will provide the solar industry proper time to innovate, evolve, streamline, and mature in order to develop a sustainable infrastructure that will serve low-income communities over the long-term.

Low-income programs require sustained and predictable incentive financing. Short term funding or small pilot programs will not allow a robust consumer base to develop or the industry to mature. Like a general market

program, it could take a decade or more for a low-income consumer base to develop especially since most low-income families today do not view themselves as having the opportunity of being a solar adopter. Significant marketing and outreach efforts are typically required and, if done properly, can build strong a strong customer base in only a few years.

For most low and middle income families to become solar adopters, solar must be cash flow positive from day one. Unfortunately, most families do not have the financial means to invest in a solar system that has a long-term return on investment. High income early adopters were more likely to make that large upfront payment and long term investment to, in part, hedge their future electricity prices. Financing models like solar leases and power purchase agreements have expanded solar to more middle income families with low credit risk, but often these financing models do not work for low-income families. A low-income solar program requires an appropriate upfront incentive that helps lower that initial cost barrier.

Outreach and marketing are unique challenges for low-income solar programs. Most low-income families have been left out of traditional solar programs. They often do not think of themselves as having the option to go solar. More educational marketing is necessary to inform these customers about how solar works and how it saves them money. Moreover, many established solar contractors have never targeted low-income families and do not have appropriate marketing and outreach collateral or internal knowledge to support this market segment. Low-income families are also very culturally diverse and multi-lingual so extra effort is required to develop appropriate marketing materials. In California's SASH Program, around half of the participating households are multi-lingual. New low-income solar programs must invest in the marketing and outreach campaigns if the programs are to be successful. Partnering with the right community organizations to assist with marketing and outreach is critical to a program's success.

When the SASH Program launched in 2009 much of the effort in the first year was to make sure the infrastructure was being developed to support fast and significant growth in the subsequent years and to support low-income solar for the long term. It was the right strategy since tremendous growth followed. In 2009 the SASH Program had less than 100 installations; in 2010, SASH installed over 250 systems; in 2011, nearly 800 systems, and; in 2012, over 1,200 solar systems. Obviously, with the right program, low-income communities can be a vibrant part of the solar industry. Fig.3 charts the growth in installations each year for the SASH Program.

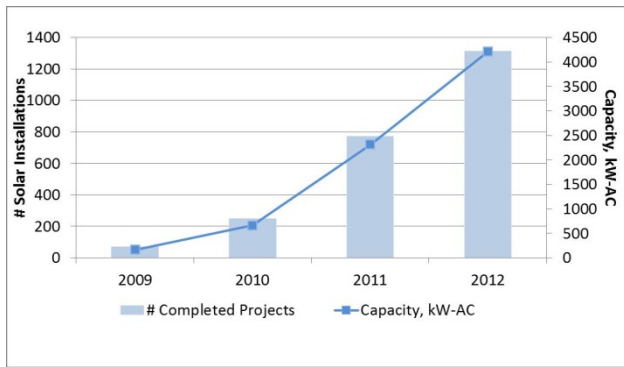


Fig. 3: Low-Income Families Served – 2009-2012

2.6 Future Opportunities for Low-Income Solar

It is increasingly common for new solar programs to include some form of low-income participation. California’s SASH and MASH Programs led the effort in a major way; Colorado’s recent Community Solar Gardens program included a 5% set-aside for low-income subscribers, and the California low-income programs helped ensure incorporation of low income residents into the renewable energy program strategies for the District of Columbia.

In California, there is a concerted effort to continue to make solar accessible to new market segments, including low-income adopters. Nearly every recent solar bill has included some discussion about how to ensure participation by low-income communities and families and, in January 2013 a bill was introduced in the Legislature (Assembly Bill 217) to continue funding California’s SASH and MASH programs through 2021.

Though state programs are proactively trying to broaden the solar adopter base, one of the biggest obstacles for low-income families to go solar is their inability to take advantage of the 30% Federal Investment Tax Credit (ITC). It is difficult for low and middle-income families to directly take advantage of the ITC since their tax appetite is small or non-existent. Other popular solar financing models (Solar Lease, Power Purchase Agreements) that leverage the tax appetite of institutional investors, require customers to have very high FICO scores and low credit risk. Again, these models exclude most lower- and middle-income families from participation. Therefore, the federal ITC primarily benefits businesses and upper income households who have plenty of tax appetite or access to up-front capital. Federal solar policies should reflect the vision that solar should become a mainstream energy solution in the 21st century that is accessible to all of our communities. This

could be achieved through special grant programs, a federal “rebate-type” program, or other mechanisms outside the tax code.

Finally, to increase solar adoption throughout all communities, solar policies and programs should not be designed as a ‘one size fits all’ solution. Solar policies should aid in leveling the entrance barriers for various customer groups. Since entrance barriers are different for different groups it means having varying policies or incentive structures that directly targets each group’s needs. California is proving that the right solar policies and programs can successfully expand the solar adopter base to include all communities, including low-income communities.

3. DISTRICT OF COLUMBIA’S RENEWABLE ENERGY REBATE PROGRAM FOR LOW-INCOME SINGLE FAMILY HOMES

3.1 Background

The District of Columbia Sustainable Energy Utility (DC SEU) is managed by Vermont Energy Investment Corporation (VEIC), a mission-driven non-profit dedicated to reducing the economic and environmental costs of energy consumption. The DC SEU was created by the Clean and Affordable Energy Act of 2008 by the Council of the District of Columbia. It was not only designed to reduce energy consumption and grow participation in the renewable energy market in Washington, DC, but is contracted with the District Department of the Environment to achieve certain social equity, economic development, and job creation goals. Through comprehensive energy efficiency and renewable energy programs, the DC SEU exists to:

- create green jobs for District residents
- stimulate the local economy
- reduce energy use throughout the District
- improve the efficiency of housing for low-income residents
- reduce the growth rate of peak electricity demand
- increase renewable energy participation

In 2012, the DC SEU saved enough electricity to power more than 2,000 American homes for one year and served over 18,500 District households with energy efficiency and renewable energy initiatives.

In the recent years there has been focus on renewable energy in the District of Columbia, through the efforts of the local solar community cooperatives and the District Department of the Environment (DDOE) Renewable Energy Incentive Program. This has helped increase solar energy participation by helping and encouraging residents and businesses to invest in solar energy systems.

However, participation levels among residents have varied throughout the district. In 2012, the DC SEU embarked on a pilot program to better understand the landscape of solar opportunities in the District. The pilot revealed that while the current market has provided opportunities for some District residents, residents with limited income, especially those east of the Anacostia River, are not benefiting from solar technology.

3.2 Clean Energy for All

In the District of Columbia, low-income¹ households spend nearly twice as much of their total earnings on energy than the average U.S. household, making these families particularly susceptible to high and fluctuating energy costs. To reduce the burden of energy costs for income-qualified District residents and create opportunities for residents of Wards 7 and 8 to benefit from clean energy technologies, the DC SEU introduced a Small-Scale Solar initiative in the spring of 2012.

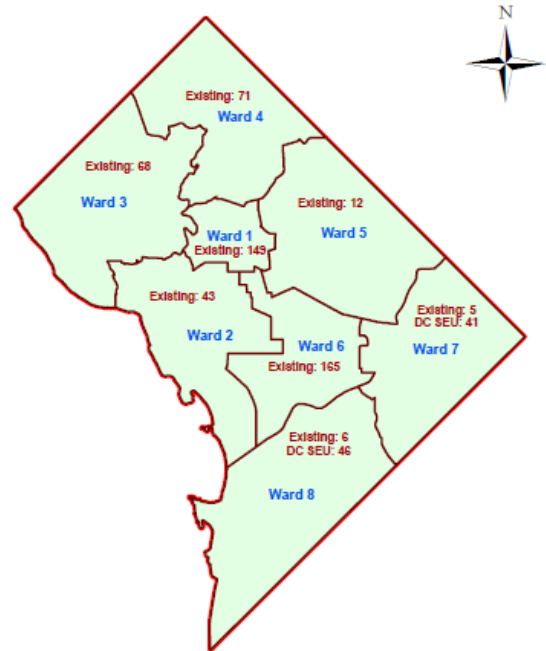
3.3 Results

Through a competitive RFP process, the DC SEU worked with three local contractors who emphasized community building, word-of-mouth marketing, employment of neighborhood jobseekers, and customer education in their winning proposals. Selected contractors also considered environmental benefits and retrofit opportunities beyond solar, such as water conservation and rainwater capture. Through a combination of Solar Renewable Energy Credits (SRECs), federal tax incentives, DC SEU incentives, and contractor financing, the systems were installed at no upfront cost to the homeowner, who also receive the electricity from the systems free of charge.

3.4 Savings

Prior to the DC SEU's Small-Scale Solar initiative, there were fewer than a dozen homes with solar panels east of the Anacostia River. When the DC SEU launched the initiative in June of 2012, the goal was to install solar arrays on 20 homes belonging to low-income residents of

Wards 7 and 8. The DC SEU quickly exceeded this goal and expanded the program by 67 qualified participants. By November, 87 installations were completed. (Fig 4)



District of Columbia Solar Installations by Ward numbers

Fig. 4: District of Columbia, Number of Solar installations by Ward

Each system will prevent nearly three tons of greenhouse gas emissions per year. In total, these systems prevent more than 260 tons of greenhouse gas emissions annually—equivalent to the emissions of 49 cars. These impressive savings contribute to the District's larger environmental goals to reduce greenhouse gas emissions by 7.5 million metric tons by 2032, as outlined in the Climate Action Plan, and to increase use of renewable energy by 50%, as presented in Mayor Gray's Sustainable DC goals.

Participating residents now benefit from no-cost electricity produced by the systems, saving each customer approximately \$350 to \$500 each year. In addition, since sun, rain, snow, and pollution now fall on the panels instead of the roof, photovoltaic arrays help protect roofing materials. For homeowners, this means their roofs will last substantially longer than they would without the panels.

¹ Low-income households are defined by household income limits ranging from a size of 1 for \$45,180 to size of 8 for \$85,140.

3.5 Additional Benefits

Through this program, lasting connections were established between contractors, community members, and the DC SEU. When solar panels began to go up on houses in Wards 7 and 8, neighbors became interested in learning more about solar technology. The visibility of the Small-Scale Solar initiative enabled contractors to sell several systems at the market rate to District residents who were not qualified for the low-income installations. Fig. 5 demonstrates multiple installations on single family townhouses. Additionally, data from the solar arrays will inform future DC SEU programs and initiatives by providing real-time local electricity cost information.



Fig. 5: Solar installations in Ward 8

Contractors provided training on solar panel installation and inspection to local jobseekers, which enabled them to hire previously unemployed workers to assist with projects taking place in their own communities. Through the initiative, these residents also received technical training and on-the-job experience in the expanding field of renewable energy.

The DC SEU provided additional training and job opportunities to temporary staff members who were hired as quality assurance inspectors. These staff members received training on photovoltaics—physical components of an electric solar panel, photovoltaic effect, and system configuration—as well as in-depth training on inspection protocols. As a result of their tenure with the DC SEU, two temporary staff members were hired by solar contractors.

3.6 Financial Mechanism and Model Applied

One of the key objectives of the Small-Scale Solar initiative was to develop a program to provide renewable energy technology to low-income single-family households at no out-of-pocket cost to the homeowner. Table 1 identifies the financial mechanisms that made each transition possible. The financing model used by all three contractors can be characterized as a hybrid of

several established solar financing models: Solar lease (no upfront cost); Power Purchase Agreement (financial arrangement in which a third-party developer owns, operates, and maintains the photovoltaic system); and cash purchase (where cash or other incentives dollars are used to buy down cost). Using current incentives offered through State and Federal agencies combined with programs offered through the SEU, installers are able to offer services to home owners who would normally not be able to purchase such a system.

3.7 Key Successes and Lessons Learned

3.7.1 Education and Outreach

Education and outreach are critical to the success of residential solar initiatives. Customer education should take place throughout the project. The DC SEU had a compressed timeline for completion, putting added pressure on all parties to identify potential residents, inspect the homes of potential participants, provide customer education, and to identify and secure financing. One of the primary obstacles to field implementation was convincing homeowners that the solar systems would be installed at no cost to them. Contractors worked with trusted community groups and leaders to overcome homeowners' skepticism. Due to the time constraint, contractors focused on newer homes with secure roofs. A longer project period would have allowed for a thorough review of roofs on older homes that may have qualified.

3.7.2 Leveraging Resources and Programs

The DC SEU provides an array of energy efficiency and renewable energy programs to help District residents of all income levels save energy and money. When launching the Small-Scale Solar initiative, the DC SEU successfully leveraged existing low-income programs as a strategy to identify potential program participants. Partnering with complimentary programs such as Habitat for Humanity, low-income roof repair, and home weatherization programs allowed the DC SEU to efficiently identify income-qualified participants and offer customers additional energy efficiency and sustainability measures.

TABLE 1: FINANCIAL MECHANISMS AND TOTAL COST BY CONTRACTOR

Who...	Contractor 1	Contractor 2	Contractor 3
Pays for installation?	Contractor & DC SEU	Contractor & DC SEU	Contractor & DC SEU
Owns the system?	Homeowner	Homeowner	Homeowner
Claims Federal Investment Tax Credit?	Contractor	Contractor	Contractor
Owns the Renewable Energy Credits?	Contractor	Contractor	Contractor
...for how long?	10 years	5 years	5 years
Maintains the system?	Contractor	Contractor	Contractor
Total Cost			
Per system	\$10,485	\$12,500	\$7,143
Provided by DCSEU per system	\$3.50/W	\$4.25/W	\$3.20/W
To the homeowner for electricity from the system	0 ¢/kWh	0 ¢/kWh	0 ¢/kWh

3.7.3 Partnerships with Trusted Community Leaders

An invaluable resource for any community-focused project is a partnership with trusted community leaders. Leaders of faith-based organizations have proven to be a vital resource in driving change and communicating important messages to communities within the District. As was demonstrated in this program, a trusted leader can assist in many ways. A powerful first step in establishing credibility, an endorsement from church leadership gives an organization the stamp of approval the community can trust. As a resource center for their congregations, churches can serve as the linkage between job seekers and training and job opportunities. Finally, churches can benefit from the programs themselves, using their own facilities to showcase new technologies, save precious resources with energy efficiency and solar panels, and lead by example.

3.7.4 Establish Process for Early Feedback

Although the DC SEU specified that the Small-Scale Solar initiative relationship was between contractor and resident, the DC SEU clearly benefitted from customer education, community outreach, and maximizing opportunities for savings and energy generation through new technology. Establishing more robust procedures around the site criteria and minimum rated production output of the installed PV systems would ensure the best sited locations are receiving the largest incentives. Additionally, more consultation with DC SEU staff during the site selection would enhance the quality assurance and quality control processes. Early consultation in the form of project review would also improve the eligibility application process for customers and would help the DC SEU inform the local utility on pending projects.

3.8 Future Plans

The DC SEU will continue supporting renewable energy initiatives serving low-income single-family homeowners and low-income multifamily buildings in 2013. The 2013 budget is just under \$900K a similar budget to 2012. The DC SEU will consider expanding the program to include other wards, additional RFP solicitations, increased participation from installers, and financing alternatives education. Additionally the program has added incentive support for low-income multifamily solar hot water heater projects.

4 CONCLUSION

Both California and the District of Columbia have recognized the need to develop more inclusive renewable energy programs. Each program took a similar approach to reaching the low-income marketplace using education, marketing and outreach, trusted partners and supporting organizations and financial mechanisms. However, the programs were customized to support the specific low-income community needs and existing relationships to accelerate participation. They both incorporated job training programs and successfully grew in-state jobs among local residents. Other states should follow this lead with public policy and legislation that includes the low-income community and ensures that all residents can enjoy the benefits of renewable energy and efficiency.