DAC Snack Pack – How a Menu of Options Aims to Make the Clean Energy Grid Accessible to Disadvantaged Communities

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ABSTRACT

Statewide legislation in California has directed the California Public Utilities Commission to ensure that residents in disadvantaged communities (DACs) are able to take part in a cleaner energy future, including gaining access to rooftop solar (AB 327) and affordable, clean energy for households that rely on propane and wood for cooking and heating (AB 2672). The California Office of Environmental Health Hazard Assessment defines DACs based on a combination of pollution burden and population characteristics.

This paper will share recent findings from evaluations of four clean energy DAC programs, including how each program has utilized outreach strategies and program delivery approaches to encourage enrollment in these programs and how they have been received by DAC residents. This paper also documents barriers faced as programs worked to ensure access to affordable, clean energy by DACs.

This information will help other states and local governments consider how to identify and serve customers that are at risk of being left behind in a cleaner energy future and will feature successful implementation strategies and approaches that have worked for DACs in California. The paper also highlights how programs can set goals to enable tracking of progress towards an equitable energy transition.

Introduction

This paper synthesizes findings from evaluations of four programs focused on serving DACs in California with the goal of demonstrating how California is working towards identifying and improving clean energy access for residents in DACs. This paper is meant to share how California directed clean energy program funding to these residents and created programs to serve them, and will also share barriers that were identified in the process of evaluating these programs.

Below are short descriptions of each of the four featured programs that were designed specifically to serve customers in DACs in California:

- **The Disadvantaged Communities - Single-Family Solar Homes (DAC-SASH) program** was established in 2018 and was modeled after a prior Single-Family Solar Homes program that was targeted more broadly at installing solar on lower-income households across the state. The DAC-SASH program goals are to decrease electricity usage and reduce energy bills by offsetting the expense of solar ownership for low-income, single-family homeowners residing in the California electric investor-owned

utilities' (IOUs') service territories. The program installed solar on 964 homes through March 2022 (Evergreen Economics 2023).

- **The Disadvantaged Communities Green Tariff (DAC-GT) program** was established in 2018 and was modeled after a prior Green Tariff program. It aims to help customers who are unable to put solar on their homes (such as through the DAC-SASH program or other programs) across the state. The program gives customers a 20 percent bill discount while adding solar capacity within the same or other DACs. At the start of the 2022 evaluation, all customers who were enrolled (roughly 15,000) in the program were served by prior Renewable Portfolio Standard (RPS) interim resources (Evergreen Economics 2022a).
- **The Community Solar Green Tariff program (CSGT)** is a more localized variation of the DAC-GT program that works with community sponsors to help with solar placement within the same DAC of the benefiting residents. This program was also established in 2018. Community sponsors are also able to benefit via a bill discount for their role in the siting. At the time of our research in 2022, there were no customers enrolled in the CSGT program (Evergreen Economics 2022a).
- **The San Joaquin Valley Disadvantaged Communities pilot (SJV DAC pilot)** had an overall goal of offering cleaner, more affordable energy options to residents of DACs in the SJV, where many households lack access to natural gas and rely on propane and wood for cooking and heating. The pilot program offered dryers, water heaters, ACs, and stoves to 11 DACs. Three of the four program administrators (all but one being a utility) expanded access to electricity while one utility expanded natural gas access. It will be more challenging for any possible future expansion of the pilot to include natural gas products given the California Air Resources Board's plan to ban new sales of natural gas water heaters, heaters, and furnaces in the future. At the time of the 2022 process evaluation, a total of 254 households had participated in the program (Evergreen Economics 2022b).

We use findings from completed evaluations of the above programs to share lessons for other programs looking to:

1. Identify customers left behind in the transition to clean energy;
2. Leverage community-based outreach strategies;
3. Address barriers within target communities; and
4. Develop metrics to track progress towards equity focused goals.

Identify Customers Left Behind in the Transition to Clean Energy

While programs focused on improving access to clean energy and energy efficiency have existed for decades, there has been a recent shift to create more expansive definitions of households that should be singled out for additional program efforts (e.g., beyond just low- or moderate-income participants to more broadly encompass pollution burden) with the aim of ensuring they do not get left behind in the clean energy transition. The definitions of this more expansive set of households targeted by equity programs use a variety of different indicators, and

there is much debate from within and outside of these communities regarding how these groups should be labeled. California has settled on "Disadvantaged Communities" or DACs. Given this paper's focus on California programs serving this targeted population, we use the same label. Below, we summarize the definition of DACs and share similar metrics used in other jurisdictions to give examples of how groups are defined and targeted in this push for greater equity in the clean energy future.

California, DACs: The definition of DACs, the use of which has facilitated targeted implementation of each program discussed in this paper, was borne out of legislation at the state level that gave CalEPA (specifically the California Office of Environmental Health Hazard Assessment) the responsibility to identify DACs based on *"geographic, socioeconomic, public health, and environmental hazard criteria"*. The legislation that gave CalEPA the responsibility to create this designation also created a minimum funding level to serve DACs, which is 25 percent of the state's Cap-and-Trade proceeds (OEHHA 2024).

United States, Justice40 Communities: An executive order directed the Council on Environmental Quality to develop the Climate and Economic Justice Screening tool, which is being used to identify communities that can participate in the Justice40 Initiative. The tool focuses on eight categories including "*climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development."* The Justice40 Initiative aims to ensure that 40 percent of benefits related to investments in climate and clean energy accrue to these communities (CEQ 2022).

Minneapolis, Green Zones: Minneapolis has identified regions exposed to disproportionate environmental harm via its Green Zones Initiative. Green zones are areas with high levels of environmental pollution and with *"racial, political and economic marginalization"* (Minneapolis Health Department 2024). According to an American Council for an Energy-Efficient Economy (ACEEE) report (Dewey 2022), Green Zones are used to track participation in energy efficiency and renewable projects on an annual basis.

Washington State, Overburdened Communities: Through the Climate Commitment Act, the state of Washington required its Department of Ecology to identify overburdened communities and monitor levels of greenhouse gas and criteria pollutants in these communities, in addition to their health impacts. The same act created a cap-and-invest program that dedicated funding to ensure that communities that are disproportionately impacted by climate change benefit (Ecology 2024).

Baltimore, Maryland, Equity Assessment Program: This program requires the city of Baltimore to conduct an equity assessment and progress report when the city develops its annual budgets. The program focuses on *"disparate outcomes based on race, gender, or income and to proactively develop policies, practices, and investments to prevent and redress those disparate outcomes"* (Dewey 2022).

Leverage Community-Based Outreach Strategies

Each of the programs discussed in this paper involved an outreach partner or implementer that works within the local targeted communities at some level. We found that hearing about programs from community members helped establish trust in the offering, which helped with enrollment. Alternatively, additional outreach staff may add cost to a program and also add the need for coordination between implementers, outreach staff, and administrators.

The Disadvantaged Communities - Single-Family Solar Homes (DAC-SASH) program is implemented by GRID Alternatives (GRID), which is a mission-driven organization that works at the community level to advance environmental justice through renewable energy. GRID works through regional affiliates throughout California and utilizes regional offices to train solar installers and to perform outreach to enroll local residents into the DAC-SASH program. These offices work with GRID headquarters to follow up on leads, but often form their own relationships with community-based organizations (CBOs) or municipalities local to the region for leveraged outreach. This regional approach utilizes other organizations and municipalities familiar with the eligible population to overcome the barrier of trust.

Many GRID staff reported that referrals were the best way to generate new leads for the program, and customers confirmed this in the customer surveys . GRID's referral program provides a cash bonus for participants who refer an eligible neighbor to the program. Participants are also able to add a second referral bonus from Sunrun if they have a third party-owned system. The monetary incentive, paired with the established credibility of hearing about the program from someone they know, helped to increase word-of-mouth about the program, according to a GRID staff member (Evergreen Economics 2023).

The San Joaquin Valley Disadvantaged Communities pilot (SJV DAC pilot) utilized Self Help Enterprises to conduct outreach. Self Help is an organization that focuses on community development in the SJV. At the time of the pilot, Self Help partnered with a local well-known member of each of the 11 pilot communities to conduct outreach in the targeted communities. Ninety percent of pilot participants and 78 percent of non-participants reported that these outreach teams seemed "very" or "extremely" trustworthy. Nearly half of all eligible households filled out an application to participate in the pilot, which is a testament to this approach (Evergreen Economics 2022b).

In addition to instilling trust at the program level, there was at least one instance where trust in one program was believed to improve trust in another DAC-focused program. Self Help Enterprises was also a community sponsor for the aforementioned CSGT program in addition to their role in the SJV DAC pilot. In an interview with staff from Self Help, we heard that for PG&E enrollees in the SJV DAC pilot, auto-enrollment in the DAC-GT program was very valuable in increasing trust that the SJV DAC pilot would deliver on the promise of new appliances. By being able to point to a resident's bill to show them that they are already getting help with their bills, Self Help was able to instill trust.

One downside to incorporating CBOs was identified in the SJV DAC pilot in that there was a need for additional coordination when participants would call in to ask questions about the participation process. The participants would call the CBO, the local outreach staff, the utility, or the installation company with questions regardless of which group was currently managing their participation. While it took time to work out systems and processes to coordinate and handle customer information, this process improved over time. Ultimately, 47 percent of eligible customers filled out an application, which may indicate that the extra coordination was a reasonable tradeoff for a higher participation rate that may have been facilitated by the trust in local organizations involved in outreach, but it is worth noting that this required additional administrative time for the organizations working to track the customer journey. It may be useful to account for the need to help CBOs to create systems that are typical of third party implementers but may not be standard within CBOs.

In the programs that involved a bill discount related to added solar siting in another location (**DAC-GT and CSGT**), program awareness was not an explicit goal of the program nor was it required for DAC households to benefit from the program. The explicit goal of the DAC-GT program as stated in the original decision is to "provide low income customers in DACs the opportunity to access the benefits of Green Tariff/Shared Renewables programs and provide multiple green energy options for these customers," (CPUC 2018) and access need not imply awareness or engagement (especially in the case of auto-enrollment). It may be the case for CSGT that awareness and a sense of contribution are implicit goals, since an explicit goal of the program is to provide an "indirect community 'ownership' opportunity," which might imply engagement and connection with local solar projects (CPUC 2018).

In most cases, both the CSGT and DAC-GT programs have been marketed to eligible customers by some combination of Program Administrators (PAs, IOUs, and Community Choice Aggregators), CBOs, and/or developers, with dedicated community sponsors assisting in outreach specifically for CSGT. However, some PAs auto-enroll customers or plan on auto-enrolling customers specifically for DAC-GT, reducing the need for marketing and outreach to encourage enrollment.

At the time of our evaluation, only one PA had auto-enrolled customers, and one had had customers self-enroll.

These enrollment decisions ultimately ended up being associated with:

- Differing levels of customer awareness of the enrollment process: 46 percent of responding auto-enrolled participants were aware that they were auto-enrolled compared to 76 percent of self-enrolled participants who were aware that they enrolled in the program.
- Higher awareness of program elements by self-enrolled participants: Self-enrolled participants reported being more aware of various prompted elements of the DAC-GT program compared to auto-enrolled participants, by a margin of 8 to 12 percent.

If program designers would like to place greater emphasis on making participating customers aware and engaged, then the PA(s) would need to expand outreach and education efforts particularly for customers who are auto-enrolled. This may involve more significantly engaging CBOs as the other DAC-focused programs did.

Address Barriers within Target Communities

A number of barriers to customer participation in clean energy programs were identified through these program evaluations and should be considered when planning programs in DACs or similar communities:

- Infrastructure needs
- Home remediation
- Permitting
- Energy bill concerns or lack thereof
- Changing DAC boundaries

- Low solar developer engagement

Infrastructure Needs

It is well established that grid infrastructure improvements (such as transmission corridors linked to renewable resources and shortening interconnection queues) are needed to match the increasing reliance on clean energy (IEA 2023). The fact that DACs are specifically targeted because of their lack of access to clean energy and reliance on propane and wood burning for heating and cooking (particularly through the **SJV DAC pilot**) makes them in greater need in terms of infrastructure upgrades.

The SJV DAC pilot had an overarching goal of providing clean energy options to homes in the SJV by providing new appliances for heating/cooling, water heating, and cooking (most often electric, but for one community, natural gas line extensions and natural gas appliances were offered). Electrical service upgrades were required to accommodate the load introduced with the new electric measures for some of the homes. In many cases, this involved installing a new, higher-capacity service panel in the home. More recently, the California Energy Commission (CEC) and the CPUC have shifted to encouraging panel optimization using low-amperage devices and circuit sharing to avoid having to do panel upgrades where possible. During the pilot, there were cases where multiple participating households within close proximity required more extensive transmission and distribution (T&D) work to accommodate the increased community load. This caused delays for customers and was difficult for electric IOUs to plan ahead for, given the need to understand customer interest, distance from service drop, and amount of trenching needed. Note that the trenching needs differed by housing type and often needed to be done for mobile homes that were located on private land. Our evaluation recommended that electric utilities and PAs implementing the program:

- Direct the outreach teams to conduct outreach in a staggered, targeted geographic manner (i.e., one community and neighborhood at a time) and where possible consider the electric load required to serve a targeted geographic area before authorizing outreach in that location (and plan for infrastructure updates); and
- Create a batch process for program implementers to submit electric service panel requests and other ways to streamline and speed up the household panel upgrade process.

One gas utility was able to complete advance selection of households near existing gas distribution infrastructure, which allowed quicker and less costly implementations, although it limited the number of eligible customers. Gas service line extensions are less complicated and more homogeneous and easily defined up front compared to the complexity of electrical upgrade needs (household and community). In addition, as California moves away from natural gas, this option is typically no longer being considered as part of the clean energy transition.

The **DAC-GT and CSGT programs** relied on responses to solicitations from solar developers in order to install solar capacity and build infrastructure to serve DAC residents. The main barrier to program implementation based on our research was the low number of solar developer responses to DAC-GT and CSGT solicitations. Solar developers reported that if there is no interconnection study in progress at the time of a solicitation, they need a longer timeline to

be able to submit a bid to ensure they can complete an interconnection study. While not all contacts thought that interconnection was challenging, there were comments made across the state about interconnection issues.

- *"We needed more time for the interconnection study"*
- *"Timeline on interconnection was unclear"*
- *"It is difficult to know ahead of time how many MWs will be available at the next RFO [Request for Offers]"*
- *"CAISO interconnection costs and complexities"* (Evergreen Economics 2022a)

To address this barrier, we recommend that similar programs conduct solicitations for solar resources on a schedule that allows time for the development of the siting and interconnection processes (such as a minimum of six to eight months as suggested by two interviewed solar developers). The California Independent System Operator (ISO) also reports that they plan to improve the interconnection process (California ISO 2023).

Home Remediation

Two of the programs discussed in this paper engage specifically with residential households. The SJV DAC pilot includes installation of new equipment and in some cases that necessitates home electrical panel upgrades, and the DAC-SASH program installs solar directly on customer rooftops. Both of these programs came across homes that needed repairs and remediation *before* installation could occur (such as roof patches, tree trimming, or new water heater stands). While each program included ways to combat these pre-installation barriers (such as designing around trees, finding local roof repair funds to leverage, and installing new water heater stands with remediation funds), in some cases, the needed additional work dissuaded some DAC households from participating in the programs.

The added home remediation work is likely not as large of a barrier in programs that serve higher income customers. Higher income customers are likely more able to take on the work that precedes participating in a program that is designed to incentivize solar upgrades or energy efficiency adoption. Working with CBOs has allowed for the non-profit companies to work on receiving additional grant funding for home remediation needs that have been identified in DAC households. As an example, GRID, which partnered with the DAC-SASH program, was able to work with a local program that was funding roof repairs in a certain jurisdiction.

The SJV DAC pilot partly addressed remediation barriers by including up to $5,000 per household to make remediations to the home to support the installation of the new equipment. Our research identified a grey area between what may be considered remediation costs and what are considered to be installation costs. To this end, having more clearly outlined expectations for these activities and costs may be useful to ensure most program costs are associated with energy needs rather than home improvement needs. Mobile and manufactured homes[1] were identified as having large remediation needs, with one home's remediation cost estimated to likely exceed the value of the home itself. In response to the evaluation's recommendations, the Leadership

[1] Mobile and manufactured homes were distinguished from each other in 1976 by the HUD Manufactured Construction and Safety Standards.

Council for Justice and Accountability suggested that it would help to change the cap for certain housing types to ensure that as many SJV residents as possible are able to participate.

Remediation was less of an issue for the community that opted for a natural gas pilot and measures, which is likely the reason for the higher satisfaction with the pilot among this group compared to the participants in the all-electric versions of the pilot. However, as previously stated, with the move toward electrification to meet state greenhouse gas goals, natural gas line extensions are not likely to be part of the clean energy conversation going forward.

For the **DAC-SASH** target customers, solar readiness was one of the largest barriers to participation. Our analysis of program data found that of all projects *completed* under DAC-SASH, almost half (42%) recorded some additional professional service beyond solar panel installation. Electrical upgrades were the most common needed service, with 153 projects, but roof-related repairs were the most expensive on average (Table 1). The costs as recorded in program data are often covered by grant funding, either through large partnerships with municipalities or smaller, one-off grants from CBOs.

Table 1. Additional needed service by cost for DAC-SASH participants

Service recorded	n	Minimum cost	Average cost	Maximum cost
Electrical service upgrade	153	$533	$2,568	$6,580
Professional engineer letter/stamp	108	$100	$168	$500
Electrical services other	81	$144	$738	$3,198
Re-roofing	32	$2,900	$10,935	$20,000
Code compliance	6	$150	$163	$200
Roof repair	6	$2,450	$5,208	$9,600
Equipment rental	1	$500		
Tree trimming/removal	1	$1,200		

An analysis of inactive customers (customers who were unable or unwilling to move forward with the program) confirmed that many customers did not participate due to solar-readiness issues such as problems with their roof (43%, Table 2), code enforcement issues such as not wanting to have permitting done on their property (13%), shading (8%), or other services needed (4%). Less than a third of inactive customers (30%) were inactive due to a lack of interest or because they lost contact with GRID, and only 12 percent of customers were deemed ineligible after the initial screening of homeownership and income, making solar readiness the largest barrier to participation.

Table 2. Reasons for not moving forward for DAC-SASH inactive customers

Inactive reason	Detailed reason	Percent of all inactive customers
Home not solar-ready	Roof issues (unsafe, repairs needed, or too small)	43%
	Code barriers	13%
	Solar shading	8%
	Other professional services needed	4%
Not interested	Not interested in program	20%
	GRID lost contact with customer	10%
Eligibility	Not eligible	6%
	Energy usage too low	3%
	Other ineligible	3%

Future program design should incorporate remediation funds into program budgets and/or identify external funding sources, particularly if the programs are interested in targeting communities that may be more in need of remediation before being able to partake in offerings. This finding also points to the greater cost involved in addressing DAC barriers to participation.

Permitting

Somewhat related to remediation needs is the existence of unpermitted work on households interested in participating in the **DAC-SASH** program. Unpermitted work can either impede an installation directly or serve as a deterrent to having an inspector in the customer's home. During the DAC-SASH solar installation process, an official from the municipality must inspect the solar project after completion before interconnection can occur. At this stage, if there is unpermitted work on the property (i.e., a deck or patio), the inspector has the right to enforce compliance – either by issuing a fine or having the homeowner remove the unpermitted structure.

Data are limited on this barrier, but staff from several different implementation offices mentioned that it is something for which they must plan. An implementer of an IOU program that has faced similar permitting barriers (Richard Heath and Associates, which was an implementer for the **SJV DAC pilot**) suggested that a separate permitting process for utility programs could help ease this process (CEIQP 2022). This may prove challenging given that permitting is done at the local level.

The SJV DAC pilot ran into permitting problems specifically related to mobile homes. At the start of the pilot, Department of Housing and Urban Development (HUD) documentation

was required for permitting of work, and a fee was tied to this documentation. The California Department of Housing and Community Development (HCD) ended up providing a fee waiver, and eventually, the requirement for the documentation was removed entirely, freeing up mobile homes to participate in the pilot. We recommended that, before expanding the pilot (or any similar pilot), an in-depth assessment of mobile homes should be completed to understand the magnitude of the effort to bring cleaner fuels to these homes. Note that this issue related to HCD was tied to mobile homes *outside* of mobile home parks and may not present an issue for program implementation within mobile home communities. Additionally, many mobile homes were unable to accommodate installation of heat pump water heaters (HPWHs) inside the home. The HPWHs were often too large to fit inside the existing water heater closet; to get around this physical constraint, the implementers installed the HPWHs in a metal closet exterior to the mobile home. However, HCD later informed the CPUC that this was prohibited. The finding points to how attempting to serve disadvantaged customers often raises additional barriers (either new or just more prevalent compared to market rate homes or households not in DACs). There are reasons why these customers have lower rates of energy efficiency and renewable energy program participation and penetration, which means that program costs will probably be higher both as a result of anticipated and unanticipated barriers.

Energy Bill Concerns or Lack Thereof

One DAC program in particular was hindered by low understanding among residents of the bill impacts from installing electric appliances. The **SJV DAC pilot** treated customers who were used to variable propane and wood bills for their primary heating and cooking needs and who were unsure about how switching to electric appliances would change their total energy costs. The program offered bill protection, but there was a lack of understanding of this feature among participants, and a fear of rising energy costs was the largest barrier reported by those who did not participate in the program.

Figure 1 shows that for eligible non-participants, fear of a utility bill increase was the top reason given for their decision not to participate in the SJV DAC pilot.

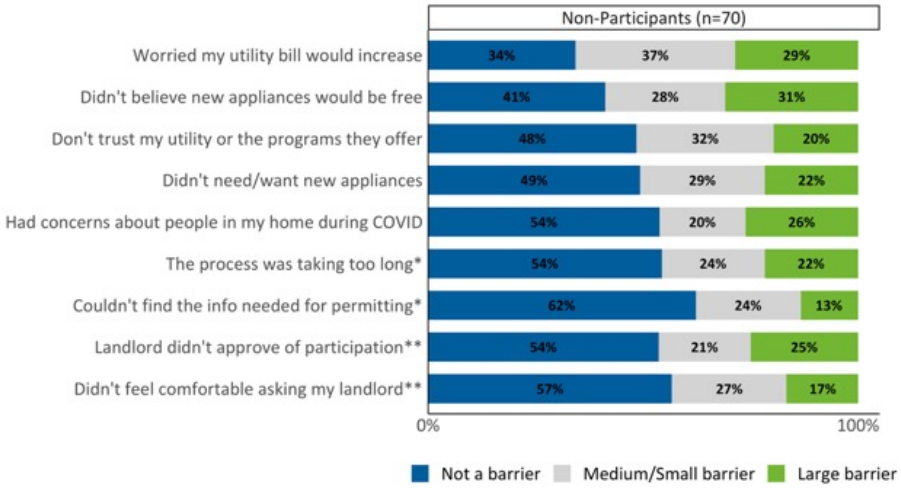

Figure 1: SJV DAC pilot non-participant barriers to participation

The **DAC-SASH program** came across the opposite issue with a small subset of eligible residents who use little energy and already had low energy bills; some of these residents decided not to participate in the program because they perceived their energy bills as too low for them to benefit from solar (3% of those who did not participate). Their relatively low electric bills reduced their motivation to participate.

Low Solar Developer Engagement

At the time of the evaluation of the **DAC-GT and CSGT programs**, there were no new solar projects developed for either of the programs, meaning that all current customers (only DAC-GT customers were enrolled at the time of this research) were using interim renewable portfolio resources rather than being served by new resources. The programs intended to treat existing solar resources as interim only while waiting for steel-in-ground new projects, but 10 rounds of solicitations for both the DAC-GT and CSGT programs led to only six awarded contracts from two solicitations for DAC-GT and three awarded contracts from three rounds of solicitations for CSGT. The total awarded contracts did not meet the total requested capacity.

Based on analysis of California IOU solar developer lists, interviews with selected solar developer bidders, and a web survey of general solar developers (that had received program requests for proposals [RFPs]), our evaluation identified the following barriers to implementing new steel-in-ground projects:

- **PA contact lists rarely overlap,** suggesting that solar developers are only seeing opportunities in one service territory despite interest in working throughout the state.
- **Solar developers on the PA outreach lists for solicitations were largely unaware of bid opportunities for CSGT and DAC-GT.** Only a quarter of surveyed solar developers were familiar with either of the two programs, even though they were on bid distribution lists and presumably received PA RFPs.
- **Solar developers who were aware of the bid process struggled with siting, interconnection, and cost**. At least three solar developers who bid on one or more solicitations reported that more time would have helped to address interconnection and siting issues. Solar developers suggested that they would want between three to eight months to develop a bid. The average number of months allotted to developers by PAs was approximately two months.

To help increase solar developer engagement, we recommended that solicitations for solar developers should be released statewide, since many developers work beyond a single PA region, and that the IOUs should conduct more outreach to increase awareness.

Changing Boundaries

The design of the programs is such that geographic boundaries as defined by CalEnviroscreen's tool impacts both customer eligibility and (in the case of **DAC-GT and CSGT**) where solar developers can propose projects. CalEnviroscreen, which is used to define what is eligible as a DAC, is now on version 4.0, and each iteration of the scoring updates the

communities that can be served, with some being added and some being removed. This poses a challenge to those working to implement programs serving DACs but does ensure that the definition of DACs stays relevant.

To add flexibility to accommodate changing DAC metrics, the Office of Environmental and Health Hazard Assessment created a final designation of DACs in May 2022 that *included* the 207 census tracts defined in the 2017 version of DACs that were not included in the current 4.0 version. This created a consistent DAC definition under Senate Bill (SB) 535, which also set minimum funding levels related to DACs. This is akin to streamlining that has occurred in other programs that serve low-income customers in California. The California Alternate Rates for Energy (CARE) program allows for categorical eligibility, which means that enrollment in a program with similar public benefits such as Medi-Cal or CalFresh can be used to qualify potential enrollees.

Boundaries are also shifting for DAC-GT and CSGT in particular with the expansion of Community Choice Aggregators (CCAs), who may opt to become a PA for the program(s). This means that a program implementer may acquire resources in a region that later becomes covered by a CCA and then has to navigate the transfer or assignment of these resources. Handling the resources during this transfer is still an open question, and at the time of the evaluation was handled on a case by case basis.

For **DAC-SASH**, GRID leverages local offices to conduct outreach, and each of these regional offices is able to experiment with outreach strategies. We visited one GRID office that worked to implement the original SASH program before the DAC focus, but the new focus involved more drive time to target the nearby DACs. This is an example of a challenge that comes with changing program targets.

Develop Metrics to Track Progress Towards Equity Focused Goals

Each of the evaluations reflected in this paper utilized a theory-based evaluation approach guided by the development of a program theory, logic model, and associated indicators of progress. The framework facilitated identification of causal mechanisms and testing of hypotheses that the successful implementation of project activities (often involving multiple actors) would lead to expected outputs, and that these in turn would eventually yield expected benefits. This theory-driven approach relied on data collection that covered project inputs, activities, outputs, and outcomes.

As part of this theory-based evaluation approach, it is possible to develop metrics that measure progress towards the expected program outcomes identified in the logic models (facilitating early evaluation). In some cases, this exercise identified a lack of specificity around program goals that could help an evaluation conclude if a program is meeting its stated goals. As an example, the goal of the **DAC-SASH** program is to "ensure that customer-sited renewable distributed generation continues to grow sustainably… for residential customers in disadvantaged communities." (Evergreen Economics 2023) Without a specific targeted number of kW installed, homes served, or guidance on the type of customers within DACs that should be prioritized, the evaluation could not conclusively find if this level of progress is or is not meeting the overall program goal.

We recommended that future programs that serve DACs or similar groups be very specific about what they are trying to achieve and set metrics to check on this progress early in the program implementation process, if not before. Without metrics, programs that are well intentioned in their desire to serve DACs run the risk of missing the opportunity to serve DACs at their full program potential.

Conclusions

Recent California legislation has led to the development of programs administered by CBOs, the CPUC, IOUs, and CCAs that address barriers for customers that are at risk of being left behind in a cleaner energy future. As other jurisdictions work to identify and serve disadvantaged communities, four programs in California offer lessons learned for program design and implementation. Much can be done at the program design phase to prepare for implementation barriers including using carefully considered definitions for the targeted communities, setting explicit goals and metrics to measure progress, securing funding and/or identifying partners that can leverage additional funding sources for remediation needs, and advancing utility planning for high volume upgrades of home panels and updates to transmission and distribution systems. Partnering with CBOs and/or with local community leaders can increase trust in program offerings and lead to much higher program participation; this should also be considered during program design, though these approaches may require additional resources and coordination.

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