

DOCKETED

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California Energy Commission
715 P Street
Sacramento, CA 95814

June 18, 2026

Docket No. 25-EPIC-01

Re: Comments of The Energy Coalition on the Draft CEC EPIC 5 Initiatives and Research Topics (June 11, 2026 Public Workshop)

The Energy Coalition (TEC) respectfully submits these comments on the draft California Energy Commission (CEC) initiatives and research topics for the Electric Program Investment Charge 2026 through 2030 Investment Plan (EPIC 5), presented at the June 11, 2026 public workshop in Docket 25-EPIC-01.

TEC is a California 501(c)(3) nonprofit with more than 50 years of experience designing and implementing energy programs. TEC led the Bassett Avocado Heights Advanced Energy Community (BAAEC) project, one of four Advanced Energy Community demonstrations funded by the CEC under the EPIC program (Agreement EPC-19-006). Conducted from 2020 through 2026 in San Gabriel Valley disadvantaged communities in eastern Los Angeles County, BAAEC delivered an integrated portfolio of community-scale clean energy interventions and produced field-tested lessons and recommendations for replication statewide. The Draft BAAEC Final Project Report (it is pending CEC review and approval) and select key findings from the project are provided as an appendix to these comments.

TEC offers these recommendations as a former EPIC grantee translating completed demonstration results into priorities for the next investment cycle. The draft EPIC 5 initiatives are closely aligned with the BAAEC findings. The recommendations below are intended to strengthen the draft plan and are organized by Strategic Goal and the Strategic Objectives adopted in Decision 26-02-037.

1. Plan-Wide Recommendation: Ensure allocation of funding to include a small number of bold, cross-cutting community-scale demonstrations (Strategic Objectives 2, 4, 6, 9, and 11). BAAEC's central finding is that the value of community decarbonization comes from the integration of measures, not from any single measure deployed on its own. The project delivered energy efficiency, rooftop solar, battery storage, electrification, community solar, EV charger installations, and shared mobility options through one coordinated, community-based delivery model, and the combined package produced affordability and grid outcomes that individual measures could not. The draft initiatives address these elements, but distribute them across separate Strategic Goals, where they are likely to be solicited as separate single-topic projects.

A single community-scale project must navigate more than fifty separate regulatory proceedings and programs. The principal constraints on distributed and community-scale resources are regulatory and program-design rules rather than technical feasibility or

customer economics, a point reinforced by international experience such as the rapid growth of behind-the-meter solar in Australia. Concentrated, ambitious demonstrations are better suited to establishing replicable models, and informing the rule changes those models require, than are a larger number of smaller and siloed projects.

TEC therefore recommends that EPIC 5 prioritize a small number of high-impact, precedent-setting, integrated community-scale demonstrations that complement the wider distribution of single-topic projects. At least one opportunity should allow for an integrated demonstration of programs under all 5 Strategic Goals, within various disadvantaged communities. Outcomes would include the creation of shared systems infrastructure¹ for financing, procurement, and collaborative governance, and with structured peer learning across grantees. Community choice aggregators are well positioned to co-invest in and help deliver such a demonstration. The impact should focus on equity outcomes. In the absence of a deliberate demonstration and the rule changes it informs, distributed adoption will continue to concentrate among customers able to self-finance, leaving disadvantaged customers further behind.

2. Distributed Energy Resource Integration (Strategic Goal 2): Recommendation: Include local distribution energy market and transactive structures in the Equity-Focused DER Solutions for DVCs topic. The draft Equity-Focused DER Solutions topic identifies virtual power plant participation, community microgrids, multifamily DER packages, and innovative ownership and financing as demonstration categories. TEC recommends adding community-scale, local energy market structures as an explicit category. The BAAEC prosumer network simulation, conducted on Advanced Homes participants using twelve months of metered data, cleared nearly 150,000 trades and delivered an average 9 percent reduction in volumetric electricity costs relative to the otherwise applicable TOU-D-PRIME rate and net billing tariff, with 10 of 11 households achieving net savings. The results indicate that a community choice aggregator is a viable near-term market maker for such a structure. These outcomes are additive to the grid-centric dispatch that the newest generation of virtual power plants provide in disadvantaged and vulnerable communities. This work supports Strategic Objective 9.

3. Distributed Energy Resource Integration (Strategic Goal 2): Recommendation: Leverage the CEC's data authority and tools, prioritize open data access, and treat BAAEC's findings as Value of DER inputs. Access to customer and grid data was a persistent constraint that EPIC 5 should systematically address. Project-level device application programming interfaces were cost-prohibitive or unavailable from manufacturers, utility meter data access through third-party services was fragile, and the distribution-grid data needed to assess locational value, including volt-VAR sensitivity, was absent from IOU Integration Capacity Analysis maps. TEC supports inclusion of the Advancing Customer-Sited DER Integration and interoperability topic and recommends that it prioritize open, standardized, customer-authorized data AMI 2.0 access rather than

¹ Shared systems infrastructure refers to critical business processes, tools, and services that are purposefully created to be used by multiple agencies and/or readily replicated.

additional proprietary protocols, and that it include a grid-edge gateway as a cost-effective path to interoperable dispatch.

The CEC is positioned to address this barrier directly through its own data authority and tools, not solely by funding research into data-sharing frameworks. TEC recommends that the CEC make the appropriate level of its energy data and analytical tools available to EPIC awardees, to the fullest extent consistent with data security and customer privacy standards. TEC further recommends that the CEC coordinate with awardees to explore access to grid and locational data to target solicitations to specific constrained or high-value locations, and to provide post-award locational and deployment support as a standard element of demonstration projects. BAAEC's experience indicates that locational relevance is key to demonstrating EPIC program benefits. The community solar component of BAAEC completed the first of its kind two-site aggregation accepted by CAISO, and both project siting and grid-service value depended on distribution data that was difficult to obtain.

4. Building Decarbonization (Strategic Goal 3): Recommendation: Pair electrification with solar and storage, and prioritize research that avoids panel and structural constraints. BAAEC's Advanced Homes program installed rooftop solar on 46 homes (192 kW) and battery storage on 45 homes (1 MWh), and completed 78 electrification upgrades across 53 homes, delivering an average 35 percent reduction in combined gas and electric bills for low-income single-family households. Two lessons bear on the draft Advancing Affordable Building Electrification Systems and Whole-Home Retrofit Solutions topics.

First, low-income participants expressed real concern that electrification on its own would raise their bills, and many would default to gas absent further support. Pairing electrification with on-site solar and storage, or community solar, is what made the affordability case credible. This is the loading lanes principle: efficiency, solar, storage, and electrification advanced together rather than in a strict sequence.

Second, electrical panel and structural constraints repeatedly drove costs and created delays: 37 main service panel upgrades were required due to safety concerns, and 26 re-roofs were needed. The draft plan already identifies panel constraints and plug-and-play DERs, but TEC recommends the following additional elements under this topic: smart load management and load-sharing (circuit splitters) approaches that avoid panel upgrades where the existing panel is safe; low-power and 120-volt appliance configurations; and business models that resolve the landlord-renter split incentive. This work supports Strategic Objective 4.

5. Building Decarbonization (Strategic Goal 3). Recommendation: make the community, not the individual building, the unit of intervention. BAAEC found that addressing deferred maintenance and decarbonization one home at a time is often cost-prohibitive, while consolidating the same work at the community level lowers transaction costs through economies of scale and supports community-led financing. TEC supports the draft Neighborhood-Level Decarbonization topic and recommends that it extend beyond thermal networks to integrated electric packages at neighborhood scale, combining

efficiency, solar, storage, and electrification with a community-based organization coordination layer. This work supports Strategic Objective 6.

6. Climate Adaptation (Strategic Goal 5): Recommendation: demonstrate community choice aggregator-led delivery models for community energy resilience.

BAAEC designed a microgrid resilience hub but was unable to construct it, in part because the change from NEM 2.0 to NEM 3.0 altered the project economics and because prospective site hosts could not absorb the ongoing operational responsibilities and risk. The project found that resilience hubs are frequently held in the planning stage by procurement, financing, and host-commitment barriers, and that a standardized, community choice aggregator-led delivery model can create a project pipeline, standard contracting, and provide economies of scale that move projects to construction. TEC recommends that the draft Building Community Energy Resilience and Reliability topic test such delivery models. This work supports Strategic Objective 9.

7. Plan-Wide Recommendation: Community-Led Capacity Building and Non-Energy Impacts.

BAAEC's enrollment outcomes depended on sustained outreach by trusted community-based organizations, and the project found that offering upgrades at no cost was not sufficient on its own to secure participation. TEC supports the draft Community-Led Clean Energy Capacity Building and Research Incubation initiative. TEC recommends that EPIC 5 continue and accelerate non-energy impact research.

8. Innovative Approaches to Building and Community Scale Decarbonization.

Recommendation: TEC strongly supports the inclusion of “renter-focused, minimally-disruptive retrofits” as a research focus. Starting with a DOE award in 2024, TEC developed a Direct-to-Renter program model, and has continued to implement and support programs to provide affordable cooling/heating, resilience, improved indoor air quality, clean cooking, and energy bill management to income qualified renters. New technologies are needed to improve on the current portfolio of 120V products in terms of GHG reductions and the range of co-benefits, as well as to bring down both the upfront investment and the ongoing utility costs. While building scale retrofits will ultimately be needed, low-income renters need access to more immediate solutions that address the growing risks from high heat and air pollution and that can be implemented without the need for property-owner intervention. The growing need for cooling must be met with heat pumps, to avoid costly impacts to renters' energy bills and to avoid additional stress on the grid. In addition to technology innovations, research is needed into effective deployment of such programs, which should integrate CBOs into program design, outreach and education. More recommendations are included in the supporting slide deck which was presented at the CPUC Decarbonization Workshop on Jan 21, 2026. This work supports Strategic Objective 5.

TEC appreciates the opportunity to comment and recognizes the staff's work in developing these initiatives. The appended BAAEC Final Project Report and final findings presentation contain the supporting data and the full set of recommendations summarized here. TEC

welcomes the opportunity to provide further detail as the CEC finalizes the EPIC 5 Investment Plan and develops solicitations.

Respectfully submitted,

/s/ Marc Costa

Marc Costa
Director of Policy and Planning
The Energy Coalition

June 18, 2026



Direct - to - Renter TM

**A Clean Energy Solution Meeting the Urgent Needs
of Low-Income Tenants**

CPUC Decarbonization Workshop Local Programs Panel

Outline

1. Direct-to-Renter Program Design
2. 2024 Pilot and Implementation
3. Program Expansion Statewide
4. Gap Analysis and Differentiation
5. Workshop Themes and Future Directions

Quick Renter Stats

California:

- Renters make up 44% of households*
- Renters make up 66% of low-income population**

*Public Policy Institute of California, 2024 - <https://www.ppic.org/blog/californias-renters/>

**Low Income Needs Assessment Report, 2022, Evergreen Economics - https://liob.cpuc.ca.gov/wp-content/uploads/sites/14/2023/07/2022_LINA_Report_120922_FINAL.pdf

Direct - to - Renter Program

- Designed by The Energy Coalition
- Brings no-cost portable appliances directly to low-income renter households for their ownership and use
- Bypasses the need to work with landlords



Direct - to - Renter

Does NOT:

- ✗ Replace long term investments in buildings
- ✗ Solve other health and safety challenges faced by tenants (e.g., mold, lead)

DOES:

- ✓ Address immediate and profound *energy-related* health and safety needs
- ✓ Fill an equity gap in current energy programs

Direct -to -Renter - Technical Design

Benefits to renters:

1. Efficient, affordable cooling and heating
2. Resilience in the event of power outages
3. Indoor air quality improvements
4. Ability to manage energy use / bills
5. GHG reductions



Direct - to - Renter - Technical Design

Appliance criteria:

- Portable
- 120V
- No new circuits or panel upsizing
- No permission or involvement from landlords required



Appliance Categories and Benefits

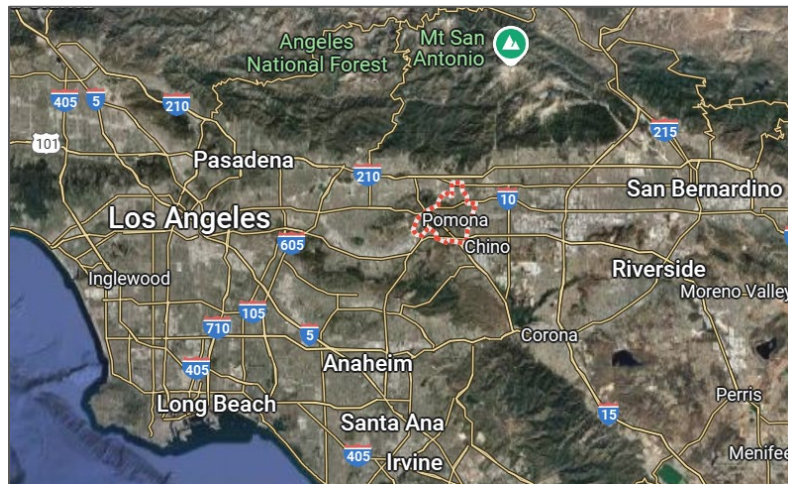
Appliance Category	Benefits				
	Resilience / Safety	High Heat Management	Indoor Air Quality	Utility Cost Savings	GHG Reductions
Portable heat pump air conditioners/ heaters		✓	✓		✓ (When used in place of inefficient units)
Electric cooking appliances		✓	✓		✓
Air purifiers			✓		
Portable batteries	✓			✓	✓
Fans		✓			✓ (If used to reduce need for existing A/C)
Energy management plugs and apps				✓	✓

2024 Appliance List for City of Pomona Pilot

Category	Appliance	Sample Images
Air Quality	Air purifier (\$110)	
Cooking	Electric kettle (\$41), slow cooker (\$99), induction cook plate (\$110), optional cookware (\$88)	
Cooling / Heating	Tower fan (\$77), portable heat pump A/C / heater (\$769)	
Power Storage	Portable plug-in battery (\$2,089)	
Smart Home	Smart plugs (\$48) / power strip (\$73), smart speaker (\$55, optional add-on)	

2024: Design and Pilot Implementation

- Funded by a DOE Community Energy Innovation Prize
- **CBOs were integral partners** in the design and implementation
- Programmatic design: eligibility, outreach strategy and materials, enrollment, ordering, staging, delivery
- Pilot Implementation:
 - 10 households in Pomona, CA
 - Collected surveys and testimonials



Pilot Program Participant Feedback Demonstrated the Need for Affordable Cooling



“The window one doesn’t help [to cool] the whole house.”

SURVEY RESPONDENT



“The appliances are needed for cooling [our] baby.”

SURVEY RESPONDENT



“The central A/C is too expensive [to use].”

SURVEY RESPONDENT

Pilot Program Participant Feedback Demonstrated the Program's Immediate, Powerful Impact on People's Lives



My electricity bill increased this summer, but it was less of an increase than last summer when I was using a \$100 portable A/C unit.

Liz G., Resident, City of Pomona

“ ”

Pilot Program Participant Feedback Demonstrated the Program's Immediate, Powerful Impact on People's Lives



Estoy muy agradecida por el aire acondicionado portátil. Me siento fresca y me ha ayudado con las altas temperaturas. ¡Gracias Pomona ACTS!

I am so thankful for the portable air conditioner. I feel cool and it has helped me with the high temperatures. Thanks Pomona ACTS!

Fatima B., Resident, City of Pomona



Expanding Throughout the State

- **“Pomona ACTS”** - Transformative Climate Community grant
 - Funding from Strategic Growth Council
 - Direct-To-Renter is one of a suite of projects
 - >100 renter participants
- **Santa Monica**
 - Funding from the Clean Power Alliance
 - ~75-80 renter participants
 - Program is underway, started in 2024
- **Alhambra**
 - Funding just awarded from the Clean Power Alliance
 - ~100-150 renter participants
- **Orange County Power Authority (OCPA)**
 - Self-funded roll out starting Spring 2026
- **Peninsula Clean Energy (PCE)**
 - A proposed program within their business plan portfolio

Cities, CCAs, and State agencies are recognizing the need and embracing the benefits of a Direct-to-Renter program.

Each DTR program is tailored to local priorities and funding constraints.

Gap Analysis : Comparison to ESA Rules and Offerings

1	Feature	Direct to Renter	SCE ESA	Multifamily ESA	Notes / Takeaways
2	Eligibility criteria	Focus on low-income renters in priority/disadvantaged communities; program can also target residents of high-pollution areas or disaster-impacted communities.	SCE serves income-qualified homeowners (≤250% of Federal Poverty Guideline) and renters with active SCE service through a residential meter. Residences with four (4) or fewer units are considered single-family homes. Households qualify either by income (same income limits as PG&E) or by participation in specific public-assistance programs (see below). SCE	Property: Multifamily (≥5 units; shared walls/floors/ceilings) in a PG&E, SCE, SDG&E, or SoCalGas territory (or affiliated CCA) Resident (in-unit) path: even if a property doesn't qualify, income-eligible residents can still receive in-unit upgrades. Eligibility	Similar eligibility requirements
3	Method for verifying eligibility	Programs can streamline by prioritizing households already enrolled in utility income-qualified programs (e.g., CARE/FERA); Complex verification (e.g., tax docs) reduces sign-ups.	ESA Program eligibility can be met if 1 person in the household participates in one of the following programs: Bureau of Indian Affairs General Assistance CalFresh (SNAP food stamps) CalWORKs (TANF/Tribal TANF) Head Start Income Eligible (tribal only) Low Income Home Energy Assistance Program (LIHEAP) Medi-Cal/Medicaid Medi-Cal for Families (Healthy Families A&B) National School Lunch Program (NSLP) Supplemental Security Income (SSI) Women, Infants, and Children (WIC)	Verification . Two options for residents: 1) Categorical eligibility via listed public-assistance programs Medicaid/Medi-Cal for Families A & B CalFresh (SNAP food stamps) SNAP Head Start Income Eligible (Tribal Only) Bureau of Indian Affairs General Assistance Women, Infants and Children (WIC) National School Lunch Program (NSLP) Low Income Home Energy Assistance Program (LIHEAP) Supplemental Security Income (SSI) CalWORKs (TANF) or Tribal TANF 2) Income by household size using CPUC ESA limits (250% FPG).	While neither program lists CARE / FERA enrollment as an option for proof of eligibility, the CPUC ESA website explicitly says: "Providing no-cost weatherization services to consumers who meet the CARE or FERA income limits".
4	Appliances/measures & benefits for SF homes	Portable heat-pump A/C+heater, portable battery, induction cooktop + cookware, air purifier (with extra filters), electric cooking appliances (induction cookplate, electric kettle, air fryer, etc.), fan. Targets resilience, high-heat management, IAQ, electrification, and bill affordability without landlord approvals.	Program Flyer Lighting Smart Power Strip Refrigerator Replacement Smart Thermostat Thermostatic Shower Valve/Showerhead Clothes Washer Replacement Dishwasher Replacement Freezer Replacement Heat Pump Water Heater Replacement Pool Pump Replacement Cooling: Evaporative Cooler Evaporative Cooler Maintenance Window or Wall AC Replacement Central AC or Central Heat Pump Replacement Portable AC HVAC Filter Weatherization Services <i>These services may not be available in all areas. Certain restrictions may apply for all products and services.</i>	See list here . Lighting (LED lamps & fixtures; retrofit kits; occupancy sensors) Smart Power Strip Refrigerator Replacement Clothes Washer Replacement Smart Thermostat Thermostatic Shower Valve / Showerhead (incl. low-flow showerhead; kitchen & lavatory aerators) Heat Pump Water Heater Replacement (in-unit, plus central HPWH option) Water Heater Pipe Insulation & Repair/Replacement (includes storage/tankless options) Pool Equipment (variable-speed pool pump; pool/spa heater) Cooling / HVAC (Central AC or Central Heat Pump, Split AC/HP, Ductless Mini-Split Heat Pump, PTAC (packaged terminal AC), Portable AC , Duct Leakage Sealing, Central Gas Furnace) Health & Safety: Air purifier, CO alarm, smoke alarm Weatherization Services: Air sealing, attic insulation, wall insulation	Overlapping appliances with the DTR program include the portable AC unit and air purifier. Does not include portable battery or electric cooking appliances.
5	Level of cost coverage	Appliances provided at no cost to participants	Appliances and installations are provided at no cost. Co-pay may be required for some services (noted on SCE flyer fine print)	Residents: in-unit upgrades at no charge if income-qualified. MF ESA .	No difference in level of cost coverage.
6	Home entry / assessment required?	No requirement for home assessment or entry.	Yes. After qualifying, an SCE-approved contractor does a walk-through assessment; SCE may also perform a post-installation inspection. SCE	Yes. On-site energy assessment are required and conducted by "Energy Advisors". Program flyer also describes the assessment process and post-audit guidance.)	This is a critical differentiator, especially in underserved communities.
7	Landlord involvement required?	Designed to avoid landlord approvals: portfolio prioritizes 120V, portable technologies that don't require landlord consent.	Yes. As noted on the flyer , "renters may be required to obtain the property owner's written permission before services are delivered"	In-unit upgrades are installed by an ESA contractor network; Property coordination is typically needed for access/scheduling but no specific mention of formal landlord-permission	This is a critical differentiator, especially in underserved communities.
8	Use of CBOs for outreach/enrollment	Core feature. DTR is CBO-led for outreach, trust-building, enrollment, and logistics; emphasizes multilingual materials and partner logos.	No specific mention of CBOs	Emphasis on delivery via the ESA contractor network, program Energy Advisors, and utility Single Point of Contact (SPOC) channels; no explicit mention of CBO-led outreach	This is a critical differentiator, especially in underserved communities.

Findings: Existing statewide programs fall short in serving renters

	ESA	DTR
Offerings	Portable AC Air purifier	Portable HP AC/Heater Air purifier Battery Electric cooking appliances
Program Design	Requires home entry Requires landlord involvement	No home entry No landlord involvement CBOs are integral to outreach and education
Per 2024 filings with the Low Income Oversight Board: <ul style="list-style-type: none">• SCE* ESA provided only 24 portable AC units to SF homes and 0 to MF homes• PG&E** ESA provided only 10 portable AC units to SF homes and 3 to MF homes		

Direct-to-Renter addresses the barriers to serving low-income renters and under-resourced communities.

CBOs are essential to program design, outreach, education, and relationship building.

*https://liob.cpuc.ca.gov/wp-content/uploads/sites/14/2025/10/SCE-Low-Income-Annual-Report-2024_Revised.xlsx

**https://liob.cpuc.ca.gov/wp-content/uploads/sites/14/2025/10/PGE-ESA_CARE_FERA_AR_Tables.xlsx

Workshop Themes and Future Directions (1 of 2)

Best practices:

- **Serve renters directly**
 - Recognize the need for non-permanent interventions
 - Recognize the energy-health nexus and urgency of unmet needs
- **Integrate CBOs** in program design, outreach, and education
- Program implementers **tailor offerings** to local priorities and conditions, e.g.
 - Marketplace innovation for ordering and delivery
 - Portable solar panels may be a feasible offering in some areas
- Ensure that the growing need for rental unit cooling is **met with heat pumps**
 - Otherwise people will buy cheap / second-hand units
 - Less efficient and more costly to operate
 - New LA County cooling ordinance (Aug 2025) requires landlord action by 2027



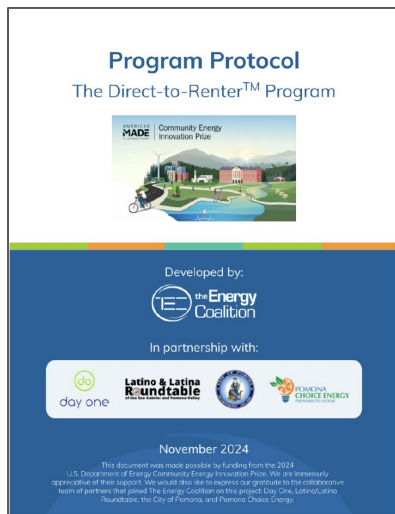
Workshop Themes and Future Directions (2 of 2)

- Goal: enable use of **portable battery in conjunction with heat pump**
 - Reduce electricity bills and support the grid by shifting load to non-peak hours
- Assess extent to which portable heat pump **heating feature** can replace use of gas furnaces / wall heaters
 - Will provide immediate GHG and pollution reduction
- Expand **data analytics** - quantify energy reduction and indoor AQ benefits
 - Renters also need help to understand their bills and manage energy use
- Program learnings support **CaIMTA**
 - **Room Heat Pumps MTI, Induction Cooking MTI**
 - Increased engagement provides insights into rental building stock (e.g. SM slat windows)
- Potential to help overcome a **major barrier to zonal decarbonization**
 - Induction cook plates can provide a stepping stone to full stove replacement
 - CBOs can provide education around indoor AQ benefits

Resources

Direct-to-Renter Program Protocol

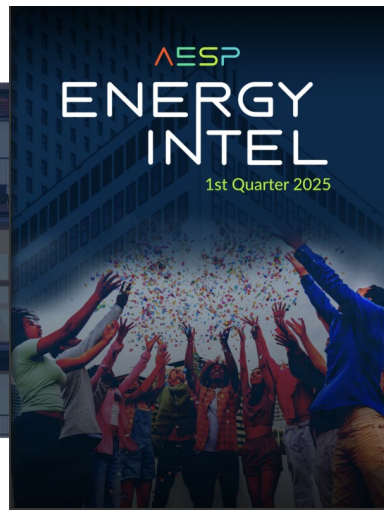
A roadmap for scaling



https://energycoalition.org/wp-content/uploads/2025/02/Pomona-DTR_Protocol.pdf

AESP Q1 2025 Energy Intel Article

A deeper dive into the pilot program motivation and implementation



<https://online.pubhtml5.com/sicr/pyev/>



Thank You!

Questions?

Felicia Federico, D.Env.
Director, Funding and Research
ffederico@energycoalition.org

Extra Slides

Motivation

Programs designed for rental property owners have barriers that limit uptake.

- The “split incentive”
- Renters have no control and very little influence over a landlord’s decision to participate.
- Policies related to rental property upgrades may increase the likelihood of tenant displacement.

Motivation (cont'd)

Energy program incentives build wealth for owners, but not for renters.

- Programs designed for homeowners (such as solar, battery storage, and appliance electrification) build wealth for participants by increasing the value of their home.
 - Incentives and/or direct install for low-income households can be worth ~\$5K-\$20K
 - Most of these improvements also reduce energy bills
- Renters benefit from reduced energy bills when they participate in community solar or CARE/FERA rates, or when improvements are made to landlords' property, but none of these programs build wealth for renter households.

From SAJE 2025 Report: A Renter's Right to Cooling



Living through dangerous levels of indoor heat is common, especially in the summer. Most tenants described their apartments as hotter than the outdoors during heat waves.



The monthly electricity costs associated with A/C are often unaffordable, making tenants hesitant to run A/C units.



Indoor heat makes people sick. Tenants reported physical- and mental-health impacts from extreme heat, including headaches, dizziness, asthma attacks, nosebleeds, anxiety, and heat rashes.



Leaving home to cool down is expensive. Tenants who have tried escaping the heat in their homes by going to cafes, gyms, or the beach said the cost of food, gas, and parking quickly add up.



Many landlords disallow window A/C units, citing electrical or aesthetic concerns.



Tenants overwhelmingly want A/C. Despite the costs associated with running it, nearly everyone said they would use A/C if it were provided and believe it should be a legal requirement.



**CALIFORNIA
ENERGY COMMISSION**



ENERGY RESEARCH AND DEVELOPMENT DIVISION

FINAL PROJECT REPORT

Bassett / Avocado Heights Advanced Energy Community

May 2026 | CEC-500-2026-XXX



PREPARED BY:

The Energy Coalition

Primary Authors

Genaro Bugarin

Felicia Federico

Michael Ferreira

Project Manager

California Energy Commission

Agreement Number: EPC-19-006

Anthony Ng

Branch Manager

Technology Innovation and Entrepreneurship

Jonah Steinbuck, Ph.D.

Director

ENERGY RESEARCH AND DEVELOPMENT DIVISION

Drew Bohan

Executive Director

DISCLAIMER

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ACKNOWLEDGEMENTS

The BAAEC Project Team deeply appreciates and acknowledges the central role of the people of Bassett and Avocado Heights, and surrounding cities. You gave us your attention, trust, and time, and enabled the successes of this project.

We thank the members of our Technical Advisory Committee, and those of our Community Advisory Committee, for your input and perspectives throughout these last 5+ years.

Many thanks to the Energy Commission for funding this project, and to our agreement manager, Michael Ferreira, for his valuable guidance, flexibility, and long term focus in support of this project.

We recognize and thank all of the project design and implementation partners who brought patience, persistence, and commitment to the BAAEC community and the project's ambitious goals.

The Project Team also recognizes and appreciates the other three AEC project teams - Oakland EcoBlock, Richmond AEC, and Lancaster AEC. We benefited from the knowledge shared among these related efforts throughout the grant term.

We commit to sharing knowledge gained in this project to support the goal of an equitable energy transition for all Californians.

PREFACE

The California Energy Commission's (CEC) Energy Research and Development Division supports energy research and development programs to spur innovation in energy efficiency, renewable energy and advanced clean generation, energy-related environmental protection, energy transmission, and distribution and transportation.

In 2012, the Electric Program Investment Charge (EPIC) was established by the California Public Utilities Commission to fund public investments in research to create and advance new energy solutions, foster regional innovation, and bring ideas from the lab to the marketplace. The EPIC Program is funded by California utility customers under the auspices of the California Public Utilities Commission. The CEC and the state's three largest investor-owned utilities—Pacific Gas and Electric Company, San Diego Gas and Electric Company, and Southern California Edison Company—were selected to administer the EPIC funds and advance novel technologies, tools, and strategies that provide benefits to their electric ratepayers.

The CEC is committed to ensuring public participation in its research and development programs that promote greater reliability, lower costs, and increase safety for the California electric ratepayer and include:

- Providing societal benefits.
- Reducing greenhouse gas emission in the electricity sector at the lowest possible cost.
- Supporting California's loading order to meet energy needs first with energy efficiency and demand response, next with renewable energy (distributed generation and utility scale), and finally with clean, conventional electricity supply.
- Supporting low-emission vehicles and transportation.
- Providing economic development.
- Using ratepayer funds efficiently.

For more information about the Energy Research and Development Division, please visit the CEC's research website (www.energy.ca.gov/research/) or contact the Energy Research and Development Division at ERDD@energy.ca.gov.

ABSTRACT

The Bassett Avocado Heights Advanced Energy Community (BAAEC) project aimed to understand and work to overcome barriers to disadvantaged communities' participation in the clean energy transition, by showcasing how local communities can lead in ensuring an inclusive California energy future. The project took place from 2020-2026 and focused on unincorporated county places and adjacent cities in eastern Los Angeles County. It was designed to reduce energy consumption and greenhouse gases, meet electricity demand with local energy, and create energy bill savings for participants, through an integrated portfolio of clean energy projects. Accomplishments included: conducting more than 150 community outreach and engagement activities; screening more than 500 households for eligibility; conducting retrofits of 46 single family homes including rooftop solar, batteries, appliance electrification; conducting a simulation of local energy trading; constructing a community solar project; designing a microgrid resilience hub; installing Level 2 electric vehicle chargers at public schools; and implementing an electric vehicle car sharing program.

The project was led by The Energy Coalition, a California-based 501(c)3 nonprofit. The core implementation team included: Day One, Active San Gabriel Valley, GRID Alternatives-Los Angeles, and the California Center for Sustainable Communities at UCLA, and was supported by dozens of additional partners.

This work produced a framework of insights, lessons learned, and recommendations for replication statewide, including the following key principles: (1) Strengthen community capacity to lead in the energy transition; (2) Address systemic barriers through a long-term framework rather than short-term transactions; (3) Prioritize trust-building by partnering with mission-aligned organizations working with community interests in mind; (4) Goes beyond energy to also include community resilience, wellbeing, and economic development; (5) Streamlines customer adoption by moving from individual to collective decision making; (6) Creates the opportunity for community-centered local investment.

Keywords: Low-Income, Disadvantaged Community, Outreach, Rooftop Solar PV, Battery Energy Storage, Residential Electrification, Community Solar, Microgrid Resilience Hub, Electric Vehicle Infrastructure, Prosumer Network, Car Sharing, BAAEC, trust-building, capacity-building, San Gabriel Valley, California

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Executive Summary

The Bassett Avocado Heights Advanced Energy Community (BAAEC) Project is one of the first few comprehensive, long-term, community-focused energy projects in California. It provides deep insights into what it takes to advance the clean energy transition in low-income, under-resourced communities. Benefits to ratepayers are multi-fold: (1) specific improvements made in the lives of people in the project area through home retrofits, increased affordability, community-scale installations, and new clean transportation services; (2) an extensive list of learnings and best practices, shared through numerous conferences, and documented in a Replication Toolkit to enhance and accelerate similar efforts statewide; and (3) recommendations to address the policy and regulatory barriers encountered in the project and which need to be overcome to enable the State to fully and equitably meet its climate goals.

Project Purpose and Approach

The Advanced Energy Community solicitations challenged multi-sectoral project teams to apply new approaches to planning, permitting, and financing the clean energy transition in a way that accelerates the replication and scaling of these transformations.

The BAAEC project aimed to overcome the barriers to disadvantaged communities' (DAC) participation in the clean energy transition, by demonstrating how locally produced renewable energy can be deployed at scale and showcasing how local communities can be a key component of California's transition to a clean energy future.

The project was designed to demonstrate community-scale solutions for reducing energy consumption and greenhouse gases, and to create energy bill savings for low-income participants through an integrated offering of diverse elements as described in the section below.

More broadly, the intention was to produce a framework of insights, lessons learned, and recommendations for replication to accelerate decarbonization of similar communities statewide, ensuring they are not left behind in the transformation of our energy future.

The BAAEC project involved dozens of partners serving in a variety of roles. The project was led by **The Energy Coalition (TEC)**, a California-based 501(c)3 nonprofit with 50 years of experience designing and implementing energy programs and strategies. TEC collaborated with a core implementation team which included two community-based organization (CBO)

partners, who led community outreach and enrollment: **Day One** and **Active San Gabriel Valley**. The core team also included **GRID Alternatives - Los Angeles**, and the **California Center for Sustainable Communities (CCSC) at UCLA**.

Key Results

Outreach, Engagement, and Workforce Development

While securing enrollment proved to be more difficult than expected due to numerous factors, BAAEC implemented multiple outreach and engagement strategies to deliver program services to residents:

- Conducted more than 150 outreach activities across all initiatives
- Received interest from more than 700 households across all initiatives
- Screened more than 500 households across all initiatives
- Recruited and enrolled 38 participants in a Solar PV training program, with 32 graduates

Advanced Homes

Retrofits were completed on 46 single-family homes, with the installation of generation and storage (46 homes with rooftop solar PV and 45 homes with battery storage) and electrification (28 heat pump water heaters (HPWH), 10 HP HVAC, 21 induction ranges, and 15 electric dryers).

This work was funded by stacking \$1.8M across three different rebates and \$400K from two additional complementary grants. The average household experienced an overall savings of \$38.45/month in total energy expenditures (a 35 percent utility bill reduction). The load flexibility provided by the battery and programmable appliances serves to reduce the coincident peak as a larger grid benefit.

Prosumer Network

The simulation found that, with the ability to access compensation and pricing for Prosumer power within a network hosted by a local market maker, participants could average on the order of 9 percent savings in volumetric electricity costs (not including the transmission and delivery system operator delivery costs) compared to a standard time of use rate for energy consumption and a net-billing tariff for solar generation exports.

The Prosumer Network is a submarket that can better account for the benefits of local power, and can help mitigate over-building of the utility grid, putting downward pressure on utility rates.

Community Solar

The project built the first-of-its-kind two-site aggregation community solar project. A total of 670 KW was installed across the two sites, which are scheduled with CAISO as a single resource, and serve approximately 350 households. In total, the project's outreach team enrolled more than 400 income-qualified households into the Clean Power Alliance's PowerShare program, where they receive a 20 percent discount on their bills. Community solar generates local generation with less system loss for greater efficiency.

Microgrid Resiliency Hub

Despite not reaching implementation of the resilience center, BAAEC worked through substantial project development with important learnings related to planning and procurement barriers.

Electric Vehicle (EV) Charging Infrastructure

A total of 30 chargers were installed across three campuses within Bassett Unified School District and \$87,000 in SCE rebates were secured in support of new infrastructure. By locating EV charging infrastructure at a public school for staff and the community, it encourages daytime charging with associated grid benefits.

Shared Mobility

This project element provided nine enrollees with EV rentals, four of whom also received home EV chargers. With fewer internal combustion cars on the road, the community realizes better air quality and reduced healthcare costs.

Knowledge Transfer and Next Steps

Key Takeaways and Recommendations

1. Portfolio-of-Strategies Approach

The BAAEC project demonstrates that customers need wrap-around concierge-like support throughout home upgrades, particularly in the coordination of various trades, and in translating the reasons for, and importance of, these technologies and retrofits. This approach

reflects the importance of authentic engagement with the goal of partnership, strengthening capacity, and building community. **Recommendation:** An integrated, portfolio-of-services model for community transformation can best meet these goals: it requires more funding for community and mission-aligned partners, and the de-siloing and streamlining of incentive programs to allow effective layering of multiple funding sources. Community outreach and trust-building work must be valued on par with technology and installation budgets, it must foster cross-sector collaboration, and be invested in root-cause solutions

2. Affordability

The BAAEC team heard real concerns from Advanced Homes participants, all of whom were low-income, related to bill impacts from electrification. Their reservations about switching to electric, even when the new appliance itself was free, means that these price-sensitive homeowners will continue to choose a gas-powered appliance in the absence of further support. For a large segment of the population—those under the area median average of income, and those on fixed income—electrification by itself will not be an option in the near term. By continuing to install gas appliances, homes will be locked in to higher GHG emissions for 10-20 years. **Recommendation:** Addressing these challenges require two-fold approach: (1) pair electrification with solar plus storage whenever possible (either on-site rooftop systems or community solar enrollment), and (2) advance the development of electric appliances with features that make the switch for customers easier and more affordable - for example an induction stove with integrated battery.

3. Value of Distributed Energy Resources (DER)

Solar and storage can be a path to mitigate/manage affordability and allows implementation partners to lead with services that authentically address the needs of DAC communities. However, the full installation costs of solar and battery storage are impossible to access for most low-income households. **Recommendation:** In addition to continued investment that can help close the access gap for low-income families, state agencies must update policies and regulatory frameworks to allow for local power to be properly valued. When the cost savings from avoided transmission and distribution, and the diverse set of community benefits of distributed power, including resilience, are better valued - the market will respond to policy signals and innovate with business models that lower access barriers for low-income families.

4. Transforming Individual Problems into Community Opportunities

Solving the problem of deferred maintenance such as roof replacements and panel upgrades one home at a time is difficult and cost prohibitive for individual families. **Recommendation:**

When consolidated at a community level, solar and decarbonization home readiness repairs become an opportunity with a high dollar value that lowers transaction costs, through economies of scale. And, when mission-aligned partners with a long-term community transformation perspective, new opportunities for unlocking investments through community-led solutions are possible. This beyond business-as-usual community-wide solution helps articulate a shared priority, one that builds community and can mobilize resources in unprecedented ways.

5. Local Energy Market

The Prosumer Network simulation and potential for bill savings via a local market, shows the potential to create new regulatory and utility tariff design models that make better use of existing demand-side resources. This innovative solution, where homes help balance electricity shortfalls and excess production with each other, can increase grid utilization while addressing affordability concerns for communities. **Recommendation:** California Public Utilities Commission (CPUC) and CEC should establish a regulatory pathway for community-scale, price-bounded local energy market pilots, including clear guidance on how transactive energy settlements interact with T&D cost recovery and IOU tariff structures. A CCA may be the most viable near-term vehicle for piloting tariff-based local energy market structures.

6. Serving Renters through Community Solar

Community solar provides access to decentralized clean energy and discounts on utility bills. While not exclusive to low-income households, it is an equitable solution for the 44 percent of California residents who either rent, do not have homes suitable for solar, or cannot afford rooftop solar. BAAEC demonstrated the first ever aggregation of small sites to meet CAISO minimums for wholesale market participation, a blueprint that can be applied to future projects to enable the economics to pencil out for a wider range of sites. **Recommendation:** The fact remains that community-scale solar and storage is policy dependent. Developers' decisions to pursue more community scale projects in California will depend on whether the state can create a landscape of opportunity for investment more favorable than the existing one. Then, Community Solar can thrive through more focused support from local governments, either directly or by championing local energy procurement by CCAs. In the same way that local governments engage with issues like zoning, carbon-free energy projects should be explicitly planned for at the local level.

7. Community Energy Resilience

Some utilities are currently funding programs for energy Resilience Hubs, but in a siloed approach. BAAEC's experience points to the need to build on, and expand, these utility efforts. For example, a standardized community choice aggregator (CCA) led project delivery model has the potential to create a market by generating a pipeline of projects and economies of scale, which in turn attracts project developers, financiers, and contractors.

Recommendation: Ratepayer funds from CCAs have the potential to be the catalytic funding source to move projects to implementation. This systematic approach addresses the various challenges that have trapped resilience hubs like BAAEC in the planning stages.

Information Sharing

Since late 2021, the project team has engaged in 28 different public outreach activities, including presentations, panel discussions, and publications. These have taken place across local, statewide, and national venues, and have increased awareness of the project work to a wide and diverse audience. In addition to this Final Project Report, the project team created a Replication Toolkit to aid communities with scaling these programs. The team also created a Case Study that provides a detailed, chronological description of how the work progressed and evolved throughout the 5-year grant term.

Next Steps

This work produced a framework of insights, lessons learned, and recommendations, that have been synthesized into a proposed approach for replication statewide, including the following high-level principles:

1. Strengthen community capacity to lead in the energy transition
2. Address systemic barriers through a long-term framework rather than short-term transactions
3. Prioritize trust-building by partnering with mission-aligned organizations working with community interests in mind
4. Go beyond energy to also include community resilience, wellbeing, and economic development
5. Streamline customer adoption by moving from individual to collective decision making
6. Create the opportunity for community-centered local investment.

CHAPTER 1:

Introduction

1.1 Project Purpose

The Bassett Avocado Heights Advanced Energy Community (BAAEC) project aimed to understand and overcome the barriers to disadvantaged communities' (DAC) participation in the clean energy transition, by demonstrating how locally produced renewable energy can be deployed at scale and showcasing how local communities can be a key component of California's transition to a clean energy future. Conducted from July 2020 through June 2026 the implementation grant built on an earlier planning grant which ran from June 2016 to March 2018.

Rather than using an incentive-based approach, which supports the most ready and able households from across the state, this project took a community-specific approach to make the clean energy transition accessible to all. BAAEC was designed to be a long-term solution that addresses embedded challenges of access and affordability, so that adoption is equitable and inclusive. This approach is difficult at first, but is required to meet the State's goals for carbon neutrality.

1.2 Context and Background

Despite Southern California's substantial progress in supporting, commercializing, and deploying clean energy technologies, the region continues to struggle to upgrade its built environment, particularly within DACs. Although California's Title 24 Energy Code has improved new buildings' energy profiles, existing buildings continue to account for 40 percent of energy use and greenhouse gas (GHG) emissions.

Southern California's stock of the worst performing (pre-1978) buildings is often concentrated in DACs, where residents have the fewest resources to complete the retrofits themselves, there's a high rate of deferred maintenance, and the high percentage of households who are renters have no authority to make such improvements. These structural barriers (building age/condition, insufficient capital, and low home ownership rates) as well as programmatic barriers related to customer outreach and data limitations, have limited not only uptake of energy efficiency upgrades in DACs, but also access to renewable energy.

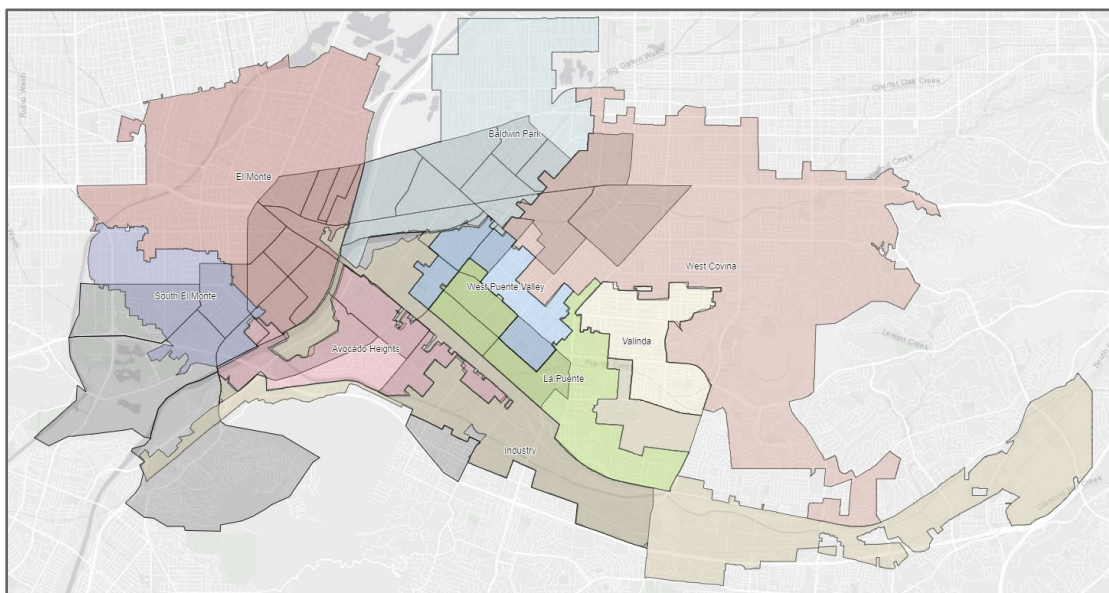
If barriers for low-income households in DACs are addressed, widespread adoption of AECs has the potential to become an equitable critical pathway to achieving the State’s statutory energy and climate goals.

1.3 Project Area

The project area started with the communities of Avocado Heights and Bassett, unincorporated areas of Los Angeles County, and grew to adjacent areas to encompass a total of ten communities. Three major freeways and the (now closed) Puente Hills landfill surround the project area. Residents are impacted by high levels of air pollution, including particulate matter, and ongoing concerns about harmful lead and arsenic emissions from the nearby Quemetco Battery Recycling Center. Located within the San Gabriel Valley, the BAAEC community is predicted to experience more than 40 additional days of extreme heat per year by 2050.

As the project got underway, the project team realized the need to expand the boundaries to facilitate enrollment of the target number of participants. The expanded area included the following cities and unincorporated communities (Figure 1): El Monte, South El Monte, City of Industry, La Puente, West Covina, Baldwin Park and unincorporated communities of Bassett, Avocado Heights, Valinda, and West Puente Valley.

Figure 1: Map of Final BAAEC Project Area



1.4 Project Goals and Metrics

The AEC Implementation grant funding opportunity established these project goals:

- Create a zero net electric community by providing local renewable electricity generation and battery storage to offset the annual electricity consumption of mostly low-income participants within DACs.
- Generate more efficient, resilient, and lower cost energy within the community.
- Enable DAC residents to access cost-effective renewable generation.
- Demonstrate that locally produced renewable energy reduces costs for the utility grid.
- Reduce GHG emissions and improve air quality in alignment with state and local goals.
- Promote social equity, environmental justice, and a more livable community.
- Demonstrate a successful model of integrated decentralized energy systems that can be replicated by other DACs.

The BAAEC Project aimed to understand structural and programmatic barriers and develop recommendations for replication and scale through:

- Comprehensive and authentic community engagement
- A suite of offerings related to building energy, resilience, community energy, and transportation
- Stacking of grant programs, rebates and incentives, and private dollars
- A no-cost program design for income-eligible households

Each project element included the following objectives and metrics (Table 1), which reflect adjustments approved by the CEC throughout the course of the project.

Table 1: Project elements, objectives, and metrics

Project Element	Objectives & Metrics
Community Outreach, Enrollment, and Workforce Development	<p>Inspire, educate, engage, and enroll community members through targeted community action strategies that include education, workforce development, and dissemination of energy saving tips and conservation tools.</p> <ul style="list-style-type: none">• Conduct outreach activities to engage project area residents and provide information on project offerings• Screen applicants for program eligibility and enroll participants to meet the goals listed for each technical element.• Provide turnkey and ongoing support to participants during upgrades of their home.

Project Element	Objectives & Metrics
	<ul style="list-style-type: none"> Enroll up to 40 general adults in a solar photovoltaic (PV) Installation Basics Training transitional employee program. Recruit project area residents and adults from within a 25-mile radius.
Advanced Homes	<p>Retrofit single-family homes with the following clean energy equipment and appliances:</p> <ul style="list-style-type: none"> Enroll up to 50 income-qualified homeowners to install rooftop solar PV and battery storage. Install HPWHs in up to 20 homes. Install electrification measures (gas-to-electric) in up to 20 single-family low-income homes. <p>Layer multiple incentives and grant funding sources to provide these offerings at no cost for income-qualified households.</p>
Prosumer Network	Conduct a simulation of local energy trading among Advanced Homes participants.
Community Solar	Implement a community solar project and enroll up to 235 participants, with at least 50 percent of subscribers meeting low-income requirements. Achieve zero net electricity status by offsetting 100 percent of the annual electricity consumption of enrolled participants over a 25-year period.
Microgrid Resilience Hub	Design a microgrid resilience hub to provide backup power in the event of a power outage.
EV Chargers	Increase the community's access to EV charging infrastructure by installing 30 Level 2 public EV chargers in the project area.
Car Sharing	Offer project area residents a new zero-emissions shared transportation program and the option to have an EV charger installed at their home.
Air Quality Monitoring	Test the capabilities of two emerging technologies to better understand current pollution conditions within the community.
Evaluation, Monitoring & Verification	Implement a cost-effective evaluation, measurement, and verification (EM&V) process to track, analyze, and report on the performance of the overall project and individual project components, and quantify outcomes.

Project Element	Objectives & Metrics
Case Study	Complete a Case Study report that documents the implementation experience, identifies lessons learned, and evaluates the potential replicability and scalability of BAAEC.

1.5 Audience

The primary audience sectors for this project's findings and best practices are local governments, CCAs, utilities, community-based organizations, and any other entity who is leveraging funding to develop similar projects and programs.

CHAPTER 2:

Project Approach

2.1 Introduction

Rather than being a research project to advance a specific clean technology, BAAEC is a deployment demonstration with a focus on non-technology solutions. The project explores what it takes to deploy otherwise commercially available technology in DAC communities and for low-income households. This project approach chapter covers the design and implementation methods used by the project team to deliver clean energy transition benefits with strategies that put the customer at the center (rather than the technology, market, or state's policies).

2.2 Project Partners, Advisors, and Other Participants

The BAAEC project involved dozens of partners serving in a variety of roles.

The project was led by **The Energy Coalition (TEC)**, a California-based 501(c)3 nonprofit with more than 50 years of experience designing and implementing programs and strategies that transform energy use and empower communities to take action.

TEC collaborated with the following core implementation team members across multiple project activities, including iterative program design throughout the project and project-scale strategy:

- Two CBO partners, who led community outreach and enrollment:
 - **Day One**, a 501(c)(3) nonprofit with a 38-year history of providing effective, high quality, and culturally appropriate outreach, education, and project development throughout the San Gabriel Valley.
 - **Active San Gabriel Valley (ActiveSGV)**, a 501(c)(3) nonprofit whose mission is to support a more sustainable, equitable, and livable San Gabriel Valley.
- **GRID Alternatives - Los Angeles**, who supported community outreach for solar PV, led residential solar PV and battery installations, and led workforce development.
- **California Center for Sustainable Communities (CCSC) at UCLA**, who led the AEC Phase 1 planning grant, and who conducted the EM&V and the Case Study Report for this Phase 2 implementation grant.

In addition to a Technical Advisory Committee and a Community Advisory Committee that provided guidance throughout the project, the project team included numerous other design and implementation partners, public agency outreach partners, as follows:

Key Design and Implementation Partners (a subset of major partners, not a comprehensive list)

1. Pivot Energy - Community Solar developer
2. Quality Conservation Services - residential battery and electrification contractor
3. Aclima, Inc. - ambient air quality monitoring
4. Sensor COMM Technologies, Inc. - tailpipe emissions air quality monitoring
5. Mobility Development Operations - operator for CarShare mobility program
6. EVCS - EV charging station installation developer
7. Swell Energy Inc. - residential battery installation developer
8. Perl Street - financing advisor
9. Urban Us Capital - lender for rebate bridge financing
10. Community Electricity.io, Inc. - Prosumer Network lead
11. DEXCO Energy - Prosumer Network simulation platform

Public Agency Outreach Partners

1. County of Los Angeles - 1st District Supervisor Hilda L. Solis
2. Bassett Unified School District (BUSD)
3. Clean Power Alliance (CPA)

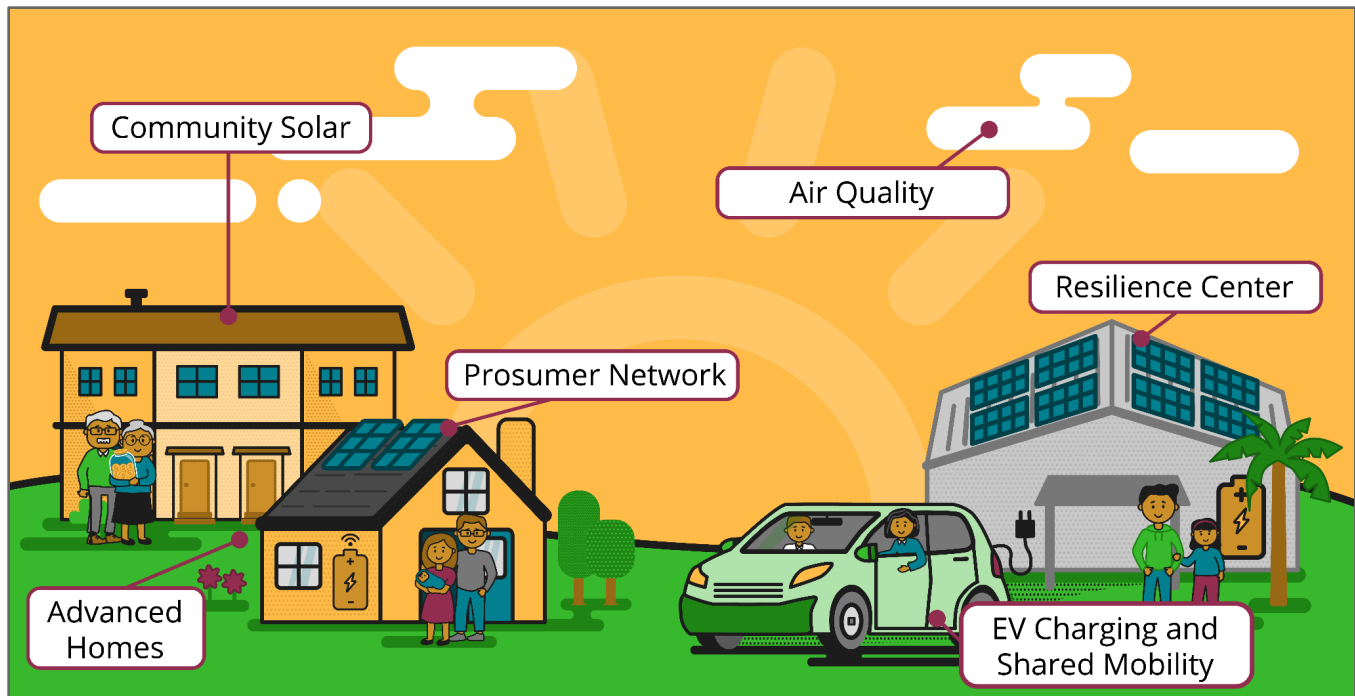
BAAEC secured complementing grant funding from the Los Angeles Cleantech Incubator (LACI) and TECH Clean California Quick Start Grant (QSG).

2.3 Project Design and Methods

The project used a portfolio-of-strategies approach to community energy transformation, focusing on low-income households and aiming to develop replicable models that can be scaled statewide.

Figure 2 shows the BAAEC program features in the project-branded imagery used on the website and for engagement/educational materials.

Figure 2: BAAEC Program Features



The following provides a high level overview of the design and methods. Further details are provided in the companion reports available at the [program website](http://www.AdvancedEnergyCommunity.org) (<http://www.AdvancedEnergyCommunity.org>).

Outreach, Enrollment, and Workforce Development

This cross-cutting component of the project consisted of three elements: brand development, marketing, and outreach; engagement and enrollment; and workforce development. The community-led outreach and wraparound customer support was guided by the following key principles:

- Build community through partnerships - not just in the early stages of program design but throughout implementation.
- Serve customers with turnkey and wraparound support.
- Approach community outreach with a diverse set of strategies.

Advanced Homes

Advanced Homes was the flagship program of the BAAEC project and a complex undertaking. A defining goal was to provide home retrofits at no cost to low-income project participants who met eligibility requirements. The program approach included the following aspects: incentive layering and grant funds stacking; bridge financing; screening for eligibility of

participant households and buildings; technical systems design for the rooftop PV system, battery storage, and electrification measures; and installation process sequencing and logistics. Incentive layering included leveraging the CPUC's Disadvantage Communities - Single-Family Solar Homes (DAC-SASH) program and its pre-paid power-purchase agreement model with GRID Alternatives as the implementer and Sunrun as the third-party-owner.

A single point of contact acted as a project manager to facilitate communications on behalf of the customer across other partners. The project team also conducted preliminary work related to dispatching battery power under a virtual power plant (VPP) design.

Prosumer Network

A Prosumer Network refers to a transactive energy market and associated technologies that allow participants ("prosumers") to produce, sell, and buy electricity among themselves. The BAAEC project included a Prosumer Network simulation that aimed to evaluate the potential for integrating Advanced Homes' solar PV, battery storage, HPWHs, and other energy loads, into a clean energy markets and settlement structure.

Community Solar

Community Solar was designed to implement a local, front-of-the-meter solar PV installation under the Clean Power Alliance's Community Solar Green Tariff, providing a 20 percent bill discount for income-qualified renters or homeowners. At the time of this project, the Community Solar program rules did not allow for the inclusion of battery storage.

Microgrid Resilience Hub

The goal of the microgrid resiliency hub was to build on the strength of existing community-based organizations to help people in Bassett and Avocado Heights adapt to multiple perils including heat waves, wildfire smoke, earthquakes, and more. The project aimed to equip an existing building within the community with solar and battery storage to guarantee critical community services such as cooling/heating relief in the event of a grid outage.

Electric Vehicle (EV) Chargers

The project aimed to install publicly accessible EV chargers at schools within Bassett Unified School District, to support community access to charging infrastructure and the electrification of light-duty passenger vehicles. Funding for EV chargers was provided through a combination of CEC grant funds and SCE's Charge Ready 2 program, which covered the entirety of the utility-side construction, as well as a portion of the customer-side infrastructure, and provided a rebate for the installation of the charging stations.

Shared Mobility

Over the course of the project, the BAAEC team explored three different shared mobility models: a vanpool, a microtransit program, and a car share program. While substantial effort was invested in all three models, only the car share program, called BAAEC CarShare, was able to be implemented. BAAEC CarShare was designed to increase clean mobility options for residents by giving them the opportunity to rent an EV without making a full commitment to purchase. The program also offered no-cost installation of home Level 2 EV chargers, and the ability to make the chargers available to the public, thereby expanding the network of charging stations in the community.

Air Quality Monitoring

In addition to advancing the clean energy transition, BAAEC sought to better understand current pollution conditions within the community, given that the project area has been long impacted by high concentrations of fossil-fuel combustion by-products. Technological advancements are enabling new approaches to monitoring pollution at a local scale, and BAAEC aimed to test the capabilities of two emerging technologies in a real-world setting: street-level monitoring, and measurement of heavy-duty vehicle tailpipe emissions.

Evaluation, Measurement, and Verification

The goal of the EM&V element was to provide a quantitative assessment of the results of the Advanced Homes and Community Solar programs. This element was led by The California Center for Sustainable Communities at UCLA. A technical plan for conducting the EM&V work was submitted early in the project timeline, but challenges encountered in implementing both of the programs significantly impacted the feasibility of this original approach, and therefore adjustments were made.

Case Study

In addition to conducting the quantitative EM&V analysis, the UCLA team also led a qualitative review of the project, referred to as the Case Study. This is an ethnographic¹ study of the project that draws upon interviews with project participants, analysis of project documents, and supporting data. The purpose of this ethnographic study is to collect and analyze data for the evaluation of the project, and to create a record of the project's history, with special focus on what lessons the project has to teach about the future deployment of renewable DER in

¹ Ethnography is the systematic study of individual cultures that involves the observation of individual cultures or groups by the researcher.

disadvantaged communities. Conducting this kind of research, and doing it well, will provide the state with a much deeper understanding of the social dimensions of the transition to renewable energy, ensuring that future programs and policies meet their equity goals.

The Case Study is published and accessible at the [program website](http://www.AdvancedEnergyCommunity.org) (<http://www.AdvancedEnergyCommunity.org>).

CHAPTER 3:

Results

3.1 Outcomes

1. Outreach, Enrollment, and Workforce Development

BAAEC established itself as a trusted community program, endorsed by public agencies and community organizations. The following accomplishments led BAAEC to be a familiar name for the community.

1.1. General Branding and Community Awareness

TEC led the general branding of the program and directly supported CBO outreach partners in their efforts throughout the term of the grant. TEC's key brand awareness accomplishments included:

- Developed a website in English and Spanish for online program enrollment.
- Developed more than 125 education and outreach materials, such as fact sheets, banners, and flyers, to build awareness and drive enrollment.

1.2. Project-Specific Community Outreach

Day One and ActiveSGV developed outreach plans for each project feature and conducted extensive outreach to enroll community members through events, workshops, canvassing, direct mailers, texts, and social media. They also screened hundreds of interested community members for program eligibility.

GRID Alternatives recruited 38 workforce development trainees and graduated 32. Of the recruits, 27 lived within the project area and 11 resided in the greater project region.

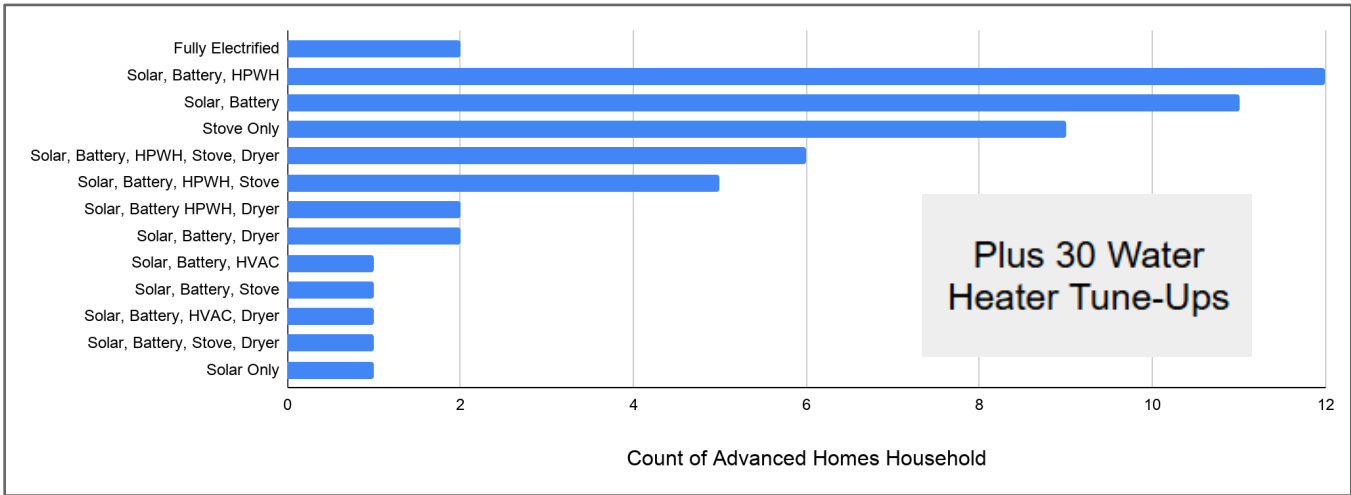
2. Advanced Homes

In total, the Advanced Homes program provided 46 solar PV systems, 45 battery storage systems, and the electrifications of gas appliances: 28 water heater to HPWH retrofits, 15 electric dryers, 10 air conditioning systems to heating and cooling heat pumps, and 21 retrofits of stoves to induction technology. Two homes were fully electrified. In addition, 30 other homes received tune-ups (discussed further below) for a total of 85 homes served.

In the process of installing these technologies, 26 homes required new roofs and 37 homes required main service panel upgrades. Fourteen of the panels required upgrades due to concerns about outdated and unsafe panels.

The specific mix of technologies installed for each home varied due to homeowner interest and feasibility. Figure 3 shows the mix of services completed for the BAAEC Advanced Homes cohort. The total number of participating homes is greater than the 34-home cohort included in the EM&V analysis, due the timeline requirements for the utility energy data request.

Figure 3: Quantities of Homes Categorized by Services Received



3. Prosumer Network Simulation

The simulation found an average of 9 percent reduction in household electricity costs relative to baseline tariffs (Table 2), with every home except one achieving net savings. (The one customer that did not achieve savings only lost a dollar.) Because the DEXCO platform used a learning algorithm to predict the day ahead load shape, there can be instances where the predictions did not meet the actual load shapes, and the anticipated trades did not align with the bill minimization goal. Further investigation is needed to pinpoint the actual intervals where the deviation occurred, and why defaulting to the otherwise applicable tariffs did not result in at least parity with the baseline.

Table 2: Results of the Prosumer Network simulation conducted by DEXCO

	A	B	C	D	E	F
Customer Index	Baseline kWh	Simulation net kWh (negative for imported and positive for offered)	Baseline bill (\$)	Simulation bill (\$)	Benefit in percent change in bill amount (%)	Number of trades
1	974	1,092	\$773	\$704	8.93%	11,004
2	1,630	912	\$677	\$522	22.90%	10,470
3	851	574	\$382	\$323	15.45%	17,609
4	1,207	151	\$447	\$448	-0.22%	24,901
5	5,171	50	\$1,213	\$1,077	11.21%	9,783
6	2,651	1,009	\$1,016	\$912	10.24%	10,935
7	6,005	346	\$1,178	\$1,134	3.74%	18,302
8	8,119	-767	\$2,091	\$1,944	7.03%	9,156
9	1,380	526	\$632	\$582	7.91%	9,275
10	8,603	-3,432	\$1,731	\$1,592	8.03%	9,340
11	10,632	-461	\$2,292	\$2,070	9.69%	18,978
Total	47,223	0	\$12,432	\$11,308	(avg) 9.04%	149,753

Column A shows the actual 12-month historic baseline of the prosumers after BAAEC upgrades, based on metered data from UtilityAPI. Column B shows the annual net exports or imports that resulted from trading between prosumers. Negative values represent imports, and positive values are exports.

As an example: Participant 1 offered or exported a net of 1,092 kWh to the simulated market and received better compensation than the NBT export rate. Participant 10 imported a net of 3,432 kWh from the simulated market at a lower cost than the retail rate.

Participants with negative values, importing from the simulated market, are pulling local resources and creating capacity in the grid.

Columns C through F show the monetized value of the transactions—this is the monetary value of the energy transacted in the prosumer network market. Column C shows the monetary value of the baseline bill—in other words, what households actually paid for their electricity. Column D shows the prosumer bill as a result of participating in the network after executing transactions. Column E shows the percentage that their baseline bill vs. post

simulation was changed due to participation. Column F is the number of trades executed over the year for each prosumer.

These data show that with the ability to access compensation and pricing for prosumer power within a network hosted by a local market maker, participants could average on the order of nine percent savings in volumetric electricity costs (not including the transmission and delivery system operator delivery costs) compared to a standard TOU-D-PRIME rate and NBT.

4. Community Solar

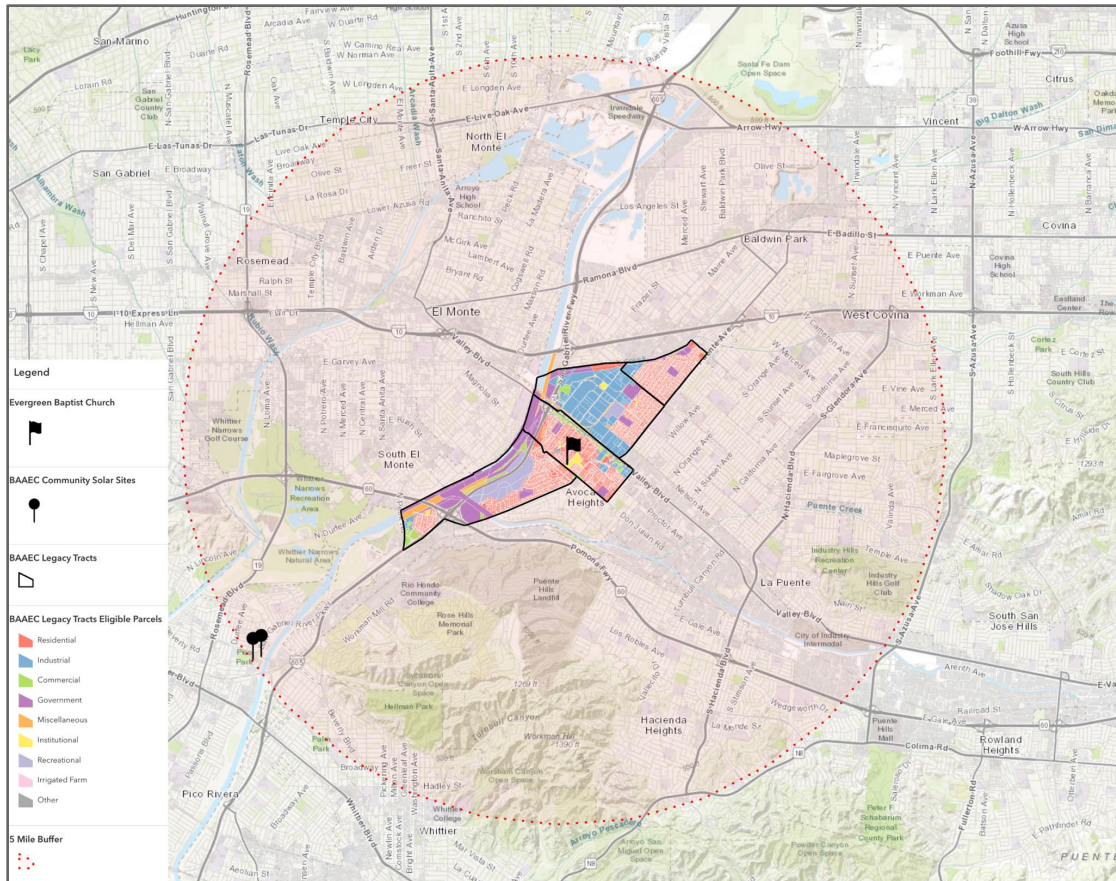
Withdrawal of the original host, Evergreen Baptist Church, from the project required the BAAEC team to initiate an extensive review of other locations for the Community Solar installation. This search was challenging due to numerous constraints and barriers including the CSGT program requirements, grid interconnection capacity limitations, and difficulties identifying and working with property owners. Note that CSGT required the site to be within a DAC census tract and within a 5-mile radius of where the subscribing customers reside.

The project team used the UCLA Community Solar Opportunities Map,² to look for publicly owned and community-serving sites, but found (through Pivot Energy) a willing site host in Extra Space Storage (ESS). They had two buildings across the street from each other located within 5 miles of the project area.

The two ESS sites are located at: (1) 9612 Beverly Boulevard in Pico Rivera (Pivot-Beverly), and (2) 4344 San Gabriel River Parkway (Pivot-San Gabriel), and are 400 kW-AC and 270 kW-AC respectively. Both sites are rooftop-based systems on existing self-storage facilities on industrial-zoned parcels (Figure 4), and are collectively referred to as the BAAEC Community Solar Project. The project is located in a disadvantaged community (DAC) scoring in the 85-90th percentile of CalEnviroScreen 3.0 and is within 5 miles of the BAAEC project area subscribers.

² [LA County Community Solar Opportunity Map](https://solar.energyatlas.ucla.edu/) ((<https://solar.energyatlas.ucla.edu/>))

Figure 4: Community Solar Census Tracts & Parcels, Sites, and CS-GT Boundary



With ActiveSGV leading outreach, the BAAEC team helped to enroll 400+ participants, exceeding enrollment targets. The CPA, as permitted by CPUC rules, allowed these participants to enroll and receive the 20 percent discount on their bills before the BAAEC project was brought online by allocating them to other existing green tariff projects, then moving them over to the BAAEC project once it was complete.

The final number of participants assigned to the Project by CPA was 360, with a total average metered annual consumption of 4,884 kWh (407 kWh/month). Accounts were reviewed individually by CPA and selected based on consumption to ensure alignment with the project size. Because CPA does not have information on owner/renter status of the customer, the project team was not able to determine the split between these customer types.

The project offtaker (purchasing the projects generation) is the CPA. For the distribution utility, Southern California Edison (SCE), the project went through the Wholesale Distribution Access Tariff (WDAT) Fast Track interconnection process. The project was required to comply with CAISO's new resource implementation (NRI) requirements. And to connect to the CAISO

Wholesale Market, the project needed to meet minimum size requirements. At the time of the project's initial proposal to CPA, that minimum size was 500kW (later lowered to 100kW to comply with FERC 2222). Because each of the two project sites was smaller than 500kW, but their collective size was 670kW, BAAEC chose to aggregate the two sites under CAISO's Distributed Energy Resources Aggregation (DERA) program. This was the first such aggregation for CAISO.

5. Microgrid Resilience Hub

The project secured utility interconnection approval and reserved more than \$321K in SGIP rebates. However, the Resilience Hub faced numerous challenges over the course of 45 months, including finding a suitable site, gaining commitment and approvals from the site host, and contractor personnel changes and associated schedule impacts. Ultimately, changes in state policy (from NEM 2.0 to NEM 3.0) altered the project economics and prevented the hub from being constructed.

6. Electric Vehicle Charging Infrastructure

Ten L2 chargers were installed at three BUSD school sites.

The following agreements created project delays; each required legal review from BUSD and formal approval from their Board:

- An **Easement** between BUSD and SCE - as the property owner, this is how BUSD grants SCE the right to install utility distribution equipment.
- A **Conveyance** between BUSD and SCE - this is a legal transfer of property, in this case - concrete pads in the parking lot for a dual-utility feed point. Provided by SCE, this feed allowed a second point of service from the transformer, and the conveyance meant that an equipment failure at that location would be SCE's responsibility to replace at no cost to BUSD.
- A **Site Host Agreement** (SHA) between BUSD and EVCS, for the latter to provide ongoing operation, maintenance, and billing for the chargers.
- An **Assignment and Assumption of Participant Agreement**, and an **Installation Agreement**, both between BUSD and EVCS, as required by BUSD's legal department.

The EV charger planning, design, and installation effort was a lengthy process. The technical decisions were straightforward, but challenges arose from the intricacies of SCE's Charge Ready program, the opaque process and response times for DSA permit approval (Table 3),

and the unanticipated timelines and requirements when working with an under-resourced school district.

Table 3: DSA Permit Application Timelines by Site

Site Name	DSA Application Received	DSA Application Approved	Number of Months to Approval
Van Wig Elementary	6/12/2024	3/11/2025	9
Sunkist Elementary	6/12/2024	5/9/2025	11
Bassett High	10/4/2024	6/6/2025	8

Despite the lengthy and difficult process, the learnings from this project are valuable. EV charging stations on school sites can bring tremendous benefits to both the school and the community. In addition to the income generated from site host revenue sharing discussed in Chapter 2, EV chargers are open to the public and allow school staff and nearby households to charge vehicles, making EV ownership feasible especially for renters and those living in multi-unit dwellings without access to home charging. Furthermore, workplace charging during the day, when renewables are a high percentage of grid power, minimizes GHG emissions and manages load in a way that benefits the grid. Recommendations for process improvements and transparency to facilitate widespread replication of this work are discussed in Chapter 4.

7. Shared Mobility

7.1. Early Progress

BAAEC CarShare secured its first two enrollments in November 2024. However, the program failed to secure any additional enrollments during the first half of 2025. To increase participation, the program revised the 2-month EV rental period to provide a choice of two, three, or four months. Despite these changes, the program failed to secure enrollments. The project team made additional program design changes to better meet the community needs.

7.2. Program Design Changes

The project team made the following changes to the program, effective September 2025:

- The eligible service area expanded to serve cities neighboring the project area.
- The EV rental fee was reduced from \$100/week to \$25/week (with a mileage limit of 500 miles/week and \$0.40/mile for additional miles).
- EV rental periods could range anywhere from one week to two months

- Participants were no longer required to install the Level 2 EV charger at their residence to rent an EV.
- EV chargers that were installed did not have to be publicly available.

As a result of these changes, the program experienced a significant increase in interest, which prompted the program to create a waitlist. The program steadily delivered services to participants through the end of 2025.

7.3. Program Participants

In total, ActiveSGV and TEC made more than 4,300 touchpoints and secured 175 sign-ups. The program screened 36 people for eligibility and 11 moved forward to participate in the program. Four participants received an EV charger and rented an EV, five only rented an EV, and two only had an EV charger installed. A total of six Level 2 EV chargers were installed, and nine EV rental terms were completed. Of the six homes where EV chargers were installed, two were equipped with solar PV and battery storage, which were provided by the BAAEC Advanced Homes program.

8. Air Quality Monitoring

The air quality monitoring elements were a relatively small component of the BAAEC project due to the project's focus on energy systems transformation and direct benefits to community households. However, it is important to quantify the non-energy benefits of the energy transition. Emerging technologies have the potential to increase our knowledge in this area and provide more granular data to augment other monitoring programs. Given the budget priorities for BAAEC, the team was only able to support proof of concept efforts for these emerging technologies. The results illustrate the challenges of conducting air quality monitoring at a local level in a way that is methodologically useful and statistically meaningful.

Due to differences in methodologies and length of monitoring period, the vast majority of the street-level and tailpipe measurements were not able to be compared directly to regulatory standards set by CARB or SCAQMD for purposes of determining regulatory compliance. Furthermore, both companies struggled to translate their monitoring results in a way that would be meaningful to the public. They needed more funding to support information sharing with the community that could guide the development of mitigation plans.

Despite these challenges, the project team has identified ways these results and technologies might be used to inform future efforts by air quality agencies or by advocacy groups with expertise in air quality science.

9. Evaluation, Measurement, and Verification Results

Full results can be found at [AdvancedEnergyCommunity.org](https://advancedenergycommunity.org) (<https://advancedenergycommunity.org/>).

10. Case Study

The case study is a stand-alone, publicly available report that serves as a companion to this Final Project Report and the Replication Toolkit.

3.2 Barriers, Best Practices, and Recommendations

The following is a brief and representative list of best practices and recommendations. A comprehensive list can be found in the Replication Toolkit.

1. Outreach, Enrollment, and Workforce Development

1.1. Building Trust

The project team assumed that free home upgrades would drive enrollment, but the community was generally distrustful of energy program offerings, unclear about where the funding was coming from, and skeptical about how home upgrades would benefit them.

BAAEC Experience: The project team learned that enrollment requires trust building and community empowerment. The process was slow and required more resources and time than anticipated. The team legitimized the project by partnering with trusted messengers: the local school district and the County.

Solution: BAAEC created a visible community presence by establishing a community advisory committee and iterated on outreach strategies with Day One and ActiveSGV, the project's community-based partner organizations. BAAEC also established a wraparound, concierge-like process as an enhanced customer service strategy throughout the grant term. This level of effort is needed to provide services in an inclusive and equitable manner.

Recommendation for Scalability: Leverage established community-based organizations to promote program services and consider co-branding with trusted organizations such as local governments and school districts to establish legitimacy. Use a mix of outreach methods (in-person visits, phone calls, emails, etc.) to humanize the experience for the homeowner. Ensure that staff can explain why a program exists, how it's funded, and very clearly describe to participants what it means to enroll and participate. When this is done effectively, it can

address the community's distrust. Build program flexibility that allows for people-first strategies, rather than rigid policy program drivers. Focus on educational outreach and the human connection, keeping in mind both the expected benefit for participants and what is being asked of them. Foster cross-sector collaboration for wraparound support, and acknowledge concerns even when a solution is not available.

1.2. Personal Connection

A large catalog of services and unfamiliar technologies represents a challenge in connecting with the community.

BAAEC Experience: It was difficult to grab residents' attention because the project had so many offerings. During the initial launch, the messaging was overwhelming for community members because it was complicated and new. It created hesitation that translated to a lack of participation.

Solution: The project team split the outreach scope between Day One and ActiveSGV, allowing each partner to concentrate on specific elements. The team delayed the introduction of project features to simplify messaging and developed new and improved marketing materials that focused on direct benefits. The team secured new funding to offer induction stoves, a tangible in-home fuel-substitution offering that participants engaged with more personally.

Recommendation for Scalability: Start with a simple approach to avoid overwhelming potential participants with all program services. Highlight top priority offerings, then once interest is expressed, introduce additional services.

1.3. Family-Based Engagement

Recognizing the best way to reach decision makers in intergenerational households.

BAAEC Experience: Community events, which the project team initially relied on for outreach, were primarily attended by a younger generation: parents with young children. While parents paid the utility bills, the homes were often owned by grandparents, who were the decision-makers for the types of major renovations offered by the project.

Solution: The project team pivoted to using mailers that reached older homeowners who had the legal agency to take action for home upgrades. The team also established a clear single point of contact for each participating home to streamline communication and avoid confusion.

Recommendation for Scalability: Understand the demographics of the target community,

and who would most likely be eligible/benefit most from program services, to tailor outreach efforts. Then use that information to integrate multi-stakeholder engagement strategies to reach leads that have the authority to enroll. The goal is for engaged leads to provide program referrals via word of mouth.

1.4. Communicating Sufficient Information for CBO Partners' Outreach Efforts, While Being Transparent About Program Design

BAAEC Experience: The project timeline required that outreach to prospective participants begin while the technical specialists on the project team were still working through some program details. Challenges with finding partners, stacking incentives, and establishing rebate bridge financing delayed program finalization. Residents had detailed questions that could not yet be answered, which put CBO staff members in an awkward position, potentially undermining their credibility.

Solution: In addition to sequencing the program offerings, to allow more time for details to be worked through, the project team developed and provided technical fluency training to better enable CBOs to talk about the technologies, how they were being funded, and what the benefits would be, even before all program details were worked out.

Recommendation for Scalability: Equitable decarbonization requires institutional capacity building and not just program deployment. A technology knowledge base/101 training for outreach staff is a best practice at the beginning of any new program so they are able to clearly and accurately communicate benefits and technical aspects of program services. Furthermore, project circumstances may require additional guidance or technical knowledge-sharing to ensure that CBOs can connect with potential participants without risking their credibility. Program implementers must be sensitive to the potential impact of the project on community members' perceptions of organizations on the front lines of outreach.

2. Advanced Homes

2.1. Despite being free, participants go through a time-intensive journey and need hands-on and concierge-like support

BAAEC Experience: BAAEC layered various energy programs to create the Advanced Homes package, which needed the coordination of several different contractors. This tested the patience of many participants as their installations took longer than expected, with many more contractor touchpoints. The team did not originally anticipate that TEC staff would be strongly involved in personalized, guided assistance. TEC staff had to expend significant time and resources to be a point of contact for participants.

Solution: The team held weekly meetings with each installation partner to review installation status and support homeowner outreach. The outreach staff adjusted messaging to help manage participant expectations, developed collateral to explain the roles of each program partner, and centralized project scheduling and communication through a single point of contact for the homeowner, available via phone, email, and text messaging.

Recommendation for Scalability: Provide a clear roadmap ahead of enrollment to communicate steps and timeline, and be clear about the time investment that will be required. Stay in frequent communication, even when no specific milestone is achieved. Be very clear on what is under the program control, and what is not, especially when relying on other funding sources. Budget enough staff time to provide wraparound, concierge-level support for participants. Provide accessible and clear roles and responsibilities across implementation partners. Expect and plan for the buy-in process to be iterative and not one-time.

2.2. Deferred Maintenance and Solar/Decarbonization Home Readiness Costs.

BAAEC Experience: Twenty-six participants required roof upgrades to accommodate solar. Thirty-six participants required main service panel upgrades to accommodate solar/battery, primarily due to concerns around panels by certain manufacturers that were deemed unsafe.

Solution: The team had to identify funding to cover re-roof costs and increase the investment of time to do roof replacements, which caused project delivery delays. The team used CEC grant funds to pay for roof upgrades so that they could be suitable for rooftop solar PV. Roof work included both full replacements and partial replacements, where only the solar impacted area received a new roof. The team stacked rebates to help cover main service panel upgrades.

Recommendation for Scalability: Provide additional funding in equity programs to account for structural upgrades and home remediation needed to install solar PV and battery storage. Look for partnerships with other health and safety programs and with roofing industry trade associations, where work on sizing the opportunity for upgrades across communities can happen. Develop model performance specifications and best practices for the use of smart load management alternatives. When the existing panel is to code and otherwise safe to remain in place, these smart 'load sharing' technologies coordinate when and how appliances in the home draw power. These strategies are new to many contractors and technologies are continuously improving. Therefore, a concerted effort to share best practices is required to ensure these solutions are accessible.

2.3. Managing Funding and Incentive Stacking with Reimbursable Rebates

BAAEC Experience: Because SGIP reimburses battery storage expenses only after installation and has a long (several months) and uncertain wait time, the project needed a way to cover the upfront costs. And, because each rebate and grant had its own timeline and requirements for contractors, the project faced added complexity and delays from working with extra partners.

Solution: TEC established a bridge financing program with private dollars borrowed against the anticipated SGIP funds and managed several sequences of work across home upgrades. Concierge-level customer support became a critical function. Contractors agreed to unusual implementation practices. For example, site photos and inspection reports from one contractor were used to design and permit another contractor's work.

Recommendation for Scalability: Incentive programs need to consider that homeowners, especially those that are low-income, cannot afford to bear the upfront cost of a rebate and cannot wait until reimbursement. These programs should consider partnering with bridge financing companies to alleviate this burden from homeowners, or develop other program approaches to remove this barrier. Similarly, small, local contractors with limited cash flows cannot be expected to cover the upfront cost and wait for the rebate reimbursement. When rebate programs are designed for implementers with more resources, it creates a competitive disadvantage for smaller, local contractors. Stacking rebates can be streamlined with transparent equipment performance specifications, contractor training, and by building performance-based contractor networks that emphasize standardization, upskilling, and peer-learning.

2.4. Unpermitted Structures at Participants' Homes

BAAEC Experience: Unpermitted structures directly affected the feasibility of solar PV, battery storage, and electrification projects. Structures such as patios, home extensions or modifications that were completed without obtaining city permits made homes ineligible to participate in BAAEC. This program policy was put in place to avoid unintended consequences such as fines or forced changes to the home to meet building and safety code compliance.

Solution: The BAAEC team notified participants of the unpermitted structures on site and the need to resolve the issue before proceeding with solar PV/battery projects. BAAEC would also consult contractors to provide recommendations/next steps to participants for resolving issues with unpermitted structures.

Recommendation for Scalability: Revise protocols for inspections of solar, battery, and heat pump installations to focus solely on the retrofit at hand, rather than looking for unpermitted structures, except for imminent safety issues. Recognize that this is a major barrier to the clean energy transition in low-income households, and an equity issue.

3. Prosumer Network Simulation

3.1. Specialized Installation and Commissioning Requirements for Emerging Smart Home Energy Monitoring Hardware and Software

BAAEC Experience: The installation of prosumer monitoring nodes (eGEO CT nodes) was delayed due to the limited availability of contractors familiar with current transformer (CT) placement in complex legacy residential panels. Node design and installation required electrical contractors who understood both DER systems and data monitoring hardware—a combination that proved rare in the local contractor market.

Solution: To minimize installation and equipment failures, the program team conducted pre-training, provided clear instructions, and sent program staff into the field for the first day of node installations. In subsequent installations, the program team diligently ensured the nodes were transmitting data, and when they did not, the team followed up with contractors to provide feedback on incorrect or incomplete installations.

Recommendation for Scalability: This broader market challenge requires both plug-and-play nodes and, more importantly, increased exposure of various contracting trades to the installation of smart home energy monitoring hardware and software. Node installation should be paired with DER installation scopes, leveraging contractors already on-site for solar, storage, or electrification work. Program designs should include explicit scope language for node installation, commissioning, and data validation, rather than treating it as an ancillary task.

3.2. Limited Access to Real-Time Utility Meter and Device-Level Telemetry Data

BAAEC Experience: Distinct data access constraints limited the team's ability to deliver on the original real-time simulation vision:

- **Device API Access:** Obtaining over-the-air API connections to DERs was cost-prohibitive or unavailable from manufacturers. Rheem did not offer a project-level API for heat pump water

Recommendation for

Scalability: Any new smart meter deployment must be regulated in ways to remove IOU exclusivity on building data ownership and access. Additionally, programs that value and utilize direct insights

heaters. Tesla required expensive commercial arrangements. Sunrun/Swell inverter telemetry failed to materialize as Swell entered bankruptcy and Sunrun ended its GRID partnership. Without device-level telemetry, the team could not enable device-specific data collection or optimization strategies.

- **Utility Data Instability:** Utility data access via UtilityAPI was fragile due to multi-factor authentication (MFA) interruptions and customer data-sharing concerns. Not all participants had online utility accounts, language barriers on utility websites created friction, and participants had general privacy concerns about sharing data. When customers began using their DERs they moved to a different tariff, triggering the need to reset UtilityAPI data authorization.
- **Lack of Electrical Distribution Grid Data:** Publicly available electrical distribution grid data was limited and further information was unobtainable from SCE. Volt-VAR sensitivity data—which is needed to assess the locational value of DER siting and operations for grid services—is not included in SCE's Integration Capacity Analysis maps.

Solution: The team diversified our methods for collecting the necessary data across these challenges. When the main service panel could accommodate CTs, the node takes precedence for collecting whole building data. When the panel could not accommodate the CTs, the team used UtilityAPI.

from appliance level data, which is customer-owned and not contested (currently) by IOUs, should be explored for program and dynamic pricing purposes. Device manufacturers should be required to provide project-level API access as a condition of eligible equipment listing for incentive programs. Distribution grid data (including volt-VAR sensitivities) must be made available through ICA maps to enable DER siting that supports grid services.

3.3. Absence of a Local Energy Market and Unresolved Pricing and Settlement Structures for Transactive Energy

BAAEC Experience: No local energy market exists in California through which households can directly buy and sell electricity, requiring the team to conduct a simulation

Recommendation for Scalability: CPUC and CEC should establish a regulatory

rather than a live market. This constraint surfaced several unresolved structural questions that would need to be addressed before a live prosumer market could operate:

- Energy procurement charges on bills only represent one-third of the total retail rate, with the remaining two-thirds consisting of T&D charges including line losses, reliability reserves, and planning reserves. It remains unresolved how prosumer transactions settling at the meter in real time, producing power only using the distribution grid would interact with or avoid these cost recovery mechanisms.
- A fundamental pricing mismatch exists between how prosumers are compensated and how grid-scale energy is valued. Prosumers sell at the retail price while grid-scale energy settles at the Locational Marginal Price (LMP) or Load Aggregation Point (LAP) prices, with the only exception being Participating Load that can respond directly to a CAISO real-time dispatch. The price signals between retail, wholesale, and the avoided cost calculator are not aligned, nor do they reflect local grid conditions. However, these are the realistic prices that can be transacted today, without the creation of a new volumetric tariff at the CCA level.
- The ACC DAC adder governing export compensation for low-income participants was found to always exceed the LMP at the nearest pricing node—the inverse of what one might expect. The DAC adder must also be calculated separately from the PRIME rate, adding administrative complexity for program administrators and participants.

pathway for community-scale, price-bounded local energy market pilots, including clear guidance on how transactive energy settlements interact with T&D cost recovery and IOU tariff structures. A CCA may be the most viable near-term vehicle for piloting tariff-based local energy market structures.

4. Community Solar

4.1. Site Host Commitment: Change of Site Host for Community Solar

BAAEC Experience: Delays due to the need to search for a new site host.

Solution: We searched for a new site with the help of publicly available property information and the state-funded Community Solar Opportunities Map, created by UCLA. Ultimately, however, the new site was identified by the community solar project developer through their industry relationships with property owners.

Recommendation for Scalability: Expand existing efforts that create programs and update regulations to increase the value of distributed solar. State agencies should ensure that there's a strong market signal for more distributed solar. In addition to an enabling regulatory environment, state agencies can partner with solar industry associations to commission research and develop tools that help quantify the opportunity. In turn, industry can undertake public campaigns that target large property owners, through which education around the opportunity to leverage available roof space can be made. By taking these steps to build the market and engage stakeholders, site hosts will be approached with clear, credible, and certain offers that they can respond and commit to.

4.2. Interconnection: Delays with Utility Interconnection Approval

BAAEC Experience: Significant delays in obtaining confirmation of Southern California Edison's (SCE) interconnection Fast Track eligibility forced BAAEC to participate in two competitive solicitations (requests for offers) from the Clean Power Alliance over a two-year period.

Solution: We invested additional project resources in a second competitive solicitation from CPA. Using the same interconnection application a year later helped to overcome this barrier.

Recommendation for Scalability: Design a flexible, two-stage competitive power procurement process through which developers can reserve the opportunity for a formal bid once utility interconnection feasibility and eligibility are confirmed. Developers can better manage the pre-development expense to the probability of securing a project power offtaker with flexible and/or staged competitive procurement. Program funding and schedule milestones should similarly allow for any flexibility that encourages developer participation. Without these changes, interconnection delays will cause projects to be either unviable and not built, or to charge more for electricity to cover the additional costs.

4.3. CPUC Community Solar Program Requirements

BAAEC Experience: CS-GT requires local public agencies, as the community sponsor, to work with the community to identify project site preferences and to do outreach to generate community interest in community solar, but this work was not funded. Battery storage was not allowed, reducing the value of the installation for reliability, resilience, dispatchability, and RA benefit.

Solution: BAAEC enlisted the help of the school district to serve as the project's community sponsor and used grant resources for enrollment outreach.

Recommendation for Scalability: Revise Green Tariff program requirements. Although the CPUC's 2024 changes to the Community Solar Program discontinued the CSGT model, these two issues were partially resolved through revisions to the DAC-GT model, which now allow for automatic enrollments and permit battery storage. More generally, the CPUC should continue to invest in community solar programs using regulatory and program implementation best practices from other states, where the market for community solar has been successful. The CEC should evaluate a finer granularity in their land use screens for urbanized and the built environment to maximize community scale DERs into the resource planning process. Deploying community DERs avoids transmission losses and lowers the need for rate-based capital investments that would otherwise be needed to increase grid capacity, and can be deployed faster than long-lead time assets typically required in transmission and CPUC distribution planning.

4.4. Community Solar Rules Should Leverage Demonstrated Aggregation For CAISO Interconnection

BAAEC Experience: The Project was required to comply with CAISO's new resource implementation (NRI) requirements. Substantial costs and delays resulted from the process of determining the terms of agreements, and roles and

Recommendation for Scalability: The CAISO minimum size has been lowered to 100kW since the time that the BAAEC Project was undergoing interconnection. However, CPUC discontinued the CSGT program (which had no minimum project size), and only DAC-GT remains, which has a 500kW minimum size. That change limits the number of sites that can be used for community solar and renders the CAISO change irrelevant with respect to supporting community solar interconnection under the DAC-GT

responsibilities across parties, because it was being defined for the first time. The project effort took four full years, from 2021 to 2025.

program. The CPUC should not set project size limits and instead, leverage the minimum size and aggregation requirements already in place by CAISO. In other words, the CPUC funding should not create programs that are more restrictive than the CAISO. Instead, it should act as a catalyst and build a market that supports the aggregated DER participation model enabled by FERC Order 2222.

5. Microgrid Resilience Hub

5.1. Local Government's Undefined Role in Community Energy Resilience

BAAEC Experience:

The County stakeholder buy-in and decision-making process was hindered by the lack of a specific mandate to plan for local energy and community resilience.

Recommendation for Scalability: Integrate local clean energy into local government planning. In addition to engaging with zoning, land use, public space, stormwater, housing, building codes, forestry, and economic development, local governments should specifically build local energy planning capacity and support carbon-free energy projects that enhance energy resilience and affordability. Local clean energy projects, such as community microgrids and community solar, can power neighborhood-scale critical services and generate community-wide savings on customer bills. Recommendations include:

- Fund and develop internal energy planning capacity
- Develop partnerships with organizations advocating for local clean energy
- Establish collaboration with internal department leads responsible for addressing local energy adjacent issues, such as zoning, building codes, etc.
- Collaborate with other local governments for knowledge sharing and best practices around local clean energy. For example:
 - Types and applications of local clean energy, including information on benefits, costs, and deployment challenges.
 - Technical, Policy, and regulatory obstacles
 - Availability of resources such as technical assistance, funding, and best practices
- Work within applicable Regional Energy Networks and CCAs

to leverage existing programs and efficiencies

5.2. Procurement: Lengthy, Competitive Public Procurement Process

BAAEC Experience: The County required full designs before they would put the project up for board approval. The County's strict policies around sole-source projects also create project delays.

Recommendation for Scalability: *Streamline lengthy approval processes in collaboration with other public agencies.*

- Develop master power purchase agreement templates with generally applicable language that can streamline the approval process, with site and project specifics in a separate addendum that can be more easily reviewed.
- CCAs, as public agencies and direct beneficiaries of the demand flexibility offered by microgrids, should lead competitive procurement and financing solutions on behalf of local governments and non-profits with community-serving facilities.
- Local governments, CCAs, or program administrators (on behalf of, for example, non-profits with community-serving facilities) should create a preapproved contractor or vendor list, share knowledge on specific procurement options, develop related language and resources (e.g., legal opinion review letter) on needed procurement paths such as sole source justification, and develop templates for letters of support addressed to the jurisdiction overseeing the project site.
- Proactively identify and address long-lead time and product availability issues

5.3. Uncertainty Around the Host's Ongoing Responsibilities and Associated Costs

BAAEC Experience: The Church and BUSD both cited uncertainties about public access in their explanations for leaving the project. The Church and BUSD's operational scope did not completely align with the project's. Neither site host found the financial benefits of solar plus battery storage a sufficient compensation for the risks and responsibilities they would have assumed as the host of the Resilience Center, resulting in cancellation of the project.

Recommendation for Scalability:

- Define public use and facility access requirements from the start.
- Provide details on the ongoing operation and maintenance of the resiliency hub. Project developers must provide details on plans for the resiliency hub's operations, maintenance, and hand-off during the site and sitehost vetting phase. Program

administrators should add an O&M hand-off plan requirement to grant-funding opportunities. The hand-off plan would outline details on the full transition of ownership and responsibility for continued operations after the grant term length has expired. The end result would be a self-sufficient resiliency hub with established standard operating procedures and staff prepared to deploy resiliency services to the community.

- For sites operated by non-profits in the community, grant funding opportunities must support both resilience hub community-building activities year-round and the services provided during grid outages and during emergency operations. For resilience sites at municipal facilities, local governments' community services and emergency response services should be explicitly budgeted to support community resilience.

6. Electric Vehicle Charging Infrastructure

6.1. Challenging Economics for EV Charging Infrastructure

BAAEC Experience: EV infrastructure installation requires significant upfront costs, including permitting, utility design, construction, and equipment. These costs cannot be recuperated until well after the planning and installation phase, when revenue can finally be realized from charging sessions and LCFCs credits. Due to these high upfront costs, many public agency or community site hosts cannot participate in the clean transportation transition, despite their interest, unless economic assistance is provided. For the BAAEC installation, the willing site host, Bassett Unified School District, was not able to provide any funding toward the EVI installations – the BAAEC grant covered all out of pocket costs.

Solution: The project team spent upfront time and resources identifying additional funding opportunities beyond the BAAEC grant. Ultimately, the decision was made to use Southern California Edison's Charge Ready program to cover the infrastructure costs so that grant funds could be used for equipment and installation labor. Utilizing Charge Ready resulted in a no-cost installation of the infrastructure, although it did not cover charging equipment.

Recommendation for Scalability: Additional EVI funding must be made available to public agencies and disadvantaged communities to participate in the clean transportation transformation. Bridge funding is required to cover the upfront cost and make EVI accessible in DAC communities. Funding should also support technical assistance for under-resourced site owners throughout the process. Without this comprehensive support, public charging infrastructure will continue to be limited in DACs, reducing uptake of EVs.

6.2. Identifying a No-Cost, Turnkey EVSE Provider

BAAEC Experience: With the goal of having a no-cost offer to the site host, the BAAEC project team needed to find an EVSE partner who had a compatible business model. This delayed project implementation as the team spent time working through two partners, Greenlots (Shell Recharge) and EV Connect, whose business models did not meet the needs of Bassett USD, before deciding on Green Commuter/EVCS.

Solution: The team found a third partner with the right business model. EVCS was able to provide BUSD with a turnkey third-party-owned model that does not require any upfront funds, minimizes administrative burdens on BUSD staff, covers O&M, and can wait to receive the utility rebate as a form of payment. BAAEC worked with EVCS to comply with SCE Charge Ready requirements and streamline rebate processing.

Recommendation for Scalability: We recommend promoting and vetting more turnkey business models to support EV charging with hosts that do not have the means to pay out of pocket and would otherwise not serve as hosts for DAC or priority communities. IOUs should continue funding programs such as Charge Ready (SCE) and Power Your Drive (SDG&E) to provide streamlined utility extension work for EV charging stations.

6.3. Division of the State Architect (DSA) Unclear Procedures and Long Permit Review Timelines

BAAEC Experience: Unique to working with a public school district, the authority having jurisdiction (AHJ) for these installations is the DSA. Throughout the project, there were unanticipated delays as DSA approval was needed at more steps than were planned in the original timeline. Beyond issuing permits, DSA approves pre-construction kickoff forms and does multiple inspections throughout the construction process.

Recommendation for Scalability: A clearly defined process overview for EVI installations by DSA would be a valuable tool, allowing for more accurate and efficient planning. In addition, we advocate for streamlined EVI permitting procedures, per CA AB 1236 (2015) and AB 970 (2021) to expedite the planning stages of these installations.

3.3 How Results are Being Shared

Table 4 lists public outreach, presentations, panel discussions, and publications have increased awareness of the project work to a wide audience:

Table 4: Project Knowledge Transfer Activities

Date	Knowledge Transfer Activity
October 2021	The Climate Center Community Resilience Planning - Community Asset Mapping workshop
November 2021	Behavior, Energy & Climate Change (BECC) Conference (Session 2D: Advanced Energy Communities: Exploring the Future of Energy through Community-Scale Solutions Models)
April 2022	California Efficiency + Demand Management Council (CEDMC) Spring Symposium (Session #1)
May 2022	IEEE Power & Energy Society (PES) / Gridwise Architecture Council (GWAC) Transactive Energy Systems Conference and Workshop (Session 2, Regulatory Perspectives)
June 2022	International Energy Agency (IEA)'s Global Observatory on Peer-to-Peer, Community Self-Consumption and Transactive Energy Models (GO-P2P)
August 2022	American Council for an Energy-Efficient Economy (ACEEE) Summer Study - Paper and Oral Presentation: Building Advanced Energy Communities, One Community At a Time
October 2022	LACI Fall Power Day (Panel: Accessing Virtual Power Plants: Who is Currently Participating?)
November 2022	CalPlug Workshop, University of California, Irvine (Addressing Equitable Electrification through Advanced Energy Communities)
November 2022	Smart Grid 2022 Conference (Panel - Regulatory Barriers to Transactive Energy)
November 2022	California Building Energy Modeling (CalBEM) Conference. From BEMs to SLEMS (Smart Local Energy Markets)
February 2023	International Energy Agency Global Observatory on Peer to Peer Energy Trading (GO-P2P) - TEC hosted an international meeting in Santa Monica
May 2023	MyGBCE Conference (workshop)
September 2023	EPIC Resiliency/Reliability Workshop

Date	Knowledge Transfer Activity
October 2023	Decarbonizing California Communities of Concern: Presentation to Buildings Action Coalition (Presentation)
October 2023	CEC EPIC Annual Symposium (Planery)
October 2023	CEC/EPRI Electrification Summit (poster)
November 2023	Behavior, Energy & Climate Change (BECC) Conference - Equitable Decarbonization and a Just Energy Transition for Low-Income Households: Barriers and Solutions (panel)
August 2024	American Council for an Energy-Efficient Economy (ACEEE) Summer Study - Paper and Oral Presentation: Delivering on Equity by Decarbonizing Low-Income Homes as part of a Multi-project Approach for Resilient and Healthy Communities
August 2024	American Council for an Energy-Efficient Economy (ACEEE) Summer Study - Paper and Oral Presentation: From Loading Order to Loading Lanes: Rethinking the Energy Transition and Unlocking Smart Local Energy Markets for Communities of Concern
August 2024	TECH Clean CA Quick Start Grant (QSG) - Designing Inclusive and Comprehensive Electrification Programs
October 2024	CEC EPIC Annual Symposium (Video)
April 2025	NBI Getting to Zero Forum: Inspiration from the field: how to both go slow and build trust with community but move fast and scale in the journey toward climate resilience and clean energy adoption (Panel)
June 2025	California Alliance for Community Energy (CACE) - Statewide Call: Community Solar: Lessons from the State's First, Multi-Site System
July 2025	16th Annual California Climate & Energy Forum: Making Community Solar Work in California: Lessons from the State's First Small Multi-Site System
February 2026	Advanced Energy Communities (AEC) Symposium: Spotlight on the CEC's AEC Challenge (Implementation Grants)
March 2026	34th CivicWell Policymakers Conference: Transformative Neighborhood-Scale Energy Solutions
April 2026	GridWise Architecture Council (GWAC) - Face-to-Face Meeting

Date	Knowledge Transfer Activity
May 2026	The California Efficiency + Demand Management Council (the Council) Spring Symposium: Transformative Community-scale Energy Solutions

CHAPTER 4:

Conclusion

4.1 Project Importance

The Bassett Avocado Heights Advanced Energy Community (BAAEC) project is one of the first comprehensive, long-term, community-focused energy projects in California. It provides deep insights into what it takes to advance the clean energy transition in low-income, under-resourced communities.

4.2 Project Benefits

The following summarizes direct customer benefits across program elements and related broader impacts.

- **Advanced Homes**
 - Customer benefits: 35 percent average reduction to combined energy bills, increased electricity reliability and home resilience, improved air quality and quality of life.
 - Macro impacts: Load flexibility with battery and programmable appliances reduces coincident peak for the utility.
- **Community Solar**
 - Customer benefits: 20 percent reduced bill for participants, including renters
 - Macro impacts: Local generation with less system loss for greater efficiency
- **Prosumer network**
 - Customer benefits: Simulated average of 9 percent bill savings on electric bills
 - Macro impact: A submarket that accounts for local power can reduce long-term procurement of utility-scale power
- **EV Charging Infrastructure**
 - Customer benefits: Supports switch to EVs with lower-operating costs
 - Macro impact: Grid benefits from daytime charging
- **Car Sharing**
 - Customer benefits: Opportunity for EV adoption to reduce transportation costs and potential revenue from sharing charger with community /neighbors

- Macro impact: Less internal combustion cars on the road which improves air quality and pollution-related healthcare costs

4.3 Project Policy Implications

Authentic Community Outreach is Essential

Because participation in California's energy transition is voluntary, and because changing one's relationship to energy means moving to a new and less-understood risk landscape, outreach staff needed to explain how the retrofit would happen and describe the benefits and costs of participation. BAAEC's experience shows that future **residential decarbonization programs for disadvantaged communities should address the social, political, and economic aspects of energy transition honestly** if they are to be seen as credible and desirable. Eliciting participation is about more than providing bill savings and resilience benefits. Project participants needed to be assured that the project was "real," and their participation depended on the willingness of outreach staff to talk with them about the costs, benefits, and risks of participation. Community outreach and engagement work should be recognized as the kind of specialized and professional labor that it is. There's no magic budget number that applies for all community work; instead, BAAEC's recommendations take a more comprehensive lens: 1) wraparound community engagement that breaks down programmatic silos and puts all of a participants needs first, rather than the offering of a particular service or program (to unlock more energy and resources), 2) do not ask how can community participate but instead, ask what resources do they need (articulating a shared, community-led priority will translate to sustained engagement for broader impact), 3) consider community engagement as critical project development and community readiness for investment (when seen as project development, as laying the groundwork for community investment, community engagement can be adequately funded).

Maximizing Distributed Power

Regulatory limits on how much behind-the-meter generation can be produced at any one site are counterproductive. Most of the program's participant homes were able to achieve net-zero status, but only for a minority of the months in their respective post-implementation periods. For many of these households, this was likely due to the addition of new electrical loads associated with fuel-substitution. Current PV system sizing guidelines are oriented towards netting-out historical energy demands, but they could be incentivizing grid-participation and increasing the value of these systems to both homeowners and the grid.

Similarly, there is enormous, unrealized potential for community solar in California. The consensus among solar developers and energy policy professionals is that the State's community solar programs lag behind those of others. Firms that are active in this space point to a regulatory cause: the CPUC was not interested in community-scale, in-basin solar and storage because its leadership is aligned with the investor-owned utilities, who envision a centralized approach to growing renewable generation and storage capacity. Regardless of whether this explanation for the CPUC's recent decisions regarding community solar is correct, the fact remains that community-scale solar and storage is "policy-dependent". Developers' decisions to pursue more community scale projects in California will depend on whether the state can "get the policy right," and create a landscape of opportunity for investment more favorable than the existing one.

Valuing Local Electricity

We have observed how policy changes like NEM 3.0 diminished the potential benefits of rooftop solar to low-income customers. One way of increasing the benefits is to change how we value electricity from distributed renewable energy systems. Local generation and storage of electricity has certain advantages over long-distance, bulk transmission of electrical power, and it is possible to measure the magnitude of these benefits and fold them into dynamic or static calculations of the dollar value of electricity. A re-valuation to include the full spectrum of benefits afforded by local generation and storage is needed.

Customer-Centered DER Solutions

When clean energy systems are designed to benefit the grid, it subordinates the prerogatives of users/ owners of DERs to those of the managers of grid infrastructure. Alternatively, designing residential solar and storage systems so as to maximize customers' benefit means reducing the systems' sensitivity to grid conditions. Customers need to be empowered to make decisions about whether to dispatch their systems for the benefit of managers of grid infrastructure. Fuel-substitution measures such as HWPHs and induction stoves can confidently deliver significant reductions in overall customer energy expenditures and net-GHG emissions when implemented in conjunction with solar PV and batteries. But, clarifying the benefits and incentivizing grid-participation by DER owners to simultaneously provide individual and grid infrastructure value should be a topic of more research.

Virtual Power Plants (VPPs) are a perfect space to showcase a higher value of local energy, but VPPs are also private networks of great technical complexity, and they are owned and operated by private firms whose interests might diverge from those of their customers and

regulators. We should consider more comprehensively how VPPs can serve low-income electricity consumers, especially the trade-offs between economic dispatch and household resilience, and the trade-offs between legal/contract terminology and the need for transparency and clear communication to participants.

Recognizing the Limitations of Private Sector Involvement

The comprehensive transformation of low-income and DAC communities will not happen without some form of public support. As we saw, many people are distrustful of free home retrofit offers, and community-based organizations needed to spend time legitimizing and differentiating Advanced Homes to enroll participants. These processes occurred through a combination of public and one-on-one interactions over time that could not be scripted; honesty, repeated conversations, staff availability, and the fulfillment of promises helped to enroll and retain homeowner-participants.

Additionally, developers of residential solar and storage systems have largely avoided low-income market segments because it is easier to do business in areas where households have savings and housing stock is newer (or better maintained). Even if retrofits are made more attractive to developers, many will still prefer to do business in places where work is easier.

The results of the project indicate that unlocking private investment, or making way for the participation of cleantech firms in low-income residential decarbonization (i.e., “attracting” the private sector), is not the silver bullet that supporters have made it out to be. Private capital is often impatient, their attention may be divided across many projects, and they are subject to a host of pressures that nonprofit or public organizations are not. Fostering partnership between sectors is time-consuming and labor intensive, organizational cultures and work styles differ, and the stability of public-private, or nonprofit-private partnerships are sensitive to changes in state spending patterns, investor sentiment, and the outcomes of policymaking processes. Multi-sided, intersectoral partnerships like BAAEC need to find and enroll private sector actors that are aligned with the goals of equity and social justice. Alternatively, one way of transcending the issues is to create hybrid organizations that can earn modest returns while receiving state funding and philanthropic gifts.

4.4 Market Opportunities and Recommendations

Market Opportunity

While a business might consider the market opportunity for a product by assessing the size and scale of need, this project’s ‘market opportunity’ is in the design and implementation of

future programs, with the goal of helping DACs and low-income households (including renters) benefit from a clean energy transition.

The lessons learned from this project could lead to significant breakthroughs, but only as long as the work continues.

Recommendations

The following are recommendations for continued work and community impact across various elements of BAAEC:

Outreach, Enrollment, and Workforce Development

BAAEC demonstrates the need for wraparound, concierge-like strategies: ongoing support throughout home upgrades, particularly in the coordination of various trades, and in translating the reasons for, and importance of, these technologies and retrofits. This approach is directly opposite to transaction-based sales tactics. It is grounded in authentic engagement with the goal of partnership, strengthening capacity, and building community, which also provides an opportunity to engage and employ more community members in the process. It is the opposite of an extractive relationship in which communities are asked to expend their limited resources to achieve state climate goals. BAAEC found that establishing trust and the collaborative governance nature of a community-based approach are slow, but required. Despite the need to speed up and scale the energy transition, investing time in authentic engagement and tailored solutions is the only way to ensure an equitable transition where all communities participate in meeting California's climate and GHG reduction goals. The opportunity lies in being deliberate and intentional about developing shared systems infrastructure, in a way that minimizes the effort of subsequent communities. Once community buy-in and technology adoption reaches a tipping point, the required effort at the community level will start to decline. The following principles apply:

1. Communities are active participants, engaged early and throughout programs and projects.
2. Diverse but coordinated clean energy strategies are optimized for both community and personal benefits and are designed via community-driven planning.
3. Community-based organizations are implementation partners who are adequately compensated and supported for sustained capacity.
4. Workforce development is embedded throughout with an emphasis on economic development and shared prosperity for all.

Advanced Homes

Deferred Maintenance

Solving the problem of unaffordable roof replacements one at a time is difficult and costly. But when consolidated at a community level, it becomes an opportunity with a high dollar value where economies of scale can bring the cost down for everyone. Similarly, creative financing that uses solar and battery savings to pay for roof replacements over time, or just and fair valuations of the home's equity for a second mortgage with below market rates, or public funding that comes about from local government leaderships at a local or regional level, are all examples of opportunities to solve for remediation costs at scale.

Solar and Storage

While some equipment costs have come down, the full installation costs of solar and battery storage are inaccessible for most low-income households. Public-private partnerships (when mission-aligned) can lower costs for consumers by lowering the cost of customer acquisition through trusted engagement and enrollment strategies and by using customer-friendly agreements and designing creative financing solutions. Examples of financing solutions include third-party ownership of solar and storage assets with no up-front or on-going payments required, or other forms of energy as a service or subscription-based models that also address the upfront capital requirement and difficult underwriting. And business models must reflect the value of DERs to the grid and innovate to share on that value with customers. Both behind the meter and community scale front of meter DERs should be accurately reflected in state agency resource planning procedures to avoid the need for longer lead time and more expensive alternatives.

Solar and storage can be a path to mitigate/manage affordability. Together, they allow implementation partners to lead with services that authentically address the needs of DAC communities.

Electrification

The BAAEC team heard real concerns from Advanced Homes participants, all of whom were low-income, related to bill impacts from electrification. Their reservations about switching to electric, even when the new appliance itself was free, means that these price-sensitive homeowners will continue to choose a gas-powered appliance in the absence of further support. It's possible that utility bills will be manageable when it comes to a highly efficient heat pump water heater, or with respect to appliances responsible for a smaller portion of household energy use, such as induction stove or clothes dryer. But it is dependent on the

specific characteristics of the household and physical home, and the industry is currently unable to provide guarantees that bills will not increase. We can therefore expect that for a large segment of the population—those under the area median average of income, and those on fixed income—electrification by itself will not be an option in the near term. By continuing to install and incentivize gas appliances, homes will be locked into higher GHG emissions for 10-20 years. The opportunity for electrification is twofold: (1) pair electrification with solar plus storage whenever possible (either on-site rooftop systems or community solar enrollment), and (2) advance the development of electric appliances with features that make the switch for customers easier and more affordable—for example an induction stove with integrated battery.

Prosumer Network

BAAEC's simulation and potential for bill savings via a local market, where homes help balance electricity shortfalls and excess production with each other, shows the potential to create new regulatory and utility tariff design models that make better use of existing demand-side resources. It is well understood that the electricity grid is not built to meet the average load, but rather the peak demand of ~100 hours out of 8,760 hours in a year (roughly 1 percent). Innovative solutions, such as BAAEC's Prosumer Network, albeit needing access to realtime data, can increase electrical distribution grid utilization, and lower system costs that help with affordability concerns for communities. Increased grid utilization would put downward pressure on electricity rates by reducing how much new grid capacity needs to be built to meet expected demand by optimizing local energy consumption, exports, and power conditioning.

Community Solar

Community solar provides access to decentralized clean energy and discounts on utility bills. While not exclusive to low-income households, it is an equitable solution for the 44 percent of California residents who either rent, do not have homes suitable for solar, or cannot afford rooftop solar (Davalos, Kimberlin, and Mesquita 2021). According to research commissioned by the Coalition for Community Solar Access, adding 5.4GW of community solar and storage in California can produce an estimated \$6.5 billion in savings to California ratepayers (over 20 years). These are system-wide savings that reduce bills for subscribers and do not harm non-subscribers. The BAAEC project has demonstrated the first ever aggregation of small sites to meet CAISO minimums for wholesale market participation, a blueprint that can be applied to future projects to enable the economics to pencil out for a wider range of sites. The Community Solar opportunity can thrive with specific support from local governments, either

directly or by championing local energy procurement by CCAs. In addition to engaging with issues like zoning and general plan updates, local governments can support carbon-free energy projects that enhance energy resilience and affordability and support a local economy. Local clean energy projects, such as community solar, can power neighborhood-scale critical services and generate community-wide savings on customer bills. Institutionalizing local power production requires the CEC to update land use screens to include urban and built environment DERs as well as for the CPUC IRP to integrate this scale and granularity of resources into the IRP process.

Microgrid Resiliency Hub

Some utilities are currently funding local energy resilience hub programs, but in a siloed approach. BAAEC's experience points to the need to build on, and expand, these utility efforts. For example, a standardized CCA-led project delivery model has the potential to create a market by generating a pipeline of local DER projects and economies of scale, which in turn attracts project developers, financiers, and contractors to community scale projects. Ratepayer funds from CCAs have the potential to be the catalytic funding source to move projects to implementation. This systematic approach addresses the various challenges that are trapping resilience hubs like BAAEC in the planning stages.

Shared Mobility

BAAEC's CarShare program showed promise as a way to increase participants' confidence in EVs and thereby increase EV adoption, particularly among low- and middle-income segments of the population who are less risk tolerant. By having a few weeks or months to try out an EV and by receiving a free L2 home charger, participants experience EV ownership and the ease of charging at home. Furthermore, such an ongoing program can also conveniently meet residents' temporary needs for a vehicle without having to purchase one, resulting in substantial household savings.

Integration of Project Elements

The BAAEC model used a portfolio-of-projects approach, with integrated outreach and community engagement. This approach brings multiple benefits for future program implementation, as follows:

1. **Strengthening community capacity to lead in the energy transition:** An integrated approach can better engage and fund community participation. Narrowly

focused projects/programs may lack the budget for meaningful engagement of community organizations.

2. **Addressing systemic barriers:** An integrated approach lends itself to establishing a long-term framework for activities based in understanding and addressing the root cause of problems, rather than short-term transactions. It also invites public-sector and other community-serving organizations to share community needs and opportunities.
3. **Differentiation for trust-building:** An integrated approach is most likely to attract and retain mission-aligned partners who see community transformation as the ultimate goal. Mission-aligned partners, working with the community interests in mind, foster community trust and differentiate the program from predatory practices and bad-actors who may be operating in the community. This sets the stage for community-led problem-solving and the partner governance and implementation procedures that are essential to attract funding and financing partners.
4. **Beyond energy, communities experience increased resilience, wellbeing, and economic development:** An integrated approach invites other community-serving organizations to the table, such as those focusing on health, social, economic, and housing issues. This adds further layers to the wraparound and customer-centered services, creating a positive feedback loop and mutual reinforcement among elements. It creates efficiencies in community outreach and engagement, and strengthens the roles and capacities of organizations working in these spaces. Moreover, because energy is just one of many important concerns for people, the integrated approach helps work through the reality of competing priorities through its inclusive and diverse set of entry points.
5. **From individual to collective decision making:** The integrated approach eases the decision making process for individual participants by offering multiple paths for engagement and creating a space for peer learning and group-based approaches to education and decision making. Potential hesitancy and mistrust is better addressed when individuals see engagement across programs and services - it's less of a sale of a product or service, and more of an invitation to join a collective movement.
6. **Opportunity for community-centered local investment:** The integrated approach can develop solutions across various community concerns—such as clean energy, climate resilience, social, and wellbeing—and can build an environment that attracts investment and supports local prosperity.

GLOSSARY AND LIST OF ACRONYMS

Term	Definition
ActiveSGV	<i>Active San Gabriel Valley</i> , an environmental justice and public health non-profit organization based in El Monte, California, dedicated to making the San Gabriel Valley a more sustainable, equitable, and livable region.
AEC	<i>Advanced Energy Community</i> , a community based on systems integration in which energy efficiency, renewable energy generation, and smart-grid technologies meet the energy supply and demand needs of its residents and supports local grid reliability and safety. Advanced Energy Communities can be a new, reconstruction, or retrofit development of a residential, commercial, or municipal development in new, unused or underutilized lands.
BAAEC	<i>Bassett Avocado Advanced Energy Community</i> , the name of this project
BUSD	<i>Bassett Unified School District</i> , a public school district within the BAAEC area that hosted 30 EV charging stations.
CAISO	<i>California Independent System Operator</i> , a non-profit, independent organization that oversees the operation of the bulk electric power system, transmission lines, and wholesale electricity market for about 80% of California and a small part of Nevada.
CARB	<i>California Air Resources Board</i> , the lead state agency responsible for fighting air pollution and combating climate change.
CBO	<i>Community Based Organization</i> , a non-profit or grassroots group that operates within a specific geographic area to serve its residents.
CCA	<i>Community Choice Aggregate</i> , a local, not-for-profit public program that lets cities and counties pool the buying power of their residents to purchase or generate electricity.

CCSC	<i>California Center for Sustainable Communities</i> , a prominent research center at the University of California, Los Angeles (UCLA) that is dedicated to advancing equitable, data-driven, and sustainable solutions for California's cities and urban environments.
CEC	<i>California Energy Commission</i> , the primary energy policy and planning agency for California.
CPA	<i>Clean Power Alliance</i> , the largest Community Choice Aggregator in California, providing electricity generation for over 3 million residents and businesses across Los Angeles and Ventura counties.
CPUC	<i>California Public Utilities Commission</i> , a state regulatory agency that oversees privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies in California.
DAC	<i>Disadvantaged Community</i> , a community that is located entirely within a 2010 census tract with the poorest environmental quality as defined by a CalEnviroScreen 2.0 or CalEnviroScreen 3.0 in the 75 or greater percentile range.
DAC-SASH	<i>Disadvantaged Communities - Single-family Solar Homes</i> - a California state initiative program that provides no-cost rooftop solar systems to qualifying low-income homeowners.
DER	<i>Distributed Energy Resource</i> , small-scale, decentralized electricity generation and storage systems located close to where energy is consumed, such as rooftop solar, battery energy storage systems, and electric vehicles.
DERA	<i>Distributed Energy Resources Aggregation</i> , a model from CAISO that allows smaller, localized energy technologies—like rooftop solar panels, home batteries, and electric vehicles—to group together and participate in California's wholesale electricity markets.

EM&V	<i>Evaluation, Measurement, and Verification</i> , a set of practices and protocols used to assess the performance of energy efficiency and demand-side programs.
EPIC	<i>Electric Program Investment Charge</i> , a major funding grant program for scientific and technological research to accelerate the transformation of the electricity sector, reduce greenhouse gas emissions, and help California achieve its ambitious climate goals.
ESS	<i>Extra Space Storage</i> , a self storage business and the host site for the Community Solar project.
EV	<i>Electric Vehicle</i> , a car or vehicle powered by an electric motor and rechargeable batteries rather than a traditional gas-powered engine.
EVSE	<i>Electric Vehicle Supply Equipment</i> , a technical term for hardware, cables, connectors, and communication software that safely deliver electricity from the power grid to an electric vehicle.
GHG	<i>Greenhouse Gas</i> , any gas in the Earth's atmosphere, such as carbon dioxide and nitrous oxide, that traps heat.
HPWH	<i>Heat Pump Water Heater</i> , a highly-efficient water heater powered by electricity
HVAC	<i>Heating, Ventilation, and Air Conditioning</i> , refers to the interconnected systems used in homes and buildings to regulate temperature, control humidity, and maintain good indoor air quality.
IOU	<i>Investor-Owned Utility</i> , a private, for-profit company that owns and operates the infrastructure to generate, transmit, and distribute electricity or natural gas to the public.

LACI	<i>Los Angeles Cleantech Incubator</i> , a nonprofit business accelerator and workforce initiative aimed at creating an inclusive green economy by focusing on scaling clean technology startups, advancing climate policy, and providing green-collar job training to underserved communities.
NRI	<i>New Resource Implementation</i> , a process for power generators, energy storage, and distributed energy resources to connect to the California Independent System Operator grid.
PPA	<i>Power Purchase Agreement</i> , a long-term contract between an electricity generator and a buyer. It guarantees that the buyer will purchase a set amount of energy at a fixed price, providing financial certainty for developers and stable, predictable energy costs for consumers.
QSG	<i>Quick Start Grant</i> , a grant program designed to fund targeted, innovative pilots that test approaches to overcoming market barriers to heat pump space and water heating adoption.
SCAQMD	<i>South Coast Air Quality Management District</i> , the regional air pollution control agency responsible for regulating stationary sources of air pollution (such as factories, businesses, and industrial facilities) across a 6,700-square-mile region of Southern California.
SCE	<i>Southern California Edison</i> , an investor-owned electric utility company serving approximately 15 million people across a 50,000-square-mile territory in Central, Coastal, and Southern California.
SGIP	<i>Self-Generation Incentive Program</i> , a major state-funded rebate program that provides financial incentives to residential and non-residential customers to install clean energy and advanced battery storage systems.
SHA	<i>Site Host Agreement</i> , a binding agreement used to determine which parties are responsible for ongoing operation, maintenance, and billing for installed equipment.

TEC	<i>The Energy Coalition</i> , a 501(c)3 non-profit organization with 50+ years of experience advancing clean energy, who led the BAAEC project.
VPP	<i>Virtual Power Plant</i> , a cloud-based network of decentralized energy resources—like home solar panels, batteries, electric vehicles, and smart thermostats—that are aggregated by software.

References

The value of Community Solar and Storage in CAISO (April 2025)

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Project Deliverables

Item	Deliverable Name	Deliverable URL
1.	Case Study	TBD
2.	Replicability Toolkit	TBD