California Energy Commission

Clean Transportation Program

**FINAL PROJECT REPORT**

# Multifamily Electric Vehicle Charging Accelerator 1.0

**Prepared for: California Energy Commission**

**Prepared by: Ecology Action**

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# California Energy Commission

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# PREFACE

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program, administered by the California Energy Commission (CEC), to advance California's climate goals and support projects that reduce greenhouse gas emissions from the transportation sector. Most recently, Assembly Bill 126 (Reyes, Chapter 319, Statutes of 2023) reauthorized the Clean Transportation Program to July 1, 2035

The Clean Transportation Program has an annual budget of approximately $100 million and provides financial support for projects that advance California's clean transportation goals, including:

Developing and deploying zero-emission technology and fuels.

- Producing alternative and renewable low-carbon fuels in California.
- Deploying zero-emission fueling infrastructure, fueling stations, and equipment.
- Improve the efficiency, performance and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Establishing workforce-training programs and conducting public outreach on the benefits of alternative transportation fuels and vehicle technologies.

To be eligible for funding under the Clean Transportation Program, a project must be consistent with the CEC's annual Clean Transportation Program Investment Plan Update. The CEC issued GFO-21-603 to demonstrate replicable and scalable business and technology models for large-scale deployment of electric vehicle (EV) charging infrastructure capable of maximizing access and EV travel for multifamily housing (MFH) residents. In response to GFO-21-603, the recipient submitted an application which was proposed for funding in the CEC's notice of proposed awards on May 11, 2022 and the agreement was executed as ARV-22-002 on September 30, 2022.

# ABSTRACT

This report summarizes the work completed by Ecology Action for the Multifamily EV Accelerator Project. Ecology Action installed 384 EV charging ports at 43 multifamily housing communities to promote EV ownership among low- and moderate-income apartment renters. Additionally, the project team canvassed 2,701 apartment units/households to educate multifamily residents about the benefits of EV ownership and model options, incentives for purchasing EVs and how to use the EV charging stations installed. 40 of the 43 EV charging installation project sites were affordable multifamily housing communities for low-income households. The outcome of this work demonstrates a successful EV charging direct installation model for multifamily housing in priority communities.

**Keywords:** Electric vehicles, multifamily housing, affordable multifamily housing, low-power EV charging, smart outlets, load management, community outreach, priority communities, low-income households.

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# TABLE OF CONTENTS

# LIST OF FIGURES

Page



# LIST OF TABLES

Page

# EXECUTIVE SUMMARY

Multifamily EV charging installation projects require up-front capital costs for design and construction, as well as a budget for ongoing maintenance and network fees. These may increase a property's net operating cost but create no return on investment for the multifamily property owner. This lack of ROI potential has resulted in lagging EV charging deployment in multifamily communities, particularly those serving low-and moderate-income renters. Consequently, the lack of convenient and reliable on-site EV charging has resulted in low EV adoption rates among multifamily renters.

Ecology Action's Multifamily EV Accelerator project demonstrated a cost-effective direct installation approach to help solve EV market inequities by constructing 384 EV charging ports at 43 multifamily apartment communities that utilized the existing available electrical service, level 1 smart outlets and load-managed level 2 equipment EV chargers. The project resolved barriers for multifamily property operators by offering technical assessment with site prioritization, no-or low-cost installation, construction project management, payment of 2 years of EVSP networking fees, and post-construction operations and maintenance support. The project increased possibilities for EV ownership among low- and moderate-income multifamily residents in California Climate Investment priority areas by constructing convenient and reliable on-site EV charging and canvassing 2,701 resident households to provide information about how to apply for state and local incentives that reduce the cost of EV ownership.

28 of 43 EV charging projects were installed in Low Income and/or Disadvantaged Communities (LIC/DAC) as defined by the California Climate Investments Priority Populations Mapping Tool 4.0. 40 of 43 EV charging project sites were deed-restricted affordable multifamily housing communities renting to low-income households. On average, the 43 EV charging projects required one year to construct from initial site assessment to project commissioning. Collectively, site managers surveyed reported a 262% increase in EV ownership one year after EV chargers were installed. Overall, the 384 charging ports installed are expected to reduce greenhouse gas emissions by 7,509 MT $CO_2e$ over 5 years of operation, helping to contribute to California's Clean Transportation Program goals to develop conveniently located charging infrastructure for low-and zero-emission vehicles to support 5 million ZEVs on California's roads by 2030.

This final report summarizes the work performed, project outcomes and lessons learned. The data collection and analysis section presents key data metrics associated with the project.

# CHAPTER 1: Project Description

## Purpose

The goal of this project was to install at least 375 EV charging ports at multifamily apartment communities, creating on-site EV charging opportunities for apartment residents in priority communities and affordable housing.

## Multifamily Housing Recruitment Approach and Program Design

When applying for the CEC REACH grant, Ecology Action secured letters of support from affordable multifamily housing operators, committing them to participating in EV charging technical assessments within their property portfolios. When signing the letter of support for the grant, it was important to affordable multifamily property operators that specific properties were not committed, as many organizations had never installed EV charging stations and didn't know if regional and on-site managers or property investors/owners would be supportive of EV charging installations. After the CEC grant was awarded, interviews were scheduled with each multifamily operator to identify properties within the portfolio that would have the most likelihood for EV adoption, and on-site support for an EV charging installation. Ecology Action developed a recruitment flyer illustrating the benefits of participating in the project that champions within multifamily housing organizations could share with both decision makers and on-site managers.

Ecology Action's direct installation program design and recruitment messaging centered the following solutions:

- No cost installation for multifamily properties in priority communities.
- Vendor neutral.
- Turnkey EV charger design, permitting, construction, and commissioning by Ecology Action, a general contractor and 501c3 non-profit organization.
- Two years of cellular and networking fees pre-paid.
- 1-year of operations and maintenance plan pre-paid.
- EV education & technical assistance for on-site management and residents.

Technical assessments were scheduled with staff for each identified property, where on-site property managers were surveyed about their thoughts and concerns about EV charging and associated parking impacts. Visual presentations were prepared for asset management teams of each multifamily housing organization. These presentations showcased the results of technical assessments, proposed locations and quantity of EV charging equipment including site manager feedback, and site-specific reasons for technical disqualifications (see methodology section below). Asset managers/decision makers then selected the properties that they wanted to move forward in the process of scope of work development and contract execution.

## Technical Assessment Qualification Methodology

147 multifamily properties participated in site technical assessments to evaluate EV charging opportunities.

With an installation goal of 375 ports, our CEC REACH grant construction budget allowed for an average CEC contribution of $3,298/port. With this budget constraint in mind, we utilized the following tiered ranking methodology for evaluating the cost effectiveness of projects using the site's existing electrical service, and to disqualify projects that would be likely to exceed the grant budget.

Tier 1 Project Site

Project site is cost-effective. Project is expected to cost equal to or less than the pilot's target cost per port. 'EV Ready' projects, constructed according to requirements in previous CalGreen code cycles were included in Tier 1 because they were more likely to be cost-effective.

Tier 2 Project Site

Project site has make-ready and installation costs that are likely to drive up the cost-effectiveness of a project. Subcontractor quotes from Tier 2 sites were evaluated on a case by-case basis and allowed to proceed with scoping and site design if a local agency rebate program or utility program was available to cover additional costs expected.

Tier 3 Disqualified Project Site

Project site is not cost-effective and has no local funding to offset costs.

Overall, Ecology Action conducted technical assessments at 147 multifamily properties to execute 43 project agreements. 99% of the 147 participating properties were either deed-restricted affordable multifamily housing properties or located within CARB Priority Communities. 41 sites (28%) were classified as "Tier 3" sites and disqualified during either remote site survey or the on-site technical assessment process. 59 sites (40%) were cancelled by the multifamily operator after site assessment because they were unable to obtain site or asset manager 'buy-in' to proceed with the EV charging installation, or the organization wasn't ready to make a decision at the time of the grant deadline for project agreement signature because of competing construction projects or internal staff changes. Only 3 of the 59 cancelled sites were cancelled at the time of project agreement issuance after asset managers approved the scope of work presented.

**Table 1: Technical Assessment Ranking of the 43 Constructed Projects**

| Technical Site Assessment Ranking | Number of Project Sites | Number of Charging Ports |
|---|---|---|
| Tier 1 'EV Ready' Project Site | 13 | 107 |
| Tier I Project Site | 17 | 175 |
| Tier II Project Site | 13 | 102 |

Source: Ecology Action 2026

# CHAPTER 2: Project Construction

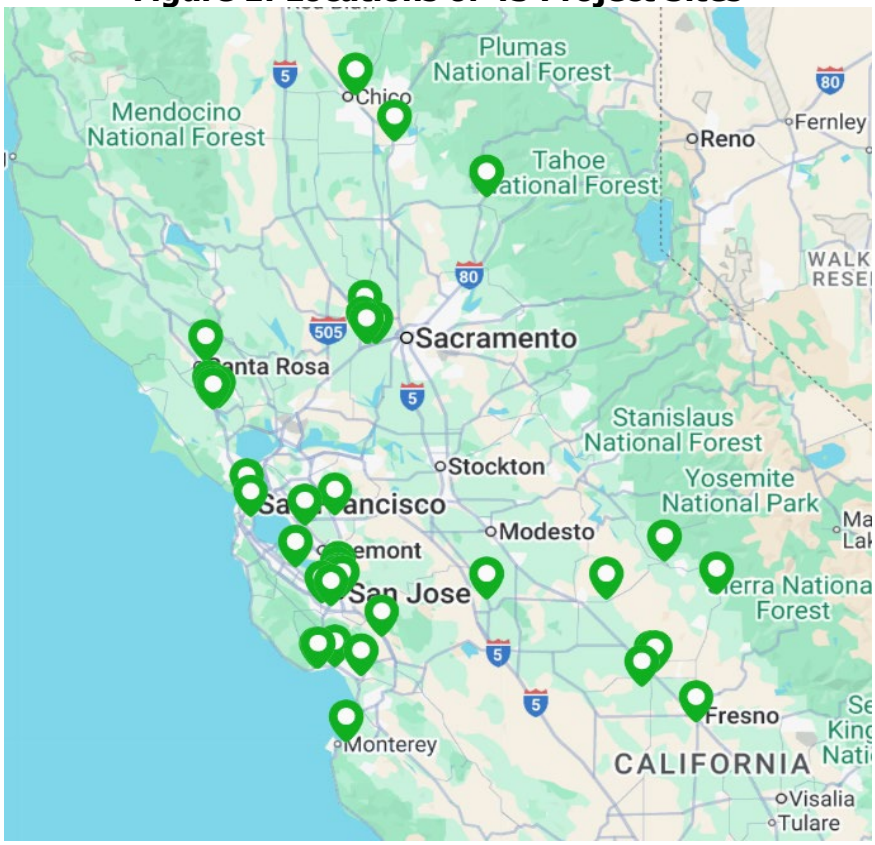
## Summary of Project Construction Data

Between September 2023 and February 2025, Ecology Action as general contractor and subcontractors completed construction for 43 projects and 384 ports at multifamily housing communities. 65% of the sites are in LIC/DAC, as defined by the California Climate Investments Priority Populations Mapping Tool 4.0. Additionally, 93% of the sites are in affordable multifamily housing communities. The following figures and tables summarize construction data points of interest.

### Location of EV Charging Projects Installed.

43 project locations were distributed throughout the Northern San Joaquin Valley, Sacramento Valley, San Francisco Bay Area, and Monterey Bay Area.

**Figure 1: Locations of 43 Project Sites**




Source: Ecology Action 2026

**Number and Type of EV Chargers Installed (level 1 outlet vs. level 2).**
Although multifamily operators were educated on the benefits of level 1 smart outlets, a level 2 vendor was most often selected. Local agency rebates were not available for level 1 smart outlets, and these rebates were needed to cover costs that exceeded the CEC grant agreement construction budget. 24% of ports installed are level 1 smart outlets and 76% of ports installed are level 2 networked chargers.

**Table 2: Number and Type of Chargers (L1 outlet vs. L2)**

| Type of Charging Units Installed | Number of Projects | Number of Charging Ports |
|---|---|---|
| Level 1 Smart Outlet - Assigned | 3 | 91 |
| Level 2 - Assigned | 29 | 218 |
| Level 2 - Private Shared | 11 | 75 |

Source: Ecology Action 2026

**Figure 2: EV Charging Installation Photos**


Source: Ecology Action 2026

## Number of MFH Units Served

Overall, the 43 projects represent 2701 multifamily housing units that now have access to EV charging at home. 59% of multifamily units (1583) served were in Low income or disadvantaged communities. 93% (40 of 43) of EV charging projects were installed at deed-restricted affordable multifamily and low income or disadvantaged communities representing 2,588 low-income multifamily units. 294 ports were installed in partnership with 8 affordable housing operators.

**Table 3: MFH Units Served, by Community**

| Type of Community | Number of Projects | MFH Unit Count | Number of Ports Installed |
|---|---|---|---|
| Affordable Housing-Deed Restricted | 14 | 1106 | 100 |
| Affordable Housing-Deed Restricted + Cal-Enviroscreen DAC Census Tract | 1 | 56 | 4 |
| Affordable Housing-Deed Restricted + Cal-Enviroscreen DAC Census Tract + Low-Income Census Tract | 7 | 511 | 44 |
| Affordable Housing-Deed Restricted + Low-Income Census Tract | 18 | 915 | 146 |
| Low-Income Census Tract + Market Rate Housing | 2 | 101.0 | 74 |
| Market Rate Housing | 1 | 12.0 | 16 |
| **Total** | **43 projects** | **2,701 MFH units** | **384 ports** |

Source: Ecology Action 2026

## EV Charger Installation Costs

Overall, the CEC REACH grant contributed 39% of construction costs towards all construction projects. The remaining funds were reported as match in the vendor/construction budget.

**Table 4: Total Project Funding Sources for 43 Project Sites**

| Funding Source | Subsidy Amount | % of Construction Budget |
|---|---|---|
| CA Energy Commission (CEC) | $1,074,191.78 | 39% |
| Federal Share | $0 | 0% |
| Utility Share | $ 1,016,233.50 | 37% |
| Local Agency Share (CCAs and Air Districts) | $572,324.26 | 21% |
| Privately Funded Cost Share | $66,795.00 | 2% |
| Overall Construction Budget | $2,729,544.54 | |

Source: Ecology Action, 2026

## Total Average Cost Per Port by Installation Type

In this section, the average cost per port reported is for 43 projects installed December 2023-February 2025. These averages do not reflect current labor costs. The three principal factors that increase total project costs are:

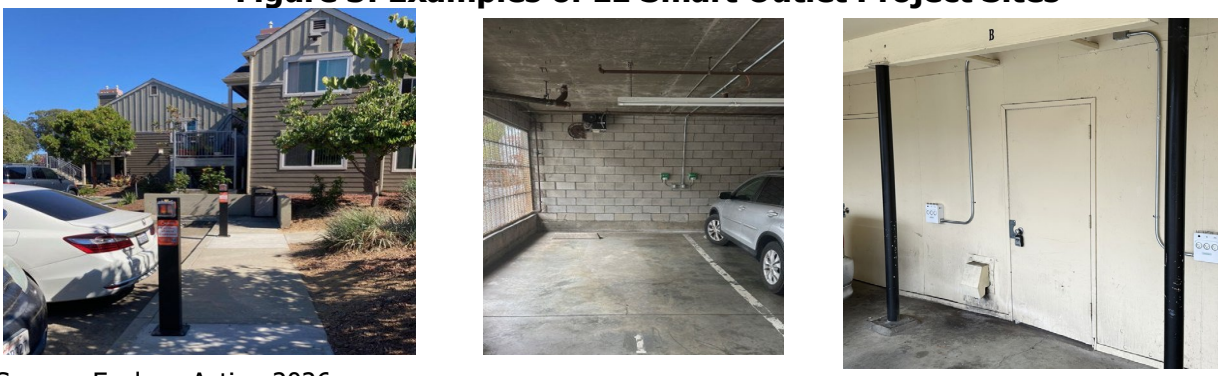
1. Labor costs for trenching and asphalt/sidewalk repair in open parking areas.
2. ADA improvements required for shared, private charging.
3. CEC requirement for prevailing wages to be paid on all labor. Based on quotes for comparable projects, we estimate that labor costs are 20-30% higher for prevailing wage projects than non-prevailing wage projects, especially for projects in the San Francisco Bay area where prevailing wage rates are higher for electricians and laborers.

**Table 5: Average Cost per Port by Type of Charging Unit Installed**

| Type of Charging Unit Installed | Average Cost per Unit | Number of Projects |
|---|---|---|
| Level 1 – Smart Outlet | $5,791.99 | 3 |
| Level 2 - Assigned | $8,353.51 | 29 |
| Level 2 - Private Shared | $10,442.06 | 11 |

Source: Ecology Action 2026

**Figure 3: Examples of L1 Smart Outlet Project Sites**



Source: Ecology Action 2026

**Table 6: Average Cost per Port by Parking Type**

| Parking Type | Average Cost per Port | Number of Projects |
|---|---|---|
| Parking Garage | $5,255.12 | 8 |
| Tuck-Under Parking | $6,583.26 | 2 |
| Covered Carport | $9,600.68 | 7 |
| Open Parking | $11,010.26 | 26 |

Source: Ecology Action 2026

**Table 7: Average Cost per Port by Technical Assessment Ranking**

| Project Site Tier | Average Cost per Port |
|---|---|
| Tier 1 – 'EV Ready' | $6,617.27 |
| Tier 1 | $8,225.37 |
| Tier 2 | $11,173.33 |

*Average cost per port for Tier 1 and Tier 2 projects demonstrates that site complexity and installation labor increases construction costs.* Source: Ecology Action 2026

**Figure 4: Example of Tier 1 – EV Ready Project Site**

*EV-Ready sites were the least expensive to construct as the site was compliant with ADA regulations and had been designed per previous CalGreen code cycles to accommodate new EV loads.* Source: Ecology Action 2026

# CHAPTER 3:
# EVSP Vendors & Performance Optimization

## Electric Vehicle Service Provider (EVSP) Business Models

Ecology Action partnered with seven (7) EVSP vendors to provide networking, load management, and payment collection services for the 43 projects. EVSP vendors can generally be divided into 2 business models that multifamily property operators may choose from:

- No annual fee – All costs may be passed to EV drivers via subscription ($15-$25/month), a surcharge (10–20%) on the cost of electricity, or an activation fee per charging event.
- Annual networking fee - $180–$350 per port per year is charged to the property, and surcharges of 4-11% may be imposed on the common area meter's utility electrical rate (kWh), depending on the EVSP's specific terms and conditions.

In general, affordable housing operators preferred the 'No Annual Fee' business model to avoid future operational costs to the property. Properties with existing EV drivers were more likely to opt for the 'Annual Networking Fee', as they could impose surcharges on the electrical rate to recover the cost of the EVSP vendor's annual fee. If an affordable housing operator had a pre-existing relationship with an EVSP (EV chargers had been installed with a specific EVSP at one or more properties), their preference was to continue working with that EVSP for ease of management of credential access and vendor accounting within the organization.

**Table 8: Number of Charging Ports by Electric Vehicle Service Provider**

| EVSP Vendor | Number of Projects | Number of Charging Ports |
|---|---|---|
| AmpUp | 3 | 26 |
| EV Connect | 8 | 63 |
| Evercharge | 15 | 123 |
| GoPowerEV | 1 | 16 |
| Orange Charger | 1 | 12 |
| Plugzio | 1 | 63 |
| SWTCH | 14 | 81 |

Source: Ecology Action, 2026

## Annual Networking & Operating Costs

The CEC REACH grant pre-paid for 2 years of cellular and networking fees for multifamily properties to bridge the gap between no staff or resident EV drivers to a few EV drivers on site as a result of the EV charging installation. A 'break-even' kWh price was recommended to multifamily operators based on the common area meter's PG&E rate and the average

commuter miles traveled per day so that those who chose an EVSP with an annual fee model would be reassured that there would be no increases in annual net operating costs as a result of the EV charging installation.

When combined with the cost of County Agriculture Commissioner division of weights and measures registration fees, annual EVSP fees may result in additional surcharges above the surcharges the EVSP is embedding in their pricing. The hypothetical example in Table 9 below demonstrates the total out of pocket costs to operate 7 level 2 ports and the annual and daily utilization needed for the property owner to 'break even' and cover these expenses with a $0.09/kWh surcharge. The example does not include the added operational cost of recovering expenses for repairing chargers that experience vandalism. These costs are discussed in more detail in chapter 4.

**Table 9: Estimated Annual Operating Expenses for Seven (7) Level 2 Ports.**

| **Operating Expense** | **Annual Cost** |
|---|---|
| County Ag Commissioner - Weights and Measures Annual Registration Fees for 7 chargers ($28.20/port + $120 location fee) | $317.40 |
| EVSP networking fees for 7 chargers @ $350/port per year | $2,450.00 |
| Total Annual Operating Expense | $2,767.40 |
| Annual kWh utilization needed to break even with a $0.09/kWh surcharge | 30,749 kWh |
| Daily kWh utilization needed to break even with a $0.09/kWh surcharge | 84 kWh<br>(approximately 11 hours of charging) |

Source: Ecology Action, 2026.

The implication of surcharges for multifamily renter/EV drivers is that charging an EV at home, although convenient, is not necessarily more affordable than driving a gas-powered vehicle. If the base utility rate for common area power supplying the chargers is more than $0.40/kWh, and both the EVSP and the property owner are charging a $0.09 surcharge (total of $0.18), the EV driver is paying $0.58/kWh. This is the equivalent of paying $0.16 per mile or $4.80 per gallon of gas.[1]

## Multifamily Property Management Training & Post-Construction Close Out Process

After a building permit was signed by an Authority Having Jurisdiction (AHJ) and chargers were energized, Ecology Action and electrical subcontractors coordinated on-site commissioning of the EVSP, ensuring that chargers were fully operational, pricing was set, and

[1] Assume an EV consumes an average of 0.28kWh per mile, and the average gas car efficiency is 30mpg.

charger status is visible on the property operator's EVSP dashboard. During these on-site commissioning visits, community managers are trained on how to download the EVSP vendors charging app and activating a charge. Ecology Action coordinated virtual onboarding trainings between EVSP representatives and multifamily housing on-site management and asset management staff, ensuring that a point of contact is established within the organization who can administer the EVSP account, and that all operators understand how to set up reimbursement with the EVSP, use their EVSP dashboards to assign EV chargers to specific user groups, adjust pricing when utility rates change, and track utilization of the chargers installed.

After the virtual property management training with the EVSP, Ecology Action completed an Operations & Maintenance Manual for the property. The goal of the operations and maintenance manual is to document as-built conditions and to ease facilitation of communications between EVSP and contractors who may perform future service calls or repairs. The following elements were included in the O&M plan.

- EV charging site map – referencing numbered locations of installed chargers.
- EV charger project data – referencing site map number, meter, panel, circuit breaker. numbers, EVSE make and model, serial number, and charger ID for each charger.
- Electric Vehicle Service Provider contact information and training resources.
- Site host administrator log-in credentials.
- User groups and pricing rates for EV charging.
- How to place service calls and get troubleshooting support.
- Resident/staff EV charger sign-up and user instructions.
- Attachments of project documentation, including copies of the EVSE warranty, Final Building Permit and As-Built Plan, and the EVSP Service Agreement.

**Figure 5: Management Training at Eden Housing Property**

Source: Ecology Action, 2025

# CHAPTER 4:
# EV Charger Performance & Maintenance

## Operational Performance and Uptime

During the one-year monitoring period, chargers were serviced as needed to maintain the 97% uptime rate required by the CEC grant Agreement. Ecology Action maintained a hotline where site managers could report performance issues. More often than not, site managers reported issues directly to the Ecology Action project manager who coordinated the issue resolution.

## Common Operational Issues & Resolutions

Ecology Action responded to and resolved a total of 19 operational issues throughout the Agreement term. The most common operational issue was modem failure, which caused all chargers connected to the modem to go offline. Chargers experienced frequent network disconnection when the modem was not installed in the optimum location to connect to a cellular signal. Modems that were installed in locations with low cellular connectivity were relocated to areas without interference or obstructions in the line of sight to the EV chargers. In the case of modem failure, new modems were ordered from the EVSP, and the EV chargers were reconfigured to the new modem's IP settings. Of the 384 chargers installed, two (2) experienced a warranty claim within the warranty period and were replaced by the manufacturer.

**Table 10: Common Operational Issues**

| Maintenance Type | Number of Issues |
|---|---|
| Commissioning Correction | 6 |
| Modem/Networking Issues | 7 |
| Vandalism | 4 |
| Warranty Claim | 2 |

Source: Ecology Action 2026

### Addressing Vandalism

Two (2) of the 43 projects experienced vandalism in the form of charging cables cut at the base of the charger. Both were affordable multifamily housing locations, one in a parking garage and one in an open parking area. One project site in Fresno, CA experienced charging cables cut 3 times in a 6-month period. After the second incident, protective cable shields were installed on each charging cable. Ecology Action's EV charging technician noticed a flaw in the design where a determined vandal could manipulate the cable shield device and cut the cable where it attaches to the body of the charger. Ecology Action continues to work with this vendor to improve the design.

**Figure 6: Cable Shield Installation for Prevention of Vandalism**

*Left: EV Charger with CatStrap Cable Shield installed. Source: Ecology Action 2026, Center: Uncovered Cable Shield metal rods installed on Level 2 cable (w/o external sleeve).* Source: CatStrap 2025*; Right: EV charger with cable cut*. Source: Ecology Action, 2026

## Cost of Vandalism Repairs

The cost of vandalism increases operating costs significantly, and chargers are unlikely to be repaired unless multifamily property owners and managers plan for and budget these costs. Most multifamily owners will pass the costs onto resident EV drivers via surcharges on the electrical rate. The following table illustrates the cost of replacing one EV charging cable, with and without a protective cable shield.

**Table 11: Typical Cost of Replacing One Charging Cable**

| Description | Cost |
|---|---|
| Labor to replace charging cable | $1,200.00 |
| Replacement cable + shipping | $350.00 |
| Cable shield + shipping | $300.00 |
| Additional labor to install cable shield | $150.00 |
| Total cost w/o cable shield | $1,550.00 |
| Total cost w/ cable shield | $2,000.00 |

Source: Ecology Action 2026

# CHAPTER 5:
# Multifamily Resident Engagement

A key objective of Ecology Action's Multifamily EV Accelerator Project was to educate residents of multifamily housing communities where EV charging stations were installed about the benefits of EV ownership and how to access charging through door-to-door canvassing, coordinating in-person EV car show and charging demonstrations, and offering "Affordable EV" webinars.

## Outreach strategies to staff and residents of MFH apartment communities.

### Canvassing

Ecology Action provided two rounds of on-site canvassing and outreach at each property, delivered by Ecology Action staff or by contracted community-based organizations (CBOs). Canvassing dates for each location can be found in appendix 5. Canvassing consisted of engaging residents to take a 5-10 minute survey while standing outside and away from the doorway. When residents were not home or not answering their door, the outreach team left flyers with a link to an EV survey and the link to participate in the monthly Affordable EV webinar. Canvassing teams also communicated with community managers for preferences for posting flyers in community spaces like laundry rooms, mail rooms, playgrounds, or community bulletin boards, and brought copies of printed surveys to keep in the community office for residents who do not have internet access.

### EV Educational Events

Ecology Action delivered EV educational events through a combination of 16 virtual webinars and three in-person events.

#### Virtual Webinars

"Affordable EV" virtual webinars were conducted monthly on the fourth Thursday of the month from 7-8 pm by Ecology Action staff. Webinars provided an opportunity for multifamily residents to have questions answered about EVs and EV charging from a knowledgeable EV outreach and education specialist and provided information about.

- An overview of electric vehicle types and where to find charging stations.
- State and federal incentives to lower the cost of EV ownership.
- How to apply for grants and rebates through the Access Clean CA Benefits Finder.

#### In-Person EV Car Shows:

Ecology Action partnered with regional Community Based Organizations to deliver EV car show events at three properties that installed EV chargers through the CEC REACH grant. Partner CBOs included GRID Alternatives, Self-Help Enterprises, and Breathe California, Sacramento. Events were held in collaboration with multifamily housing management, including Mercy Housing in San Francisco on 6/29/2024, Self-Help Enterprises in Newman on 3/28/2025, and Mutual Housing in Davis on 3/28/2025. In-person events focused on EV charging demonstrations, providing resources for EV purchase incentives, and promoting upcoming "Affordable EV" webinars.

**Figure 7: Pictures from EV Car Shows**

*EV Event at Self-Help Enterprises Project – Newman, CA .* Source: Self Help Enterprises 2025


*EV Event at Mutual Housing property in Davis, CA.* Source, Breathe CA 2025

EV educational event promotion consisted of canvassing and posting flyers before the event, as well as notices shared by property management in newsletters and common areas.

**Figure 8: EV Car Show Promotional Flyer**


*EV Car Show Event at Mercy Housing Property- San Francisco.* Source: Ecology Action *2026*

## Education and Outreach Results

Ecology Action completed 84 EV Education Canvassing Events between September 2023 and March 2025 across 2,701 multifamily housing units.

Residents who completed surveys during canvassing and outreach were invited to Ecology Action's monthly Affordable EV Workshop, delivered via Zoom. Surveys also helped to identify current EV drivers, who were provided with support and resources to access the newly installed EV chargers.

**Table 12: Resident Participation in EV Outreach Events**

| Event Outcome | Number of Participants | Notes |
|---|---|---|
| Total surveys collected during canvassing events | 351 | 351 participants represent 13% of total MFH units canvassed |
| Total Participants in Affordable EV Workshops | 65 | 65 participants attending workshops represent 19% of 351 survey participants. |
| Total Participants at In-Person EV Events | 57 | |

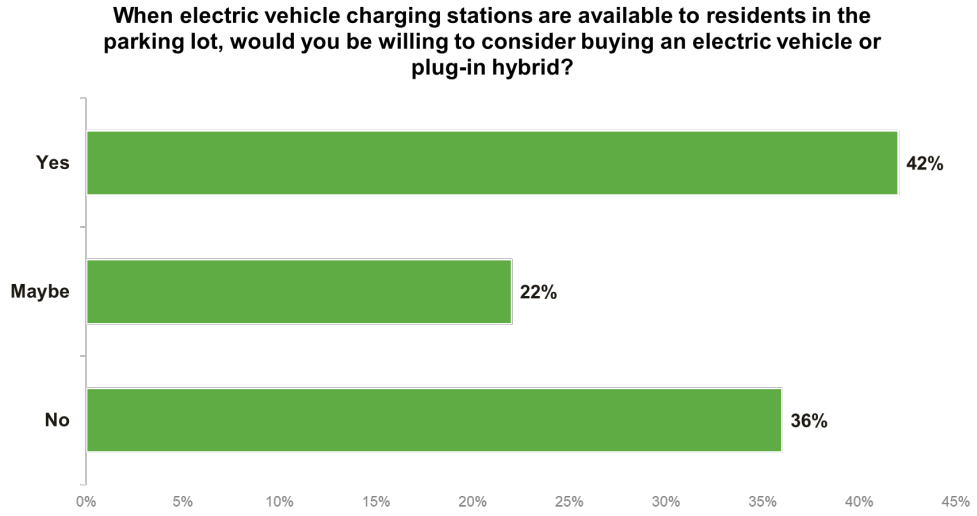
Source: Ecology Action 2026

Affordable EV Workshop attendees who were interested in purchasing an electric vehicle were guided through the process of enrolling in Access Clean CA's Benefits Finder to identify their eligibility for rebates and incentives. Six applicants who qualified under Access Clean CA's income requirements were approved to participate in down payment assistance programs.

### EV Awareness and Readiness

Survey responses indicate that most residents have limited familiarity with electric vehicles—67% reported no prior experience with EVs, and only 6% currently drive one. Despite this, a promising 42% expressed willingness to consider EV ownership if on-site charging is available, with another 22% responding "Maybe". This suggests that once key barriers are addressed, many residents are well-positioned to become early adopters of electric vehicles. The survey did not ask why people responded "No"' to this question. We may speculate that the 36% of residents who responded "No" may reflect the impact of politics on EV perceptions, lack of desire or time to research EVs, or simply satisfaction of these drivers with their current vehicles.

**Figure 9: Willingness to Purchase EV when EV Chargers are Available**




Source: Ecology Action, 2026

## EV Adoption by Multifamily Residents

From April-June 2026, Ecology Action surveyed multifamily community managers of 21 of 43 projects to gather their perspective on EV adoption of residents and staff one-year or more after the installation. Community managers surveyed represent 1,475 multifamily units/households and reported 16 EV drivers' pre-installation. Post-installation, community managers surveyed reported 58 EV drivers are currently utilizing the chargers, a 262.5% increase from the same properties before construction. EV adoption was higher at Bay Area and Sacramento area properties, and significantly lower across Central Valley and rural communities. Key results from the post-installation manager survey are presented below:

The survey asked community managers to rate their confidence in explaining how residents and/or staff can request access to use the EV chargers. 66.7% of the community managers reported a confidence level of 3 or above. At multiple properties surveyed, the community management staff had changed since the EV chargers had been installed, leading to a lack of

knowledge around where the residents sign up instructions were, or how the EV chargers worked.

## EV Charging Challenges Reported by Community Managers

Throughout the manager surveys, a commonly cited barrier to EV charger utilization was the cost of purchasing an electric vehicle. Community managers reported that residents are predominantly low-income and do not believe they can afford to make the switch. Multiple community managers expressed interest in receiving more information about EV affordability programs and available rebates to share with their residents. Two managers noted active resistance to EVs among residents stemming from personal and cultural beliefs. Multiple community managers requested more hands-on resident education sessions and a request to resend resident sign-up instructions, suggesting that residents aren't always connected to the chargers due to management staffing changes and/or community manager’s lack of participation in the initial onboarding process.

# CHAPTER 6: EV Charger Data Collection & Analysis

## Charger Utilization Data Summary – Year One

Utilization data from the 43 projects was analyzed from the date of activation of the first constructed chargers in the project, January 25, 2024, through February 28, 2026. During the reporting period:

- 36 of 43 (84%) of project sites experienced some utilization.
- 5,619 charging sessions were recorded.
    - The project site with the most sessions recorded was a San Francisco property in a low-income community with 63 level 1 chargers installed at resident assigned parking (880 sessions, or 15% of total sessions).
- Average charger downtime was 0%. Seven project sites experienced downtime of 1% due to maintenance issues described in Chapter 4.
- Total energy delivered was 94,242.22 (kWh).
    - The project site with the most energy delivered was a Mercy Housing affordable housing property in San Francisco 13,495 kWh (14% of all energy delivered).
    - Four (4) project sites utilized 51% of energy delivered. These project sites were affordable housing and priority community properties in the cities of San Francisco and San Jose.
    - 19 project sites utilized more than 1,000 kWh. In general project sites in the San Joaquin Valley and Central Coast experienced less utilization that project sites in the San Francisco Bay area.
- Total duration of active charging sessions was 14,444.34 hours
- Average session duration was 2 hours
- An average of 14 kWh was dispensed per charging session
- On average EV drivers paid $0.44 kWh to charge. $0.44/kWh is the equivalent of $3.96 gallon.[2]
- No bidirectional chargers were installed, and no energy was delivered back to grid.
- Normal operating hours for residents of multifamily housing was 24 hours/7 days per week. Overall, chargers throughout the project experienced 99% uptime.
- The total energy delivered 94,242.22 (kWh) in the first year of operation is the equivalent of 314,140 vehicle miles and resulted in 10,471 gallons of gasoline displaced. This is the equivalent of 93.1 MT $CO_2$e.
- Greenhouse gas emissions reduction of 7,509 MT $CO_2$e from 22,755,469 avoided internal combustion engine (ICE) vehicle miles are expected over 5 years of operation.

[2] Assuming an EV consumes 0.3kWh per mile and the fuel efficiency of a gas-powered vehicle is 30 miles per gallon on average.

- Ecology Action is a general contractor and chose to work with installation subcontractors that were locally owned, small businesses in northern and central California communities. Subcontractors earned a total of $2,729,544.54 in revenue from constructing the 43 projects funded wholly or in part by the grant agreement. Electrical subcontractors hired skilled apprentices and laborers to scale their operations in anticipation of working on the 43 projects. These small businesses sent workers to complete EVITP training to comply with CEC agreement requirements and increased their crew's knowledge and experience with EV charging installations using multiple EVSP vendors. These certifications, work experience and references may lead to potential job creation and economic opportunity for years to come.
- Assuming that each of the 384 chargers installed has a useful life of 10 years, the carbon intensity value for life-cycle greenhouse gas emissions of all 43 projects is estimated to be 95,677 $CO_2e$/MWh.[3]

[3] CA Energy Commission – GHG Intensity Report, version 1.0 updated August 2024 was used to quantify the greenhouse gas emissions.

# CHAPTER 7: Project Evaluation & Recommendations

## Accomplishments

Overall, year one results from both utilization data and manager surveys indicate that construction EV chargers at multifamily housing properties in priority communities did accelerate EV ownership among low- and moderate-income apartment renters. The work completed in the grant agreement either met or exceeded expectations provided in the original proposal:

Exceeded the port goal of 375 EV charging ports at multifamily apartment communities, installing 384 ports for residents.

Met the geographic distribution goal of approximately 50% of properties selected from the Central Valley, 25% from the Central Coast, and 25% from the San Francisco Bay Area.

Exceeded the objective of 75% of EV charging projects with a minimum of 50 percent of a project's EV chargers within LIC/DAC) 98% (42 of 43) of constructed projects were either affordable housing or located in a LIC/DAC and 70% of the chargers were installed in LIC/DAC.

## Lessons Learned

The work funded by the REACH grant agreement was a test of Ecology Action's hypothesis in the grant proposal that a direct installation model is needed to support affordable housing operators to construct EV charging for residents. Ecology Action's experience implementing this agreement affirmed our premise that comprehensive project management, including support for EVSP vendor selection and project site selection, coordination of design & engineering, permitting and construction, post-construction commissioning and operations support, staff training and resident engagement, is the deeper level of service needed to move EV charging projects to completion in the multifamily housing market serving low-moderate income renters.

### Technical Qualification

- 28% of project sites receiving technical assessment services were disqualified from participating because they either lacked existing electrical capacity to power at least 2 EV chargers at 1.92 kW/each, or existing site conditions made installation too expensive to construct with the amount available from both the CEC grant and local rebate funding sources.

#### Project Timelines

- Between the initial technical site assessment and final permit sign-off by the AHJ, the average project took 386 days (about one year) to complete.
- The average plan review cycle time (building permit package submitted to permit issuance) was 87 days. 16% of projects were in AHJ plan review for more than 6 months. These projects did not need a service upgrade.

## Drivers of Project Cost

- Construction costs are driven by the complexity of a project and labor hours more than the difference in equipment costs between level 1 vs. level 2 networked chargers. For example, one low-cost level 1 smart outlet project was $3,013 per port where 63 smart outlets were installed in one parking garage, whereas another level 1 smart outlet project was $8,538 per port where 12 smart outlets were installed in an open parking area requiring trenching across landscaping and sidewalks to parking spaces from multiple electrical panels.
- Smart outlets and tuck-under parking assigned to EV drivers in assigned parking spaces were the least expensive charger type on average because these projects have conduit runs near electrical panels and conduit is mounted to the building structure (no trenching is required).
- A cap on project construction costs or cost effectiveness metric based on "cost per port" for determining project eligibility incentivizes higher port count, low-complexity projects as the fixed costs of design and engineering, project mobilization, permitting, and project labor can be spread out over many ports. This type of per port rebate incentive model covers the capital costs of EV charger installation for newer multifamily properties with parking garages or 'EV Ready' infrastructure but is more discouraging to older multifamily properties with open parking that only want 2-4 ports installed because of limited shared parking spaces available. For example, the project with the highest cost per port of the 43 projects was $20,868 per port. This project was a three (3)-port level 2 project at a multifamily project with shared resident parking. The drivers of this higher cost per port were labor costs and material costs associated with electrical panel upgrades, long trenching distances across landscaping and sidewalks from panel to parking areas, and ADA improvements to comply with CBC 11B-228.3.2 Minimum Number. The project with the lowest cost per port of the 43 projects was $3,013 per port. This project was a 63-port, level 1 smart outlet project in a parking garage with assigned resident parking with no trenching required, and newer electrical infrastructure. Both projects were affordable housing where residents needed access to charging, and operators did not have a budget for cost-share. Without the ability to stack both utility and local agency funding sources, the more expensive 3-port project in a shared parking area would not have been possible.

## Operations and Maintenance

- Vandalism of cables became a major concern after installation. Installing cable shields to deter cable cutting at project sites with a high risk of vandalism is critical to protect level 2 charging infrastructure. Project sites with level 1 or level 2 smart outlets where residents bring their own cable are immune to this problem.

# Recommendations

Design Grant Programs to Accommodate Technical Assessment & Decision Making

Grant program guidelines that favor projects with pre-selected project sites, engineered site plans and expedited timelines are often not favorable to participation by affordable housing and other multifamily housing property owners serving low-and moderate-income renters. These organizations are likely to have less renters who are EV drivers, no or little to no experience deploying and maintaining EV chargers and have no project management staff or budget dedicated for EV charging infrastructure. Creating equity in EV charging infrastructure deployment for renters in priority communities requires state and public agency investment in wrap-around services that includes electrical infrastructure evaluation, EV education and vendor selection assistance, and construction project management services to make EV charging installations possible. This is especially the case in California rural and urban communities where there is no local agency funding, or EV charging technical assistance services provided.

Allow Flexibility in EV Charging Program Design to Lower Multifamily Operator Costs

Connecting EV chargers to common area power, rather than a resident's personal utility meter, presents a challenge for keeping charging rates more affordable than gas or DC fast charging for EV drivers. The inclination of multifamily property owners to pass on all operating costs to EV drivers so that offering the amenity is revenue neutral or positive results in surcharges applied to the utility rate to recover the cost of annual fees for weights and measures compliance, EVSP networking fees, and vandalism. To support keeping the cost of charging low in future grant solicitations, the CEC might consider:

- Allowing grant funds to be applied to pre-pay for EVSP networking fees past the agreement term.
- Increasing the allowable amount per port with no per port cap to encourage older multifamily properties that need infrastructure upgrades to apply for new utility service and/or dedicated EV meters with lower rate structures.
- Encouraging direct wiring solutions where load management devices are connected directly to a multifamily resident's meter, thus avoiding annual EVSP and weights and measures compliance fees altogether.

Allow ADA Improvements Triggered by EV Charging Codes to be a CEC Reimbursable Expense

A minimum number of ADA compliant EV charging spaces are required by the California building code in common-use parking areas. The CEC REACH grant did not allow ADA improvements as an allowable expense, thus creating a disincentive for affordable multifamily housing properties with shared parking to participate, especially those in rural communities. Ecology Action disqualified many priority community multifamily properties with shared resident parking during the technical assessment phase, simply because there was no local funding source to cover the cost of parking lot and sidewalk modifications necessary to meet accessibility requirements required by building code for shared EV charging parking spaces. Affordable multifamily housing operators participating in this agreement had no capital budgets available to pay a cost share for their EV charging projects. We recommend that in future grant solicitations dedicated to under-resourced and priority communities, that the CEC

consider making ADA improvements an eligible expense when they are required by the CA building code for EV charging projects. This change would increase the number of multifamily housing communities that can benefit from grant funding.

In the future, Ecology Action will continue to assist multifamily property operators to maintain the 43 projects installed and leverage the success of these projects to encourage other multifamily operators serving low- and moderate-income households to install EV chargers.

# GLOSSARY

AMERICANS WITH DISABILITIES ACT (ADA) - ADA refers to the Americans with Disabilities Act of 1990 which is one of the most significant federal laws governing discrimination against persons with disabilities. This Act prohibits discrimination against individuals with disabilities in employment, housing, education, and access to public services.

ALTERNATING CURRENT (AC) — Flow of electricity that constantly changes direction between positive and negative sides. Almost all power produced by electric utilities in the United States moves in current that shifts direction at a rate of 60 times per second.

ELECTRIC VEHICLE CHARGING STATION (EVSE) — Infrastructure designed to supply power to EVs. EVSE can charge a wide variety of EVs including BEVs and PHEVs.4

ELECTRIC VEHICLE (EV) — EVs utilize energy that is stored in rechargeable battery packs. EVs sustain their power through the batteries and therefore must be plugged into an external electricity source in order to recharge.

CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans) — Responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries.

CALIFORNIA ENERGY COMMISSION (CEC) — The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The Energy Commission's five major areas of responsibilities are:

1. Forecasting future statewide energy needs
2. Licensing power plants sufficient to meet those needs
3. Promoting energy conservation and efficiency measures
4. Developing renewable and alternative energy resources, including providing assistance to develop clean transportation fuels
5. Planning for and directing state response to energy emergencies.

COMPRESSED NATURAL GAS (CNG) — Natural gas that has been compressed under high pressure, typically between 2,000 and 3,600 pounds per square inch, held in a container. The gas expands when released for use as a fuel.

DIRECT CURRENT (DC) — A charge of electricity that flows in one direction and is the type of power that comes from a battery.

ELECTRIC VEHICLE SERVICE PROVIDER (EVSP) An entity that provides software as a service for EV charging station operators and drivers. The software enables communication between stations so operators can manage access, set fees, monitor station operations, and access utilization data.