FUNDING, FINANCING, & INVESTMENT STRATEGIES *to Advance Clean Mobility Infrastructure* IN PRIORITY COMMUNITIES

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Policy Brief

EV Equity Initiative

Berkeley Law | Center for Law, Energy, & the Environment

ProspectSV

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ABOUT THIS REPORT

This report is a collaboration between Prospect Silicon Valley (ProspectSV) and the Center for Law, Energy & the Environment (CLEE) as part of their joint Equitable Mobility Initiative, an effort to develop investment solutions for zero-emissions mobility infrastructure in lower-income communities, and CLEE's EV Equity Initiative, which seeks to build locally tailored, community driven, and replicable approaches to the development of electric vehicle and mobility infrastructure in priority communities in California and US cities.

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ABOUT PROSPECTSV

ProspectSV is a nonprofit cleantech innovation and social impact hub focusing on decarbonization technologies, transition strategies, and deployments. ProspectSV helps solution providers and institutions take innovative approaches from pilots to full-scale implementation. ProspectSV's deep connection to asset ownership, design, and technology development leadership offers immediate, tangible value and path to success. We approach projects differently – forging teams of experts and providing integrated support ranging from commercialization advisory to pilot implementations and program management.

ABOUT THE CENTER FOR LAW, ENERGY & THE ENVIRONMENT

CLEE channels the expertise and creativity of the Berkeley Law community into pragmatic policy solutions to environmental and energy challenges. CLEE works with government, business, and the nonprofit sector to help solve urgent problems requiring innovative, often interdisciplinary approaches. Drawing on the combined expertise of faculty, staff, and students across the University of California, Berkeley, CLEE strives to translate empirical findings into smart public policy solutions to better environmental and energy governance systems.

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I. INTRODUCTION

As part of California's legislative mandate to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030 and 85 percent below 1990 levels by 2045,[1] Governor Newsom and the California Air Resources Board (CARB) have committed the state to a complete phaseout of new gasoline-powered automobile sales by 2035.[2] The transition to 100 percent zero-emission vehicle (ZEV) sales (largely battery-electric vehicles) will require massive investment in electric vehicle (EV) charging infrastructure throughout California, the other 12 states (representing over 40 percent of US light-duty vehicles) that have adopted the phaseout target,[3] and eventually the entire country.

Ensuring that California's priority populations are included in and benefit from the ZEV transition–through enhanced mobility, improved air quality, and greater affordability–in a timely manner will rely heavily on ensuring equitable access to this charging infrastructure across California.[a] Priority populations are most likely to face structural barriers to charging access such as residence in rented and multifamily dwellings (lacking dedicated parking spaces and control over charger installation), limited available capital, and older building stock with limited electrical grid infrastructure, among many others.[4] As a result, these Californians are among those most likely to rely on publicly accessible charging infrastructure to require proactive policy support and investment to develop that infrastructure, and to benefit from the cost savings and air quality improvements that zero-emissions mobility can bring.[5]

The California Energy Commission (CEC) estimates that nearly 1.2 million public and shared private chargers will be needed to support the 8 million EVs anticipated to be on California roads by 2030, and over 2 million by 2035 (including over 600,000 in multifamily dwellings alone).[6] And with more than 29 million automobiles on the road in California, many more publicly accessible chargers will be needed to serve a fully electrified vehicle fleet in the state. As of March 2024, publicly accessible chargers in California hover around 105,000.[7]

a "Priority populations" is a definition used by California climate policymakers to collectively describe Disadvantaged Communities (as defined by the CalEnviroScreen 4.0 set of environmental burden and demographic indicators) and low-income communities and households (at or below 80 percent of statewide median income). These households and communities are prioritized in many state and local climate planning and investment programs, such as the California Climate Investments program.

California leaders have invested in a number of programs to expand the state's charging infrastructure network, including the CEC-led CALeVIP program that funds publicly accessible charging, CPUC-approved electric utility investments[8] and CARB- and CEC-funded pilot programs such as Clean Mobility Options and Communities in Charge, which are providing hundreds of millions of dollars for charging at apartments and workplaces, mobility hubs, and innovative community mobility pilots. Federal programs such as the Alternative Fuel Infrastructure tax credit and Charging and Fueling Infrastructure and National Electric Vehicle Infrastructure grants provide additional funding. But even these programs will be insufficient to meet the total funding gap–highlighting the need for replicable investment models to provide charging for all.

According to one estimate by the California Public Utilities Commission (CPUC) Public Advocates Office, the nearly 1.25 million publicly accessible chargers needed to meet state vehicle targets could cost approximately $31 billion to install, of which only $4.8 billion will come from existing allocated state funds.[9] The remaining $26 billion will require a combination of private capital (such as from EV charging companies and property owner investments) and new revenue sources.[10] At the local level, for example, the City of Oakland's equity-focused ZEV Action Plan estimates a potential funding need of $200 million by 2030 and $730 million by 2045 for public Level 2 and DC Fast charging in the city, with a range of public and private sources available to meet the need but few concrete pathways identified.[11] One National Renewable Energy Laboratory estimate found that the charging network needed to support an anticipated 33 million EVs nationwide in 2030 could require cumulative investment of up to $127 billion, including $55 billion for publicly accessible charging.[12] While businesses and multifamily property owners in wealthier communities may be willing to pay a higher proportion of these costs (with higher rates of local EV adoption and thus likelihood of charger use, plus greater access to capital), priority populations are likely to face a significant funding gap for publicly accessible EV chargers.

Given the importance of publicly accessible charging for priority populations, the structural barriers they face, and the practical challenges of rapidly developing new energy and transportation infrastructure, it is clear that local governments will need to craft deliberate strategies for everything from site selection and community engagement to streamlined permitting and public-private partnerships. Given the many billions of dollars needed to make this charging a reality over the coming decade and the limitations of city and county budgets, it is equally clear that funding and financing innovations will be necessary. While the sheer volume of chargers and funding needed to meet future demand is significant, local leaders will need to carefully design programs to meet communities' mobility needs–rather than simply increase infrastructure counts–to promote EV interest and access for all.[13] They will also need to ensure that revenue sources themselves are equitable, reliable, long-term, and developed through community partnerships.[14]

Prospect Silicon Valley (ProspectSV) and the Center for Law, Energy and the Environment at UC Berkeley School of Law (CLEE) convened an advisory group of experts in climate and public finance, clean mobility, and city infrastructure investment to develop innovative proposals to address this challenge. Strategies discussed by the group ranged from microfinancing for owner-occupant charger installations and cooperative/community trust ownership models to state-subsidized electricity for charging in underserved communities, reduced cost-share requirements for infrastructure grants,

and the state as a first-loss funder to induce private investment in areas with lower charging demand. The group also considered strategies such as:

- Monetizing Low Carbon Fuel Standard credits earned through provision of electricity for charging to fund capital investments in charging infrastructure or charging subsidies for priority communities.
- Adapting federal and state purchase incentives to fund EV car-share participation.
- Connecting curbside chargers to neighboring behind-the-meter building electrical infrastructure, simplifying permitting and utility approval processes.
- Establishing monthly flat-rate (rather than per-kilowatt-hour) charging fee arrangements to deliver lower total costs for high-certainty charging users, such as ride-hailing and taxi service drivers.
- Using standard City contracting arrangements to accelerate EV charger installations, such as master lease and franchise agreements (to settle all financial and technical terms in advance of individual site selection and engineering); tolling agreements (giving the public entity control of site selection and uptime and the private entity financial protection against low utilization through a flat fee) and pro forma asset transfer agreements (with charging infrastructure transferring to or from a public entity at a pre-agreed date and price).

This document outlines the top financing and revenue strategies identified by the group to bring city-scale charging and mobility infrastructure solutions to fruition.

II. HOW LOCAL GOVERNMENTS ARE APPROACHING CHARGING INFRASTRUCTURE

Local governments in California and other jurisdictions are taking varied approaches to EV charging and mobility infrastructure, and these approaches will shape what investment and financing strategies are most likely to advance access and equity.

An analysis by the C40 cities coalition identified a range of city government roles (regulations/permitting, funding/incentives, public-private partnerships, planning/zoning, awareness/education) and governance approaches (governance-, private sector-, and utility-driven) in EV charging infrastructure decision-making, finding that cities should conduct needs assessments, establish governance bodies dedicated to EV infrastructure, and develop EV-specific legal, regulatory, administrative, and urban space management strategies to ensure infrastructure access.[15]

In California, EV adoption has grown to over 25 percent of all new automobile sales in 2023.[16] (Nationwide, EVs were approximately 7.5 percent of sales.) Vehicle costs are declining, manufacturers are offering more models, and the 2022 Inflation Reduction Act extended and income-capped federal EV purchase incentives and made them available for used vehicles.[17] At the same time, public charging can be spotty and scarce, with a number of competing market players facing maintenance and operability challenges, and Tesla chargers becoming more widely accessible to non-Tesla drivers but unevenly distributed in communities throughout the state.[18] Significant federal grants are available through the 2022 Infrastructure Investment and Jobs Act, as are tax credits for charging infrastructure in rural and lower-income communities under the Inflation Reduction Act,[19] but cities and counties have limited capacity to obtain these funds and integrate them into coherent local strategies. However, certain approaches are emerging at the city level to facilitate greater investment:

- **Curbside permitting:** Some cities have established planning processes specifically for curbside charging–identifying appropriate locations that do not conflict with other transportation needs, setting design and accessibility requirements, and developing permits tailored to private EVSE investment.[20]

- **Curbside pilots:** Several jurisdictions[b] have experimented with streetlight- and utility pole-mounted curbside charging, which eliminates the need for curb disruption and can take advantage of existing electrical capacity, reducing the cost and complexity of bringing charging to public spaces and potentially supporting public EV car-share programs to meet the needs of underserved communities.[21]
- **Multifamily properties:** Local (and state) programs are testing a range of approaches to address the complex financing and infrastructure challenges of multifamily charging, including focusing on Level 1 charging to provide initial charging access[22] before large-scale electrical upgrades can be made, dwelling-proximate charging clusters for properties that are too costly to upgrade, and car-share programs.[23]
- **Public parking garages:** Cities are investigating public and private investment in municipal lots and installation mandates for commercial lots, taking advantage of spaces already committed to vehicle parking, existing electrical infrastructure and wall/overhead spaces for mounting chargers, and medium- and long-term parking intervals well suited to charging.[24]
- **Comprehensive action plans:** Local agencies are beginning to craft formal, comprehensive ZEV action plans that commit city leaders to specific actions to promote the local transition to zero-emission mobility, including public and curbside charging strategies, multifamily building incentives and mandates, mobility hubs, permitting and agency coordination improvements, and engagement and community participation.[25]

While local governments will play a central role in crafting equity-focused approaches to EV and mobility infrastructure, in most cases this infrastructure will likely be provided by non-government actors seeking revenue-positive projects. To ensure investment in priority communities, local governments will need to both leverage their planning and permitting capacities and pursue funding and financing coalitions that include a mix of public and private partners.

b For detailed discussion of city curbside and public charging pilots and equity implications, see Ted Lamm and Malcolm Johnson, Center for Law, Energy & the Environment, *Case Studies: City Public & Curbside EV Charging Strategies* (March 2024), available at https://www.law.berkeley.edu/research/clee/ev-equity/our-publications/curbside-ev-charging-strategies/.


NO PARKING
EXCEPT WHILE CHARGING
EV PARKING ONLY
TOW-AWAY ZONE
EV CHARGING ONLY

III. FUNDING, FINANCING, AND INVESTMENT STRATEGIES TO SUPPORT EQUITABLE MOBILITY INFRASTRUCTURE DEPLOYMENT

Research and work with advisory group experts surfaced a number of potential strategies to address the challenge of funding the capital and operational costs of charging and mobility infrastructure in underserved communities. These include a mix of revenue strategies and alternative strategies to reduce the cost of installations (providing "revenue" through savings or otherwise accelerating investment).

These strategies are divided into two groups: local coalition approaches that could form the basis of one or more local government-led pilot programs; and supporting revenue strategies that could support these pilots and more with large-scale clean mobility funding. These strategies largely focused on investment in public spaces, intended to support and fill the gaps where convenient home and workplace charging remain infeasible.

While this report does not rank or score the proposals, key criteria for evaluation could include the extent to which a proposal:

- Is specifically designed to meet the mobility needs of priority communities
- Is structured around infrastructure/components that are likely to draw multiple funding streams
- Engages the strengths of local governments and identifies clear partnership pathways
- Has the potential to scale from pilot to community- and jurisdiction-wide impact

It is crucial that any coalition or local government-led strategy to advance zero-emission mobility investment in underserved communities be built on a foundation of community needs assessment and engagement in project design and site selection. As detailed in The Greenlining Institute's Mobility Equity Framework, direct community involvement in decision-making processes is essential to ensure that projects actually increase mobility, reduce air pollution, and enhance economic opportunity in commu-

nity-relevant ways. Truly equitable mobility coalitions will include community partners and robust engagement processes.

1. LOCAL COALITION APPROACHES

These approaches include a group of potentially overlapping strategies that could conceivably fit together to provide overlapping financial support for a suite of local clean mobility options: utilization support, fleet charging, and TNC partnerships could provide revenue for high-priority public EV charging and mobility hubs, all described below. Meanwhile, city and philanthropic support for home-to-curbside charging could create a low-cost bridge to support near-term EV adoption for those who lack private charging.

a. City utilization support incentive and fleet charging

Local governments seeking to support access to EV and zero-emission mobility infrastructure in underserved and lower-income communities often face the challenge of uncertain or low anticipated charger utilization deterring investment by private EVSE developers, which primarily focus on areas that currently exhibit high demand (and thus secure utilization and revenue). To jumpstart EVSE deployment in priority communities that currently lack high demand and its associated revenue stability, local governments could lead public-private coalitions that incentivize investment through utilization support and priority site selection. Such a program might include the following components:

- **Real estate marketplace:** The city would partner with a spatial data analytics firm to identify underutilized real estate (e.g., parking facilities, gas stations, commercial sites with excess parking, or vacant lots) in key locations within priority communities where EVSE developers can install charging infrastructure, coupled with trip data and mobility analytics to identify high priority destinations. The city would host or sponsor a virtual "marketplace" to connect EVSE developers to land owners and help obtain low-cost leases and access agreements. Best-fit locations could include or overlap with clean mobility hubs (described below).
- **Fleet charging:** To ensure baseline utilization, the city would work with the EVSE developer to negotiate a commitment for fleet charging at the site, either by a city vehicle fleet or a private fleet willing to guarantee a minimum level of utilization at designated hours. At all other times, chargers would be publicly accessible for the community, enabling the charging to serve as a community mobility asset and promoting eligibility for many EVSE incentive programs.[c] Or, a fleet charging commitment could be provided through a TNC partnership (described below) which would entail charging at various times by community members who drive for TNCs.

c Shared fleet/public use of chargers may not be feasible for critical fleet vehicles such as police and other first responders.

- **Utilization support:** To ensure revenue sufficient for EVSE developers to justify investments, the city or a private financial institution would provide "utilization support" in the form of a minimum payment guarantee if charger utilization is below a predetermined threshold (subject to the developer's meeting minimum uptime and maintenance requirements). Payments would decline after the first year of installation and phase out completely over time (with the expectation that charging site familiarity and broader EV adoption patterns will sustain future demand) and the public or private guarantor could be entitled to a portion of future revenues should they exceed a predetermined threshold in a "pay for success" model.[26]

Locating candidate sites that meet both community and fleet needs and can reach financial sustainability in short order could prove challenging; however, for dense cities seeking to electrify fleets but lacking in dedicated parking (or capital) to secure charging, the shared model could prove vital. To ensure safety and operational utility for potential fleet partners, parking areas must be spatially relevant to the fleet's operations and must provide adequate lighting among other measures to monitor and secure vehicles in the space.

In addition, while either public or private fleet partners could fulfill charger utilization needs, political considerations may limit the range of viable private partnership options; some private companies seeking to electrify their fleets (e.g., delivery services, autonomous vehicle companies, TNCs) may have controversial reputations or relationships with public agencies that could strain partnership efforts. Accordingly, public agencies with significant light-duty fleets and limited-time vehicle usage (e.g., parking enforcement) and local companies may offer the most feasible utilization support pathways. And while direct financial support to ensure a private EVSE provider's revenue bottom line could prove challenging for local governments to fund alone, the promise of secure charging for city vehicles, investment in priority communities, and potential upside payments if a project is successful could make the case for a program.[27]

Additional Considerations

- What level of utilization support would be necessary to secure private investment and what level of future revenue sharing ("pay for success") would be feasible?
- What city light-duty fleets are preparing for electrification in the near term and what fleets are best suited to charger-sharing with community drivers?
- Can the utilization support agreement include mechanisms to secure long-term O+M commitments?

b. TNC driver community partnerships

Transportation network companies (TNCs) like Uber and Lyft are a key element of the modern mobility landscape and collectively drive millions of vehicle miles per year. Under California's Clean Miles Standard, these companies are required to ensure that an increasing portion of the total miles driven by in-service vehicles are driven by zero-emission vehicles, from 4 percent in 2024 to 90 percent by 2030.[28] As a result,

these services will need to encourage California drivers to shift largely to EVs over the coming five years, including by promoting access to affordable charging throughout the areas drivers serve. (Uber and Lyft are both targeting system-wide electrification through a mix of driver incentives, EV rental programs, and some charging support, alongside existing state and federal programs.[29]) While driver demographic data is challenging to obtain, TNC drivers are diverse and deliver a large proportion of rides to or from lower-income communities and to lower-income customers (according to Lyft for example, over 70 percent of drivers are members of a community of color, median rider household income is $55,000, and 43 percent of rides start or end in lower-income communities in the US.[30]) This means that access to charging in low- and moderate-income communities and communities of color will likely be vital to TNCs' ability to make the electrification transition in a way that is cost-effective and convenient for drivers.

Publicly accessible charging infrastructure in these areas could both help TNCs meet their electrification targets and provide charging access to community members seeking to switch to EVs for private use. City leaders could work with TNCs–as part of comprehensive charging priority zone selection–to identify communities where a high proportion of TNC drivers live that overlap with other city priorities regarding equity and charging access, such as lower-income communities and areas with dense multifamily housing. City leaders can target initial public charging installation in these communities and obtain cost-share from TNCs as part of their driver electrification support programs. TNCs could highlight these chargers in their existing charger-location support apps and subsidized charging rates for drivers, leveraging the investment to attract drivers to their networks and facilitate their fleets' EV transition. TNCs could also co-brand the charging infrastructure (alongside city and EVSE developer partners) and promote it in public-facing materials as a community investment.

These partnerships, in turn, would ensure a baseline level of charger utilization needed to support private EVSE installation. And since the California Public Utilities Commission has identified a significant cost premium for TNC driver charging due to reliance on public DC Fast charging,[31] a commitment to community-scale Level 2 charging (for longer periods when vehicles are not in service), could help drivers save costs as well.

Additional Considerations

- What EVSE/charging hub amenities are needed for TNC drivers' use case?
- As community use increases, will TNC drivers have sufficient access to chargers to make them reliable for business use? What strategies (restricted hours, driver verification, parking enforcement) could be used to meet TNC driver needs while still promoting community access?
- How can TNCs and cities link the infrastructure to EV carshare programs and promote ride-sharing on the TNC services?
- Can charging partnerships also include traditional taxi companies, which are not subject to California's Clean Miles Standard but still need to transition to EV fleets and serve (and employ) highly diverse populations?

c. Clean mobility hubs

The primary concept of a mobility hub is to serve as a connectivity point for various modes of transportation, such as walking, biking, transit, and shared mobility. These hubs can offer a wide range of integrated mobility services, amenities, and technologies that help build transportation equity in underserved neighborhoods by addressing the first and last mile of an individual's trip. As the Bay Area Metropolitan Transportation Commission notes in its Mobility Hub Implementation Playbook, hubs are a tool for local governments "to flexibly design and integrate a variety of sustainable transportation options to enhance connectivity" across regions using a "combination of incremental funding sources."[32]

Typically, these hubs utilize a combination of public and private funds and/or partnerships to implement more cohesive and integrated transportation systems within communities. A recently launched clean mobility hub in Sacramento presents an example of the variety of mobility services that can be made available in underserved communities as a result of leveraging multiple funding streams.

The Net Zero Mobility Hub[33] in Del Paso Heights (DPH), Sacramento, CA is an innovative transportation outlet designed to improve health and economic equity in the Del Paso Heights neighborhood and surrounding areas by providing a diverse set of zero and low-emission transportation options. The DPH Mobility Hub is operated by Green Tech Education and Employment (Green Tech)[34] in partnership with Sacramento Metropolitan Air Quality Management District and other local nonprofits. The DPH Mobility Hub helps fulfill Green Tech's goal by building transportation equity in frontline neighborhoods, and improving quality of life through cleaner air and greater access to socioeconomic resources such as jobs, education, and healthcare.

The DPH Mobility Hub includes an array of supporting components including an electric shuttle bus, electric bikes, scooters, electric vehicle charging stations, bike racks, charging benches, and green space.[35] The Hub also hosts four programs: Net Zero Student Ride Hail Program; Plan, Share, Go Program; Community CarShare; and Microtransit.

- **Net Zero Student Ride Hail Program:** An EV Shuttle Bus provides free rides to students in need of transportation. Through this program, school-age youth have greater access to job training and educational programs. The shuttle also provides transportation to medical care centers and workplaces.
- **Plan, Share, Go Program:** The Plan, Share, Go Program identifies the most in-use routes by community members in need of transportation (job centers, hospitals, schools, churches, etc.) and provides rides from the DPH Mobility Hub or a predetermined location via pre-planned routes. This program utilizes three EV Kias driven by paid drivers.
- **Community CarShare:** Our Community CarShare Sacramento Pilot Project (OCCS)[36] is a cost-sharing transportation program partnered with Zipcar located in communities throughout Sacramento. The program provides an opportunity for individuals living in disadvantaged communities that fall within or near the 25% percentile for low-income in CalEnviroscreen 3.0, as defined by California Air Resources Board (CARB), to access electric vehicles and other alternative transportation modes. Residents can reserve clean,

zero-emission vehicles to run errands, get to appointments, and take local trips. Membership in the program is free.

- **Microtransit (Lyft Concierge):** The site was officially launched in September 2023. Services provide over 350 weekly trips to over 200 community members.

By combining multiple forms of clean mobility infrastructure at a single physical site, hubs enable cities to pull together multiple public and private funding streams, partnerships, and resources. The DPH Mobility Hub was able to gather funding for clean mobility infrastructure and services from the California Greenhouse Gas Reduction Fund and Clean Mobility Options program, private donations, and provision of the project site at zero cost by the city. The hubs can also bring together other strategies outlined above, including identifying underutilized real estate in key locations within priority communities where the hub and other services can be built, and partnering with ride-share and TNC companies like ZipCar and Lyft.

Additional Considerations

- Beyond grants, what private investments or partnerships align with the goals of clean mobility hubs?
- What broad coalition of partners can enable a city to pursue a variety of funding opportunities (I.e., regional, community groups, workforce development, educational institutions)? How can cities begin to form these partnerships?

d. Authorizing residential charging cords across the sidewalk

As a general matter, city laws governing the public right-of-way prevent residents from running charging cables from homes across the sidewalk to curbside parking spaces, due to concerns around safety and privatization of public space. But for ground-floor residents who lack access to dedicated off-street garages or driveways, this practice offers the most immediate, affordable way to charge an EV at home and overnight. Several cities are turning toward formal approval of this application–subject to design, safety, and time-of-use requirements–as an alternative to rapidly expand residential charging access that involves none of the public costs or commitments of permanent curbside charging stations.

Leading examples include programs in Portland, Seattle, and Washington, DC that allow residents to extend charging cords across the street to vehicles parked at the curbside, subject to compliance with a published set of cord cover guidelines.[37] Other cities are actively considering the practice as part of their ZEV plans.[38] Crucially, no permit is required as long as guidelines are followed–the programs consider the practice approved or permitted by right, subject to compliance. In each of these cities, guideline enforceability is derived from existing city code that regulates private occupation of the PROW and authorizes the city to remove such structures. Key guideline components for the existing programs include:

- Only Level 1 charging cords may cross the PROW; Level 2 is prohibited.

- Charging cords must be covered by a highly visible and stable cable ramp/cord cover while in use.
- Cord covers must comply with specifications for height, width and ramp steepness that adhere to ADA requirements. These covers are widely commercially available, and are of the sort frequently used during sidewalk construction work.
- Residents must disconnect and remove charging cables when not in active charging use, and standard parking rules apply.
- Residents must use a charging outlet that is connected to their own utility account.
- Failure to abide by the guidelines may result in equipment removal and public space restoration at the user's expense, and/or fines.

While this type of program would not constitute "financing" in a traditional sense, city governments should consider it as a near-term solution to accelerate charging access for EV drivers who do not have dedicated parking spaces to charge their vehicles (i.e., ground-floor renters and homeowners without driveways or garages). The cost and time savings associated with this approach–tens or hundreds of dollars per charger rather than thousands, no permits reviewed or issued, no public capital or labor expenditure–should be considered equivalent to potentially millions of dollars in revenue dedicated to expanding access to EVs, in particular lower-income drivers. Cities could partner with financial institutions or air districts to offer free code-compliant cord covers and high-quality extension cords for residents of priority communities to accelerate uptake, ensure safety, and promote equity. Cities could also explore including Level 2 charging in the approach to meet the needs of larger batteries and greater charging convenience. While the approach likely does not constitute a long-term solution for citywide charging, it can play a central, low-cost role in a comprehensive city approach that meets the needs of all residents.

Additional Considerations

- What additional safety and design measures are needed to allow Level 2 charging under this approach?
- How can cities integrate charger-sharing so multiple residents can use a single installation?
- How can private entities and financial institutions contribute (e.g., free cord covers and hardware) to facilitate greater access for lower-income drivers?

2. SUPPORTING REVENUE STRATEGIES

These proposals present opportunities for large-scale local and state revenue streams dedicated to EV charging and zero-emissions mobility infrastructure, as well as an option to reduce costs for users. They can provide core funding for the coalition approaches described above.

e. State green bank financing programs

State green banks and infrastructure banks use public funds to provide bonds, credit enhancement, and financing for public infrastructure. California's Infrastructure and Economic Development Bank (IBank) is one such institution with a set of programs that fund climate-related infrastructure, including a Climate Catalyst Fund (CCF) that provides low-cost financing for specific sectors of decarbonization and resilience infrastructure in need of accelerated capitalization.[39] The IBank could use the CCF to provide financing for cities to make capital investments in public charging infrastructure in underserved communities where private investment has been slowest to emerge, with repayment made from charging revenues but without traditional financing interest rates. California Law already authorizes IBank to incorporate EV charging infrastructure into the CCF program, but IBank would have to take a few key steps–issuing a new financing plan and securing seed capital, potentially from new federal funding sources–to launch the program.[40]

The I-Bank's authorizing legislation directs it to use the CCF to finance climate-related "catalyst projects" that classify into one of five possible categories, subject to compliance with a set of procedures. To date, IBank has developed programs for financing climate-smart agriculture, forest biomass, and clean energy transmission projects; EV charging infrastructure falls within the scope of two remaining eligible project categories, which cover projects using federal funds for projects that avoid GHG emissions and using federal Greenhouse Gas Reduction Fund (GGRF, described below) financing for projects that meet state climate and equity goals.[d]

To add a new project category, I-Bank must develop a new financing plan that lays out the terms of eligibility and project types. I-Bank must develop each financing plan in consultation with a relevant agency that has expertise in the proposed plan's project sector, and funding applications are restricted to the set of projects that correspond to an established plans' eligibility criteria.[41] Eligible projects can receive low-cost loans, loan participation, loan guarantees, and other credit enhancement intended to attract and complement private capital investment in emerging technologies and strategies. IBank's transaction criteria for the Catalyst Fund include "various transaction sizes, participation levels and concentration limits," but generally the Fund targets direct financings over $1 million with a maximum term of 30 years, plus an origination fee of 1.0%. Maximum loan/guarantee size, interest rates, cost share requirements, and loan participation/guarantee fees are not preset.[42]

I-Bank can institute a funding pathway for EV infrastructure catalyst projects by consulting with a relevant agency – such as the California Energy Commission, California Public Utilities Commission, California Air Resources Board, or Governor's Office of Business and Economic Development, which is responsible for the state's ZEV Market Development Strategy – to create a new financing plan for either Anthropogenic GHG Emissions Reduction projects or GGRF projects.

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d In December 2023, IBank issued a Request for Information seeking input on the design of state lending and financing programs that would use funds provided by the IRA's National Clean Investment Fund to advance investment in zero-emission transportation (among three program areas), indicating IBank will likely be acting as a state "green bank" for EV charging. See https://ibank.ca.gov/climate-financing/climate-financing-request-for-information/.

Once a catalyst project's relevant financing plan has been established, prospective borrowers follow standard CCF application procedures.[43] Eligible applicants (e.g., private entities, nonprofits, and local, state, or tribal governments) must provide capital development budgets, readiness and feasibility assessments, demonstration of sufficient resources for project completion, and necessary permit documentation, among other information. Upon project approval, the CCF draws from I-Bank's variety of case-determined financing instruments to fund eligible project costs, which range from construction and maintenance operations to licensing and administrative services. If project needs exceed the CCF's financial capacity, I-Bank prioritizes projects that serve disadvantaged communities.[44] This overall project prioritization method in conjunction with the prospective GGRF category's required alignment with state climate and equity goals makes CCF particularly well positioned to fund charging infrastructure in low income communities.

The availability of federal funds for charging infrastructure–through the Inflation Reduction Act's Greenhouse Gas Reduction Fund (GGRF) and various provisions of the Infrastructure Investment and Jobs Act[45]–presents an opportunity to craft a CCF financing plan focused on charging infrastructure in underserved communities. This infrastructure may generate insufficient revenue in the first few years after installation to support stand-alone investment (private or public), necessitating access to low-cost capital before EV adoption is high enough throughout California communities to transition to revenue positivity.

Because California leaders are targeting a phaseout of new internal combustion engine (ICE) vehicle sales by 2035 and statewide carbon neutrality by 2045 while relying on consumer adoption of EVs to meet these goals, equity-focused charging infrastructure is a strong candidate for CCF financing that can attract public and private investment and bridge the financing gap to achieve scale across communities regardless of income or demographics. As CLEE and ProspectSV noted in a response letter to the IBank's Climate Financing Request for Information, federal funding from the GGRF should be used to support "strategies that include community-accessible charging infrastructure, shared and micromobility, mobility hubs, and projects with community amenities and economic development potential."[46] In particular, GGRF funds could provide key capital for city utilization support models and mobility hubs that integrate several zero-emission mobility modes in a single project.

By limiting eligibility to CARB-identified Priority Populations (e.g., areas that meet state criteria for disadvantaged communities and low-income communities) or an equivalent measure, CCF could ensure that state funds support investment in communities that need it most. A charging infrastructure CCF program could also potentially integrate private capital from financial institutions willing to offer concessionary capital for this crucial mobility infrastructure. The rapid ramp-up in California's EV use in the coming decade–by the CEC's estimate, 15.2 million vehicles and 2.1 million public and shared chargers by 2035–will secure some long-term revenue for loan repayment, although local agencies will need to identify additional revenue streams (e.g., payments for associated mobility services, advertising) to ensure charging remains affordable. Larger-scale loans to local governments to support a mix of investments could help mitigate the risk of underutilized charging sites and address cost barriers for lower-income drivers.

Additional Considerations

- Which of IBank's available financing instruments (e.g., loan guarantees, loan participation, low-cost financing) best accommodate the timeline and magnitude of EV charging infrastructure costs?
- Can IBank support EV car-share programs, or only the underlying charging infrastructure?
- What set of eligibility criteria in a new financing plan for EV charging infrastructure would yield the best outcomes for priority populations?

f. Financing districts for EV charging and mobility infrastructure

Tools such as community facilities districts (CFDs) and enhanced infrastructure financing districts (EIFDs) enable community-scale revenue generation for new public infrastructure (potentially including energy infrastructure) through bonds backed by property taxes that are anticipated to increase in value due to the benefit of the infrastructure. Financing districts use the same basic revenue mechanism as municipal bonds, but with investments and voter approval limited to a geographic district within a jurisdiction. Thus, they may have particular appeal for jurisdictions where publicly accessible charging is not needed in all areas, but rather only in particular communities or districts (such as commercial centers or residential areas with a high proportion of multifamily buildings). In these cases, commercial and residential property owners could seek district-based solutions to collectively fund charging that meets the needs of residents and visitors, rather than relying on piecemeal investments by individual entities.

For example, owners of multifamily residential buildings without dedicated parking spaces for car-driving residents will identify access to charging as a neighborhood-scale need over the coming decades. Under California's Mello-Roos Community Facilities Act, the owners (or the residents) could petition the local government to create a district to issue bonds, funded through a special property tax assessment on district properties, that would cover the capital and operations cost of publicly owned and accessible charging infrastructure. CFD and EIFD bonds can be issued on a tax-exempt basis like GO bonds for public infrastructure, increasing appeal for green investors. A local agency such as a city/county transportation authority or a regional joint powers authority (JPA) would administer the program. While the public hearing and approval requirements (including ⅔voter approval for a CFD or 55% for an EIFD) typically create a high bar for district creation, in the case of public charging infrastructure–involving singular decisions around use of the public right-of-way and crucial mobility infrastructure access–these processes could be conducive to ensuring equity in siting and investment.

Flexibility in use of funds (both CFDs and EIFDs could fund charging infrastructure)[47] and shape of the district (including the ability to "annex" or add additional territory to an existing district, with no requirement for geographic contiguity) could make the CFD mechanism particularly useful for investing in district-scale charging infrastructure throughout a city.[48] Since the CFD assessment is based not on property value but on a district-specific "rate and method of apportionment," local leaders have the ability to design the funding structure with equity considerations in mind.

While it does not appear that any local government has created a charging infrastructure-dedicated CFD or EIFD to date, cities and counties around the state have used these tools for energy and transportation infrastructure improvements.[49] Local governments with existing districts, in particular CFDs with annexation/expansion capability, could also consider expanding and updating these existing districts to fund charging investments in priority areas–for example, San Francisco's existing or in-development Transbay, Hunters Point, or SOMA CFDs, which could all cover critical areas for charging access.[50] A charging infrastructure-focused financing district could also fund a utilization support program, mobility hubs, or TNC community partnerships as described above.

Additional Considerations

- What cities, if any, have existing energy-focused financing districts that could expand to add a charging component?
- How can local governments identify and bring together multifamily and commercial property owners potentially interested in access to curbside and public charging?
- Can the financing district be used to fund a utilization support program or to fund the public investment portion of a mobility hub or EV charging co-funded by a TNC?

g. General obligation and revenue bonds for EV charging and mobility infrastructure

While charging infrastructure is a new form of public infrastructure, it falls squarely within the broad category of publicly accessible transportation infrastructure typically funded by local agencies' bond issuance authority. City and county governments, transit agencies, public utilities, and community choice aggregators frequently raise revenue for transportation infrastructure costs by issuing general obligation bonds or revenue bonds.[51] Publicly accessible EV chargers, generating revenue through user payments, present a novel but clearly viable bond funding opportunity.

In California, general obligation (GO) bonds are used by local governments to fund a range of large-scale capital infrastructure, from transit system improvements to affordable housing, relying on local property taxes as a secure source of future income to repay bond purchasers. GO bonds typically require approval by two-thirds of voters and their proceeds must be used to fund investments deemed a public necessity by the local governing body (i.e., city council or county board of supervisors). Given state EV mandates and many residents' inability to charge at home, public charging (in appropriate locations) can readily satisfy the public necessity requirement. Because GO bonds are backed by property taxes (paid by property owners based on assessed value) and subject to voter approval, they offer a relatively equitable revenue generation mechanism–and to the extent a GO bond funds publicly accessible EV abd mobility infrastructure designed for use by residents who lack private garages, it could prove particularly equitable in terms of the source and use of funds.

Importantly, bonds that fund publicly owned infrastructure can be issued on a tax-exempt basis, making them particularly appealing to investors; bonds dedicated to charging and clean mobility infrastructure could qualify as green bonds, further increasing appeal. (Bonds can also fund non-public infrastructure, but on a non-tax-exempt basis.) In order to maintain creditworthiness and limit the number of voter approvals sought, many local governments maintain caps on total outstanding bond indebtedness and bond schedules that map anticipated investments years into the future, so the potential to add new stand-alone GO bonds for charging infrastructure may be limited in some areas.[52] In addition, any mobility infrastructure bond would require a local agency (e.g., transportation authority) with capacity to plan and operate (or contract for) the infrastructure.

Revenue bonds function similarly, but with future revenue from the project to be funded (e.g., transit system user fees) used to repay bond purchasers, rather than property taxes or the city general fund. Revenue bonds are typically issued by a local agency such as a transportation department or a public utility, and thus they can be particularly appropriate for infrastructure investments that are anticipated to generate steady revenue over many years–which should include appropriately sited public charging infrastructure in a future high-demand scenario. Revenue bonds are often subject to less stringent approval requirements than GO bonds (e.g., simple majority of voters or city council approval), meaning they may have an easier pathway to success, particularly for cities that act first.[53]

While it appears that no local government has to date proposed or issued a public charging infrastructure-focused bond, some cities have dedicated bond proceeds to fleet charging, and leading green bond and electrification organizations have called for application of GO and revenue bonds to charging infrastructure.[54] The San Francisco Board of Supervisors has called for a series of climate bonds including funding for publicly accessible EV charging.[55] Importantly, bond revenue could fund publicly accessible charging infrastructure whether it is city-owned and -operated or later transferred to private management, though the latter would eliminate tax-exempt status. To improve public approval prospects, charging investments could be coupled with broader city electrification, transportation, or affordable housing investments; they could also be paired with grid upgrade investments needed to support charging demand, perhaps through municipal electric utility bonds. For a city that anticipates direct public investment in a portion of the local charging network, a GO or revenue bond could offer an innovative application of traditional municipal finance mechanisms.

Additional Considerations

- What complementary investments (such as building electrification or grid upgrades) would fit best alongside charging infrastructure in a large-scale electrification bond?
- What accompanying policy mechanisms (e.g., site selection framework and community input process) would be necessary to ensure equitable rollout?
- What local agency (e.g., transportation agency, municipal utility) would be best suited to issue revenue bonds? What utilization assurance would be needed to support a revenue bond?

- What source of predevelopment funding can local governments use to facilitate the charger capital investment?

h. Demand-response and off-peak charging innovations

EV drivers who charge at home have the ability to take advantage of specialized EV charging rates or time-of-use rates that reward charging at times of lowest demand (typically overnight) and charging hardware and apps that automate the process. State energy regulations and electric utility policies mediate charging pricing in many cases, and many utilities offer EV rates that reduce costs during off-peak hours. Innovative approaches are increasing predictability of costs and expanding reach to public charging, allowing more drivers to access these savings.

Flat Fee Home Charging

In one example with the potential to reduce costs and increase accessibility for lower-income drivers, Florida Power & Light is piloting a flat-fee approach to home charging with unlimited charging on a Level 2 smart charger (provided free of cost by the utility) that charges primarily overnight and on weekends.[56] The program is limited to residents with private garages and requires adequate power supply, but offers substantial savings over public charging (plus the predictability of monthly flat billing) and could be a viable model for residents who want to make the EV switch but cannot afford a Level 2 smart charger or risk high electricity bills. A similar approach can enable greater EVSE expansion in multifamily dwellings. Some multifamily building owners seeking to install EV chargers have resolved electrical capacity barriers by using load-balancing charging equipment that sets a cap on collective electricity output and distributes power among simultaneous users accordingly.[57] This strategy circumvents the high-cost infrastructural investments required to expand a parking area's electrical capacity.

Demand-Response for Public Charging

Those who rely on public charging typically cannot benefit from these savings, adding another cost premium on top of the cost of using private EVSE for drivers who are less likely to be able to afford it. Applying demand-response technology to public charging–adjusting power consumption to meet the needs of the electrical grid–can substantially reduce electricity costs for end users (because utilities and grid managers are willing to pay or discount for the practice) and increase the total number of end-use devices on the grid (because they can reduce consumption at peak times).

The city of Amsterdam's "FlexPower" smart-charging system manages grid capacity and optimizes usage of local renewable energy as a means to integrate growing demand for EV charging into the existing power grid.[58] The pilot outcomes demonstrated potential to yield significant grid cost reductions in larger-scale iterations, while the program's newest model–FlexPower3–allows the grid to accommodate significantly more charging stations in a given network relative to a static grid system.[59] Accordingly, Amsterdam has taken action to upscale FlexPower3 for citywide use, while the Netherlands' National Charging Infrastructure Agenda has incorporated this model into a successor program for national-scale implementation.[60]

The FlexPower system's "Smart Static Charging Profile" applies standard demand response protocols to maximize the efficiency of EV charging: As solar energy production surges in the middle of the day, EV chargers deliver more power and faster charging speeds to vehicles.[61] During morning and late afternoon demand peaks, charging power diminishes to offset systemwide increased energy usage and renewable source reduction.[62] The charging station operator coordinates with the grid operator to calibrate each station's capacity collectively by district, according to average demand.[63] This collective scheduling feature, combined with the demand response mechanism, allows the grid to accommodate up to 3-4 times more charging stations in a given network as compared to a static system, albeit with customers receiving lower-power charging at multiple times throughout the day.[64]

The grid operator is the FlexPower system's primary beneficiary, with savings accrued through maintenance reductions and averted investments in grid expansion.[65] The system relies on users' willingness to accept reduced charging speeds during peak hours (and EVSE providers' willingness to supply it), but since parking times during peak hours typically exceed charging needs, few users experience significant changes in total charge received.[66]

Local governments seeking to add significant amounts of public and curbside charging as an equity-focused charging solution–for example, Oakland[67]–could encourage EVSEs and electric utilities to pilot this strategy as a way to avoid costly and time-consuming electrical grid upgrades that may be needed to support new charging infrastructure, particularly in areas with older grid infrastructure.

Additional Considerations

- What education and outreach is necessary for drivers to adapt to variable speed charging?
- Are private EVSE providers incentivized to participate in demand-response measures that slow charging times?
- How can city leaders and EVSE providers identify residential areas that are the best candidates for public charging with variable speeds?
- How can widespread residential energy storage installation support demand-responsive charging installations?

CONCLUSION

Each of the strategies described in this brief--from community-scale pilot concepts to large-scale transportation bond measures--must be designed to meet the mobility needs and priorities of the communities it is intended to serve, based on needs assessment, engagement, and participation in decision-making processes. Local agencies should evaluate new program concepts to ensure that mobility equity priorities are reflected throughout program design, from needs assessment to revenue generation to project selection and investment. And coalitions leading these programs must include community voices from the outset to ensure that community clean mobility needs are at the center of every investment.


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51 *See generally* California Debt and Investment Advisory Committee (CDIAC), *California Debt Financing Guide* (revised March 2022), available at https://www.treasurer.ca.gov/cdiac/debtpubs/financing-guide.pdf.

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61 Chenadec, supra.

62 Id.

63 Groen et al., supra, pp. 5-6.

64 Id. at pp. 6-7.

65 Peter Bons et al, Amsterdam University of Applied Sciences, "Final report: Amsterdam Flexpower Operational Pilot" (2020), p. 41, available at https://pure.hva.nl/ws/files/17123318/SEEV4_City_Flexpower_Operational_Pilot_Final_Report.pdf.

66 Groen et al., supra, p. 6.

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