



ZERO EMISSION VEHICLE ACTION PLAN



City of Oakland

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oaklandca.gov/projects/zero-emission-vehicle-action-plan



CITY OF OAKLAND

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By Kerby Olsen, Edna Aguilar, Alex Gutiérrez, (Spanish Speaking Citizen's Foundation), Michael Randolph

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List of Actions

City Leadership (CL)

CL-1 : Fund Dedicated Staff Resources for Zero Emission Vehicle Infrastructure Implementation

CL-2 : Conduct a Comprehensive Audit of City Property for Potential ZEV Infrastructure Implementation

CL-3 : Develop a Smart and Equitable Mobility Hubs Program

CL-4 : Collaborate with Partner Agencies to Expand the Network of Public EV Chargers

CL-5 : Expand affordable neighborhood ZEV Car Sharing Programs

CL-6 : Support ZEV Education and Awareness in Underserved Communities

CL-7: Ensure Fire Safety in the ZEV Infrastructure Rollout

CL-8 : Accelerate City Fleet Vehicle Replacement

CL-9 : Add EV Charger Installation and Electrical Work to the Contractor On-Call List

CL-10: Incentivize Use of ZEVs at City-owned Parking Lots and Garages

CL-11: Establish an Inter-Departmental Working Group to Review, Assess, and Streamline Strategic Mobility Projects

Existing & Multi-family Buildings (EMB)

EMB-1: Develop An “EV-Ready” Ordinance For Major Retrofits and Property Transfers

EMB-2: Conduct Outreach to Tenants and Property Owner/Managers

EMB-3: Working with Partners, Establish A Program to Facilitate Collection of Information About Electric Infrastructure and Peak Demand for Multifamily Buildings

EMB-4: Include Strategies to Encourage EVSE Installation In Existing Buildings in the Building Electrification Roadmap

EMB-5: Analyze the Potential for Reducing Localized Air Pollution through Targeted EV Charging Investments

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PC-2: Create a Residential Curbside EV Charging Strategy and Ordinance

PC-3: Develop and Implement a Program to Deploy EV Charging Infrastructure in Frontline Communities

PC-4: Study the Feasibility of Subsidizing Public Charging for Low-Income Users

PC-5: Pursue EV Charging Requirement for Fuel Service Stations

Medium & Heavy-Duty Fleets (MHD)

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MHD-2: Require Upgrades to MHD Vehicle Fleet Sites

MHD-3: Establish an Inter-Agency Working Group and Partnership Agreement to Facilitate Site Identification and Streamlined Construction

MHD-4: Develop a Zero-Emission Delivery Zone Pilot Program

MHD-5: Study the Potential for Autonomous Delivery Vehicles

MHD-6 Support Enhanced Action on Zero Emission MHD Infrastructure in the East Oakland Community Action Plan

Electric Micromobility (Micro)

MM-1: Create and Expand an E-bike Lending Library

MM-2: Connect Residents with Subsidies and Incentives to Residents for Purchasing E-micromobility

MM-3: Pursue Resources to Assist Local Businesses to Purchase Cargo E-bikes

MM-4: Assess Continuation and Expansion Of City's Universal Basic Mobility Program Pilot

MM-5: Incentivize Promotion of Adaptive E-micromobility Devices for Persons with Disabilities

MM-6: Expand Public Secure Parking and Bikeways for Bikes and Scooters

MM-7: Include E-micromobility in Next Bike Plan

ZEV Economy (ZE)

ZE-1: Fund and Conduct a Local Economic Assessment for ZEV Transition

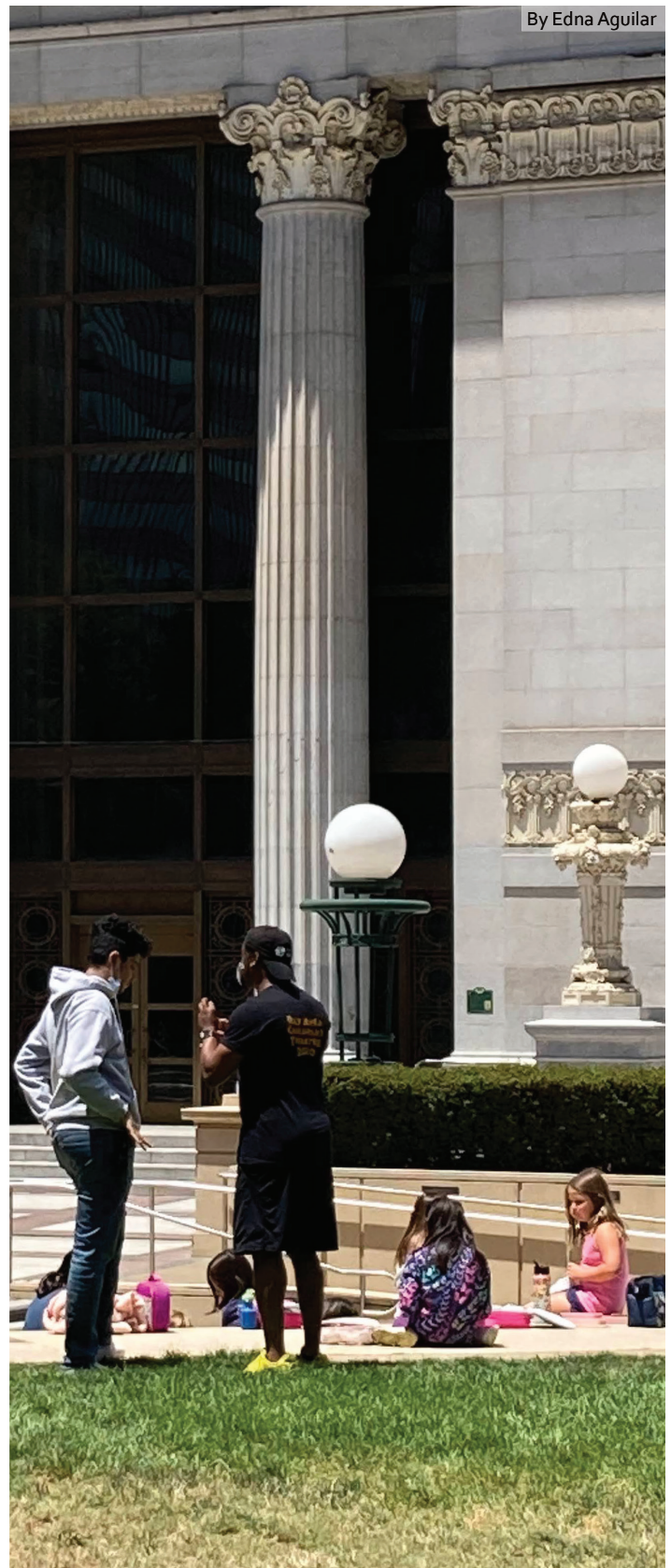
ZE-2: Hold an Annual "Clean, Green, and Just Business and Employment Expo"

ZE-3: Partner with Local Community Colleges and Workforce Training Partners to Create ZEV-specific Training Programs and Pathways

ZE-4: Work Across City Departments to Incorporate the ZEV Ecosystem into Relevant Plans

ZE-5: Establish High-Road Labor Standards and Goals for All City of Oakland Municipal Decarbonization Projects

ZE-6: Build Partnerships with Local Labor Leaders to Ensure Critical Needs Are Being Addressed



What is a Zero Emission Vehicle?

A Zero Emission Vehicle (ZEV) produces zero exhaust emissions of any pollutant under all conditions. ZEVs are typically powered by electricity or hydrogen.

ZEVs can include:

- Passenger cars
- Medium and heavy-duty trucks
- Busses and trains
- Motorcycles and mopeds
- Bicycles, scooters and skateboards
- Wheelchairs and other mobility devices






By Kerby Olsen, Edna Aguilar, Alex Gutierrez, (Spanish Speaking Citizen's Foundation)

Electric Or Hydrogen?

There are two dominant technologies for Zero Emission Vehicles: Electric Vehicles (EV's) and hydrogen fuel-cell electric vehicles (FCEVs). While both are commercially available and used in the Bay Area, EVs have significantly more market share: through 2021, 11,956 FCEVs had been sold in California, compared to 663,014 EVs. In Alameda County, FCEVs make up only 1.4% of ZEVs sold as of 2022.¹ Charging for EVs is far more plentiful than hydrogen fueling. As of February 2022, there are 3,697 publicly available EV chargers in Alameda County, compared to six hydrogen fueling stations (with two more planned). EVs can more readily be part of a fully zero-emission ecosystem, since they tap into an electric grid that is almost carbon-free today and will be 100% renewable and carbon-free by 2030. Conversely, while FCEVs have no tailpipe emissions, commercially available hydrogen today is predominantly produced from non-renewable methane gas, a potent GHG. However, investment in green hydrogen, including hydrogen produced from renewable electricity and biogas, is steadily increasing. Industry analysts expect green hydrogen to be cheaper than fossil fuels by 2050 globally, and likely sooner in California.

Proponents of FCEVs cite the rapid fueling time and longer range of hydrogen-powered vehicles compared to EVs. Hydrogen may hold unique promise for long-haul, heavy-duty trucks due to its simpler fueling logistics and lighter weight compared to batteries. The State of California is exploring investments in hydrogen demonstration projects to accelerate "green hydrogen" technology development, assess the fuel's potential, and gauge its appropriate role in a zero-emission transportation ecosystem.

EV CHARGERS 101

	Voltage	Added Miles per hour	
Level 1 Level 1 refers to the typical wall outlet that is normally used to plug in or charge electric devices such as computers and cellphones. This level is most convenient during long periods of charge time such as all-day workplace or overnight residential charging.	110/120V 12-20 Amps	2-5 miles	
Level 2 Level 2 charging stations are commonly found at shopping plazas and offices. They use 208/240 Volts (similar to a clothes dryer) and typically draw 40 amps, though that can vary for higher or lower power: for example, typical output can range from 7-20 kW, depending on amperage.	208/240V 32-50 Amps	10-20 miles	
Level 3 (Direct-Current Fast-Charging) This is the fastest EV charging currently available. It is four times as powerful as Level 1 charging and it is most convenient for long-distance and inter-city travel. Direct-current fast charging (DCFC) technology is advancing rapidly, in part due to rapid innovation in EV batteries for the medium- and heavy-duty EV sector.	440V	180-240 miles	



By: Creative Commons, Shayna Hirshfield-Gold, Kerby Olsen



1 Introduction



By: Alex Gutiérrez (Spanish Speaking Citizen's Foundation)

The Zero Emission Vehicle Action Plan

The City of Oakland is a leader in developing policies to advance sustainability and justice. From “Transit First” policies to the Department of Race and Equity to the Climate Emergency and Just Transition Resolution, Oakland City government has followed the lead of our community in being an agent of change. In 2020, Oakland City Council unanimously adopted the 2030 Equitable Climate Action Plan (ECAP), targeting a 60% reduction in greenhouse gas (GHG) emissions by 2030 while increasing climate resilience and improving racial and economic equity. The City Council also committed Oakland to attaining carbon neutrality by 2045, with the ECAP laying the foundation to achieve that target.

The transportation sector is responsible for nearly two-thirds of Oakland’s local GHG emissions, making it a primary focus for climate action. Transportation is also essential to life, connecting Oaklanders to work, critical services and daily cultural activities. Oakland’s ECAP set two important goals for transportation:

1. Switch as many trips and activities as possible from vehicles to active and public transportation; and

2. Shift all remaining vehicles to zero-emission technologies.

Changing how people and goods move around the Town will require economic, logistical, and behavioral efforts – efforts that are urgent if we are to achieve our climate, health, and mobility equity goals.

The Zero Emission Vehicle Action Plan (Plan) provides a critical piece of this puzzle. Building on the ECAP, and complementing the 2017 Pedestrian Plan, 2019 Bike Plan, and Transit First Policy, it provides a detailed roadmap for transitioning all vehicular trips in Oakland to zero-emission modes by 2045. The transition to zero-emission vehicles (ZEVs) benefits the health, welfare, and resiliency of Oakland and its residents by reducing air pollution, greenhouse gas (GHG) emissions, and fossil fuel dependence. It can also increase the share of private transportation spending that stays in the local community.

ZEV deployment is not on pace with the urgency that the climate crisis demands. As of the end of 2020, ZEVs made up just 1.31% of all light-duty vehicles in California, and 2.1% of light-duty vehicles in Oakland. Moreover, ZEV ownership, use, and infrastructure remain concentrated in more affluent neighborhoods and in areas that already enjoy the best air quality.ⁱⁱ

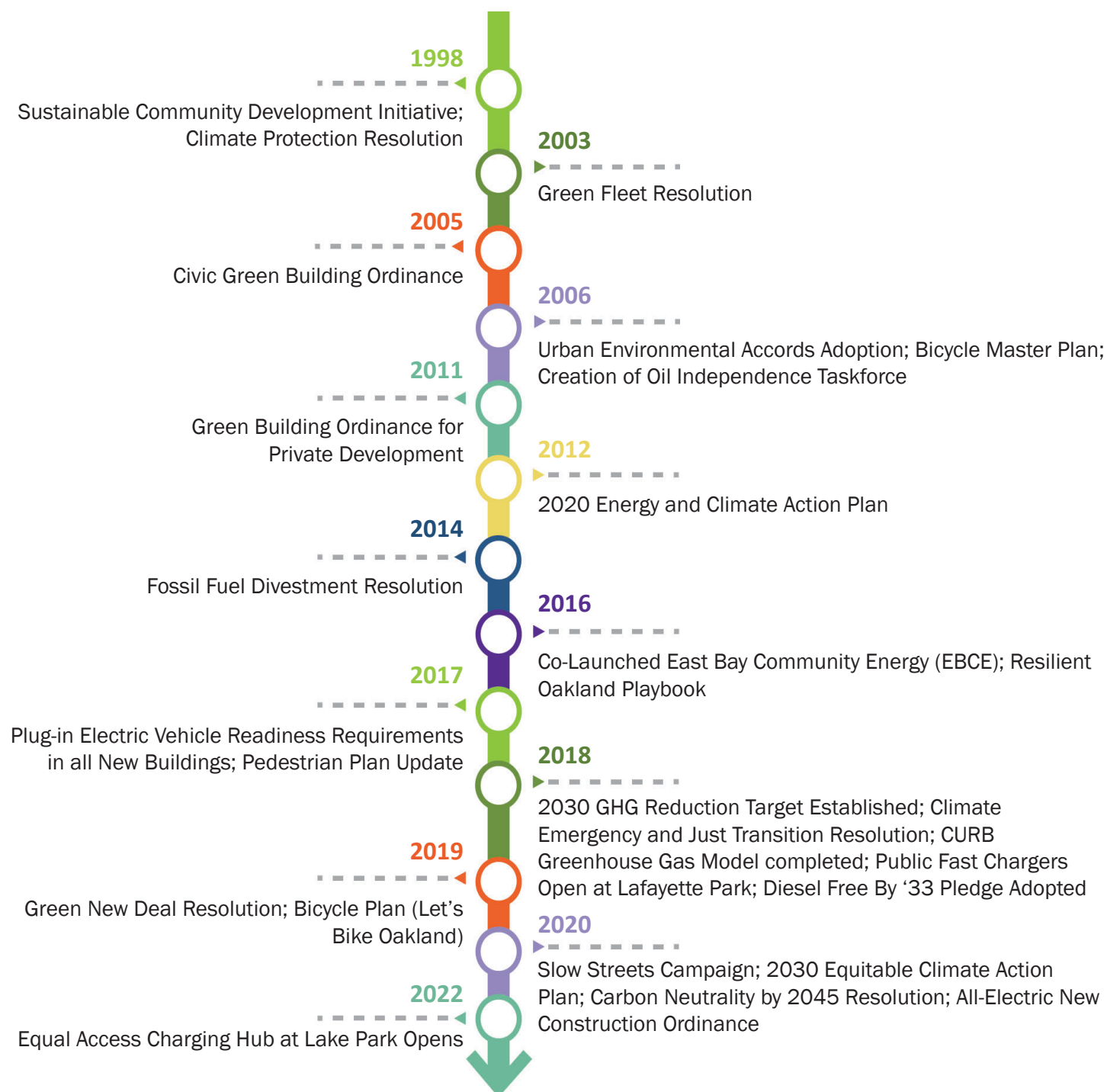
Large scale investment in ZEV infrastructure is needed, but the appropriate type of investments and where they should be targeted vary over time based on numerous factors. Accordingly, the Actions in this Plan focus on two broad categories: process changes that will facilitate investments in ZEV infrastructure and demand across all sectors (based on Oakland’s overall projected share of statewide goals); and measures to ensure that investments in clean transportation are made in communities that need them the most.

COVID-19 Highlighted the Urgency of Climate Action

The disparate impacts of the COVID-19 pandemic highlight the deeply rooted health inequities among those most vulnerable to the climate crisis. Underserved communities, particularly people with disabilities, the low-income, Black and Latinx residents, immigrant communities, and unsheltered residents, have been disproportionately impacted by COVID-19 due to higher rates of underlying health conditions like chronic lung disease, diabetes, and cancer. These conditions are worsened by chronic exposure to poor air quality, including from heavily trafficked highways. As parallels are drawn between the health impacts of COVID-19 and the climate crisis, the ZEV Action Plan reaffirms the focus on improving health outcomes through deliberate, equitable actions to transition Oakland away from polluting travel modes.

Oakland's History of Climate and Zero Emission Vehicle Leadership

The ZEV Action Plan builds on the City of Oakland's history of climate leadership. This Plan builds on lessons learned from past work to create a bold and accountable approach. Oakland's notable achievements related to the ZEV transition include:



Sustainable Mobility Framework

This Plan assesses transportation priorities within a sustainable mobility framework that integrates accessibility, equity, and sustainability. To reduce the total carbon and pollution impacts of transportation, the City must help as many Oaklanders as possible to meet their needs without cars. Active transportation (walking and biking) and public transportation are the top priorities. For those who must use vehicles (including cars, trucks, buses, and delivery vehicles), electrification and shared use wherever possible are key. Electric Vehicles (EVs) tap into an increasingly clean electric grid (one which,

thanks to East Bay Community Energy, will be powered by 100 percent clean energy by 2030), and can even be powered by locally-powered, “off-grid” solar. Transitioning gasoline and diesel fuel use to electricity supports more widespread clean energy, improves public health outcomes, supports local jobs, and adds robust options for mobility and commerce. Shared mobility reduces global GHG and pollution emissions by reducing the total number of vehicles that need to be manufactured and delivered.

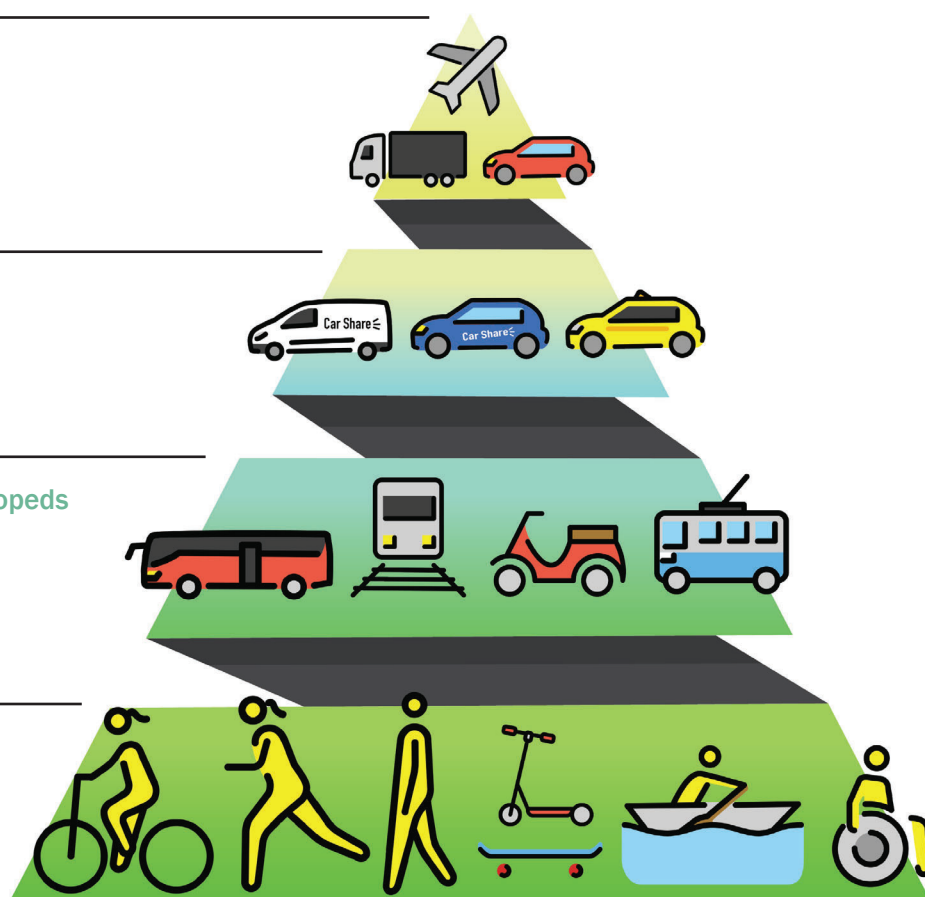
Figure 1-1: Transportation Priorities

Airplanes, Private Cars & Trucks
USE SPARINGLY

Taxis, Carpools, Shared Cars & Trucks
USE OCCASIONALLY

Public Buses & Trains, Motorcycles & Mopeds
USE FREQUENTLY

Walking & Human Powered Vehicles
USE AS MUCH AS POSSIBLE



Centering Equity

ZEVs can be a powerful tool for social equity. They reduce the pollution associated with private automobile use that disproportionately impacts frontline communities, and lower lifetime driving expenses thanks to reduced fueling and maintenance costs. This is a significant benefit to low-income community members who spend a disproportionate share of their income on transportation. In 2021, the annual cost of maintaining an EV was \$600-\$949 less than for an equivalent internal-combustion car.ⁱⁱⁱ Acquiring a ZEV is also becoming more affordable, thanks to the growing number of incentive programs like “Clean Cars for All” that make purchasing or leasing ZEVs more accessible to low-income people. The market for used ZEVs is also growing rapidly. Finally, for those reliant on vehicles for their livelihood – from taxi or app-based drivers to long-haul truck drivers – the reduced fueling and maintenance costs of EVs can have a profound impact on financial stability.

Despite the benefits and increasing affordability of ZEVs, ownership in frontline communities remains stymied. Widespread use of ZEVs depends upon convenient access to EV charging and hydrogen refueling. Unfortunately, today large portions of the communities of East Oakland, Fruitvale, and West Oakland are charging “deserts,” with little public charging available to residents and workers. These are the same communities that experience disproportionately high levels of air pollution caused by vehicle emissions and who suffer from poorer health outcomes due to that exposure. They are also at disproportionate risk of harm from rising sea levels and other impacts of the climate crisis. Making publicly accessible charging infrastructure available in these communities will enable more Oaklanders to consider purchasing, leasing, or using ZEVs, both new and used. Advocating for the expansion of state and Federal rebate and incentive programs will also help to ensure that low-income Oaklanders can benefit equitably from ZEVs.



By Alex Gutiérrez

ZEVs & Public Health

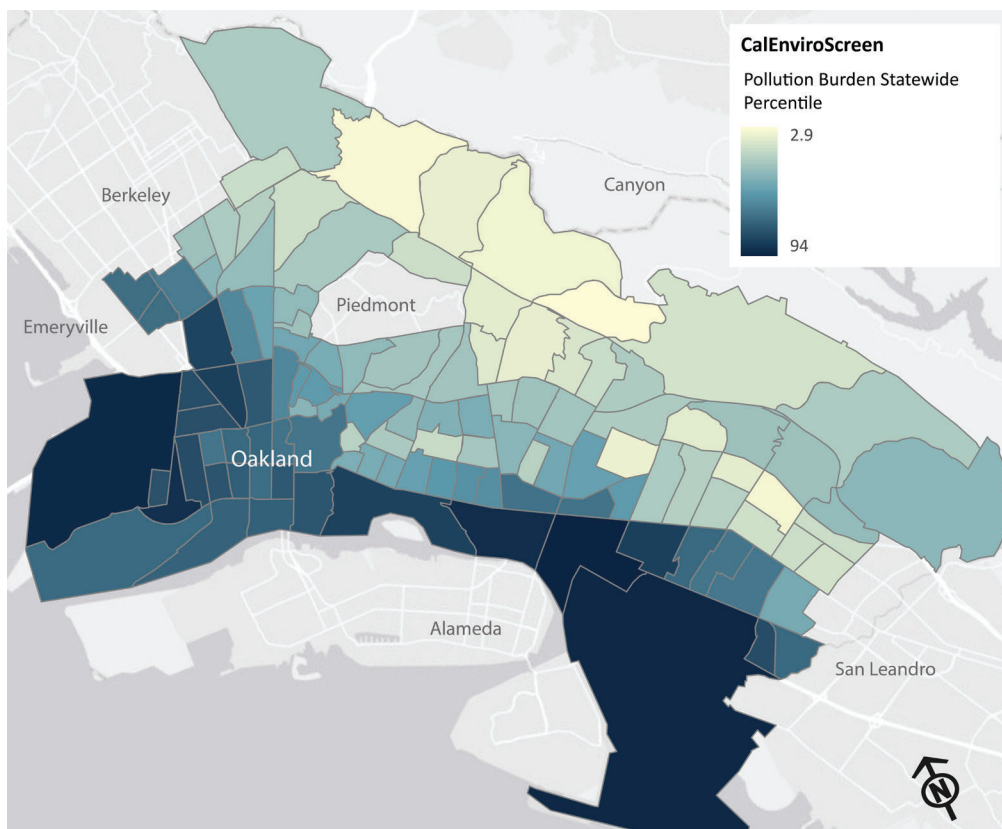
The environment around us has a profound effect on our quality of life, health, and life expectancy. Oakland's Department of Race and Equity (DRE) and Alameda County's Public Health Department (ACPHD) have documented significant health disparities linked to environmental conditions based on race and income. DRE found in 2018 that African American children in Oakland were 10 times more likely than White children to be admitted to the emergency department for asthma-related conditions. ACPHD data show that average life expectancy can vary by as much as 15 years across one mile, from Oakland's flatlands to Oakland's hills, depending on race. Swift and equitable climate action can reduce these disparities, improve health outcomes, and ensure that all Oaklanders can thrive regardless of race or neighborhood.

Air pollution from vehicles increases risk of early death from heart attacks, strokes, diabetes, and respiratory diseases. Diesel and gasoline-powered cars and trucks produce nitrogen oxides (NOx), sulphur oxides (SOx)

carbon monoxide (CO), volatile organic compounds (VOCs), and fine particulate matter (PM2.5 and PM10). These pollutants contribute to poor air quality and health outcomes that are inequitably distributed across Oakland (see Map 1-1). For example, nitrogen oxides are highly concentrated around major roadways and contribute to medical conditions such as asthma and bronchitis.^{iv} Communities in the flatlands along the Interstate 880 corridor, particularly in West and East Oakland, have a much greater pollution burden than communities in the hills. Especially in these heavily trafficked parts of the city, shifting to electric and hydrogen-powered vehicles can help reduce local air pollution.

When the move toward ZEVs is accompanied by a shift away from single-occupancy vehicles, frontline communities stand to see a marked increase in wellbeing even beyond cleaner air and lower transportation costs. Less road congestion means fewer accidents. Walking and biking can improve physical health.

Map 1-1: Cal EnviroScreen 3.0, Pollution Burden In Oakland



Targets & Approach

The ZEV Action Plan sets ZEV targets for 2030 and 2035 in alignment with adopted state policy. Oakland is expected to absorb its share of statewide ZEV deployment across all sectors by 2030 and 2035 relative to the statewide targets discussed below. By 2045, the Plan assumes that Oakland's transportation sector will be 100 percent zero-emission to support Oakland's adopted carbon neutrality target. Because the transportation sector is marked by uncertainty stemming from its regional nature as well as global and national market forces, this Plan omits targets for narrower sectors and technologies. Instead, it establishes a detailed, process-oriented framework to efficiently and equitably achieve the targets established, with clear checkpoints at which staff will assess progress alongside the evolving context, and adjust strategies as necessary.

State-wide Goals

In 2020, California Governor Gavin Newsom issued Executive Order N-79-20, mandating that 100% of new passenger vehicle sales be ZEVs by 2035. Based on vehicle ownership projections developed by the California Air Resources Board (CARB), this is expected to translate to 8 million passenger ZEVs across the state by 2030. To achieve California's 2045 carbon neutrality goal, CARB estimates that the state will need 27.9 million ZEVs. The California legislature has adopted ambitious targets for transitioning all transit buses, trucks, and other heavy-duty vehicles to zero-emission technologies over the next two decades, with interim milestones that are discussed in this Plan's Medium- and Heavy-Duty Vehicle chapter. Massive growth in specialized charging/fueling infrastructure will be needed for those fleets.

Oakland's Baseline

In 2020, Oakland had 268,370 light-duty vehicles, of which 5,569 were ZEVs (fuel cell and battery electric), a ZEV ownership rate of 2.1%. This compared to a rate of 2.6% across Alameda County, and 1.3% statewide. Since 2010, the number of ZEVs in Oakland has grown rapidly, as illustrated in Figure 1-2. As discussed, this growth has disproportionately occurred in higher-income areas (see Figure 1-3).

Figure 1-2: ZEV Share of Total and New Vehicle Sales by Zipcode

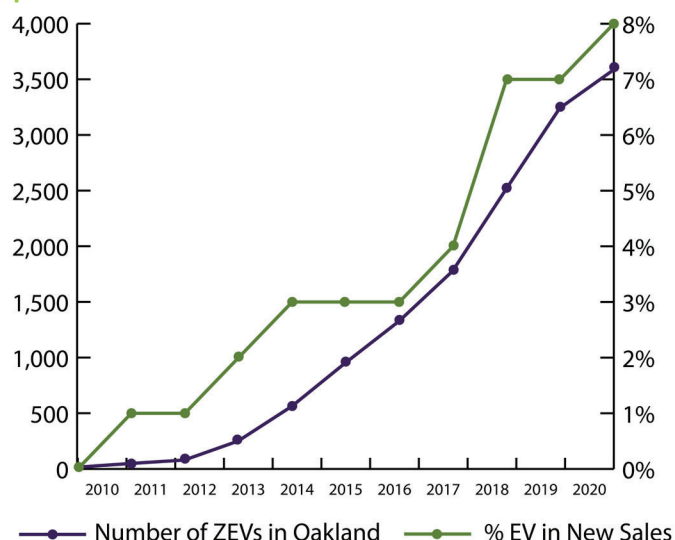
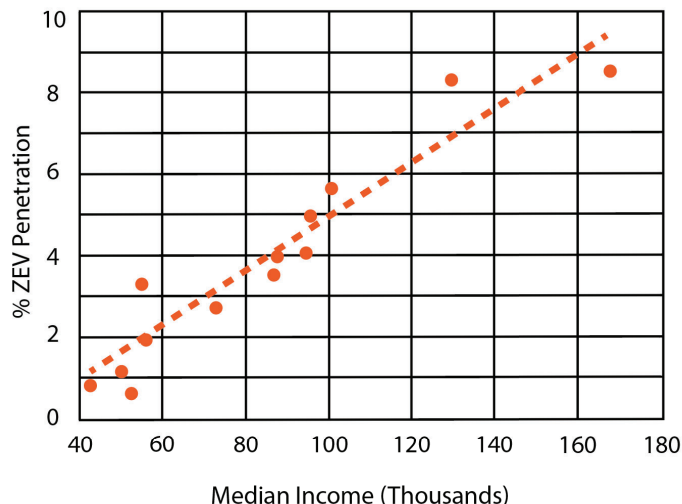
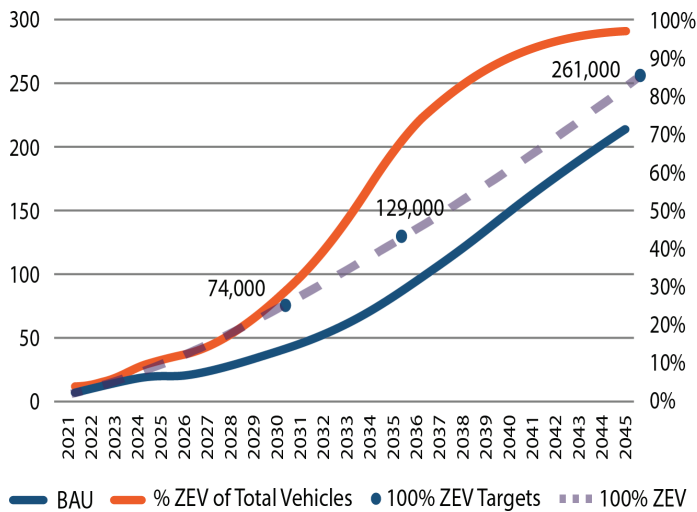


Figure 1-3: Median Income and Percentage of ZEVs



Without concerted action, current trends show Oakland failing to meet its ZEV adoption targets in 2030 and 2045, as shown Figure 1-4 (see Appendix B for details).

COVID-19 and ongoing supply chain issues in 2022 have resulted in ZEV sales stagnating compared to historical trends. However, as the economy returns to normal, ZEV sales are expected to recover. The likely net effect is a delay in reaching ZEV goals by 1-3 years.

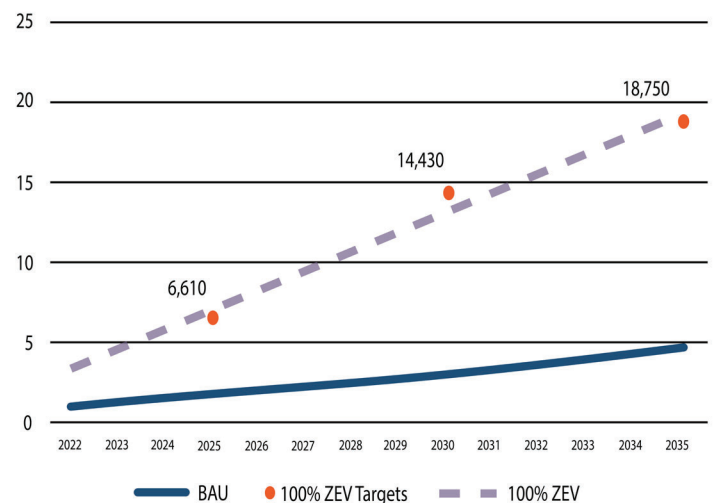
Figure 1-4: ZEV Ownership Projections (1,000's)

ZEV demand is constrained by inadequate infrastructure (EV chargers and hydrogen fueling stations). The California Energy Commission (CEC) estimates that Oakland will need about 4,100 public chargers, 3,500 chargers in multifamily buildings, and 3,400 workplace chargers by 2030 to reach its share of the state goal of 8 million ZEVs. The CEC projects that residential and workplace charging will comprise 63% of total ZEV chargers with public charging filling the remainder. Of the total number of chargers installed, only 2% are expected to be DC fast charging while the rest will be L1 and L2. To ensure that 100% of vehicles on Oakland roads are ZEVs by 2045, over 70,000 chargers will be needed.

Current trends show Oakland falling short of the number of EV chargers needed to align with state goals (see Figure 1-5 and Appendix B). While Oakland may reach its share of statewide ZEV ownership targets in 2030, it will fall behind thereafter without concerted action. Increasing ZEV infrastructure will be especially critical in lower-income areas where home charging is harder to install, and where residents are more likely to purchase used EVs that have shorter ranges and thus require more density of charging infrastructure.

Specific estimates of the types and locations of EV charging needed are likely to change over time due to a rapidly evolving market for ZEV infrastructure. Technological

innovations, grid capacity and constraints, changes in local land use and zoning policies, and more can dramatically affect the types of infrastructure needed and where it will be most impactful. For example, significant advancements in hydrogen FCEV technology could temper EV demand. If more DCFC and high-powered public chargers are installed on City streets and in commercial districts, the number of chargers needed in residential settings will decrease. Conversely, advancements in load-sharing and vehicle-to-grid technology could ease installation of private chargers in older homes and apartment buildings with limited electrical capacity, reducing the need for public and workplace chargers.

Figure 1-5: EV Charger Projections (1,000's)

By Alex Gutiérrez

Focusing on Equitable Distribution

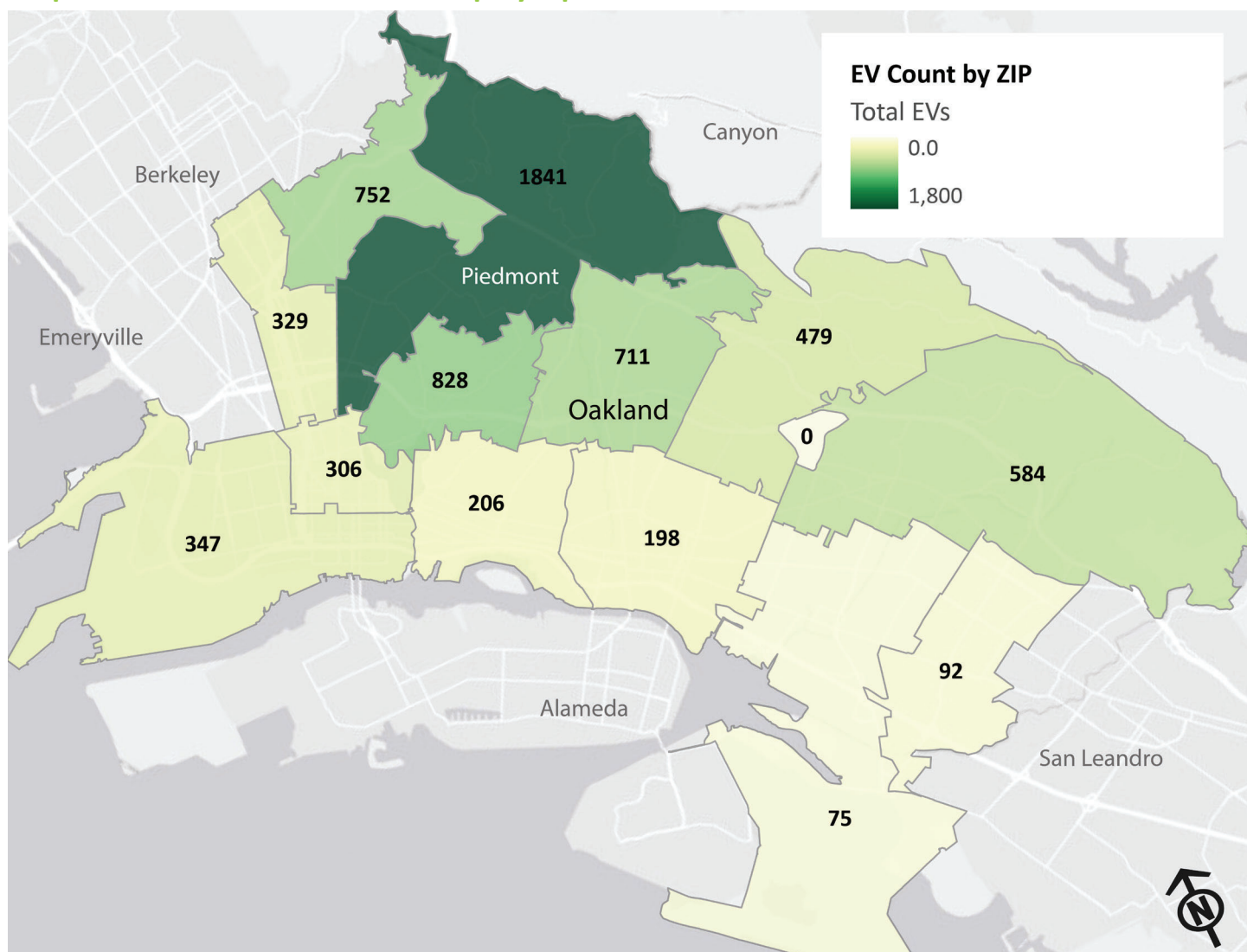
Current market trends, increasing gas prices, and state policies are expected to accelerate ZEV demand across the state. While this Plan establishes Actions to boost that overall trend, it focuses most heavily on ensuring equity in the ZEV transition.

Despite the potential for ZEVs to improve health outcomes due to lower air quality impacts, they are concentrated today in areas that already have the best air quality. The Oakland Hills – a relatively affluent part of the city where the majority of residents are white – are home to the greatest concentration of EVs in Oakland. The total number and percent of EVs decreases to the west and

south and is lowest in the flatlands along the Interstate 880 (I-880) corridor (see Map 1-2). Here, in the areas with the worst pollution and lowest average incomes, EVs are most needed and least available.

Demand for ZEVs is heavily influenced by the availability of ZEV charging or fueling infrastructure and the ease of installing that infrastructure. Along the I-880 corridor, there are higher percentages of rental units, older homes and infrastructure, and substandard housing – all of which make it challenging to install EV chargers. If neither home charging nor public charging are available, it is unlikely a person will purchase or lease an EV.

Map 1-2: Electric Vehicle Ownership by Zipcode



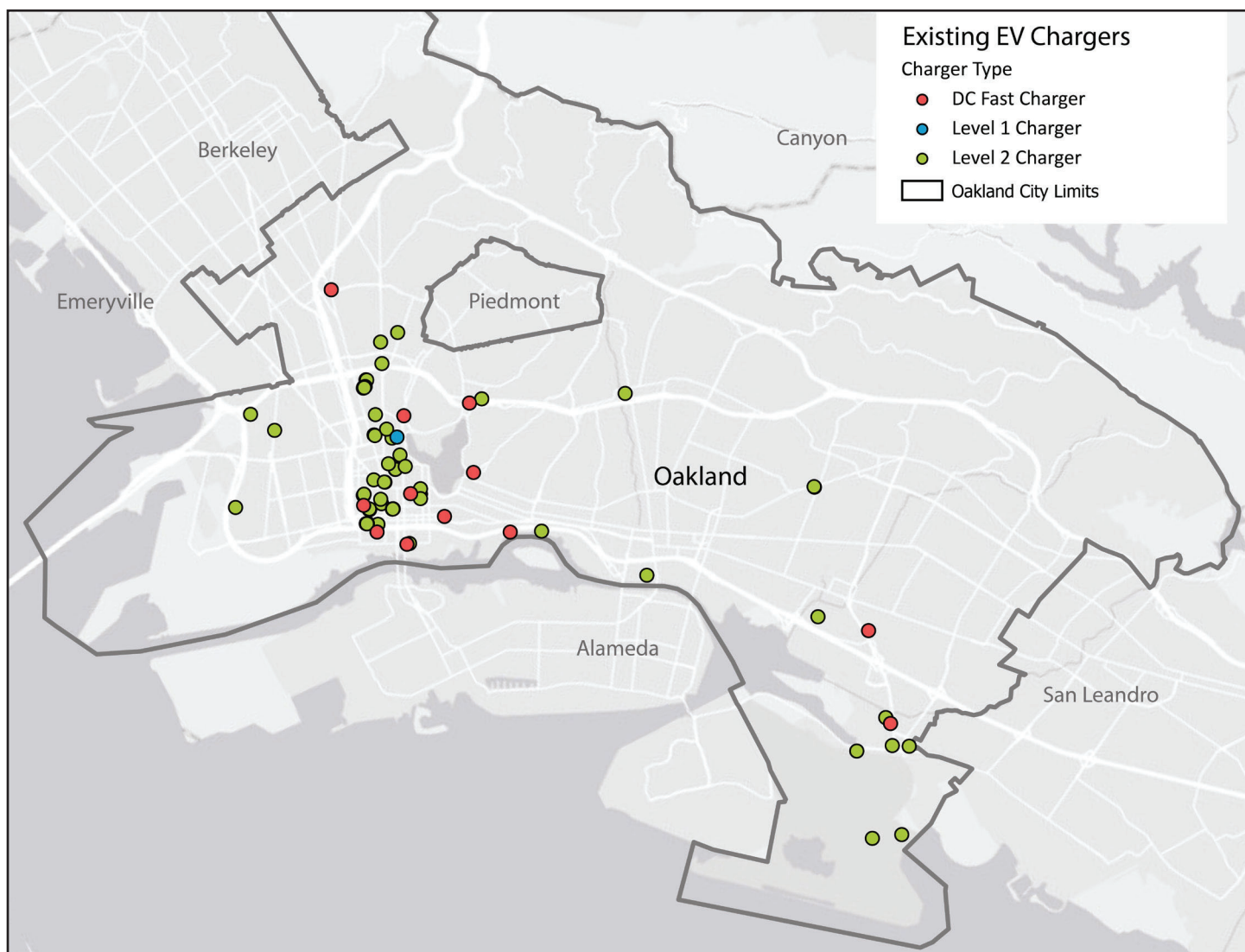
DISTRIBUTION OF EV CHARGERS

EV chargers exist in a range of locations and at several different power “levels”. Chargers can be installed at homes, businesses, workplaces and other destinations.

There are approximately 1,473 EV chargers in Oakland. About 37% of chargers are publicly available and 62% are private, residential chargers. Of the publicly available chargers, almost all (91%) are L2 chargers (see Table B-1, Appendix B).

The neighborhoods of Old Oakland, Downtown, and North Oakland have the highest concentration of public EV chargers, with a combined 63% of existing chargers. There are also a significant number of public EV chargers in East Oakland, with 26% of chargers. However, the disparity of chargers per capita between East Oakland and downtown Oakland is glaring. As shown in Table B-2 in Appendix B, downtown Oakland has about 8.8 - 12.3 chargers per 1,000 people but East Oakland only has 1.9 chargers per 1,000 people. Map 1-3 shows existing public chargers in Oakland.

Map 1-3: Public Chargers In Oakland



Neighborhoods currently seeing less ZEV ownership tend to have multiple factors that inhibit ZEV ownership and use. These include underinvestment in the form of poor street and other public infrastructure conditions, older buildings with deferred maintenance, lower overall income levels, and higher rates of rental and multifamily units. Addressing these barriers will include a mixture of public

and private investments, new policies for streamlining projects, public outreach and engagement, inter-agency partnerships, and targeted incentives. Holistically linking ZEV projects with other resilience, public health, decarbonization, and grid modernization projects will be critical to maximize resources and ensure benefits are appropriate for the specific communities being served.

What are Frontline Communities?

This Plan uses the term Frontline Communities to define those who have been and will continue to be hit first and worst by the impacts of environmental injustice and the climate crisis. Frontline communities face intersecting vulnerabilities, including racial discrimination, poverty, disability, housing insecurity, linguistic isolation, poor air quality, and more, which magnify climate threats. As a result, they are often the least able to adapt, resist, or recover from climate impacts. Who is defined as a “frontline community” can change based on the specific threat or public policy being considered. In Oakland, Frontline communities often include those living in areas with the worst air and soil pollution, traffic congestion, and diesel particulate exposure, and the least access to nature and healthy food. This largely describes the flatlands and the Interstate 880 corridor, where generations of industry have left their mark. Flatland residents suffer elevated rates of asthma, heart disease, and early death – as well as reduced access to economic opportunities. Frontline communities have done the least to create the climate crisis, yet they are bearing the greatest burden of its impacts.



By: Alex Gutierrez

Community Engagement

This Plan is part of a wider effort by the City to invest more equitably in Oakland's transportation system. In keeping with the [ECAP's Racial Equity Impact Assessment and Implementation Guide](#), OakDOT partnered with community organizations to understand the needs of frontline communities. These partnerships are part of a longer process of building trust, improving communication and collaboration, and fostering a common vocabulary across different neighborhoods and communities in Oakland.

Community outreach was led by TransForm, an Oakland-based not-for-profit organization focused on transportation equity. In partnership with TransForm, OakDOT enlisted the expertise of local community-based organizations to lead community workshops in neighborhoods identified as in greatest need of investment in ZEV infrastructure. TransForm partnered with the Spanish Speaking Citizens' Foundation (SSCF) and the West Oakland Environmental Indicators Project (WOEIP) to encourage grassroots participation and reach underserved communities in West Oakland and Fruitvale, respectively.

Each group led two workshops in the Summer and Fall of 2021. The first set of workshops provided basic information about ZEVs and identified key barriers community members faced in accessing them. The second set invited attendees to prioritize needs and identify action steps to be included in the Plan. The City also leveraged the [East Oakland Mobility Action Plan \(EOMAP\)](#) process, occurring simultaneously, to identify

needs and concerns among frontline communities in East and Deep East Oakland.

The following key barriers to ZEV adoption were identified during outreach:

ZEV Education and Access

There is a lack of knowledge about the new technology of zero emission vehicles, the impacts and opportunities in employment due to the transition to ZEVs, and how to access the incentives that can reduce the costs of buying an electric vehicle or using shared e-mobility services.

Infrastructure

The lack of ZEV infrastructure is a major barrier to using and accessing ZEV modes. Residents worried that without EV chargers in their neighborhood or installed in their apartment buildings, owning an electric vehicle would be incredibly difficult.

Larger Zero Emission Vehicles

Residents identified a lack of diversity of affordable ZEVs. Residents cited a desire to have access to trucks and larger vehicles to accommodate work and large families.

Electric Micromobility

Residents pointed to unsafe or non-existent bike and pedestrian infrastructure as a barrier to use of e-micromobility, as well as the lack of knowledge about low-income programs or adaptive micromobility options for persons with disabilities.

"We charge pretty much each night so that I start off each day with a full tank essentially. If you start off every day with a full tank you essentially have no range anxiety because every day is a full tank...I thought that having a lot of local public chargers would be important, like at the Whole Foods, but the reality is that I never use them as I always charge at home."

- Karen Nakamura
Commissioner, Mayor's Commission on Persons with Disabilities



By: Edna Aguilar

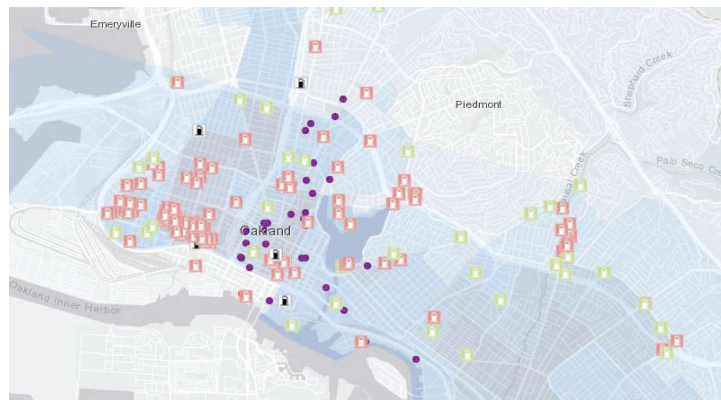
Outreach By The Numbers

20 Community Meetings or Outreach Events Attended



By: Alex Gutiérrez

200+ Suggestions For ZEV Charging/fueling Locations



190 Online Survey Responses

What charger type would you like to see at this location?

Level 1 (2-5 mi per hour of charging)

What is the location type of the address?

- ☐ Curbside - In the Public Right of Way
- ☐ Public Parking Lot or Garage
- ☐ Other:

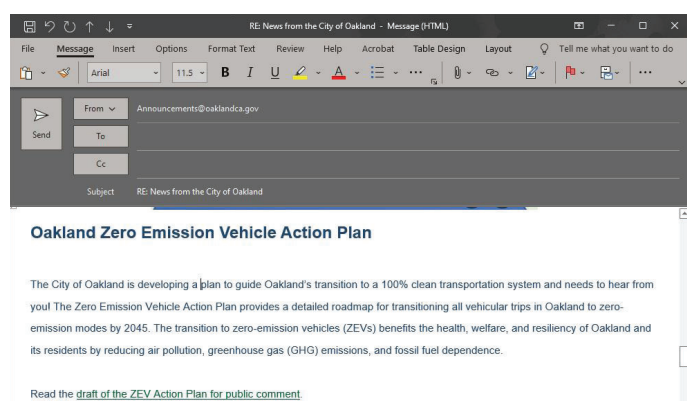
Do you have any further comments about this location?

100 City Staff Hours In The Community



By: Carmen Lopez

300+ Subscribers To The Zev Plan Email List



Stakeholder Workshops

Stakeholder workshops were held to explore solutions to the most challenging barriers facing ZEV adoption in Oakland. Key takeaways are listed below, and a more detailed summary of each workshop is provided in Appendix A.

Public and Curbside Charging in the Public Right of Way Stakeholders discussed the need for specific goals related to public charging infrastructure, the importance of balancing different mobility needs at the curb, and linkages to other City plans (such as the Bike and Pedestrian Plans, the ECAP, and the General Plan). Many voiced the need for a residential curbside charging program (see Chapter 4: Public and Curbside Charging) and stressed the importance of collaboration with partners like East Bay Community Energy (EBCE).

Electrification in Existing Buildings

In a workshop that combined the needs of transitioning to all-electric buildings and incorporating EVSE in existing buildings, stakeholders discussed the complex array of building systems, technologies, code requirements, and professionals that influence building retrofits. A central goal was ensuring that outcomes, both intended and unintended, would enhance equity, and not exacerbate displacement or exclusion. Attendees stressed that the City must ensure that both vehicles and charging technologies are accessible to frontline communities, such as being accessible at affordable housing sites and community centers. Critical concerns included the cost of necessary upgrades, the phasing of electrical work needed to support both building and vehicle electrification, and market readiness (including contractor training and equipment availability).

Workforce and Economic Development


The City held a series of three workshops in 2021 in partnership with the Greenlining Institute, Rising Sun Center for Opportunity and Common Spark Consulting, focusing on the economic transition to decarbonized buildings and zero-emission transportation. Stakeholders focused on the need for, and components of, a “high-road” economy that includes “thrivable” wages, matching programs that boost demand for products and services with workforce training programs and addressing the full spectrum of career ladders for frontline community

members. A significant number of low wage workers are currently employed within the auto, trucking, and delivery driver sectors. Stakeholders highlighted the need to ensure they are not economically impacted by the transition but are offered avenues for a just transition within the zero-emission job ecosystem.

Medium- and Heavy-Duty Fleets

Starting in 2021, City staff both convened and participated in stakeholder meetings with medium- and heavy-duty (MHD) vehicle fleet operators, including AC Transit, the Port of Oakland, and smaller operators such as Mi Pueblo and Kaiser. The needs of MHD operators are diverse, including vehicle types and capabilities that are not yet market-ready; site analyses of corporation yards; incentives for vehicle and infrastructure investments; and a robust regional charging infrastructure network. The City partnered with EBCE in many of these conversations, as the utility is playing an increasingly prominent role in planning for a regional MHD ZEV charging ecosystem.

Register Today



Event Details

Tues., August 10
6:00 PM PST

Register for zoom details

An invite for a Zero Emission Vehicle Plan workshop on Eventbrite

How to Read the ZEV Action Plan

Action Number

This is shorthand used throughout the plan to refer to this Action

Section Name

Cost

This is an estimate of the staff cost to the City to implement this action.

\$\$\$ - \$0 - \$29,000

\$\$\$ - \$30,000 - \$60,000

\$\$\$ - \$60,000+

Section Logo

Action Name

Lead Agency

This shows which City agencies will lead implementation of this Action.

OPW	Public Works
DOT	Department of Transportation
PBD	Planning and Building
EWDD	Workforce & Economic Development Department
CAO	City Administrator's Office
SRD	Sustainability and Resilience Division

Action Descriptor

This language describes the specific details of the Action

Going Deeper

This describes the background, context, and rationale for each of the Actions

PUBLIC AND CURBSIDE CHARGING

PC-2 **Create A Residential Curbside EV Charging Strategy And Ordinance.**

Cost: \$\$ Lead Agency: DOT

By 2023, adopt an Ordinance to facilitate PROW charging in residential neighborhoods, including clear protocol for addressing ADA and pedestrian safety, permitting, and station use. In public outreach materials, include examples of allowable technologies and configurations so that residents seeking neighborhood curbside charging are aware of their basic options and approximate costs. Pursue strategies to reduce the permitting cost of residential curbside charging installation for residents who lack dedicated off-street parking, or whose residences cannot feasibly accommodate onsite EV charging. Post clear guidance on appropriate City webpages detailing the application process for residential curbside chargers.

Going Deeper

Oakland needs solutions for residents who want to purchase an EV but cannot due to concerns about where they can reliably charge. Many residential neighborhoods featuring older homes that lack dedicated off-street parking, and large populations of renters and apartment dwellers. Few cities to date have enacted policies or programs to facilitate resident-initiated curbside charging. Oakland has no specific permit available for these situations; in fact, the City has identified numerous administrative barriers to residential curbside charging, including ADA access (electric cords are not permitted to cross a sidewalk), technology access (any technology installed in the PROW must be available to the general public), and cost (adding the cost of an encroachment permit to the expected cost of a charger and its installation makes the project prohibitive to most).

The neighboring City of Berkeley created a Residential Curbside EV Charging Pilot program in 2014, allowing participants without off-street parking to install charging at the curbside in front of their home. These projects are completely financed by the property owner, and the street parking remains available to all. While there was strong interest in the program, few installations were completed due to expense and access concerns.

Through this Action, staff within Oakland Public Works will assess emerging best practices from other jurisdictions in facilitating residential curbside public EV charging. Oakland's residential curbside EV charging policy should include strategies to address ADA accessibility, minimize damage from stormwater and irrigation, avoid conflict with other utilities in or traversing the curb, and minimize costs. An initial pilot, managed by Oakland of Public Works, staff will also include the following:

- Clear and concise information on the City website about program options and requirements;
- Measures to enhance equity outcomes, which may include prioritizing applications from Priority Communities and areas with low rates of EV ownership, and/or waiving permitting fees for chargers in frontline communities;
- Encouragement for community-based organizations, Homeowner Associations, and neighborhood groups to share costs and apply for permits to bring public residential charging access to frontline communities; and
- Strategies to empower renters to take advantage of the residential charging permit program.

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2 City Leadership

By: Kerby Olsen

Vision

The City of Oakland plays a leading role in local and regional efforts to dismantle barriers and accelerate the transition to a zero-emission transportation system. City shows leadership by taking decisive actions toward this overarching objective, focusing internally, centering equity and resiliency, leveraging strategic partnerships, and consistently advocating for a greener transportation system.



Introduction

The City of Oakland is itself one of the largest users of the transportation system in the East Bay. As an employer, fleet manager, and consumer, City government can make significant contributions to this Plan's objectives and set an important example by transforming the way that it uses that system. For example:

The City has 4,000 employees, all of whom are expected to commute to their work site at least three times per week. The City can use various incentives to encourage employees to walk, bike or take transit to work. For those employees who cannot use active transportation or transit, the City can incentivize them to carpool or use a ZEV (see Action CL-10, Incentivize the Adoption and Use of ZEVs).

The City has approximately 1,500 vehicles in its fleet and will upgrade those vehicles to low- and zero-emission technologies when possible (see Action CL-8, Accelerate City Fleet Vehicle Replacement).

The City spends over \$350 million annually on goods and services, and thus can take measures to ensure that its vendors and suppliers to transition to ZEVs.

The actions and measurable targets introduced in this section combine to create an environment that enables City government to become a leader in the transition to ZEVs. This environment should ensure that staff have the resources needed to run programs, re-examine existing processes, develop partnerships, and amplify and take advantage of regional programs to increase ZEV access.

CENTERING EQUITY

As described in Oakland's 2030 Equitable Climate Action Plan (ECAP), the City has a profound role to play in boosting resilience throughout the community. This includes resilience not only in the face of major disasters, but also in the day-to-day struggle to dismantle the root causes and consequences of disinvestment, structural racism, and climate change.

An equitable transition to a sustainable, zero-emission transportation system requires significant planning, public investment, and targeted outreach and engagement. Residents in frontline communities who would benefit most from eliminating transportation-related fossil fuel use are often unfamiliar with new ZEV technologies. During community outreach for this Plan, many participants were hearing about State and regional electric vehicle financial incentives for the first time. For many, ZEV technology

Recycling EV Batteries

End-of-life (EOL) management processes are essential to minimize the environmental lifecycle impact of EV batteries. The Lithium-Ion Car Battery Recycling Advisory Group published a draft report highlighting two key policy proposals: a core exchange with vehicle backstop policy, and a producer takeback policy. Both options would ensure a chain of custody, assigning responsibility for the reuse or recycling of lithium-ion batteries to various stakeholders. Other policy suggestions include access to battery information; support for repurposing, reuse, and recycling industry development; and safe and efficient reverse logistics. While many of these policies must be enacted at the state-level, the City of Oakland can support an emerging battery recycling, reuse, and repurposing industry through Recycling Market Development Zones. Through a combination of incentives, streamlined permitting, and zoning allowances, the City of Oakland can position itself as a leader in the EOL lithium-ion battery industry, leveraging the Port of Oakland for access to global markets. Any such strategy must be pursued with equity at its core: engaging nearby residents in the decision-making process and avoiding any project that would add significant air pollution, soil contamination, residential street congestion, or other inequitable burdens to frontline communities.



By: Kerby Olsen



feels new and untrusted, while gasoline infrastructure is much more familiar. Finding and applying for incentives can be confusing without one-on-one consultation. Special attention must be paid to non-English speaking communities that do not have information provided in their first language.

Numerous incentives and information campaigns have been launched across California to boost ZEV awareness and uptake, particularly in frontline communities. These include the [Clean Vehicle Rebate Program \(CVRP\)](#), [Clean Cars for All \(CC4A\)](#), [Drive Clean Bay Area](#), and more. Unfortunately, these programs are not yet as widespread as they need to be. Community outreach participants identified the lack of education about ZEV technology and incentives for frontline communities as a key barrier to ZEV access (see Appendix A: Community Outreach & Engagement).

Moreover, a justice-centered approach to the ZEV transition must bring technology demonstrations to under-invested communities before residents may be expected to adopt

them. Many investments in the infrastructure needed to charge or fuel ZEVs have been in communities where ZEV demand has already been proven. This has been true for both publicly- and privately- funded projects. This perpetuates a cycle where underserved areas become even further left behind, widening the technology gap, and worsening health burdens in underserved communities.

To overcome barriers to access, the City needs to invest resources into education and engagement in frontline communities. The City must also engage impacted residents and vulnerable businesses in decisions about where and how to locate ZEV infrastructure in their communities.

Utilizing its own assets, such as parking garages, the City can encourage both personal action and major private investments in zero-emission transportation. The City can also leverage its community and industry relationships alongside its communication channels to promote ZEV use and demystify low-carbon technologies.

MEASURING SUCCESS

KEY PERFORMANCE INDICATORS

- Number of City-owned parking lots, garages and properties hosting ZEV charging or fueling infrastructure
- Number of ZEV education events held by the City and partners in frontline communities
- Percentage of ZEVs in City fleet
- Number of ZEV carshare vehicles operating in frontline communities
- Number of defined partnerships with regional and State organizations to increase ZEV infrastructure and access



ADVOCATE

- ... for expanded State and regional resources for ZEV Awareness and Education.

The City has limited resources for the in-depth outreach and one-on-one consultation that is needed to help residents in frontline communities understand ZEV technology and incentives. The City must advocate to federal, state, and regional agencies for resources to help bridge this education gap.

- ... for expanded ZEV Infrastructure on non-City-owned public property.

There are strategic sites owned by the Port of Oakland, Caltrans, AC Transit, and BART, and other public agencies that could host ZEV charging. Many of these sites are in frontline communities where access to EV charging infrastructure remains starkly inadequate.

- ... for the expansion of multi-modal ZEV infrastructure.

The City will advocate to state, federal and regional organizations for resources and funding to enhance all forms of ZEV mobility, including car share, electric micromobility, and “mobility hubs” that bring diverse transportation modes together.



By: Edna Aguilar



City Leadership Actions

CL-1

Fund Dedicated Staff For Zero Emission Vehicle Infrastructure Implementation

CL-2

Conduct A Comprehensive Audit Of City Property For Potential ZEV Infrastructure Implementation

CL-3

Develop A Smart And Equitable Mobility Hubs Program

CL-4

Collaborate With Partner Agencies To Expand The Network Of Public EV Chargers

CL-5

Expand Affordable Neighborhood ZEV Car Sharing Programs

CL-6

Support ZEV Education And Awareness In Underserved Communities

CL-7

Ensure Fire Safety In The ZEV Infrastructure Rollout

CL-8

Accelerate City Fleet Vehicle Replacement

CL-9

Add EV Charging Installation And Electrical Work To The Contractor On-Call List

CL-10

Incentivize Use Of ZEVs At City-owned Parking Lots and Garages

CL-11

Establish an Inter-Departmental Working Group to Review, Assess, and Streamline Strategic Sustainable Mobility Projects

By: Edna Aguilar



**CL-1****Fund Dedicated Staff For Zero Emission Vehicle Infrastructure Implementation****Cost: \$\$\$****Lead Agency: DOT**

Create and fund a staff position within the Department of Transportation or Oakland Public Works to oversee implementation of this Plan and related public EV infrastructure projects. Provide resources for City engineers to support those and other ZEV-related projects.

Going Deeper

Due to the comprehensive nature of this Plan, dedicated planning staff will be needed to implement it efficiently. Staff are also needed to pursue grants to implement infrastructure. The City has missed out on grant funding due to a lack of staff to apply. At present, the City has no full-time staff position dedicated to the planning or engineering of ZEV infrastructure. Implementation of EV-related projects can require months of staff time for grant writing and management, policy development, permit review, coordination across multiple teams and outside agencies, public engagement, site inspection, etc. Even with grant funding, projects have experienced delays due to a lack of full-time staff to manage them.

The City's largest public EV charging projects – including DC-fast charging installations at Lafayette Square and Lake Park and Level-2 EV charging installations at a number of other public parking garages – all required significant staff resources.

Staffing challenges most acutely affect frontline communities with overlapping needs stemming from years of under-investment. Equitable ZEV infrastructure implementation in frontline communities may require more staff time to conduct public engagement and incorporate amenities beyond just charging infrastructure. These are the very communities that rely more heavily on publicly led projects due to lack of private sector investment.

Peer cities such as Santa Monica, CA, and Seattle, WA, have full-time positions focused on ZEV infrastructure implementation. Within Seattle's Department of Transportation, multiple staff split responsibilities focusing on transportation electrification, assisted by a full-time transportation electrification staffer in the Office of Sustainability. Santa Monica also has a full time "Sustainability Analyst – Transportation Electrification" position.

CL-2**Conduct A Comprehensive Audit Of City Property For Potential ZEV Infrastructure Implementation****Cost: \$\$****Lead Agency: OPW**

Make a full accounting of City assets to catalogue the feasibility of siting public electric vehicle charging infrastructure. Develop a set of criteria for prioritizing candidate sites. Criteria may include technical feasibility, equity (especially proximity to Priority Communities according to [OakDOT's Geographic Equity Toolbox](#)), lack of nearby public EV charging, number of rental and/or apartment buildings in the immediate area, and cost. Based on the results of this audit, the City shall pursue grants and partnerships to install infrastructure at prioritized locations.



Going Deeper

The City of Oakland controls many vacant lots, public parking lots and garages, and community-serving facilities with onsite public parking. These assets are controlled by various City Departments, including OakDOT, Public Works, Public Library, Human Services, and Parks, Recreation & Youth Development. City-owned properties may be the best sites to install EV charging infrastructure and to host programs that encourage ZEV adoption and use. As of 2022, only a fraction of these properties have EV charging stations; however, many of these sites could be strategic locations to install public chargers for visitors and nearby residents without access to home charging.

The City has received funding to install EV charging stations (EVCS) in various City-owned lots and garages. However, without an overarching strategy, these projects have been opportunistic. A citywide audit, informed by racial equity analyses and data, will enable targeted investments in the areas that need them most, and should result in more successful funding applications. These tasks need to be integrated and reflected in the City's Capital Improvements Program prioritization criteria.

CL-3

Develop A Smart And Equitable Mobility Hubs Program

Cost: \$\$

Lead Agency: OPW

Smart and Equitable Mobility Hubs (Hubs) are locations that bring together public transit, bike share or e-scooter share, car share, ZEV charging/fueling, and other ways for people to get around safely and reliably without private vehicles. The City will develop a "Smart and Equitable Mobility Hub" program, identifying goals, amenities, minimum services, fee structures, employment opportunities and responsible parties. Smart and Equitable Mobility Hubs will be placed in convenient locations to support the City's transportation priorities, including active and public transportation, shared and micromobility, and zero-emission vehicles. By 2024, develop a list of at least 10 candidate locations for Smart and Equitable Mobility Hubs across the city, with a majority located in and serving Priority Communities according to OakDOT's Geographic Equity Toolbox. By 2030, partner with relevant agencies to fund and develop at least 3 Smart and Equitable Mobility Hubs, with at least two located in Priority Communities.

Going Deeper

Smart and Equitable Mobility Hubs (Hubs) should be built around frequent and high-capacity transit and offer a safe and convenient space to seamlessly transfer from one type of transportation to another. When developed in partnership with residents, Hubs can become sites of civic pride as well as safe and efficient places to catch a ride on a bus or pick up an e-scooter. They can also facilitate the "last mile" connectivity that too often prevents residents from using public transit. A Mobility Hub Policy is the first step to identifying locations in frontline communities for pilot projects and will lay the groundwork for working with utilities and public transit agencies to identify overarching needs for this critical service.

Where possible, Mobility Hubs should be integrated with Resilience Hubs as specified in the 2030 ECAP, marrying mobility access and resiliency. This would ensure access to critical resources for resilience-building in frontline communities.



CL-4

Collaborate With Partner Agencies To Expand The Network Of Public EV Chargers

Cost: \$

Lead Agency: CAO (SRD)

To date, OakDOT and the Sustainability and Resilience Division of the City Administrator's Office have led funding and building public electric vehicle charging with limited resources. The City cannot meet its goals for ZEV infrastructure proliferation on its own. Transforming the vehicle market will require partnering with numerous agencies, including those listed in Table 2-1.

Table 2-1: Partner Agencies in ZEV Implementation

East Bay Community Energy	EBCE, a nonprofit public agency and Oakland's electricity provider, is taking a leadership role in EV infrastructure construction in the region. EBCE is investing heavily to expand the availability of public EV charging infrastructure throughout its service territory. This includes a fast-charging network for passenger vehicles, and work with nonprofit CalSTART to animate a charging ecosystem for goods movement that will benefit the entire region. Collaboration between the City and EBCE will result in more affordable project development that delivers the biggest benefit possible to the local community.
The Port of Oakland	The Port is an essential economic engine for the region and will play a key role in the transition to zero-emission medium- and heavy-duty vehicles. The Seaport Air Quality 2020 and Beyond Plan sets the stage for infrastructure investments and partnerships that will undergird this shift.
Bay Area Air Quality Management District	BAAQMD provides incentives for purchasing EVs and for installing EV charging infrastructure. BAAQMD also sets regional policy to achieve state air quality targets and supports communities in developing plans to mitigate local air pollution.
Metropolitan Transportation Commission	MTC is the metropolitan planning organization (MPO) for the San Francisco Bay Area and provides grants for programs such as Mobility Hubs.
Bay Area Rapid Transit	As a flagship regional public transit agency, BART owns parking lots that could host public EV charging in the underserved communities of West Oakland, Fruitvale, and Coliseum. In November 2021, BART's Board of Directors approved their Electric Vehicle Charging strategy, with a focus on pollution reduction, equitable access, and scalable operations. At BART stations slated for future transit-oriented development, the City can collaborate with BART and private developers to ensure publicly accessible charging is included.
Alameda Contra Costa Transit District	AC Transit is transitioning to a fully zero-emission bus fleet as articulated in their Clean Corridors Plan. The City will collaborate with AC Transit to ensure that new charging infrastructure does not negatively impact bus stops and bus service.
Oakland Unified School District	The City will collaborate with OUSD to assist them in transitioning their vehicle fleet to ZEV technology and in developing curricula on ZEV technology and job opportunities.
Peralta Community College District	The City can collaborate with the Community College District for vocational training opportunities in the ZEV sector (see Action ZE-3). A partnership can also be developed to expand public charging opportunities on community college parking lots for use by students, staff, faculty and local Oakland residents.
Neighboring Cities	A useful ZEV network will extend beyond city boundaries. Staff will collaborate with neighboring cities in the bay area to ensure that a regional network is efficient and equitable.



CL-5

Expand Affordable Neighborhood ZEV Car Sharing Programs

Cost: \$\$

Lead Agency: CAO (SRD)

By 2025, work with partner agencies and car sharing platforms to explore strategies for expanding car share programs into frontline communities. Strategies may include:

- Pursue partnerships and incentives that expand car share services into Priority Communities as defined by the OakDOT Geographic Equity Toolbox;
- Work with car share operators to ensure that ZEV car share vehicles are deployed in communities disproportionately impacted by transportation-related air pollution;
- Partner with property developers and managers to expand access to dedicated ZEV car sharing services in affordable multifamily buildings;
- Support community-based organizations in pursuing funding for community-level or non-profit run ZEV car sharing programs; and
- Ensure that, wherever feasible, ZEV car sharing amenities or programs are available at Mobility Hubs developed by the City or by external partners with City support.

Going Deeper

Oakland's car share programs take multiple forms. Some, like Gig Carshare, are "free-floating," meaning the cars can be borrowed from or returned to anywhere within a geographic home territory. Others have a dedicated space in a parking lot or apartment building.

Oakland residents have called for more neighborhood car sharing in multiple public planning processes, including the 2030 ECAP and the East Oakland Mobility Action Plan (EOMAP). While multiple car-sharing companies operate within Oakland, as of 2021 none of their fleets are ZEVs, and their areas of operation do not sufficiently serve frontline communities. For example, Zipcar, Getaround, and Gig Carshare are active in Oakland, but a disparity remains in services between frontline communities and the rest of Oakland.

Residents of affordable multifamily buildings must be a key target for program expansion. Working with affordable multifamily building owners or managers to increase access to car share programs and provide a reliable and affordable mobility option for income-insecure Oaklanders. An exemplary program is Sacramento's [Our Community CarShare](#)^v. Launched in 2017, Community CarShare is a free, membership-based transportation service now in seven lower-income communities in the Sacramento region. Community CarShare partners with affordable housing sites to provide ZEVs and EV charging infrastructure to increase mobility and reduce GHG emissions in low-income communities.



CL-6

Support ZEV Education And Awareness In Underserved Communities

Cost: \$\$

Lead Agency: CAO (SRD)

Expand coordination with local, regional, and state-wide campaigns to increase ZEV awareness, ownership, and use. Increase City resources devoted to ZEV outreach and education in frontline communities and geographies with lower-than-average ZEV ownership and use. Ensure ZEV outreach and education is coordinated with outreach, education, and relevant resources for reducing dependence on vehicle use in general, including E-micromobility, active transportation, public transit, and improved land use.

- By the end of 2023, develop clear digital resources on the City's website and at key community touch points, such as libraries and community centers, for residents to learn more about sustainable mobility technology and incentives including ZEV mobility.
- By 2023, launch or expand partnerships with OUSD and others to expand awareness of ZEV-related career pathways.

Going Deeper

The number one barrier to ZEV adoption identified by Oaklanders, particularly those in underserved communities, is lack of knowledge of both ZEV technology and the financial incentives available to help purchase ZEVs. During public outreach for this Plan, many residents learned about ZEVs and incentive programs for the first time. Agencies at the regional and state level have struggled to reach underserved communities about these incentives. Non-profit organizations or community-based organizations tasked with outreach do not always have the resources to fund the needed one-on-one consultation or language interpretation services necessary. Additional resources can bridge this gap.

The City has laid important groundwork for successful collaborations with community-based organizations and affordable housing residents through developing this Plan, the 2030 ECAP, the East Oakland Neighborhoods Initiative, and other projects. These efforts should be expanded and improved upon, particularly as the City launches its General Plan Update. Future community engagement activities should be leveraged where possible to include information about ZEVs and other mobility options.

Successfully pursuing these partnerships will require internal collaboration among City departments and work units: alongside Oakland Public Works and OakDOT, ongoing coordination will be needed with Real Estate Division, Finance Department, and Community and Economic Development Agency.



By: Michael Randolph



CL-7

Ensure Fire Safety In The ZEV Infrastructure Rollout

Cost: \$

Lead Agency: CAO (SRD)

Staff charged with leading the planning, permitting approval, design, and construction of ZEV infrastructure will coordinate with Fire Department staff as appropriate to maximize safety and avoid fire danger in the construction and operation of ZEV charging/fueling infrastructure and in ZEV use. By 2023, develop and post on the City's website a handbook for safe installation and use of EV chargers and hydrogen fueling stations, covering all major classes of hardware and major use cases. By 2024, develop a training for City staff, including Fire Department staff and any staff tasked with inspecting chargers, on relevant safety issues.

Going Deeper

As with any new technology, ZEVs and ZEV infrastructure have unique safety needs that must be considered as the City expands their installation and use. This generally falls into three categories:

- **Public education** concerns how users approach the installation and use of hardware. One important area for education is around planning for power outages, especially where power backup systems are involved. Those installing, owning, or tasked with maintaining chargers need to understand how to shut down and de-energize charging stations, as well as have familiarity with different energy types and major forms of energy storage.
- **Staff training** pertains to basic technical awareness of key City staff tasked with inspecting infrastructure once installed, and for firefighters who may encounter ZEV technologies in the course of fighting fires. This includes training on hazards related to batteries that may get overheated, overcharged, or are actively burning; how to deal with ZEVs that are submerged in water; shutdown procedures including locating and disconnecting the energy source supplying the vehicle; installing and maintaining built-in fire protection measures at locations with multiple charging stations; and how to safely inspect charging stations prior to use.
- **Ensuring safety** of the ZEV infrastructure itself is critical. This takes place not only during the installation and maintenance of infrastructure, but also in preparing buildings—particularly older buildings—for the added electricity demand of chargers. EV charging stations must be installed and maintained properly to guard against fire hazards from overheating of electrical parts, such as abnormal short circuits. Unattended damaged cords and plugs can cause shock and fire hazards in both public and private charging. Hydrogen fueling stations require specialized measures due to the high heat and invisibility of hydrogen fires.

In cases of emergency, risks to first responders as well as further damage can be minimized by following certain precautions: ensuring that chargers have emergency shutdown capabilities, clearly marking parking structures (whether residential or commercial) that host EV chargers and ensuring that EV charging stations are located and positioned so as not to inhibit or block paths of egress, fire hydrants, or other fire department connections to a building.

**CL-8****Accelerate City Fleet Vehicle Replacement****Cost: \$****Lead Agency: OPW**

By 2030, ensure that over 50% of the City's fleet uses alternative fuels, with 100% of all non-emergency response sedan purchases being zero emission vehicles. By 2030, triple the number of electric vehicle chargers dedicated to fleet vehicles. By 2025, develop a feasibility study to identify zero emission and alternative fuel solutions for all City heavy-duty and emergency response vehicles and equipment.

Going Deeper

Oakland City Council adopted the Green Fleet Resolution in 2003, detailing the City's commitments for the procurement, operation, and management of fleet vehicles to improve efficiency and reduce emissions. Since 2010, all new non-emergency response City vehicle acquisitions have been alternative fuel or hybrid, and as of early 2020, 12.7% of Oakland's municipal fleet is efficient vehicles, including hybrid, plug-in hybrid, and battery electric. All of the City's diesel fleet vehicles have run on renewable diesel since 2015; in 2019, the City began deriving that fuel from raw materials sourced from Oakland itself. The City and its partners gather waste cooking oils from restaurants and cafeterias in the Oakland metropolitan area and convert them to fuel the city's fleet. By repurposing "waste" and supporting jobs that collect and treat it, Oakland has established a circular fuel economy that supports the local economy while reducing emissions and pollution.



By: Oakland Dept. of Public Works

City of Oakland ZEV Fleet

366 Vehicles operating on Renewable Diesel
 128 Vehicles operating on Renewable Natural Gas
 41 Dedicated Battery Electric Vehicles
 28 Plug-in Hybrid Electric Vehicles
 65 Hybrid Electric Vehicles
 4 Hydrogen Fuel Cell Vehicles
 13 Vehicles operating on Liquefied Propane Gas

City of Oakland Green Fleet Awards and Recognition

2021: Named one of 50 Leading Fleets by Government Fleet Magazine and APWA
 2019: "In It for the Long Haul" Award from ACT Expo
 2019: Ranked 3rd in top 50 Green Fleets North America
 2017: Clean Air Champion Award- East Bay Clean Cities



CL-9

Add EV Charging Installation And Electrical Work To The Contractor On-Call List

Cost: \$

Lead Agency: OPW

The City will add EV charging installation and associated electrical work to the contractor on-call list and explore strategies to boost participation among contractors from frontline communities. Public EV charging infrastructure remains a rapidly evolving field, with a small number of firms specializing in the relevant technologies. Implementing this Plan will require ongoing investment in public charging stations around the City. Economies of scale, reliable expertise, and an ability to “hit the ground running” will be critical.

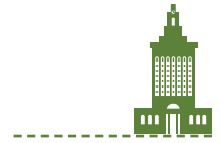
Going Deeper

The City uses “On-Call” contracts for routine tasks or major categories of work that are consistently needed. Contractors available through the on-call lists are pre-vetted and have completed a portion of the contracting process. On-call contracts are used for tasks with relatively consistent needs and parameters, such as graphic design, community engagement, and contaminated soil remediation. Adding EV infrastructure design and installation to OakDOT’s contractor on-call list will provide a ready bench of EVSE experts, help ensure equity and competitive bidding, and avoid time-intensive request-for-proposals (RFP) processes for each new project.

The City already prioritizes disadvantaged business enterprises (DBEs) through its existing contracting protocol. This requirement provides small businesses, owned, and controlled by socially and economically disadvantaged individuals, a fair opportunity to compete for federally funded transportation contracts. When creating the on-call list for electricians to install and maintain ZEV infrastructure, staff should explore increasing the DBE requirement, such as by doubling the points that DBEs receive on their applications.



By: Kerby Olsen

**CL-10****Incentivize The Use Of ZEVs at City-owned Parking Lots And Garages****Cost: \$****Lead Agency: DOT**

By end of 2023, the City will implement a host of incentive programs to encourage the adoption and use of ZEV. Three types of incentive program will be pursued:

- “Clean Air Vehicles” will be eligible for discounted monthly parking rates at City-owned parking lots and garages, relative to vehicles with internal combustion engines.
- Shared or carpool vehicles with a “Clean Air Vehicle” designation will be eligible for a more heavily discounted parking rate.
- For City-owned EV chargers, electricity will be sold at a discounted rate, until 50% of vehicles registered in Oakland are zero-emission.

The City will explore opportunities to further subsidize EV charging in City-owned facilities for low-income individuals.

Going Deeper

Cost of electricity may remain a barrier to ZEV adoption by low-income drivers who would be dependent on public EV charging. The City will explore ways to ensure that these individuals have affordable places to charge. For public chargers owned by third parties but located in City-owned facilities or in the public-right-of-way, the City will work with those owners to identify solutions for ensuring affordable electricity for low-income users.

CL-11**Establish an Inter-Departmental Working Group to Review, Assess, and Streamline Strategic Sustainable Mobility Projects****Cost: \$****Lead Agency: DOT**

Convened by DOT and the Sustainability Program Manager, this Quarterly Working Group will also include staff from EWDD, PBD, and DRE to track, review, and facilitate sustainable mobility projects that combine ZEV infrastructure with other strategic ECAP goals. In its first year, this Working Group shall propose a framework for a streamlined permitting process, including a funding plan, for projects that integrate housing equity, neighborhood resilience, and sustainable mobility.

Going Deeper

ZEV infrastructure projects have the potential to touch every aspect of our lives, from mobility options to jobs. Optimal projects enhance neighborhood resilience, incorporate strategies to prevent housing displacement, and boost local economic and workforce development. This Action will enable City staff to identify potential projects that would have multiple equity and sustainability benefits as identified in the ECAP Racial Equity Impact Assessment and Implementation Guide, and streamline the internal City processes that could otherwise lead to project delays and cost overruns. It will help to ensure early coordination among disparate departments, maximizing staff resources and augmenting the City’s ability to secure external resources to support innovation.

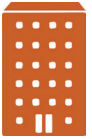
3

Existing and Multifamily Buildings

By City of Oakland

Vision

Residents and visitors across Oakland enjoy convenient and affordable access to electric vehicle chargers in their buildings. This easy access facilitates EV adoption for low-income residents who need vehicle access and who benefit the most from cleaner air, improved health, and reduced mobility costs.



Introduction

Widespread adoption of Zero Emission Vehicles (ZEVs) will depend upon convenient access to ZEV fueling or charging for everyone. In most cases, this will mean electric vehicle (EV) chargers where Oaklanders live and work – frequently in or attached to buildings. In 2017, the City of Oakland added PEV Readiness Standards in New Construction (Ordinance No. 13576). Oakland's PEV Readiness Standards require minimum levels of EV charging readiness in all new buildings, based on the type of building and the total number of parking spaces constructed. The City has yet to institute analogous requirements or targeted incentives for existing buildings. Oakland's high number of older buildings and renter-occupied properties complicate installation of on-site chargers. This chapter addresses the needs and challenges of existing buildings – both residential and commercial – for EV charger installation and presents

Actions to remove these barriers and empower residents to pursue ownership or shared use of EVs. Recognizing that home charging is most often the preferred way to charge personal vehicles, this chapter places special emphasis on charging in older apartment buildings.

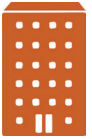
Charging infrastructure in buildings is often split into two categories:

- EV service equipment (EVSE) – the electricity provision, conduit, and other electrical infrastructure and hardware needed to install the chargers; and
- EV chargers – the flexible hose, port and charger itself.

Different types of buildings present varying challenges and opportunities for installing EVSE. Challenges tend



By Kerby Olsen



to be greatest in multifamily and older buildings. It should be noted that competing priorities and the cost and extent of work needed to enable safe installation may make it cost-ineffective to install onsite chargers in some older buildings. To date, the overwhelming majority of EV charging is done at home, due to a combination of convenience and cost (where public charging is generally most costly). Overnight charging also tends to be most conducive to electric grid stability. These factors make it a high priority to facilitate residential charging where possible. Workplace charging is a second priority, because vehicles are stationed for long periods and can be charged during the day when solar energy is the most plentiful.

When considering EV charging in older buildings, the sustainable mobility priorities that guide this Plan remain paramount. Vehicle chargers should not be installed at the expense of active mobility or public transit amenities, such as bicycle parking or bus stop access. In deciding what to install, how rapidly, and where, residents must be engaged to understand and address their needs and concerns.

SINGLE FAMILY HOMES

Single-family homes comprise 84% of all buildings in Oakland and nearly half (48%) of all occupied residential units. Almost a third of single-family homes are rented. As of 2019, 17% of single-family home occupants had household incomes below 30% of the Area Median Income (AMI). A majority of Oakland's single-family homes

(88%) were built before 1978, when California passed the first "Building Energy-Efficiency Standards" as part of the California Building Standards Code (Title 24).

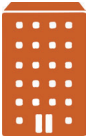
Single-family homeowners, who control their electricity consumption and property rights, can make unilateral decisions to install EVSE. As of early 2022, the City had issued over 400 permits to homeowners to install EV chargers, covering 4% of single-family homes. Data show that these installations have not been equitably distributed across Oakland. More EV chargers have been installed in Oakland's wealthier zip codes. Extra incentives to reduce the expense of installing EVSE in older and lower-income neighborhoods could help to reduce the disparity.

Another factor benefitting most single-family homeowners is the availability of dedicated off-street parking. Most single-family homes include a garage or other dedicated parking space where EV chargers can be conveniently deployed. However, for some homes, only street parking is available.

Based on trends to date, single-family homes are expected to drive the largest transition to ZEVs, with tens of thousands of chargers needed to reach state goals of 100% ZEVs in new sales by 2035 and Oakland's target of carbon neutrality by 2045. For some single-family homes, dedicated EVSEs may not be necessary with a sufficiently large electrical panel and outlet. However, given the older building vintage of Oakland's residential buildings, many single-family homes are expected to need EVSEs to accommodate ZEVs.

Title 24: A Game Changer

The California Building Standards Code – Title 24, Part 6 of the California Code of Regulations (Title 24) – establishes construction and performance requirements for new construction and certain alterations and is updated every three years. This code is credited for much of California's leadership in energy efficiency; the California Energy Commission credits it for avoiding more than \$100 billion in utility bills since it was put in place in 1978. The code requires minimum levels of insulation and ventilation, high-performance windows, efficient lighting, and much more. Since 2020, the code has required renewable energy such as solar to be included in new single-family homes. Buildings constructed after Title 24 took effect generally require fewer upgrades in order to cost-effectively accommodate EV charging and other system electrification, with newer buildings requiring the least amount of invasive work.



MULTI-FAMILY HOMES

Multifamily buildings – buildings with three or more residential units, such as apartment buildings or condominiums – contained 44% of Oakland’s occupied housing units in 2019. Of these, 90% were rented and 10% owned. Almost all multifamily units in Oakland (95%) were built before 1978. As of 2021, only 0.2% of Oakland multifamily buildings have installed EV chargers, with 84 total chargers installed to reach Oakland’s ZEV targets, multifamily buildings will need at least 3,400 charging ports by 2030 and 13,100 by 2045.

Compared to single-family homeowners, renters in multifamily buildings have little say in property improvement decisions. Building owners and managers, who often do not reside onsite, are typically responsible for investments and upgrades. Yet it is the tenants who benefit from EV chargers. This “split incentive” results in many property owners being hesitant to installing EV chargers in their buildings – especially when the chargers are seen as “optional amenities.” A combination of education, outreach, financial incentives, and regulatory guidance can help to align property owner and tenant interests.

Additional challenges facing older multifamily buildings include competing needs from deferred maintenance, high costs of upgrading older electrical systems and adding electrical service, and insufficient off-street parking. Many older apartment buildings have less than one parking space per unit or no parking at all. In others, parking spaces are associated with specific units, complicating decisions of where to locate shared chargers. Even when parking and electrical systems are sufficient, not all building owners can afford the capital costs of EVSE, especially affordable housing and nonprofits like community land trusts. Tenants may also fear increased rents if property owners “pass through” costs to offset their investment. Additional flexibility, resources, and protections for affordable housing (both deed-restricted and naturally-occurring) and low-income tenants should be included in the City’s strategies for encouraging EVSE in multifamily buildings.

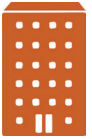
Finally, while managers and owners of older buildings

generally know that their electrical systems are outdated, many lack information about how much capacity is available, what changes would be needed to accommodate new systems, and how to find that information without significant cost. Being an older city with predominantly overhead electrical transmission wires, transformer upgrades may be needed when larger buildings add significant electrical load. The more EV chargers and other electrified systems are added, the more likely a transformer upgrade will be needed. Property managers and owners need information and technical assistance, along with clarity about the options available for various building types and ages. For example, in buildings constructed after 1980 and in recently renovated, low-rise, or garden style apartments, installing low-cost and low-power charging equipment could significantly facilitate installation of EV charging infrastructure.^{vi}

NON RESIDENTIAL BUILDINGS

There are over 6,000 commercial buildings in Oakland – about 3% of all buildings. Most of Oakland’s commercial buildings are older; about 87% were built before 1978. Rapid growth of the ZEV market has spurred EV charger deployment in many commercial facilities, especially shopping plazas and public garages. However, since these investments have been market-driven, they have primarily occurred in areas where EV demand has already been proven, rather than in areas where public charging is needed to unlock demand. Continued support for commercial EV chargers will be critical for giving drivers the option to charge at work or while shopping at local businesses. To date, roughly 0.2% of commercial buildings have installed EV chargers for a total of 34 stations. To meet Oakland’s ZEV targets, commercial buildings are estimated to need more than 3,300 charging ports in 2030 and over 14,900 by 2045.

Despite the strong business case for EV chargers, commercial establishments may face challenges in making the investment due to electrical panel upgrade requirements, conflicting capital needs such as seismic upgrades, other deferred maintenance, and the need to coordinate planning for electrical service conveyance and changed traffic flow among diverse operational staff. These competing needs can be acute for small



businesses with fewer financial resources to commit to capital improvements. As with multifamily buildings, some commercial properties are managed by a third party. As a result, coordination among the owner, tenant, and property managers can be cumbersome. The additional electricity load from EV charging can trigger expensive electric panel and service upgrades. If the added electric load of the new chargers is large enough, the project can trigger a PG&E transformer upgrade or require an onsite dedicated transformer, dramatically increasing costs. Small businesses need extra flexibility and support for EV charger installation. Small businesses would also benefit from longer timelines to achieve full electrification, when compared to larger commercial enterprises. Providing greater financial subsidies to businesses with low revenue can help keep capital cost burdens affordable.

CENTERING EQUITY

Frontline Community members – especially Black, Latino, and low-income residents – stand to benefit most from the lifetime financial savings and cleaner air that result from a shift to ZEVs. Yet these are the very community members most likely to live in buildings without EV

chargers. Renters tend to have lower average income and are more likely to be nonwhite than homeowners. In 2019, 45% of all households in rented homes had annual incomes under \$50,000 per year. 66% of renters identified their race as non-white compared to 60.5% of Oakland's population.

Across building types, addressing the key barriers to charger installation – the cost of EVSE installation, split incentives, outdated electrical systems, and lack of off-street parking – will benefit renters and low-income Oaklanders the most. Effective solutions must include providing multifamily building owners and managers with education about the benefits of EV charging and what incentives are available; increased financial incentives and technical assistance for older and multifamily buildings, especially those serving low-income residents and workers; assistance in installing low-power chargers and load management to enable EV charging with less electricity demand; and blending EV charging incentives with other health and safety projects, such as building electrification and seismic upgrades.



By Kerby Olsen



Recognizing the unique challenges faced by older apartment buildings, particularly those deemed “affordable,” the City convened a 7-month stakeholder working group (WG) in 2019 to develop realistic, equitable, and creative solutions to removing barriers to EV charger installation in multifamily buildings. The WG included a range of participants, including affordable housing developers and managers, EV charger network companies, energy consultants, City staff, and utility representatives. Participants identified five key challenge areas:

1. Property Management and Ownership

How can we overcome the split incentive between property owners and tenants who own/drive EVs? How do property owners collect information about their buildings needed to pursue charger installation projects?

2. Parking and Access

What are successful strategies to navigate different parking models, and to fairly and cost-effectively site EV chargers?

3. Codes, Standards, and Regulatory Requirements

What is needed to ensure EV charger installations in older buildings comply with ADA laws? What are the insurance costs and considerations? How can we streamline the City’s permitting process?

4. Costs and Infrastructure

Policy and Incentive Design: How can incentive programs

better reach underserved communities and meaningfully lower initial costs? What ownership models exist for charging stations? Who should pay for the electricity?

5. Public Communication and Program Awareness

How do we expand and tailor outreach to building owners and renters?

Outcomes of the WG were incorporated into the Actions in this Plan. For a detailed description of the WG, see Appendix A. Since the WG concluded, the City streamlined permitting for EV chargers. Permits for EVSE in existing buildings no longer require electrical panel reviews and are now issued over the counter.

A critical consideration for rental homes and multifamily buildings is the potential to cause or exacerbate housing displacement when major upgrades are needed. Tenants must have a “right to return,” both to the physical space as well as their original rental rate to ensure that they will directly benefit from the building upgrades. Any property owner, manager, or developer considering EVSE installation must consider the potential impacts on housing displacement and take steps to mitigate those impacts, in consultation with affected residents and neighbors.



By Kerby Olsen

“It’s hard to find places to charge my plug-in hybrid. We live in an apartment so it would be impossible to hang a cord out the window. There are only four or five chargers in Oakland that work for my car but most of the time they are full.”

-Vanessa Pope, Oakland resident



MEASURING SUCCESS

KEY PERFORMANCE INDICATORS

- Number of permits for EV chargers in multifamily buildings
- Number of permits for EV chargers in single family buildings
- Percent of multifamily buildings in priority communities with EV chargers

ADVOCATE

- **...for clarification of Americans with Disability Act (ADA) EV charging requirements in older buildings:** Actively engage with the California Division of the State Architect (DSA) as ADA rules and guidance are developed and reviewed for EVSE. Engage proactively with DSA and the California State Governor's Office of Business and Economic Development (GOBIZ), to ensure that EVSE Accessibility regulations effectively support proliferation of EV chargers in older buildings and in the Public Right of Way.
- **...for utility-coordinated information sharing:** Work with East Bay Community Energy (EBCE) and Pacific Gas & Electric (PG&E) to coordinate information-sharing, Time-of-Use (TOU) understanding, and load management/peak demand education with property owners and managers.



By Edna Aguilar



Existing and Multifamily Building Actions

EMB-1

Develop An “EV-Ready” Ordinance For Major Retrofits And Property Transfers

EMB-2

Conduct Outreach to Tenants and Property Owner/Managers

EMB-3

Working With Partners, Establish A Program To Facilitate Collection Of Information About Electric Infrastructure And Peak Demand For Multifamily Buildings

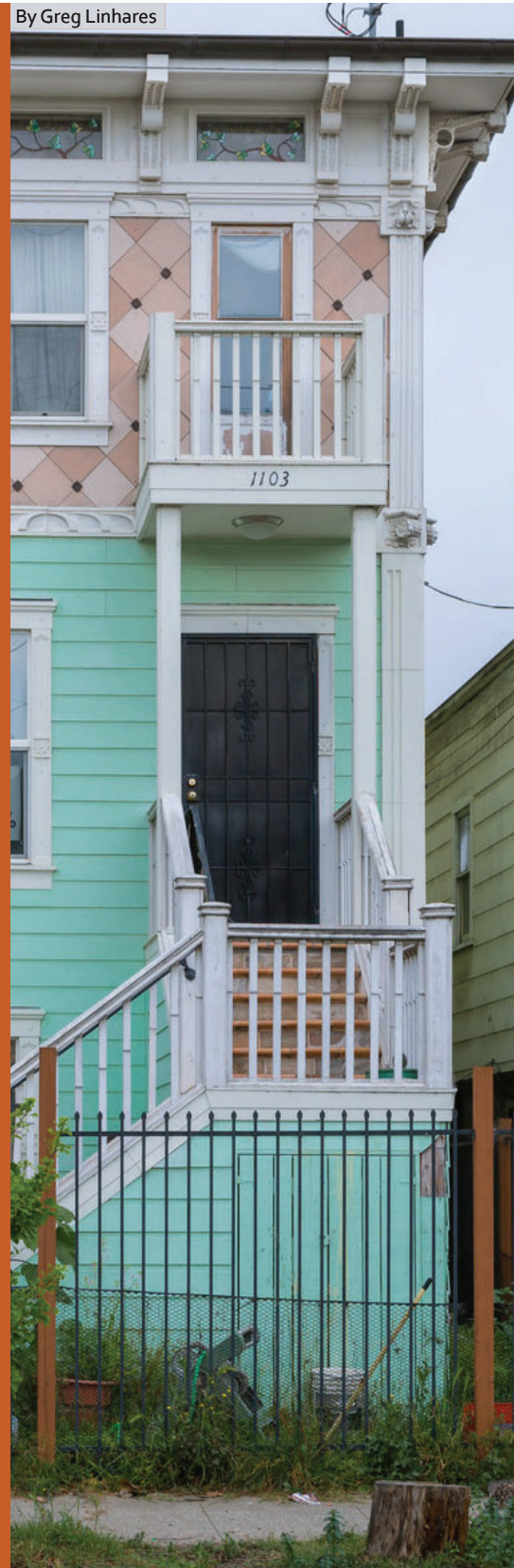
EMB-4

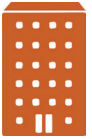
Include Strategies To Encourage EVSE Installation In Existing Buildings In The Existing Building Electrification Roadmap

EMB-5

Analyze The Potential For Reducing Localized Air Pollution Through Targeted EV Charging Investments

By Greg Linhares



**EMB-1****Develop An “EV-Ready” Ordinance For Major Retrofits And Property Transfers****Cost: \$\$\$****Lead Agency: CAO (SRD) & PBD**

Develop and adopt an Ordinance requiring installation of certain EVSE and/or targeted electrical system upgrades when buildings undergo major retrofits and at time of sale. Define “major retrofits” and other appropriate triggers for single family, multi-family, and non-residential buildings in the Ordinance. Provide flexibility in the Ordinance regarding which types of electrical system upgrades or installations are required for varying retrofit or property transfer scenarios. Include appropriate exemptions for financially burdened or economically insecure property owners. Provide a grace period of at least six months before the Ordinance takes effect. Develop outreach materials in key languages to educate building owners and contractors about the new requirements.

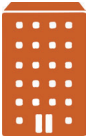
Going Deeper

To accelerate equitable EV adoption, Oakland will need to require “EV-ready” infrastructure installation in existing buildings wherever feasible. Major renovations are an important opportunity to include requirements because key building systems and components are already being modified. Major renovations typically refer to substantial changes to a building’s configuration or energy systems, often including electric panel or service upgrades. Installing EVSE during major renovations can greatly reduce the cost of installation compared to solely adding EVSE. However, the low percentage of permitted renovations, particularly in older and small buildings, may limit the effectiveness of this type of trigger. Further discussion with community members and Planning and Building Department staff will be necessary to balance cost effectiveness and permit enforcement.

Property transfers provide another intervention opportunity. An “on-sale” trigger could require the buyer or seller to make upgrades when a property is sold. Requirements on the seller could range from assessing the building’s electrical capacity to installing the chargers themselves. Requirements for buyers could include installing EVSE within a set time period after the sale. This type of requirement would miss properties that are held long-term by a single owner. It also has the potential to increase housing prices in an already constrained market.

The City will conduct community engagement to determine what requirements would be most effective and fair for residential and commercial properties. Appropriate technologies may differ among building types, usage, and ownership. High-capacity chargers may work best in buildings where visits are short, like retail buildings, while lower-capacity chargers can work well where cars are parked for longer periods of time (See Chapter 4: Public and Curbside Charging for a discussion of charger types and best uses). Load management strategies, such as circuit sharing devices, may help provide EV charging without upgrading the electrical panel or service in some situations. Exemptions should be considered for cases where the addition of EVSE would constitute an undue burden, such as for low-income homeowners where the per-unit cost of electrical upgrades exceeds a certain threshold.

In developing this Ordinance, the City should consult best practices from other jurisdictions. For example, the City and County of San Francisco requires that 100 percent of parking spaces in a multifamily building become EV-capable when major renovations take place. If there are no plans to upgrade the existing electrical service, the requirement applies to the maximum extent before electrical service upgrades are needed. The City of Menlo Park has instituted similar requirements for commercial buildings, based on minimum square footage.

**EMB-2****Conduct Outreach to Tenants and Property Owner/Managers****Cost: \$****Lead Agency: CAO (SRD)**

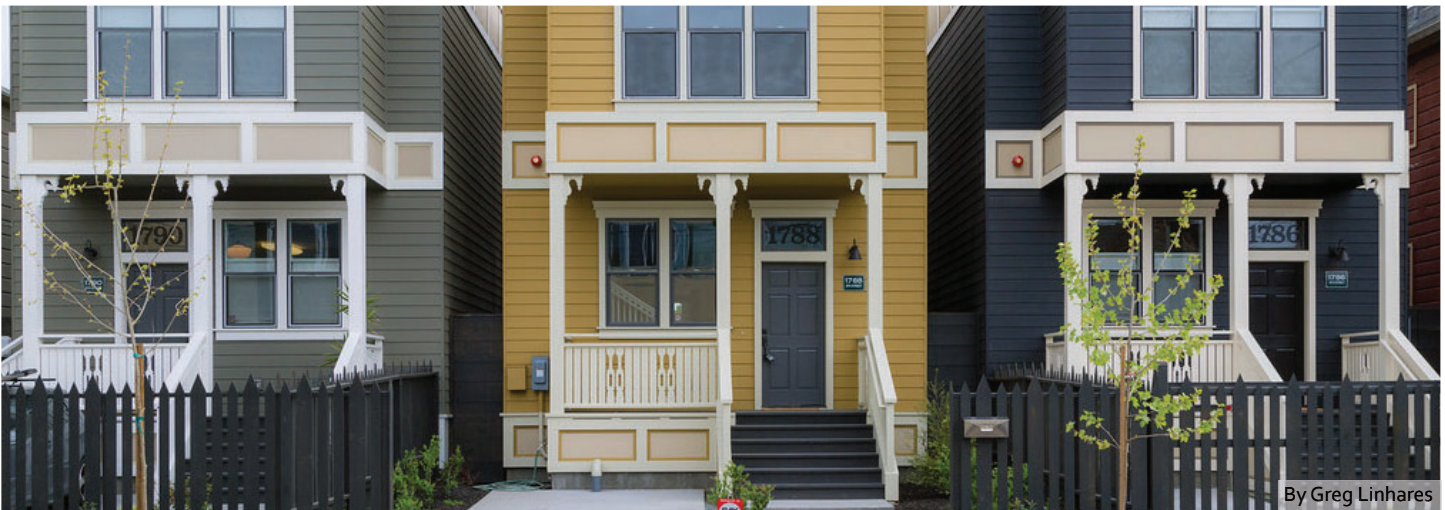
Engage with property managers and community partners to develop model tenant outreach plans, including a script and survey to perform a needs assessment. Work with community partners to create outreach materials for homeowners and property owners, including EV and EVSE fact sheets, details about funding sources, average costs, approved contractors, and an online portal to help building owners understand and identify relevant building characteristics and EVSE needs. By 2024, develop a pilot tenant and property owner education and outreach campaign about building and vehicle electrification.

Going Deeper

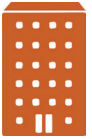
The effort to install EV chargers in multifamily and non-resident landlord buildings face a split incentive, where the entity investing in a project (the property owner) is different from the entity who benefits (the tenant who gets to charge their EV on site). This conflict often reduces motivation to invest but can be overcome.

Numerous ownership models exist that could help property owners and tenants pursue options appropriate to their circumstances. The first step is understanding the needs of residents, building owners/managers, and the building itself. Residents need to know what is possible; building owners or managers need to know what their residents need and want – including their potential future car ownership plans. Property owners need data to understand their buildings' existing electrical infrastructure and energy use before pursuing a charger installation project. In many cases, owners lack this detailed information and must hire a contractor to perform an assessment. Property owners and managers also need clear and concise information about the potential costs and available financial resources.

A tenant outreach plan and needs assessment can inform property owners about the intentions of their tenants to pursue EV ownership and their desire to live, work, or invest in a building where chargers are installed. The property owner/manager outreach will also help explain the benefits and the process of installing EV chargers.



By Greg Linhares

**EMB-3**

Working With Partners, Establish A Program To Facilitate Collection Of Information About Electric Infrastructure And Peak Demand For Multifamily Buildings

Cost: \$**Lead Agency: CAO (SRD)**

Include incentives for property owners and managers to perform load studies, as well as technical assistance for affordable properties. Develop and provide resources that give property owners/managers an alternative to paying an electrical contractor to learn about their building's electrical infrastructure.

Going Deeper

A common barrier for property owners to pursue EVSE installation is a lack of information about their homes or buildings, especially in underserved communities. This data gap includes both the electrical infrastructure in their buildings, and their energy use. Baseline electrical information is needed before an EV charger installation project can be pursued. If building owners and operators have a clear understanding of the electrical upgrades needed to add EV charging, they may be able to incorporate charging capacity as part of other building retrofits.

The City can help property owners perform electrical load studies by working with partners to provide technical assistance. City staff should also explore the benefits and potential equity harms from requiring these studies at key points, such as at the time of sale or major retrofits. Reducing the costs to building owners of hiring contractors to collect this data can accelerate investments and help owners establish necessary systems for tracking and understanding energy use and electrical capacity.

EMB-4

Include Strategies To Encourage EVSE Installation In Existing Buildings In The Building Electrification Roadmap

Cost: \$**Lead Agency: CAO (SRD)**

In all Roadmap requirements, include consideration of the total electrical burden across all-electric building systems and appropriate EV charging infrastructure. Include precautions to avoid missed opportunities from uncoordinated electrical system or service modifications.



By Kerby Olsen



Going Deeper

The City of Oakland committed to electrifying all existing buildings by 2040 in the Equitable Climate Action Plan (ECAP, Action B-2). The resulting Building Electrification Roadmap (expected July 2023) will include strategies to encourage or require the addition of EV-charging capability when buildings are transitioned from natural gas to all-electric power.

Building electrification requires replacement of all appliances that use natural gas, like space and water heating, cooking, and laundry, with efficient electric alternatives. This transition frequently requires upgrades to electrical infrastructure, making it an ideal time to add EV charging.

The Building Electrification Roadmap will also discuss funding opportunities and incentives for building owners and operators to electrify their buildings and add EV charging infrastructure. Funding sources could include rebates, grants, low-interest loans, tax incentives, and on-bill financing.

EMB-5

Analyze The Potential For Reducing Localized Air Pollution Through Targeted EV Charging Investments

Cost: \$

Lead Agency: CAO (SRD)

Facilitate an assessment of vehicle miles traveled (VMT) by residents across Oakland neighborhoods, overlaid with income, vehicle registration, and granular air quality data. Map the data to identify corridors or specific buildings where EV charger installations have a higher potential for reducing localized transportation-related air pollution. Conduct outreach to identify multifamily buildings in these areas whose owners or managers are amenable to low-cost, low-power EV charging equipment. By 2026, secure resources and partnerships to pursue an EVSE installation pilot with at least two of these properties.

Going Deeper

Residents across Oakland have varying equity, mobility, and health needs. In homes and apartments located far from abundant public transit, or where residents tend to drive long distances for work or other needs, there may be a greater potential to reduce both localized air pollution and climate emissions by facilitating vehicle electrification through EVSE installation. Understanding the needs of residents may help to illuminate this potential. A VMT assessment will demonstrate how many miles residents travel in passenger vehicles and when they most use their vehicles. Targeting areas with higher average VMT can help to reduce barriers to EV adoption for Oaklanders who spend the most time in their cars. This information can also help target investments in expanding and enhancing public transportation and active transportation infrastructure.

4

Public and Curbside Charging

By Michael Randolph



Vision

Access to public EV charging is plentiful and equitably distributed throughout Oakland. The City facilitates expansion of public ZEV charging infrastructure when needed, especially in frontline communities. The City has an in-depth understanding of where additional public charging infrastructure is needed, and can quickly take advantage of funding opportunities to build that infrastructure where feasible.



Introduction

Oakland's network of publicly available electric vehicle (EV) chargers is insufficient, especially in frontline communities. A lack of access to EV charging is a commonly cited barrier to ZEV ownership and use. Therefore, a public charging network that is as plentiful, dispersed, and convenient as the traditional gasoline fueling network is essential for the City to meet its GHG and ZEV transition goals. The need for more charging is greatest in older neighborhoods and areas with high concentrations of existing multifamily housing. As private, off-street parking requirements are reduced in new construction, the value of public and curbside charging is growing.

The City must plan for public charging in two main types of locations:

- **The Public-Right-of-Way (PROW):** The PROW includes the street, curb, and sidewalk – commonly referred to as “curbside charging.” For these projects, it is critical that the City solicits input from the surrounding community, including residents and businesses. Curbside chargers may also be placed in residential areas for residents who lack access to off-street driveways and garages. Due to physical constraints of both charging infrastructure and EVs, curbside charging is currently only feasible where parking spaces are diagonal or perpendicular. Oakland's first curbside chargers were installed at Lafayette Park in Old Oakland.
- **Public Garages and Lots:** Public chargers can also be located in publicly accessible parking garages and lots. Some of these facilities are owned by the City, but

a majority are privately owned. Decisions about siting EV charging infrastructure in these facilities is up to the individual owners. Construction planning tends to be simpler in these cases because there are fewer overlapping jurisdictions to coordinate, hardware is often easier to install, and less public engagement is needed for private facilities. Depending on the site, both Level 2 and DC fast chargers can be appropriate. The City has installed public chargers in multiple parking structures, including Pacific Renaissance Plaza (Chinatown), Dimond Lot (Dimond District), and City Center West Garage (Downtown).

The City must balance the need for public EV charging infrastructure with other sustainable mobility priorities, ensuring that space for pedestrians, bikes, and public transit users is not degraded. Installation of EV chargers in the PROW must respect the City's adopted policies and plans, including the 2019 Bicycle Plan, 2017 Pedestrian Plan, and 2020 Transit Action Strategy. Wherever possible, the City will pair public chargers with EV Carsharing services, EV shuttles, or e-micromobility.

Additional considerations for siting and building public EV chargers include:

- **Overlapping Jurisdictions:** Particularly for curbside charging projects, several departments may need to be involved, including Parks, Recreation, and Youth Development; Planning and Building; Public Works (for street tree preservation/maintenance as well as sidewalk maintenance; Department of Transportation;

Accessible Charging

Construction of publicly available EV chargers in Oakland must adhere to federal and state Americans with Disabilities Act (ADA) requirements. California's Division of the State Architect (DSA) has developed regulations for accessibility to EV chargers in public facilities (see Appendix C for details). While the application of these requirements to PROW infrastructure is not explicitly stated, City leadership has indicated that public charging infrastructure, whether in the PROW or in public parking facilities, must follow the DSA guidelines. Following these guidelines ensures that Oaklanders with disabilities can use public EV chargers. Yet challenges have arisen where ADA access requirements conflict with other needs, such as drainage or tree preservation. In implementing the Actions in this Plan, the City will need to reconcile these various needs.



By Kerby Olsen

and the City Attorney's Office. Coordination must also include the electric utilities, private property owners, and community stakeholders.

- **Conveying Electricity to the Curb:** Physically running electricity from the electric grid to the chargers often requires trenching and moving concrete, burying electrical lines, and often siting new transformers and other electrical equipment. However, the PROW is a public space that must remain unobstructed for safety and mobility priorities.
- **Parking Equipment:** Co-location of equipment or systems to process both parking fees and payments for EV charging can be complicated.
- **Enforcement:** The City must devise policies and practices for enforcing new requirements to ensure that only EVs use the spaces dedicated for vehicle charging; that cars move once they are fully charged; and that charging equipment is maintained in acceptable working order a minimum percentage of the year (i.e., a minimum "up-time").

Rethinking Curb Space

The 2030 Equitable Climate Action Plan includes Action TLU-7, "Rethink Curb Space", which instructs OakDOT to prioritize the use of curb space throughout Oakland by function. Curb space should be prioritized in order of: public transit and active transportation, such as walking and biking; access for people and commerce (loading zones and short-term parking); activation; and storage for long-term parking. Where on-street parking is provided, the City must revise pricing, availability, and location of parking to encourage active transportation, public transit, and ZEVs without increasing cost-burden to low-income residents and other sensitive populations such as seniors. Finally, the City will use parking revenues to fund public transit and active transportation improvements in frontline communities. Today, most of the curb is used for the parking of single-occupancy vehicle, which is inequitable by design: it subsidizes drivers at the expense of those without access to cars.



By Edna Aguilar



ELECTRIC VEHICLE CHARGING TECHNOLOGIES

There are numerous ZEV technologies, which primarily fit into the categories of electric vehicle (EV) and hydrogen fuel-cell electric vehicles (FCEV). In order to serve current and forecasted need, the City's primary focus for public charging infrastructure is EV chargers. As technology evolves, the City will monitor trends and invest in the technologies that are the most efficient and equitable in reducing barriers to ZEV access.

ALTERNATIVE TECHNOLOGIES

While the typical EV chargers described above are the most commonly used and the most market-ready, other technologies are available or under development. To remain technology-neutral and keep up with the needs of this evolving field, the City will monitor trends and explore potential applications for:

Hydrogen Fueling Stations: FCEVs are powered entirely by electricity supplied by an onboard hydrogen-powered fuel cell. These vehicles refuel at hydrogen fueling stations and take about 5 minutes to fully recharge. Hydrogen fueling stations are similar to conventional gasoline stations and are much less ubiquitous than EV charging stations. As of 2020, there were 43 hydrogen fueling stations open to the public in the United States, with most concentrated

in the California.^{vii} There is one hydrogen fuel station in Oakland, the True Zero Station located at 350 Grand Ave.

Battery Swapping: "Battery swapping" is the strategy of physically replacing an EV's depleted battery with a fully charged battery in a matter of seconds, as opposed to waiting for the existing battery to charge. This strategy is still in its early stages, with most current applications have been in Asia.

Street charging: Streetlights may offer an opportunity to expand charging infrastructure to parallel parking curb spaces, but there are multiple barriers to deploying the approach in Oakland. PG&E, which controls electricity transmission and distribution in the Bay Area, implements electricity rate structures approved by the California Public Utilities Commission (CPUC). Current rate structures effectively prohibit EV charging on streetlights. Each streetlight-connected charging station would serve no more than 1-2 vehicles in a parallel parking configuration, thus requiring a greater amount of ongoing maintenance per vehicle served. Streetlight EV charging may therefore eventually be a solution in limited areas where other types of public charging infrastructure are infeasible, but would first require extensive policy revisions with the CPUC and PG&E.

Streetlight Charging Pilot

From 2019-2020, East Bay Community Energy (EBCE), the East Bay's nonprofit electricity provider, worked with the City of Piedmont and PG&E to explore a potential pilot for installing Level 2 charging infrastructure on that city's streetlights. The pilot was deemed infeasible due to barriers of submetering the load associated with EV charging, in addition to prohibitive rates structures as allowed by the CPUC. Both PG&E and EBCE are tracking development of similar pilots around the state.



By Greg Linhares



CENTERING EQUITY

Easy and consistent access to EV charging for all members of the community is essential for the transition to a ZEV transportation system, but many frontline communities lack the infrastructure. Inadequate public charging in frontline communities is compounded by the fact that most residents in these communities live in older houses or apartment buildings and/or are renters, often making off-street residential charging an impossibility. More than anywhere else, a robust public charging network is essential in these neighborhoods.

To date, however, the reality has been the opposite: Investments in public charging infrastructure, whether public or private, have been concentrated in areas that already boast higher rates of EV ownership. If these trends continue, those who would benefit the most from the cleaner air of the ZEV transition will be the last to receive it. Thus, this Plan prioritizes frontline communities and neighborhoods with lower rates of EV ownership and higher concentrations of rental and multifamily properties for investments in public charging.

The cost of electricity is another barrier to EV ownership and use. On average, charging an EV is more affordable than fueling a gasoline automobile, but public charging is often more expensive than charging at home. Because those living in apartments, rental properties, or homes without off-street parking will be most dependent on public charging, the ways in which pricing is structured at public stations will have a heavy impact. The City will need to work with charging providers, East Bay Community Energy, and others to ensure that pricing structures can reasonably recoup investments where possible, but also not create a further burden for these impacted populations.



MEASURING SUCCESS

KEY PERFORMANCE INDICATORS

- Number of publicly accessible EV chargers in frontline communities
- Number of designated affordable housing developments within one mile of two or more publicly accessible chargers
- Number of permits approved for residential curbside chargers citywide and in frontline communities
- Number of residents with access to EV chargers within ¼ mile of home

ADVOCATE

- **...For increased support for EV Chargers in Frontline Communities** – The City will advocate for more state and regional funding to plan for and install public charging infrastructure in frontline communities, including in areas without “proven demand.”
- **...For Streetlight and Utility Pole Charging** – The City will advocate for, and collaborate with, EBCE and PG&E to find creative solutions to pilot streetlight charging and other innovative solutions for public curbside charging. The cities of Los Angeles and Portland have enacted this strategy, greatly increasing the accessibility of curbside EV charging infrastructure by utilizing the abundance of streetlights in their jurisdictions.



By City of Oakland



NOTABLE PUBLIC EV CHARGING PROJECTS

The City hosts numerous Level 2 and DCFC public EV chargers at City-owned parking lots and garages. Some, installed by Oakland Public Works through a variety of funding sources, serve both the City fleet and private vehicles. Others have been installed by OakDOT with grant funding, largely through the Bay Area Air Quality Management District, for the sole purpose of expanding the availability of chargers for the general public. Through partnerships with outside agencies and private companies, the City has also constructed, or is in the process of building, four projects that serve as flagship charging “hubs.” Charging hubs host multiple Level 3 chargers at a single site. This stretches investment dollars, facilitates public awareness of the amenity, and helps ensure that a charger will be available when a driver arrives.

Lafayette Square

In 2020, four new EV charging stations at Lafayette Square in the Old Oakland neighborhood opened to the public. EVgo installed the chargers and operates them at no cost to the City. EVgo collaborated with local artists, through the Old Oakland Neighbors Association, to commission murals to decorate the stations and electrical equipment. The site includes four DCFC charging ports, serving three public EV parking spaces and two parking spaces dedicated to EV carsharing. EVgo partnered with Maven to own and operate the car share vehicles, until Maven shut down in 2020. This project piloted the first curbside chargers in Oakland, allowing City staff to work with an experienced firm in exploring the steps needed to expand curbside charging city-wide. To date, these chargers experience occasional use.

Lake Park

The public EV chargers in the Lake Park parking lot are intended to create a “High-Speed EV Charging Plaza”. Lake Park is centrally located in an area with one of the highest concentrations of multifamily buildings in the East Bay. Here again, the City partnered with EVgo to expand public EV charging in Oakland with advanced high-power DC fast charging technology in a highly visible location. The project stalled in late 2019 when an abandoned underground storage tank (UST) was discovered in the final stage of construction. Unable to locate the UST’s owner, the City and EVgo were forced to excavate the tank, ensure no leakage had occurred, and remediate the

site as necessary before it could open in May 2022. This project is an example of the unexpected costs and delays that can happen when installing charging infrastructure in the PROW. Since their recent opening, these chargers have seen consistent use.

Civic Center West Garage Fast Charging

In 2021, OakDOT partnered with EBCE to create a “Fast Charging Hub” at City Center West Garage in downtown Oakland. EBCE will construct and operate the chargers at no costs to the City. This hub will include fifteen 75-kilowatt dual-port DCFCs serving 30 EV-only parking spaces and two 175-kilowatt dual-port DCFCs serving 4 EV-only parking spaces. Three of the spaces will be ADA compliant. Public access to the City Center West Parking Garage for the purpose of EV fast charging will be at no cost to drivers for the first 30-60 minutes of their session (depending on charging level). Anticipated to be open to the public in 2022, this will be the largest single public charging hub in Oakland, and the second largest in Alameda County.

Lion Creek Crossings

In November 2020, OakDOT submitted an application for PG&E’s Fast Charge Program to install 6 DC Fast Chargers in a low-income area in East Oakland. The City partnered with Carbon Solutions Group, an owner and operator of EV chargers, and ChargePoint, an EV charger manufacturer, on the application. The project is located next to the Coliseum Gardens Park at Hawley Street and Lion Way, adjacent to the Lion Creek Crossings affordable housing. The PG&E Fast Charge Program allows the City to support the installation of the chargers at no costs.

Additionally, ChargePoint has agreed to provide six low-cost leases for Nissan Leaf EVs to Lion Creek Crossings residents for personal use, ride share (Uber, Lyft, etc.), or delivery work. This partnership is unique in that it serves an area where almost no residents own or have access to EVs, and it pairs the charging infrastructure with amenities such as the low-cost leases that can help to break down barriers to ZEV access.



Public and Curbside Charging Actions

PC-1

Amend The Oakland Municipal Code (OMC) To Facilitate And Regulate Equitable EV Charging In The Public Right-Of-Way

PC-2

Create A Residential Curbside EV Charging Strategy And Ordinance

PC-3

Develop And Implement A Program To Deploy EV Charging Infrastructure In Frontline Communities

PC-4

Study the Feasibility of Subsidizing Public Charging For Low-Income Users

PC-5

Pursue EV Charging Requirement for Fuel Service Stations

By Michael Randolph



**PC-1****Amend The Oakland Municipal Code (OMC) To Facilitate And Regulate Equitable EV Charging In The Public Right-Of-Way****Cost: \$****Lead Agency: DOT**

By 2023, adopt an Ordinance governing the goals, specific areas of responsibility, and workflow requirements for installing EV chargers in the PROW. Work with the Department of Race and Equity to include clear goals and specific, data-driven targets for equitable distribution of public EV charging infrastructure by geography. Link equity goals for ZEV infrastructure to sustainable mobility goals, including for active and public transportation. Where possible, identify specific work units within the City that have responsibility for aspects of PROW EV charging projects. Include clear protocol for oversight and remediation in the event of discovery of underground storage tanks at construction sites. Include protocol for noticing and enforcing “EV Only” requirements.

Going Deeper

EV charging infrastructure in the PROW is a late addition to the suite of public goods that cities manage. Cities may therefore struggle to pinpoint the optimal workflow and responsible parties to pursue and implement projects. In Oakland, departments involved include OakDOT, Oakland Public Works, the Planning and Building Department, and the Department of Race and Equity. Updating administrative processes will accelerate installation of EV chargers in the public-right-of-way. Knowing, for example, which types of permits are needed, which work units within PG&E need to be engaged, and who should take the lead for community engagement around neighborhood projects, will reduce delays and help the City take advantage of external funding opportunities.

Frontline communities have unique mobility and public infrastructure needs, which require more staff involvement, education, and outreach in project development and implementation. Many frontline community residents do not yet have access to ZEVs. Simply installing an EV charger in these communities with no additional amenities, education, or programming may not be helpful or immediately relevant. An Equitable ZEV Infrastructure Implementation Policy would guide staff in how to manage ZEV projects in frontline communities, pair ZEV charging with other amenities (See Action CL-3, Mobility Hubs), and provide much needed outreach and education to break down access barriers.

New municipal code language governing the installation and oversight of public EV charging will also facilitate enforcement of EV-only spaces and allow the City to establish specific rates for public, City-owned charging infrastructure. It will also enable the integration of charging infrastructure with other utility infrastructure in the PROW.



By Edna Aguilar

**PC-2****Create A Residential Curbside EV Charging Strategy And Ordinance****Cost: \$\$****Lead Agency: DOT**

By 2023, adopt an Ordinance to facilitate PROW charging in residential neighborhoods, including clear protocol for addressing ADA and pedestrian safety, permitting, and station use. In public outreach materials, include examples of allowable technologies and configurations so that residents seeking neighborhood curbside charging are aware of their basic options and approximate costs. Pursue strategies to reduce the permitting cost of residential curbside charging installation for residents who lack dedicated off-street parking, or whose residences cannot feasibly accommodate onsite EV charging. Post clear guidance on appropriate City webpages detailing the application process for residential curbside chargers.

Going Deeper

Oakland needs solutions for residents who want to purchase an EV but cannot due to concerns about where they can reliably charge. Many residential neighborhoods featuring older homes that lack dedicated off-street parking, and large populations of renters and apartment dwellers, Few cities to date have enacted policies or programs to facilitate resident-initiated curbside charging. Oakland has no specific permit available for these situations; in fact, the City has identified numerous administrative barriers to residential curbside charging, including ADA access (electric cords are not permitted to cross a sidewalk), technology access (any technology installed in the PROW must be available to the general public), and cost (adding the cost of an encroachment permit to the expected cost of a charger and its installation makes the project prohibitive to most). .

The neighboring City of Berkeley created a Residential Curbside EV Charging Pilot program in 2014, allowing participants without off-street parking to install charging at the curbside in front of their home. These projects are completely financed by the property owner, and the street parking remains available to all. While there was strong interest in the program, few installations were completed due to expense and access concerns.

Through this Action, staff within Oakland Public Works will assess emerging best practices from other jurisdictions in facilitating residential curbside public EV charging. Oakland's residential curbside EV charging policy should include strategies to address ADA accessibility, minimize damage from stormwater and irrigation, avoid conflict with other utilities in or traversing the curb, and minimize costs. An initial pilot, managed by Oakland of Public Works, staff will also include the following:

- Clear and concise information on the City website about program options and requirements;
- Measures to enhance equity outcomes, which may include prioritizing applications from Priority Communities and areas with low rates of EV ownership, and/or waiving permitting fees for chargers in frontline communities;
- Encouragement for community-based organizations, Homeowner Associations, and neighborhood groups to share costs and apply for permits to bring public residential charging access to frontline communities; and
- Strategies to empower renters to take advantage of the residential charging permit program.

**PC-3****Develop And Implement A Program To Deploy EV Charging Infrastructure In Frontline Communities****Cost: \$\$****Lead Agency: DOT**

Identify highest-priority locations for public charging. Develop and include measures of where new infrastructure would maximally reduce barriers to EV ownership and use, as well as where charging is technically and logistically feasible. In identifying locations, use best practices in inclusive community engagement to maximize input from residents and business owners who could be impacted by new infrastructure, and who stand to benefit most from EV access and use.

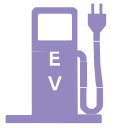
- By 2024, develop and maintain a map of pre-approved PROW charging locations. These locations shall be vetted by the City's civil engineers and transportation planners.
- By 2024, maintain a map of charging locations desired by members in frontline communities. Building on engagement during the development of this Plan, work with residents and community-based organizations to identify desired locations for public EV charging infrastructure in the PROW or in off-street locations controlled by community partners. Ensure the map is publicly available as a resource for industry and advocates and establish a process for updating the map with new public input.
- Partner with places of worship to site EV charging infrastructure. Opportunities may include public grant availability from regional or state agencies, EV charging companies looking for a site to deploy chargers, or utility or street infrastructure projects that could reduce costs of off-street installations.

Going Deeper

This Action links to Action PC-1, and will inform the language for the equity goals in that Action. By setting clear equity targets for equitable EVCS siting and developing a public map that clearly displays priority locations, the City and its partners will be better positioned to apply for funding. When grants and other opportunities to fund public charging infrastructure become available, partners and community buy-in will already be in place – strengthening applications and enabling projects to start quickly.

Frontline community needs vary from neighborhood to neighborhood. The Ordinance indicated in Action PC-1 will support these efforts by setting a protocol to guide ZEV projects in frontline communities. More staff involvement is needed to conduct community engagement, ensure that project implementation is culturally appropriate, and address any unique access needs. In areas where community members do not yet have or use ZEVs, charger installations must be accompanied by additional amenities such as Mobility Hubs, culturally-relevant programming, and outreach and education to dismantle access barriers.

Finally, many places of worship have access to parking lots that are not utilized during most of the week. However, these organizations often do not have the capacity or funds to apply for grants to build charging infrastructure built on their property. The City can play a role linking supportive organizations and grant funders with places of worship. Additionally, as leaders in the community, places of worship are important allies in increasing ZEV awareness and education in frontline communities.

**PC-4****Study the Feasibility of Subsidizing Public Charging For Low-Income Users****Cost: \$****Lead Agency: DOT**

Study the possibility of subsidizing charging for low-income users, first by subsidizing electric vehicle parking and charging infrastructure in City-owned facilities (see Action CL-10). Beyond City property, explore partnerships with peer government organizations such as BART and BAAQMD that are also aiming to reduce the cost burden for low-income residents to charge their vehicles.

Going Deeper

Affordability is a major barrier to ZEV access. While “fueling” a vehicle with electricity is more cost-effective than with gasoline, low-income users often still experience cost burdens. This is particularly true for residents who lack access to charging in their homes and are dependent on public chargers: electricity provided publicly tends to be more expensive than what is available at home. Reducing the cost burden for low-income residents, including through partnerships with BART, BAAQMD, and EBCE, has the potential to significantly reduce barriers to ZEV ownership and use.

PC-5**Pursue EV Charging Requirement for Fuel Service Stations****Cost: \$\$\$****Lead Agency: PBD**

By 2024, develop an ordinance requiring new service stations and those service stations proposed for renovation to install a minimum number of EV fast-charging stations as a condition of approval. In developing the ordinance, include consideration of additional opportunities to require and encourage installation of ZEV charging and fueling infrastructure, including permit review and approval, business license application, economic development goals and incentives, and other opportunities within the Oakland Municipal Code. Ensure that any requirements are feasible, reasonably cost-effective, and avoid undue burden on small business owners, including through inclusion of exemptions for certain qualifying conditions as well as through incentives as reasonable.



By Edna Aguilar



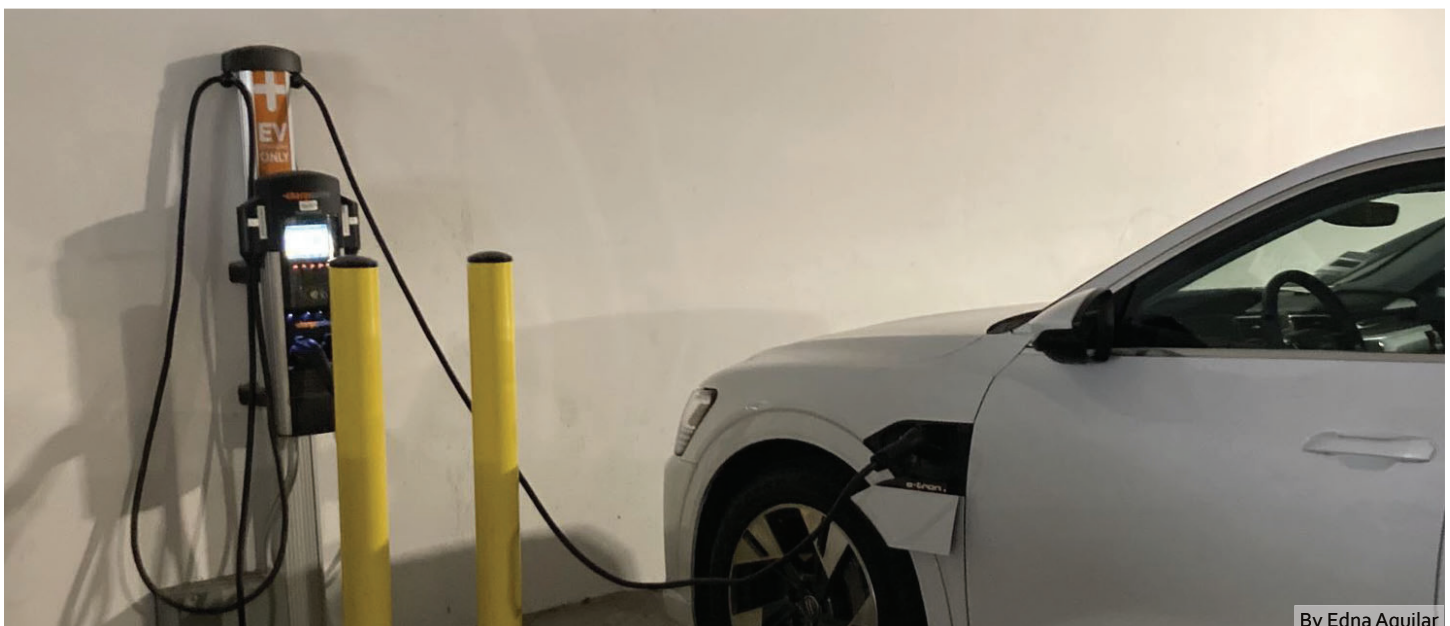
Going Deeper

As Oakland transitions from fossil-fuel powered vehicles to ZEVs, every opportunity must be taken to increase the number of publicly-available EV charging stations. Gasoline fueling stations, or service stations, offer a strategic opportunity because they are distributed throughout the City, conveniently located, and commonly sited with or near amenities that drivers can use while charging or fueling.

As such, construction of new service stations and expansion/renovation of existing stations are important opportunities to advance the City's ZEV mobility goals. The proposed Ordinance will require existing service stations seeking qualifying modifications to incorporate fast charging stations where feasible, with reasonable exemptions such as for excessive costs or physical site constraints. Where new service stations are being considered, the proposed ordinance will establish minimum requirements for the inclusion of ZEV charging and fueling infrastructure, recognizing the increasing number of ZEVs on Oakland roads will require diverse, and appropriately co-located, services.

In implementing this Action, staff in the City Administrator's Office, Planning and Building Department, Economic & Workforce Development Department, and Department of Transportation will collaborate to assess potential approaches, conduct stakeholder outreach, and finalize a draft ordinance. Staff shall endeavor to minimize undue burdens on neighborhoods and small businesses, while crafting the ordinance in a way that is not over-prescriptive and maximizing the likelihood that the new legislation will result in a real and timely increase in EV charging infrastructure.

This Action will expand Oakland's charging network overall, and ensure that legacy fossil fuel infrastructure contributes to the transition to clean mobility. By providing an opportunity for service stations to be part of the transition, this Action has the potential to minimize negative impacts of vehicle electrification for small business owners in Oakland.



By Edna Aguilar



5

Medium and Heavy Duty Fleets



Vision

Oakland is a leader in the equitable transition away from fossil fuel use for goods movement, public transportation, vans, and off-road equipment. The transition to zero-emission trucks and other medium- and heavy-duty vehicles in, and moving through, our city has dramatically reduced poor health impacts in frontline communities. Portions of the local delivery sector have been fundamentally reinvented in favor of smaller, more local, innovative approaches.



Introduction

Trucks play an outsized role in Oakland's economic landscape – and in the sources of pollution that disproportionately impact frontline communities. Oakland's seaport is one of the busiest in the country, and 30% of County employment is linked to goods movement.^{viii} Nearly a third of all goods movement by weight (and 36% by value) in the nine-county San Francisco Bay Area has an origin or destination in Alameda County, and/or utilizes the Port of Oakland. The city is crisscrossed by freeways and sits at the hub of the region's public transit systems.

While diesel engines have become more efficient in recent years, they remain an acute source of pollution. Medium- and heavy-duty (MHD) vehicles – such as delivery vans, long-haul trucks, and buses – are thus a prominent target for pollution mitigation and GHG reduction efforts. MHD vehicles emit significantly more pollution than passenger cars on a per-vehicle and per-mile basis. Heavy-duty gasoline vehicles emit more than four times as many hydrocarbons, six-and-a-half times as much fine particulate matter (PM2.5), and four-and-a-half times as much nitrogen oxides (NOx) as gasoline-powered passenger vehicles. Heavy-duty diesel

trucks emit hydrocarbons equivalent to passenger cars, but more than 26 times as much PM2.5 and 21 times as much NOx.^{ix} Diesel engines are a major source of black carbon (BC), a primary component of PM2.5 and a potent greenhouse gas.

Given the region's geographic, economic, and industrial prominence, ensuring zero-emission MHD vehicles in Oakland will have a profound impact on both reducing local health disparities, and catapulting global goods movement toward a low-carbon future.

The regional nature of trucking and the relative autonomy of MHD truck operators means that regional, data-driven approaches are needed to decarbonize the industry. This chapter provides the broad context of transitioning MHD vehicles, including equity implications, technological and operational considerations, key regional initiatives, and progress among key players, including East Bay Community Energy (EBCE), the Port of Oakland, and Alameda Contra Costa Transit District (AC Transit).



By OMSS



CENTERING EQUITY

Communities near Interstate 880 and the Port of Oakland experience elevated concentrations NO_x and PM_{2.5}, contributing to high rates of heart disease, lung disease, cancer, and asthma. This is attributable in large part to the trucking and industrial operations concentrated there. According to the California Air Resources Board (CARB), about 70% of air-pollution-related cancer risk in California is attributable to diesel particulate matter (DPM), a component of PM_{2.5}.^x

As in communities across the country, Black, Indigenous and people of color (BIPOC), and immigrant communities are disproportionately harmed by the air and soil pollution

from trucking and heavy industry. West Oakland is ringed by the Oakland Seaport and Interstates 880, 580/80, and 980. Its census tracts range from 60-93% people of color – primarily Black – and rank in the 55th to 82nd statewide percentile in terms of pollution burden. South of West Oakland are the districts of Chinatown; Vietnamese and Spanish-speaking communities in the Fruitvale and San Antonio neighborhoods; and, bordering the Oakland International Airport, Deep East Oakland, which is primarily Black and Latinx. Deep East Oakland census tracts range from 85-98% people of color, and rank in the 56th to 88th percentile for pollution burden. Linking all these communities is the I-880 freight corridor, marked by a history of industry, redlining, and disinvestment.^{xi}

The West Oakland Community Action Plan

Due to its proximity to the seaport and freeways, West Oakland is acutely impacted by transportation-related air pollution. West Oaklanders have a life expectancy 7.5 years less than the County average, and nearly twice the number of asthma-related hospitalizations. The community was selected as the first to receive planning resources through the Community Air Protection Program (CAPP, created by Assembly Bill 617 in 2017), in which regional Air Districts support communities with high pollution exposure to develop comprehensive plans for mitigating and recovering from those burdens through local solutions. The resulting West Oakland Community Action Plan (WOCAP) was developed by the West Oakland Environmental Indicators Project (WOEIP) and the Bay Area Air Quality Management District (BAAQMD), with support from numerous agencies and community members. Its 89 actions are intended to mitigate local impacts while empowering the community and laying the groundwork for regional solutions. Appendix D lists WOCAP strategies that address the MHD sector. Many of these point to actions planned or in progress by various agencies, including the City, Port of Oakland, Alameda County, California Air Resources Board (CARB), Bay Area Air Quality Management District, and others.


FINAL


OWNING OUR AIR

The West Oakland Community Action Plan – Volume 1: The Plan

October 2019

A joint project of the Bay Area Air Quality Management District and West Oakland Environmental Indicators Project

 BAY AREA AIR QUALITY MANAGEMENT DISTRICT

 West Oakland Environmental Indicators Project
know which way the wind blows



Technologies and Considerations

The MHD sector is evolving rapidly, with new technologies and vehicle models every year. Two technologies dominate the market: battery electric (BE) and hydrogen fuel cell (HFC). While BE vehicles tend to be less costly, they generally have shorter ranges on a charge and may require changes to routes and schedules. HFC vehicles are operationally more similar to diesel or compressed natural gas. They refuel more rapidly, but with much higher vehicle and infrastructure costs. Both technologies will have a role to play. Which is used for a given operation, and how, when, and where the “fuel” is procured and delivered, depends on what the vehicles are used for, their duty cycle and route length, and logistics of where they are typically located (i.e. domiciled).

VEHICLE CLASS

MHD vehicles fall into one of a series of classes, from 2B through 8. The Gross Vehicle Weight Rating (GVWR) determines class; this includes the weight of the vehicle plus the maximum it can carry, including fuel, trailer, cargo, and passengers. Classes 3-6 are generally considered medium duty. Class 4 includes box trucks and large walk-in trucks. Class 6 includes single-axle and beverage trucks as well as some school buses and is the smallest class for which a commercial driver’s license may be required.

Heavy-duty refers to Class 7 and 8 vehicles. These include street sweepers and transit buses, and other three-axle trucks. Class 8 vehicles are the largest – more than 33,000 GVWR – and include drayage trucks serving the Oakland Seaport, big-rigs and cement trucks.

VEHICLE USE AND ROUTES

To understand what technology changes can be implemented, it is important to know what a vehicle is used for, including its typical cargo and routes, duty cycle, and other power needs linked to the vehicle’s purpose (such as refrigeration).

The Port of Oakland defines “short haul” as truck routes that remain within the East Bay. On these trips, trucks are less likely to need to reach highway speeds or traverse major hills. However, many short haul drayage drivers are independent operators who take their trucks home for the night elsewhere in the county or beyond. Short-haul trips may also include local delivery vehicles

that return to a central location at the end of a shift. For these fleets, if businesses own their property, vehicle electrification can be simplified with the deployment of overnight charging infrastructure.

Regional haul trips reach highway speeds and may involve hills that must be traversed with the heater or air conditioner running. Charging at the destination or along the route may be needed to ensure continuity and reliability. Long haul routes – primarily driven by Class 8 trucks – traverse the state or nation. For these, a network of charging or fueling hubs, akin to gas stations or public charging for passenger cars will be needed. To date, BE vehicles dominate the short- and regional-haul sector, with long-haul potentially relying more heavily on HFC vehicles.

ELECTRICITY PROVISION

The types of vehicles operating in an area, how they are owned, and where they domicile, inform the location and concentration of needed charging or fueling infrastructure. Fleets with a central home base may be able to add refueling/charging infrastructure on site, while drivers with no access to infrastructure must rely on charging at their designation or along the route.

When installing charging infrastructure, operators must consider a site’s electrical capacity, as well as capacity on the electric power grid. MHD vehicles require a tremendous amount of power, often with exacting needs in terms of how frequently and at what times of day they charge. How and when vehicles charge determines the total cost of electricity (per utility rates), as well as how that charging stresses or benefits the power grid (based on overall demand and renewable energy generation). If capacity upgrades are required at the building and/or grid level, they can cause delays due to project permitting and utility interconnection.

Site configuration is another important factor. Fleets are often space-constrained with complex logistical needs. Adding charging infrastructure to a site requires consideration of how vehicles will move through the space, given the length of time it takes to charge. When sites serve multiple fleets or vehicle types, an additional challenge stems from the fact that there is no standard for where on a vehicle the charging port is located. This



can make it difficult to design a site where any truck can enter, charge, and leave efficiently.

OPERATIONS AND MAINTENANCE

Fuel and maintenance are the two largest operating costs for trucks. Electricity prices are more stable than diesel or natural gas, though rates differ based on utility territory, time of day, and peak demand. BE vehicles are both more efficient and require less maintenance, in part due to a simpler drivetrain. BE trucks have also been found to have significantly lower annual costs for fueling/charging and maintenance when compared to both new and used diesel alternatives. However, if a used MHD ZEV market is anticipated – which could make vehicles more accessible to smaller operators – more research will be needed on the range and lifespan of older batteries.^{xiii}

BUSINESS PLANNING

Planning for new investments, such as replacement vehicles or charging infrastructure, can be challenging when those investments include unfamiliar technologies. MHD ZEVs remain more expensive than conventional vehicles, though battery prices are falling quickly. By 2030, the total cost of ownership of heavy-duty electric trucks is expected to be less than that of heavy-duty diesel models. Opportunities to offset costs in the near-term exist through various incentive programs, such as California's Low Carbon Fuel Standard (LCFS) and Hybrid and Zero-

Emission Truck and Bus Voucher Incentive Project (HVIP) programs, but not yet at the quantity needed to facilitate a rapid transition. See Chapter 8: Funding for a complete list of grant and incentive programs available in California to help offset the costs of transitioning to zero-emission MHD vehicles.

When incentives are available, fleet owners and operators may need assistance in finding and applying for them. Smaller operators may not know where to look for funding, and many incentive programs have complicated requirements. California's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) is based on a first-come, first-served basis, and has quickly oversubscribed with each new infusion of funding. Language accessibility may also be a barrier if incentive program materials are provided mainly in English.

Battery Weight: A Technological Challenge

Batteries are heavy. Especially for longer routes and heavier trucks, the added weight can reduce the allowable cargo – in turn reducing operator income – and cause more wear on the roadway. The added weight for an average long-haul BE truck is anticipated to be 5,328 pounds in 2030. Technology improvements may lower the figure to 4,267 in 2050. For an average medium-duty electric truck, batteries could add 1,444 pounds in 2030, and 606 in 2050.^{xii}



By Port of Oakland



California Sets the Stage

Planning is advancing rapidly across the state for MHD ZEV investments, due in part to policy action in Sacramento. California's 2016 Sustainable Freight Action Plan directed multiple state agencies to coordinate in advancing progress towards a zero-emission freight ecosystem, focusing on major corridors, intermodal operations, advanced technologies and economic development. Governor Newsom's Executive Order N-79-20 requires 100% of MHD vehicles to be zero emission by 2045 where feasible, and by 2035 for all short-haul trucks and off-road vehicles and equipment. Recognizing the extreme power needs of BE MHD vehicles, the 2018 Electric Vehicle Charging Infrastructure act (Assembly Bill 2127) directed the California Energy Commission (CEC) to assess the changing needs of an increasingly electric statewide MHD fleet and implications for the state's electricity grid through 2030.

The 2021 Clean Freight Corridor Efficiency Assessment act (Senate Bill 671) requires the California Transportation Commission to identify high-priority corridors for deployment of zero-emission MHD vehicles. The law also requires the state's freight plan to describe the needed infrastructure, projects, and operations for deployment of zero-emission MHD vehicles.

To implement state targets, CARB developed The Advanced Clean Truck regulation and the Innovative Clean Transit Rule. The Advanced Clean Truck regulation requires Class 2b-8 vehicle manufacturers to sell an increasing number of ZEVs. It also requires large employers to report information about shipments and shuttle services, and large fleet owners to report information about fleet operations, so that regulators and manufacturers can understand current technology and logistics needs. Per SB 671, the transition to zero-emission freight must be fastest in areas with "freight-adjacent" communities. By 2035:

- 55% of Class 2b-3 truck sales must be zero-emission
- 75% of Class 4-8 truck sales must be zero-emission
- 40% of tractor trailers must be zero-emission

CARB's Innovative Clean Transit Rule requires 100% of new bus purchases to be zero-emission by 2029. Transit agencies must publish plans for transitioning to fully zero emission bus fleets by 2040. Regulations provide

flexibility through differing interim purchasing targets for large and small transit agencies. Zero-emission purchase requirements begin in 2023 for large agencies, starting with 25% of all new purchases.

CURRENT INITIATIVES

The MHD sector is most efficiently addressed at the regional scale and by major individual fleet operators. Numerous ongoing efforts will directly benefit Oakland residents and the local economy. Current efforts in the transition to zero emission MHD vehicles in Oakland include the projects and agencies detailed below:

East Bay Community Energy

In 2016, Alameda County and eleven of its cities, including Oakland, entered into a Joint Powers Agreement to launch East Bay Community Energy (EBCE), an independent public agency. EBCE secures electrical energy supply for residents and businesses and leads energy-related climate programs, including transportation electrification. As the nonprofit public power provider, EBCE delivers electricity with high renewable energy content, at a reduced cost to customers, through PG&E's transmission and distribution system.^{xiv}

EBCE's service area is among the most important gateways for international, domestic, and interregional trade in the nation. Alameda County's goods movement infrastructure is linked to San Joaquin County, home to the Central Valley's agricultural economy. The territory has the highest volumes of goods movement truck traffic in the Bay Area, due to freight corridors including Interstates 5, 80, 205, 238, 580, 680, 880, and 980, and State Routes 84 and 92.

Short-haul trucks serving the Seaport footprint contribute less to DPM concentrations in the West Oakland community than non-Port MHD vehicles.^{xv} Therefore, a regional approach to MHD electrification is key. To support solutions that maximize benefits to frontline communities, EBCE secured CEC funding in 2021 to launch a data-driven, comprehensive regional approach. The *Zero-Emission Medium- and Heavy-Duty Vehicle Infrastructure Blueprint for Goods Movement* will identify near-, medium-, and long-term strategies in five opportunity areas: vehicles, infrastructure, financing, workforce development, and community benefits (see Appendix C for details).



In addition to the Blueprint, EBCE has launched a free technical assistance pilot program to help goods movement stakeholders with fleet electrification assessments, infrastructure planning, identification of applicable incentives, and funding applications. The City will leverage EBCE's Blueprint and technical assistance to inform its own ZEV policies and identify where targeted partnerships could advance the market.

Alameda Contra Costa Transit District (AC Transit)

AC Transit carries 200,000 passengers daily on a fleet of 635 buses, ranging from 24 to 60 feet long. They began deploying battery electric buses (BEBs) and fuel cell electric buses (FCEBs) in 2000. With ambitious environmental goals, the District's strategy extends beyond technology: In 2018, AC Transit and the City of Oakland jointly released the *Transit Action Strategy* (TAS), building on the City's visionary 1996 *Transit First* policy that prioritized "public transit and other alternatives to single-occupant vehicles." TAS targets include street and land use improvements to make public transit more efficient and equitably increase ridership – evolutions that can facilitate the switch to zero emission buses (ZEBs).

In 2020, AC Transit published the Zero Emissions Bus Rollout Plan: Version 1, in compliance with CARB's Innovative Clean Transit regulation. Anticipating an eventual fleet of 530 BEBs and 150 FCEBs, AC Transit estimates a \$1.1 Billion total price tag, inclusive of vehicles and charging/refueling infrastructure. Additional needs include upgraded and new information systems to monitor and improve performance. The Rollout Plan anticipates a 100% zero-emission fleet by 2037, after replacement of the last 91 diesel vehicles in 2036.

Current ZEV deployment is based on available grants and incentives. By remaining technologically neutral, the District deploys BEBs and FCEBs according to which vehicle type meets their operational needs while remaining cost effective. This includes "depot-charged BEBs for shorter routes and blocks, on-route charged BEBs for mid-range routes with layovers at a transit center, and FCEBs for long routes or routes with higher speeds and/or heavier loads."^{xvi} AC Transit's *Facilities Utilization Plan* details operations and maintenance needs and a funding strategy, including fueling and charging infrastructure and parking reconfiguration.

AC Transit is committed to deploying new ZEBs in the communities that will benefit most from air quality improvements. Their 2017 *Clean Corridor Plan* and 2018 TAS identified corridors in greatest need of ZEBs, including Oakland-specific routes in West Oakland, along San Pablo Avenue, and the MacArthur/Grand corridor.

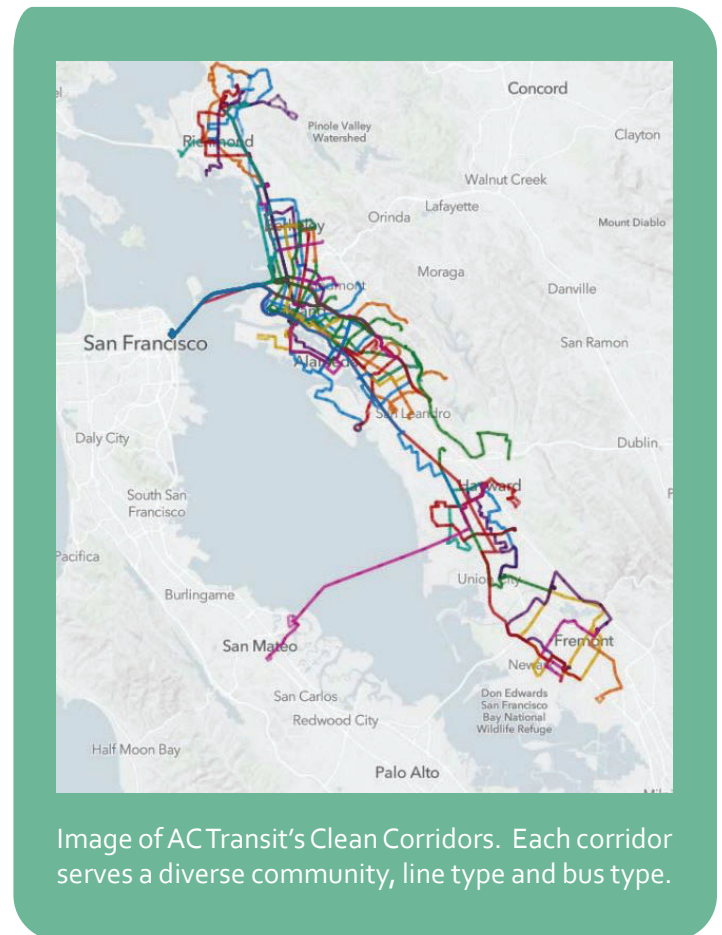


Image of AC Transit's Clean Corridors. Each corridor serves a diverse community, line type and bus type.

As of late 2021, AC Transit was operating 26 ZEBs, including 7 BEBs and 19 FCEBs, and had secured funding to purchase an additional 41 ZEBs. AC Transit is currently working with PG&E to upgrade a charging depot to support up to 50 buses. By 2028, the Oakland facility will be upgraded to support 250-300 buses, and 500 by 2031.

Port of Oakland

The Port of Oakland oversees the 10th busiest Seaport in the U.S., Oakland International Airport, and much of the land along the city's waterfront. Approximately 850-1,200



ships visit the Seaport annually, carrying the equivalent of 2.5 million 20-foot containers; these link to the 3,000-5,000 short-haul trucks that haul shipping containers there daily. The airport processes more than 700,000 tons of cargo, which is also trucked throughout the region. MHD diesel vehicles concentrated along routes serving the Seaport account for almost a tenth of Oakland's GHG emissions. While the Port is an essential economic driver for Oakland and the region, the activity it supports contributes to elevated pollution in the surrounding communities.

Additionally, the Port of Oakland serves many of its customers and tenants as a local municipal utility, so it can more nimbly implement projects and not be completely reliant on PG&E for last-mile connections. The Port has been focused on increasing the capacity and

resiliency of their overall electrical grid and preparing for the future implementation and adoption of equipment at a greater scale as the MHD class of equipment continues to become more commercialized and readily available.

The *Seaport Air Quality 2020 and Beyond Plan*, approved by the Board of Port Commissioners in June 2019, sets a zero-emission Seaport as its goal. It is divided into three phases:

Near-Term (2019-2023): Initial actions focus on demonstration projects funded through various grants and incentives, as well as investments in electricity infrastructure that will support early pilots as well as future scaled projects. Much of the implementation funding derives from the Zero- and Near Zero-Emission Freight Facilities (ZANZEFF) program, administered by CARB with funding from the State's Cap and Trade program. Projects



By Port of Oakland



are spread across the Port's own operations as well as those of Port tenants and partners (See Appendix D).

Electricity needs at the Port will increase sharply as vehicles and cargo handling are electrified. The Port's Publicly Owned Utility is assessing where charging infrastructure is best suited across its property. As of 2021, with around 20 MHD EV chargers installed, the Utility is working with manufacturers to develop a mobile solar-plus-storage EV charging unit. To reduce the need for new power lines, it is exploring the potential of load control modules to facilitate charging with existing power.

Intermediate term (2023-2030): Port leaders anticipate new requirements and emissions-reduction targets from CARB over the next decade, which will add specificity to timelines, technology availability, and costs. The Port has committed to working with its tenants and independent operators through 2030 to deploy zero-emission short-haul and yard trucks and provide ongoing support for the installation of charging infrastructure. Current capacity assessments indicate that this will require upgrading or replacing all of the Port's electrical substations. As with AC Transit, the Port anticipates a diverse range of ZEV technologies and infrastructure.

Long term (2030-2050): The Port will continue promoting pathways to zero emissions for equipment, operations, and vehicles throughout the duration of the Plan. Technological and operational innovations will influence where, when, and how the Port, its tenants, and independent operators invest in ZEVs and supportive infrastructure. The 2020 *and Beyond Plan* assumes that incentives and grants will be critical to scale investments.

Additional Projects

The City of Oakland has 15 acres of land dedicated to ancillary maritime services (truck parking and services, cargo storage, and a planned maritime commodities terminal) near the Seaport. Oakland Maritime Support Services (OMSS) provides truck services and petroleum diesel fueling at the site. The centralized location reduces the impact of trucking on the West Oakland community and has served as a proving ground for BE trucks. OMSS purchased an Orange EV T-Series pure-electric terminal truck in 2018 – the first 100% electric Class 8 truck at the Seaport. In 2020, OMSS purchased a second vehicle,

citing improved power, safety, and maintenance; financial savings due to avoided fueling and maintenance; and LCFS credits. With OMSS and EBCE, the City is exploring the feasibility of deploying multiple types of truck charging at this site.

CITY OF OAKLAND

The City is committed to reducing GHG emissions from its fleet vehicles and operations. Since 2010, all new non-emergency response City vehicle acquisitions have been alternative fuel or hybrid; as of early 2020, 12.7% of Oakland's entire municipal fleet is efficient vehicles, including hybrid, plug-in hybrid, and BE. Through the 2030 ECAP, the City committed to identifying zero emission and alternative fuel solutions for all heavy-duty and emergency response fleet vehicles and equipment by 2025, and to using alternative fuels in at least 50% of fleet vehicles by 2030.

MHD vehicle projects to date have focused on innovative, interim strategies for reducing emissions. These have included transitioning 100% of the City's diesel fleet, from street sweepers to backhoes, to locally sourced renewable diesel; and the use of locally refined natural gas derived from the Altamont Landfill to power the City's garbage and compost collection vehicles and transfer trucks.



By Department of Public Works



MEASURING SUCCESS

KEY PERFORMANCE INDICATORS

- Number of permits for properties hosting MHD fleet vehicles with EV chargers installed onsite
- Number of permits for properties hosting MHD fleet vehicles with Green Hydrogen fueling installed onsite
- Joint pilot infrastructure project identified and funded

ADVOCATE

- **...for favorable electricity rates and reduced barriers for electric MHD charging sites.** A critical barrier to widespread MHD vehicle electrification is the time it takes to charge. High-voltage chargers – 500 kW and above – could change that dynamic.
- **...for a strong, diverse, and accessible used MHD vehicle market.** For small businesses and independent truck owners, the used zero-emission MHD truck market will be important for a successful transition.
- **...for expanded zero-emission MHD incentives and a streamlined statewide incentive clearinghouse.** Incentives are particularly critical for small or independent operators. A central clearinghouse for incentive information as well as application support would ease the burden of finding and applying for incentives.
- **...for increased investments in pavement resilience and traffic management planning.** Strategic investments in pavement upgrades and maintenance are needed to mitigate the additional weight of MHD vehicle batteries. Clear protocols are also needed to facilitate efficient routes for freight vehicles that minimize disruption and maximize safety in residential districts.



By Port of Oakland



Medium & Heavy-Duty Fleets Actions

MHD-1

Develop a Zero-Emission MHD Vehicle Charging Overlay Zone in the City's Zoning Ordinance

MHD-2

Require Upgrades to MHD Vehicle Fleet Sites

MHD-3

Establish an Inter-Agency Working Group and Partnership Agreement to Facilitate Site Identification and Streamlined Construction

MHD-4

Develop A Zero-Emission Delivery Zone Pilot Program

MHD-5

Study the Potential for Autonomous Delivery Vehicles

MHD-6

Support Enhanced Action On Zero Emission MHD Infrastructure In The East Oakland Community Action Plan

By Edna Aguilar



**MHD-1****Develop a Zero-Emission MHD Vehicle Charging Overlay Zone in the City's Zoning Ordinance****Cost: \$\$\$****Lead Agency: PBD**

By 2025, assess and identify sites where zero-emission MHD charging (for BEVs) or fueling (for green hydrogen) may be an appropriate allowable land use, either as a stand-alone use or in coordination with additional co-locatable land uses. The designation shall account for impacts to the surrounding community, including noise, traffic congestion, and potential air pollution or ground contamination. Site identification shall include a public process to help inform which sites would be optimal candidates to include; how to address conflicts between opposing potential highest-and-best-uses (e.g. affordable housing, MHD charging, urban farming, etc.); and how to mitigate potential impacts to surrounding neighborhoods. Optimal sites for consideration shall include industrial corridors, sites where MHD fleet vehicles domicile, and properties hosting MHD logistics activities (loading, unloading, etc.).

Going Deeper

MHD vehicle and fleet owners and operators face a chicken-and-egg game in the ZEV transition when vehicle investments cannot be made until charging/fueling sites are identified, yet logistics site managers are reluctant to undergo the process of installing charging/fueling infrastructure until demand is certain. An additional challenge stems from uncertainty over whether a given corridor or property is suitable for charging or fueling, how the surrounding neighborhood may respond to the proposed new activity, how receptive relevant public agencies may be to the project, and how onerous the permitting process may be. Meanwhile, the City's General Plan, including the Industrial Land Use Policy, must identify the best economic and social uses for parcels across Oakland's diverse neighborhoods within a rapidly changing economy.

This Action will reduce uncertainty by identifying specific corridors and properties that can be considered for MHD ZEV charging or fueling. A new zoning overlay will provide clarity to the marketplace regarding acceptable and appropriate locations for charging/fueling sites, establish relevant standards for placement of infrastructure, identify facilities appropriate for co-location, and ensure that nuisance concerns are addressed in local development standards. Engaging the community in establishing the overlay will support a robust discussion of the benefits and potential harms of the activity, and help ensure that projects are pursued in pre-vetted locations.



By Port of Oakland

**MHD-2****Require Upgrades to MHD Vehicle Fleet Sites****Cost:** \$\$**Lead Agency:** PBD

By 2025, develop a plan to require existing business that own or host MHD fleet vehicles to invest in site upgrades for zero-emission charging/fueling infrastructure, or to provide a business and investment plan for those upgrades.

Going Deeper

A major obstacle for MHD ZEV transition is the lack of charging infrastructure at sites where fleet vehicles traditionally fuel up, load cargo, or domicile. Infrastructure installation is complicated by the costs of electrical and site upgrades, and planning for the added time needed to charge.

A robust approach to serving the full range of MHD vehicles, use cases, and ownership structures must maximize sites that vehicles already utilize. This Action asks site owners and operators to anticipate the infrastructure needs of the vehicles that access their sites and identify how they will become part of the future zero-emission charging or fueling ecosystem. Requirements could be based on use-type, property size, number or dock doors, or other characteristics. To assess potential approaches, the City should conduct a study of the nexus between current and anticipated businesses operating in Oakland, anticipated technology needs, and industrial land availability. Any requirements should begin as voluntary.

MHD-3**Establish an Inter-Agency Working Group and Partnership Agreement to Facilitate Site Identification and Streamlined Construction****Cost:** \$**Lead Agency:** DOT & CAO (SRD)

Within one year of Plan adoption, finalize a Partnership Agreement among the Port of Oakland, EBCE, PG&E, and relevant City departments (including Planning and Building, Sustainability, Economic & Workforce Development, and Transportation) identifying roles and expectations, and establishing a quarterly Working Group among these parties to address issues of permitting, electric service upgrades, land use and transportation impacts, and related issues for planning and constructing MHD charging and fueling infrastructure. Identify at least five candidate sites for MHD ZEV charging depots involving the partners, with commitment to pursue implementation for one site at minimum.

Going Deeper

Multiple agencies and work units influence various stages of infrastructure projects for MHD charging and fueling. In addition, each of these agencies and departments have their own goals, resources, and specific needs for the MHD ZEV transition. This MOU and Working Group will establish a process for collaboration to propose and streamline projects, and to ensure that public resources are used efficiently.

**MHD-4****Develop a Zero-Emission Delivery Zone Pilot Program****Cost: \$\$\$****Lead Agency: DOT**

By 2025, the City will develop a Zero-Emission Delivery Zone (ZEDZ) pilot in at least one Oakland neighborhood. The City's Department of Transportation, Sustainability Group, Economic and Workforce Development Department (EWDD), and Department of Race and Equity (DRE) will work together, along with the community, to identify candidate sites, with equity (including pollution burden, traffic congestion, and traffic safety) as the key criterion. Program design will address, at minimum:

- Geographic parameters
- Appropriate mix of commercial and residential properties to be included
- Community outreach and education
- Industry partners
- Enforcement and/or incentive mechanisms
- Metrics for measuring success, including access, pollution reduction, and economic impacts

Going Deeper

A ZEDZ is an area where most or all deliveries are zero emission. This can include traditional ZEVs as well as alternative approaches such as cargo bikes, delivery robots, or central delivery hubs where people can collect packages.

Pilots can be mandatory or voluntary. A mandatory ZEDZ would compel shippers and carriers to identify local/last-mile alternatives to traditional delivery approaches in order to serve customers within the zone. A voluntary ZEDZ would utilize a mixture of incentives – such as priority parking, free charging, nighttime delivery, or grants – to encourage alternative delivery methods.

The City of Santa Monica, CA partnered with the Los Angeles Cleantech Incubator and Fluid Truck, a vehicle rental company, to deploy a ZEDZ pilot in their core commercial area. The pilot includes delivery robots as well as zero-emission cargo vans and trucks, and targets food and larger parcel delivery.

The City must engage industry stakeholders in exploring options to ensure that cost-effective zero-emission delivery options are available, to safeguard flexibility in choosing appropriate technologies that provide long-term financial stability, and to support local businesses.



**MHD-5****Study the Potential for Autonomous Delivery Vehicles****Cost: \$****Lead Agency: DOT**

The City will assess current technologies and emerging best practices, and, when appropriate, design an Autonomous Delivery Vehicle Pilot to reduce local delivery emissions, focusing initial efforts on neighborhoods or communities experiencing disproportionate air pollution burdens.

Going Deeper

Autonomous delivery robots are a new technology that has the potential to reduce GHG emissions from certain deliveries. In 2020, Mountain View, CA-based Nuro, an autonomous delivery vehicle startup, received the first permit from the CA Department of Motor Vehicles to operate its autonomous delivery vehicles. Yet, as of 2021, the company has deployed the vehicles commercially only in Houston. With a maximum speed of 25 MPH, they can operate only in “fair weather conditions.”

The City will explore partnerships with developers of autonomous delivery technology. Staff must first investigate the regulations, challenges, and benefits of allowing delivery robots onto city streets. This includes delivery limitations, pedestrian and cyclist safety, equity issues, upstream climate impacts, and impacts to local businesses. Before launching a pilot, the City would need to establish what streets delivery robots could traverse, allowable cargo, travel speed, safety precautions including ADA sidewalk access, privacy, and data protection.

MHD-6**Support Enhanced Action on Zero Emission MHD Infrastructure in the East Oakland Community Action Plan****Cost: \$****Lead Agency: DOT**

The City will work with East Oakland community leaders, the Port of Oakland, Air District, Alameda County, and other relevant partners to ensure the inclusion of ambitious, accountable, realistic, and equity-driven actions to accelerate the shift to zero-emission MHD vehicles in East Oakland via the AB 617 planning process.

Going Deeper

The next Oakland community to receive planning resources through AB 617 will be Deep East Oakland, along Interstate 880 near the Oakland Airport. This plan is an important opportunity to address the impacts of trucking and logistics in Deep East Oakland, and to explore the potential for grid innovation, community-scale solutions, industry partnerships, and public health data to accelerate progress in zero-emissions goods movement. An East Oakland Community Action Plan will build on lessons from the WOCAP to improve partnerships and accountability for the benefit of the entire city. With EBCE’s Blueprint process, and with AC Transit targeting both Deep East and West Oakland for ZEB rollout, those agencies will be critical partners in exploring common charging yards, zero-emission delivery zones, and new funding opportunities to spur innovation.



6 Electric Micromobility

By Kerby Olsen



Vision

Small electric vehicles are affordable, readily available and commonplace throughout Oakland. A large percentage of Oaklanders use electric micromobility vehicles to get to work, school and essential services. Electric cargo bikes are frequently used for by businesses, including local delivery, retail, and trades.



Introduction

The term “micromobility” refers to small, lightweight vehicles such as bicycles, kick scooters, tricycles, and skateboards. Electrically propelled versions of these devices (E-micromobility) have become common over the last decade and today electric bikes are the highest selling type of electric vehicle in the US and many other countries^{xvii}. E-micromobility vehicles can be personally owned, operated as part of a commercial fleet, or made available to the public for short term rental via bike share and scooter share programs.

Electric micromobility (E-micromobility) is a key component of this Plan for several reasons. First, small electric vehicles like e-bikes and e-scooters have no direct emissions and are among the most energy efficient modes of travel ever invented. Second, some of these vehicles can be a replacement for car ownership for many

people, allowing them to ride farther and carry more cargo or passengers than non-electric versions. E-bikes can also increase accessibility to biking for persons with limited stamina or leg strength. However, many barriers to widespread adoption of these vehicles remain, including their high up-front cost, a lack of knowledge or availability, a lack of secure parking and a perceived lack of safe bike lanes. Widespread adoption of shared versions of these vehicles faces its own barriers, such as a lack of availability in some areas, lack of accessibility for persons with disabilities and high user fees.

While bikes and E-bikes can be ridden without a driver’s license, it is illegal for people without a driver’s license to operate an E-scooter or E-moped. Most shared E-micromobility companies require their users to be 18 years of age or older.



By Michael Randolph



CENTERING EQUITY

The barriers to E-micromobility are even higher for Oakland's underserved communities, which may not have as much access to driver's licenses, bike shops, secure bike parking, shared mobility fleets and safe bike lanes as more affluent communities. Oakland's disadvantaged communities stand to benefit greatly from widespread adoption of these vehicles, due to their low cost (when

compared to car ownership), health and exercise benefits and zero emissions. People with disabilities also face barriers in using bike share and E-scooter share, as the typical vehicle is not accessible to many. Many of the recommended policy actions were designed specifically to address barriers in disadvantaged communities.



By Ethan Nasr



MEASURING SUCCESS

KEY PERFORMANCE INDICATORS

- Number of rebate or voucher used in frontline communities
- Number of secure public bike parking spaces
- E-bike library usage overall and in frontline communities
- Shared mobility trips overall and in frontline communities
- Percent of commercial deliveries made by E-micromobility

ADVOCATE

- **...For a direct-to-consumer rebate program in Alameda County for E-micromobility vehicles.** Nearby counties have successfully operated such rebate programs.
- **...For State and Federal tax incentives for E-bike purchases.** The high price of E-micromobility vehicles is a major barrier to use.
- **...For State government to eliminate the Driver's License requirement for E-scooters.** Using an E-scooter is very similar to using a bike. Bike riders are not required to hold a driver's license, but E-scooter users are.
- **...For reduced permit fees for shared mobility service providers.** Permit fees have been identified by operators as a key constraint to expanding shared mobility services.
- **...For shared mobility providers to ensure equitable access to services in disadvantaged neighborhoods.** Any reduction in permit fees should be accompanied by commitments from Operators to better service disadvantaged communities.



By Kerby Olsen

"I absolutely love my E-bike. It's completely changed the way I see the city and my mobility options. I would never have thought I could travel these kinds of distances, from West Oakland to downtown Berkeley, from downtown Oakland to Fruitvale, in record time and without breaking a sweat. Better yet, I feel confident while I'm riding because I can easily keep up with traffic too."

- Warren Logan, Oakland Resident



Electric Micromobility Actions

By Mateo Van Thienen

- MM-1** *Create and Expand An E-Bike Lending Library*
- MM-2** *Connect Residents With Subsidies And Incentives for Purchasing E-Micromobility*
- MM-3** *Pursue Resources To Assist Local Businesses To Purchase Cargo E-Bikes*
- MM-4** *Assess Continuation and Expansion Of City's Universal Basic Mobility Program Pilot*
- MM-5** *Incentivize Promotion Of Adaptive E-Micromobility Devices For Persons With Disabilities*
- MM-6** *Expand Public Secure Parking and Bikeways For Bikes And Scooters*
- MM-7** *Include E-Micromobility In Next Bike Plan*



**MM-1****Create And Expand An E-Bike Lending Library****Cost: \$\$\$****Lead Agency: DOT**

Create an electric bike library to allow Oaklanders to check-out an electric bike for a long periods of time at low cost, like checking out a library book.

Going Deeper

This concept was first recommended as part of the 2018 Oakland Bike Plan (Lets bike Oakland!). The City received a \$1 million grant in 2021 from the Clean Mobility Options Voucher Program to fund the E-bike library and purchase 500 E-bikes of various types. The City awarded the contract for the E-bike Library to GRID Alternatives Bay Area, who will subcontract to local bike shops in West Oakland, Chinatown, Fruitvale/ San Antonio, and East Oakland to act as the storefront for the program. The E-bike Library is expected to begin operation in Summer of 2022. If demand for E-bikes under this program exceeds supply, OakDOT should apply for further grant funding to expand the program to include more bikes and more locations.

MM-2**Connect Residents With Subsidies And Incentives For Purchasing E-Micromobility****Cost: \$****Lead Agency: DOT**

Develop a program to publicise, and connect Oaklanders with, new E-micromobility financial incentives as they become available.

Going Deeper

Several incentive programs for E-bikes have been proposed in the California legislature and the federal government. For example, The State of California's E-Bike Affordability Program provides \$10 million in subsidies to help people buy e-bikes. The program is scheduled to begin in July of 2022. Contra Costa County also provided between \$150 and \$300 for purchase of an E-bike, E-bike conversion kit or E-moped. If E-micromobility rebates are approved by Alameda County, the State of California, or the federal government, the City will help connect residents to those rebates via education and outreach campaigns in priority communities.



By Alex Gutiérrez

**MM-3****Pursue Resources To Assist Local Businesses To Purchase Cargo E-Bikes****Cost: \$****Lead Agency: DOT**

The City will develop a subsidy program to promote the use of cargo bikes for local delivery, prioritizing locations according to pollution burden and safety for this form of delivery. The City will seek partners and funding for an initial pilot, to be launched by 2025. Work with local businesses and delivery workers to determine local delivery needs, and how E-cargo bikes could be useful to them. Once needs are determined, pursue grants or other resources to help local businesses and delivery workers purchase, lease, or rent E-cargo bikes. Include equity criteria, including pollution burden, in determining where to allocate resources.

Going Deeper

Cargo bike delivery is a last-mile strategy that reduces emissions, supports active transportation and local entrepreneurs, and offers job opportunities in the low-carbon economy. Electric cargo bikes can hold more cargo than a typical bike, making them useful for local deliveries. Local businesses could replace some delivery trucks with E-bikes, especially if they were affordable. France is developing a subsidy for cargo bike deliveries, with a three-year plan in which subsidies decrease over time; delivery companies would receive approximately \$2.30 per package for the first 500,000 packages delivered, decreasing to approximately \$.70 per package for up to 3 million packages in year three. Manufacturers of cargo bikes have been ramping up for this market in recent years, unveiling amenities such as climate-controlled cabins, extra shock absorption, and heavier carrying capacities.

Developing a local approach to cargo bike subsidies will entail identifying an appropriate initial level of subsidy, timeline, technology partner(s), pilot location(s), eligibility criteria, and appropriate funding sources. Any pilot rollout must include equity criteria in location selection, as well as business development and entrepreneurship opportunities.



By Adam Eliath

**MM-4****Assess Continuation And Expansion Of City's Universal Basic Mobility Program Pilot****Cost: \$\$****Lead Agency: DOT**

In partnership with the City's Department of Race and Equity, develop criteria to assess impacts as well as feasibility of expanding the City's Universal Basic Mobility pilot begun in 2021. If the pilot is deemed successful, pursue resources to expand and continue the program.

Going Deeper

In 2021, OakDOT launched an innovative "Universal Basic Mobility" pilot program that provides direct subsidies to use public transit, bike share or scooter share. A pre-paid debit card with \$300 was mailed to 500 East Oakland residents, along with information on how to use AC Transit, BART, bike share and scooter share. This program is funded by a grant from the Alameda Transportation Commission and is intended to help shift trips away from cars and to active modes of transportation by reducing financial barriers. If demand for this program exceeds the supply of pre-paid cards the City should expand this program citywide and establish a permanent funding source, paid for by grants, or fees on driving or parking.

MM-5**Incentivize Promotion Of Adaptive E-Micromobility Devices For Persons With Disabilities****Cost: \$\$****Lead Agency: DOT**

Amend the City's Terms and Conditions for its Shared Micromobility Permit Program to require or incentivize operators to better promote their adaptive offerings.

Going Deeper

The City's Shared Electric Micromobility permit program requires all permitted operators to provide adaptive vehicles for persons with disabilities. However, many outreach participants noted that they were not aware that this service was available. Better awareness of these offerings may help persons with disabilities to access E-micromobility.



By Edna Aguilar

**MM-6****Expand Public Secure Parking and Bikeways For Bikes And Scooters****Cost: \$\$****Lead Agency: DOT**

Identify strategies and seek funding to provide secure public bike storage and low-stress bikeways throughout the City and especially expanding to frontline communities. Both secure parking and bikeways are important pieces of infrastructure that will make Oakland residents feel more comfortable using bikes and scooters, as opposed to solely relying on automobiles.

Going Deeper

Secure public bike or scooter parking and safe bikeways are critical for encouraging widespread use of e-micromobility. Many people's decision to use a bike or scooter is affected by security concerns for their property, and impressions of safety while traveling on the road.

Secure parking is especially important for E-bikes, which tend to be more expensive than traditional pedal bikes. Most secure bike parking in Oakland is located at BART stations or in residences or workplaces. BART operates two bike stations in Oakland with space for 360 bicycles. There are also 410 electronic bicycle lockers, all but 16 at BART stations. Since 2008 City planning codes have required secure bike parking in new development and major renovations, including new apartments and condominiums. Secure bike parking tends to be lacking in dense residential areas with multi-story buildings that were built before the bike parking requirements.

Oakland will continue to implement its 2019 Bike Plan, Let's Bike Oakland, to increase its network of low-stress bikeways. Low-stress bikeways include trails, protected bike lanes, and bike lanes with painted buffering that are not stressful for most Oaklanders to ride bikes or scooters on. However, according to the 2019 Bike Plan only 6% of Oakland's streets have these low-stress bikeways. To increase the number of Oaklanders using e-bikes and e-scooters, it is vital the city continues to develop its low-stress bikeway network.



By Michael Randolph



MM-7

Include E-Micromobility In Next Bike Plan

Cost: \$

Lead Agency: DOT

In future updates to Oakland's Bike Plan, address how the growing use of e-bikes is affecting bike travel patterns. Consider including Actions to promote E-bike usage, particularly in neighborhoods with high VMT, high pollution burdens, and poorer transit access.

Going Deeper

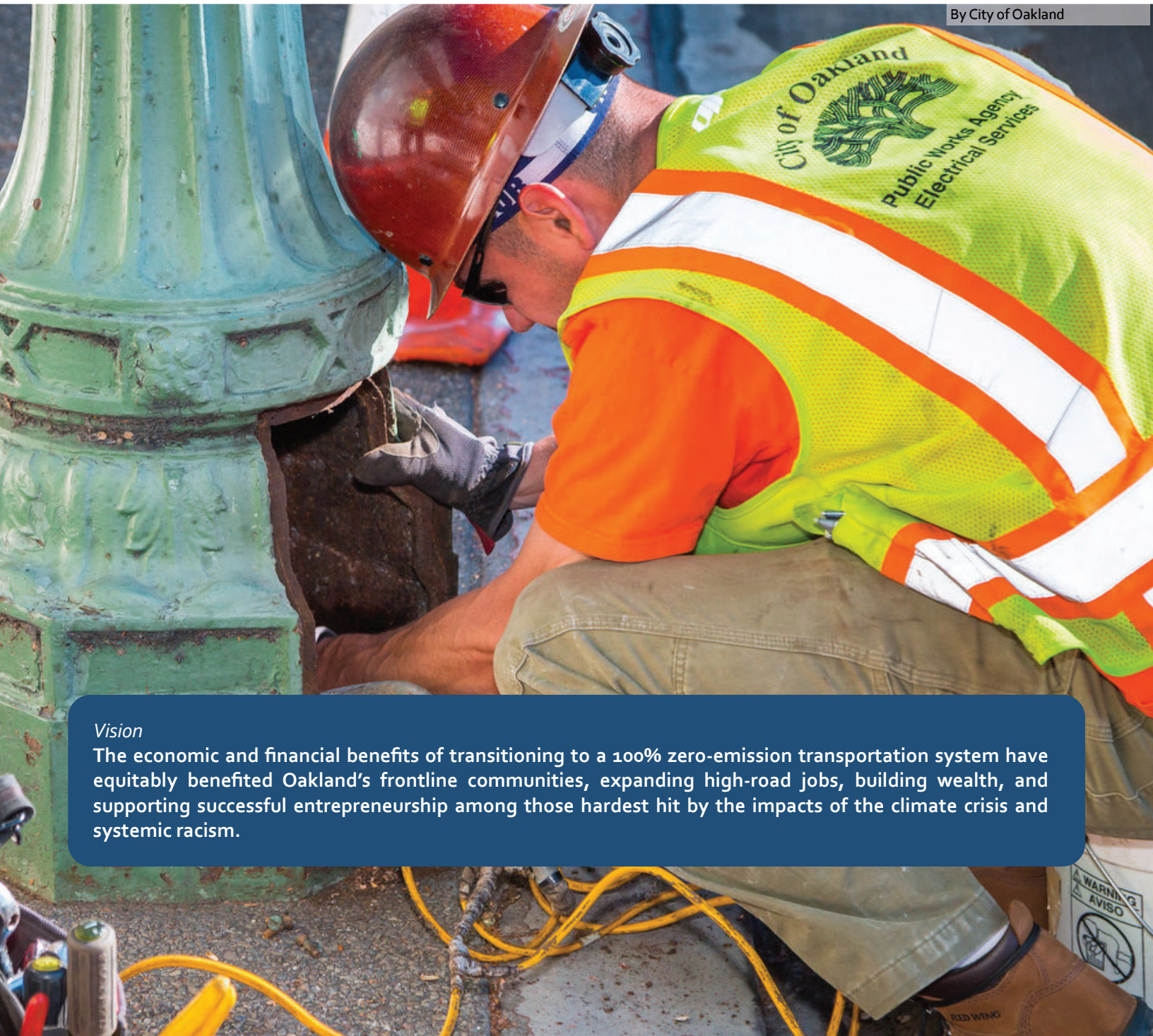
Oakland's award-winning Bike Plan, titled Let's Bike Oakland! was adopted in 2019. That plan does not specifically address E-bikes or include strategies to encourage their use. In addition to promoting the use of e-bikes, future bicycle planning should address how e-bikes allow bicyclists to travel at higher speeds, over longer distances, across hillier terrain, and with heavier loads. These characteristics of e-bikes are affecting where people ride, the types of trips taken by bike (e.g., carrying kids or groceries), and the typical speeds of bicyclists on Oakland's bikeways.



By Shayna Hirshfield-Gold

7 The ZEV Economy

By City of Oakland



Vision

The economic and financial benefits of transitioning to a 100% zero-emission transportation system have equitably benefited Oakland's frontline communities, expanding high-road jobs, building wealth, and supporting successful entrepreneurship among those hardest hit by the impacts of the climate crisis and systemic racism.



Introduction

The transition to a low-carbon economy, and to a zero-emission transportation system, will entail massive shifts in how Oaklanders work and do business. When Oakland's City Council declared a Climate Emergency in 2018, it emphasized the need for a "Just Transition." The term *Just Transition* describes a framework for ending the economy's reliance on fossil fuels in ways that are both ecologically sustainable and just for all members of the community. This commitment prioritizes strategies that maximize benefits and minimize burdens on Frontline communities. Such strategies respond to community priorities and values, and address disparities in resource allocation and local vulnerability. A just and sustainable transition would expand economic opportunity while uplifting workers and their families. The wellbeing and full participation of workers is essential for a Just Transition. Oakland has committed not only to a zero-emission transportation system by 2045, but also to eliminating the use of natural gas in all buildings by 2045. These transitions are intertwined. To get there, the City will need to harness and accelerate existing market trends. Along the way, it must work to ensure a skilled, stable, and fairly compensated local workforce.

BUSINES OPPORTUNITIES & WORKFORCE NEEDS

Oakland's workers and businesses stand to win from a Just Transition. The electrification of transportation and buildings will increase supply chain and employment opportunities across California. Most of the new positions will build on jobs that already exist. For example, jobs related to selling EVs will require minimal new training in EV drive trains and performance. Electricians with standard training can install home EV chargers. Installation and maintenance of public EV charging infrastructure largely involves existing tools and skills.

New jobs, as well as new business opportunities, are also emerging in areas as diverse as public EV charging station maintenance and shared e-micromobility. Research and development for ZEV-related technologies, from lighter batteries to hydrogen-powered trucks, is likely to see continued expansion.

At the local level, more analysis is needed to understand the potential and manage the Just Transition. Oakland

will need to conduct a regional supply-chain analysis – assessing the full range of businesses and products needed to support a Just Transition – alongside an assessment of workforce needs.

Local business opportunities will be determined by Oakland's economic landscape and the nature of ZEV technologies. For example, vehicle manufacturing – the focus of many nationwide analyses of ZEV-related economic impacts – is scarce in Oakland. At the same time, Oakland sits at the hub of major academic institutions, technology companies, key transportation corridors, and a major seaport, making it ripe for a strong role in ZEV research and development. Oakland is home to numerous transportation-related businesses, from auto body shops to transit providers. Each of these is an opportunity for a Just Transition.

ZEV-related businesses and jobs will need support through the Just Transition, so that local entrepreneurs can succeed, and workers can thrive. Some businesses may need assistance to become stable employers as they evolve. As with other aspects of this Plan, ZEV-related economic development must address the full ecosystem of sustainable mobility. Business support services must extend to enterprises focused on land use changes and shared mobility platforms, for example, in addition to those focused on vehicles and charging/fueling systems.

ENSURING A HIGH-ROAD WORKFORCE

Business development and workforce development are two sides of the same coin. New businesses need skilled local workers; newly trained workers need fair, local employers. Amidst the quantity of new jobs, the City and its partners must work to ensure quality, and to ensure that benefits accrue first and foremost to frontline communities. Fossil fuel industry jobs have often been higher paying, longer-term, and accompanied by better benefits than traditional "green jobs." Advocates of a Just Transition are therefore vocal that decarbonization must not "force workers to choose between a good job and a green job."

The term High Road describes an economic development approach that prioritizes workforce equity for Frontline communities. High road jobs are safe, family-sustaining,



careers that lead to high-wage employment. They broaden opportunities for workers from disadvantaged communities and include support systems for workers in vulnerable industries.

Many ZEV-related jobs have relatively few barriers to entry. For example, installation and maintenance of EV charging infrastructure is difficult to outsource and can generally be accomplished by workers with trade certifications rather than college degrees. Much of the ZEV-related work leverages skills of existing trades. However, today, many of the positions available for these trades are “low-road:” jobs subject to the lowest-bid model, offering low compensation, few benefits and high turnover. These jobs and support for employers must be a major focus areas of the City’s Just Transition efforts.

Strategies to support a high road workforce must be data-driven, culturally appropriate, and account for both the immediate and long-term needs of impacted populations. The City, employers, training partners, labor leaders, and others must work together to ensure growth not just in new positions, but in stable career pathways that equitably benefit the local workforce. Existing resources and programs can be harnessed and updated to explicitly incorporate electrification.

ZEV-Related Job Classes and Business Opportunities

The US Bureau of Labor Statistics (BLS) identifies the following key job classes as significant areas of growth or transformation in the shift to ZEVs: research and development, manufacturing, maintenance, infrastructure development, and sales^{xviii}. Each of these major classes includes numerous sectors that entail differing levels of required education, training, and/or certification.

- Research and development for ZEV technologies and batteries (engineers, chemists, software developers, commercial and industrial designers)
- Software development
- Vehicle manufacturing
- Infrastructure manufacturing (EV charging and hydrogen fueling)
- Installation, maintenance, and repair of infrastructure (public, dedicated commercial, residential)
- Vehicle sales (including new and used ZEVs, private and medium/heavy-duty vehicles)
- Body shops, car repair and maintenance
- Fleet maintenance
- ZEV Drivers (trucking, buses, transportation network companies)
- Charging station attendants*
- Electric grid infrastructure design, construction, and maintenance
- Manufacturing, sales, program design and implementation, and maintenance of electric micro-mobility platforms (e-bikes and e-scooters)

*Today, gas station owners and attendants, serving vehicles with internal combustion engines, are often People of Color (POC) and non-English speakers. While public EV charging stations are not yet a significant source of employment, their importance is likely to increase as public EV charging becomes more plentiful and large scale charging for electric trucks and buses is deployed.



SUPPLY AND DEMAND

The high road framework combines supply- and demand-side solutions to link workforce readiness with businesses development and product/service demand to expand the broader market. Training alone does not create jobs or ensure job placement. The High Road framework incorporates a nuanced understanding of the whole market ecosystem.

Supply-side strategies prepare the workforce for changes in the market. This is the traditional workforce development model, generally focusing on vocational training and education, and often publicly funded. **Apprenticeship programs** are a proven pathway to long-term, High Road trade careers when positions are available. However, many candidates face barriers related to education level and discrimination. **Pre-apprenticeship programs** can fill the gap: many focus on workers with systemic barriers (e.g., women or formerly incarcerated individuals), provide training in “soft skills” as well as the baseline education needed to pass apprenticeship entrance exams, and offer ongoing mentorship. An increasing number of employers offer **on-the-job training**, which can be paired with classroom instruction. This enables employer-led instruction in specific skills and technologies and facilitates mentorship among employees. Where possible, it is important to leverage existing training programs with career connections rather than launching unique programs that lack these same relationships.

Demand-side strategies focus on the businesses to ensure robust career pathways for newly trained workers. Investments in consumer education and ZEV incentives,

as well as in businesses themselves, signal to employers that re-training and investing in workers is worthwhile. Strengthening local supply chains and ensuring the availability of appropriate commercial property types helps to ensure a sufficient business environment to accommodate new workers.

A high road strategy is therefore two-pronged: It first aims to identify, launch, or invest in the businesses needed for the ZEV transition; and it aims to identify and invest in areas where local education and training aren’t available, career ladders are absent, and job classes are chronically underpaid or unbenefited. This effort must be undertaken in partnership with businesses and labor leaders.

CENTERING EQUITY

Economic inequality in Oakland falls along racial lines. White Oaklanders are 2.7 times more likely to own a business than African American Oaklanders. Unemployment is unevenly distributed, with 4.2% of Whites and 4.5% of Latinos being unemployed, compared to 8.9% of African Americans. Another stark racial difference is in what the City’s Department of Race and Equity terms “disconnected youth:” youth ages 16-24 who are neither in school nor employed. While 5.3% of Asian American youth and 8.8% of White youth are disconnected, the figures are 13.2% for Latinos and 14.8% for African Americans.^{xx}

The City of Oakland has committed to pursuing a Just Transition that ensures a skilled, stable, and compensated local workforce; a path that steers economic development benefits toward the frontline communities that have traditionally been left behind.

On-the-Job Training from Local ZEV Employers

Alameda-Contra Costa County Transportation District (AC Transit) and Fremont-based Tesla provide local examples of in-house apprenticeship programs supporting the ZEV transition:

To support an equitable zero-emission bus transition, AC Transit created a workforce development program that includes training on topics ranging from basic safety to high-pressure gaseous fuel systems.

Tesla’s START program trains individuals for careers in EV manufacturing and related fields. Their “Pathway to START” program is an intensive 8-week training, including fundamental mechanical and electrical skills and hands-on training, which prepares individuals from under-represented groups to enter the START program.



The transportation and automotive industries include a range of jobs with lower barriers to entry, and jobs that do not require advanced degrees. These jobs often fall to members of underrepresented groups, but they also tend to be lower-pay, part-time, lacking in full benefits, or lacking in strong career ladders – reinforcing systems of inequity and economic insecurity. As Oakland envisions a decarbonized transportation sector, it can rewrite the narrative.

Assessing the current ecosystem of employers, education and training programs, and local vehicle and infrastructure projections will provide a clearer picture of where the City and its partners can direct efforts to reverse inequities. Just Transition efforts must prioritize those with pre-existing or historical barriers to employment. That is not an easy lift for an industry that has, to date, been rooted in largely white startup culture, and whose products have generally commanded an upfront price premium. In the same way that a demand-side equity strategy should focus incentives on those who will benefit most from the product or service, supply-side strategies like pre-apprenticeship programs must prioritize African Americans, dislocated youth, formerly homeless or incarcerated individuals, and others with the greatest employment barriers and the highest economic insecurity.

Similarly, to stimulate entrepreneurship and economic development that benefits frontline communities first and foremost, strategies must address where public contracts for ZEV infrastructure are being awarded. For example, contracts for major projects can incorporate high road job standards. The City can also work to ensure connections among local employers, training programs, and ZEV infrastructure planning, to ensure that newly created jobs go to Oaklanders and the overall economic benefits of successive investments stay within the city.

Finally, as we anticipate the later stages of the ZEV transition, we must plan to avoid traditional pitfalls of “low-road” jobs. Automation is advancing rapidly, which can disproportionately harm frontline communities and lower-skilled workers if proper supports are not put in place. Similarly, early work in building out a new EV charging network could lead to dead-end jobs when major infrastructure projects are complete. Employers and workforce leaders must partner to ensure that workers in these fields have ample high road transition opportunities in infrastructure maintenance, retraining programs, and other areas.

“East Oakland residents face many mobility challenges, and according to our outreach the top two challenges are the cost of gas and heavy traffic. That tells us that these drivers are driving gas powered vehicles and are often stuck in traffic, likely emitting lots of GHG in communities that are disproportionately burdened by air pollutants.

East Oakland residents also walk a lot in the neighborhoods, thus increasing their exposure to air pollution. We need to decrease our GHG emissions to offset climate change but addressing the health impacts of polluting vehicles is urgent for our community as well.”

-Danielle Dynes, Neighborhood and Transportation Planner, East Oakland Collective



By EOC



MEASURING SUCCESS

KEY PERFORMANCE INDICATORS

- Increase in pre-apprenticeship pathways and other official training mechanisms focused on sustainable mobility and decarbonization
- Development of Decarbonization Sector definition
- Number, job status, and occupation of trainees/participants completing training, and total hours of training provided for each trainee/participant.
- Number of new partnerships with local and regional workforce entities and economic/business development entities.
- Number of new full- and part-time jobs created and retained.
- Increase in investment capital for sustainable transportation
- Number of Oaklanders employed in ZEV-related jobs
- Number of decarbonization-related career events
- Increase in number of Oakland-based ZEV and sustainable mobility businesses



By City of Oakland



ADVOCATE

- ...for state and Federal workforce development funds to be earmarked for training and career development support related to the ZEV transition. This can build on previous experience with transportation electrification programs at the California Workforce Development Board.
- ...for regional agencies, such as AC Transit and the Strategic Growth Council, to site regional training centers in or near Oakland, and to leverage Oakland-based workforce development partners, such as Laney College or the Cypress Mandela Training Center, as host or satellite locations.
- ...for union training and pre-apprenticeship training centers to be sited within Oakland frontline communities

By Alex Gutiérrez





The ZEV Economy Actions

ZE-1

*Fund And Conduct A Local
Economic Assessment For ZEV Transition*

ZE-2

*Hold An Annual "Clean, Green, And Just
Business And Employment Expo."*

ZE-3

*Partner With Local Community Colleges
And Workforce Training Partners To
Create ZEV-Specific Training Programs
And Pathways*

ZE-4

*Work Across City Departments To
Incorporate The ZEV Ecosystem
Into Relevant Plans*

ZE-5

*Establish High-Road Labor Standards
And Goals For All City Of Oakland
Municipal Decarbonization Projects*

ZE-6

*Build Partnerships With Local Labor
Leaders To Ensure Critical Needs Are
Being Addressed*

By Edna Aguilar



**ZE-1****Fund And Conduct A Local Economic Assessment For The ZEV Transition****Cost: \$\$****Lead Agency: EWDD**

By 2024, conduct a comprehensive regional study of business and workforce development opportunities for a 100% zero-emission transportation system. This shall include current and near-term opportunities in the local sustainable transportation field. Data will include, at minimum:

- Number of jobs in Oakland currently invested in automotive-related work, categorized as specifically fossil-fuel based (e.g., oil changing, gas and smog stations), flexible (e.g., vehicle sales, tire maintenance), and specific to the ZEV market (e.g., electricians specializing in EV chargers)
- Active local businesses in Oakland & the Oakland metropolitan area, including proportion of owned by people of color, related to sustainable mobility
- Based on projected growth of the ZEV market, investment, product and supply chain opportunities, job types, and rates of expected industry growth
- Availability and quality of appropriate properties for potential for ZEV-related businesses to locate in Oakland
- Portion of the ZEV workforce that will be short term (e.g., building out core public charging infrastructure) versus long term (e.g., infrastructure maintenance, vehicle maintenance, car sales, used EV market, innovative battery programs)
- Proportion of the eventual ZEV and sustainable mobility workforce that can gain appropriate skills through retraining, versus that which will be dependent on new skills
- Anticipated rate of retirement in current fossil fuel-based transportation workforce

Going Deeper

A viable equity strategy must be rooted in data. If the City's workforce and economic development efforts are to be effective in undoing racial and economic disparities, it must understand the dynamics of the current workforce and business ecosystem, specific needs of the first stages of the transition, and anticipated dynamics of a fully zero emission transportation economy. This will enable the City and its partners to develop a robust strategy that will serve the needs of those at risk of losing livelihoods in the transition, those traditionally dislocated from the workforce, and those who have historically experienced structural barriers to wealth-building. Data sources will include the City's own business license data, as well as proprietary employment data licensed from California's Employment Development Department and others.

ZE-2**Hold An Annual "Clean, Green, And Just Business And Employment Expo"****Cost: \$****Lead Agency: EWDD**

By 2023, work with partners to launch an annual Expo highlighting business, career, and training opportunities in ZEV technologies and services as well as other fields related to equitable decarbonization, carbon sequestration, and climate adaptation.



Going Deeper

From Spring 2021 through early 2022, the City's Sustainability Program, Economic and Workforce Development Department, and OakDOT, along with partners Rising Sun Center for Opportunity and the Greenlining Institute, convened a Decarbonization Workforce Stakeholder Series focused on the workforce and economic development needs of the electrification transition. A common request was for events convening residents and businesses across the range of sectors related to transportation and building decarbonization, so that job entrants and those seeking retraining, or a career shift could better understand their options and where the economy is heading.

Planning and hosting business and jobs fairs involve numerous stakeholders. Training providers like the Cypress Mandela Training Center, Youth Employment Partnership, local community colleges, and others can recruit trainees, link their own students to businesses, and strengthen connections that will build strong pathways from training to high-road jobs. Likewise, participation from the greatest possible range of employers will provide a clear outlook of how industries are evolving in response to the climate crisis, and how they are addressing decarbonization and climate adaptation in their labor practices.

ZE-3

Partner With Local Community Colleges And Workforce Training Partners To Create ZEV-Specific Training Programs And Pathways

Cost: \$

Lead Agency: EWDD

By 2023, work with partners to launch an annual Expo highlighting business, career, and training opportunities in ZEV technologies and services as well as other fields related to equitable decarbonization, carbon sequestration, and climate adaptation.

Going Deeper

As the City's 2021 Decarbonization Workforce Stakeholder Series made clear, many of the components of a robust workforce development network supporting Oakland's Just Transition are already in place. The City can support this ecosystem by providing clear guidance about the types of positions needed and the ultimate goals of equitable decarbonization. The City must also nurture partnerships that will underpin reliable career pathways.

The City should learn from community college programs elsewhere that are creating pathways to a carbon-neutral workforce and support pre-apprenticeship programs that build necessary foundational knowledge. Best practices are available here in Oakland. Local programs such as Rising Sun Center for Opportunity and GRID Alternatives are built on the notion that climate-positive industries, such as solar and energy retrofits, can be critical paths to high-road employment. The City can explore ways of using its own buying power, pilot projects, and major infrastructure projects as hands-on learning experiences for local students. This will help students and training centers alike to best understand where the industry is going and what specific skills are needed.

Finally, the City must work with its training partners, as well as with the private sector, to ensure that workers formerly employed in local fossil-fuel related jobs (such as maintaining internal combustion engines) can be retrained and receive the financial support they need to shift careers if necessary.

**ZE-4****Work Across City Departments To Incorporate The ZEV Ecosystem Into Relevant Plans****Cost: \$****Agency: EWDD**

Align City support of local workforce and business development programs with the goals and targets in this Plan and the 2030 ECAP. Ensure the City's Economic Development strategy addresses both the near-term changes and long-term needs of decarbonization.

Going Deeper

Transitioning to a low-carbon economy requires an all-in community approach. Plans must incorporate supply and demand-side strategies to ensure a sustainable transition beyond initial subsidies. Likewise, all members of the Oakland community must be able to access the benefits of decarbonization. Business development and retention within frontline communities must be a centerpiece of the transition.

Equity-driven investments in both entrepreneurship and product demand within frontline communities are catalysts for sustainable workforce development. If this work is successful, new businesses will arise in Oakland, and businesses from outside our borders will relocate or expand into our city. As the transition to carbon neutrality unfolds, the City must ensure that business opportunities are captured within Oakland, and that new businesses have the resources and encouragement they need to become high-road employers.

With new businesses come new employment opportunities. Software skills will be as important as physical work in a decarbonized economy. As the City updates its economic development strategy and evaluates its support of workforce training programs, it should assess the emerging software-related skills and businesses that will be foundational for the ZEV and building science industries. This will help ensure that new opportunities flow to Oaklanders, and that companies and their employees have the versatility to transition from initial infrastructure projects to other jobs with high-road growth potential. Keeping jobs in Oakland means stemming displacement – an important climate justice goal.

ZE-5**Establish High-Road Labor Standards And Goals For All City Of Oakland Municipal Decarbonization Projects****Cost: \$****Lead Agency: EWDD**

The City will explore ways of strengthening local hiring standards and incentivizing successful applications for City contracts from firms led by frontline community members. New or strengthened standards will be applied first to projects supporting building and transportation decarbonization.



Going Deeper

Over the next two decades, the City will lead numerous projects to facilitate decarbonization of its own buildings and vehicle fleet, as well as major infrastructure projects that will support electrification. From installing EV chargers in the public right-of-way to retrofitting libraries and community centers to be Resilience Hubs, the City will hire contractors and generate work specifications. This is a tremendous opportunity to support emerging local businesses with unique solutions for decarbonization in their communities, and to jumpstart demand for newly trained workers in zero-emission transportation.

The City of Oakland already has some of the most progressive local hire requirements in the country. Under the Local and Small Local Businesses Enterprise Program (L/SLBE), 50% of all City contracting must be awarded to local businesses. Additional procurement rules require living wages and favor bidders that hire Oakland residents. These requirements ensure that as the City leads on transportation decarbonization through its own operations, Oaklanders will benefit doubly.

ZE-6

Build Partnerships With Local Labor Leaders To Ensure Critical Needs Are Being Addressed

Cost: \$

Lead Agency: EWDD

Working with unions, labor leaders, and training partners, identify ways to best serve the communities that need resources the most. Workforce efforts must prioritize historically disadvantaged, impacted, and underinvested communities.

Going Deeper

The City cannot address the full spectrum of workforce needs of a Just Transition on its own. Community and stakeholder engagement has been central to the creation of this Plan, as it was to the development of the 2030 ECAP. That communication and coordination must continue so that the City continues to understand critical workforce needs and challenges and is aware of new resources and opportunities. This aligns with a key recommendation from the 2021 Decarbonization Workforce Stakeholder Series: to “Center workers in policy implementation by nurturing relationships with local unions.”

An exemplary workforce barrier is the lack of union training centers in urban areas, which limits membership opportunities for Oaklanders – especially for those who face transportation barriers

8 Funding & Implementation

By City of Oakland



Funding

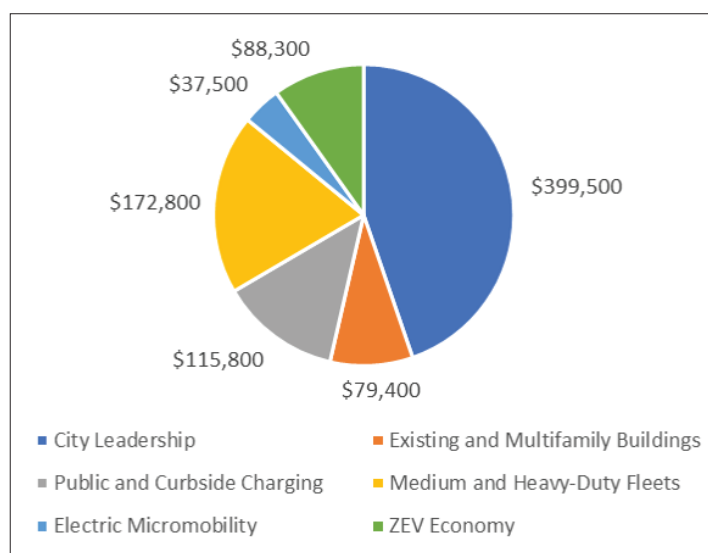
Funding to implement the Actions in this Plan will come from a range of sources, including public and private investment, fees and tax revenue, grants, and more. Since this Plan focuses on process efficiency and equity, it does not contain specific investment targets that can be quantified to produce an overall cost. This section therefore discusses the potential range of public and private investment that will be needed to reach the Plan's targets; appropriate funding sources for different categories of activities; and how the City might bundle strategies to be more effective in securing funding.

Implementing the Actions in the Zero Emission Vehicle Action Plan is estimated to require about \$900,000 annually in staff costs, including one new full-time Transportation Planner in the Department of Transportation (Action CL-1). Additional staff costs were estimated based on anticipated hours per week across implementing departments inclusive of benefits and overhead. An additional 5% was also added to staff salaries for cost-of-living adjustments. A breakdown of estimated staff costs by Chapter is shown in Figure 8-1. Staff costs are expected to be funded through existing fees and the General Purpose Funds, as allocated by Oakland City Council. Detailed funding proposals for the Actions in this Plan will be developed by City staff and be included the City-wide budget processes beginning with the Fiscal Years 2023-2025 Budget.

Public funding, in the form of grants and rebates, is available

for both ZEVs and charging/fueling infrastructure. At the state level, the California Air Resources Board (CARB) oversees ZEV funding opportunities while the California Energy Commission (CEC) is responsible for charging/fueling infrastructure. Grants are typically provided without any repayment conditions, although recipients may need to provide matching funds and/or staff time to administer the funds. Bonds are another form of public financing, where local governments raise capital from private

Figure 8-1: Estimated Annual Staff Costs for Implementing the ZEV Action Plan



"For environmental protection, electric cars should be the inevitable trend in the future! It can be done if the price is not too expensive and if charging is more convenient. The presentation on Zero Emission Vehicle project increased in interest in electric vehicles."

-Han You Huang, Oakland Resident

and institutional investors and repay the investment over time with interest. Bonds are often introduced along with an accompanying funding measure like a parcel tax, which typically allows bonds to be repaid at lower interest rates. General obligation bonds are backed by the overall general revenue of a municipality and must be voter-approved. Conversely, revenue bonds are tied to a specific revenue source such as fees or tariffs, and can be issued without voter approval. Taxes are a common source of funds for public programs, but these also must be approved by voters, and the public appetite for additional taxes is likely low as the COVID recovery continues. While taxes can be considered “revenue-neutral” if payments are invested directly back into the community, they should be structured progressively to avoid unduly burdening frontline communities, and include strong guardrails to ensure they are equitably invested. Fees are often used to fund activities closely tied to the activity that generated them. For example, a fee for a building permit helps pay the cost of the City staff time to review drawings to ensure compliance with building code.

ANTICIPATED FUNDING SOURCES

Grants

Oakland is well positioned to win competitive grants due to a strong track record of climate action, as well as relatively high levels of economic disadvantage. Some grant programs, such as the Carl Moyer Program managed by the Bay Area Air Quality Management District (BAAQMD), offer funding that prioritizes low-income and disadvantaged communities. Other equity-centered approaches in public financing include the California Climate Investment’s minimum of 35% of funding to benefit priority populations and the Biden-Harris Administration’s Justice 40 Initiative. As implementation moves forward and funding becomes available, the City is committed to working with Oakland residents and community groups to advance an equitable transition to zero-emission transportation.

Grants are available at the regional, state, and national level, totaling over 12 billion dollars. Since 2009, the City of Oakland and its partners have received over \$24 million from the California Energy Commission’s (CEC) Clean Transportation Program to support ZEV infrastructure and planning. Table 8-1 shows CEC funding by fiscal year. Of

the project types that CEC funds, Medium and Heavy-Duty ZEV Infrastructure and Manufacturing have received the bulk of funding at 36% and 30% of total received funds. EV charging infrastructure to date has only received 2% of funding from the CEC Clean Transportation Program – though this is likely to increase over time.

Much more aggressive funding will be needed to align with Oakland’s share of state targets for 8 million ZEVs in 2030 and carbon neutrality in 2045. For public chargers in Oakland, City staff estimate that \$200 million will be needed for L2 and DCFC installations by 2030 and an additional \$730 million by 2045. Public charger cost estimates reflect 2022 construction costs of \$20,000 - \$80,000 per L2 charger depending on site conditions, and \$120,000 per port for DC fast chargers. However, as technologies evolve and the electrical infrastructure expands and improves, installation costs of chargers can decrease over time and with scale.



By Edna Aguilar

Table 8-1 - California Energy Commission Funding for ZEVs in Oakland (2009-2020)

Fiscal Years						
2009	2010	2012	2013	2014	2017	2020
\$13,431,896	\$198,456	\$63,664	\$5,993	\$12,475	\$35,060	\$167,618
Grant Total	\$24,418,378					

Other major state funding sources include:

- California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP): HVIP was launched in 2009 by CARB and is administered by CALSTART. The goal of HVIP is to make clean vehicles more affordable by reducing purchasing cost. Vouchers are worth \$20,000 to \$240,000 depending on the cost of the vehicle.
- California Electric Vehicle Infrastructure Project (CALEVIP): Addresses regional needs for charging throughout California. Partially funding through the CEC, CALeVIP provides incentives for charging infrastructure and works with local partners to create and implement projects that will meet future regional needs for Level 2 and DC Fast charging.
- Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program): This program provides funding for cleaner-than-required engines. Locally, it is administered by the Bay Area Air Quality Management District (BAAQMD). Funding is available for vehicle and equipment replacement, engine replacement, power system conversion, and battery charging and fueling infrastructure.
- Low Carbon Fuel Standard (LCFS): The LCFS program launched in 2011 and is designed to incentivize the production and use of low-carbon fuels. Participants in the LCFS credit market can buy and sell credits for GHG emission reductions from fleet conversion, often recouping costs from initial capital investments or offsetting the costs of later acquisitions. Navigating the credit market requires time and expertise, and benefits are more impactful for participants with larger fleets.
- Low Carbon Transportation Investments and Air Quality Improvement Program: This program provides incentives to deploy advanced technologies for MHD vehicles. This program is supported by the California Climate Investments program.
- Truck Loan Assistance Program: Started in 2009, this program helps small fleet owners who may not qualify for conventional loans to upgrade their fleets. Borrowers must have under 100 employees, make less than \$10 million in annual revenue, and own 10 or fewer heavy-duty trucks.
- Volkswagen Environmental Mitigation Trust: The Trust provides funding for the replacement or repowering of older, heavy-duty vehicle engines and equipment with clean or zero-emission technologies. \$290 million was allocated for zero-emission transit, school, and shuttle buses; Class 8 freight and port drayage trucks; and freight and marine projects. Funding for zero-emission school buses has already been oversubscribed, along with the first \$27 million of \$90 million allocated for zero-emission Class 8 freight and port drayage trucks.

Both federal and California state agencies are expected to continue to invest billions of dollars towards increasing ZEV adoption and infrastructure deployment. With the passage of the Infrastructure and Investment Act in 2021, the new National Electric Vehicle Infrastructure Formula Program will dedicate \$5 billion dollars through 2026 to create a network of EV charging stations across the country, with \$614 million available in 2022. Table 5 summarizes the recent and expected public funding available in the next 2 years. Given the large sums of



infrastructure investment from state and federal agencies through 2026, City staff expect the majority of City-owned and operated public chargers to be funded through grants in the short term, while also tapping into other funding like the Low Carbon Fuel Standards credits. Bonds, fees, and taxes are less likely to be pursued for public chargers given current COVID recovery efforts and existing financial pressures on frontline communities.

General Purpose Fund

Oakland’s General Purpose Fund is the primary source of funding for City operations, and can be used for any public purpose. It is allocated as part of the overall City budget, approved by City Council every two years. General purpose funds are more flexible than other sources in how it can be used, since it is allocated at the discretion of City Council. However, the total amount of funding is limited, highly variable from year to year, and often already allocated to existing programs. The large number of competing priorities for these funds requires that the City seek out other sources of funding wherever possible to increase the likelihood of successful implementation for each action. These monies may be used for staffing, physical infrastructure, or other implementation costs.

Because of its limitations, the General Purpose Fund is anticipated to cover a minority of Actions in this Plan. However, it could be the principal source of funding for the full-time staff position in the City’s Department of Transportation (Action CL-1), tasked with tracking overall Plan implementation, pursuing additional funding sources for implementation, and overseeing a range of implementation projects.

External Sources

Implementing this plan will require significant investment across numerous sectors and from numerous sources, including private investors, individuals, other public agencies, and more. For example, East Bay Community Energy (EBCE), Oakland’s public electricity provider, has already made significant investments in EV charging infrastructure across their territory, including in Oakland. Funded in accordance with their Local Development Business Plan, these investments support EBCE’s goals of facilitating a clean electricity grid and local green job development. AC Transit has made similar investments, as

detailed in the Medium and Heavy-Duty Vehicles chapter.

Table 8-2 - Summary of EV Public Funding Sources (2021-2022)

Funding Source	Funding Type	Amount Available
State and Local	Infrastructure	\$2,772,000,000
	Planning	\$29,500,000
	Vehicles	\$457,200,000
National	Infrastructure	\$615,000,000

Other forms of private financing can come from philanthropic grants as well as public-private partnerships. Public private partnerships can be especially promising to drive innovation and scale up deployment of ZEVs and ZEV infrastructure by leveraging local government power to enhance private sector expertise. Moreover, public private partnerships can be constructed with a community benefits agreement such that positive outcomes are equitably distributed between the community and private sector actors.

The City has an opportunity to partner with EBCE to develop a network of publicly-available EV Fast Charge Hubs at municipally-owned parking lots and garages. EBCE will own and operate the EV Fast Charge Hubs, located in areas with a dense concentration of multifamily housing to serve renters and others in EBCE’s service area who lack access to home charging. These Fast Charging Hubs will require significant project capital, and EBCE has already funded the first of these projects by leveraging external grants (see p. 42). While grant funding can be beneficial, it is competitive and not guaranteed. To scale this critical infrastructure throughout its service area, EBCE will raise the necessary capital through agreements with financing partners. Based on 2022 discussions with EBCE on their EV strategy, City staff estimate that EBCE

will provide 95% of Oakland’s public DC fast chargers, targeting population centers and destination charging locations. The remainder of DC fast chargers and most L2 chargers are expected to be covered by the City, largely for chargers in frontline communities and other areas deemed “commercially unviable” but essential to meet community needs. The actual share of public chargers covered by EBCE and the City may shift over time as a better understanding of EV driver needs emerge after the COVID-19 pandemic.

Bonds

While grants are projected to cover a majority of short-term infrastructure investments, bonds are likely to be an important financing mechanism for longer-term funding. Bonds must be repaid over time with interest, so the total cost of bond financing is higher than the actual funding the City would receive. Approved bonds for capital investments, whether general obligation or revenue, are primarily allocated through the City’s Capital Improvements Program (CIP). Alignment with the CIP team and the ZEV Action Plan will be critical to ensure current and future bond funding for ZEV infrastructure is invested efficiently and equitably, and support the City’s sustainable mobility goals. Implementing bond funding via the CIP ensures that projects are integrated with other capital improvements, such as streetscape and paving upgrades, urban forestry, and resilient City facilities. Oakland’s CIP review process includes criteria from the ECAP and the ECAP’s Racial

Equity Impact Assessment, ensuring that this process would help realize the maximum climate and resilience benefits of any expenditures.

Fees

Fees, including fines, are likely to cover a discrete set of activities in this Plan where a direct linkage exists to the activity being funded. For example, the City may institute fines for parking in a stall marked “EV Only” while not actively charging, which could then be reinvested in installing or maintaining more public EV chargers.

Loans

Private financing, through loans and business contracts, can also unlock millions of dollars for capital investments. Unlike grants and rebates, loans and business agreements provide upfront funding with the promise of a future income stream. For loans, this revenue comes from interest payments over time. Some examples of private financing include:

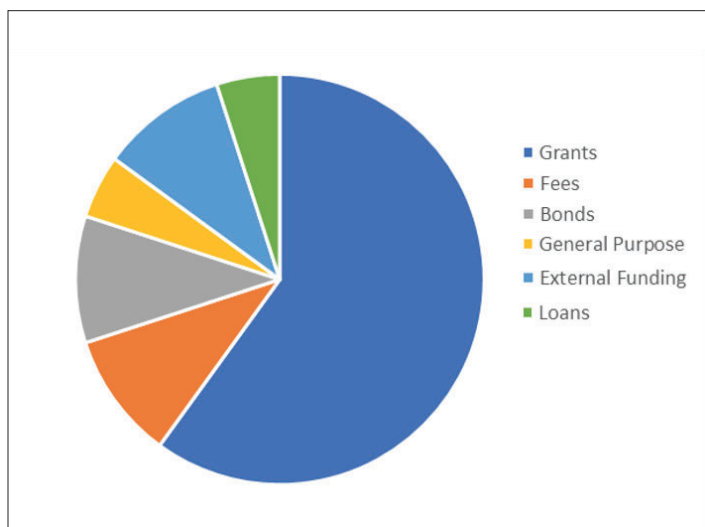
- Traditional Loan model: The City issues a bond for EV charging infrastructure which private investors purchase and receive interest and repayment over time.
- Fee-for-Service model: EV chargers can be designed and installed by a company, which can then recuperate costs from users for charging their vehicles.
- Leasing model: A company can lease or rent electric vehicles.



TOTAL ALLOCATION

Based on the 2022 landscape of financing mechanisms, City staff estimate that a majority of the Actions in this Plan will be funded through grants, given historic levels of investment from state and federal agencies. Fees, bonds, and external funding will also play a significant role but are expected to be constrained by political and equity considerations. Finally, loans and General Purpose Funds are assumed to play a small role in financing these actions given available debt servicing and budget limitations. Figure 8-2 shows a graphic representation of where funding will come to finance the Zero Emission Vehicle Action plan. Further analyses will be needed to refine this model and secure the necessary resources in a sustainable and equity-centered approach.

Figure 8-2: Modelled Distribution of Funding Mechanisms for the ZEVAP



By Alex Gutiérrez

Implementation

This Plan is intended to enable Oakland to achieve a 100 percent zero-emission transportation system by 2045, with the social, economic, and health benefits of this transition equitably distributed across the community. Milestone years are aggregated in Table 9-2, along with a list of lead and key supporting Departments for each Action in the Plan. Responsibility for the Plan's overall success will be overseen by OakDOT's Mobility Management team and the Sustainability and Resilience Division of the City Administrator's Office. These teams will incorporate ZEV Action progress reports in the biennial ECAP Progress Report using the key performance indicators (KPIs) listed in each chapter's introductions. The City will consider both the process of implementation and the outcomes of each Action when evaluating progress.

City staff will use the most reliable data available to report

on the Plan's implementation. Staff will partner with the Department of Race and Equity and leverage the ECAP's Racial Equity Impact Assessment and Implementation Guide, particularly when assessing actions intended to reduce racial disparities. For considerations of equitable implementation and progress tracking, see Appendix C.



Table 8-3: City Department Abbreviation & Implementation Table Guide

City Department and Abbreviation & Implementation Guide					
Abbr.	Department				
CAO	City Administrator's Office	FIN	Department of Finance	PW	Oakland Public Works
CAO (SRD)	CAO - Sustainability Program	HCD	Housing and Community Development Department	PW-FAC	PW - Facilities
DOT	Oakland Department of Transportation	OFD	Oakland Fire Department	PW-FL	PW - Fleet
DRE	Department of Race and Equity	OWDB	Oakland Workforce Development Board		
EWDD	Economic and Workforce Development Department	PBD	Planning and Building Department		

Table 8-4: ZEV Action Plan Implementation Timeline

Legend													
●	A deadline or deliverable year goal												
Action	Lead Dept.	Other Depts.	2023	2024	2025	2026	2027	2030	2035	2040	2050		
City Leadership (CL)													
CL - 1 Fund Dedicated staff Resources for Zero Emission Vehicle Infrastructure Implementation	DOT	CAO, PW	●										
CL - 2 Conduct a Comprehensive Audit of City Property for Potential ZEV Infrastructure Implementation	DOT	PW, CAO	●										
CL - 3 Develop a Smart and Equitable Mobility Hubs Program	DOT	PW		●				●					
CL - 4 Collaborate with Partners to Expand the Network of Public EV Chargers	DOT	PW											
CL - 5 Expand affordable neighborhood ZEV car sharing programs	DOT				●								
CL - 6 Support ZEV Education and Awareness in Underserved Communities	DOT	CAO (SRD)	●										
CL - 7 Ensure Fire Safety in the ZEV Infrastructure Rollout	DOT	OFD	●										
CL - 8 Accelerate City Fleet Vehicle Replacement	PW - Fleet	DOT			●			●					
CL - 9 Add EV Charging Installation and Related Electrical Work to the Contractor On-call List	CAO	FIN, DOT											
CL - 10 Incentivize Use of ZEVs at City-owned Parking Lots and Garages	DOT	PW-FAC	●										
CL - 11 Establish an Inter-Departmental Working Group to Review, Assess, and Streamline Strategic Sustainable Mobility Projects	DOT, CAO (SRD)	EWDD, PBD, DRE	●										
Existing & Multifamily Buildings (EMB)													
EMB -1 Develop an “EV-ready” Ordinance for Major Retrofits and Property Transfers	CAO (SRD)	PBD		●									
EMB - 2 Conduct Outreach to Tenants and Property Owner/Managers	CAO (SRD)	HCD			●								
EMB - 3 Working With Partners, Establish A Program To Facilitate Collection Of Information About Electric Infrastructure And Peak Demand For Multifamily Buildings	CAO (SRD)												
EMB - 4 Include Strategies to Encourage Installation of EVSE in Existing Buildings in the Existing Building Electrification Roadmap	CAO (SRD)	PBD	●										
EMB - 5 Analyze the Potential for Reducing Localized Air Pollution through Targeted EV Charging Investments	CAO (SRD)	CRO											
Public & Curbside Charging (PC)													
PC - 1 Amend the Oakland Municipal Code (OMC) to Facilitate and Regulate Equitable EV Charging in the Public Right-of-Way	DOT		●										
PC - 2 Create a Residential Curbside EV Charging Strategy and Ordinance by 2023	DOT		●										



Table 8-4: ZEV Action Plan Implementation Timeline (Cont.)

Action	Lead Dept.	Other Depts.	2023	2024	2025	2026	2027	2030	2035	2040	2050
PC - 3 Develop and Implement a Program to Deploy EV Charging Infrastructure in Frontline Communities	DOT	DRE	●								
PC - 4 Study the Feasibility of Subsidizing Public Charging for Low-income Users	DOT	DRE, CAO (SRD)									
PC - 5 Pursue EV Charging Requirement for Fuel Service Stations	DOT	PBD, CAO (SRD)									
Medium & Heavy Duty Fleets (MHD)											
MHD - 1 Develop a Zero-Emission MHD Charging Overlay Zone in the City's Zoning Ordinance	PBD										
MHD - 2 Require Upgrades to MHD Vehicle Fleet Sites	PBD	DOT, EWDD			●						
MHD - 3 Establish an Inter-Agency Working Group and Partnership Agreement to Facilitate Site Identification and Streamlined Construction	DOT, CAO (SRD)	PBD	●								
MHD - 4 Develop a Zero-Emission Delivery Zone Pilot Program	DOT	EWDD			●						
MHD - 5 Study the Potential for Autonomous Delivery Vehicles	DOT	EWDD									
MHD - 6 Support Enhanced Action on Zero Emission MHD Infrastructure in the East Oakland Community Action Plan	DOT	PBD									
Electric Micromobility (MM)											
MM - 1 Create and Expand an E-bike Lending Library	DOT		●								
MM - 2 Connect Residents with Subsidies and Incentives to Residents for Purchasing E-micromobility	DOT		●								
MM - 3 Pursue Resources to Assist Local Businesses to Purchase Cargo E-bikes	DOT	EWDD	●								
MM - 4 Assess Continuation And Expansion Of City's Universal Basic Mobility Program Pilot	DOT		●								
MM - 5 Incentivize Promotion of Adaptive E-micromobility Devices for Persons with Disabilities	DOT		●								
MM - 6 Expand Public Secure Parking and Bikeways for Bikes and Scooters	DOT				●						
MM - 7 Include E-micromobility in Next Bike Plan	DOT		●								
ZEV Economy (ZE)											
ZE - 1 Fund and Conduct a Local Economic Assessment for the ZEV Transition	EWDD	CAO (SRD)	●								
ZE - 2 Hold an Annual "Clean, Green, and Just Business and Employment Expo"	EWDD	CAO (SRD)	●	●	●	●	●	●			
ZE - 3 Partner with Local Community Colleges and Workforce Training Partners to Create ZEV-specific Training Programs and Pathways	EWDD	DOT									
ZE - 4 Work across City Departments to Incorporate the ZEV Ecosystem into Relevant Plans	EWDD	DOT, CAO (SRD)									
ZE - 5 Establish High-Road Labor Standards and Goals for all City of Oakland Municipal Decarbonization Projects	EWDD, OWDB	DOT, CAO (SRD)									
ZE - 6 Build Partnerships with Local Labor Leaders to Ensure Critical Needs are Being Addressed	EWDD	DOT, CAO (SRD)									

Appendix A: Community Outreach and Engagement

More in-depth reports on Community Outreach can be found on the ZEV Action Plan project website:
<https://www.oaklandca.gov/projects/zero-emission-vehicle-action-plan>

WORKSHOPS LED BY COMMUNITY PARTNERS

In partnership with the City of Oakland's Department of Transportation (OakDOT), TransForm enlisted the expertise of local community-based organizations to lead community workshops in neighborhoods identified by CalEnviroscreen as areas in greatest need of investment in Zero Emission Vehicles (ZEVs) if Oakland is to lead an equitable transition away from carbon-intensive transportation options.

TransForm subcontracted with the [Spanish Speaking Citizens' Foundation \(SSCF\)](#) and the [West Oakland Environmental Indicators Project \(WOEIP\)](#) to encourage grassroots participation and reach the targeted underserved communities. Each group led two workshops in the Summer and Fall of 2021. The first set of workshops provided basic information about ZEVs and identified key barriers community members faced in accessing them. The second set of workshops invited attendees to prioritize key barriers and identify action steps to be included in the ZEV Action Plan.



Spanish Speaking Citizens' Foundation

The East Bay Spanish Speaking Citizens' Foundation (SSCF) is located in the heart of Oakland's Fruitvale district and has been providing services for 55 over years. SSCF offers programs and services in the following three areas: 1) immigration and citizenship assistance, 2) educational and workforce development for youth and adults, and 3) information and referral services. SSCF helps improve the lives of Latino residents in Oakland and embrace their cultural heritage so they can become civic leaders committed to the betterment of their communities. Their vision is to create and maintain a vibrant community where all people live in harmony, can enjoy educational and recreational opportunities, and access high-quality jobs.

West Oakland Environmental Indicators Project

The West Oakland Environmental Indicators Project (WOEIP) is a resident-led, community-based environmental justice organization dedicated to achieving healthy homes, healthy jobs and healthy neighborhoods for all who live, work, learn and play in West Oakland, California. Their mission is to build grassroots capacity to provide local leadership for positive change. Their work aids residents in understanding the political, social, and natural forces that impact their lives. They give impacted residents the tools to participate in these processes and to drive change from the bottom.



WORKSHOP 1: IDENTIFYING BARRIERS AND DEMYSTIFYING ZEV

Workshop 1 introduced the Zero Emission Vehicle (ZEV) Action Plan to the public and informed the community of existing conditions identified to date through maps, images, stories and statistics. Through discussion facilitated by local community leaders, and human-centered design activities, community members identified pain-points and barriers to ZEV adoption in their respective neighborhoods, the Fruitvale and West Oakland.

In conjunction with the survey (Task 2.3) and online engagement (Task 2.1), findings from this workshop act as the initial needs assessment for the ZEV Action Plan. Workshop attendees shared their insight on Oaklanders needs, perceptions, and acceptance rates of ZEVs, their experience driving or riding ZEVs, and perceptions of new, used, and shared vehicle markets for ZEVs in Oakland. In planning for the workshop, Spanish Speaking Citizens Foundation (SSCF) identified two high priority items to consider: the impact of the pandemic and its economic fallout, which is particularly acute in low-income communities. SSCF also indicated workshop content should highlight clean mobility job opportunities to help community members who are interested in the field. Workshop content was adapted to include these topics.

Spanish Speaking Citizens' Foundation Workshop #1

Spanish Speaking Citizens Foundation (SSCF) held its first workshop on Wednesday, July 28, 2021, from 5:00 p.m. to 8:30 p.m. in the parking lot of their community center located at 1470 Fruitvale Avenue. In an effort to adhere to COVID-19 public health guidelines the workshop was conducted outdoors and participants were required to wear masks and have their temperatures taken upon entry. In total, 28 community members, two TransForm staff, three City of Oakland staff and one external partner from DoorDash attended the workshop.

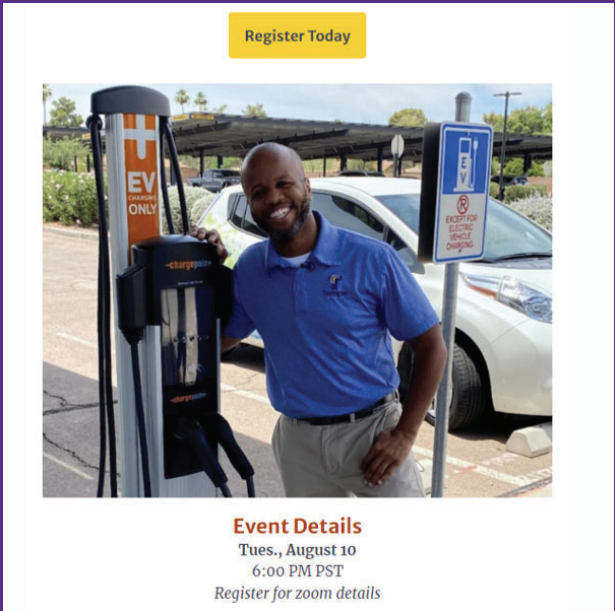
During the first hour of the event, participants ate dinner provided by a local taqueria, Birria Niko's and interacted with each other before the workshop commenced at 6:00 PM. Participants also received a raffle ticket for the opportunity to win prizes at the end of the workshop. The event was facilitated entirely in Spanish by the Executive Director and youth leaders on staff at SSCF. English speakers received interpretation services (i.e., simultaneous interpretation). This approach aimed to ensure the full participation of Spanish-speaking

participants and remove hindrances to the free flow of conversation that often happens when facilitation is in English.

West Oakland Environmental Indicators Project Workshop #1

West Oakland Environmental Indicators Project (WOEIP) facilitated its first workshop virtually on Tuesday, August 10, 2021 from 6:00-7:30 p.m. WOEIP created an [eventbrite registration](#) two weeks before the event and promoted the workshop through their organization's listserv. In total, 46 community members, two City of Oakland staff, one TransForm staff, and five representatives from partner organizations (i.e., CalTrans, BAAQMD, Acterra, East Bay Community Energy) attended the virtual workshop. The workshop was recorded and later uploaded to [YouTube](#).

The workshop opened with staff introductions from WOEIP, City of Oakland, and TransForm. Following introductions WOEIP's Co-Directors, Ms. Margaret Gordan and Brian Beveridge, shared WOEIP's mission, approach to environmental justice, and overview of existing and past projects, including ["Owning Our Air: The West Oakland Community Action Plan."](#)



Register Today

EV CHARGING ONLY

Event Details
Tues., August 10
6:00 PM PST
[Register for zoom details](#)

An invitation for a Zero Emission Vehicle Plan workshop on Eventbrite

WORKSHOP 2: ACTION ITEMS TO ADDRESS BARRIERS TO ZEVS

Workshop #2 presented solutions and actions to address the barriers identified through workshop #1, the ZEV Action Plan survey (Task 2.3) and various stakeholder meetings held by the City of Oakland. Using a deliberative decision-making process led by Spanish Speaking Citizens Foundation (SSCF) and West Oakland Environmental Indicators Project (WOEIP), workshop participants selected and refined priority actions for the city to incorporate into the final ZEV Action Plan. The City of Oakland also provided a map of proposed charging station locations at both workshops for feedback from workshop attendees.

Spanish Speaking Citizens' Foundation Workshop #2

The second Spanish Speaking Citizens Foundation (SSCF) workshop was held on Wednesday, October 6, 2021,

from 4:00 p.m. to 7:00 p.m. in the parking lot of their community center located at 1470 Fruitvale Avenue. The workshop was held outside to allow for COVID-19 safety precautions including social distancing and temperature checks. There were 47 community members and six City of Oakland staff. Additionally, representatives from Charge Across Town, a nonprofit working across the state to get the general public excited about driving and purchasing EVs, hosted educational EV test-drives for workshop attendees.

Workshop #2 with SSCF was conducted and facilitated entirely in Spanish.



By TransForm

COMMUNITY ADVISORS

TransForm and OakDOT coordinated with SSCF, WOEIP, and a host of other community organizations to identify four community advisors. TransForm coordinated with these Community Advisors to refine the scope of the outreach and engagement efforts and identify opportunities to attend or collaborate with existing community events or programs. Several of the recommended events are described in the “In-Person and Virtual Community Events” section below.

Community Advisors also reviewed the ZEV Action Plan survey and gave feedback on length of survey and ways

questions could be reworded for ease of use among their respective community. OakDOT incorporated advisors’ feedback and created a shorter version of the survey for interested residents. In addition to providing feedback on the survey, advisors were pivotal in collecting feedback from residents in their community. Some advisors distributed surveys at schools, through listservs, and at in-person community meetings and events.

All advisors will be compensated (\$200) for their time and expertise. See table below for a list of community advisors.

Table A-1 - ZEV Action Plan Community Advisors

Community Advisor	Community Represented	Highlights
Tanisha Rounds	Lions Creek Crossing (LCC) Residents	<ul style="list-style-type: none"> Survey feedback and distribution at LCC events Helped coordinate LCC events that OakDOT joined to share information on the ZEV Action Plan and possible EV charging infrastructure
Teron McCrew	West Oakland	<ul style="list-style-type: none"> Coordinated WOEIP workshops and ensured participants had access to the ZEV Action Plan resources on the WOEIP website Survey feedback and distribution
Danielle Dynes	East Oakland	<ul style="list-style-type: none"> Survey distribution Helped coordinate OakDOT’s presence at Akoma market located in East Oakland
Rodrigo Garcia	Fruitvale	<ul style="list-style-type: none"> Survey distribution Helped coordinate SSCF workshops
Cindy Lee	Chinatown	<ul style="list-style-type: none"> Survey distribution Discussions with Chinatown residents

ZERO EMISSION VEHICLE BARRIERS REPORT

This report on local barriers to Zero Emission Vehicle (ZEV) adoption in Oakland summarizes feedback received in four community workshops, a citywide survey, and the existing conditions analysis. The four workshops were held in partnership with outreach contractor TransForm, and two local community-based organizations in neighborhoods identified by CalEnviroScreen as areas in greatest need of ZEV investments. TransForm subcontracted with the Spanish Speaking Citizens' Foundation (SSCF) and the West Oakland Environmental Indicators Project (WOEIP) to encourage grassroots participation and reach targeted underserved communities in Fruitvale and West Oakland, respectively. Each group led two workshops in the Summer and Fall of 2021.

Workshop 1 introduced the ZEV Action Plan to the public and informed the community of existing conditions identified to date through maps, images, stories and statistics. Through discussion facilitated by local community leaders, and human-centered design activities, community members identified pain-points and barriers to ZEV adoption in their respective neighborhoods, Fruitvale and West Oakland.

Barriers that Oakland residents face can be broadly organized into the following categories:

- **ZEV Education and Access:** A lack of knowledge about the new technology of zero emission vehicles, the possible jobs available in the ZEV sector, and how to access the incentives that can reduce the costs of buying an electric vehicle or using shared e-mobility services.
- **Infrastructure:** The lack of ZEV infrastructure is a major barrier to using and accessing ZEV modes. Residents worried that without EV chargers in their neighborhood or installed in their apartment buildings, owning an electric vehicle would be incredibly difficult.
- **Larger Zero Emission Vehicles:** Residents identified a lack of diversity of affordable ZEVs. Residents cited a desire to have access to trucks and larger vehicles to accommodate work and large families.
- **Electric Micromobility:** Residents pointed to unsafe or non-existent bike and pedestrian infrastructure as a barrier to use of e-micromobility, as well as the lack of knowledge about low-income programs or adaptive

micromobility options.

Preliminary Survey Results

The following are preliminary survey results to understand barriers that individuals face to using ZEV infrastructure. Staff is still working on getting a representative sample of respondents in frontline communities.

- Survey respondents were more familiar with electric cars than electric bikes or scooters (31% of respondents owned a plug-in electric vehicle, 22% have used an e-bike or e-scooter, 14% own an e-bike or e-scooter)
- About a third agree that investment in electric vehicle chargers could be a sign that a neighborhood could be getting less affordable (9% Strongly Agree, 25% Agree). However, a majority of Hispanic/Latinx (64% Agree) respondents agreed. Worries about gentrification and a changing neighborhood could be a barrier to increased ZEV infrastructure.
- Major reasons for not owning an EV are the expense, range anxiety, lack of home charging
 - Minor reasons included lack of stations and charging taking too long
- Off-street home charging, workplace charging and getting vehicles through other means was not as big as a contributor

Table A-2 identifies the barriers and pain-points for zero emission vehicle access.

Table A-2 - ZEV Access Barriers

Zero Emission Vehicle Access Barriers		
ZEV Education and Access	The high cost of buying a new electric vehicles, no access to credit or a driver's license.	Residents are concerned about the net price of EVs even after incentives and want access to resources that help with credit services. Additionally, particularly in immigrant communities, residents may not have access to a driver's license. Some residents mentioned limited access to credit as a barrier to purchasing vehicles. . One participant shared that "poor people will buy used cars and these cars have higher emissions than new hybrid or zero-emission vehicles. People purchase used cars because it's what they can afford and what's available when they have limited or no access to credit."
	Lack of knowledge about ZEV technology, available incentives	Several residents were pleasantly surprised to learn about available EV incentive programs. For many this was the first they've ever heard of the potential lower cost of EVs through government subsidies. They mentioned the need for more education and outreach in their community. Specifically, "giving out information is one of the most important things we can do to tell people about electric vehicles," especially if the "first [EV] that people think about is a Tesla." For most, the discount on EVs was something they need upfront, and need to experience month over month, versus having the income bandwidth to obtain a rebate after fronting high monthly payments.
	Lack of knowledge about job opportunities in the ZEV industry	Workshop participants and community-based organization partners expressed the desire for workforce development and training opportunities that prepare current and future auto industry employees with the skills needed to adapt and succeed with new ZEV technologies.
	Employment dependence on the gasoline automobile economy	There are worries about what could happen to those that depend on the gasoline-powered automobile economy, such as the informal economy around car repairs. Residents would like to understand how they will transition to a ZEV-dominated future.
Infrastructure	The difficulty of providing EV chargers in apartment buildings	Many residents are acutely aware that those that live in the older apartment buildings that are common in East and West Oakland are at an extreme disadvantage compared to wealthier residents in single-family housing that have their own off-street parking and can easily set up charging on their own. Residents would like to see policies and programs that make it easier to bring charging to those that live in apartment buildings.
	Unreliable or unsafe public transit options	Workshop participants described safety as a concern for not taking public transportation. They would like to have more lighting and "official staff" present on public transportation. One family expressed the desire to shuttle around their children via personal automobile because they worried about their teenage children getting harassed or assaulted on transit. Participants also stressed that public transportation is not always convenient. One participant shared that "they like the new Tempo [bus rapid transit] buses because they come often, but the other lines take forever." Another group pointed out that currently buses have bike racks that only accommodate two bikes, so traveling with bikes on transit is challenging.

APPENDIX A: COMMUNITY OUTREACH & ENGAGEMENT

Table A-2 - ZEV Access Barriers (Cont.)

Zero Emission Vehicle Access Barriers		
Infrastructure	Concerns about environmental impacts of new and old infrastructure	Several residents discussed concerns around the recycling process for EV batteries and the need for a long-term recycling plan to ensure the West Oakland community doesn't suffer from additional environmental harm. One said "in the next 20-30 years gas stations will become less viable" and the ZEV Action Plan should have strategies to address the possibility of West Oakland gas stations turning into brownfields. Residents have expressed safety concerns about different kinds of infrastructure, such as the possible risk of electrical fires.
	Older Infrastructure in Buildings	In frontline communities, many residents live in neighborhoods with either outdated utility infrastructure unable to support electric vehicle charging at a high level or older buildings with outdated electrical infrastructure. Neighborhood utilities will need to be updated or "future-proofed" to be able to handle possible fast chargers, and residents in frontline communities will need resources to update electrical infrastructure in their homes to handle vehicle charging. This will be even more vital in the future as charging technology becomes more demanding and possibly uses more energy to charge quickly.
Larger Zero Emission Vehicles: Trucks, Vans and Delivery	Lack of diversity in affordable EVs available	After learning about the various types of EV chargers and vehicles, participants stressed the need to have access to additional options better suited to their needs. Participants mentioned the need for ZEVs to accommodate different family structures. They mentioned having "larger" and multi-generational families, more people than a 5-passenger vehicle can accommodate. Participants were interested in learning more about the availability of larger EVs.
Electric Micromobility: E-bikes, E-scooters, and E-wheelchairs	Financial or license access to shared mobility programs	The use of shared e-scooter programs usually requires access to a credit card or driver's license which may be difficult for low-income or immigrant residents. E-scooter and bike share companies have programs to help lower the cost of use, but many residents are unaware of these programs.
	Excessive vehicle traffic on the streets and lack of safe bicycle and pedestrian infrastructure discourages biking and transit	The lack of Infrastructure prevents some residents from using alternative modes. Community members referenced having limited to no availability of bike parking in their neighborhood. One workshop group described the excessive number of personal vehicles in their neighborhood. They wanted more public parks or gardens for people to walk and recreate outdoors.

Neighborhood Specific Insights

West Oakland

West Oakland has many affordable housing developments, such as the Acorn Town Center and Courtyards, which will be key communities for ZEV investment. There are concerns about the possible effects that a ZEV transition will have on those that depend on the traditional automobiles sector for work. There is also a desire for expanding and creating educational workshops around EV initiatives and incentives to overcome the lack of knowledge barrier.

Fruitvale

Oakland's Fruitvale neighborhoods has a larger Spanish-speaking Latino populations, and a lack of Spanish-language materials and workshops for EV incentives and initiatives is a considerable barrier. For many Fruitvale Workshop participants, our workshop was the first time they were exposed to information in Spanish about Electric Vehicles and Electric Vehicle incentives. SSCF also identified the Mam-speaking community in Fruitvale as particularly underserved for resources in their native language, as many are unable to understand English or Spanish. Finally according to our survey, a majority of Latino respondents (65%) were more likely to be worried that more ZEV infrastructure investment could lead to gentrification. This could be a possible barrier in expanding infrastructure and highlights the importance of education on how EVs and charging infrastructure can be made accessible.

Deep East Oakland

Communities in East Oakland suffer from a lack for important transportation infrastructure including ZEV charging. Many East Oakland residents are frustrated that there is currently no charging infrastructure available in their neighborhood, and the costs of the vehicles can be seen as out of range for many East Oakland residents of color. However, residents understand how important transitioning to ZEVs will be, especially to address air pollution concerns that are urgent for the community. Finally, some East Oakland residents have expressed a need for safer infrastructure throughout the community to help encourage the use of e-bikes, e-scooters and walking.

Chinatown

Like other Oakland neighborhoods, Chinatown residents are concerned with the costs of ZEVs, the lack of charging, and lack of knowledge about the technology and incentives. Additionally, Chinatown has quite a bit of traffic congestion, and residents worry about what effects of both EV chargers and other services such as shared e-bikes and e-scooters will have on parking availability. The language barrier also contributes to the lack of ZEV knowledge for Chinatown residents, and it is imperative that information is presented in Chinese, as well as other Asian languages, such as Vietnamese.

APPENDIX A: COMMUNITY OUTREACH & ENGAGEMENT

Actions

Below is a list of actions that were presented to Oakland residents during Workshop #2 in Summer of 2021:

ZEV Education and Access

- Explore City-level subsidies for ZEVs (including E-bikes, E-scooters)
- Implement an affordable neighborhood EV Car Sharing program
- Fund a City-led program for ongoing ZEV awareness and outreach
- Incorporate ZEVs into High School and community college curriculums and training programs
- Host an annual Clean Mobility Jobs Fair
- Implement a ZEV workforce training program
- Reduce barriers for electricians and contractors to work within City
- Implement a Plan to retrain and rehire employees in the gasoline industry
- Build long-term relationships with local unions to address concerns
- Help local businesses to invest for the transition to EVs and have capacity building

Infrastructure

- Provide education and financial incentives about EV chargers to apartment building owners
- Empower tenants to install their own EV Chargers
- Locate public chargers with robust community input through an Equitable Implementation Plan
- Implement a Residential Curbside Charging Permit
- Subsidize charging for low-income users

- Implement Mobility Hubs to enhance connections to transit services and provide charging
- Implement an EV Battery Recycling Program
- Implement a policy for dealing with old gasoline infrastructure like former gas stations
- Coordinate with the Fire Department on safety issues related to electric vehicles and infrastructure

Larger Zero Emission Vehicles: Trucks, Vans and Delivery

- Implement a Community EV car share program for vans, accessible vans and trucks
- Provide subsidies to local businesses and entrepreneurs to buy Cargo E-bikes
- Study and Implement a Pilot Zero Emission Vehicle Delivery Zone
- Study and Implement an Autonomous Delivery Robot Policy

Electric Micromobility: E-bikes, E-scooters, and E-wheelchairs

- Fund a permanent Universal Basic Mobility Program (Mobility Wallet) that provides subsidies to use transit, E-scooters and bike share
- Create an E-bike Lending Library including adaptive bikes (Planned 2022)
- Lobby State government to eliminate Driver's License requirement for E-scooters
- Implement Bike Plan and Pedestrian Plan
- Require and Incentivize Promotion of Adaptive Micromobility
- Build more secure parking for bikes

SURVEY RESULTS

Survey Respondents are:

- **Are more familiar with electric cars than with electric bikes or scooters**
 - 31% of survey respondents own a plug-in electric vehicle.
 - 22% of respondents have used an e-bike or e-scooter to get to work, school recreational activities or other locations in the past year.
 - 14% of Respondents own a e-bike or e-scooter.
- **Are concerned about the environment and see ZEVs as a potential solution**
 - 88% are concerned about climate change and
 - 89% are concerned about air pollution impacts.

- Of those that own an electric vehicle, they were most motivated by the desire to reduce their impact on the environment (93%), and for cleaner and healthier air (84%). About half were motivated by the vehicles being quieter and smoother (54%) or by the existence of EV financial incentives, discounts, and tax rebates.
- **Strongly support investments in ZEVs**
 - 91% agree that "their community will need much more investment in zero emission infrastructure and programs to meet state and city GHG emission goals".
 - 83% want the City of Oakland to invest in public electric vehicle chargers.
 - 83% agree that their neighborhood would be a

APPENDIX A: COMMUNITY OUTREACH & ENGAGEMENT

better place to live if more people drove electric vehicles (57% Strongly Agree, 26% Agree)

- Are also worried those investments could lead to gentrification
 - About a third agree that new electric vehicle chargers could be a sign that a neighborhood could be getting less affordable (9% Strongly Agree, 25% Agree). However, a majority of Hispanic/Latinx (64% Agree) respondents agreed.
- Recognize the potential economic benefits of ZEVs
- BIPOC Oaklanders were more likely to be interested in training or working in a career in the zero-emission vehicle industry.

Medium- and Heavy-Duty Fleets – Starting in 2021, City staff both convened and participated in stakeholder meetings with medium- and heavy-duty (MHD) vehicle fleet operators, including AC Transit, the Port of Oakland, and smaller operators. Learn more here:

STAKEHOLDER WORKSHOPS

Stakeholder workshops were held to explore solutions to the most challenging barriers facing ZEV adoption in Oakland. Full reports can be found at the links below:

Public and Curbside Charging in the Public Right of Way

– This virtual workshop brought together stakeholders to discuss barriers and pain points that exist for installing electric vehicle charging infrastructure, explore possible policy solutions and discuss how to implement these solutions equitably in the City of Oakland. A summary of this event can be found here: <https://cao-94612.s3.amazonaws.com/documents/Curbside-Charging-Meeting-Summary.pdf>

Electrification in Existing Buildings – In a workshop that combined the needs of transitioning to all-electric buildings and incorporating EVSE in existing buildings, stakeholders discussed the complex array of building systems, technologies, code requirements, and professionals that influence building retrofits. A central goal was ensuring that outcomes, both intended and unintended, would enhance equity, and not exacerbate displacement or exclusion. More information can be found:

Oakland Electrification and Decarbonization of Workforce Development Series – This series of stakeholder meetings are focused on jobs and workforce development to support the electrification of both Oakland's buildings and transportation system. Learn more here: <https://www.oaklandca.gov/projects/toward-a-just-green-economy>

Appendix B: Existing Conditions & ZEV Goals Analysis

This section outlines the methodology used to estimate the current ZEV landscape and zero-emission vehicle and charger adoption in Oakland. Calculations for Oakland’s share of state ZEV targets and other scenario analyses are also discussed here.

EXISTING EV CHARGERS

EV chargers exist in a range of locations and at several different power “levels”. Chargers can be installed at homes, businesses, workplaces and other destinations.

Table B-1 - Electric Vehicle Supply Equipment Permits in Oakland 2010 - 2021 by Charger Type

Charger Type	Public	Commercial	Residential	Total
L1	0	4	n/a	
L2	499	0	n/a	
DCFC	52	0	n/a	
All Chargers	551	4	918	1473

ELECTRIC VEHICLE INFRASTRUCTURE PERMITS

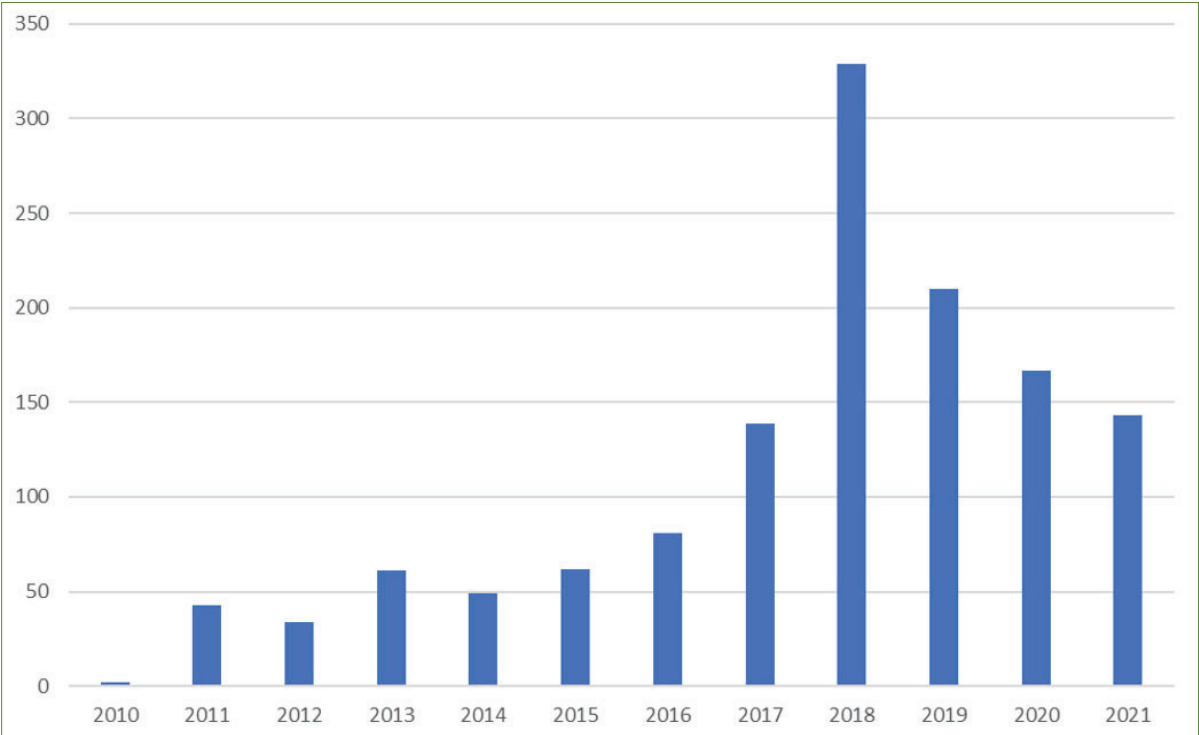
Oakland’s Planning and Building Department receives and manages the electrical work permits required for the installation of EV service equipment (EVSE – the full suite of electrical equipment and service necessary to install an EV charger, in addition to the charger itself) in single-family residences, multifamily buildings, workplaces, and commercial establishments. The electrical work needed for EVSE installation can be reviewed through a single permit, hence permit counts may include one or more EV charging ports per permit.

Figure 6 illustrates that there were 140 EVSE permits submitted between 2010 and 2013, and 849 submitted between 2018 and 2021. This shows a year-on-year increase in installations, with a decrease in most recent years, perhaps connected to the COVID-19 pandemic and resulting shortages of City staff. This data does not include residents or others who charge their vehicle with a simple 110/240 Volt wall outlet, and therefore does not correlate perfectly to EV ownership.

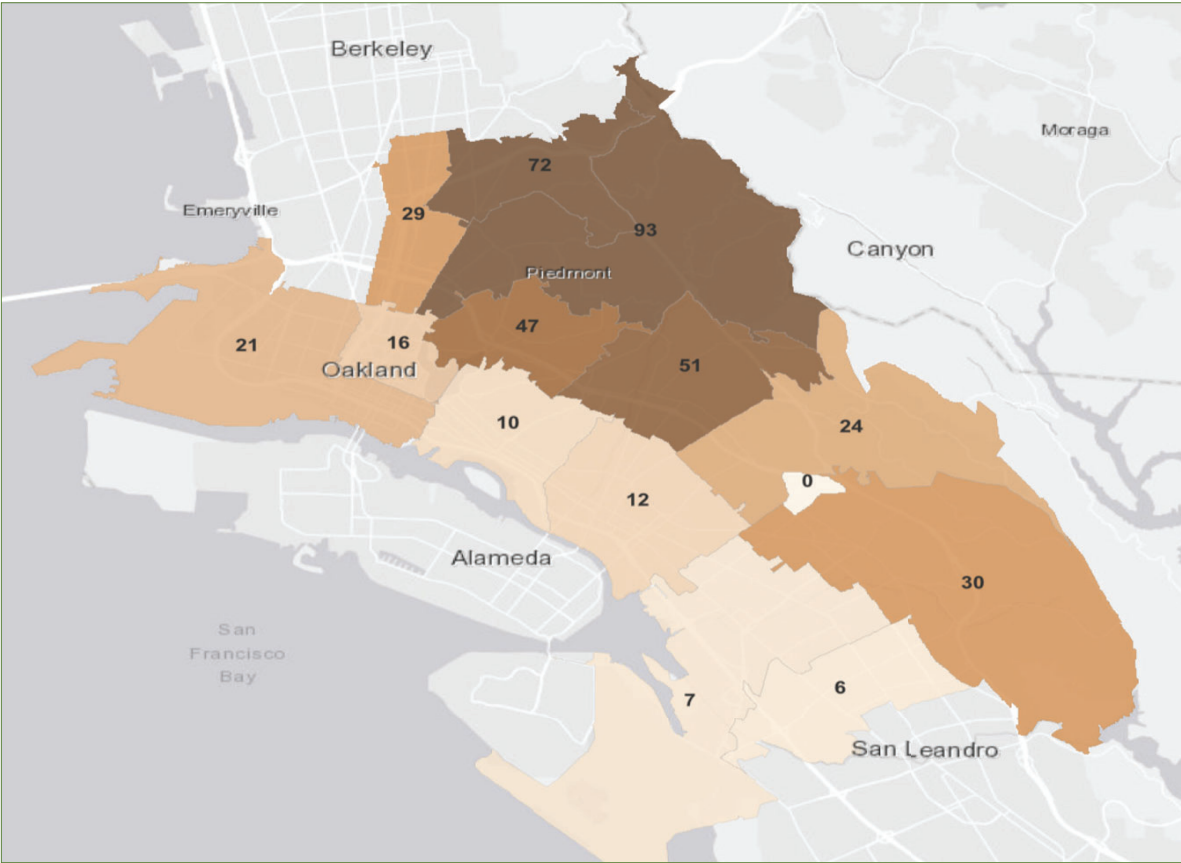
As Map B-1 shows, EV share and EVSE installation permits are highly correlated. According to the California Department of Motor Vehicles (DMV), most of the battery electric vehicles (BEV) and plug-in hybrid EV (PHEV) registrations in Oakland are in the Oakland Hills and North Oakland. EV share also has a strong positive correlation with wealth, as shown in Table A. However, siting of public EV chargers has concentrated in major economic corridors like Downtown Oakland, with a substantial portion also being built in East Oakland. In addition to commercial

districts, destination public charging is also anticipated to be widely implemented around supermarkets, schools, hospitals, and parking lots/garages. Destination charging can supplement residential charging where ZEVs are expected to be stationary for longer periods of time. Community input will be essential to siting destination chargers to meet community needs.

Figure B-1 - Permits for Electric Vehicle Supply Equipment in Oakland 2010 - 2021 by Year



Map B-1 - Electric Vehicle Supply Equipment Permits in Oakland 2010 - 2021 by Zipcode



APPENDIX B: EXISTING CONDITIONS AND ZEV GOALS ANALYSIS

Table B-2- Percentage of ZEVs and Number of Chargers by Zipcode

Zipcodes	% of ZEV Penetration	Medium Income	Number of Public Chargers	Charger per 1000 People
94621	0.8%	42,563	50	1.9
94601	1.1%	50,122	105	2.3
94603	0.6%	52,634	3	0.5
94607	3.3%	55,054	270	12.3
94612	3.3%	55,291	113	8.8
94606	1.9%	56,129	13	0.9
94605	2.7%	72,778	4	1.7
94609	3.5%	86,750	16	2.6
94608	4.0%	87,517	1	1.1
94619	4.1%	94,490	1	2.1
94602	5.0%	95,479	2	3.4
94610	5.6%	100,717	1	3.0
94611	8.3%	129,576	24	6.1
94618	8.5%	167,606	N/A	8.2

ZEV ADOPTION

To estimate ZEV vehicle adoption in Oakland in a “Business-as-Usual” scenario, four data points were calculated: (1) the total number of internal combustion engine and ZEV vehicles in Oakland; (2) ZEV sales forecast; (3) ZEV market share forecast; and (4) vehicle replacement rates. For this projection, we assumed that total vehicle population would remain constant to 2020 levels and that ZEV market share would grow to meet California’s 2035 target of 100% ZEV in new sales. The total number of internal combustion engine vehicles and ZEVs for Oakland were extracted by zipcode from the California Energy Commission’s “Vehicle Populations in California” dataset. The “Vehicle Populations in California” dataset also contains ZEV sales and market share data from 2010. For the ZEV sales forecast, we used estimates provided by experts from the International Council of Clean

Transportation (ICCT) with 30% year-on-year growth in EV sales from 2020-2025, 22% year-on-year growth from 2025-2030, and 15% year-on-year growth from 2030-2035. For the ZEV market share forecast, an exponential growth function was fitted to historical ZEV market share data such that ZEVs reach 100% of new sales in 2035 and 100% market share in 2045. Finally, vehicle replacement rates were derived from the Transportation Energy Data Book maintained by Oak Ridge National Laboratory. By combining vehicle survival rates by age with vehicles in operation by age, an expected probability of 18% of cars on the road would need to be replaced per year. For ZEVs, vehicle replacement rates are assumed to start in 2025 since the earliest ZEVs were available in the mid-2010’s. A summary of ZEV Vehicle Adoption in Oakland can be found in Table B-3.

Table B -3- Projected Number of ZEVs in Oakland (2021 - 2035)

Year	ZEV Sales Growth Rate	ZEV Market Share	Estimated Number of New ZEVs	Total Number of ZEVs	% ZEVs of Total
2021	30%	9%	1671	7240	3%
2022	30%	10%	2172	9412	5%
2023	30%	13%	2823	12235	6%
2024	30%	15%	3671	15906	9%
2025	30%	19%	4772	17496	10%
2026	22%	23%	5821	19818	12%
2027	22%	28%	7102	22957	15%
2028	22%	34%	8665	27030	18%
2029	22%	41%	10571	32195	22%
2030	22%	50%	12896	38652	27%
2031	15%	61%	14831	45753	33%
2032	15%	74%	17056	53658	40%
2033	15%	91%	19614	62540	49%
2034	15%	95%	22556	72588	58%
2035	15%	100%	25939	84010	66%

ZEV CHARGER ADOPTION

To estimate a “Business-as-Usual” scenario for ZEV chargers in Oakland, a power growth curve was fitted to historical permit data for the number of EVSE installations from 2010 to 2021. Permit data for EVSE contains both private and publicly available chargers. Historically, about 84% of permits were located in single-family residences while 11% were constructed in multifamily buildings and 4% in commercial buildings. A similar distribution of ZEV chargers is expected to be built looking forward but with a greater percentage located in commercial and public

spaces to facilitate destination and hub charging models. In “Assembly Bill 2127: Electric Vehicle Charging Infrastructure Assessment,” California Energy Commission (CEC) analysts modeled the projected number of chargers needed to satisfy California’s state goal of 8 million ZEVs by 2030. These estimates were broken down by county. Oakland’s share was calculated as a ratio of total vehicle ownership between Alameda County and Oakland. A breakdown of projected EV charger needs by type in Oakland from 2020-2035 can be found in Table B-4.

Table B-4- Projected Number of EV Chargers by Type in Oakland (2020 - 2035)

Year	MUDs (L1 + L2)	Work (L2)	Public (L2)	Public (DCFC)	Total
2020	795 (0.51)	298 (0.19)	431 (0.28)	32 (0.02)	1556
2021	910 (0.47)	412 (0.21)	570 (0.3)	41 (0.02)	1933
2022	1043 (0.44)	542 (0.23)	730 (0.31)	50 (0.02)	2365
2023	1113 (0.38)	749 (0.26)	991 (0.34)	66 (0.02)	2919
2024	1260 (0.36)	969 (0.28)	1220 (0.35)	70 (0.02)	3519
2025	1503 (0.34)	1256 (0.28)	1570 (0.36)	87 (0.02)	4417
2026	1751 (0.32)	1630 (0.3)	2005 (0.36)	108 (0.02)	5494
2027	2070 (0.32)	1972 (0.3)	2356 (0.36)	146 (0.02)	6544
2028	2499 (0.32)	2380 (0.3)	2782 (0.35)	186 (0.02)	7847
2029	2967 (0.32)	2812 (0.3)	3284 (0.35)	222 (0.02)	9285
2030	3475 (0.32)	3364 (0.31)	3890 (0.35)	255 (0.02)	10984
2031	4011 (0.31)	3978 (0.31)	4522 (0.35)	293 (0.02)	12803
2032	4396 (0.3)	4616 (0.32)	5133 (0.35)	348 (0.02)	14494
2033	4763 (0.3)	5274 (0.33)	5662 (0.35)	408 (0.03)	16108
2034	5107 (0.29)	5751 (0.33)	6226 (0.35)	465 (0.03)	17549
2035	5421 (0.29)	6164 (0.33)	6625 (0.35)	541 (0.03)	18751
The number in parentheses is the fraction of each charger type in a given year.					

OAKLAND'S SHARE OF STATE TARGETS

To calculate Oakland's contribution to the state targets of 8 million ZEVs by 2030 and 27.9 million ZEVs by 2045, the proportion of total 2020 vehicle ownership in Oakland to statewide light-duty vehicles was determined from Department of Motor Vehicles vehicle registration data and applied. These modified Oakland ZEV targets were then compared to EV sale trends from the CEC to forecast expected number of electric vehicles in Oakland

for 2030 and 2045. To align with state targets of 8 million ZEVs by 2030 and 27.9 million by 2045, Oakland derived a local target of 73,960 ZEVs by 2030 and 261,199 ZEVs by 2045 based on 2020 vehicle ownership rates. Using estimated ZEV sale forecasts, the City of Oakland is projected to fall short of the state 2030 and 2045 ZEV target, with 38,652 EVs in 2030 and 215,441 EVs in 2045. Summary results can be found in Table B-5.

Table B-5- Analysis of Oakland's Share of to California ZEV Targets

Target Year	California State ZEV Goal	Total Number of Vehicles in California (2020)	Total Number of Vehicles in Oakland (2020)	Proportion of Oakland: CA Vehicles	Oakland Share of ZEV Target	Number of ZEVs in Oakland (2020)	Forecast ZEVs in Oakland	Remaining Delta
2030	8,000,000	28,665,934	268,370	0.009362	73,960	5,569	38,652	35,307
2045	27,900,000				261,199		215,441	45,758

To test whether Oakland is on track to meet its share of EV charger targets, the historical rate of installation from 2010 to 2020 was compared to the CEC modelled rate of installation out to 2035. For residential L1 and L2 chargers, the historical rate of installation from 2010 to 2020 was about 82 new EV chargers per year. However, the projected rate of installation needed through 2035 is about 335 new EV chargers per year. Similarly, for workplace and public L2 chargers, the City of Oakland

falls short of the projected needed installation rate. The historical rate of public L2 chargers in Oakland from 2010-2020 is about 34 new EV chargers per year whereas the projected installation rate needed is between 411-437 new chargers per year. Thus Oakland must greatly expand EVSE deployment in a rapid timeframe to be in line with state targets in 2030 and carbon neutrality by 2045. Table B-6 summarizes the number of chargers by sector needed in Oakland by target years 2030 and 2045.

Table B-6 - Oakland ZEV Charger Needs Projection by Sector

Sector	BAU		100% ZEV	
	2030	2045	2030	2045
MUD (L1+L2)	978	2711	3475	13100
Work L2	948	3085	3364	14906
Public L2	1070	3272	3890	15810
Public DCFC	61	280	255	1355
Total	3057	9350	10984	45171

SCENARIO ANALYSIS FOR 100% ZEVs IN OAKLAND

To simplify the analysis for 100% ZEV within Oakland by 2045, this section will only focus on light duty vehicles and assume that the total number of vehicles will remain constant to 2020 levels. By holding the total number of vehicles constant, we assume that future population growth will be offset by reductions in private vehicle ownership. This simplifies the assumption that the City will progress toward its mode-shift goals, since Oakland's population is expected to grow over this timeframe in keeping with Plan Bay Area targets. The City has not set specific mode-shift targets over this timeframe. These targets would need to be identified by non-passenger-vehicle mode (walking, biking, public transport, other micromobility) as well as assessed at a geographic level sufficient to address land-use and mobility-access inequities.

With these assumptions, if the rate of EV sales remains linear exponential over time, Oakland can expect to replace its 258,819 internal combustion vehicles by 2057. This must be accelerated in order to meet Oakland's carbon neutrality target of 2045. This will require gradual but substantial increases in the percentage of ZEVs in new vehicle sales.

The number of ZEVs and related charging infrastructure needed to reach 100% ZEVs may be reduced by changes in mobility behavior. In CEC's Electric Vehicle Infrastructure Assessment, the "Alternative Futures" section lists modelled results in charging infrastructure needs based on various scenarios that depart from the default scenario, 8 million ZEVs by 2030. One scenario, Low Energy Demand, projects a future with 30% lower electric load from EVs, related to vehicle and battery efficiencies as well as behavior change from less vehicle miles traveled. The reduction in energy demand contracts the necessary EV infrastructure by 17%, where half of the reduction comes from public L2 chargers, 45% comes from workplace L2 chargers, and 5% from public DCFC chargers. The model also predicts a small 1% bump in MUD L1 and L2 chargers in the Low Energy Demand scenario. However, even factoring in a potential 30% mode shift away from private vehicles (interpreted as a 30% reduction in total vehicles – a highly ambitious scenario), the year of 100% ZEV replacement based on sales trend is 2049 – still failing to meet the 2045 target. If Oakland is to reach a 100% ZEV goal by 2045, EV deployment rate per year would need to be 5 times higher than current sales rates. Additional ZEV scenario analyses can be found in Table B-7.

Table B-7 - Scenario Analysis of 100% ZEV Goal

Scenario	Non-EVs to Replace	Avg. Rate of Replacement (vehicles/year)	Year Target Reached
100% ZEV Business as Usual (BAU)	255,630	238	2057
100% ZEV BAU with 30% VMT Reduction	177,270	238	2049
100% ZEV by 2045	255,630	10,225	2045
100% ZEV by 2045 with 30% VMT Reduction	177,270	6,868	2045

LOW-ENERGY DEMAND SCENARIO ANALYSIS

In CEC's Electric Vehicle Infrastructure Assessment, the "Alternative Futures" section lists modelled results in charging infrastructure needs based on various scenarios that depart from the default scenario, 8 million ZEVs by 2030. One scenario, Low Energy Demand, projects a future with 30% lower electric load from EVs, related to vehicle and battery efficiencies as well as behavior change from less vehicle miles traveled. The reduction in energy demand contracts the necessary EV infrastructure by 17%, where half of the reduction comes from public L2 chargers, 45% comes from workplace L2 chargers, and

5% from public DCFC chargers. The model also predicts a small 1% bump in MUD L1 and L2 chargers in the Low Energy Demand scenario. To first approximation, the Low Energy Demand scenario can be extended to 30% less EVs or VMT. However, even with a mode shift of 30% fewer EVs, the current pace of EV charger installation in Oakland falls short of meeting state goals, just by a smaller margin. In the Low Energy Demand scenario, the City of Oakland would need to have installed about 3481 MUD L1 and L2 chargers, 3102 workplace L2 chargers and 3554 Public L2 chargers and 253 public DC fast chargers by 2030.

APPENDIX B: EXISTING CONDITIONS AND ZEV GOALS ANALYSIS

While the CEC Assessment only projects out to 2035, a 2045 estimate was calculated as an exponential growth curve with the same distribution of chargers by sector (multifamily, workplace, public L2, public DCFC) in 2035.

The ICCT also prepared an estimate of EV charger needs based on their model of EV growth trends and use patterns. A more detailed explanation can be found in their Charging Up America report. According to ICCT, by 2030 the City of Oakland will need 6,000 L1 and L2 chargers in multifamily buildings, 4,100 workplace L2 chargers, 3,900 public L2 chargers, 430 public DC fast chargers, and 53,200 private home chargers. Similarly, ICCT did

not provide a 2045 estimate and staff calculated this projection as an exponential growth following the same distribution of chargers in 2030. Notably, the ICCT model defers from the CEC model with a greater percentage of estimated chargers in multifamily buildings.

A comparison of EV charger needs by scenario can be found in Table B-8.

Table B-8- Summary of Oakland EV Charger Scenario Analysis

	Low Energy Demand		ICCT	
	2030	2045	2030	2045
MUD (L1+L2)	3481	13122	6000	15755
Work L2	2593	13747	4100	10766
Public L2	3000	14443	3900	10241
Public DCFC	220	1343	430	1129
Total	9295	42656	14430	37890

ELECTRIC VEHICLE CHARGERS & ADA

Construction of publicly available EV chargers in Oakland must adhere to federal and state Americans with Disabilities Act (ADA) requirements. [California's Division of the State Architect \(DSA\)](#) has developed regulations for accessibility to EV chargers in public facilities . Figure C-1 shows ADA specifications for spaces with EV chargers. See

Table C-2 below to see the required number of accessible spaces according to the total number of chargers at a facility.

Figure C-1 - Specifications for ADA spaces and EV Charging Facilities from the Division of the State Architect

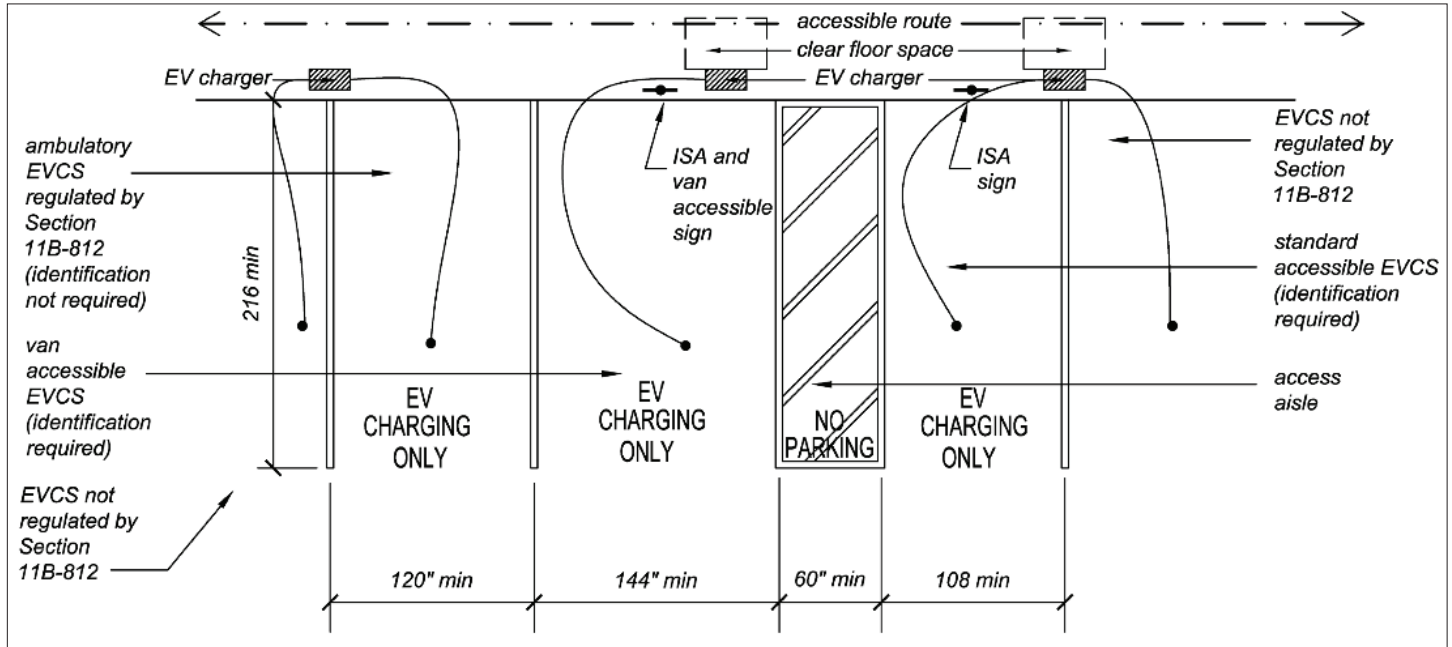


Table C-2 - Required ADA spaces at EV Charging Facilities

Total Number of Chargers at a Facility	Minimum Number of Van Accessible Chargers	Minimum Number of Standard Accessible Chargers	Minimum Number of Ambulatory Accessible Chargers
1 - 4	1	0	0
5 - 25	1	1	0
26 - 50	1	1	1
51 - 75	1	2	2
76 - 100	1	3	3
101 and over	1, plus 1 for each 200, or fraction thereof, over 100	3, plus 1 for each 60, or fraction thereof, over 100	3, plus 1 for each 50, or fraction thereof, over 100

Appendix C: Other Relevant Plans and Strategies

EBCE'S ZERO-EMISSION MEDIUM- AND HEAVY-DUTY VEHICLE INFRASTRUCTURE BLUEPRINT FOR GOODS MOVEMENT: PROGRAM DETAILS

EBCE'S Zero-Emission Medium- and Heavy-Duty Vehicle Infrastructure Blueprint for Goods Movement will serve as a dynamic process to establish EBCE's service area, including Oakland, as a "beachhead"^{xxi} market for zero-emission Class 3-6 goods movement by 2030. It will also engage key stakeholders and identify actions needed to scale investments to facilitate the transition to zero-emission Class 7-8 goods movement vehicles by 2040.

The Blueprint addresses a complex ecosystem. While many electrified vehicles will recharge where they domicile or at third-party logistic facilities where they do business, others need convenient, fast charging yards, akin to wholesale gas stations, throughout EBCE's service area. To meet State targets, planning for this network must begin immediately. EBCE's Blueprint will jumpstart the process, assuring operators across the spectrum that charging will be accessible and reliable.

The first year of the project focuses on data collection and conducting interviews with MHD goods movement stakeholders. Across each of the five focus areas, EBCE will establish a baseline, assess current solutions, evaluate benefits, forecast future needs, and identify priorities. This effort will enable EBCE and its project technical consultant, CALSTART, to develop draft strategies and actions for inclusion in the Blueprint:

Vehicles: EBCE is identifying where MHD vehicles are registered and domiciled, aligning vehicle vocation with current/future market availability of vehicle options.

Infrastructure: Linking this data with operator interviews, EBCE will identify potential locations for future fast charging hubs.

Finance: EBCE will identify creative financing opportunities for vehicles and charging infrastructure in alignment with its Blueprint goals.

Workforce: EBCE will work with its fellow East Bay Economic Development Alliance members, including workforce training programs and the City, to create or enhance programs to meet the needs of this evolving field.

Community benefits: In year two, EBCE will convene a stakeholder guidance committee with representatives from each member community, key community organizations, and regional agencies. The committee will review draft strategies, actions, and underlying data, to ensure the Blueprint maximizes benefits throughout the service area.

SUMMARY OF CURRENT ZEV PROJECTS AT THE PORT OF OAKLAND

The Port of Oakland and its tenants have numerous completed, ongoing, and planned electrification projects, as shown in Figure D-1. These early demonstration and pilot projects are crucial for advancing the technology and learning what types of equipment are feasible at both on-dock and off-dock facilities. The duty cycles and operating requirements (i.e. back-to-back shifts) for different types of equipment in the maritime environment can be grueling, so it is important to test the new technology in real-world operating conditions.

Impact Transportation, OMSS, and ConGlobal have all invested in Orange EV brand yard trucks. SeaLogix has four BYD brand BE on-road trucks and one BE yard tractor, and GSC Logistics has three BYD brand BE on-road trucks and one BE yard tractor. The Port itself has purchased

one BE passenger van and two all-electric work trucks for its fleet, with plans to purchase more.

In early 2019, the Port of Oakland entered into a Memorandum of Understanding with the Ports of Long Beach and Stockton to implement a Zero and Near Zero Emission Freight Facilities (ZANZEFF) grant project. Shippers Transport Express (STE), a Port-based trucking operation, received ten zero-emission Class 8 drayage trucks at its near-dock facility through ZANZEFF. The Port invested \$1.7 million to construct 10 EV charging stations at STE along with a new electrical substation and power line extension to connect the infrastructure. As part of ZANZEFF, SSA Marine is deploying two BE top handler also at Shippers Transport Express and a combined 38 all-electric yard tractors at its Matson terminals at the Ports

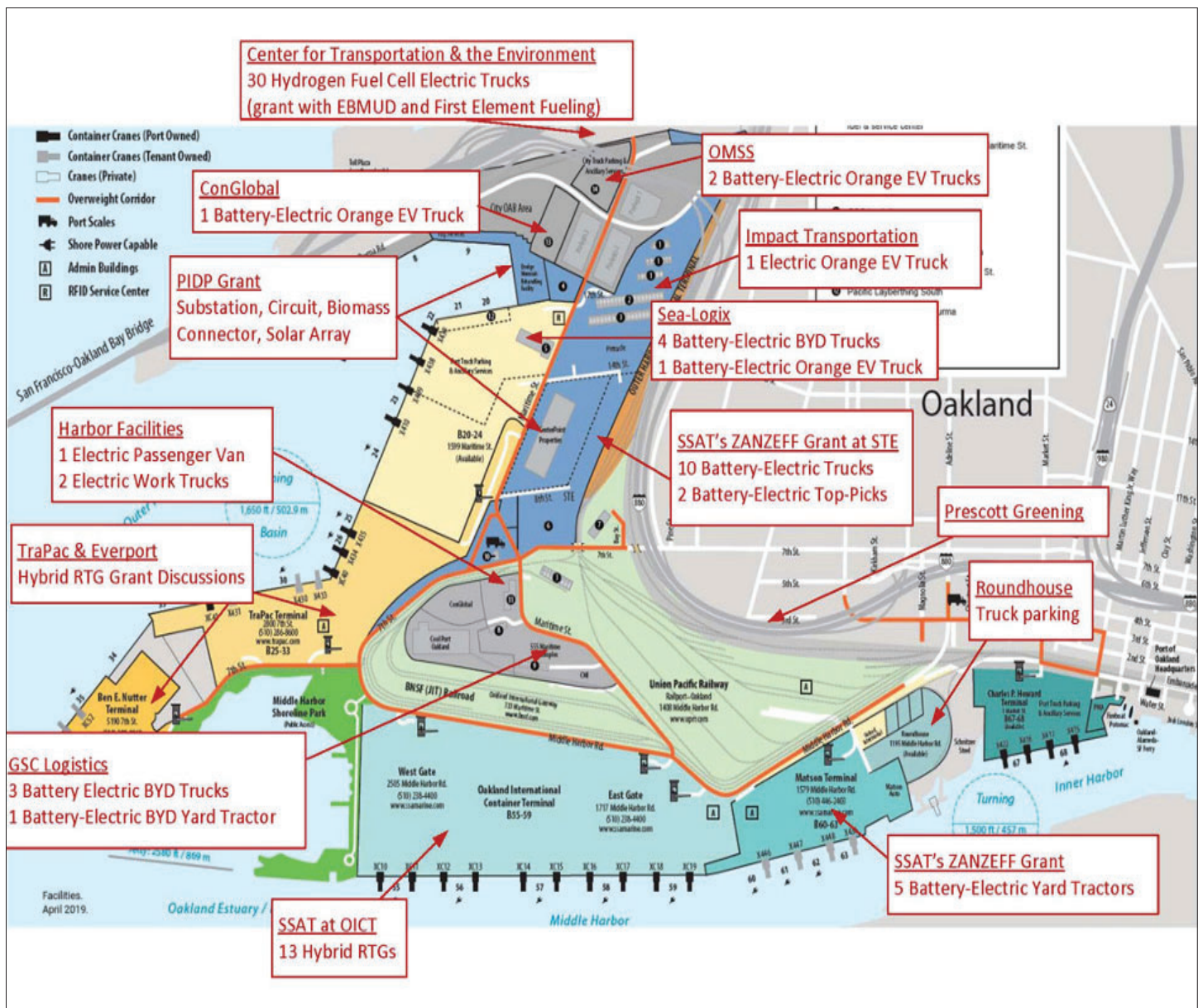
APPENDIX C: OTHER RELEVANT PLANS AND STRATEGIES

of Oakland and Long Beach. These projects pave the way for future electrification projects. The Port is collecting data on electrical usage and operational effectiveness to evaluate how the trucks and equipment operate in the seaport environment.^{xxii}

In 2021, the Center for Transportation and the Environment (CTE) received \$17 million from the Zero-Emission Drayage Truck and Infrastructure Pilot Project, funded by the CEC and CARB, along with \$7 million from BAAQMD and Alameda County Transportation Commission, to deploy 30 Class 8 HFC trucks and

hydrogen fueling infrastructure near the Port. The trucks will operate throughout the region. The Port will work with CTE to demonstrate the viability of the trucks to fleet operators, while UC Berkeley and WOEIP will support data collection and community engagement. Built by Hyundai Xcient, the trucks have a 400-mile range and can refuel in 15-20 minutes. A hydrogen refueling station will be located on Easy Bay Municipal Utilities District land, with 52% of the fuel coming from renewable sources and the remainder derived from natural gas. A service and repair station located in San Leandro will provide job training.

Figure C-1 Oakland Port Electrification Projects



RELEVANT GRANT PROGRAMS FOR MEDIUM-AND HEAVY-DUTY ZEV

California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP): Launched in 2009 by CARB and is administered by CALSTART. The goal of HVIP is to make clean vehicles more affordable by reducing purchasing cost. Vouchers are worth \$20,000 to \$240,000 depending on the cost of the vehicle.

California Electric Vehicle Infrastructure Project (CALeVIP): Addresses regional needs for charging throughout California. Partially funding through the through the CEC, CALeVIP provides incentives for charging infrastructure and works with local partners to create and implement projects that will meet future regional needs for Level 2 and DC Fast charging.

Carl Moyer Memorial Air Quality Standards Attainment Program: Provides funding for cleaner-than-required engines. Administered locally by the Bay Area Air Quality Management District (BAAQMD). Funding is available for engine replacement, vehicle and equipment replacement, power system conversion, and battery charging and fueling infrastructure.

Low Carbon Fuel Standard (LCFS): Launched in 2011 to incentivize the production and use of low-carbon fuels. Participants can buy and sell credits for GHG emission reductions from fleet conversion, often recouping costs from initial capital investments or offsetting the costs of

later acquisitions. Navigating the credit market requires time and expertise, and benefits are more impactful for participants with larger fleets.

Low Carbon Transportation Investments and Air Quality Improvement Program: Provides incentives to deploy advanced technologies for MHD vehicles. This program is supported by the California Climate Investments program.

Truck Loan Assistance Program: Launched in 2009 to help small fleet owners upgrade their fleets. Borrowers must have under 100 employees, make less than \$10 million in annual revenue, and own 10 or fewer heavy-duty trucks.

Volkswagen Environmental Mitigation Trust: The Trust provides funding for replacing or repowering older, heavy-duty vehicle engines and equipment with clean or zero-emission technologies. \$290 million was allocated for zero-emission transit, school, and shuttle buses; Class 8 freight and port drayage trucks; and freight and marine projects.

Table C-1 - Key Wocap Strategies Related to Zero Emission Goods Movement and Public Transit

Authority: California Air Resource Board (CARB)	
#	Description
28	Develop improvements to the existing truck and bus inspection and maintenance programs. Potential improvements include increasing warranty requirements, adding a lower in-use emissions performance level, increasing inspections in West Oakland, using aggregated GPS and other telecommunication records to identify locations of idling trucks and buses, and partnering with the Air District to develop a system using on-board diagnostic and remote sensing devices to identify and fix faulty emissions abatement devices on trucks and buses.
29	Develop the following regulations to increase the number of zero-emission trucks and buses operating in West Oakland. <ul style="list-style-type: none"> The Advanced Clean Trucks regulation to transition to zero-emission technology those truck fleets that operate in urban centers, have stop-and-go driving cycles, and are centrally maintained and fueled. Amendment to the drayage truck regulation to transition the drayage truck fleet to zero emissions.
31	Develop amendments to the transport refrigeration unit (TRU) regulation to transition the TRU fleet to zero-emission operations by requiring both zero-emission technology and supporting infrastructure.

APPENDIX C: OTHER RELEVANT PLANS AND STRATEGIES

Authority: California Air Resource Board (CARB)	
32	Develop amendments to the existing cargo handling equipment regulation, which includes yard trucks, rubber-tired gantry cranes, and top handlers, that may reduce idling and transition the various types of equipment to zero-emission operation.
33	Develop a handbook that identifies best practices for the siting, design, construction, and operation of freight facilities to minimize community exposure to air pollution.
Authority: City of Oakland	
5	<i>[With the Port of Oakland]</i> Amend existing Ordinances, Resolutions, or Administrative policies to accelerate relocation of truck yards and truck repair, service, and fueling businesses in West Oakland currently located within the freeway boundaries that do not conform with the zoning designations adopted in the West Oakland Specific Plan
9	Develop a plan to limit the hours that trucks can operate in the community.
36	Require industrial and warehouse facilities to provide electrical connections for electric trucks and transport refrigeration units in support of CARB regulations.
39	Consistent with the West Oakland Truck Management Plan: 1) improve signage regarding existing truck routes; 2) work with businesses on preferred routes to use when destinations are not located on truck routes; and 3) add to, or change, truck routes and prohibited streets.
42	<i>[With the Port of Oakland]</i> Award long-term leases to vendors that deliver trucker services (including mini-market and convenience stores, fast food, and fast casual restaurants), and parking to keep trucks off West Oakland streets.
Authority: Port of Oakland	
19	Adopt an Electrical Infrastructure Plan for the maritime waterfront areas of Oakland. This Plan seeks to remove barriers to adoption of zero-emission trucks, such as cost, land, and ownership of charging equipment.
26	<i>[With the City of Oakland]</i> Work to establish permanent locations for parking and staging of Port related trucks and cargo equipment, i.e., tractors, chassis, and containers. Such facilities will provide long-term leases to parking operators and truck owner-operators at competitive rates. Such facilities will be at the City or Port logistics center or otherwise not adjacent to West Oakland residents
37	As part of the <i>Seaport Air Quality 2020 and Beyond Plan</i> , support the transition to zero-emission drayage truck operations, including setting interim year targets out to 2035, coordinating an extensive zero-emission truck commercialization effort, working with the City of Oakland to amend local ordinances to increase the allowable weight limits for single-axle, zero-emission trucks on local streets located within the Port and the Oakland Army Base/Gateway areas, and developing an investment plan for needed upgrades to the Port's electrical infrastructure. Work with the California Public Utilities Commission and the California Energy Commission to study the development of time-of-day electric rate structures favorable to truck operators on Port property.
43	Study the effects on truck flow and congestion due to increasing visits from larger container ships, the feasibility of an off-terminal container yard that utilizes zero-emission trucks to move containers to and from the marine terminals, and the potential efficiency gains from increasing the number of trucks hauling loaded containers on each leg of a roundtrip to the Port.
Authority: Bay Area Air Quality Management District (Air District)	
3	Study the potential air pollution and health outcomes of allowing truck traffic on I-580 and designating a truck lane on I-880. Allowing truck traffic on I-580 would require legislative approval, re-engineering, and re-construction

APPENDIX C: OTHER RELEVANT PLANS AND STRATEGIES

Authority: Bay Area Air Quality Management District (Air District)	
41	Work with CARB to streamline the process for providing financial incentives for fueling infrastructure, and for low and zero-emission equipment. The Air District increases outreach and assistance to individual owner-operators and small companies by providing two workshops and enhanced outreach in West Oakland by 2022.
52	Plan to offer financial incentives to support the development of a hydrogen refueling station and the purchase of trucks and off-road equipment powered by fuel cells every year.
53	Offer financial incentives to replace long-haul diesel trucks with zero-emission trucks owned by West Oakland businesses every year.
Authority: Multiple Agencies	
21	The Air District works with the City and Port of Oakland and other agency and local partners to create a Sustainable Freight Advisory Committee to provide recommendations to each agency's governing board or council. The Committee's scope includes air quality issues, enhanced/increased enforcement of truck parking and idling, improved referral and follow-up to nuisance and odor complaints related to goods movement, improvements to the Port appointment system, charging infrastructure and rates, developing land-use restrictions in industrial areas, funding, and consideration of video surveillance to enforce truck parking, route, and idling restrictions.
45	The City collaborates with AC Transit, BART, Emery-Go-Round, and the local community to implement the broad array of transit improvements identified in the West Oakland Specific Plan. This would be a joint effort led by the City of Oakland, AC Transit, BART, and City of Emeryville.

SOURCES

- ⁱ California Energy Commission, <https://www.energy.ca.gov/data-reports/energy-insights/zero-emission-vehicle-and-infrastructure-statistics/new-zev-sales>
- ⁱⁱ California Energy Commission, <https://www.energy.ca.gov/data-reports/energy-insights/zero-emission-vehicle-and-infrastructure-statistics/vehicle-population>
- ⁱⁱⁱ <https://www.aaa.com/autorepair/articles/true-cost-of-ev>; <https://www.energy.gov/eere/vehicles/articles/fotw-1190-june-14-2021-battery-electric-vehicles-have-lower-scheduled>
- ^{iv} Environmental Defense Fund: <https://www.edf.org/health/health-impacts-air-pollution>
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- ^v Shared Use Mobility Center, “Our Community CarShare Sacramento Case Study” February 2020. <https://learn.sharedusemobilitycenter.org/wp-content/uploads/Our-Community-Car-Share-Case-Study-Final.pdf>
- ^{vi} “Innovation in Electric Vehicle Charging for Multi-Unit Dwellings” prepared by Ecology Action for East Bay Community Energy
https://afdc.energy.gov/fuels/hydrogen_stations.html
- ^{viii} Alameda County Transportation Commission: https://www.alamedactc.org/wp-content/uploads/2020/04/Goods_Movement_FS_Jan2020.pdf
- ^{ix} Comparative emissions data are for 2020 vehicles, sourced from the U.S. Department of Transportation, Bureau of Transportation Statistics: <https://www.bts.gov/content/estimated-national-average-vehicle-emissions-rates-vehicle-vehicle-type-using-gasoline-and>.
- ^x California Air Resources Board. (2019b). Overview: Diesel Exhaust and Health. arb.ca.gov/resources/overview-diesel-exhaust-and-health
- ^{xi} Racial and pollution burden derives from CalEnviroScreen 3.0.
- ^{xii} University of California Institute of Transportation Studies, Effects of Increased Weights of Alternative Fuel Trucks on Pavement and Bridges. <https://aboutblaw.com/Xa7>
- ^{xiii} UCLA Luskin Center for Innovation. Zero-Emission Drayage Trucks: Challenges and Opportunities for the San Pedro Bay Ports. https://innovation.luskin.ucla.edu/wp-content/uploads/2019/08/Zero-Emission_Drayage_Trucks.pdf
- ^{xiv} Assembly Bill 117 (Stat. 2002, ch. 838, codified at Public Utilities Code Section 366.2)
- ^{xv} [Owning our Air: West Oakland Community Action Plan](#) (2019).
- ^{xvi} Alameda-Contra Costa Transit District ZEB Rollout Plan: https://www.actransit.org/sites/default/files/202103/AC%20Transit%20ZEB%20Rollout%20Plan_06102020.pdf
- ^{xvii} <https://www.nytimes.com/2021/11/08/business/e-bikes-urban-transit.html>
- ^{xviii} U.S. Bureau of Labor Statistics, Careers in Electric Vehicles: https://www.bls.gov/green/electric_vehicles/.
- ^{xx} These statistics derive from Oakland’s Equity Indicators Report, published a year before COVID 19 tore through the community. Preliminary analysis shows that the pandemic worsened these disparities, making an equity-driven approach more critical.
- ^{xxi} For an explanation of the “Beachhead model,” see [CALSTART Drive to Zero Strategy: Beachhead model](#), and [Global Commercial Vehicle Drive to Zero: Beachhead Model White Paper](#) (2020).
- ^{xxii} <https://www.portofoakland.com/press-releases/zero-emissions-truck-project-launches-at-port-of-oakland/>



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ZERO EMISSION VEHICLE **ACTION PLAN**



CITY OF OAKLAND

2023