Task 5: Central Coast Community Energy Blueprint

ARV-21-031

Prepared for: California Energy Commission

Prepared by: Build Momentum, Inc.

September 2023

California Energy Commission

Authors

John Friedrich, Build Momentum, Inc
Nicholas Pieper, Build Momentum, Inc.

Build Momentum, Inc.
801 K St., Suite 2800
Sacramento, CA 95814
(916) 444-FUND
https://buildmomentum.io

Agreement Number: CEC-ARV-21-031

Rose Strauss
Commission Agreement Manager

Elizabeth John
Branch Manager
Medium- and Heavy-Duty Zero Emission Technologies Branch

Hannon Rasool
Director
FUELS AND TRANSPORTATION

Drew Bohan
Executive Director

Table of Contents

1 Executive Summary

Central Coast Community Energy (3CE) is a community choice aggregator that was founded to source clean and renewable electricity at competitive prices for customers throughout Monterey, San Benito, Santa Cruz, Santa Barbara, and San Luis Obispo counties. 3CE funds innovative energy programs designed to lower greenhouse gas emissions and stimulate community reinvestment, including within the transportation sector. To help improve its programs and advance regional zero-emission mobility, 3CE was awarded funding by the California Energy Commission (CEC) to develop a Medium and Heavy-Duty (MHD) Zero Emission Vehicle (ZEV) Blueprint. The goal of the project is to help 3CE improve its programs that accelerate the deployment of MHD zero-emission vehicles (ZEVs) and related infrastructure while advancing science-based sustainability targets.

The Central Coast region's growing population is reliant on trucks and buses moving along the US 101 corridor and within its major population centers.[1] Electrification of this critical MHD vehicle segment has been negligible to date.

Generally, the counties and cities on the Central Coast have yet to adopt specific, targeted MHD EV fleet goals or strategies. While there are DC fast chargers installed along the Central Coast that can charge MHD vehicles (at relatively low rates of charge), local jurisdictions in the region have primarily focused on deploying electric vehicle infrastructure (EVI) for light duty vehicles.[2]

The Blueprint was designed to help 3CE gather information, data, and insights to inform decision-making that will facilitate ZEV-related capital investment, partnership development, and infrastructure deployment in Monterey, San Benito, Santa Cruz, San Luis Obispo, and Santa Barbara Counties. The project was developed in a partnership with Momentum, the lead Blueprint developer and writer.

Stakeholder Engagement

The Blueprint development process involved extensive engagement with internal stakeholders, community-based organizations, regulatory agencies and policymakers, education and workforce training and education partners, industry partners, financial partners, electricity providers, vehicle and equipment manufacturers/vendors, and community stakeholders. In addition, 3CE and Momentum conducted three webinars for local municipal fleet managers, school bus administrators and transit operators in the Central Coast region. The webinars educated regional fleet managers on transportation electrification efforts and gathered input on how 3CE could best support their efforts to transition to ZEVs.

Outreach helped the Blueprint team determine that regional fleet managers have limited bandwidth for planning fleet upgrades and are prioritizing transitioning light-duty EV fleets before focusing on medium- and heavy-duty vehicles. Additionally, the team found that member agencies (city and county agencies, including transit authorities, that have joined the Central Coast Community Energy Joint Powers Authority), were struggling to deploy EV infrastructure, despite having purchased ZEVs that were ready for deployment. Generally, fleet managers in all three fleet categories that were interviewed (transit, municipal, and school bus) are hampered by supply chain challenges. The inability of original equipment manufacturers (OEMs) to deliver school buses and other ZEVs has dramatically slowed fleet vehicle

[1] Association of Monterey Bay Area Governments (AMBAG). (2016) *U.S.101 Central Coast California Freight Strategy Final Report.*

[2] Communication with Regional and Local Governments, 2023

procurement. This has created a downstream effect that is hampering some fleet managers' ability to spend procurement funds. Beyond supply chain challenges, the level of planning required for large-scale deployments of EVs (Light Duty and MHD) has proven to be more time-consuming and involved than expected. Fleet managers have circumvented these challenges by either developing their MHD ZEV inventory in a piece-meal approach or by acquiring vehicles through leases managed by a third party.

Supported by input gathered from the webinars, 3CE plans to support customer's ZEV transitions by creating a clearinghouse of information that provides resources for fleet transitions, as well as a list of funding opportunities, guidance on funding capture, and technical assistance.

Workforce Development and Job Opportunities

The transition to zero-emission vehicles (ZEVs) will lead to new jobs and training opportunities throughout the Central Coast. The Blueprint team identified knowledge gaps for medium-heavy duty (MHD) ZEVs that need to be addressed for workforce success, including the following:

- Zero Emission Technology
- Charging Components
- Battery Theory
- Battery Safety
- Mechanical Aptitude
- Equipment Maintenance
- General Electrical

Organizations that hire staff with these skills and reskill existing staff to adapt to changing technology will be best placed to succeed. The top three job types that are expected to increase with the MHD ZEV transition are equipment vending, operations and maintenance, and infrastructure installation. 3CE may consider looking into ways to support workforce development within its service area.

Reduction of Emissions

The Blueprint team conducted a study on regional pollution and greenhouse gas (GHG) mitigation goals and assessed the benefits of transitioning to zero-emission vehicles (ZEVs) in the 3CE service area. Central Coast air quality is a health concern, particularly in inland and agricultural centers. 3CE serves five counties along the Central Coast, and each air district enforces statewide air quality policies and sets region-specific goals to reduce GHG, air pollutants, and air contaminants.

Medium and heavy-duty (MHD) fleets account for between 10% and 30% of emissions for each Central Coast municipality or county. By transitioning to ZEVs, 3CE member agencies will be able to remove GHGs, air pollutants, and air contaminants from their scope 1 fleet emissions. Because 3CE plans to source 100% of its electricity from zero-emission sources by 2030, all 3CE customers that transition their fleets to electric vehicles will also eliminate their scope 2 transportation emissions at that time.

Central Coast Economy and Freight Movement

The Central Coast region is an important agricultural production area for fresh produce and wine grape production and has other freight-related industries that are critical to the region's economy. The region relies on U.S Highway 101 (U.S. 101) as the primary transportation artery and the major truck route, with approximately 75% of all shipments in the region moved by truck. For this reason, focusing on charging infrastructure along U.S. 101 is likely to provide the greatest benefits for decarbonizing goods and people movement in the region.

To estimate private fleet MHD vehicle use patterns in the region, the Blueprint team examined employment density in the primary MHD fleet-related fields of agriculture, manufacturing, and transportation. High concentrations of agriculture businesses are found along the U.S. 101 corridor, with key clusters located around Salinas, South of Watsonville, Soledad, Santa Maria, and Paso Robles. Manufacturing is a diverse industry in the region, with key clusters in Santa Cruz, near Paso Robles, San Luis Obispo, Santa Maria, and Santa Barbara. Key manufacturing clusters are in Watsonville, along the northern U.S. 101 corridor, San Luis Obispo, Santa Maria, and Eastern Santa Barbara.

Regional freight transportation is conducted mainly with trucking and rail, with connections to other modes such as marine shipping at the Port of Oakland. Transportation and warehousing businesses are concentrated in areas that generally overlap with agriculture and manufacturing clusters. State Routes 46, 129, 152, and 156 are major interregional connecting routes between the Central Coast and the Central Valley that support these businesses and should be included as priorities for EVI investment to ensure zero-emission delivery of goods in the region.

Deployment of Fast Electric Truck Chargers

There are several DC fast chargers throughout the Central Coast region, however most of these charging stations are not accessible for Class 8 vehicles.[3] Private fleet electrification will be severely hampered until MHD electric vehicle infrastructure (EVI) is deployed at sufficient scale to enable movement of electric Class 8 tractor-trailers throughout the region. The Blueprint highlights priority areas for EVI installation based on geographic, demographic, and economic factors.

Electrification Sectors

Within the Central Coast region, there are three types of target locations for EVI deployment: Agricultural and industrial Centers, population centers, and along regional transportation routes. Agricultural and industrial centers such as the Salinas Valley and Santa Ynez Valley are primary targets for EVI installation to enable zero-emission transportation of important Central Coast commodities. Population centers and transit districts are identified as priority areas for MHD EVI installation, including transit agency vehicle depots and public services utilizing MHD vehicles such as waste management, utility maintenance facilities, county services, and school districts. Two ideal location types for initial deployments of EVI along regional transportation routes include existing truck stops and State Roadside Rest Areas (SRRAs). The National Electric Vehicle Infrastructure (NEVI) program can also serve as guidance for initial EVI

[3] SBCAG, SLOCOG, & DKS. (2023). *Central Coast Zero Emission Vehicle Strategy: Administrative draft.*

deployments. Specifically, areas identified as Alternative Fuel Corridors (AFCs) such as U.S. 101, California State Route 1, and California State Route 17 should be prioritized for EVI deployment.

Despite the wide geographic area and plethora of challenges associated with fleet electrification, there are an abundance of funding opportunities and support networks to help guide fleet managers as they electrify fleets. Knowledge sharing through engagement with stakeholders and leaders in the electrification space has been crucial to developing the electrification capabilities of staff throughout the region. Identifying appropriate funding sources and developing innovative financing partnerships will be crucial for successfully electrifying EV fleets on the Central Coast. As shown by the case studies within this Blueprint, there are a variety of viable strategies for deploying MHD ZEVs. Fleet managers should identify the optimal approach for their fleets based on funding, staff capabilities, and equipment availability.

Funding Strategies

The Blueprint also identifies strategies that fleet managers can employ to finance the electrification of their fleets. Public agency funding opportunities such as grants, equipment vouchers, or tax credits, as well as utility company infrastructure programs, are available to those who wish to switch to EVs. These strategies include independent asset procurement, system bundling models, EVI leasing, and EVI-as-a-service models in which a third-party developer owns and operates EV chargers. 3CE offers a range of incentive programs, including rebates and concierge services for agricultural customers, to help reduce greenhouse gas emissions and promote the adoption of electric vehicles.

Blueprint Recommendations

To help 3CE implement the Blueprint and improve its existing transportation programs the Blueprint team developed several recommendations. These recommendations include the following:

1) Develop a comprehensive web-based clearinghouse of resources for fleet managers.
    - Include all relevant information that fleet managers need when planning a fleet conversion.
    - Provide hands-on technical assistance to help customers navigate fleet transitions.
2) Develop a regional MHD EV charging strategy.
    - Coordinate investment in and deployment of MHD electric vehicle support equipment (EVSE) along major Central Coast transportation corridors, including US Hwy 101, with a consortium of stakeholders.
3) Expand 3CE's existing funding programs to support additional customer segments, technologies, and business models.
    - Offer rebates for public infrastructure installation to support the full logistics and supply chain of Central Coast industry, in alignment with the Regional MHD EV Charging strategy.
    - Create new funding opportunities for commercial customers and member agencies seeking charging and grid management solutions.
    - Offer incentives to additional customer segments, including private fleets. The Incentives may cover ZEVs, EVSE, battery Storage, or other advanced technologies (such as vehicle to grid charging or microgrids).
4) Evaluate Trucking and Charging as a Service Partnerships.
    - TaaS and CaaS allow interested parties, including IOOs and small fleets, to utilize zero-emission technologies without high upfront capital costs, lengthy infrastructure deployment and grant applications, maintenance issues and other risks of equipment ownership.

5) Prioritize Equity, Independent Owner Operators and Small Fleets.
    - Develop a targeted technical and financial assistance program for independent owner operators, small fleets, and disadvantaged groups in the MHD fleet space.

6) Support Workforce and Education Training for the MHD ZEV Transition.
    - 3CE could cover the costs for electricians to enroll in the Electric Vehicle Infrastructure Training Program (EVITP), to ensure there are adequately trained electricians available to support 3CE customers as they deploy EVI.

3CE is in a strong position to lead MHD ZEV electrification planning and deployment on California's Central Coast. However, there are various barriers to electrification, such as lack of product options, high upfront costs, and limited planning integration and stakeholder engagement. Regional collaboration and planning, financial subsidies, and education programs are essential to expediting the transition to zero-emission MHDs. Overall, successful implementation of these recommendations requires collaboration with various partners, engagement with fleet owners and operators, and ongoing program refinement.

2 Introduction

As the only local, community-owned electricity provider in the region, Central Coast Community Energy (3CE) is uniquely positioned to lead electrification planning and deployment on California's Central Coast. The CEC issued GFO-20-601 entitled "Blueprints for Medium- and Heavy-Duty Zero-Emission Vehicle Infrastructure" under the CEC's Clean Transportation Program. To be eligible for funding under GFO-20-601, projects must also be consistent with the CEC's current Clean Transportation Program Investment Plan, updated annually. In response to GFO-20-601, the Recipient submitted Proposal #4, which was funded by the CEC in April 2021.

The 3CE Medium and Heavy Duty (MHD) Zero Emission Vehicle (ZEV) Blueprint ("Blueprint") gathered information, data, and insights to inform decision-making that will facilitate ZEV-related capital investment, partnership development, and infrastructure deployment. 3CE's overarching Blueprint goal was to help its customers with MHD fleets accelerate the deployment of ZEVs and related infrastructure while advancing science-based sustainability targets. This Blueprint differs from other CEC-funded Blueprints because it focuses on supporting customer MHD fleet transitions as opposed to internal fleets. Momentum is the key subcontractor for the project and served as the lead Blueprint developer and writer.

3CE's efforts to support customer ZEV Fleet transitions are in alignment with its goals to reduce emissions, build a cleaner grid, and invest in the Central Coast community. 3CE customers are given the option to source their electricity from renewables such as solar, wind, and geothermal and 3CE is on a path to sourcing 100% clean and renewable energy by 2030 – 15 years ahead of the state goal.

3CE operates as a community-owned not-for-profit electricity provider. Because of this, revenue gets reinvested in the communities 3CE serves. Reinvestment comes in the form of providing affordable and fair rates, job creation, supporting local economies and businesses, as well as providing access to resources, rebates, and incentives. 3CE offers financial and educational resources as well as technical assistance to customers. This includes rebates for new and used electric vehicles, charger equipment, and the labor associated with installing a charger.

2.1 Problem Statement

There is an urgent need to tackle climate change. Diesel truck exhaust contributes to global climate change and increases human health risks, while the alternatives to fossil fuels for medium-duty and heavy-duty (MHD) vehicles are not well known to most freight-related businesses.

The five county Central Coast region is one of the most important agricultural production areas of California – and includes manufacturing, food processing, and other freight-related business clusters, which are critical to the state's economy. In total, goods movement-dependent industries[4] provide approximately one third of jobs and account for more than $13 billion of the $52.4 billion gross regional product. These industries are reliant on trucks moving along the US 101 corridor – stretching 270 miles from Silicon Valley to the Los Angeles Basin, as well as east-west corridors from the coast to the San Joaquin Valley. To sustainably meet the needs of the region's growing population – projected to hit 1.7

[4]Goods movement-dependent industries include manufacturing, retail trade, wholesale trade, construction, utilities, mining, transportation/warehousing, and agriculture.

million by 2030 – cost-efficient and zero-emission freight movement is essential.[5] To begin building this clean, all-electric future, the region has invested strongly in charging infrastructure for light-duty vehicles, and developed comprehensive plans for electrification in the light-duty segment. However, MHD trucks represent 39% of all transportation emissions in the region, and electrification of the critical MHD segment has been negligible to date.[5] MHD electrification throughout the Central Coast region has been prevented by a combination of barriers, including a lack of a comprehensive strategic vision for MHD ZEVs in the Central Coast region; a lack of product options in the MHD segment (until recently) – especially in heavy goods movement and agricultural applications; high upfront costs for both ZEV charging infrastructure and vehicles -- and limited business models able to overcome first-cost barriers; limited utility and local planning integration to develop programs specific to MHD needs; and limited stakeholder engagement, specifically of fleet operators operating internal combustion engine fleets.

Recognizing these urgent and unmet needs, Central Coast Community Energy (3CE) developed the *Central Coast Medium and Heavy-Duty ZEV Blueprint,* with the intention to catalyze the accelerated deployment of MHD ZEVs and ZEV charging infrastructure.

3 Project Background

Assembly Bill (AB) 118 (Núñez, Chapter 750, Statutes of 2007), created the Clean Transportation Program (formerly known as the Alternative and Renewable Fuel and Vehicle Technology Program). The statute authorizes the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. AB 8 (Perea, Chapter 401, Statutes of 2013) re-authorizes the Program through January 1, 2024, and specifies that the CEC allocate up to $20 million per year (or up to 20 percent of each fiscal year's funds) in funding for hydrogen station development until at least 100 stations are operational. The Clean Transportation Program has an annual budget of approximately $100 million and provides financial support for projects that:

- Reduce California's use and dependence on petroleum transportation fuels and increase the use of alternative and renewable fuels and advanced vehicle technologies.
- Produce sustainable alternative and renewable low-carbon fuels in California.
- Expand alternative fueling infrastructure and fueling stations.
- Improve the efficiency, performance, and market viability of alternative light-, medium-, and heavy-duty vehicle technologies.
- Retrofit medium- and heavy-duty on-road and non-road vehicle fleets to alternative technologies or fuel use.
- Expand the alternative fueling infrastructure available to existing fleets, public transit, and transportation corridors.
- Establish workforce training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies.

[5]US 101 Central Coast California Freight Strategy Final Report, Cambridge Systematics, April 13, 2016, p. 3-2.

3.1 Project Goals

Goals of the Blueprint

The goal of the Blueprint was to develop a comprehensive and replicable strategic vision to accelerate deployment of MHD ZEVs in California's Central Coast region, which includes a Blueprint report addressing infrastructure needs, technology, finance, and education, and ensuring that this Blueprint is available to, and benefits, the public.

Objectives of the Blueprint

- Identify the actions and milestones needed for implementation of MHD ZEVs and ZEV charging and refueling infrastructure in the Central Coast region.
- Make the Blueprint available to the public.
- Minimize the risks and uncertainties surrounding the design, permitting, planning, and financing of the ZEV infrastructure network through engagement.
- Analyze the combination of technologies and systems that offer the best mix of economic, environmental, and technical performance specific to the Central Coast region.
- Document actions or steps already adopted by local jurisdictions and the impact of those actions or steps on the development of MHD ZEV infrastructure.
- Identify analytical tools, software applications, and data needed to improve future MHD ZEV infrastructure planning activities.
- Identify each task or area of responsibility required of the project partners and stakeholder groups to develop a replicable approach for fleets transitioning to zero-emission.
- Develop an outreach strategy to educate local communities on the planning efforts and potential future impacts.
- Work with community colleges, regional community-based organizations (CBOs), and community leaders to develop workforce strategies that will enable training, education, and readiness for the local workforce to obtain the knowledge, skills, and ability to develop, support, and maintain the MHD ZEV fleets.
- Summarize the types of jobs that will be created for the local community.
- Identify goals to reduce GHG emissions, criteria air pollutants, and toxic air contaminants for the region, and local emitters that would need to be targeted.
- Identify the benefits that would accrue to disadvantaged communities (DACs), low-income communities, priority populations, and tribal lands to the maximum extent possible.

3.2 Project Team

3CE served as the prime applicant and lead agency, while Momentum provided Blueprint planning and stakeholder engagement in fulfillment of the Project Scope.

Central Coast Community Energy: 3CE is a Community Choice Energy agency established by local communities to source clean and renewable electricity at competitive prices for customers throughout Monterey, San Benito, Santa Cruz, and San Luis Obispo Counties, with expansion to in the City of Atascadero and Unincorporated San Luis Obispo planned for 2025. 3CE's mission includes transportation electrification and as such, the agency has sponsored several significant programs to accelerate electrification in the region, including its Electrify Your Ride, Electric Bus, Electrify Your Fleet, and Charge

Your Fleet programs. In addition, 3CE offers technical assistance to its Member Agencies and Commercial Customers for EV Fleet and EV Charging planning through the Plan Your Fleet and Electrify Your Ride Concierge Services.

As part of the EV program design and development process, staff engaged EV drivers, local government staff, PG&E, SCE, employers, community members, and stakeholders. As the local community-controlled electricity provider, 3CE prides itself on close relationships with customers, and is ideally suited to engage a broad stakeholder coalition to likewise accelerate MHD fleet electrification and infrastructure deployment. In addition, 3CE staff have the expertise to assess Vehicle-Grid-Integration issues and opportunities, to progressively optimize both V1G (smart charging) and fully bi-directional charging as V2G systems and standards are deployed in the MHD space.

***Momentum**:* Founded in 2005, Momentum designs, develops, and deploys innovation campaigns for forward-thinking organizations—from entrepreneurs to public agencies and Fortune 500 companies—that research, demonstrate, commercialize, and operate transformative transportation, energy, water, and manufacturing technologies. Deeply invested in the MHD ZEV transition, Momentum has provided support for dozens of grant funded projects statewide that support development, demonstration, and commercialization of MHD ZEVs. Highlights include multiple ZEV drayage vehicle demonstrations statewide, zero-emission port equipment deployments, MHD ZEV Blueprinting efforts with the Port of Long Beach, and multiple early-stage ZEV bus/transit upgrades and deployments, among others. Momentum also develops and manages strategies that support economic development and social equity goals in disadvantaged and low-income communities. Momentum's Blueprint effort was led by John Friedrich, Nicholas Pieper and Van Wifvat.

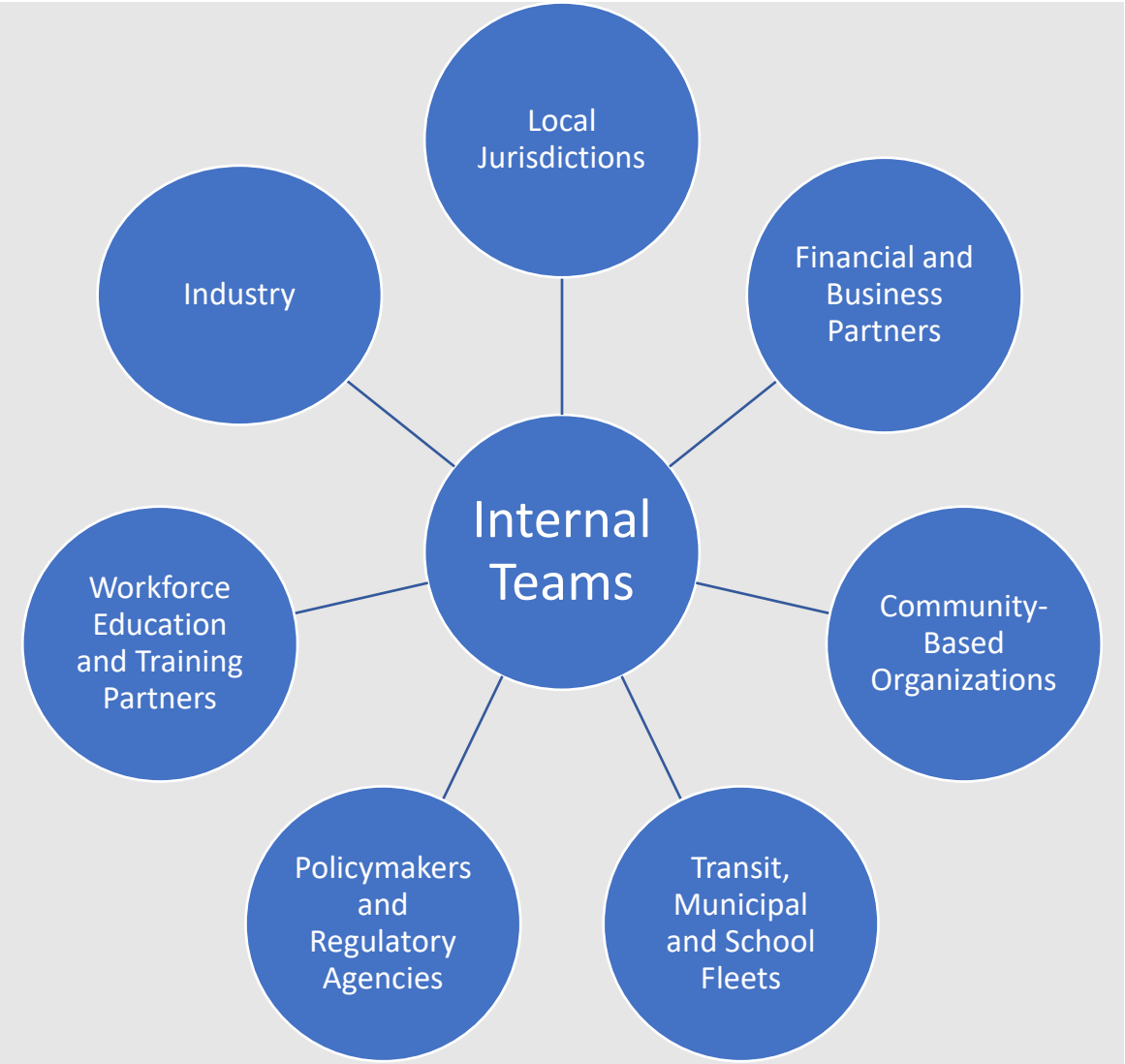
4 Community and Stakeholder Engagement

This MHD Blueprint effort served as an opportunity to engage community stakeholders to accelerate the region's transition of MHD fleets to zero-emission alternatives. The goal of this task was to bring together industry participants, 3CE stakeholders, and community leaders to foster productive and thoughtful dialogue around the deployment of MHD ZEVs and infrastructure. Perspectives were shared about challenges, risks, concerns, and opportunities.

Outreach efforts included 3CE staff, regional transit agencies, municipalities, school districts, medium and heavy-duty ZEV manufacturers, technology developers, equipment vendors, local jurisdictions and planning organizations, transit agencies, school districts, municipal fleet managers, financial organizations, regional workplaces, and community-based organizations (CBOs).

The Community and Stakeholder Engagement Report identified opportunities and challenges associated with MHD ZEV infrastructure deployments, including electricity and hydrogen-based systems. The outcomes of this task informed the work done within other tasks and are summarized below.

4.1 Participating Organizations



4.2 Overview of Input Provided

4.2.1 Internal Stakeholders

Internal stakeholders are representatives from within 3CE departments or operating groups that will be impacted by the ZEV transition. The transition to ZEV technologies will impact multiple divisions of the organization, including program staff, finance, and senior management. In addition, 3CE is guided by deep engagement of diverse stakeholders, including its Policy Board, Operations Board, and Community Advisory Council.

4.2.1.1 3CE Operations and Policy Board

3CE's policy and operations board were updated on the progression of the Blueprint through regular activity updates. Upon completion, the Blueprint will be presented to them, and used to inform decision making.

4.2.1.2 3CE Community Advisory Council

In support of the Blueprint and 3CE's Regional Transportation Electrification Action Plan, 3CE and Momentum staff convened a discussion with 3CE's Community Advisory Board on December 7th, 2022. 3CE's community advisory council (CAC) consists of individuals from the following local and regional jurisdictions:

- Monterey County (6 members)
- San Benito County (2 members)
- San Luis Obispo County (2 members)
- Santa Barbara County (2 members)

The presentations provided at the meeting served as a catalyst for the board to recommend specific actions that can be taken to support regional transportation electrification. The board was familiarized with the current state of MHD vehicle electrification and what technologies exist on the market today. Board members expressed concerns over the amount of space that ZEV infrastructure will require along the Central Coast. Members also advised that, for a region as large as the Central Coast, there will be required ongoing stakeholder engagement for years to gain the large amounts of information required to successfully implement widespread EV charging. Challenges related to limited charging access in rural areas of the Central Coast and the expansion of broadband in these areas to support charging infrastructure. County representatives raised concerns over utility timeliness and cooperation on grid upgrades as well as permitting. Building and safety staff have been overwhelmed and unable to approve permits for EV chargers. The CAC members expressed that the region is lagging other regions of California in transportation electrification. Council members were asked to vote on their current priority for transportation electrification from among the following options:

1. Light-duty vehicles
2. Transit buses
3. School buses
4. All other MHD vehicles

Nearly all the members expressed that electrifying light duty vehicles is the top priority for their county. One member emphasized the importance of electrifying transit vehicles. They expressed that market conditions are driving the advancement of light-duty EVs. However, the regional governments had a duty to support members who do not own cars. A different member emphasized that school buses are important for similar reasons. The board also discussed the importance of equity in electrifying MHD vehicles within their respective counties.

When asked to prioritize potential 3CE actions to support MHD electrification, the board emphasized support for enhancing stakeholder coordination and optimizing 3CE's incentives for MHD electrification. After the board finished deliberations, they received public comment from external stakeholders that attended the meeting. A representative for the Electric Vehicle Association communicated that the priority for EV infrastructure should be to encourage charging during the daytime while there is abundant energy available. They also expressed that the EV transition will be easier in DACs once more used EVs become available. Another public commenter expressed that maintenance and upkeep of EV chargers is a challenge because chargers fall into disrepair frequently and that private companies that sell EVs and others will be adding chargers where they sell vehicles or provide services.

4.2.2 Community Based Organizations

CBOs represent the communities which will interact with the proposed ZEVs and supporting infrastructure. Generally, CBOs are expected to be supportive of the transition away from fossil fueled vehicles. CBOs including prominent local environmental justice and equity groups will be engaged in a manner that creates a dialogue about the opportunities and concerns that are presented as part of a transition to ZEVs. Outreach was conducted to a selected cross-section of Community Based Organization partners including:

- Community Environmental Council (Santa Barbara)
- Ecology Action
- Electric Drive 805 (formerly Plug-in Central Coast)
- C5 – Central Coast Clean Cities Coalition
- Green Light Labs
- Regeneracíon

Many community-based organizations contacted were struggling considerably with bandwidth constraints. Of the organizations contacted to fill out a survey, the Blueprint team received no responses. Due to these constraints, the Blueprint team decided to focus their efforts on municipal, transit, school bus and industrial stakeholders as they represent the primary users of MHD vehicles and infrastructure in the region. Descriptions of each of the abovementioned community-based organizations are included in Appendix 2.

4.2.3 Local Public Entities

Public entities in 3CE's service territory are all required to comply with the California Air Resource Board Advanced Clean Fleets regulation, which requires that 50% of new municipal fleet purchases be ZEVs in 2024, and 100% beginning in 2027 (or adherence to a fleet transition milestone schedule). This regulatory driver means municipalities will all be looking to 3CE for support and guidance in making the required transition to ZEVs. More information about the Blueprint team's engagement with local public entities can be found in Sections 5, 6, and Appendix 2.

4.2.4 Municipal Fleet managers

3CE conducted outreach with local municipal fleet managers during a municipal fleet webinar held in the Fall of 2022. The webinar educated and fostered communication between the parties in attendance. The webinar consisted of presentations from the County of Santa Barbara Energy Division and fleet services and fleet managers for the city of San Luis Obispo and the public works department at Long Beach, as well as Momentum and 3CE. The City of Long Beach, while outside 3CE territory, was asked to attend to share information as they have ambitious fleet electrification goals and were developing their own MHD electrification Blueprint. Each presenter outlined the state of transportation electrification efforts for their respective municipal fleets.

Webinar attendees included representatives from the municipalities and counties of Santa Barbara, Goleta, Monterey, Watsonville, Santa Cruz, San Benito, San Luis Obispo, Carmel, and Long Beach. The findings from these presentations and related research and discussions can be found in the Task 3.3.2 Central Coast Fleet Electrification Case Studies. After the presentations input was gathered from the webinar's attendees on how to best proceed with MHD vehicle electrification in the region, and how 3CE could support these efforts. Key takeaways included the following:

- Cities and counties in the region have limited bandwidth and are prioritizing transitioning light-duty EV fleets before focusing on MHD vehicles.
- Infrastructure needs to be built before purchased ZEVs are ready for deployment. Long wait times for installing EVSE mean that local jurisdictions were unable to use EVs that were ready for delivery until refueling infrastructure issues were resolved, delaying the transition by several months.
- EV charging infrastructure companies offer turnkey solutions, which can reduce costs and deployment times. Currently, regional jurisdictions may end up relying on job order contracting but turnkey EV infrastructure deployment would likely be easier for subsequent deployments.
- Load management systems are essential for balancing building and fleet energy needs. Power infrastructure companies can set up load management systems that enable EV chargers to limit the energy use of the vehicle to prevent the circuit it is connected to, which likely also powers nearby buildings, from being overdrawn. These load management systems are a common tool to avoid the need for new grid upgrades.

Municipal fleet managers in 3CE's service territory were also contacted to fill out a survey. Survey results indicating fleet managers primary goals, technology preference, primary concerns, and funding outlooks are included in Appendix 1. Respondents were asked to rank the most important benefits to ZEVs. The results are shown in the table here:

Table 1: Municipal fleet ZEV benefit survey results

	1	2	3	4	5	TOTAL	SCORE
Improving air quality	18.18% 2	9.09% 1	36.36% 4	27.27% 3	9.09% 1	11	3.00
Reducing greenhouse gas emissions	18.18% 2	36.36% 4	18.18% 2	9.09% 1	18.18% 2	11	3.27
Providing jobs	9.09% 1	0.00% 0	18.18% 2	18.18% 2	54.55% 6	11	1.91
Meeting regulatory requirements	27.27% 3	27.27% 3	9.09% 1	27.27% 3	9.09% 1	11	3.36
Helping achieve agency goals	27.27% 3	27.27% 3	18.18% 2	18.18% 2	9.09% 1	11	3.45

Survey attendants were also asked to rank their primary concerns about converting to ZEV vehicles, with results shown in Table 2.

Table 2: Municipal fleet ZEV concerns survey results

	1	2	3	4	5	TOTAL	SCORE
Reliability	27.27% 3	36.36% 4	27.27% 3	0.00% 0	9.09% 1	11	3.73
Affect on operations	18.18% 2	27.27% 3	36.36% 4	18.18% 2	0.00% 0	11	3.45
Cost	45.45% 5	9.09% 1	18.18% 2	18.18% 2	9.09% 1	11	3.64
Maintenance	0.00% 0	18.18% 2	9.09% 1	36.36% 4	36.36% 4	11	2.09
Lack of information about which Zero Emission options are available/best	9.09% 1	9.09% 1	9.09% 1	27.27% 3	45.45% 5	11	2.09

The survey concluded with survey respondents being asked to rank a list of options for how 3CE can best support the transition to ZEV MHD municipal fleet vehicles. A clearinghouse of information that provided a list of funding opportunities and guidance on funding capture was chosen as the top priority, followed closely by 3CE optimizing its role in funding and support for MHD EV fleets and infrastructure. Charts indicating the survey results are included in Appendix 1.

4.2.5 Transit Operators

3CE and Momentum conducted outreach with transit agencies in the region during a transit fleet webinar held in the Fall of 2022. The webinar served to educate and foster communication between the parties in attendance. The webinar consisted of presentations from the Santa Barbara County Association of Governments, (SBCAG), the Antelope Valley Transit Authority (AVTA), and Momentum. AVTA was invited because, although they don't operate in the Central Coast region, they are the first and only transit agency in California to fully electrify its fleets. Each presenter outlined the state of transportation electrification efforts for their respective municipal fleets and strategies they were pursuing to produce optimal results. Attendees included representatives from the Santa Barbara Clean Air Express, The Breeze Bus, Santa Ynez Valley Transit, San Luis Obispo Regional Transit Authority, San Luis Obispo Council of Governments, Monterey-Salinas Transit, City of Guadalupe, and the San Benito County Express. After the presentations, input was gathered from the webinar's attendees on how to best proceed with MHD vehicle electrification in the region, and how 3CE could support these efforts. The findings from this webinar and related research and discussions can be found in the Task 3.3.2 Central Coast Fleet Electrification Case Studies.

Transit fleet managers were also asked to conduct a survey, the results of which are included in Appendix 1. The representatives were also asked to rank the most important benefits of the transition to ZEV transit vehicles, the results of which are shown below.

Table 3: Transit fleet ZEV benefit survey results

	1	2	3	4	5	TOTAL	SCORE
Improving air quality	57.14% 4	14.29% 1	0.00% 0	28.57% 2	0.00% 0	7	4.00
Reducing greenhouse gas emissions	0.00% 0	42.86% 3	42.86% 3	0.00% 0	14.29% 1	7	3.14
Providing jobs	0.00% 0	14.29% 1	28.57% 2	0.00% 0	57.14% 4	7	2.00
Meeting regulatory requirements	33.33% 2	16.67% 1	16.67% 1	33.33% 2	0.00% 0	6	3.50
Helping achieve agency goals	0.00% 0	16.67% 1	0.00% 0	50.00% 3	33.33% 2	6	2.00

Representatives also ranked their primary concerns about transitioning to ZEVs.

Table 4: Transit fleet ZEV concerns survey results

	1	2	3	4	5	TOTAL	SCORE
Reliability	42.86% 3	42.86% 3	0.00% 0	14.29% 1	0.00% 0	7	4.14
Affect on operations	0.00% 0	28.57% 2	57.14% 4	14.29% 1	0.00% 0	7	3.14
Cost	42.86% 3	28.57% 2	28.57% 2	0.00% 0	0.00% 0	7	4.14
Maintenance	0.00% 0	0.00% 0	16.67% 1	66.67% 4	16.67% 1	6	2.00
Lack of information about which Zero Emission options are available/best	16.67% 1	0.00% 0	0.00% 0	0.00% 0	83.33% 5	6	1.67

The survey concluded with respondents asked to rank a list of options for how 3CE can best support the transition to ZEV transit vehicles. A clearinghouse of information that provided a list of funding opportunities and guidance on funding capture was selected as the top priority, followed closely by 3CE evaluating funding and programmatic support needed for public fast charging and refueling infrastructure along transportation corridors in the region. Charts indicating the survey results are included in Appendix 1.

4.2.6 School Districts

3CE conducted outreach with school bus fleet managers in the region during a webinar held in the Fall of 2022. The webinar consisted of presentations from Salinas Elementary School District, Santa Cruz City Schools, and Momentum. After the school districts presented the strategies they were employing to electrify their fleets, 3CE hosted a discussion between webinar attendees and organizers. Webinar attendees included representatives from the following school districts:

- Salinas Unified
- Guadalupe Union
- San Luis Coastal Unified
- Scotts Valley Unified
- Live Oak
- Alisal Union

- Gonzales Unified
- Buellton Union
- Santa Cruz City
- Orcutt Union
- Hope Elementary

The findings from the webinar can be found in the Task 3.3.2 Central Coast Fleet Electrification Case Studies. School bus fleet managers were also asked to participate in a survey, the results of which are shown in Appendix 1. The districts were also asked to rank the most important benefits of the transition to ZEV transit vehicles, the results of which are shown below.

Table 5: School bus fleet ZEV benefit survey results

	1	2	3	4	5	TOTAL	SCORE
Improving air quality, including for student riders and bus drivers	40.00% 2	20.00% 1	20.00% 1	20.00% 1	0.00% 0	5	3.80
Reducing greenhouse gas emissions	0.00% 0	40.00% 2	20.00% 1	20.00% 1	20.00% 1	5	2.80
Providing jobs	0.00% 0	0.00% 0	20.00% 1	0.00% 0	80.00% 4	5	1.40
Meeting regulatory requirements	20.00% 1	20.00% 1	20.00% 1	40.00% 2	0.00% 0	5	3.20
Helping achieve school and community goals	40.00% 2	20.00% 1	20.00% 1	20.00% 1	0.00% 0	5	3.80

Representatives also ranked their primary concerns about transitioning to ZEV school buses.

Table 6: School bus fleet ZEV concerns survey results

	1	2	3	4	5	6	TOTAL	SCORE
Reliability	40.00% 2	40.00% 2	0.00% 0	0.00% 0	0.00% 0	20.00% 1	5	4.60
Affect on operations	20.00% 1	20.00% 1	0.00% 0	40.00% 2	20.00% 1	0.00% 0	5	3.80
Cost	40.00% 2	20.00% 1	20.00% 1	20.00% 1	0.00% 0	0.00% 0	5	4.80
Maintenance	0.00% 0	0.00% 0	0.00% 0	40.00% 2	60.00% 3	0.00% 0	5	2.40
Lack of information about which school bus options are available/best	0.00% 0	0.00% 0	20.00% 1	0.00% 0	0.00% 0	80.00% 4	5	1.60
Delays in acquiring electric school buses and charging infrastructure	0.00% 0	20.00% 1	60.00% 3	0.00% 0	20.00% 1	0.00% 0	5	3.80

The survey concluded with respondents asked to rank a list of options for how 3CE can best support the transition to ZEV transit vehicles. The standout option chosen was for 3CE to optimize its role funding and support for ZEV school bus fleets and infrastructure and highlight opportunities for customers to stack 3CE incentives with state and federal offerings. Charts indicating the survey results are included in Appendix 1.

4.2.7 Cities, Counties, and Permitting Entities

4.2.7.1 City and County Governments

The Blueprint team conducted engagement for the Blueprint through its technical advisory committee (TAC) with several representatives from Central Coast regional entities. Members of the TAC included representatives from the cities of Watsonville, Guadalupe, Santa Barbara, and the Association of Monterey Bay Area Governments (AMBAG). The TAC meeting familiarized attendees with the goals of the Blueprint and then garnered their input on a variety of subjects. Key outcomes from the TAC meeting include the following:

- Grid capacity for MHD vehicle charging is a significant concern and identifying priority areas for expanding grid capacity can also be a challenge.
- Implementing grid infrastructure to support last mile charging infrastructure is a challenge that needs to be examined.
- Additional work to identify priority areas for infrastructure upgrades is needed.
- 3CE can benefit stakeholders by increasing awareness of grant opportunities and encourage flexibility to garner funds without carrying upfront costs of equipment.
- Education of stakeholders on the equipment available for the transition is necessary for less-informed fleet managers.

Generally, the counties and cities on the Central Coast have yet to adopt specific, targeted MHD EV charging stations (EVCS) goals or strategies. While there are some DC fast chargers installed along the Central Coast that are viable for charging MHD vehicles, local jurisdictions in the region have primarily focused on deploying EVI for light-duty vehicles. The region will benefit from a more concerted effort to understand and prioritize MHD EVI deployments.

4.2.7.2 Permitting Entities

Due to the high number of permitting entities for EV charging station on the central coast, outreach to these organizations focused on identifying the status of EVCS permitting in each of the counties and cities of the region. More information about the specific status of EVSE permitting can be found in section 5.1.1 and Appendix 2.

4.2.8 Regional Policymakers and Regulatory Agencies

Policymakers and regulatory agencies guide legislation and funding that supports state and federal efforts to achieve clean air objectives. Support from policymakers and regulatory agencies to demonstrate and support the transition to ZEVs will be critical to early adoption of zero-emission technologies ahead of full market commercialization.

Outreach to policymaker and agency stakeholders was conducted to explore:

- Discussion of relevant policies, regulations, and technical reports
- Discussion of relevant funding and technical assistance programs
- Progress towards state and federal objectives, including opportunities to develop or use statewide collateral, tools, case studies, or frameworks
- Synergies with related climate and public health issues and policy that have aligned goals and objectives
- Participation in collaborative, multi-state, or regional initiatives

To advance its many environmental and clean energy policies, California has developed a well-established ecosystem of incentive opportunities, funding programs, and financing mechanisms to offset the capital and operational expenses associated with deploying advanced energy and zero-emission transportation technologies. California's cleantech funding ecosystem is unique in that it extends beyond state-level incentives to include many opportunities at the local and regional levels. See Appendix 1 for outreach and engagement with California state agencies. The following section includes information about relevant regional agencies with programs that cover 3CE customers.

In 2021, EV Communities Alliance, in collaboration with the Santa Barbara Air Pollution Control District, San Luis Obispo Air Pollution Control District, Ventura Air Pollution Control District, and Central Coast Clean Cities Coalition, created an Electric Vehicle Readiness plan for the three counties. While most of the document focusses on light-duty EV deployment, the plan does contain language and provisions for MHD EVs. These provide guidance for how counties should tailor their green fleet programs and what priorities should be set to advance green fleets, including:

- Reducing costs
- Preparing for future conditions (including potential fuel price spikes or supply disruptions) and regulatory requirements
- Reducing the fleet's harmful impact on the environment and human health
- Support the advancement of AB 32 goals, SB 375 Sustainable Communities Strategies, and municipal and county-level Climate Action Plans
- Develop fuel efficiency targets (which are convertible to GHG and other criteria pollutant emissions factors)
- Analyze fleet duty cycles in comparison with available PEVs about range, charging requirements, and operating costs
- Develop a comprehensive green fleet plan that includes goals, milestones, staff responsibilities, commitments from top management, and monitoring and implementation strategies
- Assess opportunities for joint procurement with other public and private fleet operators, in cooperation with the California PEV Collaborative and statewide Clean Cities Coalitions

Representatives emphasized that collaboration to achieve these priorities is essential for Central Coast fleets. Continued engagement and dialogue to further implement the readiness plan will be a key element of advancing zero-emission MHD fleets in the region.

4.2.8.1 Association of Monterey Bay Area Governments (AMBAG)

A conversation took place between the Blueprint team and a representative from the Association of Monterey Bay Area Governments (AMBAG), regarding the location of electric vehicle support equipment for medium and heavy-duty vehicles. The team discussed outreach with Caltrans District 5 and referenced a draft document on business opportunities along U.S. 101.

AMBAG is starting a freight study and there is concern about the capacity of electric vehicles to meet freight needs. Some stakeholders said hydrogen vehicles may be needed instead. AMBAG reported that there is a lot of hesitation about adopting electric vehicles for freight and long-distance routes. Transit fleets are the quickest to adopt electric vehicles, but there are concerns about their operability during emergency periods and significant fears over range and costs.

CalVans, a Joint Powers Authority that does van pooling for agricultural workers, is planning to electrify 280 of their vans in 2024. The vans are equipped with telematics and there is a wealth of data available on their routes. The company is thinking about mobile charging and on route charging in rural areas.

AMBAG reported that the adoption of electric vehicle technology has not been equitable, with very few chargers in the Salinas Valley and investment in infrastructure concentrated in more privileged areas with high electric vehicle adoption. Poor communities do not see electric vehicles as a part of their reality. AMBAG was asked about concerns of EV support equipment contributing to gentrification in DACs. They replied that generally people perceive vehicle electrification as a privileged undertaking, but they weren't sure how this relates to the medium and heavy-duty vehicle sector.

AMBAG is considering grants for sustainable transportation planning for climate adaptation and there is a perspective that funding should focus on securing hardware rather than planning. To add resiliency on the ground, outreach and planning for operations in non-standard scenarios, like emergencies, are necessary. This includes making sure equipment is functioning and futureproofing with charging hubs during emergency events.

AMBAG is primarily a planning agency and individual counties are better suited for implementation. Salinas Valley, Watsonville, and Hollister are target areas for more EVSE development, with infrastructure in the area leaning towards DC fast charging to support tourism and regional travel. It is not known whether grower-shipper vehicles are independently owned or leased.

Landfills in the region, such as John Smith, Buena Vista, and Monterey, record weight and origin of waste and could provide data on other medium and heavy-duty vehicle use in the region. Woody biomass waste and its transportation are a significant question in the region. Many jurisdictions in the region are represented at 3CE working groups discussing MHD electrification, but just as many agencies are not represented due to limited bandwidth. Military traffic on U.S. 101 near Vandenberg Airforce Base is a significant source of MHD vehicle traffic in the area. The meeting concluded with the next steps and a plan for further engagement on the subject discussed.

4.2.8.2 Air Pollution Control Districts

The California Central Coast consists of the three air districts (APCDs): The Monterey Bay Unified Air Resources District, San Luis Obispo County Air Pollution Control District and the Santa Barbara County Air Pollution Control District. While 3CE and Momentum have communicated with the regions APCD's concerning the Blueprint, the Blueprint team focused outreach on identifying funding opportunities offered through the air districts in response to stakeholder feedback. These opportunities are described in Section 7.3.

Figure 1: California Air Districts. Source: CARB

4.2.9 State and Federal Funding Agencies

The ZEV transition will require significant upfront capital investment. Items to purchase will be diverse and can include charging equipment and related infrastructure, fleet vehicles, energy generation and storage equipment, related infrastructure upgrades and more. The funding and financing for these items will vary dramatically, how much it costs, federal and state funding opportunities, and what sort of entity (government, large or small business, non-profit etc.) may be the borrower. To enable the ZEV transition, California has developed a well-established ecosystem of incentive opportunities, funding programs, and financing mechanisms to offset the capital and operational expenses associated with deploying advanced energy and zero-emission transportation technologies. California's cleantech funding ecosystem is unique in that it extends beyond state-level incentives to include many opportunities at the local and regional levels,

The project team conducted outreach with state and federal funding agencies to explore a variety of topics, including existing funding and financing programs, programs requirements and mechanisms. Section 7.3 of the Blueprint provides an overview of the Blueprint Team's research on the relevant state funding, research, and investment programs. More information can be found in Appendix 2.

4.2.10 Industry Partners

The Blueprint team also conducted engagement with some industry stakeholders through its technical advisory committee (TAC) with representatives from Caliber Strategies, Frontier Energy, and DKS. The input from the TAC meeting can be found in section 10.4.1. Agricultural industry stakeholders were not engaged for the Blueprint process because 3CE already maintains extensive communication with this sector regarding the electrification of MHD vehicles.

4.3 Workforce Training and Education Outreach, Strategies, and Job Opportunities

The Blueprint team conducted outreach and engagement with regional and statewide Workforce Training and Education agencies. The results of the outreach are outlined in the following sections, as well as section 3.3.1 and Appendix 3.

4.3.1 Outreach

4.3.1.1 Community Colleges

The California Community College system is the country's largest and most accessible higher education system. Many of its community college partners offer programs that are at least tangentially relevant to the MHD ZEV transition. Still, there is a significant need for this system to prioritize investments in its automotive and electrical trades programs to meet the unique demand for MHD ZEVs. Automotive programs are more likely to offer dedicated coursework on EV technologies, while electricians tend to learn about EV infrastructure through post-graduate work and apprenticeships. Presently, there are two community colleges in the state that offer training specifically on MHD ZEVs. San Bernadino Valley College offers MHD ZEV training at the certificate level, while Long Beach City College offers training at the course level (just one class). Santa Barbara Community College is the only school on the central coast that offers coursework on hybrid and electric vehicles. De Anza College, located within an hour of Santa Cruz in the South Bay, also offers coursework on electric and autonomous vehicles. Still, no central coast community colleges offer education and workforce training in MHD ZEVs. Table 7 contains more information on the relevant California Community College automotive programs in the Central Coast and Southern California.

Table 7: Central Coast and Southern California MHD and ZEV Programs.

Hartnell College (Salinas)	AS degrees and Certificates in Advanced Diesel Mechanics and Advanced Transportation, no EV courses
Cabrillo College (Santa Cruz)	No automotive programs, AS degrees and certificates in construction energy management and solar-derived energy management
Santa Barbara City College	AS degrees and certificates in Automotive Technologies, coursework in hybrid vehicles
Cuesta College (San Luis Obispo)	Multiple AS degree and Certificates in Automotive technology, no EV courses
Monterey Peninsula College	AS degree and certificates In Automotive Technology, coursework in hybrid and alternative powertrains (hybrid and EVs). Ongoing partnership with Subaru and Mercedes-Benz
De Anza College (Cupertino)	AS degree and certificates in Automotive Technology, including an Autonomous and Electric Vehicle Career Pathway Program. The program is sponsored by autonomous vehicle company Nuro and offers autonomous and electric vehicle technician level I and II certificates.

San Bernardino Valley College	AS degree Automotive Technology, Medium/Heavy Duty Clean Vehicle Technology certificate, zero net energy certificate.
Long Beach City College	AS degree in Advanced Transportation Technology includes one course on Heavy Duty Alternative Fuels

4.3.1.2 Workforce Education and Training Organizations

Outside community colleges, several regional and statewide workforce-oriented organizations are tailored to transportation and electrical trades. These include workforce education and training organizations, original equipment manufacturers (OEMS), equipment suppliers, and unions. These organizations, and their relevance to the MHD transition, are described in Appendix 3.

4.3.2 Workforce Training and Education Strategies

3CE's transition to ZEVs will create new jobs and necessitate new training and educational efforts. The first step in developing a capable ZEV workforce involves identifying and defining the skills and capabilities needed for a business utilizing ZEVs to succeed. For MHD ZEVs, these knowledge gaps broadly exist in 8 categories.

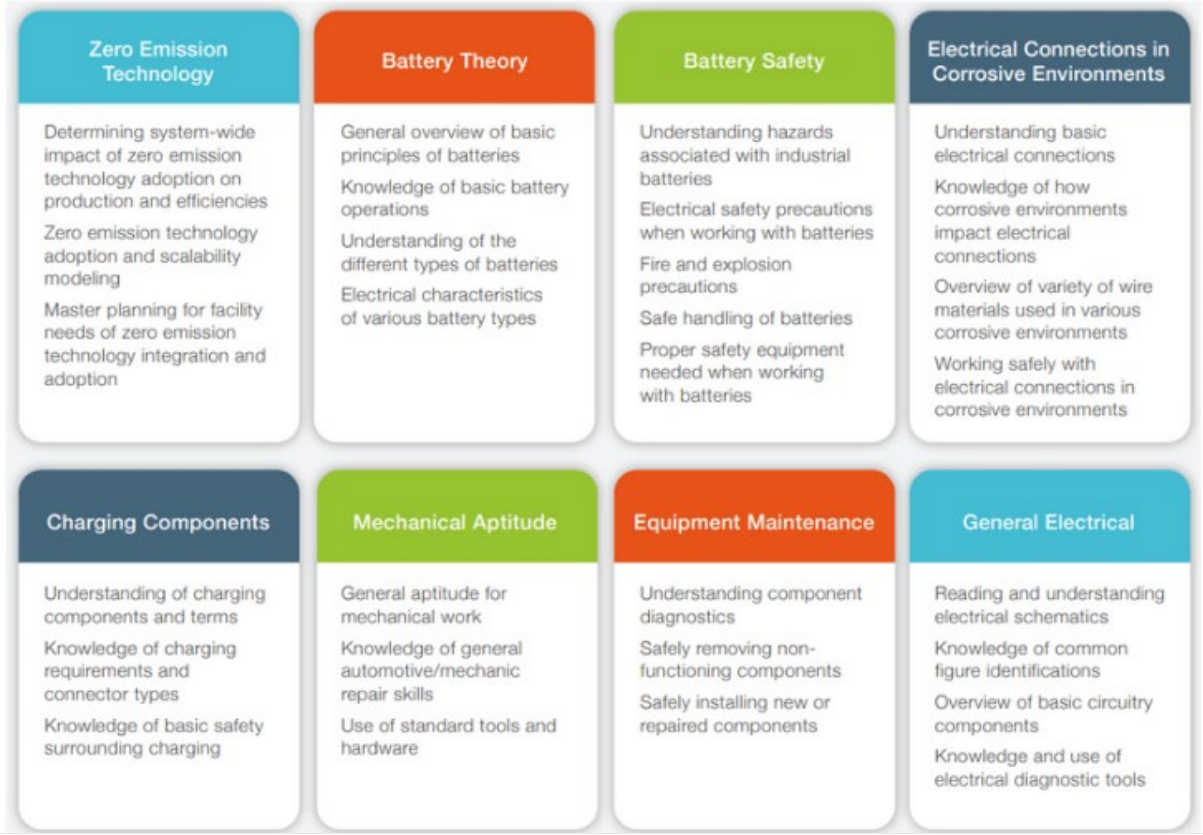


Figure 2: EV Transition Workforce Knowledge Gaps. Long Beach City College

Organizations that hire employees with the skills mentioned above and employ Workforce Training and Education strategies to reskill workers with the strategies and tools needed to adapt to a range of uncertain futures will be empowered to succeed when transitioning to EV fleets.

Although the ZEV transition is expected to create jobs along the Central Coast, reskilling and upskilling workers are also expected to play an essential role in job development. To encourage job retention and Workforce Training and Education without causing unnecessary turnover, 3CE can provide customers with information about ZEV operations and safety. Appendix 4 describes the Blueprint Team's findings related to strategies for workforce training and expected job opportunities associated with the MHD ZEV transition.

4.4 Community Benefits and Impacts

The Blueprint team studied regional pollution and GHG mitigation goals, identified priority communities and assessed benefits of the ZEV transition in 3CE's service area. The following outlines the findings.

4.4.1 GHG, Air Pollutant, and Air Contaminate Reduction Goals

California has four of the top 10 cities with the worst air quality in the US. Transportation is currently the largest source of greenhouse gas emissions in California, and decarbonizing this sector is critical in achieving state goals. Additionally, as of June 2020, the California Air Resources Board (CARB) adopted their first ZEV requirement for heavy-duty trucks which includes a manufacturers ZEV sales requirement. This requirement obligates truck manufacturers to transition from diesel trucks and vans to electric zero emission trucks beginning in 2024, catalyzing carbon neutrality in the transportation sector.

Although Central Coast air quality benefits from coastal winds and lower population densities, pollution is still a regional health concern, especially in inland and agricultural centers. The areas served by 3CE are under the jurisdiction of three CA Air Control Districts:

1. Santa Barbara Air Pollution Control District
2. San Luis Obispo County Air Pollution Control District
3. Monterey Bay Air Resources District

Each air district enforces statewide air quality policies and sets region-specific goals to reduce GHG, air pollutants, and air contaminants. Movement and transportation operations using conventional MHD vehicles account for roughly 8% of greenhouse gas (GHG) and particulate matter 2.5 (PM 2.5) emissions statewide. Bus and truck air pollutants primarily consist of diesel particulate matter (DPM), of which more than 90% is Particulate Matter (PM) 2.5. ZEVs do not emit DPM, so once a company transitions its fleets away from diesel, it will effectively remove this emissions type from its emissions inventory. Because DPM and other sources of particulate matter are known to contribute to a variety of respiratory illnesses, this will lead to community health benefits.

3CE is on track to source 100% clean and renewable energy by 2030, 15 years before the statewide goal. 3CE provides its customers with a 100% renewable energy option called 3Cprime Service. Because 3CE serves various customers with different emissions reduction goals, it is difficult to quantify the impact their MHD ZEV charging program will have on Central Coast emissions. Despite this, any organization that transitions its fleets will essentially remove all GHGs, air pollutants, and air contaminants from their scope 1 transportation emissions (Scope 1 emissions are direct emissions from a company's controlled sources). By 2030, all 3CE customers that have transitioned their fleet will also have eliminated their scope 2 (indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling) transportation emissions. If 3CE customers opt for the 3Cprime energy service and transition their fleets to EVs, they will have eliminated or nearly eliminated their scope 1 and 2 transportation emissions.

3CE serves five counties along the Central Coast, all of which have assessed the emissions or climate change impacts through various climate change action plans, reports, and other assessments. The following section breaks down the available information on county emissions inventories and GHG reduction plans that align with 3CE's pending efforts to support MHD fleet conversion efforts.

Monterey and San Benito Counties: Per the Monterey County Draft Greenhouse Gas Emissions Inventory Report (August 2022), on-road transportation makes up 44% (479,174 $MTCO_2e$) of the county's total GHG emissions. Although the models implemented by the county did not distinguish between light duty and MHD vehicles, roughly 21% of on-road vehicle emissions in California are emitted from MHD vehicles. If this holds true for Monterey County, approximately 9% (99,126 $MTCO_2e$) of Monterey County's total emissions are generated from on-road MHD vehicles. Non-agricultural off-road vehicles and equipment make up 2% (17,616 $MTCO_2e$) of emissions, while off-road agricultural equipment generates an additional 6% (61,564 $MTCO_2e$) of the county's total emissions. Targeting MHD fleets and associated on and off-road equipment will help eliminate 17% of Monterey County's emissions inventory.

Table 8: 2019 Monterey County Community Off-Road Vehicles and Equipment GHG Emissions

Off-Road Vehicles and Equipment Type	GHG Emissions ($MTCO_2e$)
Airport Ground Support	215
Commercial Harbor Craft	4,018
Construction and Mining Equipment	5,136
Entertainment Equipment	58
Industrial Equipment	1,860
Lawn and Garden Equipment	637
Light Commercial Equipment	1,466
Pleasure Craft	1,206
Portable Equipment	622
Railyard Operations	394
Recreational Equipment	113
Transportation Refrigeration Units	1,891
Total	**17,616**

Santa Cruz County: Santa Cruz County updated its 2013 climate action strategy in December 2022. Their current emissions inventory identifies the vehicle fleet emissions as roughly 10% of government operations emissions, while transportation accounted for 60% of countywide emissions in 2009. The action plan also identifies agriculture as a primary target for emissions reductions, including the use of MHD vehicles in farm operations.

San Luis Obispo County: MHD vehicles in San Luis Obispo County totaled 70,640 $MTCO_2e$ in 2016, 31% of the total emissions from transportation and 20% of total emissions from all sectors in the county.

Table 9: Annual emissions from MHD vehicles in San Luis Obispo County estimated using EMFAC. Vehicle classes are based on EMFAC.

	2016		
Vehicle Class	Total VMT	$MTCO_2e$/ VMT	Total Emissions
All Other Buses	475,202	0.001312	620
MDV	72,526,011	0.000559	40,550
Motorcoach	170,739	0.001888	320
OBUS	596,298	0.001373	820
PTO	255,527	0.002398	610
SBUS	421,161	0.001162	490
T6	6,810,943	0.001295	8,820
T7	8,939,945	0.001876	16,780
UBUS	711,612	0.002291	1,630

Santa Barbara County: Santa Barbara is in the process of creating a 2030 climate action plan. As of 2017, transportation contributed 45% of GHG emissions sources in Santa Barbara, while off-road equipment contributed 11% of emissions. Agricultural equipment made up an additional 11% of emissions. Current Santa Barbara County reports do not break down emissions into vehicle categories. However, the three sectors with the high portions of emissions coming from MHD vehicles indicate that transitioning these fleets should be a high priority for emissions reductions in the region.

4.4.2 ZEV Health Benefits to Priority Populations

Climate change and continued use of fossil fuels on the Central Coast impacts priority communities through poor air quality and a variety of effects associated with climate change.[6] In addition to mitigating climate impacts, fleet electrification is broadly expected to benefit priority populations by improving air quality and creating jobs as well as additional opportunities for existing careers.

California policies require a focus on reducing emissions in communities that have been historically disenfranchised, are disproportionately burdened by pollution, and are disproportionately populated by people of color, low-income residents, and or linguistically isolated people. These burdens include poverty, high unemployment, air and water pollution, the presence of hazardous wastes as well as a high incidence of asthma and heart disease.

Through the 2012 Senate Bill (SB) 535, minimum funding level requirements were established for DACs, and CalEPA was given the responsibility for identifying these communities based on geographic, socioeconomic, public health, and environmental hazard criteria. This responsibility led to the creation of the CalEnviroScreen mapping tool which is used to identify communities disproportionately burdened by multiple sources of pollution and with population characteristics that make them more sensitive to pollution. Historically, these communities have been excluded from policy setting and have been largely underrepresented in the decision-making process. To prevent further harm, the Office of Environmental Health Hazard Assessment (OEHHA), on behalf of CalEPA, continuously updates the CalEnviroScreen tool to reflect which census tracts in California need the utmost consideration and priority. The Blueprint for

[6] California High-Speed Rail Authority. (2022). *Section 3.3 Draft Environmental Impact Report (EIR)/Environmental Impact Statement (EIS).*

Medium- and Heavy-Duty Zero Emission Vehicle Infrastructure Grant Program also requires assessment of the impacts (positive and negative) of potential ZEV transition projects on DACs.

3CE will take significant steps toward helping customers meet their emissions reduction targets as it helps replace diesel trucks with ZEVs. Based on currently available battery technology and range, 3CE commercial customers could replace all the vehicles in their fleets operating routes less than 150-200 miles per day with electric models. Across the five counties in the region, MHD fleet transitions supported by 3CE will contribute to eliminating emissions that make up between 10% and 20% of the region's total GHG inventory.

ZEVs will significantly reduce air contamination and pollution by reducing CO2, NOx, and DPM. These pollutants are linked to the prevalence of respiratory and development-related illnesses. ZEVs are also quieter than diesel trucks and can lead to a safer and more pleasant environment in which they operate.[7] 3CE's efforts to support the deployment of emission-free trucks for transportation will directly contribute to the benefits mentioned above. The economic and job benefits that will accrue to priority and disadvantaged populations are included in section 2 of the report.

Multiple Central Coast County climate action plans include developing a community choice aggregation (CCA) program as a tool to reduce emissions. As a CCA, 3CE is helping advance these counties' climate action plans through programs that allow customers to select 100% renewable energy or enroll in programs to electrify their vehicles.

Under the Electrify Your Ride program, 3CE offers enhanced incentives to customers who fall under 400% of the federal poverty line. These programs are designed to help target investment in disadvantaged communities. In 3CE's Member Agency Medium and Heavy-Duty Incentive Program, two of the five applicants represent DACs and have reserved 3CE funds to purchase a refuse hauler and a municipal electric bus.

Priority Populations: 3CE's ZEV charging deployment efforts will apply to many CalEPA low-income and disadvantaged climate investment priority populations in 3CE's coverage area. 3CE's electrification efforts include EV programs for regional transit agencies and schools which serve priority populations. Specifically, 3CE provides coverage and can offer ZEV programs in the following priority populations areas.

Low-Income and Disadvantaged Communities: Salinas and Marina Region, parts of Watsonville and the surrounding area, Guadalupe and Mussel point region.

Low-Income Communities: Lompoc and the areas south of Lompoc, Burton Mesa Region, Census Tract 6083001800 (Los Padres National Forest Area), parts of Morro Bay, Parts of San Luis Obispo, Parts of Atascadero, Parts of Paso Robles and the surrounding Area, the southern half of Monterey County, the region including King City, Greenfield, Soledad and Gonzales, the Big Sur Region, parts of Santa Cruz and the surrounding area.

The maps below show the location of 3CE's coverage area that includes California EPA climate investment priority and low-income and disadvantaged communities.

[7] California Energy Commission. (n.d.). Transforming transportation. https://www.energy.ca.gov/about/core-responsibility-fact-sheets/transforming-transportation

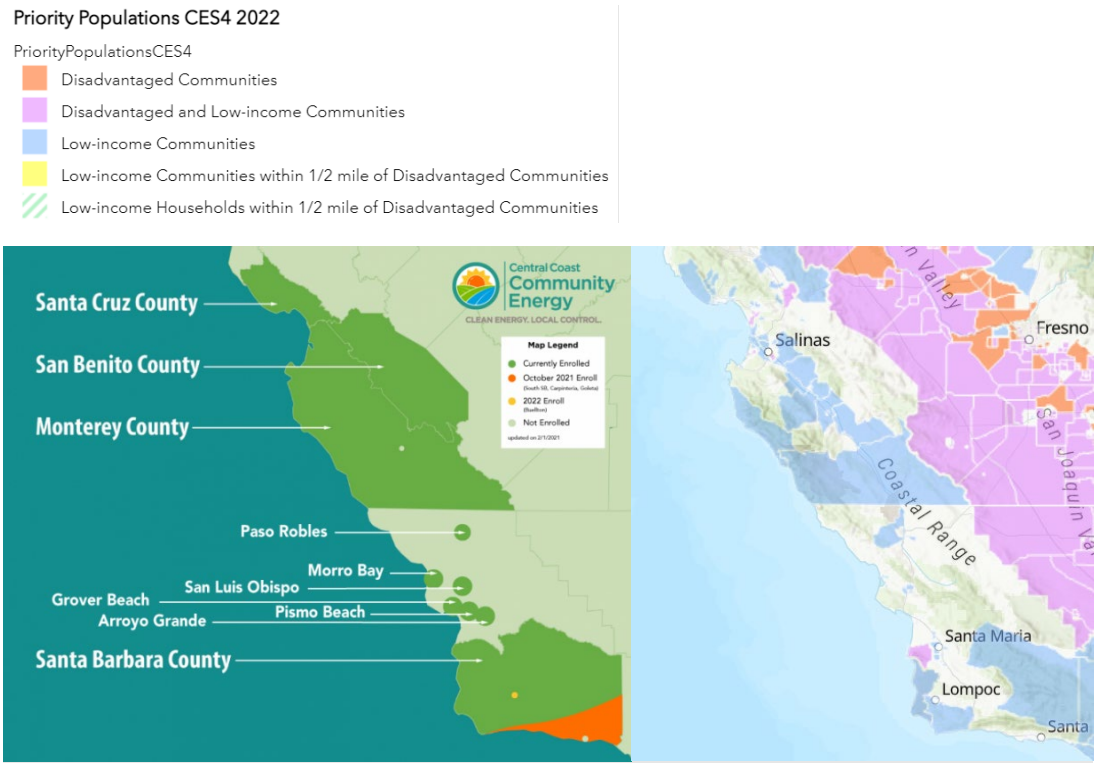


Figure 3: Central Coast Community Energy Priority Populations and Coverage. Sources: 3CE and CalEPA

5 The Central Coast MHD EVSE Network

5.1 Regional Goals

In the Central Coast Region, most existing efforts to develop ZEV infrastructure have been focused on light-duty transportation.

- The Counties of San Luis Obispo, Santa Barbara, and Ventura created a joint initiative, Plug-in Central Coast, to develop an Electric Vehicle Readiness Plan[8] for the three counties. Although the EV Readiness plan mentions MHD vehicles as a priority for investment, specific goals and targets are not included in the plan, and it has not been updated since 2021.
- San Luis Obispo County offers incentives for electric vehicle charging station (EVCS) through its Air Pollution Control District (APCD) Alt-Fuel Infrastructure Grant Program. The program includes eligible project categories for off-road heavy-duty equipment replacement and agricultural engines, as well as EV charging stations for light-duty or MHD vehicles. Currently, the program has $600,000 available.
- The South-Central Coast Incentive Project, administered by the California Electric Vehicle Infrastructure Project (CALeVIP), administers funds in the San Luis Obispo and Santa Barbara Counties to support electric vehicle charging station (EVCS) installation. The project, part of the larger California Electric Vehicle Infrastructure Project, provides up to $6,000 per connector for level 2 charging and up to $80,000 per DC fast charger. A minimum of 50% of funding for each

[8] Schorske, R., et. al, (2021). Electric Vehicle Readiness Plan for Ventura, Santa Barbara, and San Luis Obispo Counties (Central Coast) (CEC-600-2021-017). Clean Transportation Program. Transportation Energy (600)

county is required to be invested in disadvantaged communities, and all chargers are required to be always publicly available.

- CALeVIP also administers a nearly identical project for Monterey, San Benito, and Santa Cruz County through the Central Coast Incentive Project. 25% of funds in Monterey and San Benito County are reserved for disadvantaged communities (DACs), and 15% are reserved for DACs in Santa Cruz County.

5.1.1 EVCS Permitting

	Scoring Criteria:	Complete if:
☐	**1. Streamlining Ordinance** Ordinance creating an expedited, streamlined permitting process for electric vehicle charging stations (EVCS) including level 2 and direct current fast chargers (DCFC) has been adopted.	– Streamlining ordinance has been adopted
☐	**2. Permitting checklists covering L2 and DCFC** Checklist of all requirements needed for expedited review posted on city or county website.	– Permitting checklist is available and easily found on city or county website
☐	**3. Administrative approval of EVCS** EVCS projects that meet expedited checklist are administratively approved through building or similar non-discretionary permit.*	– The streamlining ordinance states that permit applications that meet checklist requirements will be approved through non-discretionary permit (or similar)
☐	**4. Approval limited to health and safety review** EVCS project review limited to health and safety requirements found under local, state, and federal law.	– The streamlining ordinance states that no discretionary use permit is required and permit approval will be limited to health and safety review
☐	**5. Electronic signatures accepted** AHJ accepts electronic signatures on permit applications.*	– Electronic signatures accepted on City or County website (usually specified in the ordinance)
☐	**6. EVCS not subject to association approval** EVCS permit approval not subject to approval of an association (as defined in Section 4080 of the Civil Code).	– The streamlining ordinance states that EVCS permits do not require association approval
☐	**7. One complete deficiency notice** AHJ commits to issuing one complete written correction notice detailing all deficiencies in an incomplete application and any additional information needed to be eligible for expedited permit issuance.	– The streamlining ordinance dictates that a written correction notices must detail all deficiencies

California Assembly Bills AB 1236 (2015) and AB 970 (2021) require cities and counties to adopt streamlined permitting procedures for electric vehicle charging stations, which must include a streamlined ordinance and checklist. The streamlining status of these ordinances can be found on the EVCS Streamlining Map,[9] which grades jurisdictions based on the Permitting Electric Vehicle Charging Stations Scorecard shown here.

Santa Barbara and San Luis Obispo County have developed an expedited permitting process for EVCS that satisfies all the requirements of the Charging Stations Scorecard. The City of San Luis Obispo has yet to create a permitting checklist for EVCS installation, although they have satisfied all other categories of the scorecard. Monterey county has similarly satisfied all the EVCS scorecard's streamlined process recommendations, except for a permitting checklist.

Figure 4: EVCS Streamlined Permitting Scorecard. Source: GO-Biz ZEV Program

The major cities and towns within Monterey County have achieved varying levels of the EVCS streamlined permitting process. San Benito and Santa Cruz Counties and the cities within (except Watsonville) have not yet satisfied any requirements.

Generally, the counties and cities on the Central Coast have yet to adopt specific, targeted MHD EVCS goals or strategies. While there are DC fast chargers installed along the Central Coast that are viable for charging MHD vehicles, local jurisdictions in the region have primarily focused on deploying EVI for light duty vehicles. The region will benefit from a more concerted effort to understand and prioritize MHD EVI deployments.

5.2 Existing MHD EVSE Network

There are currently 118 public DC fast chargers throughout the Central Coast region. Most of these chargers are clustered along the region's major transport route, U.S. 101. The "West Coast Electric Highway" is an extensive network of DCFC stations located every 25 to 50 miles along three major US west coast transportation corridors, including U.S. 101. This route connects all the major cities within 3CE's service territory. Although many of these charging stations are likely accessible to a variety of medium-

[9] https://california.maps.arcgis.com/apps/webappviewer/index.html?id=5b34002aaffa4ac08b84d24016bf04ce

duty trucks, most are not accessible for class 6 through 8 vehicles such as semi-trucks. The map below shows locations of Level 2 and DCFCs in the region.

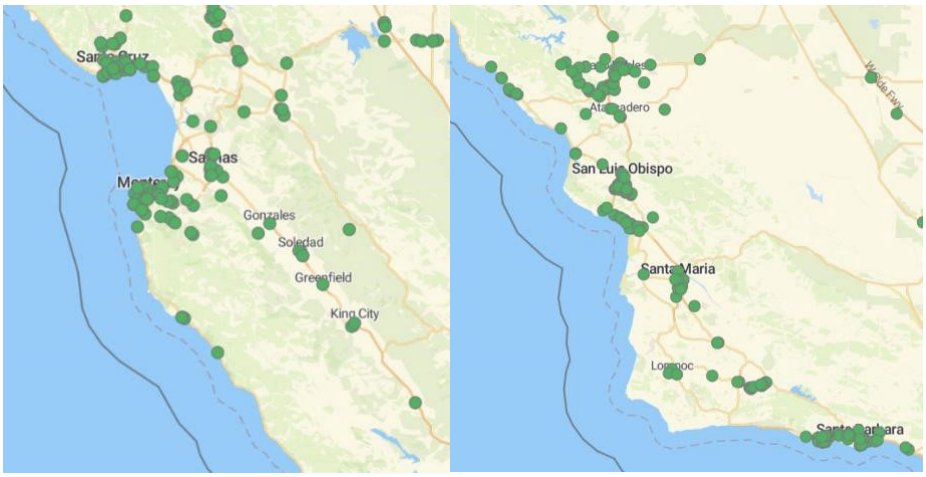


Figure 5: Existing Public Level 2 and DCFC EV Chargers in the Central Coast Region. Source: Alternative Fuels Data Center (AFDC).

The following table shows the existing public EV chargers by county in both unincorporated and city areas. Most of these chargers are either inaccessible to HD trucks or provide insufficient power to charge a HD truck within several hours.

Table 10: Existing Central Coast public EV chargers. Source: AFDC

County	Level 2	DCFC	Tesla Destination	Tesla Supercharger	Total
Ventura	46 (337)	- (37)	4 (21)	- (88)	50 (483)
Santa Barbara	73 (202)	2 (23)	17 (31)	8 (38)	100 (294)
San Luis Obispo	121 (165)	3 (14)	89 (33)	- (110)	213 (322)
Monterey	71 (140)	20 (25)	40 (18)	8 (62)	139 (245)
Santa Cruz	36 (113)	6 (14)	9 (8)	- (46)	51 (181)
San Benito	4 (8)	- (5)	- (-)	- (-)	4 (13)
Total Study Area	**351 (965)**	**31 (118)**	**159 (111)**	**16 (344)**	**557 (1,538)**

Sources: AFDC, PlugShare
Note: Unincorporated (Within Cities)

5.3 Regional MHD Vehicle Use Patterns

The Central Coast region is one of the country's most important agricultural production areas for fresh produce and wine grape production. The region's other industries include services, manufacturing, food processing, and other freight-related business clusters, which are critical to the region's economy. Growth in Central Coast population centers, as well as the Los Angeles Metro and San Francisco Bay areas, has resulted in increased demand for products shipped via a variety of freight modes throughout the region. The Central Coast relies on U.S.101 as the primary transportation artery for the region and the area's major truck route. Except for the City of Santa Cruz, this highway connects within 20 miles all the major

population centers in 3CE's service territory. Approximately 75 percent of all shipments in the region, measured by both tons and value, move by truck.[10]

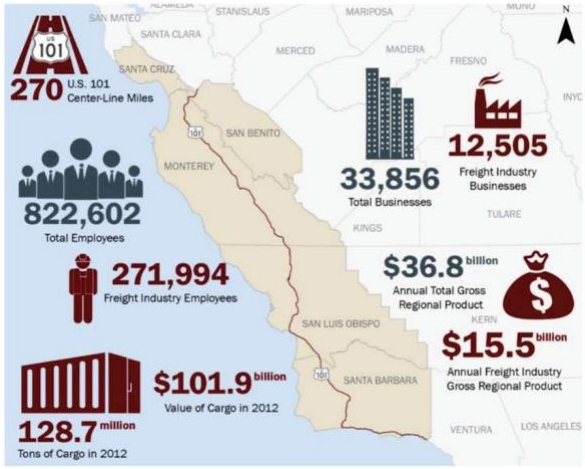


Figure 6: US 101 freight-related statistics on California Central Coast. Source: AMBAG Central Coast California Freight Strategy.

In 2016, seven of the region's county and city government associates and the region's transportation agencies (including Caltrans) created the U.S. 101 Central Coast California Freight Strategy. Their report notes that U.S. 101 is a highly efficient freight route that is challenged by congestion, lack of modal alternatives, and truck parking shortages. Goods movement-dependent industries are estimated to support approximately 33% of the jobs in the region, most of which are driven by agriculture, manufacturing, and the transportation and warehousing sectors.

[10] Association of Monterey Bay Area Governments (AMBAG). (2016). *U.S. 101 Central Coast California freight strategy final report.*

	Monterey	San Benito	Santa Cruz	San Luis Obispo	Santa Barbara
Population (2010)	415,057	55,269	262,382	269,593	423,895
Population (2035)	495,086	81,332	308,582	315,636	507,482
Goods Movement Dependent Industry Employment (2013)	96,170	8,978[a]	40,410[b]	46,242[c]	80,194
Total GRP (2009)	$16,016	No Data	$9,122	$9,577	$17,732
Key Industries	Agriculture (salad, wine), retail, manufacturing (includes food products)	Retail, manufacturing (includes food products), agriculture	Retail, construction, manufacturing (includes food products), agriculture	Retail, construction, manufacturing (includes food products)	Retail, manufacturing (includes food products), agriculture
Key Trading Partners	San Joaquin Valley, Southern California, San Francisco Bay Area	San Francisco Bay Area	San Francisco Bay Area	San Joaquin Valley, Southern California, San Francisco Bay Area	San Joaquin Valley, San Francisco Bay Area, Southern California
Major Connecting Roads to U.S. 101	SR 156	SR 152 (some truck restrictions) SR 129 SR 156	SR 17/I-880 SR 1/SR 129	SR 46 SR 41 SR 1 SR 166	SR 135 SR 154 SR 246 SR 1

Figure 7: Central Coast California Summary Economic Profile by County. Source: AMBAG Central Coast California Freight Strategy.

The amount of goods moving in and out of the Central Coast is relatively even by weight, although there is a heavier inbound flow when measured by value. The region imports higher-priced consumer and specialty products while exporting relatively lower-value agricultural products and some manufactured goods, mostly tied to the agricultural industry. Movement of goods within the Central Coast Region (goods that do not enter or exit the region during transit) accounts for less than five percent of total goods transportation.

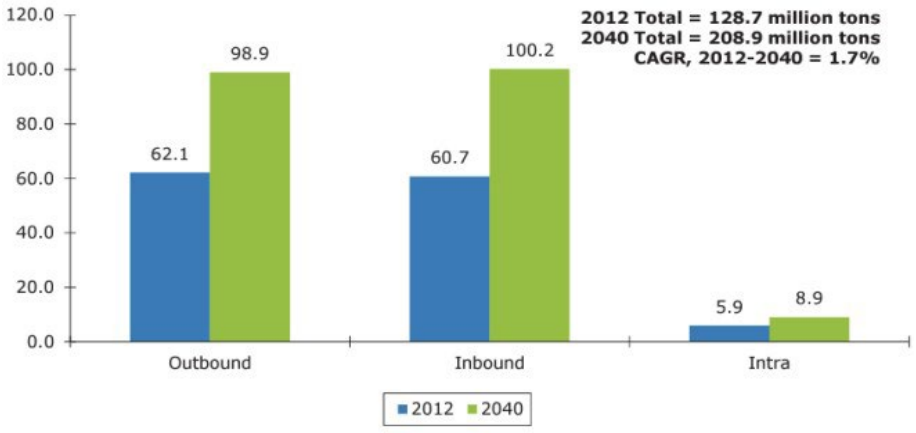


Figure 8: Central Coast Regional Freight Flows by Direction of Movement. Source: Federal Highway Administration, Freight Analysis Framework 3.

Employment density in the sectors of the Central Coast economy that rely on MHD fleets (Agriculture, Manufacturing, Transportation) can be used to estimate vehicle use patterns. Employment density in these sectors is expected to correlate strongly with the use of MHD fleets for transportation (Federal Highway Administration). InfoUSA data shows high concentrations of agriculture businesses along the U.S. 101 corridor, with key clusters located around Salinas, South of Watsonville, Soledad, Santa Maria, and Paso Robles.

Manufacturing is a diverse industry in the region, with key manufacturing clusters in Santa Cruz, near Paso Robles, San Luis Obispo, Santa Maria, and Santa Barbara. Food manufacturing, which includes wine production, is a particularly important component of manufacturing in the region, given it is a region of major agricultural activities. The key food manufacturing clusters are in Watsonville, along the northern U.S. 101 corridor, San Luis Obispo, Santa Maria, and Eastern Santa Barbara. Since these locations are near U.S. 101, deploying EVI in the area will be essential to electrifying MHD fleets serving this industry.

Throughout the region, freight transportation is conducted mainly with trucking and rail, with connections to other modes, such as marine shipping at the Port of Oakland. Transportation and warehousing businesses are concentrated in areas that generally overlap with agriculture and manufacturing clusters. Key clusters are in the Salinas Valley, northern U.S. 101 near Paso Robles, San Luis Obispo, Santa Maria, and Santa Barbara. Truck connections include U.S. 101, SR 156/SR 152, SR 166, SR 41, and SR 46.

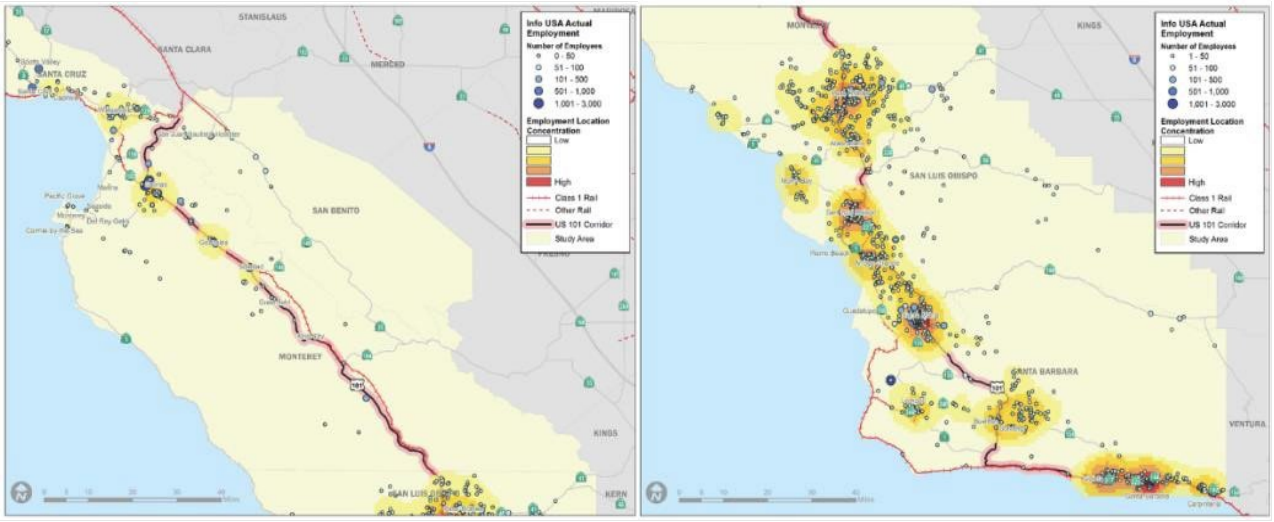


Figure 9: Employment density for agriculture, manufacturing, and transportation/warehousing in the Central Coast. Employment density in these sectors is expected to correlate strongly with the use of MHD fleets for transportation. Source: AMBAG

Apart from U.S. 101, State Routes 46, 129, 152, and 156 are major interregional connecting routes between the Central Coast and the Central Valley that support these businesses, and therefore they should be included as priorities for EVI investment to ensure zero-emission delivery of goods in the region.

Outside of goods movement, several state highways in the region serve as the region's primary tourist and commute travel corridors. CA Route 17 and CA Route 1 are the primary routes connecting the City of

Santa Cruz to the major industrial and population centers of the San Francisco Bay Area. CA Route 1 also connects the coastal towns of Cambria, Morro Bay, and Lompoc to US Route 101 and the region's major cities. CA Route 154 connects the communities of the Santa Ynez Valley.

The use of MHD fleets to transport people is concentrated among municipal fleets and school districts. Most of the populations along the Central Coast are concentrated in the region's largest towns, including Santa Cruz, the City of Monterey Bay, and the surrounding towns, San Luis Obispo and Santa Barbara and the surrounding towns.

5.4 Analysis - Lowest-Carbon Movement of Goods

This section of the Blueprint identifies actions that will support low carbon movement of goods and bulk cargo throughout the region.

Because 75% of all goods movement in the Central Coast region is transported by truck, fleet electrification will net the most significant reduction in GHG emissions from transportation in the region. Within the MHD trucking sector, few opportunities exist to divert or re-route vehicles transporting goods along the Central Coast. Because U.S. 101 is the only major transportation route throughout the region, which is already a highly efficient route that connects nearly all major cities, there are few alternatives to reduce carbon emissions by alternate routing. Enhancement of EVI along routes that connect U.S. 101 to Interstate 5, further inland, could reduce carbon intensity in the region for eastbound goods movement.[11] Despite this, it is unclear whether developing low-carbon transport corridors going east would make a significant impact because most goods on the central coast are bound for transport hubs in the Los Angeles and San Francisco Bay Areas, according to AMBAG.

One of the unique traffic patterns of the Central Coast region is the seasonal variability of traffic generated from peak harvest seasons from March to October, and the summer tourist traffic near SR 156, which may impact freight operations.[12] When trucks are moving simultaneously during peak harvest season, there can be more serious congestion issues. Overall trends indicate a peak in all vehicle traffic between May and August, with the lowest levels of traffic occurring in February and March. Truck traffic follows a similar pattern, with the highest annual daily truck counts occurring in July or August. February, March, November, and December are the months with the lowest number of trucks.

An existing strategy to enhance the efficiency of goods movement north and south along U.S. 101 and other routes in the region is to decrease congestion along the route. Rush hour traffic conditions near San Luis Obispo and Santa Barbara slow the movement of goods through these routes, increasing idling and other energy intensive driving practices. Congestion can also be mitigated by expanding rail transport or by enhancing EVI to encourage zero-emission movement in the region.

Although there are other strategies for enhancing goods movement across major transportation routes, fleet electrification is the best and most reliable option for reducing carbon emissions from transportation. The high upfront costs and challenges associated with expanding rail service in the region make it likely that MHD fleet-driven transport will continue to dominate in the region. The Central Coast region is dominated by a single transportation route already considered highly efficient. Ensuring EVI is

[11] ICF. (2020). *Caltrans Greenhouse Gas Emissions and Mitigation Report*.
[12] https://dot.ca.gov/programs/traffic-operations/census/traffic-volumes

deployed to enable zero-emission trucking along this route will represent the region's most significant carbon reduction action.

Outside of goods and agricultural movement, 3CE is focused on supporting the deployment of EVI for customers with school bus fleets, transit organizations, municipal fleets, and private fleets. These fleet types typically have low daily mileage requirements for their fleet vehicles or frequent availability for opportunity charging. A primary goal of EV and EVI deployment should be to ensure that EVs can achieve operations that are on par with existing internal combustion vehicles. Project partners and stakeholders should explore all options to ensure a meaningful acceleration of EVI deployment in the region. To do this, they should consider all options available to them, including technologies such as wireless charging. Technologies like this have significantly increased the range and operability of transit bus systems serving multiple towns. MHD fleet managers should analyze anticipated power requirements for their fleets to reserve capacity ahead of time. Those fleets with regular driving schedules and short routes should be prioritized for electrification while EVs with longer ranges are developed.

5.5 Target EVI Deployment Locations

Due to the variety and geographic spread of 3CE customers, along with uncertainty about which customers will enroll in 3CE fleet electrification programs, mapping exact locations of EVI is not possible for this study. The following maps and figures highlight which areas should be prioritized for EVI installation based on geographic, demographic and economic factors.

5.5.1 EVI Target Locations: Agricultural and Industrial Centers

MHD Transportation of goods and freight are concentrated along U.S. 101 and between facilities located near this transportation corridor. Maps indicating industry employment density in MHD dependent industry, and therefore priority areas for deployment, are shown in Section 5.3.

The wine and agricultural/produce centers including Salinas Valley, Santa Ynez Valley, Atascadero, Santa Maria, San Luis Obispo and Paso Robles are primary targets for EVI installation to enable zero-emission transportation of these important Central Coast commodities. The cluster of CA designated "important farmland" in the Salinas Valley and northern Central Coast along U.S. 101 is currently a charging desert and should be a focal point of MHD electrification efforts. EVI developers should also consider charging infrastructure for electric trailer refrigeration units (eTRUs) in areas with significant levels of cold supply chain transport.

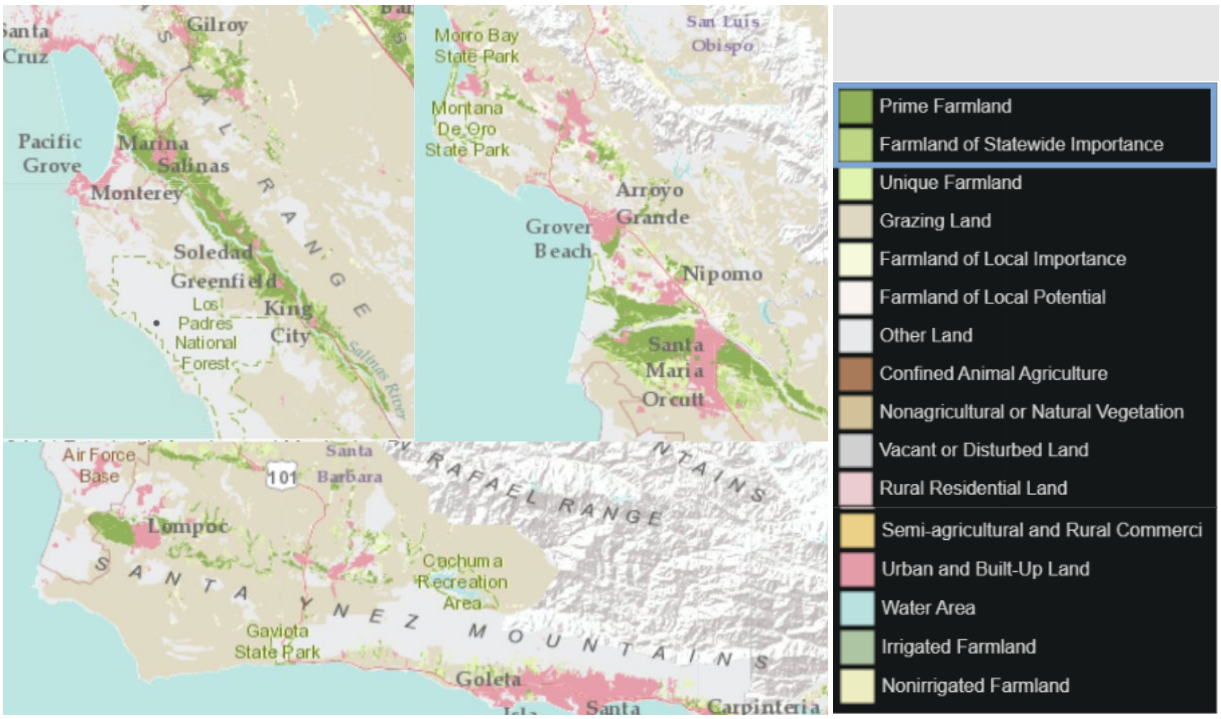


Figure 10: Map indicating land use on the Central Coast. Source: CA Dept of Conservation

5.5.2 EVI Target Locations - Population Centers and Transit Districts

MHD transit is concentrated within and between the Central Coast's population centers. Transit agency vehicle depots are a primary target for EVI installation. Public services utilizing MHD vehicles such as waste management, utility maintenance facilities, county services, and school districts should also be prioritized for MHD EVI installation. More detailed information on EVI targets for MHD transportation in Central Coast Municipalities can be found in Section 6 – Central Coast Fleet Electrification Case Studies.

5.5.3 EVI Target Locations – Regional Transportation Routes

This color-coded "California Truck Network Map" indicates all the primary trucking routes within 3CE's service territory.

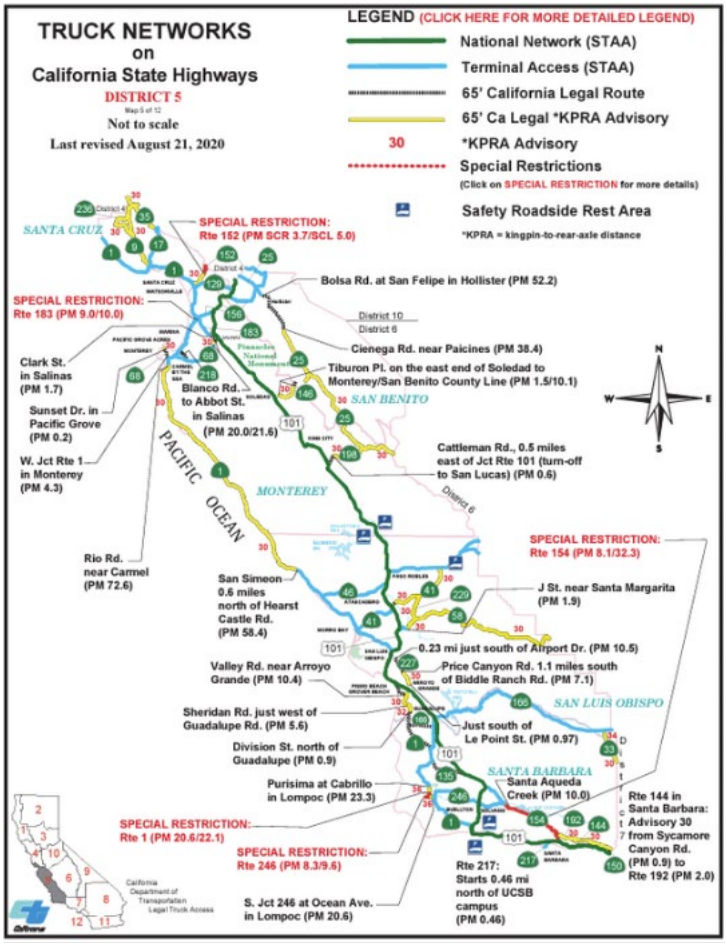


Figure 11: California trucking network map. Source: Caltrans

EV charging for MHD vehicles will need to be implemented along all these routes for a 100% transition to zero-emission MHD vehicles in the region. Along these routes, there are two ideal location types for initial deployment of EVI: Existing truck stops and State Roadside Rest Areas (SRRAs).

5.5.3.1 Truck Stops

There are nine truck stops centered along U.S. Route 101 on California's Central Coast. Each truck stop functions as a hub for refueling and resting HD vehicle drivers moving goods throughout the region. Due to the long charge times associated with MHD EVs, truck stops are ideally suited for refueling electric HD trucks while providing rest for drivers. The addition of EV charging capabilities to truck stops will help advance MHD electrification efforts in the region. The following shows the location of truck stops within 3CE's service territory.

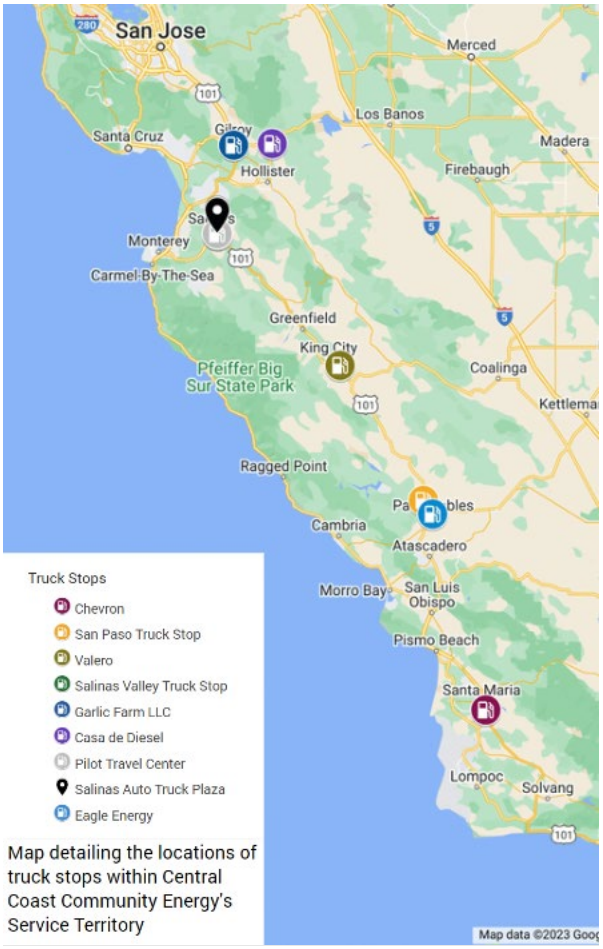


Figure 12: Map detailing the locations of truck stops within 3CE's service territory.

5.5.3.2 Rest Stops

California operates three Statewide Roadside Rest Areas (SRRAs) within the 3CE's service territory that mainly serve long-haul trucking needs. Gaviota NB/SB and Camp Roberts NB/SB– are on U.S. 101. The NB and SB Camp Roberts rest areas each have one existing DCFC plug. The third– Shandon– is located on SR 46 in San Luis Obispo County, east of U.S. 101. These rest areas could serve as charging points for long-haul truckers in need of rest.

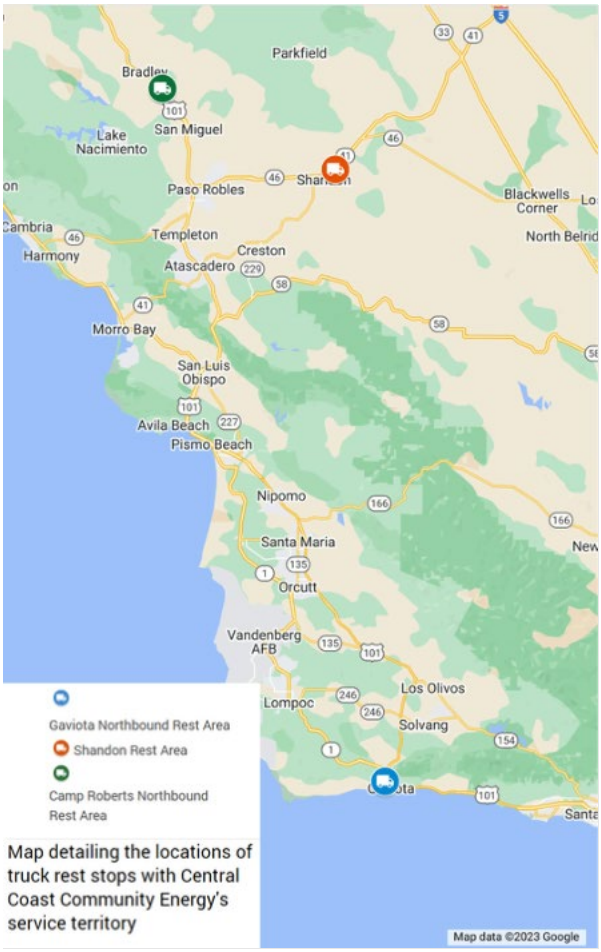


Figure 13: Map detailing the locations of truck rest stops within 3CE's service territory.

5.5.4 National Electric Vehicle Infrastructure (NEVI)

The California Deployment Plan for the National Electric Vehicle Infrastructure Program (NEVI) has identified several Alternative Fuel Corridors (AFCs) that run through the 3CE's service territory. The $5 billion NEVI Program is part of the $1.2 trillion Infrastructure Investment and Jobs Act (IIJA) signed into law by President Biden in November 2021. The California Department of Transportation (Caltrans) is the designated lead agency for NEVI. The CEC is the designated state energy partner. Caltrans and the CEC have partnered to create California's Deployment Plan for the National Electric Vehicle Infrastructure Program,[13] which describes how the state plans to allocate its $384 million share of federal NEVI funds to build out a network of modern, high-powered DC fast chargers along Interstates and national highways throughout California. To ensure deployments in alignment with the program goals, route segments are ranked by funding priority. The following highways and interstates on the Central Coast have been identified as AFCs: U.S. Route 101, California State Route 1, and California State Route 17. These areas have been designated priority areas for EVI deployment, however U.S. 101 is ranked 10th for this round of funding and therefore is considered noncompetitive. The corridor may become more

[13] https://rebuildingca.ca.gov/static/2022-ca-nevi-deployment-plan-a11y-8acc5dc59e4a797c873f28e1bfb74805.pdf

competitive if a clear and demonstrable infrastructure gap is shown, along with a clear demand for additional EV infrastructure.

The map on the left shows existing DC Fast Chargers that meet NEVI criteria or are prioritized for upgrading to meet the criteria. NEVI program-funded EV chargers must be located less than one mile from an electric corridor exit, have a minimum of four CCS-type ports, a power per port of at least 150 kW, and a total site power capacity of no less than 600 kW. Although EV chargers deployed under the first round of NEVI funding will be designed for light-duty vehicles, some may be accessible to MHD vehicles, and will likely be strong targets for future MHD infrastructure development.

6 Central Coast Fleet Electrification Case Studies

This part of the Blueprint provides several case studies on the MHD fleet electrification experience of several Central Coast fleet managers. The case studies document the experience and strategies of municipal, city transit, and school bus fleets as they plan and deploy EVs and EVI. Information used to inform the case studies was derived from interviews, webinars, presentations, and online publications.

Figure 14: Map indicating NEVI Alternative Fuel Corridors and existing public DCFCs that meet or are scheduled to meet NEVI requirements.

6.1 Municipal Fleets

The municipal fleets element of this case study explores the experiences of three municipalities in central and southern California that have electrified portions of their light-duty fleets and are in different phases of electrifying their MHD fleets.

6.1.1 County of Santa Barbara

The Santa Barbara County Board first adopted a mandatory EV policy resolution in March 2019. The policy stated that all new mid-size and compact sedans in the county fleet needed must be plug-in electric vehicles. In response to the mandate, the county's department of general services began identifying viable charging locations for the new vehicles, determined which departments qualify for EV replacements, and assessed ideal funding sources to help replace the vehicles. In spring 2022, the Santa Barbara County Board updated the policy to mandate that all light-duty vehicles need to be replaced with EVs at the end

of their lifetime, starting in January 2023.[14] The county's department of general services then created a policy to implement the mandate.

The department began the transition by assessing all vehicles that would need to be replaced by determining the expected end-of-use periods for each vehicle in the county's light-duty fleet. This effort was followed up on with surveys to each County department, which identified 350 potential vehicles that would need to be phased out in the next seven to 10 years. Currently, Santa Barbara has 60 EVs deployed throughout the county, with charging stations at facilities where the vehicles are domiciled or regularly parked during business hours. Most of the EVs currently in operation are deployed in the county's automated motor pool system.

The county motor pool dispatch system allows county employees 24/7 access to motor pool vehicles. County employees use the motor pools reservation site to reserve vehicles for work purposes to ensure that vehicles are available and used in a documented, organized way. Employees that wish to drive an electric vehicle are required to fill out a separate EV Driver registration form, which includes a training video on EV use. The county has experienced some challenges ensuring that all EVs reserved in their motor pool system are adequately charged. This is because, occasionally, a vehicle is only parked and charged for a short period of time before the next employee reservation comes into effect, leaving the vehicle insufficiently charged for travel. The county is working to develop an optimization strategy that will ensure EVs are fully charged for each motor pool reservation without creating large gaps for charging throughout the workday.

The rest of the county's EVs are deployed to specific departments. The county's primary challenge with these vehicles is getting charging infrastructure in place at the departments they are assigned to. Santa Barbara County has recently ordered 30 additional light-duty vehicles using clean vehicle rebate (CVRP) funds and 3CE rebates to offset vehicle and infrastructure costs.

Santa Barbara County officials emphasized that they haven't had the bandwidth to begin electrifying the city's MHD fleet yet, as they are still busy developing their light-duty EV fleet.

The county has installed 127 Powerflex charger stations, 6 of which are DC fast chargers. It has surveyed all the county's departments to determine which vehicles will need to be phased out in the next four years. They are planning on installing up to another 150 chargers for light-duty fleets. The county has been experiencing challenges obtaining contracts to install EV infrastructure. To get around this, the general services department has opted for Job Order Contracting (an on-call construction services contract where construction work and performance are determined by issuing work orders with the contractor during a fixed period) because the volume of work necessary limits the usefulness of asking for bids for each project.

- *Key takeaways:*

At this stage of the County of Santa Barbara's fleet electrification efforts, general services team members noted the following key takeaways concerning ZEV fleet transitions:

[14] Guentz, S. (Noozhawk) (2023, February 15). *County Adopts Zero-Emission Vehicle Policy for Its Fleet.*

- The county has limited bandwidth and is prioritizing transitioning its light-duty EV fleets before focusing on MHD vehicles.
- Infrastructure needs to be built before purchased ZEVs are ready for deployment. Long wait times for installing EVSE meant that the city was unable to use EVs that were ready for delivery until refueling infrastructure issues were resolved, delaying the transition by several months.
- EV charging infrastructure companies offer turnkey solutions, which can reduce costs and deployment times. Currently, the county is relying on job order contracting but expressed that turnkey EV infrastructure deployment would likely be easier for subsequent deployments.
- Load management systems are essential for balancing building and fleet energy needs. Power infrastructure companies can set up load management systems that enable EV chargers to limit the energy use of the vehicle to prevent the circuit it is connected to, which likely also powers nearby buildings, from being overdrawn. These load management systems are a common tool to help avoid grid upgrades.

6.2 San Luis Obispo

The city of San Luis Obispo has 350 total fleet assets and is just beginning its fleet electrification efforts. The city has run into consistent challenges with long lead times for vehicle deliveries. In 2021, the city ordered five Ford Lightning, but they have only received one to date.

San Luis Obispo's single Ford Lightning is currently in use as a police department patrol vehicle. Based on the vehicle use thus far, the city is expecting significantly reduced total cost of ownership (TCO) for their electric fleets. Specifically, the City expects that using this model of medium-duty electric vehicle will save the city thousands of dollars in maintenance costs and reduce fuel costs by 50%. Police department officials have noted the vehicle's performance capabilities and quiet engine as especially valuable perks for their operation. City officials currently view EVs as not useful assets for a vehicle that needs to travel long distances. For this reason, they have recommended that other cities phase in the ZEV transition until models with longer ranges are available.

6.3 City of Long Beach

Of the municipalities that 3CE has engaged with, the City of Long Beach (COLB) has made the most progress on MHD fleet electrification. Long Beach is not within 3CE service territory however they have engaged in knowledge sharing webinars through 3CE's Blueprint process. COLB officials note that while they have made significant progress in planning for and deploying charging and fueling infrastructure for light-duty passenger ZEV, substantial challenges, gaps, and barriers remain to the widespread deployment of infrastructure for MHD ZEVs. For this reason, the City of Long Beach also developed a CEC grant- funded MHD ZEV Blueprint. The city has also developed a Climate Action and Adaptation Plan (CAAP), which outlines the city's proposed approach to reducing GHG emissions. The Plan proposes a 40% reduction in GHG emissions from transportation by 2040 and a 100% reduction by 2045. COLB estimates that 44% of the City's emissions result from transportation activities.

COLB's fleet includes 700 MHD vehicles. This number of vehicles will constitute a major energy demand within the city. They worked with their Blueprint team to assess the amount of electricity required to power their fleet, as well as locate where this power will need to be distributed through EVSE.

COLB cited two external drivers for their aggressive MHD fleet:

1. The Advanced Clean Fleet Rule mandates that 50% of municipal fleet vehicles purchased are ZEVs beginning in 2024 and 100% by 2027 (unless using an alternate fleet transition milestone schedule). The mandate is based on the total count of vehicles purchased rather than the value of purchases.

2. Governor's executive order (N-79-20), which mandates that all internal combustion engine (ICE) passenger vehicles must be zero-emission by 2035

The city also noted that MHD ZEV availability is more limited than light-duty vehicles, creating difficult market conditions to operate in. They do not expect orders for MHD vehicles to be fulfilled for 1-2 years and are having trouble gathering detailed pricing information without engaging with manufacturers or dealers to make offers.

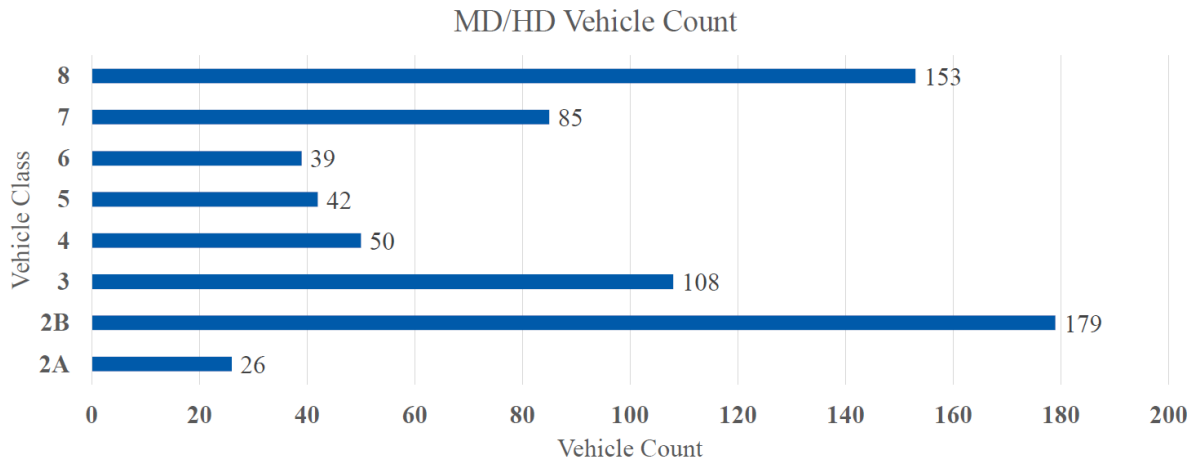


Figure 15: City of Long Beach vehicle count by vehicle class. Source: Arup

COLB is a medium-sized city, and the average daily mileage of city fleet vehicles is typically under 20 miles. Most MHD ZEVs have a published range of around 200 miles. Because of this, ZEV range requirements are not a significant concern because the required ranges are low. Despite this, energy demand is still expected to be significant based on fleet duty cycles.

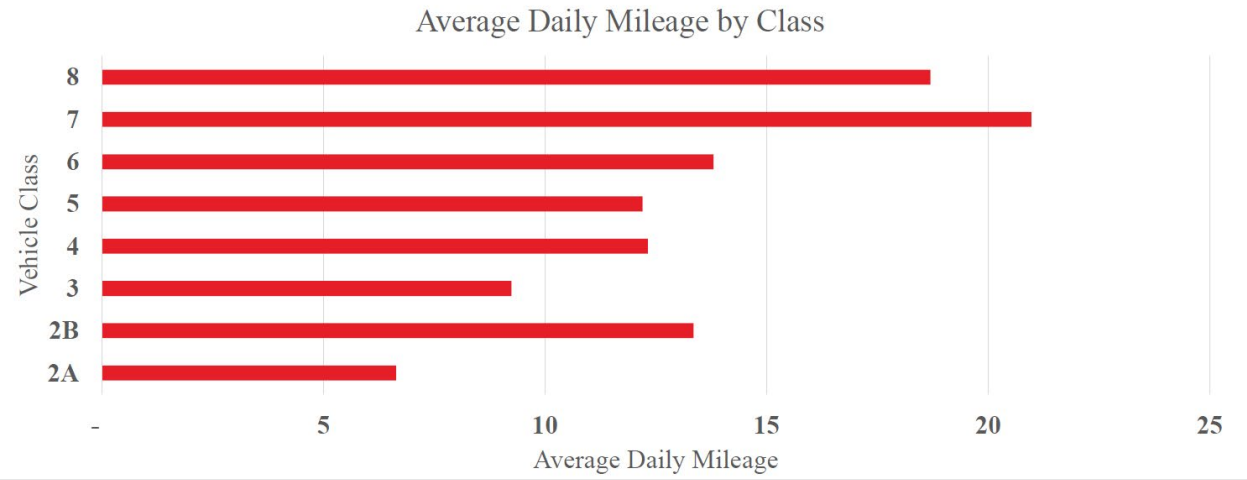


Figure 16: City of Long Beach daily fleet mileage by vehicle class. Source: Arup

COLB has created a ZEV replacement plan to scope their ZEV fleet transition. It identifies the following considerations that are key to the ZEV transition.

- Replacement vehicles
- Phasing of replacement vehicles
- Key Performance Indicators (KPIs) for replacement vehicles
- Baseline & proposed fleet energy demand profiles
- Expected emissions reductions associated with fleet conversion

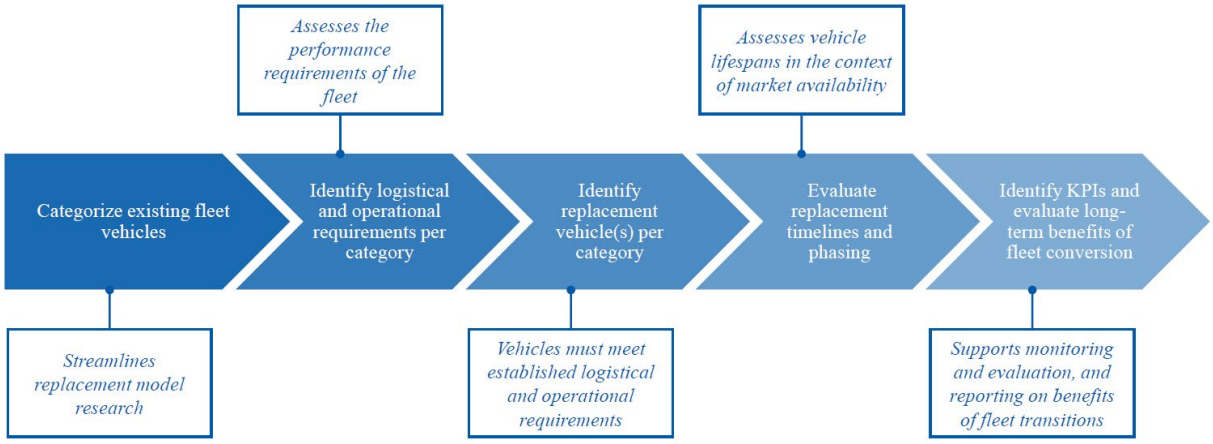


Figure 171: COLB ZEV Replacement Model Identification Approach, as included in the ZEV Replacement Plan. Source: Arup.

During the development of the ZEV replacement Plan, COLB identified several key outcomes and lessons learned, which are included below.

- The average service life of a COLB MHD fleet vehicle is ten years.

- Many COLB MHD fleet vehicles will need to be replaced around 2030.
- State and federal funding is being made available to support fleet conversion. Plan for engagement with fleet operators early.
- Some vehicle classes have limited ZEV options, though more options are anticipated to be available in the coming decade.
- Battery-electric options significantly outnumber hydrogen options.
- Full vehicle replacement may not be necessary to achieve emissions reduction objectives. Powertrain retrofits and electric auxiliary equipment can provide benefits and contribute to emissions savings over a vehicle's service life.

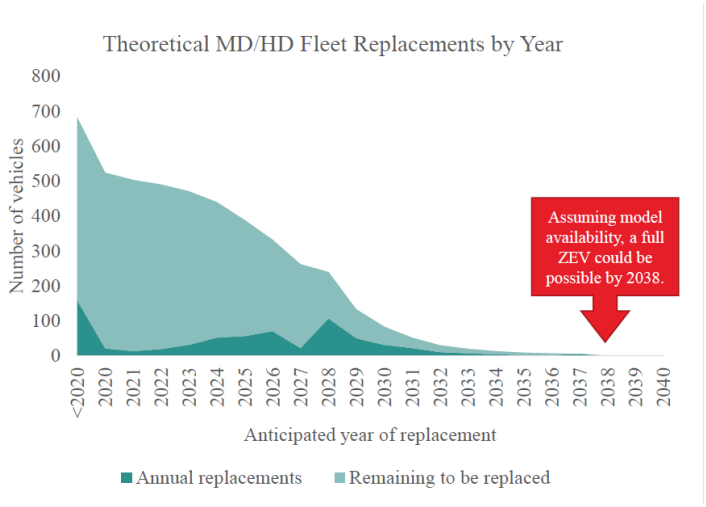


Figure 18: City of Long Beach MHD fleet replacement model. Source: Arup

The following graphs indicate the expected emissions reductions associated with COLB's MHD fleet electrification efforts.

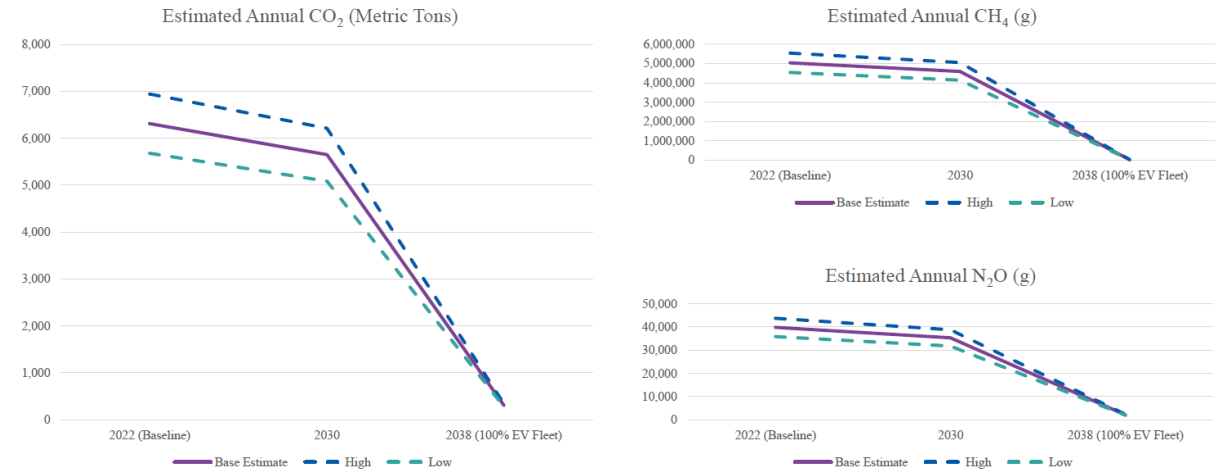


Figure 19: Estimated annual carbon dioxide, methane and nitrous oxide emissions reductions associated with fleet electrification over time. Source: Arup

The COLB developed a ZEV refueling infrastructure map. This map highlighted what refueling equipment is required in a geographical format and summarized the infrastructure requirements for refueling technologies. The city also evaluated what kind of midday and on-route charging options are available to its fleet.

COLB created an electric and hydrogen grid infrastructure development plan. The plan will establish the city's ZEV refueling infrastructure goals and guide the deployment of EV chargers and, if necessary, hydrogen refueling infrastructure. COLB focused on public charging that can power its own fleet vehicles and regional businesses. City officials noted that direct engagement with utilities is a straightforward and reliable method to ensuring that fleet infrastructure will have access to sufficiently cover fleet energy needs.

6.4 Transit Fleets

The following section provides a case study of two California Transit Agencies/operators. The first, Antelope Valley Transit Authority (AVTA), became the first all-electric zero-emission transit agency in North America. The second transit agency discussed is the Central Coast's Clean Air Express, which is owned and operated by the Santa Barbara County Association of Governments.

6.4.1 Antelope Valley Transit Authority

Beginning in 2016, the AVTA Board of Directors committed to becoming a 100% electric fleet. Shortly after, it purchased up to 85 new all-electric zero-emission buses from BYD (an electric bus manufacturer based in China). Existing electric buses have typical ranges of 150-230 miles; however, AVTA operates routes that exceed 290 miles. To address this challenge and simplify operations, AVTA purchased WAVE inductive (wireless) chargers. These chargers function by inductively providing electricity to EV batteries through a charging pad that is embedded in a street or parking lot. The pads don't require any manual labor and can charge up to 500 kW. Because the chargers are embedded in the ground and can supply high power levels of charging, they can be installed at bus stops and charge buses during wait times. By placing these wireless charging pads strategically located at transit centers throughout their bus routes, AVTA was able to extend the range of its electric buses to serve routes up to 350 miles long.

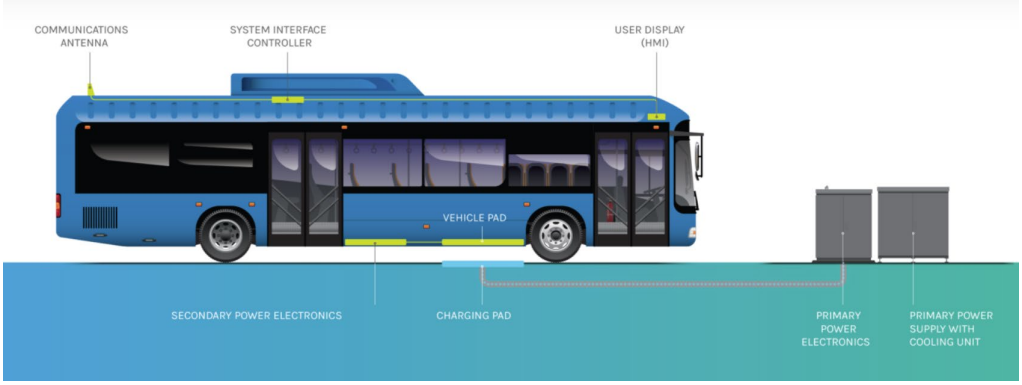


Figure 20 2: Wireless charger, power supply, and electric bus configuration. Source: Wave Wireless.

As of 2022, AVTA's fleet consists of 57 BYD zero-emission buses, 10 GreenPower EV Star Microtransit vans, and 20 Motor Coach Industries battery-electric commuter coaches. In addition to plug-in charging stations at their depots, AVTA deployed 12 Wave Wireless 250 kW chargers along their bus routes. Portions of this EV fleet and associated EVI were purchased with the help of state funding, including $28.5 million from

the Transit and Intercity Rail Capital Program (TIRCP) administered by Caltrans and the California State Transportation Agency.

AVTA Fleet Electrification Milestones:

- May 2019: AVTA celebrated achieving the first one million miles driven by its all-electric zero-emission fleet of buses.
- April 2020: AVTA decommissioned the last diesel bus from service in their local fleet and became the first all-electric local bus fleet in the US.
- August 2021, AVTA purchased the first of 24 battery-electric MCI commuter coaches, launching into service the first electric commuter coach in North America.
- January 2022: AVTA celebrated seven million miles driven by its all-electric zero-emission fleet.

AVTA estimates that the transitioning to zero-emission fleets has resulted in the following reductions and savings:

- 1,750,000 gallons of diesel fuel avoided
- 41.58 million pounds of CO2 reduced
- 130,900 pounds of particulate matter reduced
- $2,362,500 Net Savings as of January 2022
    - Savings could be as large as $1 million per year, considering fewer electric buses were purchased due to battery electric bus range extensions from wireless charging.

AVTA's example of transitioning to 100% zero-emission buses proves that transit agencies with long routes can fully electrify their fleets and save money by doing so. By utilizing range-extending wireless charging strategies and pursuing public funds for fleet electrification, AVTA met statewide emissions reduction goals and electrified its fleet 18 years ahead of the state-mandated requirement. This has resulted in millions of dollars in savings and can serve as a model for other transit fleet electrification efforts.

6.4.2 Santa Barbara Metropolitan Transit District (MTD)

MTD is the primary transit bus service connecting communities in Goleta, Santa Barbara, Montecito, and Carpinteria. MTD offers forty-two (42) transit routes that cumulatively result in 2.6 million service miles per year. The bus service provided 6.2 million passenger trips in 2018 through 719 bus stops. Their existing fleet consists of 82 Diesel Buses, 18 Hybrid Buses, and 14 all-electric buses.[15]

A seven-member board of directors governs MTD. Two members are appointed by the County Board of Supervisors, two are appointed by the Santa Barbara City Council, one is appointed by the Goleta City Council, and one is appointed by the Carpinteria City Council. The seventh member, also known as the at-large director, is appointed by the other six members of the board. In November 2018, the Santa Barbara MTD Board of Directors voted unanimously to adopt a goal of a 100 percent zero-emissions fleet by the year 2030.[16] MTD operated the first battery-electric bus fleet in the United States back in 1991. Currently, MTD boasts the second-largest active electric bus fleet in California, with 14 fully battery-electric buses out of a total fleet of 113. MTD has also ordered nine (9) additional 40 ft battery electric buses from New

[15] https://sbmtd.gov/about/about-mtd/
[16] https://sbmtd.gov/electricfuture/

Flyer Industries. These purchases were supported by funds from the Federal Transit Administration. Each bus is expected to reduce greenhouse gas emissions by up to 160 tons per year.

Outside of its bus fleet, MTD operates electric shuttles that serve Santa Barbara's downtown and waterfront. The Santa Barbara Department of Public Works contributed around $1 million per year to the program, which was funded by parking meter funds. MTD financed vehicle costs. Because of this agreement between public works and MTD, the electric shuttle service costs 50 cents per ride or $1 per one-day pass. Santa Barbara MTD's step-based approach to bus electrification and unique financing of its electric shuttle bus system can serve as a model for other organizations looking to electrify their fleets.

6.5 School Bus Fleets

3CE offers an Electric School Bus Program that provides funding to school districts to purchase new electric school buses and charging stations. To participate in the program, school districts will identify the desired bus and secure necessary match funds to complete bus purchases and apply for 3CE's funding online. If accepted, 3CE issues a Letter of Intent (LOI) to reserve funding for the bus(es) to the selected School/school district. Once electric buses and charging infrastructure are purchased, 3CE reimburses the recipient. Electric bus manufacturers and local Air Pollution Control Districts may have additional funding programs available to combine with this funding. The California Air Resources Board's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) plays an important role in funding EV school bus fleets. The program offers between $85,000 and $395,000 in vouchers to support the purchase of electric school buses.

3CE is in its 4th fiscal year of operating the School Bus Program. Since the program started, it has provided funds for 21 school buses in its service area from Santa Cruz to Santa Barbara County. Despite providing funds for 21 school buses, only two buses have been delivered; the other 19 buses have funds reserved. The following benefits accrue to school districts that electrify their fleets.

- Each school bus replaced with an all-electric model is estimated to avoid 15.6 metric tons of greenhouse gas emissions (MTCO2e) each year, as well as all diesel particulate matter emitted.
- Electric school buses are typically cheaper to run and maintain[17]
    - Districts typically save 72% on fuel compared to a standard diesel bus.
    - Districts can save up to 80% *in* maintenance.
- Electric buses have best-in-class driver visibility, a tighter turn radius, and wider aisles

The case studies below explore the bus electrification process of two Central Coast school districts within 3CE's service area.

[17] John Doerr (Time). (2022, January). *The Ubiquitous Yellow School Bus Can Be Turned Into a Force for Climate Change Good.*

6.5.1 Salinas City Elementary School District

The Salinas City Elementary School District partnered with Highland Fleets to help them plan and deploy ten electric school buses and upgrade a bus depot with ten chargers. The project was slated to be completed by the start of the 2023-2024 school year.[18]

Highland Fleets Business services consist of assisting school districts in finding funding, planning, procuring, and deploying electric school buses and chargers. Instead of requiring the school to front the remaining upfront costs for equipment that are not covered by grants, Highland will charge Salinas Elementary School an annual fee for 10-15 years (the projected timeline of vehicle ownership). This allows the school to save money through fuel and maintenance costs from transitioning to ZEBs (zero-emission buses) and transfer the upfront costs of purchases to Highland. Highland is also planning on working with Salinas's elementary school district to train its drivers and mechanics to operate and maintain the new fleet and include a service plan that includes repairs, parts, and labor into the contract with the school.

The project represents the first use of California General Code 4217 to create an energy-savings contract for transportation.

Other schools in the Central Coast region, such as Santa Cruz City Schools, have purchased electric buses. However, most have not seen their orders delivered in full. Due to supply chain challenges, OEMs such as Lion Electric have been unable to deliver electric school bus orders. Salinas Elementary is planning to avoid these challenges by procuring its buses through Highland. Because Highland is the largest purchaser of electric school buses in the country, they can plan their procurement needs well in advance to secure orders for their clients. Highland also works to order switchgear grid components, an essential piece of grid equipment necessary to provide electrical capacity to EV chargers, well in advance of their expected deployments.

6.5.2 Santa Cruz City Schools

In contrast to Salinas City Elementary School District, Santa Cruz City Schools is phasing in electric bus pieces piecemeal as funds become available. In May 2019, it received a zero-emission school bus grant, along with HVIP vouchers, to purchase one Lion Electric school bus. They also purchased a Clipper Creek, 64-amp EV charge to fuel the bus. This equipment was delivered shortly after. In 2020, the School District filed for and received a second Lion Electric school bus and used a 3CE grant and HVIP voucher to purchase a 3rd electric school bus. In 2022, the Rural Schools Bus Pilot Program awarded the school district funding for an electric school bus. That same year, Lion Electric notified the school that its manufacturing deadlines were moved and that the company wouldn't be able to deliver the second bus that was ordered in 2020 until 2023.

Recently, the school qualified for four additional buses through the HVIP Set Aside school bus program. They anticipate using this funding to order four Collins electric school buses. The school district is also attempting to secure funding for additional EVSE modules, and hope to use the grants they used to purchase Lion Electric Buses that haven't been delivered to purchase three additional Collins Electric School buses. They are also working with PG&E to add grid-enhanced connectivity to support their additional EVSE modules.

[18] https://3cenergy.org/central-coast-community-energy-awards-funding-for-nine-electric-school-buses/

6.6 Case Study Conclusions

Generally, fleet managers in all three fleet categories (transit, municipal, and school bus) are hampered by supply chain challenges. The inability of OEMs to deliver ZEVs has dramatically slowed fleet vehicle procurement. This has created a downstream effect that affecting some fleet managers' ability to spend procurement funds. Beyond supply chain challenges, the level of planning required for large-scale deployments of EVs (light duty and MHD) has proven to be more time-consuming and involved than expected for many fleets. Fleet managers have circumvented these challenges by either developing their MHD EV inventory in a piece-meal approach or by acquiring vehicles through leases managed by a third party.

Despite the challenges associated with fleet electrification, there is an abundance of funding opportunities and support networks to help guide fleet managers as they electrify fleets. Knowledge sharing through engagement with stakeholders and leaders in the electrification space has been crucial to developing the electrification capabilities of staff throughout the region. Identifying appropriate funding sources and developing innovative financing partnerships will be crucial for successfully electrifying EV fleets on the Central Coast. As shown in these case studies, there are a variety of viable strategies for implementing MHD ZEVs. Fleet managers should identify the optimal approach for their fleets based on funding, staff capabilities, and equipment suitability and availability.

7 Funding the MHD Transition

Fleet Managers can finance the electrification of their fleets through a variety of approaches. Identifying the appropriate financing mechanism is crucial to a successful EV transition. There are two primary approaches fleet managers can use to finance a fleet electrification project: leasing and ownership. The key difference to most financing approaches is centered around infrastructure ownership and procurement. Fleet managers can build, operate and manage fleet infrastructure and vehicles through their own organization or hire other organizations to assume these responsibilities in exchange for financing the projects. Although EVI financing approaches can vary between a lease model and an outright ownership model, both approaches can rely on some of the same funding sources. Public agency funding opportunities take the form of grants, equipment vouchers, or tax rebates. Most utility companies offer support through grants, limited or no-cost electrical infrastructure upgrades, and EVI installation services. Whether a fleet owner decides to opt for an EVI leasing model or outright ownership, any party involved in fleet electrification should seek funding support through these avenues if available.

The first EVI financing approach is for the fleet owner to apply for funding from public agencies and use capital expenditures or financing to cover the residual costs. The benefits of this approach include outright ownership of all assets purchased, operational flexibility to purchase and utilize equipment as needed, and savings benefits that accrue from ownership. Challenges associated with this approach include responsibility for maintenance and depreciation, and difficulty with asset procurement.[19]

Independent Asset Procurement is a model in which each piece of equipment is procured individually, as needed. The advantages of the independent asset procurement model may include:[20]

- Allows for a phased-in approach to allow equipment testing.

[19] EV Smart Fleets. (2017). *Public sector fleet EV procurement examples: A nationwide initiative to accelerate electric vehicle adoption in public fleets*.

- Does not commit operation to a single brand or model, allowing for the purchase of improved models later (higher charger capacity, better operability).

The challenges of the independent asset procurement model may include:

- The project owner retains the integration risk of independent elements. If project elements are delayed, the project wwner will have to manage the challenges of schedule impacts and cost overruns.
- Increased project management and coordination responsibilities of the project owner.

If the project owner wants to simplify the procurement of equipment and electrify its fleet quickly, it can pursue a bundled purchase of EVs and EVI. The advantages of the system bundling model may include:

- Reduced integration risk between equipment types and simplified project management.
- Bundling systems may facilitate third-party financing and may improve the terms of financing.

The challenges of the system bundling model may include:

- High upfront costs associated with purchasing many pieces of equipment at the same time.
- There may be limitations on agencies to procure complete operations scope due to union arrangements or preexisting contractual agreements.
- Possible risk premium for items that the project owner could handle in-house.

The EVI lease financing approach works by contracting an EVI or EV company to install and maintain equipment on behalf of the fleet owner. Fleets that pursue a leasing model can have the funding, planning, procuring and deployment of EVI managed by the leasing organization. In exchange for leasing fees from the fleet, the leasing organization pays for the upfront costs of installation and recoups through fuel savings and LCFS credits. Fleet managers can still accrue savings using the models through fuel and maintenance savings but will not be able to benefit from equipment ownership.

In an EVI as a Service model, the third-party developer develops, owns, and operates EV chargers. This can apply to the EVs themselves as well. The advantages of this model may include:

- Faster and more reliable delivery of EVI (EVI companies can anticipate, and order equipment based on expected future needs, enhancing delivery times).
- Highly reduced project management and maintenance.
- Simplified funding and long-term contract paid by fuel savings and LCFS credits can eliminate upfront capital expenditures.

The challenges associated with this model may include:

- Inability to fully benefit from fuel and maintenance savings from using EVs.
- Commitment to long-term contracts that may limit operational flexibility or the ability to switch brands.

The following section provides a more detailed breakdown of the two most common EVI and EV Equipment as a service model:

7.1 Charging and Trucking as a Service

Charging as a Service (CaaS) is a subscription-based EV charging package that provides turnkey EV charging solutions with minimal upfront purchasing costs. This means that instead of paying all upfront costs at once, drivers or fleet managers pay a monthly subscription fee over a fixed term. CaaS removes the burden of ownership and maintenance from the charging host by providing such things as turnkey EV charging stations, management software, 24/7 driver support, professional field maintenance, etc. This

program can reduce risk and enable flexibility to small and mid-sized businesses, especially where multiple vehicles need charging. [20]

Trucking as a Service (TaaS) refers to a similar business model where transportation businesses or other businesses reliant on vehicles can gain access to trucks on demand. TaaS companies typically provide access to battery-electric trucks at a per-mile or per-route rate nearly on par with diesel, inclusive of vehicles, costs of charging infrastructure, installation, and maintenance. This model can help reduce the upfront costs of vehicle electrification for carriers by facilitating deployment using the trucks as a service rather than as capital assets. The model functions like the lease model for vehicle procurement and offers the same benefits as CaaS. [21]

TaaS and CaaS Benefits

1. Supporting compliance with fleet regulations: The partnership with service providers can assist IOOs and small fleets struggling to comply with state fleet regulations. The service provider can provide guidance and support to ensure that the MHD ZEVs and chargers meet all necessary compliance standards, reducing the burden on IOOs and enabling them to focus on their operations.

2. Facilitating training and education: The service provider can play a crucial role in providing training and education programs for IOOs and disadvantaged groups on the operation, maintenance, and charging of MHD ZEVs. This would help bridge the knowledge gap and build the necessary skills for a successful transition to electric MHD fleets.

3. Ensuring equitable distribution: Partnering with a service provider would allow 3CE to achieve internal DEI award targets for incentives and rebates, ensuring the equitable distribution of benefits. The provider can collaborate closely with 3CE to track and report on the metrics related to the engagement of disadvantaged communities and IOOs, thus supporting transparency and accountability.

4. Collaborating on outreach and community engagement: By partnering with community organizations, the service provider can help identify locations easily accessible to low-income communities and areas where IOOs are likely to be present. This collaboration would enhance community engagement efforts, ensuring that information about the programs and MHD ZEVs reaches the target audience effectively.

7.2 3CE Funding Programs

3CE offers a range of incentive programs for electric fleets to help reduce greenhouse gas emissions and promote the adoption of electric vehicles. The primary benefits take the form of rebates for equipment, including electric vehicles and chargers. There are no limitations on stacking these incentives with other programs if those programs are not 3CE programs. The Electrify and Charge Your Fleet programs are limited to $150k for each project and only member agencies are eligible to apply. Member agencies include cities, counties and affiliated organizations such as transit agencies.

[20] https://www.forbes.com/sites/stevetengler/2022/02/16/charging-as-a-service-for-electric-vehicles-growing-as-a-market-offering/?sh=697fb4e85939

[21] https://www.act-news.com/news/how-the-taas-model-can-help-shippers-carriers-deal-with-ev-growing-pains/

3CE also offers rebates and a concierge service for agriculture customers. The concierge service was developed in response to growing customer demand for streamlined solutions that make operating electric farm equipment easier and more convenient. The service helps customers evaluate their property, design a charging station plan, navigate bids from contractors, provide construction guidance, and apply for rebates. Customers receive a plan that includes costs, rebates, tax credits, and a complete "how-to" guide and can receive up to $100,000 for their DCFC project. A full list of 3CE's rebate programs for MHD EVs is included here:

ELECTRIFY YOUR FLEET PROGRAM

- Eligibility: 3CE Member Agencies
- https://3cenergy.org/rebates/electrify-your-fleet/

CHARGE YOUR FLEET PROGRAM

- Eligibility: 3CE Member Agencies
- https://3cenergy.org/rebates/charge-your-fleet/

AGRICULTURE ELECTRIFICATION PROGRAM (geared for off-road vehicles)

- Eligibility: Commercial agricultural producers and/or processors
- https://3cenergy.org/rebates/ag-electrification-program/

ELECTRIC BUS PROGRAM

- Eligibility: Individual public schools or public-school districts and ag transport businesses
- https://3cenergy.org/rebates/electric-bus-program/

7.3 Outside Funding Sources

A key barrier to ZEV fleet conversion is the high upfront capital expenditures associated with procuring a ZEV system (including the vehicle, depot and refueling infrastructure changes).[22] As California regulations continue to hasten the timetable for fleet conversions, more funding opportunities through public grants are becoming available to businesses to convert fleets.

There are a variety of state, federal, and utility funding sources available to subsidize the transition to ZEVs, along with private financing options. Table 11 is a summary of current available funding sources in California in the form of rebates, low-interest loans, vouchers, and grants that can either be used for ZEVs or infrastructure. The balance of this section provides more detail on top funding sources and program details, as well as private financial mechanisms.

[22] Welch, D. et al. (2020). MOVING ZERO-EMISSION FREIGHT TOWARD COMMERCIALIZATION. CALSTART

Table 11: Federal and California ZEV funding opportunities

Funding Opportunity	Funding Type	Use Type	Funding Available	Next Submission Date/Deadline
SCE Charge Ready Transport Program	Rebate	EVSE	Pays for electrical work on the utility and customer sides of the meter.	Ongoing
PG&E EV Fleet Program	Rebate	EVSE	Pays for electrical work on the customer side of the meter. Also provides $9,000 per truck.	Ongoing
HVIP	Vouchers	MHD ZEVs	$60,000/truck (for fleets of 500+ domiciled in CA)	Open/Ongoing
EnergIIZE – EV Fast Track and Hydrogen Lanes	Grants	EVSE	50% of eligible EVSE costs up to $500,000	Funding lanes open at set times throughout year
BAAQMD - On-Road and Infrastructure Programs (Carl Moyer)	Grants	MHD ZEVs and ZEVs	50% of costs	Open
SCAQMD- The Carl Moyer Memorial Air Quality Standards Attainment Program	Grants	MHD ZEVs and EVSE		Closed 5.9.23
Sac Metro Air District	Grants	MHD ZEVs and EVSE	50% of charging infrastructure costs are covered; 65% if paired with a renewable energy system	
IRA	Tax Credit	MHD ZEVs and EVSE	Up to $40,000 per new truck. Up to 30% or cost for charging infrastructure, up to $100,000 per site	Ongoing

VW Mitigation Trust	**Grant**	**MHD ZEVs and EVSE**	**75% of cost, up to $200,000**	**Ongoing, but limited funding remaining**

7.3.1 State Sources

Public funding opportunities and incentive programs provide resources that support widescale adoption of cleaner technologies and compliance with regulatory requirements, with a focus on early adopters.

California has a goal to decrease GHG emissions 40% by 2030. Because the transportation sector accounts for such a large proportion of these emissions – 27% nationwide and roughly 50% in California[23] – the state aims to end sales of new internal combustion passenger vehicles by 2035 and new diesel trucks by 2036. To reach these goals, ample state funding resources are dedicated to transitioning the transport sector to ZEVs to reduce carbon emissions from combustion engine vehicles. This shift requires replacing or repowering the vehicles themselves while also investing in resilient charging infrastructure.

Funding for ZEVs is especially important for agencies, tribal entities, or small businesses that don't have the resources to support the transition on their own. In addition, certain areas such as those located near or along freight corridors experience comparatively worse air quality levels exacerbated by gasoline and diesel-powered vehicle air pollution emissions. To address these needs, there are many funding opportunities dedicated to disadvantaged communities to ensure that improvements in air quality and access to ZEVs are distributed equitably across the state.

Grants, incentives, vouchers, and tax credits are available through state and local agencies. The following agencies offer a variety of programs designed to make ZEVs and respective infrastructure more accessible to the public, and further information on specific programs can be found in Section 6.5 and 6.6. Most active opportunities are awarded on a first-come, first-served basis.

California Air Resources Board (CARB): CARB is a department within the California EPA dedicated to protecting public health, welfare, and ecological resources by reducing air pollution through various programs. Many of these programs are specifically related to ZEV expansion and fleet electrification.

Air Quality Management Districts (AQMDs) or Air Pollution Control Districts (ACPDs): AQMDs or ACPDs are local agencies under CARB that are responsible for distributing funds regionally as well as tailoring programs to fit the needs of the area. In alignment with CARB's mission, these efforts also target emissions reduction and air quality improvement.

California Energy Commission (CEC): The CEC is California's primary energy agency and thus plays a critical role in advancing the state's energy practices with the goal of reaching 50% clean energy usage by 2030. Incentive programs, grants, and research funding opportunities are some of the ways the CEC works to wean the state off its reliance on energy from fossil fuels. The California Energy Commission's Clean Transportation Program (CTP) provides MHD infrastructure investments focused on the infrastructure needs of medium- and heavy-duty ZEVs including charging and refueling for drayage trucks, grid integration, integrated storage solutions, and charging management.

[23] ICF. (2020). *Caltrans Greenhouse Gas Emissions and Mitigation Report: Final Report*. Caltrans

California Department of Transportation (Caltrans): Caltrans oversees the state highway system and supports transit systems across the state. Caltrans provides resources for sustainable planning. Certain ZEV projects would be eligible for these grants due to their impact on clean energy and resilience. In addition, Caltrans is the recipient of $384 million in National Electric Vehicle Infrastructure (NEVI) funding to be deployed along top priority transportation corridors over the next five years.

California Public Utilities Commission (CPUC): CPUC is the agency that reviews and approves utility transportation electrification programs, including the approval of Rule 29, which allows utilities to collect from ratepayers the cost of deploying utility-side electrical infrastructure. CPUC has also approved recent vehicle-to-grid pilot programs and has approved a $200 million Microgrid Incentive Program.

7.3.2 California Agency Funding Programs

The 2021-22 California state budget included a total investment of $10 billion over 6 years to reduce carbon dioxide emissions from the transportation sector by supporting ZEVs and ZEV infrastructure. Governor Newsom proposed an additional $6.1 billion in funding for ZEVs and infrastructure in his 2022-23 budget. This funding is being administered by CARB, the California Energy Commission, the California State Transportation Agency, and the Governor's Office of Economic and Business Development. This new funding builds on ZEV and ZEV infrastructure investments made by the State for more than a decade.

CARB approved its $2.6 billion Clean Transportation Incentives program budget on November 17, 2022. The bulk of these funds have come from California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment — particularly in disadvantaged communities. One of the top goals of CARB's investment plan is "supporting small owner/operator fleets' transition to zero-emission in support of equitable investment goals."

7.3.3 Top Priority Funding Programs for Central Coast Fleets and Infrastructure

HVIP

California's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), administered by the California Air Resources Board (CARB), provides point-of-sale vouchers on a first come, first served for the following Class 8 ZEVs:

- BYD 8TT Battery Electric Truck (BET) (435 kWh)
- Freightliner eCascadia BET (475 kWh)
- Hyundai XCIENT Fuel Cell Electric Truck (FCET)
- Hyzon Motors FCET8
- Hyzon Motors FCEV8-100
- Hyzon Motors FCEV8-200
- Kenworth T680E BET
- Lion8T BET
- Nikola TRE BET (753 kWh)
- Nikola TRE FCET
- Peterbilt 579 BET (396 kWh)
- Volvo VNRe BET (375 or 565 kWh)

The current baseline for BETs is $120,000, and $240,000 for FCETs, subject to the following adjustments:

Table 12: HVIP Adjustments. Source: HVIP

Voucher Adjustment Type	Voucher Adjustment Base Amount
Public and Private fleets with 10 or fewer medium- and heavy-duty vehicles	+15%
Public fleets with 11 or more medium- and heavy-duty vehicles	0%
Private fleets with between 11 and 100 medium- and heavy-duty vehicles	0%
Private fleets with between 101 and 400 medium-and heavy-duty vehicles	-20%
Private fleets with more than 500 medium- and heavy-duty vehicles	-50%

Note: Dealerships, manufacturers, and leasing entities are prohibited from requesting a voucher as a purchaser. The purchaser must be the lessee and operator of the vehicle, not the lessor. Consequently, invoices must be issued to the purchaser (lessee), not the leasing entity.

EnergIIZE

The EnergIIZE (Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles) Project, implemented by CALSTART with CEC funding, provides funding for ZEV infrastructure. Funding is provided in four funding lanes, which target different types of organizations or businesses that 3CE serves.

VW Mitigation Trust

The Volkswagen (VW) Environmental Mitigation Trust (Trust) provides about $423 million for California to mitigate the excess nitrogen oxide (NO_X) emissions caused by VW's use of illegal emissions testing defeat devices in certain VW diesel vehicles. The Volkswagen Mitigation Trust programs generally require applicants to scrap older qualifying diesel engines to receive funding for the purchase of new battery-electric vehicles, including MHD (Class 5-8) trucks. Eligible Class 8 engine model years that qualify for the scrap and replace program are 1992 to 2012. The maximum incentive is $200,000 per truck. Details of the program are provided below in Table 12:

Table 12: VW Mitigation Trust Eligibility and Funding Summary

Eligibility and Funding Summary

Baseline Equipment	Baseline Technology	Replacement Technology	Project Type	Ownership Category	Maximum Incentive Percentage (of cost)	Maximum Incentive Cap (per equipment)
Class 8 Freight Trucks (including drayage trucks, waste haulers, dump trucks, and concrete mixers)	Engine Model Years 1992 to 2012*	Zero-Emission Vehicle	Replacement	Non-Government	75%	$200,000
				Government	100%	

PG&E EV Fleet Program

Through the EV Fleet Program, PG&E pays for all electrical infrastructure from the transformer to the customer's meter. The program provides $9,000 per vehicle for Class 8 vehicles, and up to $3,000 for electric Trailer Refrigeration Units (eTRUs). The program also offers charger rebates of up to $42,000 for 150+ kW EV chargers installed in Disadvantaged Communities (DACs) ($15,000 per charger up to 50 kW, $25,000 for chargers 50.1 kW to 149.9 kW, $42,000 for 150 kW and above). To be eligible for the EV Fleet Program, applicants must be a PG&E electric customer, own or lease the property, and acquire at least two EVs.

SCE Charge Ready Transport Program

Through the Charge Ready Transport Program, SCE pays for all electrical infrastructure from the transformer to the customer's meter. As part of this program, SCE will 1) Perform on-site visits to evaluate the site's electrical infrastructure needs. 2) Develop utility-side and customer-side of the meter cost estimates. 3) Design, secure permit, project manage and install the necessary infrastructure. Participants will have the option to instead perform the necessary work on their side of the meter and receive a make-ready rebate. 4) Install a separate meter dedicated to the EV charging infrastructure and waive customer demand charges through 2024 with our commercial EV rates. 5) Make final inspections once the charging equipment is installed.

Area Quality Management Districts

The Carl Moyer Memorial Air Quality Standards Attainment Program funds the replacement of old, high-polluting vehicles, engines, and equipment, with new technologies that are cleaner than required, or earlier than what is required by rules and regulations. Grant amounts are based on the cost-effectiveness of harmful pollutants that will be reduced by the project. This program also funds the installation of charging and fueling infrastructure. The Central Coast has three distinct air districts: Monterey Bay Unified, San Luis Obispo and Santa Barbara.

Monterey Bay Unified Air Resources District: MBARD has three grant programs targeted towards MHD electrification:

1. The Zero Emission School Bus Program is awarded in the form of an executed grant agreement between the school district and MBARD and will be funded in combination from various sources:

AB617, AB923, Carl Moyer Program, Local Offsite Mitigation fees, the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), or Monterey Bay Community Power (MBCP) funds. MBCP is helping to move the program forward by contributing $1.2 Million in total funds. Six electric school bus projects will each receive $200,000 from MBCP's contribution and the rest of the funding will be supported by MBARD grant funds.

2. The Diesel Engine and Equipment Replacement Grant Program, funded by the Carl Moyer Program, provides funding to encourage the replacement of older heavy-duty motors/engines operated in one or more of the Air District's three counties: Monterey, San Benito, and Santa Cruz.

3. The AB2766 Motor Vehicle Emission Reduction Grants permits MBARD to allocate a $4 per vehicle registration surcharge fee towards grant projects that reduce motor vehicle emissions, including NHD primary MHD fleet-related fields vehicle electrification and related planning and technical studies.

San Luis Obispo (SLO) County Air Pollution Control District: SLO APCD also has three grant programs that target MHD vehicle electrification.

1. The APCD's Alt Fuel Infrastructure Grant Program provides funding for EV charging and natural gas fueling stations in San Luis Obispo County. This is a first-come, first-serve program and over $600,000 is currently available for new, conversion of existing, and expansion to existing non-residential EV Charging.

2. The School Bus Grant Program provides up to $200,000 per bus and is capped at 50% of the eligible price to schools in SLO county. Eligible buses must be at least 20 years old and must be destroyed upon delivery of the replacement bus.

3. The APCD's Carl Moyer / AB617 and FARMER Incentive Programs provide funding to help pay for projects that reduce heavy-duty diesel engine emissions prior to any regulatory requirement. Applicants may qualify for grants totaling up to $300,000 (applicants can only have $300,000 in active grants at one time- including historical active grants), subject to cost effectiveness limits and other requirements of the program. Eligible project categories include:

    a. Agricultural Tractor Equipment Replacement Program (ERP)

    b. Agricultural Equipment Repowers and Retrofits of off-road equipment such as irrigation engines, tractors, and mobile construction equipment

    c. Electrification of Agricultural Engines

Santa Barbara County Air Pollution Control District: The SBCAPCD has five grant programs available for MHD vehicle and infrastructure conversion.

1. Clean Air Grants for On-Road Trucks and Buses provides funding opportunities for a variety of on-road vehicle replacement projects. Grant funds are calculated based on the amount of pollutant emissions the replacement project will reduce. Eligible vehicles include diesel trucks and buses, solid waste collection vehicles, transit/urban buses, and diesel transportation refrigeration units (TRUs) with a 2016 or older model year engine.

2. Clean Air Grants for Off-Road Equipment Replacement provides between $10,000 to $250,000 to replace off-road equipment: diesel-powered tractors, dozers, forklifts, loaders, excavators, scrapers, agricultural utility terrain vehicles, ground support equipment, and related vehicles.

3. Clean Air Grants for Agricultural Stationary Diesel Engine Repower provides between $10,000 to $250,000 to replace diesel powered stationary agricultural engines.

4. Clean Air Grants for School Buses provides grant funds for diesel powered school bus replacements. Successful projects will be eligible to receive a grant within a range from $10,000 to $250,000 for school buses that are owned by a public school district in Santa Barbara County.

5. Clean Air Grants for Infrastructure are available to benefit public health for the installation of fueling or energy infrastructure to fuel or power covered sources. Eligible projects are those that are in Santa Barbara County and provide fuel or power to a covered source. Successful projects will be eligible to receive a grant within a range from $10,000 to $250,000. Funding priorities include EVCSs that support fleet charging, DCFCs along freeway corridors and long-term charging at destination areas such as airports and schools.

CPUC

Technical and financial assistance for infrastructure is also available through several programs. The California Public Utilities Commission has approved $690 million to support heavy-duty charging and hydrogen fueling infrastructure installation pursuant to *Senate Bill 350*.[24]

Low Carbon Fuel Standard Credit program

The California Air Resources Board (CARB) implements and administers the Low Carbon Fuel Standard (LCFS) program, launched in 2009. The LCFS Program is designed to encourage the use of cleaner, low-carbon transport fuels in the transportation sector, which is responsible for about 50 percent of GHG emissions and 80 percent of ozone-forming gas emissions in California.[21] The LCFS program is also designed to increase renewable energy usage and reduce reliance on imported fossil fuels.

LCFS standards are expressed in terms of the "carbon intensity" (CI) of gasoline and diesel fuel and their respective substitutes. Low-carbon fuels below a benchmark established by CARB (such as electricity, renewable diesel, renewable natural gas, and many others) generate credits, while fuels above the CI benchmark generate deficits. Credits and deficits are denominated in metric tons of GHG emissions and are transacted on a private market.

In the case of electricity used as a fuel source, credit generation is relative to the CI of the electricity used and the quantity of electricity supplied to the equipment. Every quarter, energy consumption data is submitted, reports are developed and submitted, credits are generated, transacted, and transferred, and payments are issued to credit-generators.

The 2018 LCFS amendments added a zero-emission vehicle (ZEV) infrastructure crediting provision to the program LCFS (Section 95486.2)[25] designed to support the deployment of ZEV infrastructure. The ZEV

[24] https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-adopts-transportation-electrification-program-to-help-accelerate-electric-vehicle-adoption
[25] https://ww2.arb.ca.gov/resources/documents/lcfs-zev-infrastructure-crediting

infrastructure provision covers Hydrogen Refueling Infrastructure (HRI) and Direct Current (DC) Fast Charging Infrastructure (FCI). In addition to generating LCFS credit for dispensed fuel, the eligible hydrogen station, or DC fast charger can generate infrastructure credits based on the total "capacity" of the station or charger, minus the quantity of dispensed fuel. That is, credits are issued based on how much theoretical energy can be supplied, not the actual fuel supplied.

All values are subject to change and can vary widely between equipment, deployment timelines, and a host of other external factors. This deployment evaluation is based on recent averages of LCFS Credit & Renewable Energy Certificate (REC) prices.

The purchase or deployment of renewable, zero-emission electricity increases the total quantity of credits generated by 25-35%. There is a net-financial benefit, as the cost of procuring zero-emission electricity (via the Renewable Fuel Standard program) is less than the additional proceeds from extra credit generation. This process is called "Book & Claim." The added benefit is that the zero-emission electricity used to charge fleets can be counted as operating with zero emissions, a benefit to internal sustainability initiatives and goals.

Other California Programs

The California Office of the State Treasurer oversees two main financing authorities that can support the advancement of ZEVs: the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) and the California Pollution Control Financing Authority (CPCFA). Another source of public financing programs is the California Infrastructure and Economic Development Bank (IBank). These agencies offer several programs that provide loans, bonds, and tax exemptions to assist agencies and businesses in financing investments in alternative energy, advanced transportation, and pollution control. ZEVs and associated infrastructure are eligible for many of these programs.

7.3.4 Federal Sources

Inflation Reduction Act

The Inflation Reduction Act (IRA) offers up to $40,000 per new truck. The IRA also offers up to 30% or cost for charging infrastructure, up to $100,000 per site.

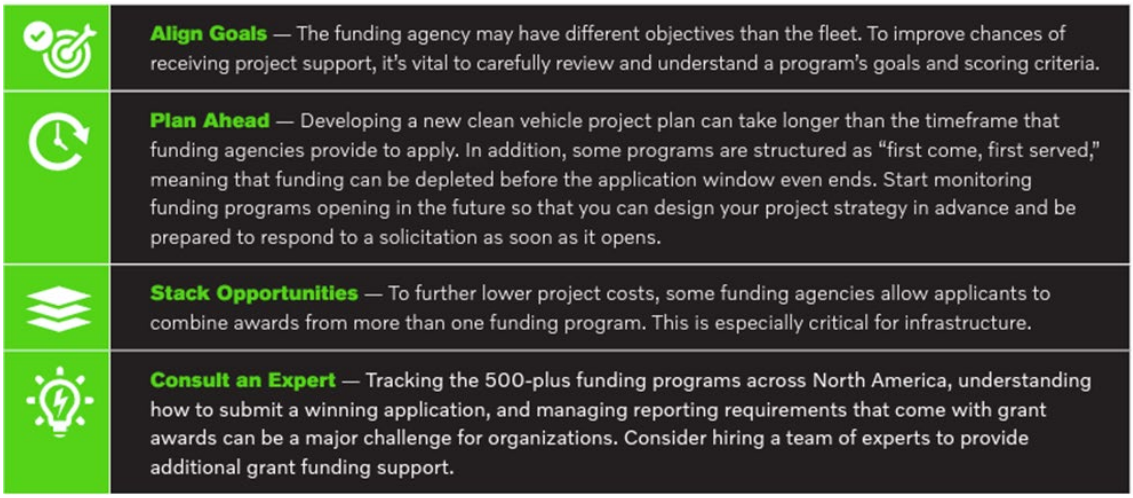


Figure 21: Funding and financing lessons learned from the Volvo Lights Program

7.4 Strategic Alignment of 3CE and Public Funding

Deploying BEVs and supporting infrastructure can require significant upfront investment compared to traditional internal combustion engine vehicles. However, utilizing an array of utility, state and federal sources can bring upfront costs close to parity. Operational savings realized by BEVS in the form of fuel and maintenance savings and Low Carbon Fuel Standard (LCFS) credits yield a very attractive return on investment (ROI) and lower total cost of ownership (TCO).

To help its customers capture the wide array of funding available in California for fleet decarbonization, 3CE is considering developing a web-based clearinghouse. The clearinghouse will be designed to guide 3CE customers and stakeholders to these funds and provide resources on how to successfully apply for the funding. Because 3CE does not prevent or limit stacking its own funding programs with the state and federal incentives listed in the previous section, Central Coast Fleet owners can heavily subside their fleet transition programs. This can help incentive regional organizations to apply for funds and will be critical to bridge the funding gap, particularly for independent owner operators and disadvantaged businesses. The following section provides a list of recommendations for 3CE to address the lessons learned during the Blueprint process, including considerations for aligning its own funding programs with other public funding sources.

8 Recommendations for 3CE's Role in Decarbonizing Regional Transportation

The following recommendations were developed upon completion of the Blueprint outreach and research process. They are intended to serve as a roadmap for implementation of the Blueprint and expansion of 3CE's role in decarbonizing MHD transportation in the Central Coast.

8.1 Develop a comprehensive online zero-emission fleet resource hub (Fleet Clearinghouse)

To provide 3CE customers with tools needed for their fleet transitions, the Blueprint team recommends development of a comprehensive web-based clearinghouse for several fleet types (Municipal, Transit, School Bus and Commercial) with resources for funding, technical assistance, how-to guides, and best practices. To avoid duplicating existing resources, the Clearinghouse can be nested within 3CE's website, build on similar fleet transition assistance sites, such as CALSTART's **Cal Fleet Advisor** and the Environmental Defense Fund's **Electrify Your Fleet** site, utilize links to existing tools and information (for example, PG&E's Fleet TCO Calculator), and showcase 3CE programs and services. The website should be beta-tested and updated regularly to reflect changing conditions and ensure links are active. To promote the website, 3CE can develop outreach, social media, and other strategies to engage fleet owners and operators. The clearinghouse can include resources from various organizations, including the Electric Drive Transportation Association (EDTA), which has a comprehensive electric fleet planning document that can be used as a reference.

Information that could be housed within the 3CE clearinghouse includes:

- Resources pertaining to funding, technical assistance, how-to guides, and best practices.
- Step by step fleet transition guides and roadmaps to deploy ZEVs and charging infrastructure, including utility interconnection processes and implementation timelines.
- Regulatory requirements, such as the recently adopted CARB Advanced Clean Fleets regulation.

- Existing 3CE EV and EVSE incentives/rebates, such as those available from Electrify Your Ride, Electrify Your Fleet, and Charge Your Fleet, where appropriate.
- Technical assistance is available from 3CE (see "Plan Your Fleet" below), including how to apply for, implement, and stack 3CE electric vehicle and charging infrastructure rebates with other incentive programs.
- Case studies of successful transitions of MHD fleets to EVs in 3CE territory, including sharing of the best EV procurement and charging infrastructure deployment practices.
- Inventories of available MHD vehicle and charging technology, particularly those included in California's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) and the EnergIIZE qualified equipment lists.
- Technical information on electric vehicles, charging infrastructure, and energy management.
- Total Cost of Ownership and Return on Investment tools, including estimated net vehicle and infrastructure costs. These tools can be referenced by links to existing resources to avoid duplication of pre-existing tools.
- Strategies to calculate and achieve reductions in greenhouse gas, air pollution and other emissions.
- A comprehensive listing of all federal, state, local and utility funding, and tax credit opportunities for MHD fleets and charging infrastructure.
- Information on entities that can help develop MHD deployment plans, and access funds – including assistance with submitting competitive applications.
- A forum or discussion board to encourage 3CE Member Agencies and other customers to share their fleet transition experiences and best practices. This will help foster a sense of community and encourage knowledge sharing.
- Permitting and interconnection standards.
- Smart charging management approaches reduce Time of Use (TOU) and demand charges, and to encourage daytime charging.
- Development of community benefit plans to conform with Justice40 and related programs.
- Workforce training opportunities (See Section 8.6).

8.2 Support the development of a Central Coast MHD EV Charging Network.

3CE is uniquely positioned to support the deployment of a high quality, unified, convenient, and fleet focused MHD EV charging network that is accessible and reliable. Charging and support infrastructure should be focused along high-priority travel corridors throughout the Central Coast, in alignment with the recent light-duty oriented Central Coast ZEV strategy and NEVI priority Alternative Fuel Corridors. Because transportation throughout the region is centered around US HWY 101 and the several state routes that connect to it, this corridor will likely emerge as the priority for opportunity charging development to support zero-emission freight transportation, including agricultural products.

<u>Recommended next steps include:</u>

- Develop partnerships with key stakeholders located in targeted transportation corridors – including U.S. 101, as well as feeder state routes, such as SR 154 – to identify ideal locations for MHD charging infrastructure, such as County Association of Governments (CAGs), Metropolitan Planning Organizations (MPOs), regional planning organizations, local governments, agricultural

businesses, private freight carriers, chambers of commerce, utilities, and community-based organizations.

- Identify gaps in fast charger infrastructure, informed by relevant local and regional EV readiness plans. To align with forthcoming federal and state funding opportunities, focus on Federal Highway Administration Alternative Fuel Corridors in the Central Coast region.
- Engage with freight and transportation customers to identify specific charging needs, regular travel routes, and other factors to inform travel corridor parameters.
- Determine deployment targets, this should include the quantity of chargers per site, and power capacity of chargers. Seek opportunities to locate sites in designated disadvantaged or low-income communities.
- Choose sites that align with DOT/DOE's guidance to locate near highway exits, restrooms, restaurants, and stores, and were filling an EV charging infrastructure gap (at least 10 miles from the nearest fast charger).
- Create a plan for visible signage.
- Work with the distribution utility and/or local electrical contractors to ensure adequate electrical capacity exists and determine specific charging station placement (preliminary site design).
- Obtain letters of commitment from the site host, utility, and other stakeholders providing labor or funds to the project.
- Identify any CEQA/NEPA, permitting, or other barriers to project implementation.
- Coordinate funding applications for the selected MHD charging sites, such as the DOT Charging and Fueling Infrastructure (CFI) program, and the National Electric Vehicle Infrastructure (NEVI) program. 3CE could provide match funds for these funding applications.
- Determine the appropriate roles for partner organizations and draft letters of support.
- After 3CE or partners obtain funding, develop and issue RFP for 3CE or partner-branded EV charging stations that meet 3CE requirements for uptime, maintenance, universal access, ease of use (i.e., consistent, uniform access using credit card), reliability, etc.
- Select and work with a vendor to deploy infrastructure, with all construction management outsourced to the chosen vendor.
- Evaluate deployment of solar and battery energy storage systems (BESS) to offset truck charging consumption.
- Integrate a Demand Side Management strategy into MHD charging network planning.
- Generate public awareness of the project and its expected commissioning date through press releases, social media, and industry events.
- A project of this scale necessitates substantial capital investment and backing from stakeholders. Consider a phased approach, beginning with a select group of partners with unique fleet attributes, including vehicle type, duty cycle, route, and use cases. Leveraging external funds, 3CE can fund a significant portion of the development, including electrical service and charging infrastructure. 3CE can also use energy program incentive funding to offset some costs for the DCFC equipment. These sites can serve as proof of concept for the viability of MDHD charging, allowing 3CE to expand the project as needed.

8.3 Expand 3CE's Existing Funding Programs to Support Additional Customer Segments, Technologies, and Business Models

The Blueprint team recommends that 3CE explore the expansion of its existing rebate programs beyond those already available for its member agencies. This could include funding for fleet transition and infrastructure deployment for freight shipping organizations, warehousing, railyards, and other key

commercial transportation nodes. Funds could be offered in tandem with 3CE's existing programs for agricultural producers and processors to support the full logistics and supply chain of Central Coast industry. To integrate this program with its regional MHD EV charging strategy, 3CE can tailor its rebate program to prioritize projects which contribute to greater EV connectivity within the region, and which provide public access to commercial trucks transporting goods along U.S. 101. In consideration of grid capacity constraints, rebate programs could be expanded to include Battery Energy Storage Systems (BESS), charge management systems, vehicle to grid (V2G) capabilities, and other technologies that support the interconnection between MHD fleets and the grid.

Expansion of funding programs could also support equipment lease models such as Charging as a Service (CaaS) and Trucking-as-a-Service (TaaS) (See Sections 7.1 and 8.3.1 for more information). Partnering with TaaS and CaaS providers that offer MHD ZEVs and chargers would facilitate the transition to electric vehicles for small businesses, independent owner operators (IOOs) and disadvantaged groups in the MHD fleet space. A plan outlining how 3CE can partner with EV CaaS and TaaS providers is provided in Section 8.4 below.

Recommended next steps include:

- Offer rebates for public infrastructure installation to support the full logistics and supply chain of Central Coast industry, in alignment with the Regional MHD EV Charging strategy.
    - Tailor the rebate program to prioritize projects which contribute to greater EV connectivity within the region and provide public access to commercial trucks transporting goods along US HWY 101.
- Create a new funding category for customers and member agencies seeking charging and grid management solutions.
    - This category could include Battery Energy Storage Systems (BESS), charge management systems, vehicle to grid (V2G) capabilities and other technologies to help customers lower their energy expenditures while minimizing impacts to the grid.
- Explicitly state that rebate programs can be used for lease models such as EV CaaS and TaaS.
    - Develop partnerships with CaaS and TaaS providers that can be referenced in the clearinghouse and include coverage of this topic in 3CE's Plan Your Fleet program (see section 8.3.1, 8.3.2).
- Ensure funding partners leverage the clearinghouse and plan your fleet program to maximize use of state and federal funds.
- Develop a framework for tracking and assessing the effectiveness of 3CE's incentives and other projects and the number of LCFS credits generated from projects enabled by 3CE's incentives.

8.4 Evaluate Trucking and Charging as a Service Partnerships

3CE can engage TaaS and EV CaaS service providers to encourage the development of a MHD ZEV truck lease model in the region, inclusive of access to charging. This would allow interested parties, including IOOs and small fleets, to utilize zero-emission technologies without high upfront capital costs, lengthy infrastructure deployment and grant applications, maintenance issues and other risks of equipment ownership.

The following plan outlines the process by which 3CE can partner with both CaaS and TaaS providers to help customers deploy zero-emission fleets quickly, in a way that eases and expedites the ZEV transition for all.

Define Objectives and Scope

- Identify and evaluate potential TaaS and EV CaaS Providers that specialize in MHD ZEVs.
- Evaluate TaaS and CaaS providers based on their experience, reputation, service offerings, and commitment to sustainability and equity.
- Articulate the objectives of potential partnerships with TaaS and CaaS providers, to include creating a pipeline for competitively selected vendors and/or subsidizing portions of leases, particularly for disadvantaged customers.
- Determine the level of financial support 3CE is willing to provide to customers seeking EVs or EVI as a service.
- Determine the geographic scope of the program, considering areas with high concentrations of IOOs and disadvantaged communities.

Establish Partnership Agreements

- Engage in discussions and negotiations with selected service providers to establish mutually beneficial partnership agreements.
- Define roles, responsibilities, and expectations for both 3CE and service providers.
- Ensure alignment with 3CE's mission, values, and commitment to diversity, equity, and inclusion (DEI).

Tailor Programs and Incentives

- Collaborate with service providers to develop customized programs and incentives for IOOs and disadvantaged businesses.
- Design financial assistance programs that address affordability barriers and help businesses located in disadvantaged communities access funding for fleet electrification.
- Incorporate successful elements from 3CE's existing programs for light-duty EVs in disadvantaged communities in the MHD fleet assistance programs.

Develop Outreach and Marketing Strategies

- Create a targeted outreach and marketing plan to reach IOOs, small fleets, and disadvantaged businesses.
- Collaborate with community organizations and industry associations to raise awareness and promote the benefits of the TaaS and CaaS offerings.
- Leverage various communication channels, such as social media, newsletters, workshops, and webinars, to disseminate information effectively.

Implement Training and Education Initiatives

- Collaborate with service providers to develop a simple training program for IOOs, small fleets, and disadvantaged businesses.
- Offer training sessions on the operation and charging of MHD ZEVs, ensuring that participants gain necessary skills and knowledge.
- Provide resources and materials in multiple languages and formats to cater to diverse communities and learning styles.

Streamline Application and Approval Processes

- Simplify the application and approval procedures for participating in the program to minimize barriers and streamline access.
- Provide guidance and support to applicants throughout the process, ensuring they have access to necessary information and resources.

Monitor and Evaluate Program Success

- Establish a metrics system to track the progress and success of the partnership program.
- Measure the percentage of IOOs, small fleets, and disadvantaged businesses that have successfully transitioned to MHD ZEVs through TaaS and CaaS offerings.
- Regularly review the program's impact on targeted communities, ensuring equitable distribution of benefits and identifying areas for improvement.
- Solicit feedback from participating IOO, small fleets and disadvantaged businesses to understand their needs and refine program offerings accordingly.
- Explore possibilities for expanding the partnership program, such as scaling up the number of MHD ZEVs available or extending the geographical coverage.

Collaborate with Stakeholders

- Foster collaboration with key stakeholders, including local government agencies, community organizations, industry associations, and regulatory bodies.
- Engage in ongoing dialogue to address challenges, share best practices, and ensure that the partnership aligns with broader sustainability and DEI initiatives.

8.5 Expand 3CE's "Plan Your Fleet" Program to Support Additional Customers and Business Models

A wide variety of stakeholders engaged during development of the Blueprint cited upfront capital costs, bandwidth constraints and uncertainty as primary roadblocks to their fleet transitions. Member agencies also shared they were having trouble finding and deploying equipment that was supported by 3CE rebates. In response to this feedback, 3CE launched its Plan Your Fleet program, which provides member agencies with technical assistance for transitioning their MHD fleets. This program could be expanded to include support for private fleets, including IOOs and small fleets. The program could also be expanded in scope to include advising customers on funding opportunities, and TaaS and CaaS offerings, as described above in Section 8.3.1.

3CE could offer its fleet planning services to any customers that apply for 3CE funding. The program could leverage information found in the clearinghouse that is then tailored to the specific needs of customers through hands-on technical support. Customers and member agencies facing bandwidth constraints and uncertainty over new technology will be more likely to transition faster and more effectively with additional support. 3CE agencies and customers applying to 3CE rebates could also be encouraged to enroll in fleet planning services to ensure that rebates are used effectively and deployed within realistic timelines.

3CE could help its customers participate in the LCFS program. This will help incentivize fleet operators to electrify their fleets through a market-based mechanism that accrues value as they transition to electric

vehicles increases. To enable this, 3CE could partner with an LCFS credit aggregator to help customers navigate the LCFS credit system without becoming directly involved in the accrual of LCFS credits. This program would also include a framework for tracking and assessing the effectiveness of 3CE's incentives and other projects, and if possible, the number of LCFS credits generated from projects enabled by 3CE's incentives.

A summary of recommendations to expand 3CE's "Plan Your Fleet" program is provided below:

- Expand "Plan Your Fleet" programs to help additional customer segments plan MHD fleet transitions to ZEVs. Services could include:
    - Electric fleet and charging infrastructure planning services in which information is provided in the fleet clearinghouse is shaped to address specific customer needs. This will address bandwidth constraints and uncertainty over new technology. The service could be provided by a third party.
    - Encourage 3CE customers that are applying for rebates to enroll in fleet planning services.
    - Provide fundraising support to help applicants identify and pursue funding opportunities, stacked with 3CE rebates.
    - Consider requiring member agencies and customers applying for 3CE funding to first maximize state and federal funds for vehicle and infrastructure deployment, then use 3CE funds to fill in gaps.
    - Incorporate guidance on CaaS and TaaS offerings into 3CE's Plan your Fleet service.
    - Support for customers to participate in the Low Carbon Fuel Standard (LCFS) program.
    - Partner with an LCFS credit aggregator to help customers navigate the LCFS credit system.

8.6 Prioritize Equity, Independent Owner Operators and Small Fleets

3CE could develop a targeted technical and financial assistance program for independent owner operators, small fleets, and disadvantaged groups. This could include programs that help businesses located in disadvantaged communities access funding for fleet electrification and programs that support independent owner operators who need assistance in transitioning to electric vehicles. 3CE can model these programs off its existing programs for light-duty EVs in disadvantaged communities.

When considering DEI in the context of MHD EV uptake, it is important to recognize that certain populations may face greater barriers to adoption than others. Studies have shown that low-income neighborhoods, communities of color, small businesses owned and operated in disadvantaged communities, as well as independent owner-operators, may face unique challenges in accessing and affording EVs and EV infrastructure. Small business fleet owners may operate in economically disadvantaged communities or regions where there may be limited access to resources, labor or infrastructure. Minority-owned or underrepresented businesses are also more likely to experience these challenges. This problem was highlighted to the Blueprint team by various members of the Blueprint Technical Advisory Committee, who noted that existing bandwidth and capital cost challenges in the region are even worst in DACs and prevent representatives from attending scoping and planning meetings for electrification. As electrification continues, this problem will be exacerbated by competition for limited MHD ZEV equipment and support resources.

To address these challenges, 3CE could pursue the following actions:

- Develop a targeted technical and financial assistance program for independent owner operators, small fleets, and disadvantaged groups in the MHD fleet space.
- Identify disadvantaged businesses, small fleets, and IOOs operating in the Central Coast region. The California Department of General Services provides resources, including maps, which identify the locations of certified small businesses and disabled veteran business that coincide with disadvantaged communities. 3CE may also define eligible disadvantaged businesses through its own criteria, and use take advantage of customer surveys to identify these customers to inform them of their eligibility.
- Model programs on 3CE's existing programs for light-duty EVs in disadvantaged communities.
- Set up a metrics system to determine the percentage of 3CE's advisory services and incentives that reach disadvantaged communities.
- Set internal DEI award targets for incentives and rebates to ensure equitable distribution of benefits.
- Ask incentive program applicants to consider the impact and location of investments to ensure accessibility to disadvantaged communities.
- Partner with community organizations to identify locations easily accessible to low-income and communities of color or areas where IOOs are likely to be present.
- Prioritize transparency and accessibility in program design and implementation to ensure equal access to information and resources related to ZEV adoption and infrastructure development.
- Partner with a TaaS provider to support IOOs and small fleets struggling to keep up with state fleet regulations, high upfront capital costs or lengthy funds capture processes. A more detailed plan for partnering with a TaaS or CaaS provider is provided in section 8.3.1.

8.7 Support Workforce and Education Training for the MHD ZEV Transition

3CE could consider supporting the participation of electricians in the **Electric Vehicle Infrastructure Training Program (EVITP)**, as the Central Coast region is experiencing a severe shortage of electricians with this qualification. Per the EVITP website, there are 16 electrical contractors with EVITP certification in the Central Coast Region. EVITP training requires a time commitment, which can be a barrier to participation. Although the EVITP certification only costs $275, it takes around 20 hours to complete. The prevailing wage for electricians in the region is between $100 and $120 per hour, resulting in around $2,000 of opportunity costs for a contractor to receive this certification not including travel, testing fees and other expenses. Beyond EVITP training, education, and training options for MHD EV maintenance is lacking in the region, which may lead to long fleet downtimes, which may in turn translate into frustration with ZEV adoption as these vehicles become widespread.

Recommended next steps include:

- 3CE could consider covering the opportunity cost for electricians enrolling in the EVITP, along with course fees, to ensure there are adequately trained electricians available to support 3CE customers as they deploy EVI. For example, provide $100/hr for the 20-hour program, plus course registration fees.
- Program eligibility could be based on the geographic location of the electrician.
- 3CE can recommend EVITP-certified electricians to its customers and member agencies.

9 Conclusion

3CE is well-positioned to lead electrification planning and deployment on California's Central Coast. This Blueprint will help guide 3CE as the organization supports its customers transition to ZEVs and related infrastructure, while advancing sustainability targets. Through stakeholder engagement, the Blueprint team reached the following conclusions:

1. *MHD electrification throughout the Central Coast region has been stymied by a plethora of barriers.* These include a lack of a comprehensive strategic vision for MHD ZEVs in the Central Coast region, high upfront costs for both ZEV charging infrastructure and vehicles, limited business models to overcome first-cost barriers, limited utility and local planning integration to develop programs specific to MHD needs, and limited stakeholder engagement, particularly from fleet operators.

2. *Internal collaboration is essential:* 3CE's Policy Board, Operations Board, and Community Advisory Council all play a key role in 3CE's efforts to support customer transitions to EV fleets. The teams need to continue to collaborate with each other and external groups to develop fleet improvement projects.

3. *Financial subsidies are an important factor in encouraging the EV transition, but the effectiveness of these programs is limited by knowledge gaps and bandwidth constraints:* CCAs and utilities broadly support fleet electrification efforts by providing funds for zero-emission vehicles, covering upgrade costs, and providing expertise for EV charging. 3CE customers take subsidies into serious consideration when making the financial case for EV transition and rely on these programs to make the transition cost-effective. Despite this, program utilization by 3CE customers is limited by a lack of knowledge of fleet implementation steps, as communicated to the Blueprint team extensively by the Technical Advisory Committee.

4. *County governments and municipalities are focused on transitioning light duty vehicles to zero-emissions before tackling MHD transportation.* Currently, there is a lack of planning in the Central Coast region for MHD ZEVs and infrastructure. Agencies are currently struggling to address light duty vehicle transitions and are ill-equipped to broaden their efforts to include MHD vehicles. 3CE is well positioned to fill this knowledge gap and lead regional planning efforts.

5. *CBOs need to be engaged in the EV transition*: Many CBOs are bandwidth constrained and largely unavailable for consultation. Real engagement with local communities in the EV transition will be enhanced by further integrating the efforts of CBOs with other organizations advancing clean transportation in the region.

6. *Public agency funding is needed to encourage a successful EV transition for 3CE customers.* A multitude of federal and state regulatory agencies provide funding and financial incentives for MHD ZEV fleet adoption.

7. *Return on investment, company policy, and state and federal regulations are the primary drives of ZEV infrastructure investment:* Financial partners and stakeholders are aware of regulatory changes and are interested in minimizing financial and operational risk and saving money while they transition to new technologies.

8. *Identifying and partnering with OEMs which provide solutions that work seamlessly together is essential for transitioning to zero-emission fleets:* ZEV and refueling infrastructure OEMs are rapidly developing new zero-emission technologies to meet demand. There are a variety of products available on the market and most companies provide incentives to help their customers adjust to the risk of using their new technologies.

9. *MHD deployments on the Central Coast are being slowed by supply chain and bandwidth issues.* A plurality of organizations consulted indicated that MHD ZEVs that have already been procured are unable to be deployed due to a lack of critical infrastructure. Specifically, EVI switchgear procurement adds significant time to potential projects. Beyond this, most agencies contacted expressed that they are unable to commit the time and resources necessary to properly scope and plan an MHD EV transition.

10. *Education programs for MHD ZEV technologies are lacking in California and need additional development:* There are just two community colleges in the state that offer a ZEV MHD workforce education and training program. However, several community colleges throughout the state provide either MHD or ZEV programs. These would be good targets for state funding to develop MHD ZEV training programs there to meet the needs of the coming transition.

11. *Collaboration with customers and stakeholders in the ZEV transition space requires extensive coordination and clear delineation of partner responsibilities and benefits:* Public agencies, governments and regional industry are interested in collaborating and sharing knowledge to support their efforts to transition to zero-emission operations.

12. *The greatest benefit to zero-emission goods movement in the region will stem from deploying public DCFC infrastructure near US Route 101 or along the other transportation corridors mentioned in the report (State Routes 1, 17, 46, 129, 152, and 156).* Goods movement is highly concentrated along these corridors, and freight transportation electrification will necessitate consistent, reliable, high-speed opportunity charging.

Large-scale MHD electrification within 3CE's service territory is possible in the coming decade. Project success will hinge on properly assessing the operational requirements of EV fleets and EVI and will be enhanced by developing a phased approach that prioritizes the easiest electrification targets first. Overall, the recommendations provided in Section 8 can help 3CE promote the decarbonization of regional transportation. Successful implementation of these recommendations will require collaboration with a variety of partners, including local governments, utilities, infrastructure providers, and community organizations. It will also be important to engage with fleet owners and operators to ensure that programs meet their needs and address their concerns. Finally, 3CE should be prepared to adapt and refine its programs based on feedback from stakeholders and ongoing evaluation of program effectiveness.

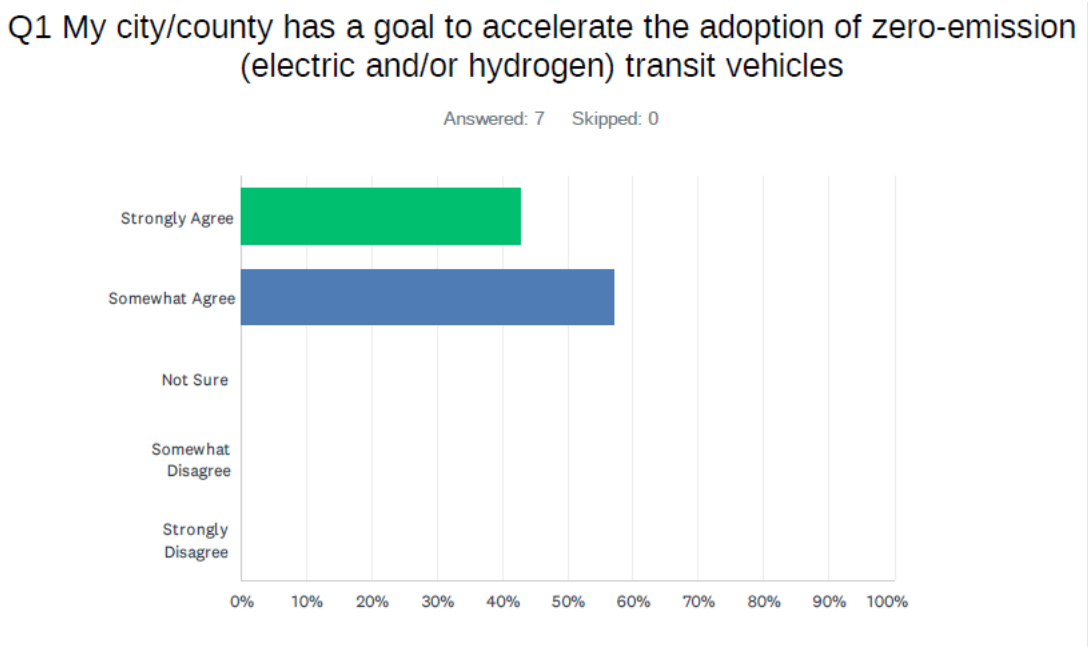
3CE's efforts to support customer ZEV fleet transitions are in alignment with their goals to reduce emissions, build a cleaner grid, and invest in the Central Coast community. With this Blueprint, 3CE can catalyze the accelerated deployment of MHD ZEVs and ZEV charging infrastructure, contributing to a clean, all-electric future for the region.

10 Appendices

10.1 Appendix 1: Survey Results

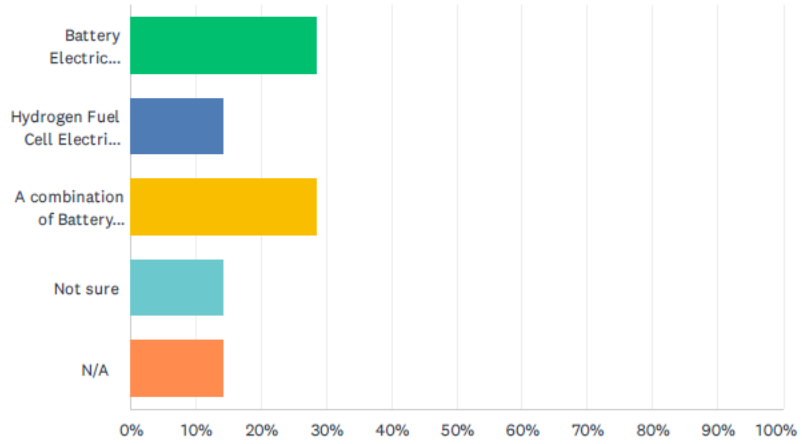
10.1.1 Transit Fleet Manager Survey Results

All transit representatives agreed that their organizations had a goal to accelerate the adoption of ZEV transit vehicles. Of the 7 transit agencies contacted in the region, 2 were most interested in BEVs, 1 in hydrogen fuel cell electric vehicles, 2 in a combination of the two technologies, and 2 unsure. 1 transit agency expressed confidence that ZEVs have the range and power to fit its needs, while the remaining six were split as to whether ZEVs will have range and power in the future, or never. All transit agency representatives expressed that they need outside funding to afford ZEVs in their fleet. 4 transit agency representatives indicated that it was somewhat difficult to determine which ZEV vehicles are best options for their fleet, while the remaining three disagreed.



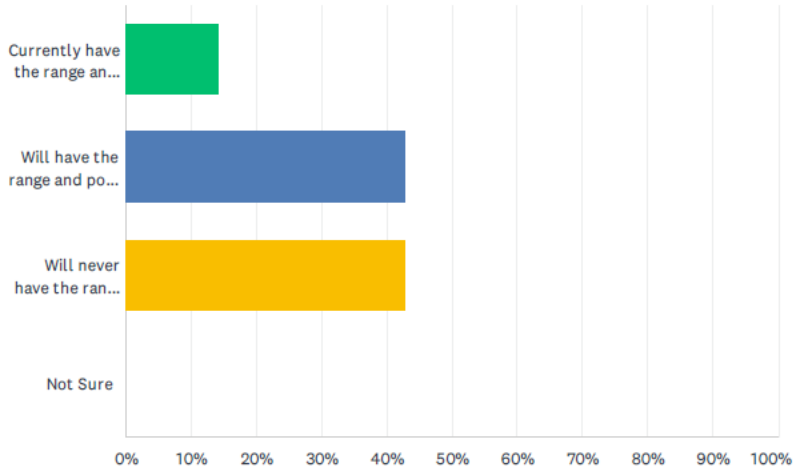
Q2 My city/county is most interested in the following Zero-Emission Vehicle (ZEV) technologies:

Answered: 7 Skipped: 0



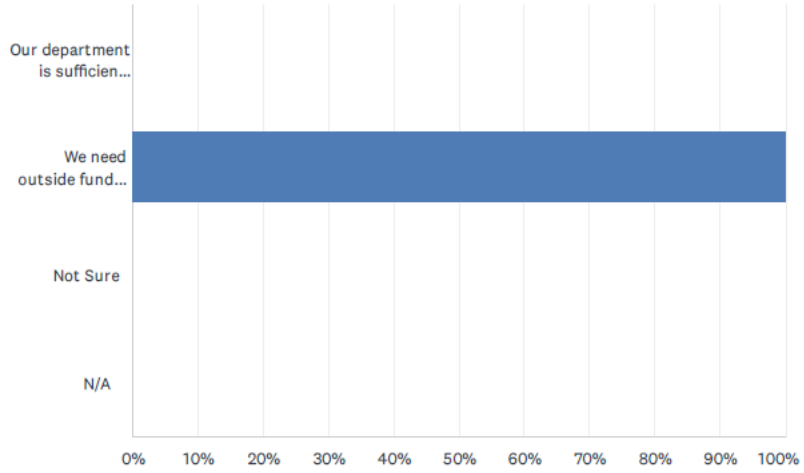
Q3 Medium and Heavy Duty Zero Emission Transit Vehicles:

Answered: 7 Skipped: 0



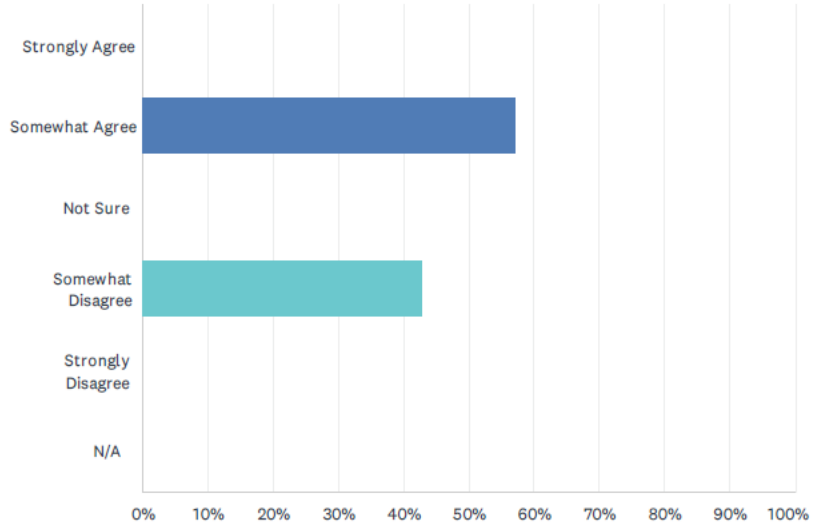
Q4 In regard to purchasing zero-emission transit vehicles for my city/county fleet:

Answered: 7 Skipped: 0



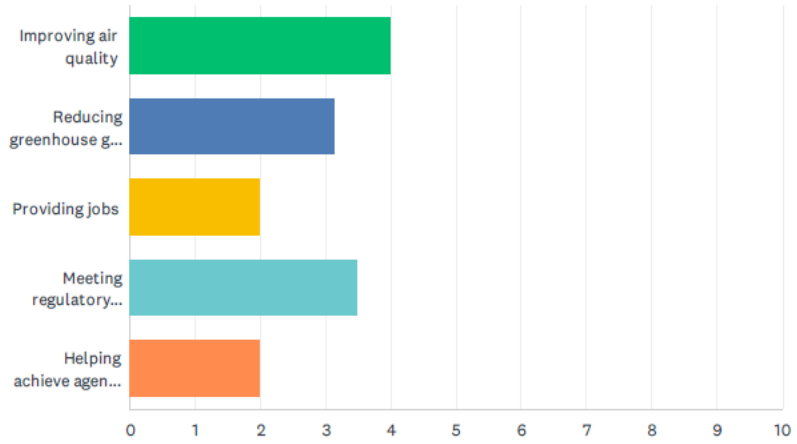
Q5 It is difficult to determine which zero-emission transit vehicles are the best options for our fleet.

Answered: 7 Skipped: 0



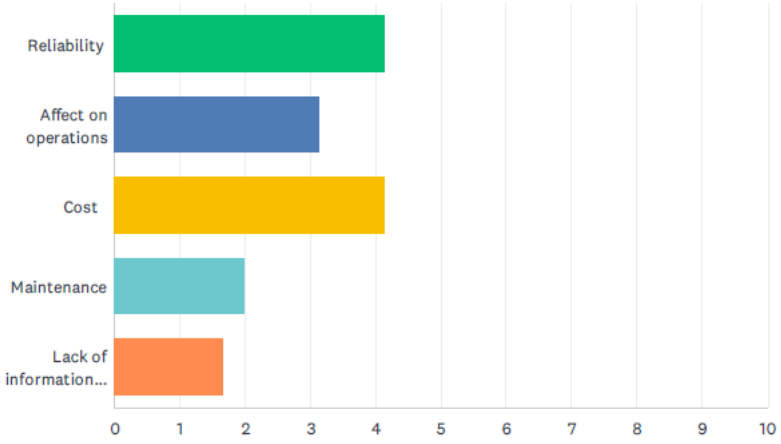
Q6 The most important benefits of the transition to zero-emission transit vehicles are (rank in order):

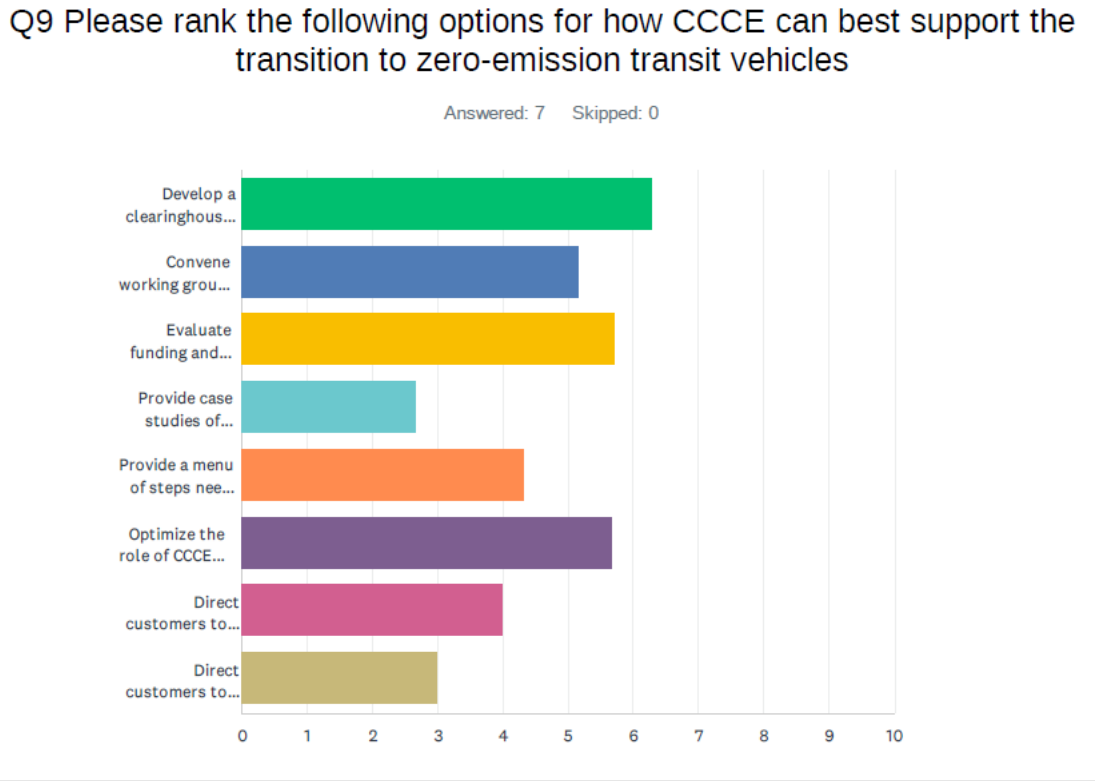
Answered: 7 Skipped: 0



Q7 What are your primary concerns about converting to zero-emission transit vehicles? (rank in order)

Answered: 7 Skipped: 0



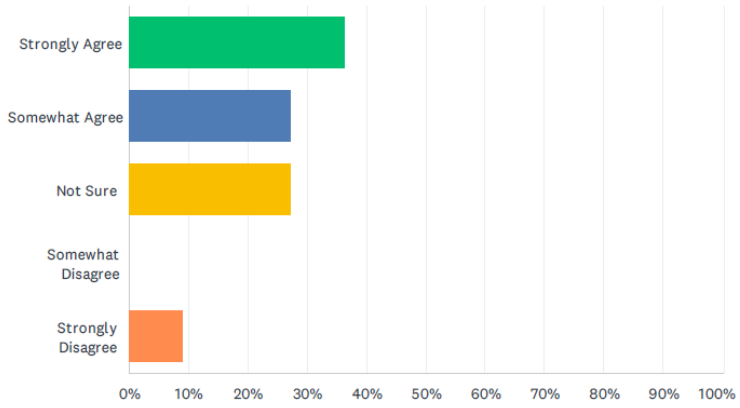


10.1.2 Municipal Fleet Manager Survey Results

Of the 11 municipal fleet managers that responded, 7 had goals to accelerate the adoption of ZEV MHD vehicles, while 3 were unsure and 1 did not. 8 of 11 municipalities listed a preference for battery electric vehicles over hydrogen vehicles, while 3 were unsure. 2 respondents felt confident that existing ZEV MHD vehicles currently have the range and power for their fleet needs, 4 felt that these vehicles will have range and power in the future, and 5 were unsure. 9 municipalities surveyed agreed that outside funding was necessary for them to afford to add ZEVs to their fleets, while 2 were unsure. 8 respondents agreed with the statement “It is difficult to determine which MHD ZEVs are the best option for our fleet, while 2 disagreed and 1 was unsure.

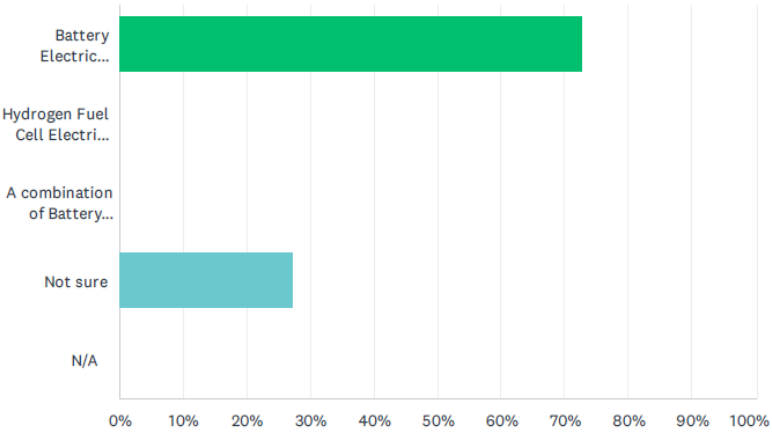
Q1 My city/county has a goal to accelerate the adoption of Zero Emission (electric and/or hydrogen), medium and heavy-duty vehicles

Answered: 11 Skipped: 0



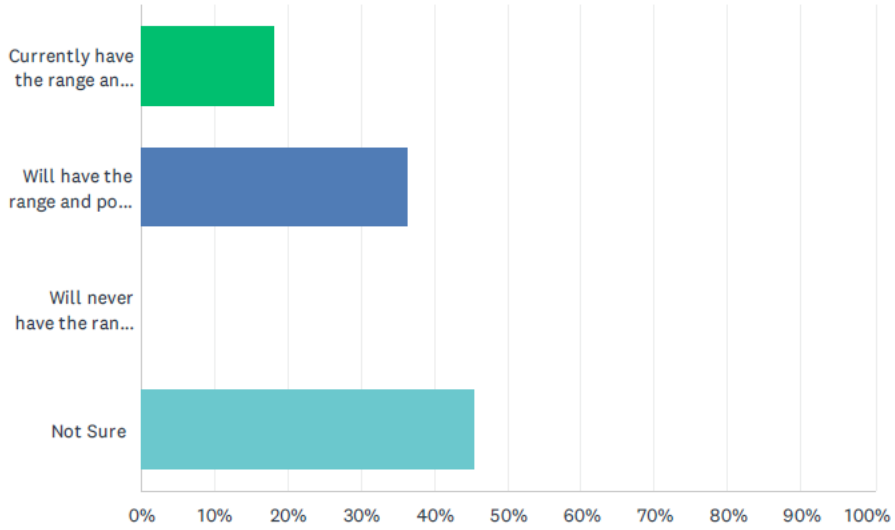
Q2 My city/county is most interested in the following zero-emission, medium and heavy-duty technologies:

Answered: 11 Skipped: 0



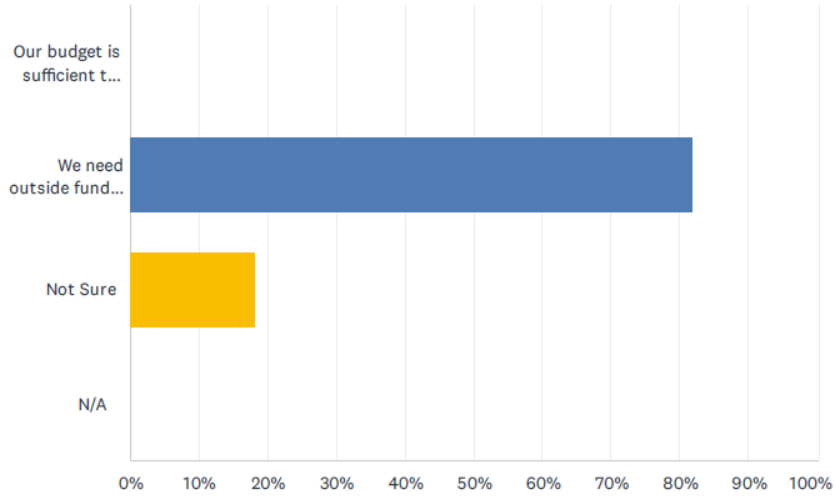
Q3 Medium and heavy-duty zero-emission vehicles:

Answered: 11 Skipped: 0



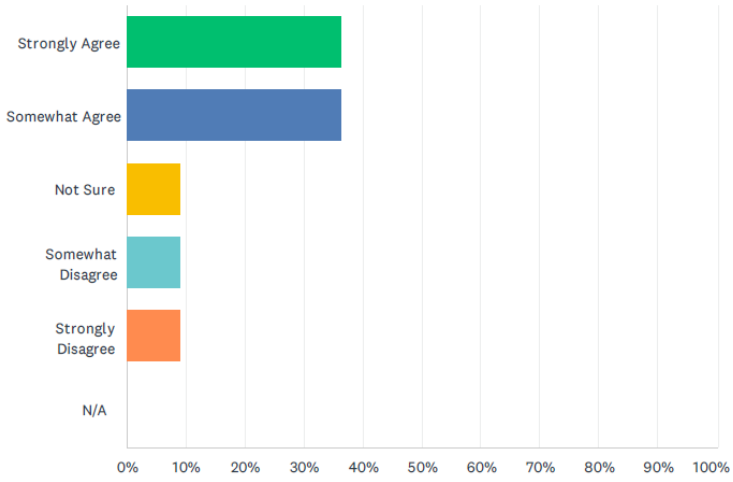
Q4 In regard to purchasing Medium and Heavy Duty ZEVs for my city/county fleet:

Answered: 11 Skipped: 0



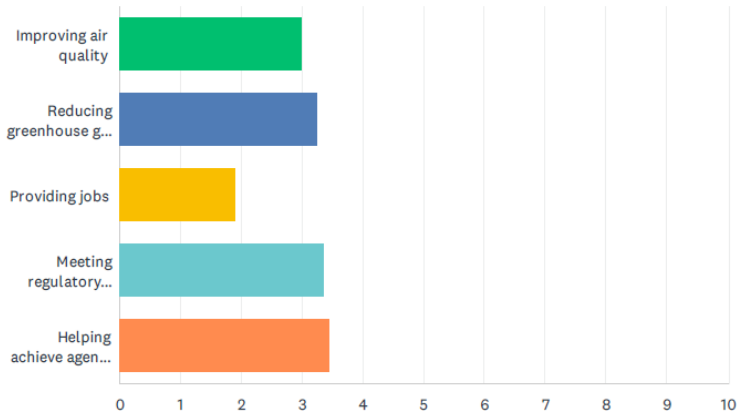
Q5 It is difficult to determine which medium and heavy-Duty ZEVs are the best options for our fleet.

Answered: 11 Skipped: 0



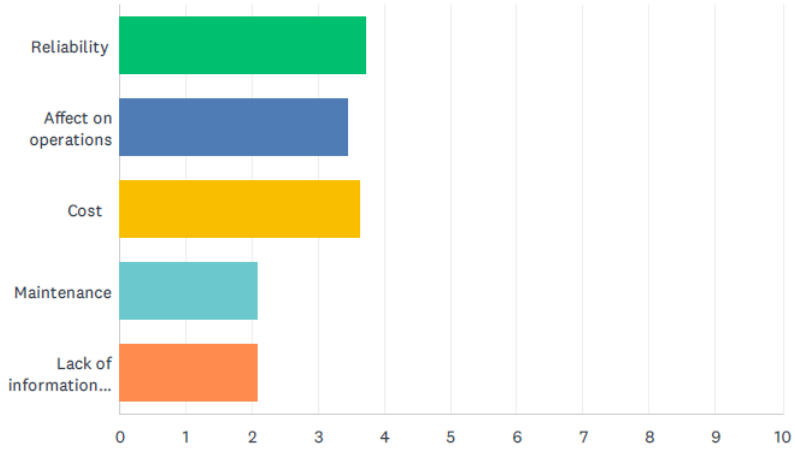
Q6 The most important benefits of the transition to zero-emission vehicles are (rank in order):

Answered: 11 Skipped: 0



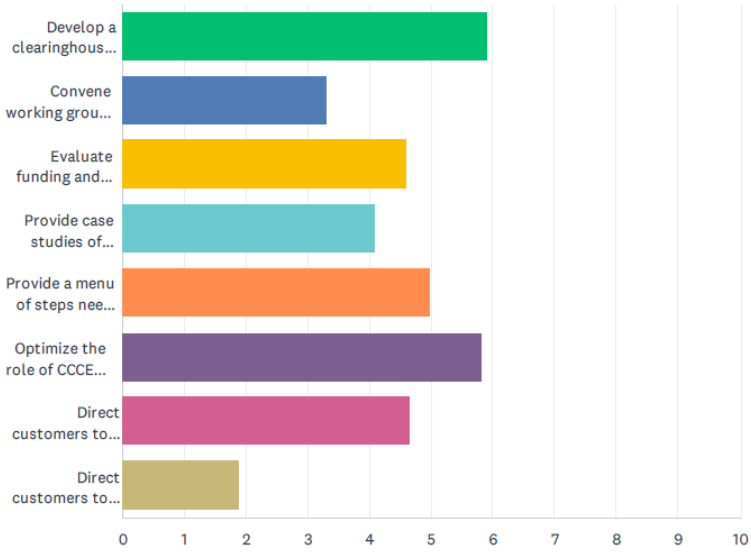
Q7 What are your primary concerns about converting to ZEV vehicles? (rank in order)

Answered: 11 Skipped: 0



Q9 Please rank the following options for how CCCE can best support the transition to zero-emission, medium and heavy-duty municipal fleet vehicles

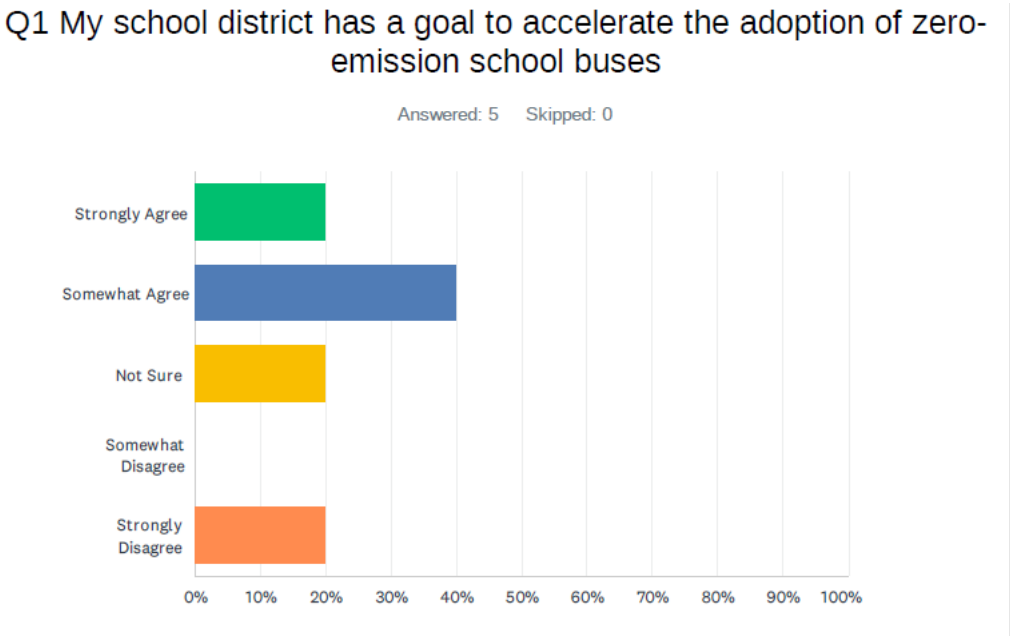
Answered: 11 Skipped: 0

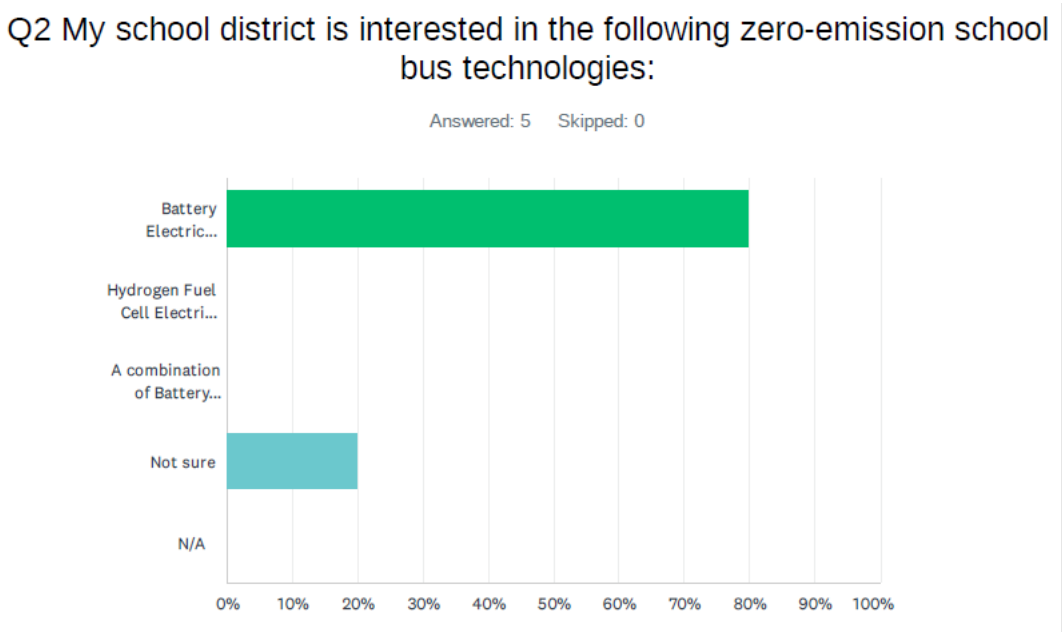


10.1.3 School Bus Fleet Manager Survey Results

Of the five participating school districts, 3 had goals to accelerate the adoption of ZEV school bus fleets, while 1 was unsure and 1 did not. 4 of the 5 respondents preferred battery electric buses to hydrogen,

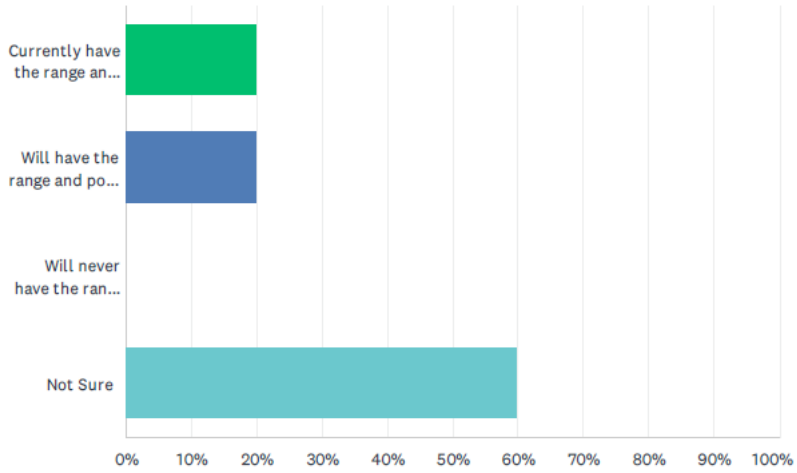
and 1 was unsure of the best technology. 1 school district expressed that existing ZEV school bus models have the range and power to cover all school bus routes, 1 expressed that they will in the future, and 3 that they will never have the range and power necessary to cover school bus routes. All school districts indicated that outside funding was necessary to afford additional school buses to fleets. 4 school districts indicated it was difficult to determine which electric school buses are the best options for their fleets.





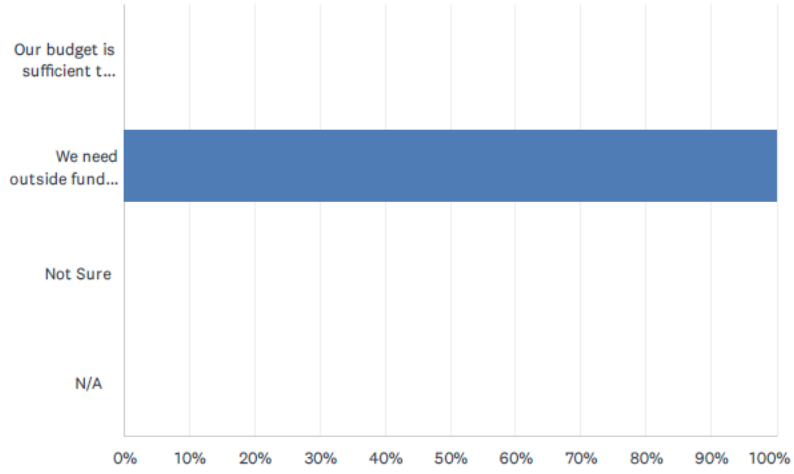
Q3 Electric school buses:

Answered: 5 Skipped: 0



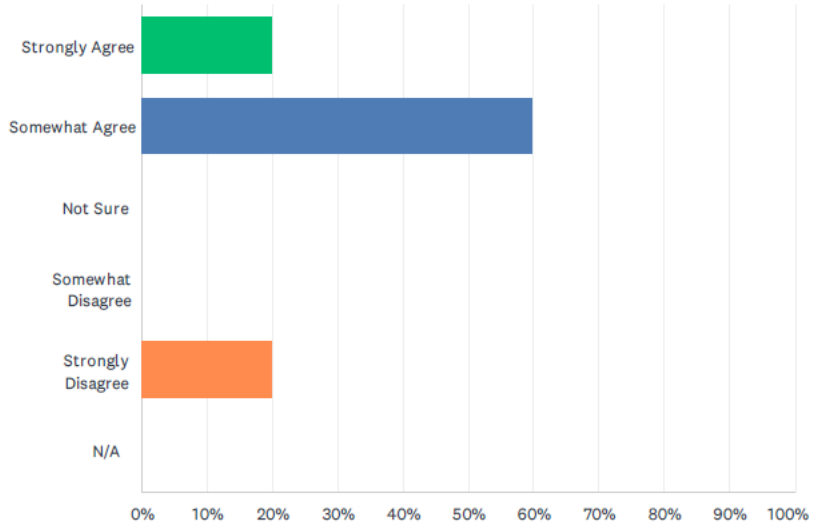
Q4 In regard to purchasing electric buses for my school fleet:

Answered: 5 Skipped: 0



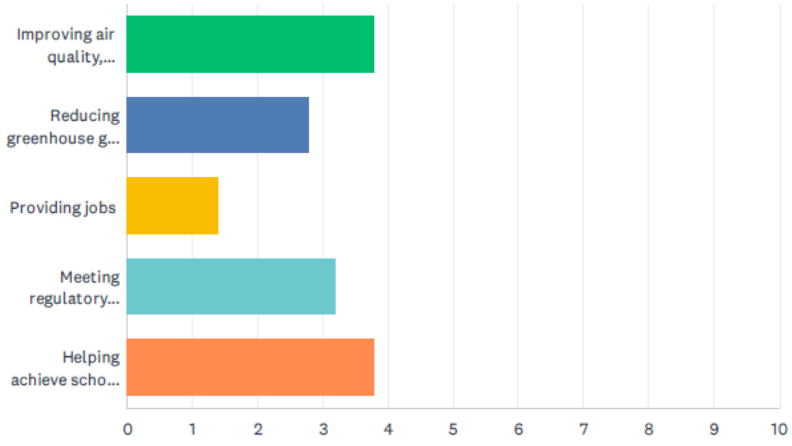
Q5 It is difficult to determine which electric school buses are the best options for our fleet.

Answered: 5 Skipped: 0



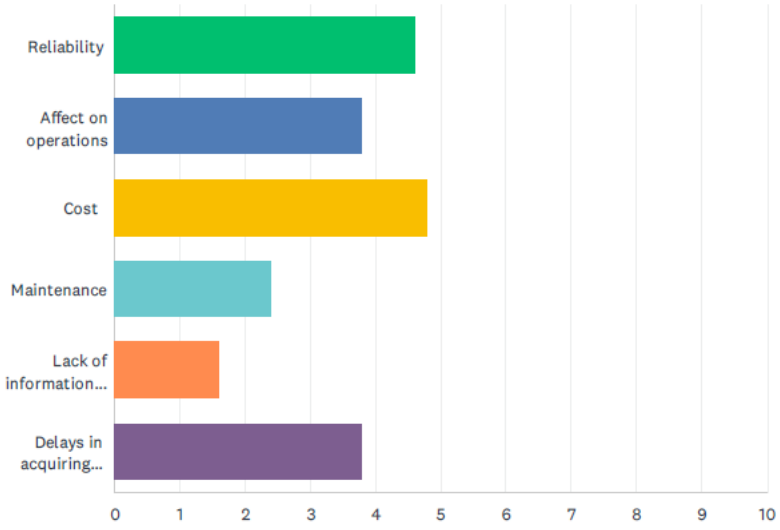
Q6 The most important benefits of the transition to electric school buses are (rank in order):

Answered: 5 Skipped: 0



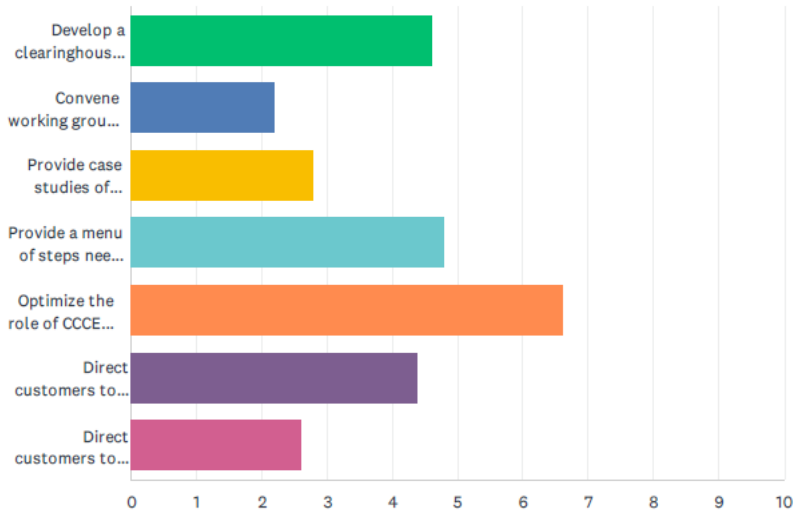
Q7 What are your primary concerns about converting to electric school buses? (rank in order)

Answered: 5 Skipped: 0



Q9 Please rank the following options for how CCCE can best support the transition to zero-emission school buses

Answered: 5 Skipped: 0



10.2 Appendix 2: Community Engagement Results

10.2.1 Community Based Organizations

- Community Environmental Council (Santa Barbara)
    - Santa Barbara's Community Environmental Council (CEC) works in climate policy, justice, and resilience, as well as clean energy and climate-smart agriculture. CEC supports moving the Central Coast to 100% clean and renewable energy sources. They host EV education events to help inform the public on financial incentives, vehicle specifications, and solar energy for charging. They partner with the Tri-County Regional Energy Network to raise awareness to advance energy-saving support to underserved populations.
- Ecology Action
    - Ecology action is a Santa Cruz based CBO whose sustainability programs include encouraging EV adoption on the Central Coast. It has designed solutions that promote equitable Electric Vehicle (EV) adoption and access to charging infrastructure to help communities reduce greenhouse gas emissions. It is currently supporting equitable transportation solutions and innovation in charging infrastructure for multi-family housing that makes EV ownership accessible for more Californians and partners with 3CE on various projects. Ecology Action's EVs for Everyone/EVs Para Todos campaign increases community awareness about the benefits of plug-in electric vehicles and helps under-resourced community members make the switch to their first plug-in electric car.
- Electric Drive 805 (formerly Plug-in Central Coast)
    - Electric Drive 805 supports the transition to electric vehicles through collaboration in our 805 region, with the goal of helping the State of California reach its goal of 5 million zero-emission vehicles by 2030. The coalition was launched as a joint effort by Community Environmental Council, the Central Coast Clean Cities Coalition, and the Air Pollution Control Districts of Ventura, Santa Barbara, and San Luis Obispo counties. Key leaders from these organizations form the Electric Drive 805 Steering Committee. In 2018, the Ventura County Regional Energy Alliance joined the Steering Committee. Electric Drive 805 has brought millions of dollars in grant funding for regional EV planning and projects to communities in the 805 region. Its EV car shows attract more than 30,000-40,000 people each year and it hosts numerous workshops with employers, property managers, and community groups that help more people drive electric. Its efforts have helped make the 805 region an EV leader with over 716 Level 2 charging stations, 144 DC fast charging stations, and almost 20,000 zero-emission vehicles as of 2019.
- C5 – Central Coast Clean Cities Coalition
    - The Central Coast Clean Cities Coalition (C5) is a voluntary, locally based government-industry partnership whose goal is to expand the use of alternative fuels. This is accomplished by accelerating the deployment of alternative fuel vehicles (AFVs) and developing local alternative fuel refueling infrastructure. Active membership is the heart

of the C5 coalition, with members from local schools & universities, fuel and vehicle providers, local government, and the public. Their efforts related to MHD electrification include:

- Increase the number of alternative fuel vehicles (AFVs) and expand the alternative fuel infrastructure in SLO and Santa Barbara counties; improve the clean fuel corridors between Los Angeles, San Francisco, and the San Joaquin Valley
- Identify local fleets and educate fleet managers/purchasers of the federal and state mandates regarding AFV requirements (i.e., identify total fleets throughout the central coast, identify fleets required to meet EPAct requirements, support the development of fleet compliance plans)
- Promote AFV maintenance and technician training programs and provide listing of training sites and dates
- Secure grants to promote AFVs and alternative fuel infrastructure throughout SLO and Santa Barbara counties

- Green Light Labs
  - Green Light Labs help utilities and large employers meet their growth and sustainability objectives by increasing adoption of electric vehicles. It provides tools like "MyFleetBuy" that can analyze historical data to help fleet owners choose the right electric vehicles and plan charging infrastructure roll-out.
- Regeneracíon
  - Regeneracíon is a nonprofit based in the Pajaro Valley in Santa Cruz County that educates and builds public awareness around environmental and social justice issues. The group is focused on creating a place-based, representative climate justice movement that focuses on elevating the voices of primarily Mexican heritage agricultural communities in the region.

10.2.2 CA Native American Tribes

Native Americans have lived on the Central Coast for more than 13,000 years—but there are now just several principal tribal organizations in the area: the Esselen Tribe of Monterey, the Aloni Costanoan Nation (ACNE), the Amah Mutsun Tribal Band, which has an enrolled membership of 600 BIA documented Indians in the area of the former Santa Cruz and San Juan Bautista Missions; and the Santa Ynez Band of Chumash Mission Indians of the Santa Ynez Reservation in Santa Barbara County. 3CE is planning to pursue additional outreach and engagement with the Native American Tribes in subsequent months pending internal developments. Additionally, the Esselen and Aloni Costanoan Nation were contacted to participate in a survey effort and subsequent discussion to discuss the following:

- Goals and objectives of the ZEV transition
- Address questions or concerns that the tribes may have about the Blueprint or the transition
- Ways to engage to support MHD ZEV adoption

As of the writing of this report, the Blueprint Team received no responses on their surveys, however subsequent engagement is pending.

10.2.3 Local Public Entities

Public entities in 3CE's service territory are all required to comply with the California Air Resource Board Advanced Clean Fleets new regulation, which requires that 50% of new fleet purchases be Zero Emission Vehicles in 2024, and 100% beginning in 2027. This regulatory driver means municipalities will all be looking to 3CE for support and guidance in making the required transition to ZEVs. More information on engagement with local public entities can be found in Sections 5 and 6.

In addition to being a key stakeholder for ZEV MHD fleet vehicles, local jurisdictions issue permits for applicants seeking to deploy ZEV charging infrastructure, including CEQA, Zoning/Land Use Permits, Building, Fire Marshall, and Air Permits. To help applicants navigate a portion of the cumbersome process, California adopted legislation in 2015 (AB) 1236 with requirements for cities & counties to expedite and streamline their permitting for residential and non-residential electric vehicle charging stations.

Outreach to local jurisdiction partners was conducted to explore:

- Plans for transitioning MHD fleets to ZEVs, including in response to the new CARB ACF regulation.
- Ways for local jurisdictions and 3CE to collaborate to accelerate MHD fleet electrification and EVSE infrastructure deployment
- Input on where 3CE should focus its MHD program dollars, and the most important role for 3CE to play to support the transition to MHD ZEVs
- Existing process to review and approve ZEV permits
- Status of compliance with AB 1236 requirements
- Resources and support needed to adopt best practices recommended by California entities such as the Transportation Electrification Partnership (TEP)
- Any climate policies or commitments adopted by the local jurisdiction.
- Best practices for streamlining and expediting EV charging station permit applications, as required by AB 1236
- Resources and assistance available to deploy AB 1236.
- Strategies to work with 3CE to assist in expedited EV charging station deployment
- Strategies to enhance EV-friendly codes and mandates

10.2.3.1 Permitting Entities

Due to the high number of permitting entities for EV charging stations (EVCS) on the central coast, outreach to these organizations focused on identifying the status of EVCS permitting in each of the counties and cities of the region. More information about the specific status of EVSE permitting can be found in section 5.1.1.

In California, EVCS permit applications are usually reviewed for compliance with building, electrical, accessibility, and fire safety regulations. The permit applications may also receive public safety, structural, and engineering review based on the processes and organizational structure of the Authority Having Jurisdiction (AHJ). If possible, these reviews are done concurrently, and AHJs and station developers should continue to look for ways to save time and share successes that others can emulate. Plan checkers evaluate the permit application to determine the following:

- All required documentation is attached
- The load calculations are correct
- New electrical service will be required
- All diagrams are accurate
- The proposed design will comply with electrical code
- The proposed charging layout is in accordance with the California Building Code accessibility regulations
- Other evaluation factors as deemed necessary to ensure public health and safety

The permit will likely be approved if the application package is deemed complete and accurate and all materials follow applicable codes and regulations. If the plan reviewers determine that revisions to the application are required, they will return the permit application to the submitter with instructions for revision. Once approval to build is granted, construction can begin. The site is typically visited by a building inspector one or more times during the process, including after construction is finished for final approval. After final approval from the AHJ and utility, the station is eligible for commissioning and operation. More information on permitting EVSE can be found at GoBiz's Electric Vehicle Charging Station Permitting Guidebook.

10.2.4 State and Federal Funding Agencies

The ZEV transition will require significant upfront capital investment. Items to purchase will be diverse and can include charging equipment and related infrastructure, fleet vehicles, energy generation and storage equipment, related infrastructure upgrades and more. The funding and financing for these items will vary dramatically, how much it costs, federal and state funding opportunities, and what sort of entity (government, large or small business, non-profit etc.) may be the borrower. Similarly, the financial partners can vary from government agencies to traditional financial institutions to specialized financial business to individual investors and more. Others, including economic development agencies, may be valuable secondary financial partners as projects move forward. The Project Team conducted outreach to explore:

- Existing financing programs that are available for the ZEV transition, including loan guarantee programs, loan loss reserve programs, collateral support programs, bond issuance and others.
- Potential adjustments to existing programs to increase the attractiveness for ZEV infrastructure and vehicles
- Potential new programs which could help accelerate deployment of ZEV infrastructure and vehicles
- Requirements to access existing and new financing programs
- Mechanisms to reduce the perceived risk of ZEV financing

The Project Team conducted outreach to a selected cross-section of potential funding and financial partners such as:

- Federal and state agencies, such as DOE, CEC, and CARB
- State lending and financial assistance programs
- Traditional financial institutions
- Alternative financial institutions include Community Development Financial Institutions and non-traditional lenders

- Local and state economic development experts
- Federal lending and financial assistance programs
- Other financing experts

Policymakers and regulatory agencies guide legislation and funding that supports state and federal efforts to achieve clean air objectives. Support from policymakers and regulatory agencies to demonstrate and support the transition to ZEVs is and will continue to be critical to the early adoption of zero-emission technologies ahead of full market commercialization.

There are many ways for entities like 3CE to relate to and build relationships with public local, state, and federal agencies. Public agencies have dual purposes of serving constituents to provide public welfare benefits and advancing goals across varying levels of government and interest sectors.

The public policy to public funding cycle starts with a need for societal change, oversight, or regulation. This cycle typically ends with the development of programs intended to distribute funds and resources to projects and initiatives that progress the agency's overarching goals and mission to address these societal changes, ultimately impacting policy at the highest levels of government.

As part of 3CE's Blueprint outreach, Momentum contacted agency stakeholders to explore the following EV transition-related issues:

- Discussion of relevant policies, regulations, and technical reports
- Discussion of relevant funding and technical assistance programs
- Progress toward state and federal objectives, including opportunities to develop or use statewide collateral, tools, case studies, or frameworks
- Synergies with related climate and public health issues and policies that have aligned goals and objectives
- Participation in collaborative, multi-state, or regional initiatives
- Approach to support for early adopters

Section 7.3 of the Blueprint provides an overview of the Blueprint Team's research on the relevant state funding, research, and investment programs. Through its work creating the Blueprint, the Team also engaged informally with the following organizations.

- California Energy Commission (CEC)
- California Air Resources Board (CARB) & Local Air Quality Management Districts
- California Public Utilities Commission (CPUC) and Utilities
- California Transportation Committee (CTC)
- California Department of Transportation (Caltrans)
- California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)
- California Pollution Control Financing Authority (CPCFA)
- California Infrastructure and Economic Development Bank (IBank)
- Office of Business and Economic Development (Go-Biz)
- Governor's Office of Research and Planning (OPR)
- California Labor and Workforce Training and Education Agency (LWDA)

While deploying clean and sustainable technology, many entities like 3CE customers seek funding from public agencies to help offset the high costs associated with adopting emerging technology, new industry, and new markets on the path to large-scale adoption and commercialization. Figure 1 below shows how public agencies use legislative acts, laws, and bills to develop programs, priorities, and investment plans that ultimately turn into notices of intent (NOIs), requests for information (RFIs), funding opportunity announcements (FOAs), solicitation releases, and notices of proposed awards (NOPAs) that are encountered throughout the year.

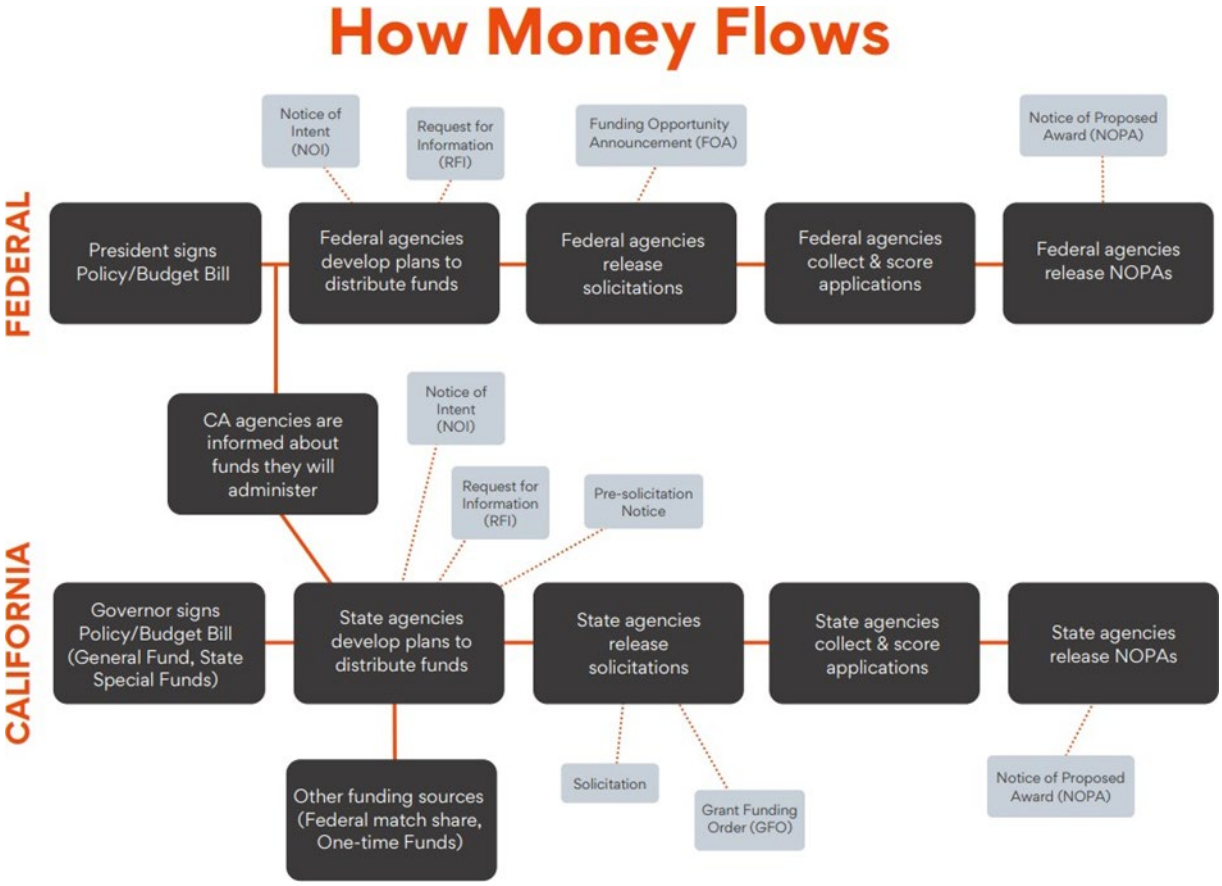


Figure 1: Diagram depicting the process and flow of funding from the California state and federal government agencies. Source: Momentum

While public agencies provide a key source of early-stage funding, many offer other ancillary services and resources, such as:

a. Project and partner development support, including alignment with overarching agency goals
b. Identification of priority communities and their unique challenges and opportunities, including providing or directing to resources that support capacity building
c. Project site identification and prioritization
d. Delivery of planning and action-oriented reports, data reporting and metrics, data synthesizing, and other technical assistance functions

e. Thought leadership on long-term government investment, including local, regional, state, and federal-level planning and coordination and other advisory services
f. Ability to serve as a prime or sub-applicant on a grant, incentive, or technical assistance application

To advance its many environmental and clean energy policies, California has developed a well-established ecosystem of incentive opportunities, funding programs, and financing mechanisms to offset the capital and operational expenses associated with deploying advanced energy and zero-emission transportation technologies. California's cleantech funding ecosystem is unique in that it extends beyond state-level incentives to include many opportunities at the local and regional levels.

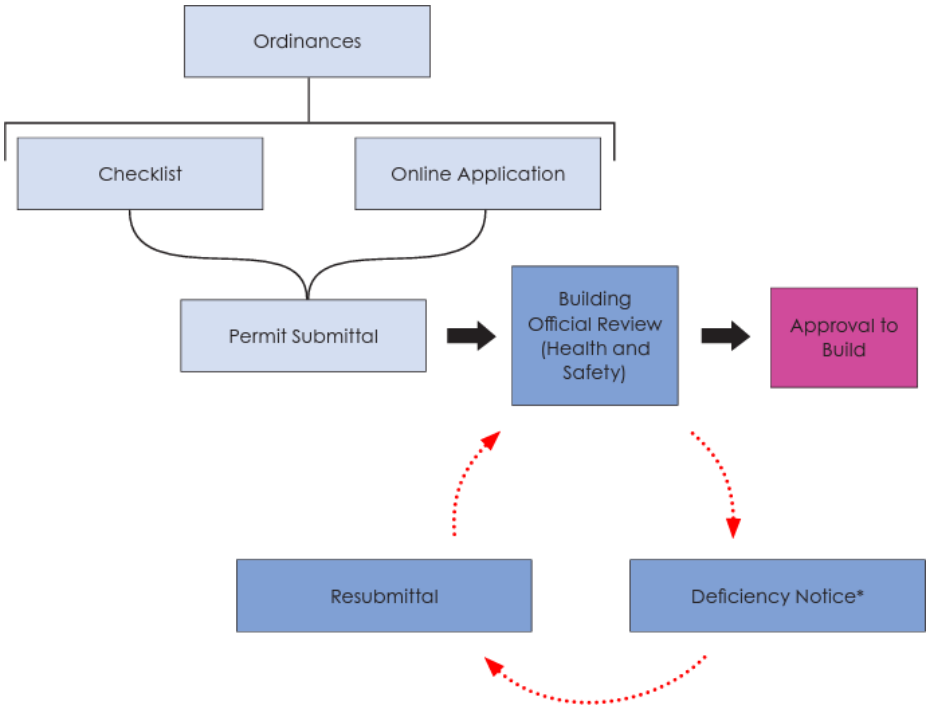


Figure 2: Electric Vehicle Charging Station Permitting Process. Source: GoBiz

10.3 Appendix 3: Workforce education and training organizations

Outside community colleges, several regional and statewide workforce-oriented organizations are tailored to transportation and electrical trades. These include workforce education and training organizations, original equipment manufacturers (OEMS), equipment suppliers, and unions. These organizations, and their relevance to the MHD transition, are described in Appendix 3,

10.3.1 Central Coast Workforce education and training Organizations

The Workforce Investment Boards of Santa Barbara, Santa Cruz, San Benito, San Luis Obispo, and Monterey Counties: County Workforce education and training Boards can be relied on to help jobseekers enroll in a wide variety of programs that develop occupational skills. Officials and programs at these organizations can direct jobseekers to careers like EV infrastructure deployment or class 8 vehicle driving. Stakeholders and members of 3CE's energy program can meet with County Workforce Training and

Education boards to help set up pathways for careers that they are in demand. The Santa Cruz Workforce Training and Education Board works with MTS Training Academy to provide Class A, B and School Bus drivers.

All five County Workforce Education and Training Boards offer scholarships up to $10,000 for participants of the Workforce Innovation and Opportunity Act (WIOA). These scholarships are designed to help individuals upgrade their skillset through occupational training in new and developing fields of work, such as electric vehicle infrastructure.

3CRen (Tri-County Rural Energy Network, covering Santa Barbara, San Luis Obispo, and Ventura): 3CRen focuses on reducing energy use in buildings. They offer building energy performance training and can educate members on energy code-related matters. They do not have EV specific programs currently.

ElectricDrive805: ElectricDrive805 is a coalition dedicated to achieving a rapid, equitable transition to plug-in electric vehicles. They lead local action to increase access to today's cleaner, more efficient electric vehicles. Their goal is to reduce emissions from the largest source of pollution in the 805 region: cars and trucks. They offer resources, events, webinars, and support on electrifying fleets and personal light duty vehicles, as well as installing and funding charging infrastructure.

10.3.2 Statewide Organizations

Advanced Transportation and Logistics: (ATL): ATL was established by California Community College's Economic and Workforce Education and Training Program and partners with CA community colleges and a wide array of industry partners, including vehicle OEMs and Transportation agencies. ATL implements and trains educators in EV, FCEV programs, and other clean transportation adjacent programs. They are currently working with the College of Alameda to develop an MHDH EV curriculum. Additional engagement is necessary to determine if Central Coast Community Colleges are interested in developing MHD ZEV curriculums through ATL.

The Automotive Training Group: (ATG) offers technical courses, technical information, and training experience to vehicle mechanics and operators. They host seminars, workshops, and training on vehicle safety and services. ATG recently published a training manual on hybrids and electric vehicles tailored to light-duty vehicle operations but compatible with medium and heavy- duty applications. Heavy Duty EV or brand-specific, customized courses are offered on request for up to 25 people per class.

Grid Alternatives: Gridscape is a national nonprofit that helps economic and environmental justice communities get solar power and solar jobs. Their program includes hands-on solar training to connect people to clean energy jobs.

Electric Vehicle Infrastructure Training Program (EVITP): EVITP is a US and Canadian-based organization that trains qualified electricians in EVSE installation and maintenance. EVITP- certified electricians must pass a certification exam that covers residential, commercial, public, and fleet charging. The program's curriculum was developed in partnership with Automakers, EVSE Manufacturers, Educational Institutions, Utility Companies, Electrical Industry Professionals, and key EV Industry Stakeholders. The EVITP website has a built-in database that shows the location of contractors who employ EVITP contractors, which can be found at: https://evitp.org/california. In some CA locals, EVITP is operated in partnership with IBEW, however, non-IBEW technicians can also become EVITP certified. Although there are expected to be more than three times as many EVITP certified electricians as are necessary in California, the Central Coast

region is experiencing a severe shortage of electricians with this qualification. Per the EVITP website, there are 16 electrical contractors with EVITP certification in the Central Coast Region.

3CE does not view workforce education and training as a key role of its programs. However, it should consider promoting local scholarships that cover expenses for EVITP training. This includes the Power Your Future Scholarship, which offers $275 to participants from San Luis Obispo, Santa Barbara, and Ventura Counties who complete the course. One challenge with encouraging EVITP training in the region is the necessary time commitment for a contractor to carry out the training. The EVITP certification takes around 20 hours and the prevailing wage for electricians in the region is between $100 and $120 per hour, resulting in around $2,000 of opportunity costs for a contractor to receive this certification not including travel, testing fees and other expenses.

10.3.3 Original Equipment Manufacturers (OEMs) and Suppliers

Momentum conducted outreach with ZEV and EV Charging OEMs and suppliers throughout the Blueprint process and at the Advanced Clean Transportation Expo. OEMs appear to be motivated to provide initial operations and maintenance (O&M) support to their customers through maintenance contracts and extended warranties as customers become familiar with new technologies. Some OEMs, however, indicated that these support services might become less common after widespread adoption in the next 5-10 years. Many OEMs plan to offer supplemental support services like workshops for service technicians. Operationally, ZEVs do not differ significantly from their traditionally fueled counterparts, and drivers will not need extensive training to operate ZEVs.

Some companies, such as Tesla and Toyota, have created partnerships with community colleges to train technicians on their products' maintenance.

Most charger OEMs indicated they have or will have programs to showcase new technologies, including O&M practices. Some companies noted that their products would come with the required warranty and O&M contracts for their products. Operations of EV charging equipment are generally straightforward and quickly learned. Nearly all charger OEMs provide diagnostic and support software to help identify maintenance needs. Warranties and O&M contracts are encouraged to ensure that charging equipment can be safely and adequately managed.

10.3.4 Unions

Across California, journeyman electricians have been identified as one of the most significant employment gaps related to EV workforce needs in the next five years. This challenge is pronounced in rural areas and less populated areas where EV purchases are still taking off. 3CE's coverage area includes three International Brotherhood of Electrical Workers (BEW) locals which include most of 3CE's coverage area.

- IBEW 413 (Santa Barbara, 356 members)
- IBEW 639 (San Luis Obispo, 247 members)
- IBEW 234 (Santa Cruz and Monterey Counties, 125 members)

Although not all IBEW electricians are trained to install EV charging stations, each local provides resources that help local contractors train for this work. The Tri-County Electrical Joint Apprenticeship and Training Committee offers EVITP certification courses to IBEW and National Electrical Contractors Union (NECA) in the Tri-County Area (Santa Cruz, San Benito, and Monterey County). IBEW Local 639 provides EV charging station training to its members through seasonal courses.

Outside of IBEW, the NECA California Central Coast Chapter has roughly 40 contractors who employee more than 500 people. They provide resources to help electricians identify EVITP training and have EVITP certified members. In a 2020 letter to the CEC, they advocated for additional EVITP certification requirements for electricians wishing to install EVSE. They point out that EVSE installation is more complex and dangerous than most conventional electrical work because it involves continuous load, high power systems that can strain existing electrical systems. Surveys of member electricians who completed EVITP training yielded the following conclusions:

1. Larger vehicle batteries, such as those in MHD EVs, can lead to extensive continuous electrical loads and exacerbate safety challenges.
2. EVSE installation requires thorough inspections of existing electrical systems and accurate site assessments and load calculations.
3. Proper site assessments and load calculations are more difficult to complete than most electricians anticipate.
4. EVITP certified technicians are better off than standard state certified electricians and can complete EVSE installation work faster.
5. EVITP certification is neither a burdensome nor lengthy process.

Currently, California regulations require at least one EVITP certified electrician to be on any team installing EVSE. The California Central Coast chapter of NECA recommends that requiring additional team members to be EVITP certified can speed up and enhance the safety of EVSE installation.

10.4 Appendix 4: Workforce Training Strategies and Job Opportunities

10.4.1.1 Workforce Training

Because of the significant variation in tasks and responsibilities at companies served by 3CE, it will be beneficial to use two complementary strategies for training employees and supporting customers.

1. General ZEV Knowledge

The first strategy focuses on general knowledge that is useful for groups of employees operating the fleet and facility. This includes information on the impact of zero-emission technology on operations, safety considerations for ZEVs, onsite power generation infrastructure, and charging and general electrical problem-solving. Truck drivers should be trained in battery theory and ZEV operations, including regenerative braking systems and charging components. Facilities operating EVSE should be taught about EVSE troubleshooting and low-level maintenance. ZEV and EVSE Safety should be taught to all employees working in their vicinity. Existing safety materials, for example FEMA's *Emergency Response Guides for Electric Vehicles*, should be relied on for standardized, OSHA-compliant safety responses.

2. Employee Empowerment:

The second strategy will enable employees to identify and learn task-specific information related to their position. Establishing self-guided development as a part of the job and rewarding self-improvement can help employees gain skills specific to their title. There are significant benefits to learning by doing, especially for the site and job-specific tasks. 3CE can create a safe and encouraging environment for this kind of learning by establishing accessible and reliable resources for development. Ensuring that employees and customers can access reliable sources of information related to EV tasks specific to their role can help them succeed in the EV workspace.

3. Workforce Partnerships

Early-stage and technology-specific workforce training and development can be achieved by leveraging partnerships with Workforce Training and Education organizations, which is detailed in the *Community and Stakeholder Engagement Report (Task 2.1).* This can help cover any uncertainties and information gaps that internal staff have while they are becoming familiar with new ZEV equipment and operations. For these partnerships to succeed, 3CE should identify the brands and programs that will make ideal partnerships.

To train and familiarize staff and customers with specific new technologies, 3CE customers should rely on the ZEV Original Equipment Manufacturers (OEMs) and vendors that customers choose. OEMs and vendors are aware that the technology that employees are familiar with is often the technology that ends up being purchased long-term. Companies that have identified the right product or brand for their business can leverage this by encouraging the vendor to facilitate training. This will help transfer the investment required for training to the vendor and will help them develop a lasting business relationship.

Outside of the OEMs and vendors, there are a growing number of Workforce Training and Education organizations in California dedicated to supporting zero-emission careers. The organizations identified in the *Community and Stakeholder Engagement Report* will serve as a basis of support and collaboration for educating and training local communities and employees in support of a robust workforce. Pairing performance and safety training – such as Automotive Training Group's (ATG) coursework on vehicle mechanics and operations – with vendor-provided materials, will ensure that employee training is accredited and technology-specific. In addition, many community colleges are interested in building their programs in partnership with corporate sponsors to help create a reliable education-to-employment pipeline and to gain access to the resources necessary for an effective educational environment. These colleges are also described in the *Community and Stakeholder Engagement Report.*

4. Safety Training

Beyond training, 3CE should encourage customers enrolled in their EV programs to ensure that safety features and infrastructure are present and visible in their workspaces. As EVs are quieter than diesel vehicles, this should be made well known to staff working near fleets, with signs encouraging employees to be aware of their surroundings to help increase alertness. Equipment and supplies designed to treat electrical injuries should also be standard in locations where EV charging takes place. Signs and information that help employees understand what to do in case of exposed wires or other electrical hazards can serve as a supplement to employee safety training.

After implementation of MHD ZEVs, 3CE should ask customers to evaluate its workforce safety training. Employee and manager feedback can be used to inform this evaluation. Once any gaps and concerns have been identified, they should be addressed and incorporated into subsequent training for new and existing employees. These strategies can help guide program development as it incorporates new technologies.

- Competencies need to be enhanced in battery technologies and electrical and charging equipment, as well as general electrical and ZEV knowledge.
- The three job categories with the most workforce education and training potential associated with the MHD ZEV transition are equipment vending, operations and maintenance, and infrastructure installation.
- These job categories generally fall under one of two educational/training programs: automotive technology or electrician work.

- There are only two community colleges in the state that offer dedicated MHD ZEV training programs, and they are both in Southern California.
- To mitigate the initial lack of maintenance personnel with MHD ZEV training, vendors propose to bear a portion of the workforce risk associated with new technology adoption by offering warranties and O&M contracts.
- EVITP certification is a necessity for installing EVSE.
- The availability of EVITP-certified union electricians is variable in the counties 3CE serves. There are currently not enough to meet expected demand.

10.4.2 Job Opportunities

Switching to new technologies provides an opportunity for 3CE and its customers to upskill its workers and create new, well-paid electrical jobs. Transitioning to ZEVs will require higher skilled laborers. The City of Sacramento's 2019 EV Economic Pathways Report[26] estimates that there will be an increased demand for equipment assemblers, machinists, urban planners, electricians, and powerline workers with the ZEV transition. Existing auto-mechanics will need additional certifications to maintain vehicles but will also be paid better for their specialized work. Workers with more specialized skills, like electricians with Electric Vehicle Infrastructure Training Program (EVITP) certifications, may be afforded promising new opportunities in the currently disadvantaged communities where 3CE customers are located. If 3CE partners with local community colleges or other Workforce Training and Education organizations, a pathway may be opened for people interested in electrical trades or ZEV maintenance to find work in their community.

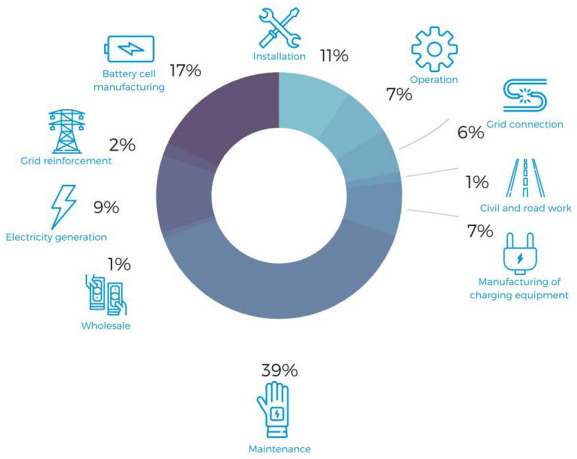


Figure 3: Anticipated types of jobs in the electromobility value chain. Source: NREL, Perk et al. 2018

Broadly, ZEV transitions are expected to create Central Coast jobs in the following categories:

1. **Maintenance**: New skills and personnel will be needed to maintain EVs and EVSE. Until internal combustion engines (ICEs) are phased out entirely, there will need to be additional EV mechanics to support the increase in EVs on the road, while existing mechanics maintain the remaining ICEs.

[26] https://www.cityofsacramento.org/-/media/Corporate/Files/Public-Works/Electric-Vehicles/5-2_EV-Blueprint_Final-EV-Economic-Pathways.pdf?la=enSS

2. **Retail:** Marketing and selling EVs and EVSE will become more prevalent as more and more companies and individuals switch to electric operations.
3. **Electricity Generation**: Increased electricity demand may lead to increased generation and associated renewable energy jobs along the Central Coast.
4. **Grid Reinforcement:** Extensive grid upgrades will be necessary to support additional load added to the grid, which will necessitate more electrical jobs.
5. **Installation**: EVSE installers will be needed throughout the Central Coast to support EV fleets.
6. **Operation:** Although many EVSE stations can be operated by existing employees, more EV service stations and grid operators will be required to support EV refueling.
7. **Grid connection**: Additional technicians for electrical connections, trenching, and equipment will be required throughout the Central Coast to connect rural and remote areas with EVSE.

3CE can familiarize businesses in their service area with ZEV technologies to inspire other ZEV transitions. By catalyzing ZEV transitions in other organizations, 3CE can compound the job creation benefits of the ZEV transition.

10.5 Appendix 5: Supplement Analytical Tools and Software Applications to Improve MHD ZEV Infrastructure Planning

There are a wide variety of tools, software, and training available for MHD ZEV infrastructure planning. The following section of the report outlines tools, training resources, and programs that can be utilized for MHD ZEV Infrastructure planning.

NREL Tools and Modelling Suites

- NREL EVI-X
    - Informs the development of large-scale EV charging infrastructure deployments
    - Identifies the number and type of chargers needed to meet a given demand
    - Helps design station with sizing, on-site energy storage requirements, load profiles, and more
    - Assesses economic aspects such as levelized cost of charging

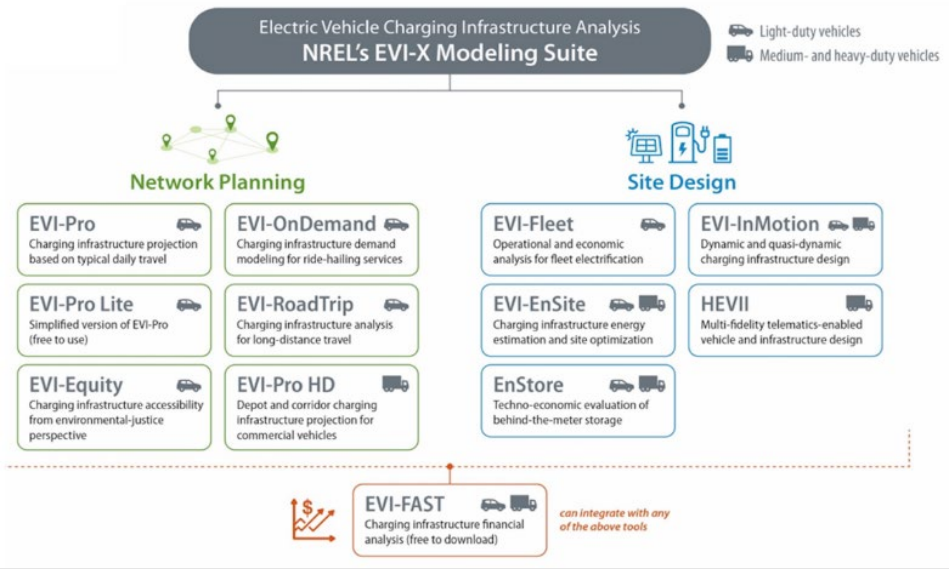


Figure 25: NREL EVI-X Modeling Suite. Source: NREL

Other than the NREL EVI-X, NREL offers seven additional tools that can be used to assess electrical power needs, MHD fleets, charging optimization, economic factors, energy storage, and battery life.

TOOL	Description	Airport Fleet Analysis Application
EVI-Pro/EVI-Pro Lite	Determines charge demand based on input travel data, models EVSE deployment needs based on input travel needs with respect to both location and time.	Airport power distribution system can be determined using this tool.
EVI-ProHD	Oriented towards MHD & HD commercial vehicles, charging infrastructure to support the use case.	Airport fleet has several MHD vehicles to be electrified and thus matches the use case of the tool.
EVI-EnSite	Models high power charging station operation and residential charging profile allocation, generates several load and performance metrics; optimizes site operation.	Optimization of airport charging station and number of ports for each EVSE.
EVI-Fast	Estimates break-even price to charge EVs based on input parameters such as installation costs, operation maintenance, utilization, grid-infrastructure upgrades.	For planning the electrification blueprint assessing economic factors and grid upgrade requirements.
EVI-Edges	Identifies the optimal design and energy flows for thermal and battery behind-the-meter-storage (BTMS) systems based on climate, building type, and utility rate structure.	Can be used for efficient energy storage incorporation with the current airport infrastructure
EVI-InMotion	This tool is used for planning, optimizing, and analyzing the feasibility of charging electric vehicles (EVs) while driving on electric roads.	Applicable if dynamic/quasi-dynamic charging module for fleet vehicles are considered
FASTSim	It provides a simple way to compare powertrains and estimate the impact of technology improvements on light, medium, and heavy-duty vehicle efficiency, performance, cost, and battery life.	Applicable for comparative economic assessment of different fleet vehicles and evaluate the battery life

Figure 26: NREL EV and EVSE Modeling Tools. Source: NREL

EV Fleet Programs

There are a variety of EV Fleet support programs available through various regional and national organizations that support MHD vehicles.

SCE Charge Ready Transport Program (CRT): This program offers MHD EV fleet infrastructure installation at low or no cost and includes consultation with SCE staff and access to the following benefits and tools:

- Incentives and rebates
- Site Design
- Construction
- Maintenance and Upgrades
- Microgrid Labs

EVOPT Controller and EVOPT Planner: EVOPT is an intelligent planning and operations software package that makes it easy for fleet operators to electrify their vehicles and manage the EV charging process. It includes provisions for the following:

- Site Design
- Construction
- Optimization
- Financial Analysis

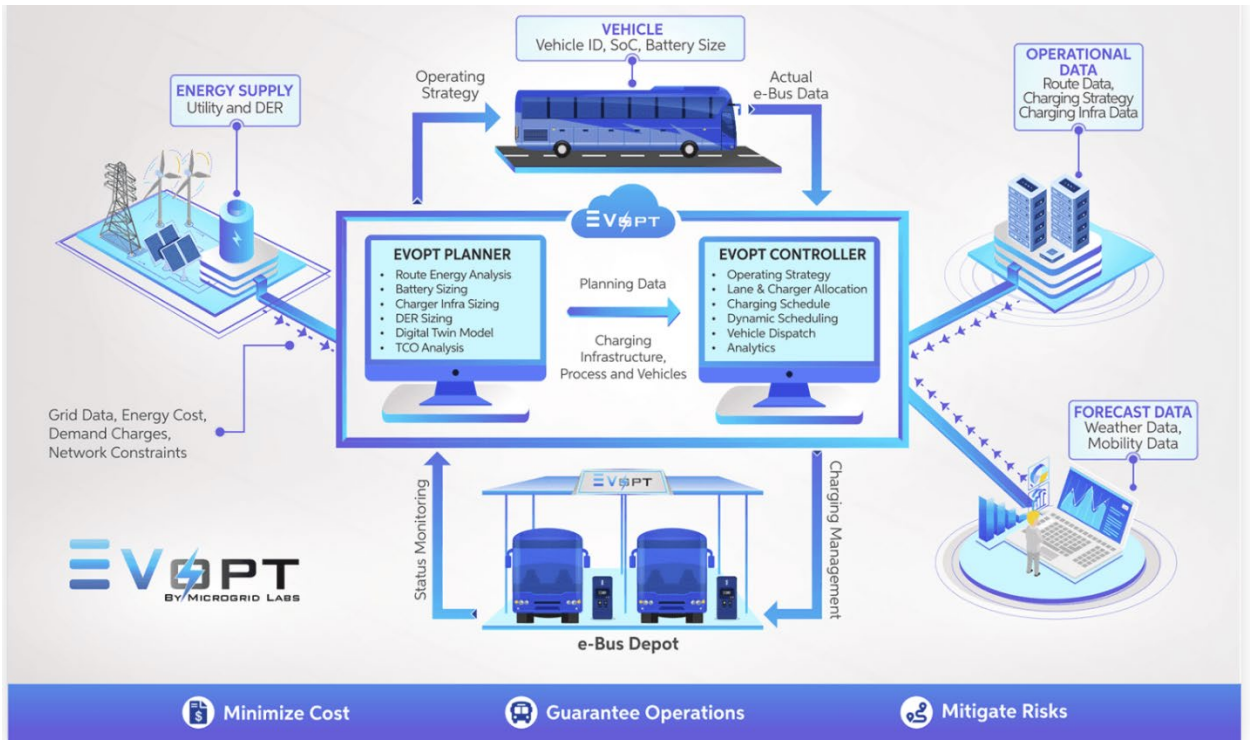


Figure 274: v. Source: EVOPT

AFleet - Argonne National Laboratory: This program examines both the environmental and economic costs and benefits of alternative fuel and advanced vehicles (AFVs). Argonne developed the Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool to help stakeholders estimate petroleum use, greenhouse gas (GHG) emissions, air pollutant emissions, and cost of ownership of light-duty and heavy-duty vehicles. AFLEET can be accessed via spreadsheet and online versions. In addition, the ATRAVEL Tool has been built using AFLEET data to examine the costs and benefits of different modes of personal travel. The program contains the following features:

- Excel (.xls) Based Tool

- Footprint analysis
- EV Charging
- Transit Coast Analysis
- Emission Calculation

Transportation and Fleet Behavior Tools

These platforms provide features to model and analyze agent-based transportation systems.

MATSim: MATSim is an open-source framework for implementing large-scale agent-based transport simulations. The framework consists of several modules which can be combined or used alone. MATSim offers a framework for demand modeling, agent-based mobility simulation (traffic flow simulation), re-planning, a controller to run simulations iteratively, and methods to analyze the output generated by the modules.

SUMO: SUMO is an open-source traffic simulation suite. It allows the modeling of intermodal traffic systems - including road vehicles, public transport, and pedestrians. The suite includes multiple supporting tools which automate core tasks for the creation, execution, and evaluation of traffic simulations, such as network import, route calculations, visualization, and emissions calculation. SUMO can be enhanced with custom models and provides various APIs to control the simulation remotely.

TRANSIMS (TRansportation ANalysis SIMulation System): TRANSIMS is an integrated set of tools developed to conduct regional transportation system analyses based on a cellular automata micro-simulator. The tool is made available under the NASA Open-Source Agreement Version 1.3.

Power System Analysis Tools

These platforms provide features to analyze the impact of electrification on the distribution network and grid. They can be used for analyzing generation, transmission, distribution, and industrial systems. The following programs are all capable of providing similar outputs based on models, analysis, or calculations.

- OpenDDS
- Powerfactory
- Matlab
- Cyme (EATON)
- Synergi (DNV)
- GridLabD (PNNL)

EVSE Charge Management Software

EVSE OEM charge management software can be used to manage charging power levels autonomously. This can be useful for minimizing demand and time of use (TOU) charges from utilities, as well as properly utilizing electricity from onsite power generation. Most EVSE OEMs or vendors provide charge management software that is unique to their products.