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DRAFT STAFF REPORT

Zero-Emission Vehicle Workforce Training and Development Strategy

**A Roadmap for Clean Transportation Program
Funding**

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California Energy Commission

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ABSTRACT

The *Zero-Emission Vehicle Workforce Training and Development Strategy* defines the California Energy Commission's (CEC) vision for zero-emission vehicle (ZEV) workforce development goals, objectives, and activities funded by the CEC's Clean Transportation Program. The strategy clarifies the CEC's role in ZEV workforce development, recognizes existing opportunities, identifies workforce program objectives, and serves as a roadmap to building the career pathways necessary to support ZEVs and ZEV infrastructure. This strategy outlines program and policy objectives, corresponding timelines, stakeholders, and funding sources for each objective. Developing a robust local workforce to support sustainable marketplaces is critical for California to achieve its climate goals and deliver benefits to California residents.

Keywords: Assembly Bill 118, Assembly Bill 126, zero-emission vehicle (ZEV), electric vehicle (EV), Clean Transportation Program, funding program, electric vehicle charging infrastructure, hydrogen, workforce, training, equity, manufacturing

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EXECUTIVE SUMMARY

Background

California leads the nation in addressing the climate crisis through aggressive greenhouse gas emission reduction goals, regulations, and innovative funding programs. The California Energy Commission's Clean Transportation Program is one of the first transportation-focused funding programs created by the California Legislature to help achieve the state's climate policies. The Clean Transportation Program has made significant progress through grant-focused investments designed to transition California to a zero-emission transportation system. Now in its fifteenth year, the Clean Transportation Program has provided more than \$1.8 billion in funding for a broad spectrum of zero-emission vehicles and infrastructure, alternative fuels and technologies, and workforce development projects in communities that will accrue health, environmental, and economic benefits from these investments.

The annual investment plans for the Clean Transportation Program identify funding for workforce training and development activities. There is \$8.4 million in approved funding available from fiscal years 2021 through 2024 for workforce activities, and \$3 million preliminarily identified as potential funding from the 2024–2025 Investment Plan Update for the Clean Transportation Program. The workforce training initiatives of the program are broad-based partnerships that leverage other public and private job-training programs and resources. Through Clean Transportation Program investments, the CEC intends to help cultivate an economically sustaining and diverse workforce that will support the state's ZEV and ZEV infrastructure deployment policies.

Purpose

The *Zero-Emission Vehicle Workforce Training and Development Strategy* will guide future actions and funding opportunities related to workforce projects funded by the Clean Transportation Program. The strategy will:

- 1) Clarify the California Energy Commission's role in developing a robust workforce to support zero-emission vehicles and infrastructure.
- 2) Identify objectives and activities to build career pathways to support zero-emission vehicles and infrastructure.
- 3) Establish funding priorities and provide an actionable plan that reflects program goals.

Objectives

The strategy presents eight objectives to support workforce training and development activities for electric vehicle charging infrastructure.

- 1) Assess the workforce needs to support the electric vehicle charging infrastructure industry (including installation, maintenance and repair, and end of life).
- 2) Increase the number of Electric Vehicle Infrastructure Training Program (EVITP) certified electricians, as EVITP-certified electricians are required to be used for most

California Energy Commission-funded electric vehicle infrastructure projects on the customer side of the electrical meter. Therefore, to ensure equitable access to grant funding and ZEV infrastructure, it is imperative that certified electricians can be found throughout the state, including in low-income and disadvantaged communities.

- 3) Develop an incentive program to fund training for charger maintenance and repair.
- 4) Organize and host a joint workshop with the CPUC to identify and discuss stakeholder feedback and access regarding the EVITP training and certification. The CEC is directed per legislation to periodically conduct joint public workshops with the CPUC to determine if the EVITP curriculum and testing should be supplemented to include updated or additional topics necessary to ensure the safe installation of charging infrastructure.
- 5) Publish the *Draft ZEV Workforce Training and Development Strategy* and incorporate relevant public feedback into the strategy objectives.
- 6) Host a Workforce Training and Development Workshop to provide information on program updates and new activities related to workforce training and development for electric vehicles and electric vehicle charging infrastructure.
- 7) Update the Clean Transportation Program Workforce web page to include information on the *Draft ZEV Workforce Training and Development Strategy*, engagement opportunities, and active and completed workforce projects.
- 8) Develop workforce requirements for solicitations that include workforce training and development activities.

Conclusions

The CEC recognizes that the most successful and innovative programs result from meaningful engagement with a diverse set of stakeholders. Regular engagement with industry stakeholders is critical to maintaining existing partnerships and identifying new partnerships, opportunities, and innovative solutions to workforce training and development challenges. This strategy and objectives are intended to serve as a roadmap to help build the career pathways necessary to support ZEVs and ZEV infrastructure.

CHAPTER 1:

Introduction

California leads the nation in addressing the climate crisis through aggressive greenhouse gas (GHG) emission reduction goals, regulations, and innovative funding programs. California's decarbonization goals, as well as air-quality and petroleum-reduction goals, rely upon the mass uptake of zero-emission vehicles (ZEVs). In September 2020, Governor Gavin Newsom issued Executive Order (EO) N-79-20, setting the following ZEV targets for California:

- All in-state sales of new passenger cars and trucks to be zero-emission by 2035.
- All drayage trucks operating in the state to be zero-emission by 2035.
- All medium- and heavy-duty vehicles operating in the state to be zero-emission by 2045, where feasible.
- All off-road vehicles and equipment to be zero-emission by 2035, where feasible.

A pathway to reaching the goals reflected in EO N-79-20 has been set by the California Air Resources Board's Advanced Clean Cars II, Advanced Clean Trucks, and Advanced Clean Fleets regulations. Over the years, California's goals, regulations, and programs have prompted rapid growth of clean transportation markets. As of April 2024, there have been more than 1.5 million light-duty zero-emission vehicles sold and 3,784 medium- and heavy-duty ZEVs on the road in California supported by 105,012 public and shared private electric vehicle chargers.¹

The California Energy Commission (CEC) *Assembly Bill (AB) 2127 Second Electric Vehicle Charging Infrastructure Assessment* projects that California will need 1.01 million chargers in 2030 and 2.11 million chargers by 2035 to support light-duty plug-in electric vehicles. To support medium- and heavy-duty plug-in electric vehicles, California will need about 114,500 chargers for 155,000 vehicles in 2030, and 264,000 chargers for 377,000 vehicles in 2035. This expansion of electric vehicle charging infrastructure will require investments in labor and workforce training and development, as up to 71,500 job-years² will be needed for charger installation prior to 2035.

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program. The statute authorizes the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. AB 126 (Reyes, Chapter 319, Statutes of 2023) reauthorized the Clean Transportation Program through July 1, 2035, with a renewed emphasis on the development and deployment of zero-emission technology and fuels in the marketplace.

1 California Energy Commission. "[Zero-Emission Vehicle and Infrastructure Statistics](https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics)." Accessed on June 3, 2024, <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics>.

2 *Job-years* assume a full time equivalent of 2080 hours and 8-hour workdays; job-years cannot always be directly translated into several jobs created but instead help describe the demand for work.

The Clean Transportation Program includes funding for workforce training programs related to developing and deploying zero-emission vehicles and related infrastructure. The workforce-training initiatives of the program are broad-based partnerships that leverage other public and private job-training programs and resources. Through Clean Transportation Program investments, the CEC intends to help cultivate an economically sustaining and diverse workforce that will support the state's ZEV and ZEV infrastructure deployment policies.

1.1 Purpose

The *ZEV Workforce Training and Development Strategy* will guide future actions and funding opportunities related to workforce projects funded by the Clean Transportation Program. The strategy will:

- 1) Clarify the California Energy Commission's role in developing a robust workforce to support zero-emission vehicles and infrastructure.
- 2) Identify objectives and activities to build career pathways to support zero-emission vehicles and infrastructure.
- 3) Establish funding priorities and provide an actionable plan that reflects program goals.

1.2 Structure of the Strategy

The *ZEV Workforce Training and Development Strategy* is organized into six chapters. This chapter, Chapter 1, provided information on the purpose and structure of the strategy. Statewide legislation, policies, and programs related to ZEV and ZEV infrastructure workforce training and development are provided in Chapter 2. Chapter 3 outlines objectives to support external workforce development projects for zero-emission vehicles and related charging and hydrogen refueling infrastructure. Internal objectives needed to administer workforce programs funded by the Clean Transportation Program are included in Chapter 4. Active workforce development programs funded by the CEC are included in Chapter 5. An implementation roadmap and next steps for implementing strategy objectives are provided in Chapter 6.

CHAPTER 2:

Program Context

The State of California has established laws and programs affecting the development and deployment of zero-emission technology, including ZEVs and ZEV infrastructure. The following chapter outlines statewide legislation, policies, and programs that provide context for the CEC's ZEV workforce development and training objectives.

2.1 Clean Transportation Program

Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) created the Clean Transportation Program and authorized the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies.

Assembly Bill 126 (Reyes, Chapter 319, Statutes of 2023) reauthorized the Clean Transportation Program through July 1, 2035, with a renewed emphasis on the development and deployment of zero-emission vehicle infrastructure.

As part of the Clean Transportation Program, the CEC prepares and adopts an annual Investment Plan Update that identifies the funding priorities for the coming fiscal year.³ The funding allocations reflect state policy goals and support the transition away from fossil fuels. The Investment Plan Update also describes how the allocations will complement existing public and private efforts, including related state programs.

The Clean Transportation Program includes funding for workforce training initiatives related to advanced energy technology designed to reduce air pollution. Workforce training initiatives funded under the Clean Transportation Program reflect broad-based partnerships that leverage other public and private job training programs and resources. Specifically, Health and Safety Code Section 44272 (e)(10) provides that workforce training programs related to the development and deployment of technologies that transform California's fuel and vehicle types and assist the state in implementing its climate change policies be eligible for program funding. Eligible workforce training initiatives include:

- Zero-emission vehicles, technologies, fuels, and infrastructure where feasible and near-zero-emission vehicles, technologies, fuels, and infrastructure elsewhere.
- Automotive computer systems.
- Mass transit fleet conversion, servicing, and maintenance.
- Training programs to transition dislocated workers affected by the state's greenhouse gas emission policies, including those from fossil fuel sectors.

³ California Energy Commission. "[Clean Transportation Program Investments Plans](https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-program-investment)." Accessed June 3, 2024, <https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-program-investment>.

- Training programs for low-skilled workers to enter or continue in a career pathway that leads to middle-skill, industry-recognized credentials, or state-approved apprenticeship opportunities in related occupations.

As of July 2023, cumulative awards from the Clean Transportation Program totaling about \$40 million have provided workforce training for more than 32,000 trainees, faculty, and trainers and helped 277 businesses prepare workers for the clean transportation economy. Providing the opportunity for employees to earn sustainable wages and expand career employment pathways.⁴ In the last five years, \$20 million in Clean Transportation Program Funds has been allocated for workforce training and development activities. Of these funds, \$2 million is reserved for workforce development activities funded by the Tribal Electric Vehicle Infrastructure, Planning, and Workforce Training and Development grant funding solicitation. There are \$8.4 million in available funds from the Clean Transportation Program for workforce training and development. The draft *2024–2025 Investment Plan Update for the Clean Transportation Program* has proposed allocating an additional \$3.0 million to support workforce training and development.

Table 1: Clean Transportation Program Workforce Funds (in Millions)

Fiscal Year	Investment Plan Allocation	Available
2019–20	\$2.5	\$0.0
2020–21	\$2.5	\$0.0
2021–22	\$5.0	\$0.0*
2022–23	\$5.0	\$3.4
2023–24	\$5.0	\$5.0

***Includes \$2 million reserved, but not encumbered, for workforce development activities funded by GFO-23-607 – Tribal Electric Vehicle Infrastructure, Planning, and Workforce Training and Development.**

Source: California Energy Commission

2.2 Economic & Workforce Development Strategies

The Labor and Workforce Development Agency (LWDA) leads California’s efforts to protect and improve the state’s current and future workforce. The agency, and the departments, boards, and panels within, plays a pivotal role in ensuring California’s labor pool is prepared to meet the demands of a rapidly expanding ZEV market.

One of the boards within LWDA, the California Workforce Development Board (CWDB), administers the California High Road Training Partnerships (HRTTP) program designed to model business and worker partnership strategies for the state.⁵ The HRTTP model is a sector-focused

⁴ California Energy Commission. May 2024. [2024–2025 Investment Plan Update for the Clean Transportation Program](https://efiling.energy.ca.gov/GetDocument.aspx?tn=256545) draft staff report. Accessed June 3, 2024, <https://efiling.energy.ca.gov/GetDocument.aspx?tn=256545>.

⁵ California Workforce Development Board. “[High Road Training Partnerships](https://cwdb.ca.gov/initiatives/high-road-training-partnerships/).” Accessed June 3, 2024. Available at <https://cwdb.ca.gov/initiatives/high-road-training-partnerships/>.

approach toward industry partnerships that deliver equity, sustainability, and job quality. The program is designed to advance a field of practice to address questions of income inequality, economic competitiveness, and climate change through regional skills strategies designed to support economically and environmentally resilient communities across the state. The industry-based, worker-focused training partnerships build skills for California’s “high-road” employers — firms that compete based on the quality of product and service achieved through innovation and investment in human capital and can generate family-supporting jobs where workers have agency and voice.

State law defines *high road* as “a set of economic and workforce development strategies to achieve economic growth, economic equity, shared prosperity, and a clean environment.”⁶ The strategies include interventions that improve job quality and job access; meet the skill and profitability needs of employers; and meet the economic, social, and environmental needs of the community.

Clean Transportation Program workforce investments are intended to generate opportunities for economic prosperity to develop an equitable and diverse workforce in building ZEV infrastructure. The objectives described in this strategy follow the H RTP principles by embodying industry partnerships that deliver equity, sustainability, and job quality.

2.3 California ZEV Market Development Strategy

The *California Zero-Emission Vehicle Market Development Strategy*, published by the Governor's Office of Business and Economic Development (GO-Biz), outlines the overall strategy to meet California’s ZEV goals.⁷ The strategy focuses on four market pillars — vehicles, infrastructure, end users, and workforce — to guide the roles and responsibilities of each public and private market player to accelerate large-scale, affordable, and equitable ZEV market development.

As part of the *ZEV Market Development Strategy*, state agencies develop annual agency action plans. These ZEV action plans are concise and ambitious documents designed to share ZEV priorities, foster alignment across agencies, and ensure agency actions are coordinated. Each plan is aimed at advancing the market in one or more of the four ZEV market pillars and reflects the core principles of the strategy. The 2024 *California Energy Commission Zero-Emission Vehicle Action Plan* prioritizes ZEV infrastructure market objectives, funding sources, key collaborators, and actions to further California’s ZEV infrastructure deployment and ZEV-related manufacturing efforts.⁸ The *CEC ZEV Action Plan* details actions to support ZEV infrastructure resilience, including the five workforce development actions for 2024 identified here:

6 Unemployment Insurance Code Section 14005.

7 GO-Biz ZEV Team. February 2021. [California Zero-Emission Vehicle Market Development Strategy](https://business.ca.gov/wp-content/uploads/2021/02/ZEV_Strategy_Feb2021.pdf). Accessed June 3, 2024, https://business.ca.gov/wp-content/uploads/2021/02/ZEV_Strategy_Feb2021.pdf.

8 California Energy Commission. March 2024. [California Energy Commission Zero-Emission Vehicle Action Plan](https://business.ca.gov/wp-content/uploads/2024/04/2024-ZEV-Agency-Action-Plan_CEC_Final.pdf). Accessed June 3, 2024, https://business.ca.gov/wp-content/uploads/2024/04/2024-ZEV-Agency-Action-Plan_CEC_Final.pdf.

- Work with the Labor & Workforce Development Agency to collaborate on high-road training and focus investments/partnerships in disadvantaged and low-income communities and rural areas.
- Work with small, certified business enterprises to access Clean Transportation Program funding.
- Cultivate new communities and partnerships to expand clean transportation career pathways.
- Establish the Clean Transportation Program Workforce web portal that includes increasing better access to EVITP training and certification.
- Assess expansion of the Electric School Bus Training Project to include the California Air Resources Board (CARB) and other school partners to offer statewide training to all schools.

CHAPTER 3:

Program Activities by Workforce Sector

This chapter identifies the workforce training and development needs associated with specific ZEV and ZEV infrastructure sectors (charging infrastructure, plug-in electric vehicles, hydrogen infrastructure, and fuel cell electric vehicles) and proposes objectives for addressing those needs.

3.1 Charging Infrastructure

A diverse workforce is needed to ensure a safe and reliable charging experience across vehicle classes and markets. To accelerate charging infrastructure deployment, investments in higher education systems, community colleges, and private entities should be leveraged to support the development of charging technology. In addition to electricians, additional elements to support charging infrastructure include planning, designing, permitting, construction, installation, commissioning, inspection, and maintenance.

3.1.1 AB 2127 – Electric Vehicle Charging Infrastructure Assessment

Under AB 2127, the California Energy Commission is required to publish a biennial report on the charging infrastructure needed for California to meet its zero-emission vehicle targets. The CEC's *Assembly Bill 2127 Second Electric Vehicle Charging Infrastructure Assessment* projects that California will need 1.01 million chargers to support 7.1 million light-duty plug-in electric vehicles in 2030.⁹ By 2035, the state will need 2.11 million chargers to support 15.2 million light-duty plug-in electric vehicles. To support medium- and heavy-duty plug-in electric vehicles, California will need about 114,500 chargers for 155,000 vehicles in 2030, and 264,000 chargers for 377,000 vehicles in 2035.

3.1.2 Future and Current Workforce

Senate Bill 589 (Hueso, Chapter 372, Statutes of 2021) additionally requires that the CEC identify workforce development and training resources needed to meet ZEV goals as part of the AB 2127 assessment. These resources shall include qualified apprenticeships, on-the-job training programs, and other training opportunities that build career pipelines in the zero-emission transportation sector and provide long-term employment in disadvantaged communities.

The *Workforce Projections to Support Battery Electric Vehicle Charging Infrastructure Installation* report estimates that 71,500 job-years¹⁰ will be needed to support about 1.53

9 Davis, Adam, Tiffany Hoang, Thanh Lopez, Jeffrey Lu, Taylor Nguyen, Bob Nolty, Larry Rillera, Dustin Schell, Micah Wofford. February 2023. [Assembly Bill 2127 Second Electric Vehicle Charging Infrastructure Assessment: Assessing Charging Needs to Support Zero-Emission Vehicles in 2030 and 2035](#). California Energy Commission. Publication Number: CEC-600-2024-003-CMR. Accessed June 3, 2024, <https://efiling.energy.ca.gov/GetDocument.aspx?tn=254869>.

10 *Job-years* assume a full time equivalent of 2080 hours and 8-hour workdays; job-years cannot always be directly translated into several jobs created but instead help describe the demand for work.

million light-duty chargers and 157,000 medium- and heavy-duty chargers (Table 2).¹¹ The greatest workforce needs for light-duty charging infrastructure are electricians (21 percent of job years), general contractors (21 percent of job years), planners and designers (20 percent of job years), and electrical contractors (15 percent of job years). The greatest workforce needs for medium- and heavy-duty charging infrastructure are in planning and design (27 percent of job years), electricians (26 percent of job years), and general contractors (20 percent of job years).

Table 2: Workforce Estimates for Charging Infrastructure Installation

Job-Role	Light-Duty Charging Job-Years Estimate	Medium- and Heavy-Duty Charging Job-Years Estimate
Planning and Design	12,490	2,410
General Contracting	13,080	1,800
Utility Linework	4,220	450
Electrical Contracting	9,340	620
Electrician	13,320	2,330
Admin	5,170	630
Legal	1,000	300
Other	3,800	560
Sum	62,420	9,090

Job-year estimates are to support about 1.69 million chargers, which includes 1.53 million light-duty chargers and 157,000 medium and heavy-duty chargers.

Source: *Workforce Projections to Support Battery Electric Vehicle Charging Infrastructure Installation*.

There are 29,724 general C-10 electricians and 7,551 registered electrical apprentices in California.^{12, 13}

11 Carr, Edward, James Winebrake, and Samuel Winebrake. June 8, 2021. [Workforce Projections to Support Battery Electric Vehicle Charging Infrastructure Installation](https://www.etcommunity.org/wp-content/uploads/2024/03/Workforce-ProjectionstoSupportBatteryElectricVehicleChargingInfrastructureInstallation.pdf). Accessed June 3, 2024, <https://www.etcommunity.org/wp-content/uploads/2024/03/Workforce-ProjectionstoSupportBatteryElectricVehicleChargingInfrastructureInstallation.pdf>.

12 *General C-10 electricians* refer to persons performing work as an electrician under a C-10 licensed contractor who have completed the Department of Industrial Relations, Division of Labor Standards Enforcement Electrician Certification Program. Electrician certification program current counts as of April 12, 2023. Department of Industrial Relations. "[Electrician Certification Program](https://www.dir.ca.gov/DLSE/ECU/ECU_Stats.htm)." Accessed June 6, 2024, https://www.dir.ca.gov/DLSE/ECU/ECU_Stats.htm.

13 Number electrical-electronic apprentice, on-the-job training, and pre-apprentice registrations as of May 29, 2024. California Department of Industrial Relations, Division of Apprenticeship Standards. "[Registration Dashboard](https://public.tableau.com/app/profile/california.apprenticeship/viz/RegistrationDashboard_16301055851260/RegistrationDashboard)." Accessed June 6, 2024, https://public.tableau.com/app/profile/california.apprenticeship/viz/RegistrationDashboard_16301055851260/RegistrationDashboard.

3.1.2.1 Objective – Charging Infrastructure Workforce Assessment

CEC staff will partner with sister agencies, industry, and labor researchers to assess the existing and future workforce needed to support the charging infrastructure industry. The AB 2127 assessment provides an estimate of the workforce required to install the charging infrastructure needed to meet California's 2030 ZEV goals. Additional research is needed to identify skill gaps through all phases of the charging infrastructure life cycle (manufacturing, construction and installation, service and maintenance, and end of life), as well as the geographical distribution of charging infrastructure and workforce. Impacts from charger uptime requirements in conjunction with aging first-generation technology should be considered when estimating the workforce needed to support a robust and reliable charging network.

Priority: Medium

Funding: None expected if partnering with other state agencies and organizations

Anticipated Timeline and Milestones:

- Draft analyses of the workforce (existing and needed) for charger maintenance and repair needs — Quarter 3, 2024.
- Draft analyses of the workforce (existing and needed) for charger installation — Quarter 4, 2024.
- Include results in the next Assembly Bill 2127 infrastructure assessment — Quarter 2, 2025.

3.1.3 Electric Vehicle Infrastructure Training Program

Assembly Bill 841 (Ting, Chapter 372, Statutes of 2020) requires that electric vehicle chargers and equipment funded by the CEC or CARB be installed by a contractor with an appropriate license classification, and at least one electrician on each crew must hold an Electric Vehicle Infrastructure Training Program (EVITP) certification. For projects installing charging ports supplying 25 kilowatts or more, at least 25 percent of the electricians working on the crew must hold EVITP certification.

EVITP is a nonprofit organization that provides online proprietary training and certification for C-10 licensed electricians to install electric vehicle supply equipment in the United States and Canada. The training program costs \$275 and takes roughly 20 hours to complete. Curriculum modules include load requirements, electrical codes and regulations, electric installation of direct current (DC) chargers, inductive charging, vehicle-to-grid applications, and best practices for charger installation and maintenance. After successful completion of the online training course, electricians are certified through a proctored online examination. EVITP does not train or certify contractors or employers, only eligible electricians. EVITP certification is valid for three years.

As of March 2024, there are 4,074¹⁴ EVITP certified electricians and 273 contractors employing certified electricians¹⁵ in California. However, the geographic distribution and availability of EVITP certified electricians throughout California is unclear.

3.1.3.1 Objective – Increase EVITP-Certified Electricians

Increasing the number of EVITP-certified electricians will develop the workforce pipeline to install electric vehicle charging infrastructure needed to meet ZEV goals in 2035 and beyond.

At the CEC’s March 2024 Business Meeting, commissioners approved a \$3 million interagency agreement with the Employment Training Panel (ETP) to fund EVITP training and certification for 3,000 electricians. To increase the social, economic, and geographic diversity of EVITP-certified electricians, 50 percent of the funds will be invested in employers located in disadvantaged and low-income communities or rural, nonurban areas.

Priority: High

Funding: \$3.0 million

Anticipated Timeline and Milestones:

- Interagency agreement approved at the March 13, 2024, CEC Business Meeting
- Project Kickoff Meeting — Quarter 4 2024. Upon agreement execution, ETP will:
 - Plan, develop, and market an EVITP training and certification program.
 - Develop, administer, and monitor subcontractor agreements to deliver training.
 - Regularly report participant data, subcontractor status, and program updates.

3.1.3.2 Objective – Electric Vehicle Infrastructure Training Program Workshop

Public Utilities Code Section 740.20 requires the CEC to periodically conduct joint public workshops with the California Public Utilities Commission (CPUC) to determine whether the EVITP curriculum and testing should be supplemented. If the CEC determines that it should, the EVITP will incorporate this supplemental curriculum and testing within six months.

CEC staff will organize and host a joint workshop with the CPUC to identify and discuss stakeholder feedback and access regarding the EVITP training curriculum and testing. The workshop may also include information on CEC’s actions to expand EVITP training compliance with AB 841 requirements and information about active programs or resources to assist with EVITP training and certification.

Priority: Low

14 Count of electricians certified through the Electric Vehicle Infrastructure Training Program as of June 3, 2024. California Governor’s Office of Business and Economic Development, Zero-Emission Vehicle Market Development Strategy, “[ZEV Market Metrics](#),” Workforce Pillar. Accessed June 3, 2024, business.ca.gov/industries/zero-emission-vehicles/zev-strategy-2/.

15 Count of contractors employing electricians certified through the Electric Vehicle Infrastructure Training Program as of June 3, 2024. “[Find a Contractor](#).” Electric Vehicle Infrastructure Training Program. Accessed June 3, 2024, <https://evitp.org/california>.

Funding: none

Anticipated Timeline and Milestones:

- Workshop target date — Quarter 4, 2024. Or, timed to EVITP 5.0 release.

3.1.4 Charger Maintenance and Repair

3.1.4.1 Electric Vehicle Charging Infrastructure Reliability Reporting and Performance Standards

Access to highly reliable and dependable charging stations is critical to increasing consumer confidence in electric vehicles. The California Energy Commission is mandated under Assembly Bill 2061 (Ting, Chapter 345, Statutes of 2022) to develop uptime recordkeeping and reporting standards for certain electric vehicle charging stations. Furthermore, Assembly Bill 126 (Reyes, Chapter 319, Statutes of 2023) mandates the Commission to adopt tools to increase charging station uptime. A skilled workforce will be needed to provide service, maintenance, and repair of deployed charging infrastructure to achieve the CEC's 97 percent uptime requirement for all publicly funded and ratepayer funded chargers.¹⁶ At the October 18, 2022, "Workshop on Labor and Workforce for Second Assembly Bill 2127 Assessment,"¹⁷ panel and participant discussions also emphasized the importance of developing the workforce necessary to support deployed charging assets. Since the life span of well-maintained charging infrastructure can last more than a decade, an additional workforce will be needed to refurbish, replace, or decommission first-generation equipment.

3.1.4.2 Electric Vehicle Charger Reliability and Accessibility Accelerator

The EV Charger Reliability and Accessibility Accelerator is a federal initiative to fix or replace non-functional charging stations, primarily focusing on public Level 2 and direct current (DC) fast chargers. On January 18, 2024, the Federal Highway Administration approved California's *EV Charger Reliability and Accessibility Accelerator Program*, and the CEC subsequently announced \$58.5 million in grant funds to repair or replace non-working Level 2 and DC fast chargers. The program will focus on the repair and replacement of 383 existing charging stations to provide a total of approximately 1300 operational charging ports to improve the reliability of existing charging infrastructure. No funding is provided through this program for workforce training or development.

3.1.4.3 Objective – Incentive Program for Charger Maintenance and Repair Training

Develop an early career pipeline by providing rebates, vouchers, or other funding for charger maintenance and repair training courses administered by community colleges, charger

16 California Energy Commission. April 09, 2024. "[Tracking and Improving Reliability of California's Electric Vehicle Chargers: Regulations for Improved Electric Vehicle Charger Recordkeeping and Reporting, Reliability, and Data Sharing.](https://www.energy.ca.gov/publications/2023/tracking-and-improving-reliability-californias-electric-vehicle-chargers)" <https://www.energy.ca.gov/publications/2023/tracking-and-improving-reliability-californias-electric-vehicle-chargers>

17 California Energy Commission. October 12, 2022. "[Workshop on Labor and Workforce for Second Assembly Bill 2127 Assessment.](https://www.energy.ca.gov/event/workshop/2022-10/workshop-labor-and-workforce-second-assembly-bill-2127-assessment)" Accessed June 3, 2024, <https://www.energy.ca.gov/event/workshop/2022-10/workshop-labor-and-workforce-second-assembly-bill-2127-assessment>.

manufacturers, and charger service providers. Staff will coordinate with the CEC's charger reliability efforts to gauge market needs and target training funds to specific equipment, sectors, or regions. This program could be modeled on current rebates for contractor training to maintain and repair energy efficiency products in residential and commercial markets.

Priority: High

Funding: Estimated \$5 million

Anticipated Timeline and Milestones:

- Public Workshop — Quarter 2, 2024
- Release request for proposals, a grant funding opportunity, or interagency agreement — Quarter 4, 2024

3.2 Plug-In Electric Vehicles

The *California Zero-Emission Vehicle Market Development Strategy* identifies four priority pillars of ZEV market development: vehicles, infrastructure, end users, and workforce. The vehicle pillar, led by CARB, includes light-, medium-, and heavy-duty plug-in electric and fuel cell vehicles, as well as vehicles used for freight, agriculture, recreation, and other industries.

Current workforce development activities funded by CARB include the "Adult Education & Vocational School Zero-Emission Vehicle Technology Training Project,"¹⁸ released August 25, 2023. This \$1.5 million competitive solicitation supports California-based, accredited, nonprofit adult education and vocational schools in developing new or strengthening existing workforce training and development programs and training curricula for ZEV technologies that lead to job and career advancement for priority populations.¹⁹

Additionally, CARB has allocated \$2.075 million to fund the Expanded and Equitable Access to ZEV Training in Disadvantaged Communities project, recently contracted with the Foundation for California Community Colleges. This project will support and invest in ZEV community college training programs, including those for electric vehicles, to expand their capacity and increase workforce participation for priority populations. The objective is to support innovative ZEV certification programs at local community colleges and expand enrollment in programs that are serving priority populations, including high schools.

While there are no objectives specifically related to workforce development for electric vehicles in this strategy, the CEC has funded several active projects regarding workforce development for light-duty ZEVs, zero-emission school buses, off-road ZEV technologies, and ZEV applications in the freight sector. Please see Chapter 5 for additional information on active workforce training and development projects related to plug-in electric vehicles.

18 California Air and Resources Board. "[Adult Education & Vocational School Zero-Emission Vehicle Technology Training Project](https://ww2.arb.ca.gov/our-work/programs/adult-education-vocational-school-zero-emission-vehicle-technology-training)." Accessed June 3, 2024, <https://ww2.arb.ca.gov/our-work/programs/adult-education-vocational-school-zero-emission-vehicle-technology-training>.

19 California Air Resources Board. "[Expand Workforce Training and Development](https://ww2.arb.ca.gov/our-work/programs/accessible-clean-transportation-options-sb-350/expand-workforce-training-and)." Accessed June 3, 2024, <https://ww2.arb.ca.gov/our-work/programs/accessible-clean-transportation-options-sb-350/expand-workforce-training-and>.

3.3 Fuel Cell Electric Vehicles and Hydrogen Refueling Infrastructure

Hydrogen will be an essential clean fuel for multiple sectors to achieve zero emissions, especially those that are hard to decarbonize, including transportation, aviation, marine, power generation, and industrial processes. Since 2008 and through November 2023, the CEC has invested more than \$472 million to support hydrogen research, development, and deployment projects.²⁰ As of May 2024, there were 54 public light-duty open and 7 temporarily non-operational retail hydrogen refueling stations in California.²¹ There are also 27 open or planned publicly accessible medium- and heavy-duty hydrogen refueling stations.²² Designing, building, and maintaining these stations, and those to come, as well as the facilities to produce, transport, and deliver hydrogen fuel, require a skilled workforce to support the growth of the hydrogen economy.

Staff recognizes the upcoming need for workforce development related to fuel cell electric vehicles and will continue to review assessments on hydrogen infrastructure workforce needs and develop objectives based on industry growth.

3.3.1 ARCHES – Alliance for Renewable Clean Hydrogen Energy Systems

In October 2023, the U.S. Department of Energy announced California would receive one of seven Regional Clean Hydrogen Hub awards totaling up to \$1.2 billion for the Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) proposal.²³ Federal funding will be used not only to implement a statewide network of proposed projects to produce, distribute, and use renewable clean hydrogen, but also to implement a community benefits framework that includes collaborating with organized labor to ensure a well-trained, diverse, and local hydrogen workforce. This plan includes \$150 million for community benefits and \$229 million for workforce development and community education.

With U.S. Department of Energy funding, ARCHES hub investments are forecast to generate robust growth of high-road careers. By 2030, the ARCHES hub is associated with anywhere from 222,400 to 660,000 new jobs across over a dozen occupational groups.²⁴ The majority of the positions are entry-level, and nearly half do not require educational credentials. All private

20 Villareal, Kristi. 2024. [2023 Final Staff Report on Senate Bill 643: Clean Hydrogen Fuel Production and Refueling Infrastructure to Support Medium- and Heavy-Duty Fuel Cell Electric Vehicles and Off-Road Applications](https://www.energy.ca.gov/publications/2023/senate-bill-643-clean-hydrogen-fuel-production-and-refueling-infrastructure). California Energy Commission. Publication Number: CEC-600-2023-053-SF. Accessed June 18, 2024, <https://www.energy.ca.gov/publications/2023/senate-bill-643-clean-hydrogen-fuel-production-and-refueling-infrastructure>.

21 California Energy Commission. "[Hydrogen Refueling Stations in California](https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/hydrogen)." Accessed June 18, 2024, <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/hydrogen>.

22 California Energy Commission. "[Medium- and Heavy-Duty Zero Emission Vehicle Charging and Hydrogen Infrastructure](https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/mdhd-zev)." Accessed June 18, 2024, <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/mdhd-zev>.

23 U.S. Department of Energy: Office of Clean Energy Demonstrations. "[Regional Clean Hydrogen Hubs](https://www.energy.gov/oced/regional-clean-hydrogen-hubs-0)." Accessed June 18, 2024, <https://www.energy.gov/oced/regional-clean-hydrogen-hubs-0>.

24 ARCHES. "[Community Benefits Pathways](https://archesh2.org/wp-content/uploads/2023/11/ARCHES_CB_PROPOSAL_for-release.pdf)." Accessed June 18, 2024, https://archesh2.org/wp-content/uploads/2023/11/ARCHES_CB_PROPOSAL_for-release.pdf.

sector members of ARCHES have committed to working with unions under a project labor agreement on projects receiving ARCHES funding. New and upskilled positions span a range of skills and will use local hiring resources and partners to reach low- and middle-income workers. The State of California will leverage its robust training systems by working with ARCHES to align high school, community college, and university training to serve the hydrogen market, co-investing in worker retraining through California's Employment Training Panel, and collaborating with local workforce development boards to increase access to apprenticeship programs.

3.3.2 CEC Active Hydrogen Workforce Development Projects

The CEC's current projects related to hydrogen refueling infrastructure include:

- California ZEV Engineering Workforce Pilot Project with California State University, Los Angeles. This project, funded by the CEC's IDEAL ZEV Workforce Pilot, provided \$500,000 to develop a curriculum, instruct, and train engineering students on fuel cell electric vehicles and hydrogen refueling stations.
- California Hydrogen Fuel Cell Manufacturing and Training Facility with hydrogen fuel cell manufacturer Symbio North America. This \$2.4 million project, funded by the CEC's Zero-Emission Transportation Manufacturing grant solicitation, will establish a hydrogen fuel cell vehicle power systems assembly facility to assemble regional long-haul heavy-duty fuel cell Class 8 trucks. Workforce development activities include developing a technical training curriculum and expansion of Symbio's direct labor workforce.

In November 2023, the CEC released a grant funding opportunity called Improvements in Maintenance Processes for Reliable Operations that are Verifiable and Effective for Hydrogen Refueling Stations (GFO-23-604). The initiative seeks to improve of maintenance protocols, equipment, design, and engineering of hardware and processes necessary to increase the reliability of hydrogen refueling stations. Two projects have been awarded funds from this solicitation; however, only one project includes workforce development activities:

- Improvements in Maintenance Processes for Reliable Operations that are Verifiable and Effective for Hydrogen Refueling Stations with hydrogen retailer and refueling station provider FirstElement Fuel, Inc. This project provided \$7.0 million to recruit and hire dispatchers, station ambassadors, reliability engineers, test engineers, and test technicians. The agreement also seeks to improve reliability, efficiency, and customer benefits at existing FirstElement Fuel, Inc. hydrogen refueling stations.

CHAPTER 4:

Internal Activities

In addition to the external program activities targeted toward specific workforce sectors outlined in Chapter 3, staff recommends pursuing the following internal program activities and objectives to prepare for future workforce development activities.

4.1 Education, Engagement, and Outreach

Education, engagement, and outreach are critical to increasing clean transportation adoption over time. Providing up-to-date information on industry regulations and workforce training and development programs is the first step toward fostering collaboration among training providers, community groups, and students. Regularly engaging with industry stakeholders is critical to identifying new partnerships, opportunities, and innovative solutions to workforce training and development challenges. Public outreach allows for a better understanding of workforce gaps and assesses the effectiveness of workforce projects.

The CEC recognizes that the most successful and innovative programs result from meaningful engagement with a diverse set of stakeholders. Engagement may involve sharing information, building relationships and partnerships, and involving stakeholders in planning and decision-making to improve the outcomes of policies and programs. Education and outreach are also critical for increasing participation from community members, particularly in disadvantaged and low-income communities and equity advocacy groups.

It is crucial that local communities, particularly those most affected by environmental burdens, are involved in leading and benefiting from workforce training and development projects. Listening with intention and trying to understand someone's lived experience are not only critical for building trusting relationships, but also to better understand gaps and help identify where to direct or prioritize investments.

4.1.1 Objective – Publish the Workforce Training and Development Strategy

Staff will publish a draft of the *Workforce Training and Development Strategy* and incorporate relevant public comments into the final strategy document.

Priority: High

Funding: none

Anticipated Timeline and Milestones:

- Publish strategy draft — Quarter 2, 2024
- Meet with subject matter experts from the Disadvantaged Communities Advisory Group — Quarter 3, 2024
- Publish updated *Workforce Training and Development Strategy* — Quarter 4, 2024

4.1.1.1 Objective – Workforce Website Updates

Staff will update the [Clean Transportation Program Workforce Training and Development](https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-funding-areas-3) website (<https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-funding-areas-3>) to include information on the *Workforce Training and Development* Strategy, engagement opportunities, and active and completed projects. Staff will also update the [ZEV Workforce Portal](https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-funding-areas-4/zev) (<https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/clean-transportation-funding-areas-4/zev>) to include information and projects related to the Electric Vehicle Infrastructure Training Program (EVITP) and certification.

Priority: Medium

Funding: none

Anticipated Timeline and Milestones:

- Website updates — Quarter 2, 2024
- Ongoing updates quarterly. Feedback on website content and EVITP can be submitted to FTDWorkforce@energy.ca.gov.

4.1.2 Objective — Workforce Training and Development Workshop

Staff will organize and host an online Workforce Training and Development Workshop. Part 1 of the workshop will provide updates on current workforce-related programs and highlights of completed projects, introduce the *Draft Workforce Training and Development Strategy*, and collect feedback on the strategy and objectives. Part 2 of the workshop will focus on charger maintenance, repair, and associated workforce training and development needs. The workshop will include presentations from CEC staff, sister agencies, subject matter experts, and industry stakeholders and will include time for questions and public feedback.

Priority: Medium

Funding: None

Anticipated Timeline and Milestones:

- Public Workshop — June 25, 2024
- Revise and publish updated *Workforce Training and Development Strategy* — Quarter 4, 2024

4.2 Policy

As ZEV infrastructure funding and incentive programs are developed, a high-road approach should be embedded in requirements for solicitations that include workforce development activities.

Recent CEC solicitations for ZEV infrastructure funding have included funds to support workforce development.²⁵ As part of competitive solicitation processes, project applications included submitting a ZEV Workforce Plan. Workforce development application evaluation and scoring criteria for projects include:

- Evaluating the number and quality of direct and indirect jobs created by the project.
- Benefits to disadvantaged and low-income communities and opportunities for upward mobility.
- Recruitment and job placement that incorporate strategies for workers facing employment barriers and recruitment.
- Community outreach and engagement.

4.2.1 Objective – Workforce Requirements for Solicitations

Staff proposes including a Workforce Plan in the CEC solicitation template to be readily available for grant funding opportunities that include workforce development. Staff also proposes developing a funding recipient survey to be included in future infrastructure grant projects to gather information on the number of preapprentices, apprentices, general contractors, C-10 electricians, and EVITP-certified electricians employed on projects funded by the Clean Transportation Program. This effort should include ZEV infrastructure construction, installation, and service.

Priority: Low

Funding: None

Anticipated Timeline and Milestones:

- Develop solicitation template language for workforce development activities to be included in future grant funding opportunities — Quarter 4, 2024
- Create and deploy funding recipient survey — Quarter 1, 2025

25 California Energy Commission. "[GFO-21-605 – Zero-Emission Transportation Manufacturing](https://www.energy.ca.gov/solicitations/2022-03/gfo-21-605-zero-emission-transportation-manufacturing)." Accessed June 3, 2024, <https://www.energy.ca.gov/solicitations/2022-03/gfo-21-605-zero-emission-transportation-manufacturing>. California Energy Commission. "[GFO-23-602 – Charging and Refueling Infrastructure for Transport in CALifornia Provided Along Targeted Highway Segments \(CRITICAL PATHS\)](https://www.energy.ca.gov/solicitations/2023-09/gfo-23-602-charging-and-refueling-infrastructure-transport-california)." Accessed June 3, 2024, <https://www.energy.ca.gov/solicitations/2023-09/gfo-23-602-charging-and-refueling-infrastructure-transport-california>. CALSTART. "[PowerForward](https://powerforwardgrant.org/index.html)." Accessed June 3, 2024, <https://powerforwardgrant.org/index.html>.

CHAPTER 5:

Active Projects

To meet California’s zero-emission vehicle and zero-emission vehicle infrastructure goals, the CEC has invested in expanding current workforce programs and developing new programs to support workforce development. These investments provide pathways to sustained clean-transportation job opportunities and help achieve the state’s climate and emission reduction goals. Information regarding workforce training and development grant funding opportunities and programs funded by the Clean Transportation Program are included in this chapter. A complete list of projects that include ZEV and ZEV infrastructure workforce activities is provided in Appendix B: Workforce Development Programs and Projects.

5.1 Grant Funding Opportunities

5.1.1 Inclusive, Diverse, Equitable, Accessible, and Local (IDEAL) ZEV Workforce Pilot Projects

In 2021 the CEC partnered with CARB to implement the Inclusive, Diverse, Equitable, Accessible, and Local (IDEAL) ZEV Workforce Pilot (GFO-21-602) to support workforce development for ZEVs, ZEV infrastructure, and ZEV-related commercial technologies in California with a focus on priority populations.²⁶ These projects will develop curricula and provide tuition and job placement assistance for ZEV training related to public transit, fleet operations, freight, and hydrogen refueling infrastructure. Grant recipients were announced in February 2022, and include community colleges, local governments, and community-based organizations.

Training will engage students from diverse demographics: high school students, college students, apprenticeship programs, veterans, and low-income and disadvantaged communities. In February 2020, the CEC announced awards for 14 workforce training and development projects totaling \$6.6 million. Most IDEAL ZEV Workforce Pilot projects are expected to conclude in 2025.

5.1.2 Zero-Emission Transportation Manufacturing

The Zero-Emission Transportation Manufacturing (GFO-21-605) grant funding opportunity was released on March 30, 2022, to fund projects that will increase in-state manufacturing of zero-emission vehicles, ZEV components and batteries, and ZEV charging or refueling equipment. Eligible project activities include establishing workforce training programs and conducting public outreach on the benefits of alternative transportation fuels and vehicle technologies. Eligible workforce training and development costs are capped at 10 percent of the CEC award amount. Projects that include workforce development were required to submit a ZEV Workforce Plan as part of the application process. In March 2023 the CEC announced awards

²⁶ Priority populations include residents of (1) census tracts identified as disadvantaged per Senate Bill 535, (2) census tracts identified as low-income per Assembly Bill 1550, or (3) a low-income household per Assembly Bill 1550.

for 13 projects totaling \$177.4 million funded through this solicitation; 11 of the funded projects included workforce development.

5.1.3 Tribal Electric Vehicle Infrastructure, Planning, and Workforce Training and Development

In January 2024 the CEC released the Tribal Electric Vehicle Infrastructure, Planning, and Workforce Training and Development²⁷ grant funding opportunity (GFO-23-607) to provide funding for tribes, tribal organizations, and tribally owned businesses for charging infrastructure, infrastructure planning, and workforce training and development to support ZEV and ZEV-related technology careers. The submission deadline for applications was June 7, 2024, and the notice of proposed awards is expected to be released in August 2024.

5.2 Other Agreements and Incentive Programs

5.2.1 Advanced Transportation and Logistics Initiative at San Diego Community College District

In April 2019, the CEC funded the Advanced Transportation and Logistics Initiative at San Diego Community College District, a \$1.4 million agreement to expand alternative fuel and advanced vehicle technology training for college automotive programs. Seven community colleges and the Southern California Regional Transit Training Consortium received funding for equipment purchases, curriculum development, and faculty professional development through the initial agreement. In April 2022, the contract was extended until September 2024, and an additional \$1.8 million of funding was added to train incumbent fleet technicians and provide funding for an additional six colleges to expand their existing medium- and heavy-duty truck programs to include zero-emission truck and infrastructure curricula.

5.2.2 Electric School Bus Training Project

Assembly Bill (AB) 181 (Committee on Education, Chapter 52, Statutes of 2022) appropriates \$1.125 billion in one-time Proposition 98 funding to CARB for the Hybrid and Zero-Emission Truck and Voucher Incentive Project (HVIP) and \$0.375 billion to the CEC for supporting electric school bus charging infrastructure. Funding may be used to support related zero-emission school bus workforce development and training. AB 181 prioritizes funding for grantees designated as small or rural school districts and local educational agencies that serve disadvantaged students.²⁸

In June 2019, the CEC contracted with the Advanced Transportation and Logistics Initiative at Cerritos Community College District²⁹ to develop and deliver electric school bus training for school district maintenance technicians and drivers related to the Senate Bill 110 School Bus

27 California Energy Commission. "[GFO-23-607 – Tribal Electric Vehicle Infrastructure, Planning, and Workforce Training and Development](https://www.energy.ca.gov/solicitations/2024-01/gfo-23-607-tribal-electric-vehicle-infrastructure-planning-and-workforce?utm_medium=email&utm_source=govdelivery)." Accessed June 3, 2024, https://www.energy.ca.gov/solicitations/2024-01/gfo-23-607-tribal-electric-vehicle-infrastructure-planning-and-workforce?utm_medium=email&utm_source=govdelivery.

28 Prioritized funding is for local educational agencies that serve at least 80 percent of students that are English-language learners, are foster youth, or are eligible for a free or reduced-price meal.

29 [The Electric School Bus Training Project](https://atleducation.org/cec/the-electric-school-bus-training-project/). Accessed June 21, 2024, <https://atleducation.org/cec/the-electric-school-bus-training-project/>.

Retrofit and Replacement Program. The initial agreement allocated \$1 million to develop a seven-course curriculum and provide electric school bus technician training to community college faculty to promote the training of fleet technicians employed by school districts. In January 2024, the project was extended until March 2026, and \$1 million in additional funding was provided to develop additional training modules and increase the frequency of training.

CHAPTER 6:

Next Steps

6.1 Objective Implementation

This strategy outlines eight objectives intended to help develop a robust workforce to support zero-emission vehicles and infrastructure. Objectives have been prioritized from high to low, and major objective milestones are presented in Table 3. A quarterly roadmap of milestones for each objective is located in Appendix A: Objective Roadmap.

Table 3: Objective Priorities and Milestones

High-Priority Objectives	Milestone
Workforce Training and Development Strategy	<ul style="list-style-type: none"> • Publish Draft — June 2024 • Publish Revision — Quarter 4, 2024
Increase EVITP-Certified Electricians	<ul style="list-style-type: none"> • Execute Employment Training Panel Interagency Agreement — Quarter 3, 2024 • Program Kick-Off Meeting — Quarter 4, 2024
Charger Maintenance and Repair Training	<ul style="list-style-type: none"> • Public Workshop — June 25, 2024 • Release request for proposals, a grant funding opportunity, or interagency agreement — Quarter 4, 2024

Medium-Priority Objectives	Milestone
Workforce Training and Development Workshop	<ul style="list-style-type: none"> • Public Workshop — June 25, 2024
Charging Infrastructure Workforce Assessment	<ul style="list-style-type: none"> • Complete draft analyses — Quarter 3, 2024 and Quarter 4, 2024 • Results included in the AB 2127 infrastructure assessment — Quarter 2, 2025
Workforce Website Updates	<ul style="list-style-type: none"> • June 2024 and then ongoing at least quarterly

Low-Priority Objectives	Milestone
EVITP Workshop	<ul style="list-style-type: none"> • Workshop — Quarter 4, 2024
Workforce Requirements for Solicitations	<ul style="list-style-type: none"> • Develop solicitation template language — Quarter 4, 2024 • Create funding recipient survey — Quarter 2, 2025

GLOSSARY

Term	Definition
ARCHES	The Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) is a public-private partnership to create a sustainable statewide clean hydrogen hub in California and beyond, utilizing local renewable resources to produce hydrogen with the objective to fully decarbonize the regional economy, while prioritizing environmental justice, equity, economic leadership and workforce development.
Assembly Bill (AB)	A law or proposed law that originated in the California State Assembly.
C-10 electrician	Persons performing work as an electrician under a C-10 licensed contractor who have completed the Department of Industrial Relations, Division of Labor Standards Enforcement Electrician Certification Program Electricians.
California Energy Commission (CEC)	<p>The state's primary energy policy and planning agency. The agency was established by the California Legislature through the Warren-Alquist Act in 1974. The agency has seven core responsibilities:</p> <ul style="list-style-type: none">• Developing renewable energy• Transforming transportation• Increasing energy efficiency• Investing in energy innovation• Advancing state energy policy• Certifying thermal power plants• Preparing for energy emergencies
California Workforce Development Board (CWDB)	The state department responsible for the development, oversight, and continuous improvement of California's workforce development system. The CWDB assists the Secretary of Labor & Workforce Development and Governor in setting and guiding workforce development policy, developing innovative initiatives through statewide programs, and expanding the High Road vision through its field branch.

Term	Definition
Class 8 truck	Class 8 vehicles have a gross vehicle weight rating (GVWR) exceeding 33,000 pounds. The class includes tractor trailer tractors, single-unit dump trucks with a GVWR greater than 33,000 pounds, and noncommercial chassis fire trucks, typically with three or more axles.
Direct current (DC) fast charger	Equipment that provides charging through a direct-current plug, typically at a rate of 50 kilowatts or higher.
Disadvantaged Communities Advisory Group (DACAG)	A group established under Senate Bill 350 (the Clean Energy and Pollution Reduction Act of 2015) and advises the California Energy Commission and California Public Utilities Commission on various programs.
Disadvantaged communities	Areas throughout the state that most suffer from a combination of economic, health, and environmental burdens. These burdens include poverty, high unemployment, air and water pollution, presence of hazardous wastes, as well as high incidence of asthma and heart disease.
Electric vehicle (EV)	A vehicle that uses an electric propulsion system. Examples include battery-electric vehicles, hybrid electric vehicles, and fuel cell electric vehicles.
Electric Vehicle Infrastructure Training Program (EVITP)	A certification program for electricians who wish to work on electric vehicle charging infrastructure. State law requires EVITP certification in some cases.
Employment Training Panel (ETP)	Created in 1982 by the California State Legislature and is funded by California employers through a special payroll tax. The panel provides funding to employers to assist in upgrading the skills of their workers through training that leads to good paying, long-term jobs.
Equity	The fair treatment, meaningful involvement, and investment of resources through clean transportation programs, incentives, and processes for all Californians so that race, color, national origin, or income level are not barriers to increased opportunities, benefits, and sustainability.
Executive Order (EO)	Policy directives to state agencies, issued by the Governor of the State of California
Fiscal year (FY)	Each California state fiscal year begins on July 1 and ends on June 30 of the following calendar year.
Fuel cell electric vehicle (FCEV)	A type of electric vehicle that derives power from an onboard fuel cell.

Term	Definition
Governor's Office of Business and Economic Development (GO-Biz)	The Governor's Office of Business and Economic Development (GO-Biz) serves as the State of California's leader for job growth and economic development efforts. The agency offers a range of services to business owners including: attraction, retention and expansion services, site selection, permit assistance, regulatory guidance, small business assistance, international trade development, and assistance with state government.
Grant funding opportunity (GFO)	Where the California Energy Commission offers applicants an opportunity to receive grant funding for projects meeting certain requirements.
Greenhouse gas (GHG)	Any gas that absorbs infrared radiation in the atmosphere. Common examples of greenhouse gases include water vapor, carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), halogenated fluorocarbons (HCFCs), ozone (O ₃), perfluorinated carbons (PFCs), and hydrofluorocarbons (HFCs).
High road	A set of economic and workforce development strategies to achieve economic growth, economic equity, shared prosperity, and a clean environment. Strategies include interventions that (1) improve job quality and job access, including for women and people from underserved and underrepresented populations; (2) meet the skill and profitability needs of employers; and (3) meet the economic, social, and environmental needs of the community.
High Road Training Partnerships (H RTP)	A \$10M demonstration project designed by the California Workforce Development Board to model partnership strategies for the state. Ranging from transportation to health care to hospitality, the H RTP model embodies the sector approach championed by the Board — industry partnerships that deliver equity, sustainability, and job quality.
Hybrid and Zero-Emission Truck and Bus Voucher Project (HVIP)	A program that provides incentives for purchasing clean commercial vehicles such as trucks and buses. Also known as the "Clean Truck and Bus Voucher Incentive Project."
Inclusive, Diverse, Equitable, Accessible, and Local (IDEAL) ZEV Workforce Pilot	A grant funding opportunity developed by the California Energy Commission to fund projects that support ZEVs, ZEV infrastructure, and ZEV-related commercial technologies in California, with focus on priority populations.
Job-years	Assume a full-time equivalent of 2080 hours and 8-hour workdays; job-years cannot always be directly translated into several jobs created but instead help describe the demand for work.

Term	Definition
Labor and Workforce Development Agency (LWDA)	An executive branch agency that works to ensure safe and fair workplaces, deliver critical worker benefits, and promote good jobs for all. The Agency oversees seven departments, boards, and panels that serve California employers and workers.
Level 2 charger	Equipment that provides charging through a 240-volt (typical in residential applications) or 208-volt (typical in commercial applications) alternating-current plug. This equipment generally requires a dedicated 40-amp circuit.
Low-income communities	Census tracts or households that are either at or below 80 percent of the statewide median income, or at or below the threshold designated as low-income by the California Department of Housing and Community Development Income Limits.
Plug-in electric vehicle (PEV)	A type of vehicle that is equipped with a battery that can be recharged from an external source of electricity. This includes battery-electric vehicles and plug-in hybrids.
Senate Bill (SB)	A law or proposed law that originated in the California State Senate.
Zero-emission vehicle (ZEV)	A vehicle that produces no pollutant emissions from the onboard source of power. This term includes battery-electric and fuel cell electric vehicles.

APPENDIX A: Objective Roadmap

Priority	Strategy Objective	Quarter 1 2024 - Milestones	Quarter 2 2024 - Milestones	Quarter 3 2024 - Milestones	Quarter 4 2024 - Milestones	Quarter 1 2025 - Milestones
High	Workforce Training and Development Strategy		Publish Draft	Public Feedback	Publish Strategy	
High	Increase EVITP Certified Electricians	Business Meeting Approval	Program Development	Program Development	Kickoff Meeting	
High	Charger Maintenance and Repair Training		Public Input	Concept Development	Business Meeting Approval	
Medium	Workforce Training and Development Workshop		June 25 Workshop			
Medium	Charging Infrastructure Workforce Assessment		Concept Development			
Medium	Workforce Website Updates		Post Website Updates	Ongoing Website Updates	Ongoing Website Updates	Ongoing Website Updates
Low	EVITP Workshop			Coordination with CPUC	Workshop Target	
Low	Workforce Requirements for Solicitations				Develop Template	Draft Funding Recipient Survey

APPENDIX B: Workforce Development Programs and Projects

Active Projects

Funding Recipient	Project Name	Project Description	Start Date	End Date	Awarded Amount
Contracts					
San Diego Community College District	Advanced Transportation and Logistics Initiative at San Diego Community College District	Expand college automotive programs to include alternative fuel and advanced vehicle technology training opportunities. Faculty training, curriculum development, and equipment purchases.	7/22/2019	9/30/2024	\$3,195,110
Cerritos Community College District	Electric School Bus Training	Develop and deliver electric school bus training for school district maintenance technicians and drivers, including curriculum development, training aids, and faculty development to deliver training through community colleges around the state.	6/12/2019	3/31/2026	\$2,004,393
California Conservation Corps	IDEAL Transportation Electrification Training Project	Train California Conservation Corp members on transportation electrification and electric vehicle charging infrastructure installation. Develop curriculum and provide training at Energy Corps locations in Fresno, Norwalk, and Sacramento.	8/10/2021	6/30/2025	\$1,000,000
IDEAL ZEV Workforce (GFO-21-602)					
Kern Community College District	South Valley ZEV Talent Pipeline Project	Develop EV charging curricula and training for the 21 st Energy Center. Courses include preparing electricians for Electric Vehicle Infrastructure Training Program (EVITP) certification. Address skills gap in EV charging installation, service, and replacement.	4/26/2022	5/31/2025	\$490,237
Fresno City College	ZEV Service Technician Educational Pathway	ZEV automotive training and internships at Clovis-, Central-, and Kerman High School.	5/11/2022	5/30/2025	\$500,000
Housing Authority of the County of San Joaquin	ZEV Training for San Joaquin County	Training for introductory ZEV careers and skills development.	5/11/2022	5/30/2025	\$500,000
County of Los Angeles	Los Angeles County Regional EVSE Workforce Training and Development Program	Municipal electricians training for EV charger installation, operation, and service, including Electric Vehicle Infrastructure Training Program (EVITP) training and certification.	5/11/2022	5/30/2025	\$499,530
California State University, Long Beach	ZEV Training Program for Communities and Businesses	ZEV engineering training program with academic and laboratory training. Provides tuition assistance and support.	5/11/2022	3/30/2026	\$499,908
Los Angeles Pierce College	ZEV Technology Training Program	Provides tuition assistance and support for the ZEV training program including automotive, electronics, and environmental.	5/11/2022	5/30/2025	\$500,000
Cal State LA University Auxiliary Services, Inc.	California ZEV Engineering Workforce Pilot	Hydrogen refueling station design, instruction, and hands-on training. Light-, medium-, and heavy-duty vehicle fuel cell technology training.	5/11/2022	5/30/2025	\$499,994
Green Paradigm Consulting, Inc.	Next Electric Vehicle Military Service Pilot Project	Training focused on California veterans, disabled veterans, and military personnel as qualified EV charging technicians.	5/11/2022	5/30/2025	\$250,000
West Oakland Job Resource Center	Greening the Transportation, Distribution, and Logistics Industry	Partnership with the Northern California Teamsters Apprenticeship Training Program. Provide high road training for ZEV technologies in the freight sector.	5/11/2022	5/30/2025	\$350,000
Municipal Equipment Maintenance Association, Inc.	Building a ZEV Workforce for Public and Private Fleets	Develop curricula and conduct technician training on ZEV and charging infrastructure for public and private fleets in and near the City of Long Beach in Los Angeles, California.	6/8/2022	5/30/2025	\$500,000
The Latino Equity Advocacy and Policy (LEAP) Institute	LEAP Statewide Training Online EV Training	Plan and conduct ZEV transit training workshops throughout California.	6/8/2022	5/30/2025	\$499,957
Sunline Transit Agency	West Coast Center of Excellence in Zero Emission Technology Training	Develop and conduct EV and electric vehicle supply equipment assessment, training, and outreach.	6/8/2022	5/30/2025	\$500,000
Zero-Emission Transportation Manufacturing (GFO-21-605)					

Funding Recipient	Project Name	Project Description	Start Date	End Date	Awarded Amount
American Lithium Energy Corporation	Scaling Manufacturing of High-Performance Battery Cells to Accelerate Zero-Emissions Transportation	Expand manufacturing capacity at existing facility to produce 1,500,000 units of high-performance battery cells per year. Hire a workforce to support production. Increase use of U.S. and California-based raw materials and equipment suppliers. Expand the existing workforce and provide training on standard operating procedures and equipment.	1/25/2023	2/14/2025	\$10,220,285
Wiggins Lift Co., Inc.	WE LIFT (Wiggins Electrified Long-term Investment in Forklift Technology)	Expand the current manufacturing facility to increase manufacturing output by two to five times the current production levels. Develop a workforce training program to attract and hire an additional 31-68 employees for manufacturing operations. Engage with regional and state workforce development organizations and educational institutions, such as the California Mobility Center and Ventura County Office of Education, to recruit and train workers to support increased demand for manufacturing, operating, and maintaining zero-emission forklifts and material handling equipment.	1/25/2023	3/31/2026	\$8,114,664
ChargePoint, Inc.	The ZEV Charging Manufacturing Project: Creating and Scaling Production Lines in California	Create a new manufacturing line for Level 2 chargers and establish an annual production capacity of at least 10,000 chargers. Scale manufacturing capacity for DC fast chargers to reach an annual production capacity of at least 10,000 dispensers. Create approximately 264 direct jobs and 1,293 indirect jobs in California. Enhance curriculum and improve student readiness for ZEV manufacturing by conducting an outreach, recruitment, and awareness campaign to local community colleges, high school vocational programs, and various community educational programs.	1/25/2023	3/31/2026	\$14,638,915
Aptera Motors Corp.	Aptera Solar Mobility Manufacturing Project	Scale up Aptera solar ZEV manufacturing annually by 2025. Establish manufacturing operations in Vista and Carlsbad, California. Relocate Aptera-Elaphe in-wheel motor manufacturing from Europe to California. Attract and employ a minimum of 5 percent of Aptera's workforce from disadvantaged communities, Tribes, and community colleges serving DACs, focusing on the DACs near Vista, CA. Train at least 444 Aptera factory workers for various Aptera manufacturing jobs.	2/15/2023	3/31/2026	\$21,911,630
Symbio North America Corporation	Symbio One -California Hydrogen Fuel Cell Manufacturing and Training Facility	Establish a hydrogen fuel cell vehicle power systems assembly facility to assemble regional long-haul heavy-duty fuel cell class 8 trucks and have an annual combined maximum production capacity to assemble 250 trucks and 250 to 300 fuel cell power system. Expand Symbio's direct labor workforce in accordance with planned production and develop a workforce development program and provide curriculum and training to students and maintenance personnel.	2/15/2023	3/31/2026	\$9,076,445
Cuberg Inc.	Make Oil History – High-Performance Battery Systems Manufacturing to Support Zero-Emission Transportation in California	Establish a lithium metal battery manufacturing facility. Create high-quality jobs for college and non-college graduates. Hire and train 300+ diverse workers, emphasizing job quality and continued development of an inclusion and diversity in hiring program.	3/6/2023	3/31/2026	\$11,207,887
Ample, Inc.	Expansion of Ample Battery Module Manufacturing	Expand the manufacturing production facility for battery-swap-related technology and modules. Enhance curriculum and improve student readiness for ZEV manufacturing by conducting an outreach, recruitment, and awareness campaign to local community colleges, local high school vocational programs, and various community educational programs.	5/10/2023	9/30/2025	\$14,738,978
Moxion Power Co	California ZEV Manufacturing Project: Scaling In-State Battery Production to Drive Mobile ZEV Charging	Expand battery module manufacturing operations in Richmond, CA. Establish a robust recruiting plan that engages with the City of Richmond and targets local job seekers from disadvantaged communities to recruit a talented, diverse workforce for the manufacturing facility.	6/16/2023	3/31/2026	\$14,999,997
BYD COACH & BUS LLC	BYD Battery Electric School Bus Manufacturing Facility	Construction of a manufacturing facility in Lancaster, CA to produce battery-electric powered school buses. At full capacity, the manufacturing facility will be capable of producing up to 4,000 battery-electric school buses annually. Recruit staff for the new manufacturing facility and train the employees for each department in the facility,	2/14/2024	12/31/2026	\$30,000,000
GILLIG LLC	Zero-Emission Bus Manufacturing Ramp-Up in the State of California	Expand electric bus manufacturing capacity at Livermore, CA facility. Establish workforce training programs and conduct public outreach on the benefits of alternative transportation fuels and vehicle technologies. Provide formal Assembler Workforce Training through the program being developed by GILLIG and Teamster Local 853's High Road Training Partnership (H RTP) project with the Workforce Development Board.	2/14/2024	12/31/2026	\$30,000,000
Sparkz, Inc.	Infrastructure Support for Battery Manufacturing Scale Up	Implement and validate a support system and equipment to establish a 420 MWh/year (1.2 million cells/year) manufacturing line that will allow efficiency in the production capacity scale-up while creating 900 direct jobs. Establish workforce training programs.	Agreement is being developed	N/A	\$12,500,000

Completed and Cancelled Projects (2015 and Newer)

Funding Recipient	Project Name	Project Description	Start Date	End Date	Amount Disbursed
Contracts					
California Community Colleges Chancellor's Office	ARFVTP Apprenticeship Training	Developed and funded advanced transportation workforce apprenticeship training. Supported participation of veterans and persons living in underserved and disadvantaged, to the extent possible.	8/13/2015	9/28/2018	\$250,000
California Workforce Investment Board	ARFVTP Apprenticeship Training	Developed and funded advanced transportation workforce apprenticeship training through the California Workforce Investment Board (contractor). Funding focused on the participation of veterans and persons living in underserved and disadvantaged communities, to the extent possible.	11/16/2015	9/28/2018	\$250,000
San Diego Community District	Advanced Transportation and Energy (ATTE) Center as San Diego Miramar College	Developed and funded advanced transportation workforce training through the California Community Colleges automotive technologies system. Published opportunities to fund alternative fuel and advanced vehicle technology proposals across the California Community College system. Focused on the participation of veterans and persons living in underserved and disadvantaged communities, to the extent possible.	3/17/2016	3/30/2018	\$2,000,000
California Employment Training Panel	Workforce Training and Development	Established pre-apprenticeship pipelines and journey-level upskilling programs in occupations in the freight industry to align regional, multi-modal freight transportation plans with regional workforce initiatives. Created a network of regional training partnerships driven by local industries and connected to coalitions of community, workforce, labor, and education partners to guarantee a supply of skilled labor to manufacture, build, operate, and maintain zero emissions freight infrastructure.	7/13/2016	3/31/2021	\$2,000,000
California State University, on behalf of CSU Long Beach	California Sustainable Freight Workforce Training	Established a robust, integrated system of pre-apprenticeship pipelines and journey-level upskilling programs in mission-critical occupations in the freight industry.	5/24/2017	6/30/2021	\$175,000
Advanced Transportation Technology and Energy (ATTE) Center at Cerritos College	ZEV High School Pilot Project	Developed a pilot training program for high school students to increase their awareness of careers in the field of clean transportation. Provided faculty training and funding for 50 high schools to purchase a Switch Lab Electric Vehicle Kit; one high school chose to utilize funding to purchase tools and supplies used to assemble a Shell Eco-marathon competition vehicle. An estimated 3,750 high school students participate in the funded programs each year.	11/27/2017	12/31/2023	\$3,500,000
IDEAL ZEV Workforce (GFO-21-602)					
Community Resource Project, Inc.	ZEV Sustainable Equitable Employment Destination	Provided classroom based hands-on training for ZEV manufacturing, maintenance, and servicing; charging installation, operation, and service; and ZEV driving and operation.	4/26/2022	3/31/2024	\$500,000
National Indian Justice Center, Inc.	Tribal ZEV Training Project	Tribal ZEV and ZEV infrastructure training. Partnership with 23 California Native American Tribes in Humboldt and San Diego Counties	5/11/2022	5/30/2025	\$211,644