



REPORT

Southern California's Zero-Emission Vehicle Workforce

Electric Vehicle & Electrical Vehicle
Supply Equipment (EV & EVSE)
Workforce Needs Assessment

March 2026

Southern California's Zero-Emission Vehicle Workforce Electric Vehicle & Electrical Vehicle Supply Equipment (EV & EVSE) Workforce Needs Assessment

**Report Prepared for the Los Angeles Cleantech Incubator
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Section 1: Executive Summary

Background and Purpose

California's policymakers have long understood that the transition to Zero Emission Vehicles (ZEVs) would require considerable workforce development and policy support. One of the earliest efforts began in 2007 with Assembly Bill 118, which established the Clean Transportation Program to fund innovation and accelerate the development and deployment of zero-emission transportation and fuel technologies. In 2023, the program was reauthorized through July 1, 2035, with a renewed emphasis on expanding ZEV infrastructure and strengthening the workforce needed to support it. To understand where targeted action can address ZEV workforce needs, the Los Angeles Center of Excellence for Labor Market Research (LA COE) a research study to develop a comprehensive picture of employment needs and training provision in five Southern California counties. An employer survey was conducted to gauge their workforce needs and hiring preferences. This report combines demand-side analysis with supply-side analysis to identify areas where actions and investments by workforce and educational stakeholders will have the greatest impact.

Demand-Side Findings

Substantial Workforce Growth Anticipated

74.4% of surveyed ZEV employers anticipate employees spending more time on ZEV activities in two years, and **84.2%** plan on employing more ZEV workers in three years. The ZEV economy could support **514,000 workers statewide by 2045**.

Weak Ties to Training Institutions

Most ZEV employers (**65.1%**) do not have ongoing relationships with training institutions. Only **31.1%** work directly with training institutions, most frequently citing insufficient hiring volume (**25.3%**) or uncertainty about program quality (**25.0%**).

Demand Outpacing Supply

A majority of surveyed employers noted difficulty hiring qualified talent and retaining trained workers, indicating high competition for experienced workers.

Critical Occupations Identified

Electrical Vehicle Supply Equipment (EVSE) Technicians, Automotive Service Technicians and Mechanics, and ZEV-savvy Managers are critical occupations. These roles were identified by employers as most critical and difficult to hire across all sectors.

Supply-Side Findings

Community College ZEV Programs

12 community colleges offer ZEV-relevant training programs in the 5-county region. Most programs are in Alternative Fuels and Advanced Transportation Technology (9) and Automotive Technology (5). An additional 12 colleges offer ZEV-relevant coursework within other programs.

Critical Gap in EVSE Technician Training

Only 1 community college program focuses on EV charging station installation/maintenance in Los Angeles County.

ZEV-Relevant Courses

67 ZEV-relevant courses exist in the study region. Most focus on hybrid and electric vehicle introduction, safety basics, and systems overview. Some colleges offer manufacturer-specific partnerships.

Integrated Gap Analysis

EVSE Technician Supply-Demand Mismatch

76.4% of surveyed installation firms report difficulty hiring EVSE Technicians, yet only one CCC program trains specifically for this role. The 9 Electrical programs represent an opportunity for expansion.

Training Pipeline Must Expand

With **514,000 projected ZEV jobs by 2045** according to a UCLA Luskin study and average annual community college awards totaling **521**, the training pipeline must expand to meet workforce needs.

Program Completions

Annual ZEV-relevant program completions total **257 awards** in Southern California — only **10%** of the 2,569 total awards in ZEV-relevant TOP codes.

Untapped Capacity in Electrical Programs

Nine community colleges offer Electrical programs (**347 annual awards**) that could expand to include EVITP certification preparation.

Geographic Concentration of Employers

51.4% of ZEV employers are in Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties, while ZEV-relevant programs are more evenly distributed statewide.

Recommendations

1

Develop Consistent ZEV Training Standards

California should lead the development of consistent, reputable ZEV training standards and certifications. Consistent academic standards would make trainees more competitive and allow employers to hire with confidence. Expand training that is Original Equipment Manufacturer (OEM)-approved and EVITP certification across more CCC programs.

2

Expand ZEV-Specific Curriculum

Community colleges should expand ZEV-specific curriculum within existing Automotive, Electrical, and Alternative Fuels programs. Priority actions: (1) Add EVITP preparation to all Electrical programs; (2) Expand EV charging station programs beyond Los Angeles County; (3) Integrate ZEV content into additional Automotive Technology programs.

3

Invest in Wraparound Services

Invest in wraparound services to improve accessibility for disadvantaged communities, formerly incarcerated individuals, people with disabilities, and older workers. Critical support services include language assistance, transportation, childcare, and affordable courses.

4

Strengthen Employer-CCC Partnerships

Strengthen employer-CCC partnerships through structured advisory boards, work-based learning, and equipment co-investment. Address the **25% of employers** who cite uncertainty about training quality by establishing industry-recognized credentials.

Section II: Background

2.1 Zero Emissions Vehicle (ZEV) Technician Jobs

The Los Angeles Cleantech Incubator (LACI) partnered with the Los Angeles Center of Excellence for Labor Market Research (LA COE), with funding from The Families & Workers Fund, to conduct a study assessing the labor market for Zero Emissions Vehicle (ZEV) technician jobs in Los Angeles, Ventura, San Bernardino, Riverside, and Orange Counties.

LACI's mission is to create an inclusive green economy, with the goal of expanding high-road clean energy jobs to make them accessible to all workers. The LA COE provides in-depth, objective labor market information and postsecondary data analysis that supports program development and partnerships that prepare community college students to enter a competitive and rapidly evolving workforce environment.

ZEV technicians focus on supporting electric and hybrid vehicles. According to the Occupational Information Network (O*NET), the country's primary source of occupational information, ZEV technicians are classified within four broader occupational categories related to electrical work and vehicle mechanics.

This report will focus on four occupation titles and their corresponding Standard Occupational Classification (SOC) codes listed in O*NET:

SOC 17-3023

Electrical and Electronic Engineering Technologists and Technicians

SOC 47-2111

Electricians

SOC 49-3023

Automotive Service Technicians and Mechanics

SOC 49-3031

Bus and Truck Mechanics and Diesel Engine Specialist

2.1.1. Target Occupation Descriptions

Electrical and Electronic Engineering Technologists and Technicians (SOC 17-3023)

According to O*NET, these workers "apply electrical and electronic theory and related knowledge, usually under the direction of engineering staff, to design, build, repair, adjust, and modify electrical components, circuitry, controls, and machinery." Sample job titles include: Communications Technologist, Electrical Engineering Technician, Electronics Technician, Engineering Technologist, System Technologist. Previous experience is usually required, such as three or four years of apprenticeship or several years of vocational training, as well as passing a licensing exam.

Automotive Service Technicians and Mechanics (SOC 49-3023)

According to O*NET, these workers "diagnose, adjust, repair, or overhaul automotive vehicles." Sample job titles include: Automotive Mechanic, Automotive Service Technician, Automotive Technician, Diagnostic Technician, Heavy Line Technician, Mechanic, Service Technician. The work can involve inspecting vehicles, test-driving vehicles and testing components and systems, and testing and adjusting repaired systems to meet manufacturers' performance specifications.

Electricians (SOC 47-2111)

According to O*NET, Electricians "install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service streetlights, intercom systems, or electrical control systems." Sample job titles include: Control Electrician, Electrical Journey Person, Industrial Electrician, Inside Wireman, Maintenance Electrician, Wireman. Previous experience is usually required, such as three or four years of apprenticeship or several years of vocational training, and passing a licensing exam.

Bus and Truck Mechanics and Diesel Engine Specialists (SOC 49-3031)

According to O*NET, these workers "diagnose, adjust, repair, or overhaul buses and trucks, or maintain and repair any type of diesel engines. Includes mechanics working primarily with automobile or marine diesel engines." Sample job titles include: Bus Mechanic, Diesel Mechanic, Diesel Technician, Fleet Mechanic, Heavy Truck Mechanic, Transit Mechanic, Truck Mechanic. Previous experience is usually required for these occupations, such as three or four years of apprenticeship or several years of vocational training, as well as passing a licensing exam.

2.2 Legislation and Regulations that Affect the ZEV Ecosystem

2.2.1 Federal

Federal funding cuts and efforts by the current administration to reverse or eliminate previous climate change and green initiatives have had an impact on California's focus on being a clean energy leader and the overall ZEV market.

The Environmental Protection Agency (EPA), the agency responsible for protecting human health and the environment, has undergone a major deregulation effort and restructuring to reverse previously established climate-focused regulations. **On Feb 12, 2026, the EPA repealed the scientific determination that gives the government the authority to combat climate change** by rejecting the scientific finding that greenhouse gases contribute to climate change, which endangers the environment and human life. This rejection officially ended the federal government's legal authority to regulate greenhouse gases. On March 19, 2026, 24 states, including California, sued the EPA to overturn its repeal of the scientific finding.

Federal funding cuts have also recently been implemented, affecting the ZEV market. On July 4, 2024, the **"One Big Beautiful Bill Act," or H.R.1**, was signed into law. It ended clean vehicle and clean commercial vehicle tax credits for new and used electric vehicles acquired after September 30, 2025. However, the **Alternative Fuel Vehicle Refueling Property Credit (IRC 30C)** and **Advanced Manufacturing Production Credit (IRC 45X)** remain in place. In addition, **the National Electric Vehicle Infrastructure (NEVI) Formula Program, a \$5 billion funded program (FY2022–2026), which has provided funding to states to expand the national network of electric vehicle charging stations, was paused on February 6, 2025**, by the Federal Highway Administration (FHWA). This caused construction delays at over 900 awarded sites. In response, 17 states, including California, filed lawsuits challenging the freeze as unlawful. The funding freeze was overturned by a Federal judge in January 2026; however, the future of the program remains uncertain. In addition, on March 12, 2026, the current administration sued California over the emissions standards and ZEV mandates established by the California Air Resources Board (CARB), arguing that the state's regulations would illegally force a transition to electric vehicles.

2.2.2 California State Regulations and Programs

Despite federal cuts, some state legislators are trying to maintain the state's standing as a clean energy leader through a large number of state regulations, initiatives, and programs to achieve its clean energy goals. California has long been committed to advancing clean transportation and clean energy goals. A central policy mechanism is the Zero-Emission Vehicle (ZEV) Regulation, adopted and administered by the CARB, which requires automakers to deliver an increasing number of zero-emission vehicles (e.g., battery-electric and fuel-cell electric vehicles) to the California market. First adopted in 1990, the ZEV Regulation has been updated repeatedly to strengthen the state's vehicle emissions standards.

In June 2025, Governor Newsom signed **Executive Order N-27-25**, which reaffirms and reinforces California's commitment to advancing zero-emission transportation by directing state agencies, including CARB, to develop next-generation strategies to accelerate ZEV adoption, expand charging infrastructure, and support consumer and fleet transitions. This order builds on earlier commitments, including Executive Order N-79-20, which established the goal of achieving 100% new zero-emission passenger vehicle sales by 2035 and broader transition goals for medium- and heavy-duty vehicles by 2045, where feasible.

To implement these goals, CARB has adopted and strengthened a suite of complementary regulations, including **Advanced Clean Cars and Advanced Clean Cars II (light-duty vehicles)**, **Advanced Clean Trucks (medium- and heavy-duty vehicles)**, **Innovative Clean Transit (public transit buses)**, **Advanced Clean Fleets**, and the long-running ZEV Regulation. Collectively, these rules assign responsibilities to manufacturers, public agencies, and large vehicle operators to support the statewide transition to zero-emission transportation.

Under Advanced Clean Trucks, CARB requires manufacturers to meet zero-emission sales targets for medium- and heavy-duty vehicles, while separately requiring large fleets to report vehicle and operational data to support regulatory planning and implementation. The Innovative Clean Transit regulation requires public transit agencies to transition gradually to zero-emission buses, beginning with 100% zero-emission bus purchases in 2029 and aiming for full fleet transition by 2040. In addition, through the Clean Miles Standard, CARB requires ride-hailing companies (e.g., Uber and Lyft) to reduce greenhouse gas emissions per passenger mile and increase the share of miles traveled using zero-emission vehicles.

These regulations have had significant influence in Southern California, which holds the state's largest population and hosts large public and private fleets subject to these rules. Several initiatives and programs have been implemented in Southern California under these statewide regulations, including the South Coast Air Quality Management District (SCAQMD), Ventura County Air Pollution Control District (VCAPCD), and Southern California Association of Governments (SCAG).

In particular, SCAQMD and VCAPCD implement county-level rules that support the statewide ZEV and air quality goals. In the South Coast Basin, covering Los Angeles, San Bernardino, Riverside, and Orange Counties, SCAQMD provides a comprehensive set of rules, including several mobile-related rules that target emissions from vehicles. For example, [Rule 1610, Old-Vehicle Scrapping](#) is a voluntary program that encourages vehicle owners to retire older, higher-emitting vehicles. Similarly, VCAPCD implements Rules 220 and 221, which ensure transportation plans conform to federal and state air quality standards and link transportation funding to emissions-reduction goals, including zero-emission vehicle targets. Under [Rule 211](#), employers with 100 or more employees report employee commute surveys, enabling the county to operate the Transportation Outreach Program.

Building on these rules, both SCAQMD and VCAPCD administer programs that directly support ZEV adoption. In the four-county South Coast Basin, SCAQMD offers multiple programs for businesses, communities, and local governments, including voucher incentive programs, residential EV charging incentives, and the INVEST CLEAN goods movement project. The Voucher Incentive Program aims to reduce emissions from in-use heavy-duty trucks in small fleets by replacing older, polluting vehicles with newer ZEVs, targeting companies that own fleets of 10 or fewer vehicles. Similarly, the Lower-Emission School Bus Program provides funding for replacing high-emitting public school buses with zero-emission buses. The residential EV charging incentives reduce the cost of installing home chargers for electric vehicles, and the INVEST CLEAN project supports zero-emission trucks and equipment used in freight and goods transportation. In line with these efforts, the Replace Your Ride Program, part of the statewide Clean Cars for All (CC4A) initiative, provides rebates of up to \$12,000 for low-income residents to replace older, polluting vehicles with newer ZEVs.

Similarly, Ventura County offers an Old Car Buy Back Program through VCAPCD, supporting residents in dismantling old, polluting vehicles. Ventura County residents can also participate in the statewide Driving Clean Assistance Program (DCAP), which provides incentives for low- and moderate-income residents to purchase or lease clean vehicles.

In addition to regulatory requirements and incentive programs administered by local agencies, the Southern California Association of Governments (SCAG), which covers six counties — Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Imperial — plays a legally mandated role in implementing state and federal air quality and climate policies. As the federally designated Metropolitan Planning Organization (MPO) for Southern California, SCAG is required under the Clean Air Act and California Senate Bill 375 to prepare a Regional Transportation Plan and Sustainable Communities Strategy that demonstrates how the region will meet federal air quality standards and align with state greenhouse gas reduction targets.

As part of this work, SCAG has hosted the federally designated Southern California Clean Cities Coalition since 2010, supporting the promotion of alternative fuels, advanced vehicle technologies, and ZEV adoption across the region. In 2023, SCAG's Regional Council adopted the Clean Transportation Technology Policy (Resolution No. 23-654-5), a non-regulatory planning framework that defines clean and near-zero emission transportation technologies and guides the integration of electric vehicle strategies into regional transportation planning and coordination efforts.

Through this policy framework, SCAG develops and disseminates technical data, analytical tools, and planning resources to support ZEV implementation, including the Southern California Plug-In Electric Vehicle Atlas, the Southern California Electric Vehicle Charging Station Study, and the Electric Vehicle Infrastructure Readiness Initiative. The Clean Transportation Technology Policy provided a structured foundation for the development of the Clean Technology Compendium, which synthesizes information on clean transportation technologies and infrastructure options. Similarly, the Electric Vehicle Charging Station Study identifies priority locations and policy tools to facilitate EV charger deployment, while the Electric Vehicle Infrastructure Readiness Initiative offers best practices for permitting, planning, and infrastructure deployment to support regional electrification efforts.

In addition to regional planning and coordination efforts, SCAG also administers federal transportation funds through the Carbon Reduction Program (CRP), which allocates funding for projects that decrease transportation carbon emissions, including ZEVs and charging infrastructure. CRP funding in the SCAG area has been allocated to a range of ZEV and infrastructure projects, including EV charging station installations in Imperial County, large-scale bus charging infrastructure for Los Angeles Metro, the electrification of shuttle services, and portable charging equipment for electric buses in Ventura County.

Overall, regional rules, planning frameworks, and incentive programs in Los Angeles, Orange, Riverside, San Bernadino, and Ventura counties demonstrate how Southern California's efforts to advance zero-emission vehicles are closely aligned with state and federal goals, supporting the transition to cleaner transportation across local communities, public fleets, and private operators.

2.3 Clean Energy and Transportation Ecosystems in Five-County Southern California Region



2.3.1 Los Angeles County

Los Angeles County has some of the most ambitious clean transportation goals in the country. Major players include the Los Angeles Department of Water and Power (LADWP), the nation's largest municipal utility, and Southern California Edison. LADWP has an ambitious goal of 100% clean electricity for the city of Los Angeles by 2035. The Transportation Electrification Partnership (TEP), convened by LACI, has set targets including deploying 129,000 public and workplace EV chargers in Los Angeles County by 2028. Los Angeles Metropolitan County Transportation Authority (L.A. Metro) has committed to a 100% zero-emission bus fleet by 2035 and LAUSD has committed to a 100% electric school bus fleet by 2035. The ports of Los Angeles and Long Beach have adopted Clean Air Action Plans that will require all new trucks servicing the ports to be zero-emission by 2035.

2.3.2 Orange County

Orange County has established clean transportation goals and is expanding workforce training programs, and developing new apprenticeship programs in emerging green industries, including ZEV vehicles. The Orange County Power Authority (OCPA) has committed to a 100% zero-emission bus fleet by 2040 and provides the option for 100% renewable electricity. The University of California, Irvine (UCI) is the first U.S. university to transition its entire bus fleet to electric buses. As part of its OC Fleet Services program, the county will also gradually replace its government vehicles with EVs and add charging at public facilities.

2.3.3 Riverside County

Riverside County also has clean transportation initiatives to grow its ecosystem. For example, the Riverside Transit Agency (RTA) is planning for a full electric fleet conversion by 2040. SunLine Transit Agency, which operates one of the largest hydrogen bus fleets in the country, will also convert its entire fleet to zero-emission by 2040.

2.3.4 San Bernardino County

San Bernardino County has also been expanding their clean transportation. Omnitrans serves the San Bernardino Valley metro area and has deployed its first electric buses with a goal for a fully electric fleet by 2040. Victor Valley Transit has added battery electric buses. Heavy-duty trucking electrification is also a top priority, given the county's role as a freight hub. South Coast AQMD's Clean Truck programs have funded demonstration electric big-rigs and installation of charging stations at logistics facilities. Ontario International Airport has also initiated a clean fleet plan to convert its shuttle buses and support vehicles to electric.

2.3.5 Ventura County

Transportation initiatives in Ventura County are focused on reducing emissions from both daily commuting and goods movement. Ventura County Transportation Commission (VCTC) and local transit operators (like Gold Coast Transit District in West Ventura) are phasing in zero-emission buses. Gold Coast Transit has deployed its first battery-electric buses on local routes in Ventura and Oxnard, aiming for a full zero-emission bus fleet by the mandated 2040 deadline. The county is also improving intercity transit. A new commuter rail extension (Metrolink) and enhanced bus rapid transit are being planned, with plans to use low- or zero-emission trains and buses.

2.4 Role of ZEV Technicians in Southern California's Clean Energy and Transportation Ecosystem



In support of California's role as a leader in clean energy with the ambitious goal of significantly increasing electric vehicles in the state, the infrastructure to support more ZEV vehicles is underway. California estimates it will need **1.2 million EV chargers by 2030**. Major employers and projects in Southern California are planning to hire ZEV technicians, including transit agencies that have committed to the expansion of their electric fleets: the Los Angeles Metro, the Los Angeles Department of Transportation, Foothill Transit, Orange County Transportation Authority, Omnitrans Public Transit Agency (San Bernardino), and school districts. Private employers include EV charging network providers such as EVgo and Electrify America.

New infrastructure projects across Southern California are also hiring field service technicians, such as TeraWatt Infrastructure, which develops and operates charging centers for medium- and heavy-duty electric fleets. Utility-led deployments, such as charging depots for electric buses or public fast-charge corridors, are also creating long-term technician jobs for ongoing operations and maintenance. Other major employers include ZEV manufacturers and automakers, like Tesla, Rivian, and Lucid, as well as service centers. Private companies are investing in electric logistic fleets, such as Amazon, UPS, and FedEx.

Clean freight initiatives at the ports and in trucking corridors are also in need of skilled technicians. For example, the Port of Los Angeles - APM Terminals is deploying 20 Orange EV all-electric yard tractors in 2025 and established a training program with the ILWU union to up-skill diesel mechanics on EV systems. In the Inland Empire, warehouse operations are also adding electric yard tractors and forklifts. Clean energy initiatives and solar and battery storage projects at transit depots, bus yards, and commercial buildings often include EV charging integration, adding to the need for ZEV technicians.

2.5 Good Jobs Principles

The Good Jobs Principles were jointly developed by the U.S. Departments of Labor (DOL) and Commerce in 2022 and established as a shared federal framework for defining high-quality employment. The principles articulate eight core elements of a good job, including **equitable recruitment and hiring, particularly for individuals from underserved communities, family-sustaining wages and benefits that promote economic security and mobility, and fair and equitable compensation**. In September 2024, the Biden administration issued a Good Jobs Executive Order (EO 14126), which sought to operationalize this framework by directing federal agencies to prioritize high-quality employment and equitable workforce practices in the allocation of federal grants and contracts.

The Good Jobs Principles were operationalized through the Good Jobs Initiative, which was designed to provide practical guidance to workforce agencies, training providers, and employers when designing workforce programs, forming employer partnerships, and allocating public funding. As part of this effort, the U.S. Department of Labor issued Training and Employment Guidance Letter (TEGL) No. 07-22, which encouraged state and local workforce boards to integrate the Good Jobs Principles into Workforce Innovation and Opportunity Act (WIOA) strategies and workforce training systems.

The Department of Labor also partnered with Jobs for the Future (JFF) to support workforce teams to build strategies for improving job quality based on the principles. In addition, the U.S. Economic Development Administration (EDA) launched the Good Jobs Challenge, a competitive grant program aligned with the principles that support regional workforce training systems to provide equitable training opportunities and place workers into high-quality jobs in emerging and high-growth sectors, including clean energy and zero-emission transportation. However, the executive order that had anchored the Good Jobs Principles in federal funding and labor standards was rescinded under the current Trump administration in March 2025. As a result, federal agencies are no longer directed to prioritize the Good Jobs Principles when making grant and contract decisions.

Although the principles and certain guidance documents, such as TEGL 07-22, remain in effect, the broader, federally coordinated efforts associated with the Good Jobs Initiative are no longer actively promoted or implemented across federal workforce and economic development systems. For example, the EDA did not continue the Good Jobs Challenge beyond the 2024 funding competition. These policy changes reflect a reduced federal emphasis on job quality frameworks in current workforce development policy, despite the continued relevance of the principles for evaluating high-quality employment.

Despite shifts at the federal level, the California Workforce Development Board (CWDB) continues to advance workforce development strategies centered on job quality, worker voice, and equity principles that align closely with the federal Good Jobs Principles. In particular, CWDB's High Road Training Partnership (HRTTP) framework aims to increase access to good jobs, create clear career pathways, and center worker voice across high-growth industries. Job quality is a central component of California's strategic workforce development vision.

In line with these statewide efforts, counties in Southern California implement HRTTPs and related workforce initiatives to connect job seekers with training opportunities in high-quality occupations. In addition, Local Workforce Development Boards (LWDBs) operate under California's WIOA system and develop local workforce plans and employer partnerships that incorporate job quality strategies consistent with both TEGL 07-22 and the state's HRTTP framework.

For instance, Los Angeles County supports innovative and high-quality workforce training programs and prioritizes technology for training partnership. Imperial County emphasizes two core job quality indicators, including family-sustaining, high-road jobs and equity in access and outcomes, in its Southern Border Regional Plan. Orange County incorporates the concept of job quality into WIOA-funded programs, including veteran training initiatives and youth programs, to support long-term career pathways for job seekers.

One of the aims of this study was to collect data on how regional employers are integrating the eight core elements of the Good Jobs Principles. Beyond the major finding that **84.2% of employers reported that they intend to hire additional ZEV workers over the next three years**, obtaining more granular data related to these principles was not possible.

Section III: Employer Needs Analysis – Demand-Side

This section presents a demand-side analysis of employer workforce needs within the ZEV ecosystem, with a particular focus on EV & EVSE-related occupations. To assess current and emerging labor demand, the analysis integrates traditional LMI data with primary data collected through a ZEV employer survey. The employer survey was administered to ZEV-related firms across five counties in the Southern California region: Los Angeles, Orange, Riverside, San Bernardino, and Ventura.

Although the project focused primarily on EVSE employers, the survey was intentionally designed to capture ZEV firms more broadly. ZEV-related firms span a wide range of activities, including battery manufacturing, ZEV fleet operations and maintenance, hydrogen fuel cell technologies and infrastructure, and charging equipment installation and services, not solely EVSE-focused businesses. Examining EVSE-related firms within this broader ZEV ecosystem allows for a more comprehensive understanding of how EV and EVSE are situated across interconnected sectors, particularly manufacturing, installation, and operations, that collectively support ZEV deployment and scaling.

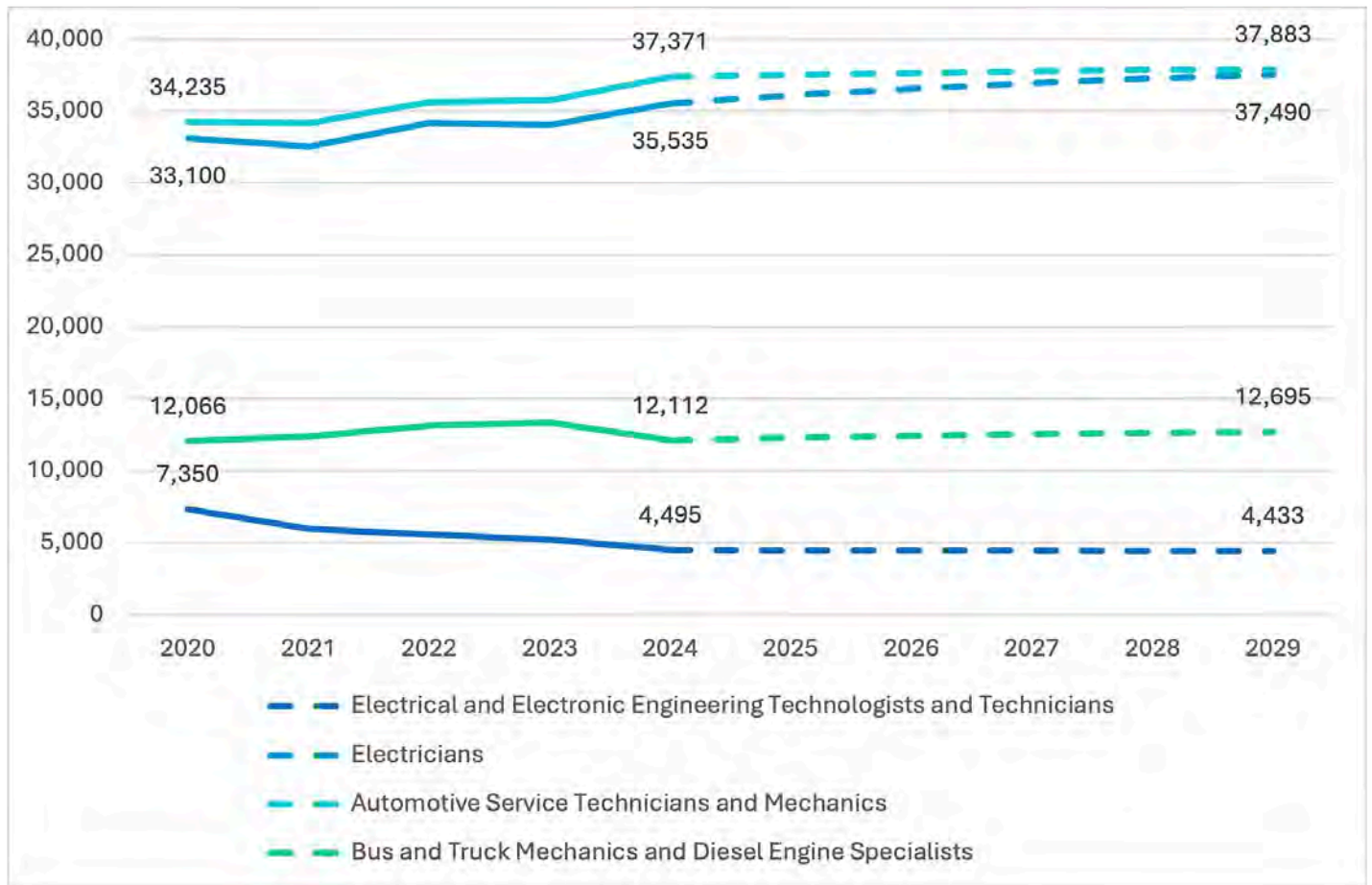
3.1 Methodology

Two methods were employed to assess employer workforce needs. First, traditional LMI data were analyzed from Lightcast for four EV- and EVSE-specific occupations to examine job demand and wages. Second, an online employer survey was conducted to capture current employer needs. The survey was fielded from October 2, 2025 to November 26, 2025, yielding **958 completed responses statewide**, of which **443 responses were from employers located in the five-county region**. The average survey duration was 20 minutes, and the maximum overall margin of error was ± 3.35 percentage points at the 95% confidence level. Survey quotas were established to ensure that respondent firm size, industry, and geographic distribution aligned with the characteristics of firms operating in ZEV-relevant sectors.

3.2 Historical & Projected Demand

Overall, historical employment for the four target occupations have increased across the five-county region by **3% over the past five years from 2020 to 2024**, adding nearly 3,000 new jobs. The majority of this growth has come from demand for Automotive Service Technicians and Mechanics, adding over 3,100 new jobs, and Electricians, adding over 2,400 jobs during this timeframe. The only occupation with decreased employment levels during this time was Electrical and Electronic Engineering Technologists and Technicians, which is due to nearly half of this occupation's prevalence in manufacturing industries, which have undergone employment declines from advancement in robotics and overall efficiency improvements, leading to decreased overall employment over the last several decades. Looking ahead to 2029, these occupations are projected to grow modestly at a **3% rate**, adding nearly 3,000 jobs during this time.

Exhibit 1. Historical and projected employment for four target occupations, five-county region, 2020-2029



Data Source: Lightcast, 2024.4 QCEW, non-QCEW, and Self-Employed

3.3 Current Job Demand and Wages

Combined, the four target occupations accounted for nearly **90,000 jobs in 2024** across the five-county region, with Automotive Service Technicians and Mechanics and Electricians accounting for over 80% of these jobs in 2024. Each year through 2029, more than **8,400 job openings** are projected to be available due to new job growth and replacement needs for the four occupations. Average annual earnings range from \$58,600 to \$87,000, all above the self-sufficiency standard wage for a single adult with no children average across the five-county region of \$49,222.

Exhibit 2. Detailed jobs, job growth, average annual openings, and average annual earnings for ZEV-related occupations, five-county region, 2024-2029

SOC	Description	2024 Jobs	Avg. Annual Openings	Avg. Annual Earnings
17-3023	Electrical and Electronic Engineering Technologists and Technicians	4,495	414	\$87,000
47-2111	Electricians	35,535	3,569	\$79,600
49-3023	Automotive Service Technicians and Mechanics	37,371	3,291	\$58,600
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	12,112	1,131	\$68,400
Total/Avg.	All Four Occupations	89,512	8,404	\$73,400

Data Source: Lightcast, 2024.4 QCEW, non-QCEW, and Self-Employed

Three of the four occupations have entry-level hourly wages (25th percentile) above the self-sufficiency standard wage for one adult (\$23.30/hour on average across the five-county region). Typical entry-level hourly wages are in a range between \$18.81 and \$30.16, with **Electrical and Electronic Engineering Technologists and Technicians** earning the highest wages and **Automotive Service Technicians and Mechanics** earning the lowest wages in the group.

Exhibit 3. Average entry-level hourly wages for ZEV-related occupations, five-county region, 2024



Data Source: Lightcast, 2024 QCEW, non-QCEW, and Self-Employed

To determine if the four target occupations pay wages that can cover a worker's basic needs and since wages can vary substantially by geography, the research team conducted an analysis of self-sufficiency standard hourly and annual wages by county and for the five-county region. Orange County has the highest hourly and annual wage requirements for a single adult with no children, **\$27.13/hour and \$57,294 annually**. San Bernardino County has the lowest, **\$20.07/hour and \$42,392 annually**.

Exhibit 4. Average self-sufficiency standard hourly and annual wages for a single adult with no children, five-county region

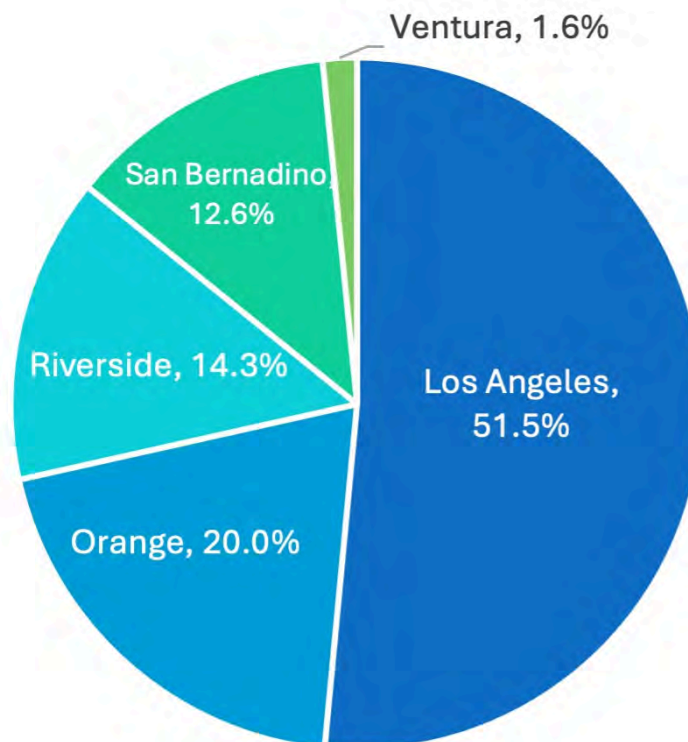
County	Hourly	Annual
Los Angeles	\$24.03	\$50,758
Orange	\$27.13	\$57,294
Riverside	\$20.76	\$43,855
San Bernardino	\$20.07	\$42,392
Ventura	\$24.53	\$51,812
Average	\$23.30	\$49,222

Data Source: The Self-Sufficiency Standard for California. Center for Women's Welfare, University of Washington. 2024.

3.4 Characteristics of ZEV Firms

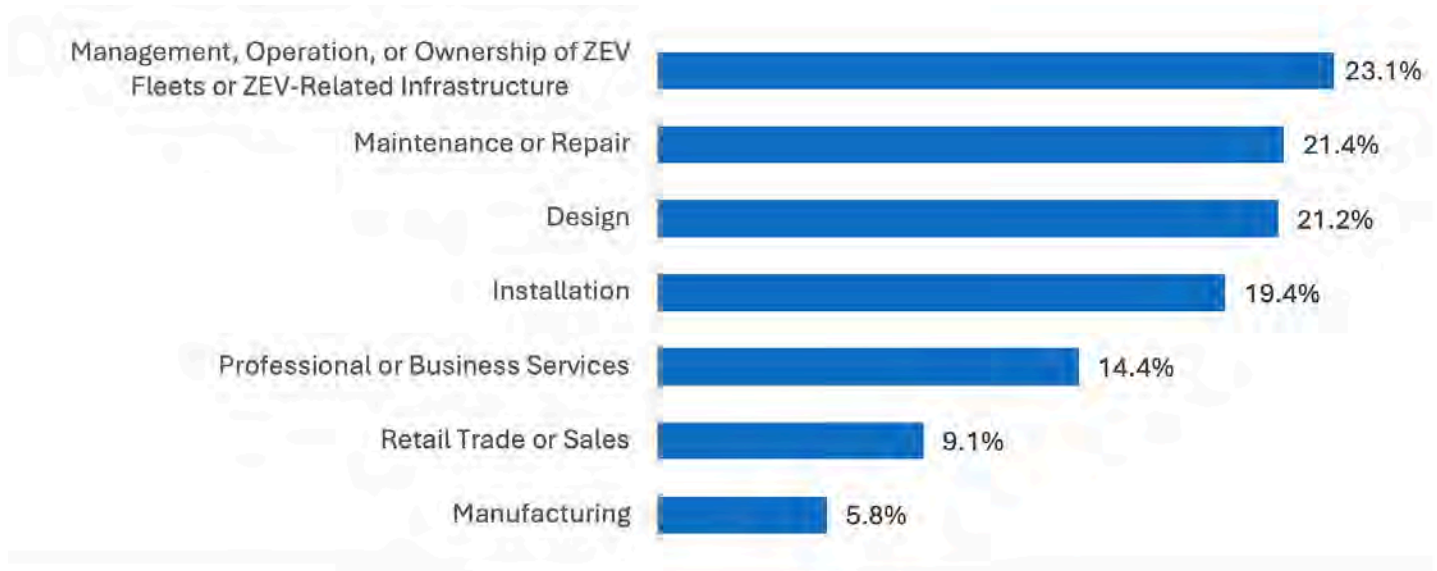
An employer survey was conducted to gauge employer workforce needs and training preferences in the five counties in Southern California. A total of 535 ZEV-related firms participated in the survey. After excluding firms that did not report location information or were not registered within the five-county region, the final sample consisted of **443 firms**. Firms located in Los Angeles County comprised the largest share of respondents (**51.5%**), followed by Orange County (**20.0%**), Riverside County (**14.3%**), and San Bernardino County (**12.6%**). Ventura County accounted for a small proportion of surveyed firms (**1.6%**).

Exhibit 5. Locations of surveyed ZEV firms in the five-county region (n=443)



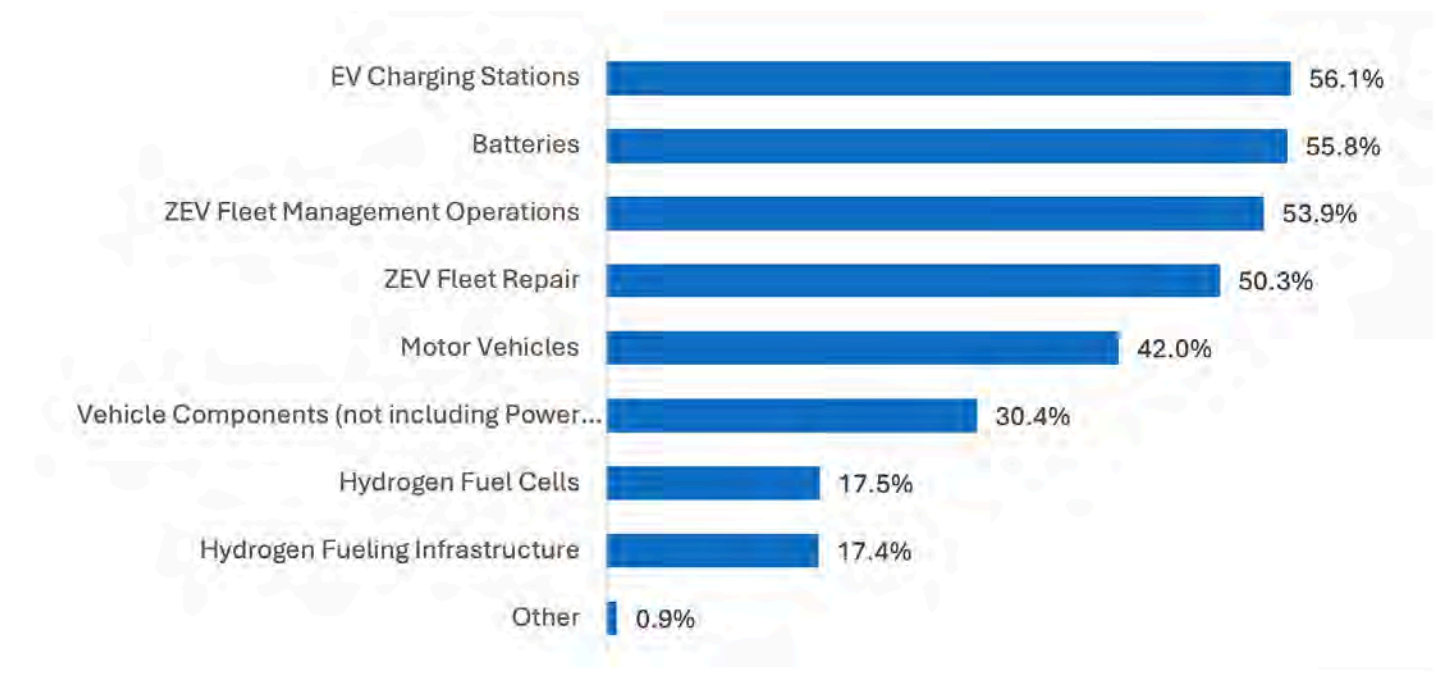
Approximately one in four ZEV firms (**23.1%**) reported that their primary industry involves the management, operation, or ownership of ZEV fleets or ZEV-related infrastructure. This was followed closely by firms specializing in maintenance or repair (**21.4%**), design services (**21.2%**), and installation services (**19.4%**). Retail trade or sales accounted for a smaller share of firms (**9.2%**), while manufacturing represented the smallest proportion of the sample (**5.8%**) (Exhibit 6).

Exhibit 6. Primary industries of ZEV firms in the five counties (n=443)



More than half of the firms surveyed indicated they offer multiple EV-related products or services. Specifically, **56.1%** reported offering EV charging stations, **55.8%** reported battery-related products or services, **53.9%** reported EV fleet management operations, and **50.3%** reported EV fleet repair services. These findings suggest that many ZEV-related firms operate across multiple segments of the EV ecosystem. In contrast, fewer than one in five firms reported offering hydrogen fuel cell-related products (**17.5%**) or hydrogen fueling infrastructure-related services (**17.4%**) (Exhibit 7).

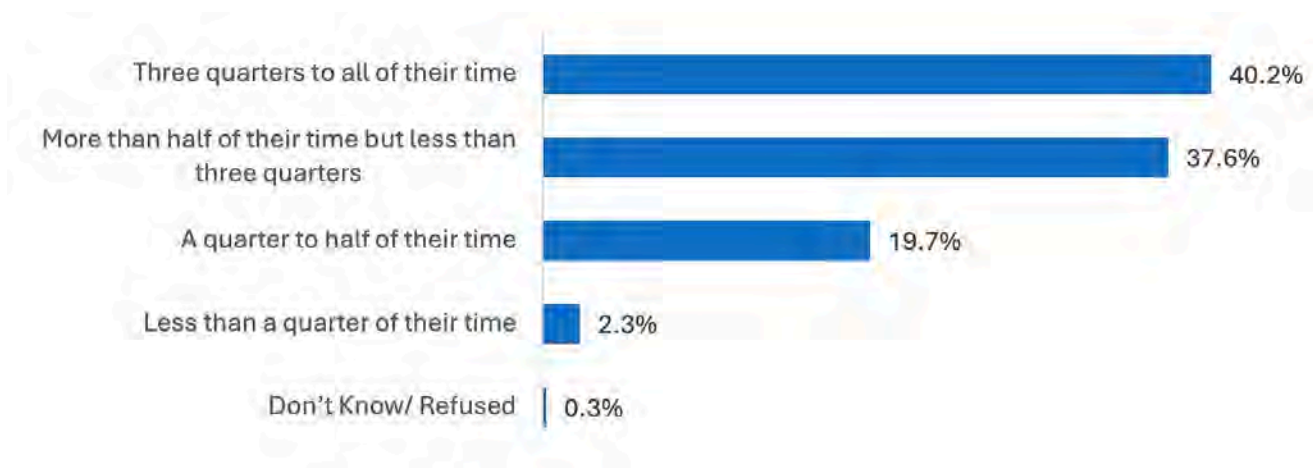
Exhibit 7. Product lines or services offered by ZEV firms in the five counties – Multiple responses permitted; Percentages may sum to more than 100%. (n=442)



3.5 ZEV Employment Composition and Anticipated Growth

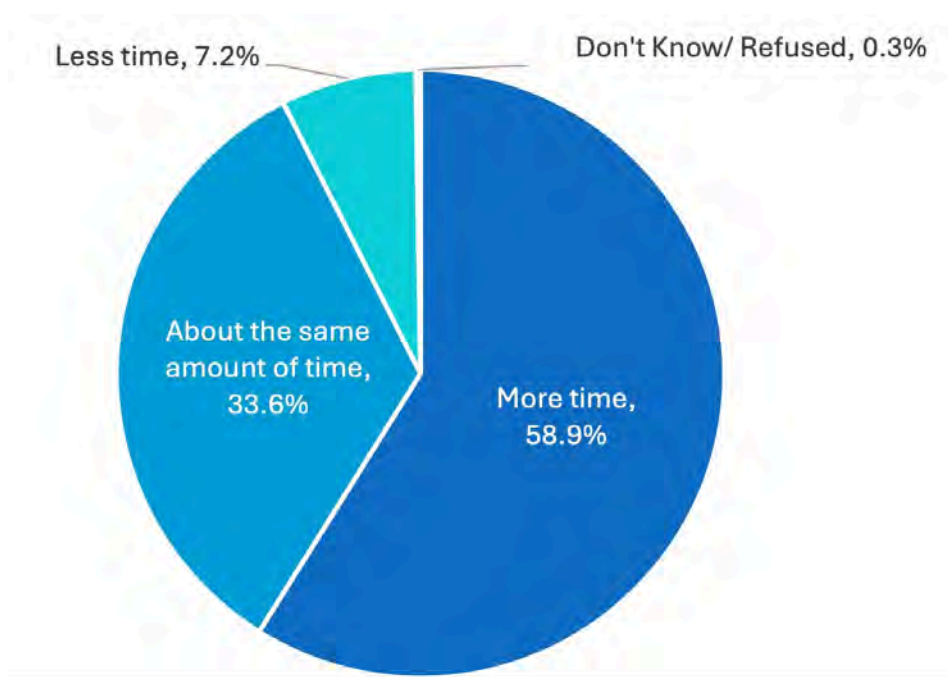
Surveyed ZEV-related firms reported employing a median of 40 permanent workers, with an average of 212 employees per firm. Of these employees, approximately one-third (**35.7%**) were directly involved in ZEV-related work activities. Nearly three-quarters (**77.8%**) of employers reported that their employees currently spend more than half of their work time on ZEV-related activities. In contrast, only **2.3%** of firms surveyed indicated that their employees spend less than one-quarter of their time on ZEV-related work (Exhibit 8).

Exhibit 8. Percentage of employees' time currently spent on ZEV-related work activities (n=439)



Surveyed employers also reported an increasing share of employee time devoted to ZEV-related work, and most anticipate this trend will continue. More than half (**58.9%**) of the firms indicated that their employees are currently spending more time on ZEV-related work compared to one year ago, while approximately one-third (**33.6%**) reported that employees are spending about the same amount of time (Exhibit 9).

Exhibit 9. Percentage of ZEV firms with employees spending more, less, or about the same amount of time on ZEV-related work activities compared to 12 months ago (n=439)



Looking ahead, nearly three in four firms (**74.4%**) expect their employees to spend more time on ZEV-related work activities over the next two years, while only **4.0%** expect employees to spend less time (Exhibit 10).

Exhibit 10. Percentage of ZEV firms that expect their ZEV employees to be spending more, less, or about the same amount of time on ZEV-related work activities in the next 24 months (n=439)

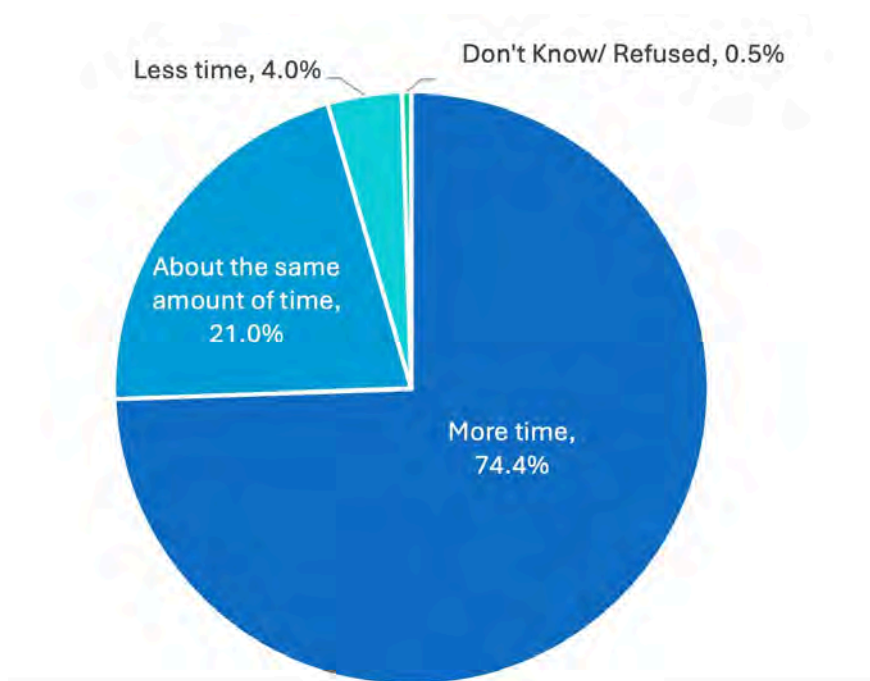
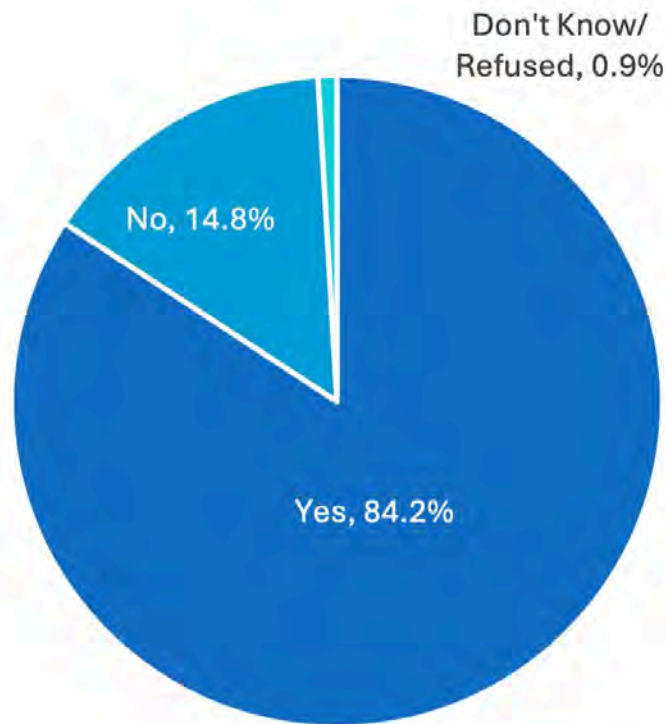
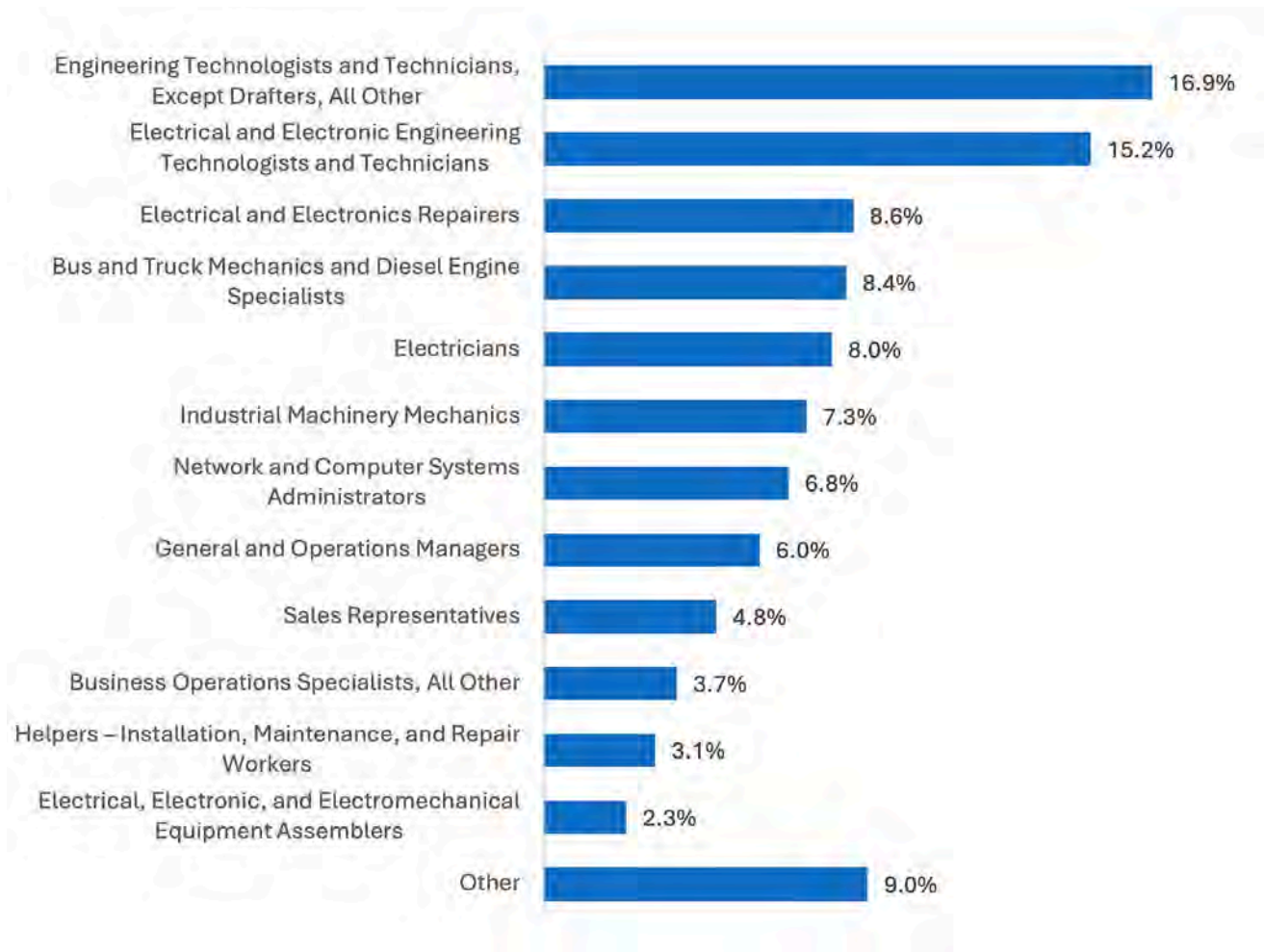


Exhibit 11. Percentage of ZEV employers who plan on employing more ZEV-related workers in the next three years (n=439)



Among employers planning to hire more ZEV-related workers, the occupations most frequently cited include Engineering Technologists and Technicians (**16.9%**), Electrical and Electronic Engineering Technologists and Technicians (**15.2%**), and Electrical and Electronics Repairers (**8.6%**) (i.e., EVSE technicians). These results suggest anticipated demand for technical occupations supporting installation, manufacturing, and maintenance or repair activities within ZEV-related firms. Bus and Truck Mechanics and Diesel Engine Specialists (**8.4%**), Electricians (**8.0%**), and Industrial Machinery Mechanics (**7.3%**) were also commonly reported occupations expected to be hired in the next three years. In addition, respondents provided several write-in responses that did not correspond directly to the listed occupations, including roles such as R&D scientists, safety and quality assurance specialists, and hydrogen and fuel cell specialists.

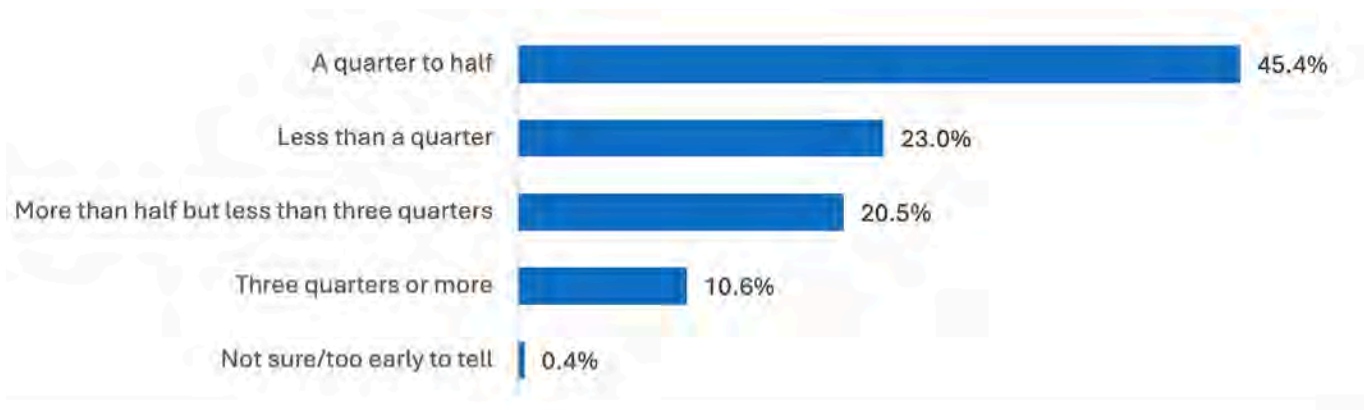
Exhibit 12. Percentage of ZEV-related occupations ZEV firms expect to hire in the next 24-36 months (n=370)



3.6 Workforce Transition Opportunities

More than half of surveyed employers (**58.4%**) reported that their workforce includes employees who will need to be retrained or reskilled to perform ZEV-related work. Among employers reporting retraining needs, **31.1%** indicated that more than half of their workforce will require retraining or reskilling, while **68.4%** reported that fewer than half of their workers will need such training. These findings suggest that the transition to ZEV-related activities will rely heavily on reskilling and upskilling existing workers rather than solely on new hires.

Exhibit 13. Share of current workforce that will need to be retrained or reskilled to work on ZEVs (n=246)



Employers identified a range of technical training needs to support the reskilling of existing workers. The most commonly cited areas include high-voltage and electrical safety (**74.6%**), battery technologies (**56.1%**), and ZEV drivetrain diagnostics and repair (**45.7%**) (Exhibit 14). Employers reported a similar set of skill requirements for new ZEV-related hires, most frequently citing battery systems and management (**18.5%**), high-voltage and electrical safety (**16.5%**), and charging infrastructure-related skills (**13.4%**).

Exhibit 14. Percentage of ZEV-related retraining or reskilling needed for ZEV-related work at surveyed firms (n=246)



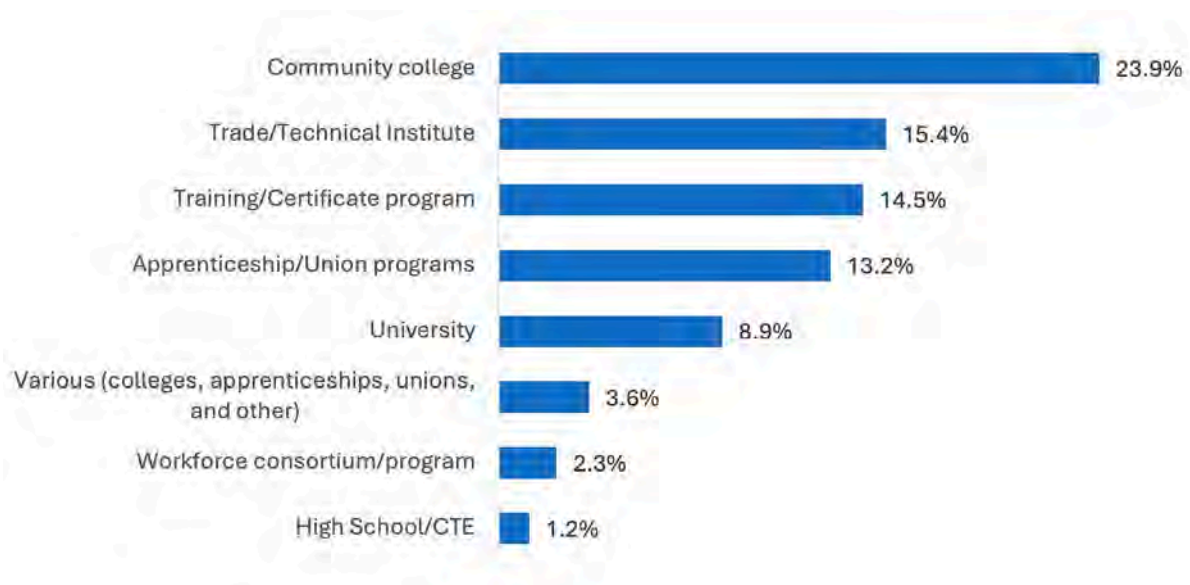
Note: Multiple responses permitted; Percentages may sum to more than 100%.

With respect to ZEV workforce recruitment, most employers reported limited engagement with formal education and training institutions. Only about one-third of surveyed firms (**31.1%**) indicated that they recruit directly from community colleges, vocational or technical schools, apprenticeship programs, or other training providers, while the majority (**65.1%**) reported no direct engagement with education-to-employment recruitment pathways.

Among employers that work with training and education providers, fewer than one in four (**23.9%**) indicated partnerships with community colleges. Other cited partners include trade and technical institutes (**15.4%**), training and certificate programs (**14.5%**), and apprenticeship or union programs (**13.2%**) (Exhibit 15).

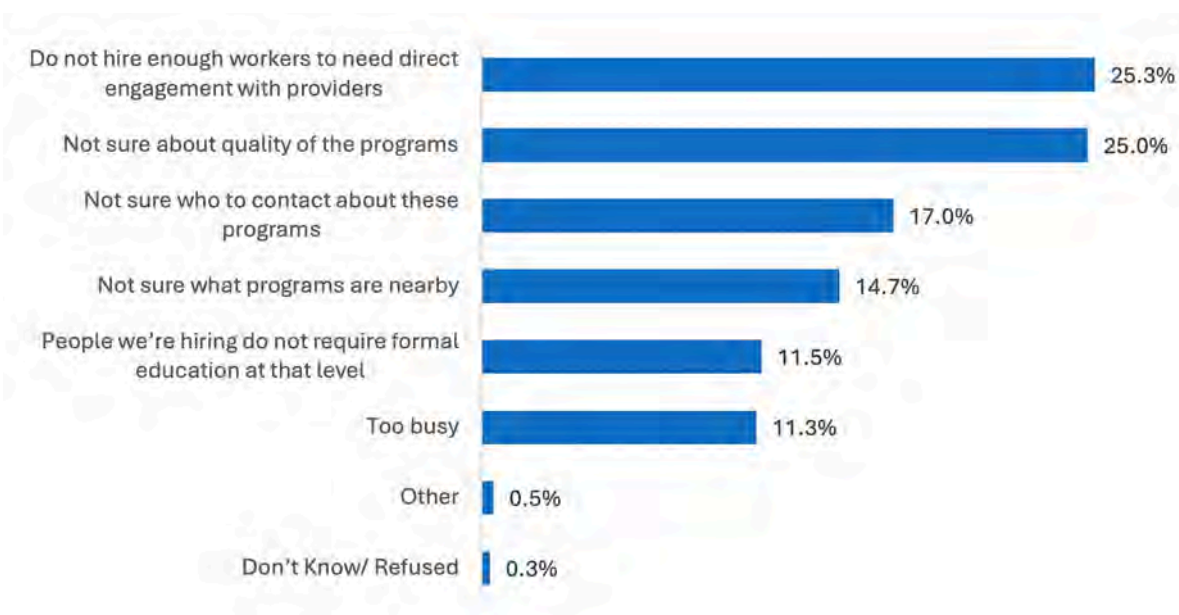
In addition to the listed options, several respondents provided write-in responses describing alternative approaches to ZEV worker recruitment. Some employers reported offering their own ZEV-related training courses, including instruction in electric vehicle technology, zero-emission vehicle maintenance, battery technology, and automotive technology. Others indicated that they recruit ZEV workers through private job platforms such as LinkedIn, Indeed, and iCIMS.

Exhibit 15. Training and education program providers used by ZEV Firm to recruit new ZEV workers (n=137)



Firms that reported not working with training and education providers most commonly reported **limited hiring needs (25.3%)** and **uncertainty about the quality of available training programs (25.0%)**. A notable share of employers also reported limited awareness of relevant training programs (**17.0%**) or a lack of nearby programs (**14.7%**). These findings suggest that barriers to engaging with training providers stem from both demand-side factors and information gaps and concerns about program quality.

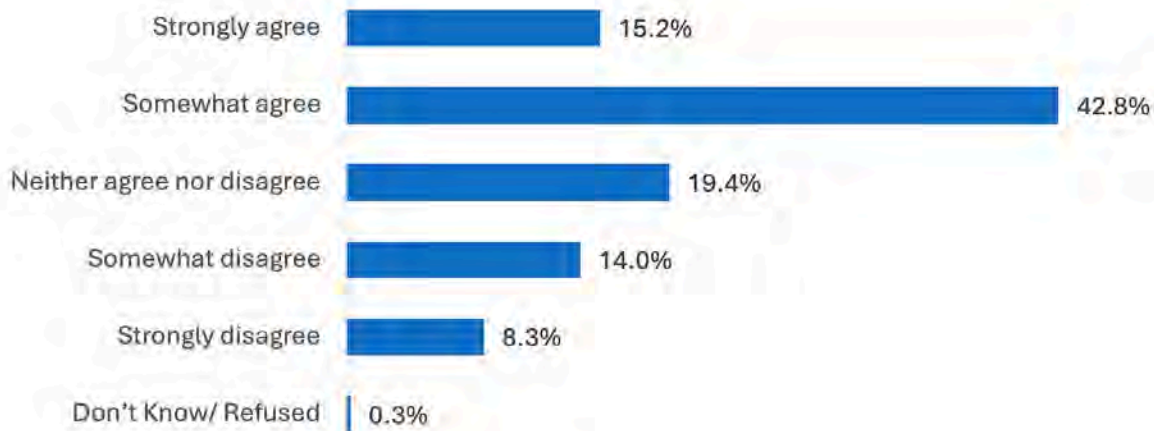
Exhibit 16. Reasons surveyed ZEV firms do not work with training and education providers for ZEV worker recruitment – Multiple responses permitted; Percentages may sum to more than 100%. (n=286)



Hiring challenges remain widespread across the ZEV workforce. Across all occupations, approximately two-thirds of hiring attempts (**63.4%**) were reported as involving some or great difficulty, indicating persistent labor market tightness. For several occupations, including Business Operations Specialists, Industrial Machinery Mechanics, Industrial Production Managers, and Financial Managers, **at least 30% and in some cases more than 40% of employers reported experiencing great difficulty in hiring.**

Worker retention also emerged as a significant challenge for many employers, further suggesting constraints in the supply of trained ZEV workers. More than half of surveyed firms (**58.0%**) indicated agreement with the statement that retaining ZEV-related employees at their business location is challenging (Exhibit 17).

Exhibit 17. Percentage of surveyed employers who agreed with the statement “Retaining ZEV-related employees at my business location once they are hired is challenging” (n=439)



3.7 Sector-Specific Workforce Considerations

Workforce needs and transition opportunities vary across sectors. Surveyed ZEV-related firms identified their primary industry, such as maintenance or repair, design, installation, and retail trade or sales. While EVSE employers operate across these sectors, EVSE technicians are primarily employed in maintenance. The following sections outline EVSE technicians roles and then describe the findings for each sector, including the occupations most frequently employed and the transition challenges anticipated by ZEV employers.

Electric Vehicle Supply Equipment (EVSE) Technicians

BEV charging stations represent what is likely the most 'novel' part of the ZEV economy since EV chargers are not technologically similar to the Internal Combustion Engine Vehicle (ICEV) technology stack in gas vehicles, as EV charger technology and their operation are distinct in most ways from a diesel or gasoline pump. Because of this novelty, this section contains additional discussion to showcase the workforce needs around this new technology.

Bringing a new EV charger online and operating it may involve three distinct phases. First is the **installation phase**, which requires a licensed Electrician to connect an EV charger to the electrical grid. The second phase is the **commissioning phase**, which must be carried out by a 'commissioning agent' who is certified to commission that specific model of EV charger. The certification for the commissioning agent is vital, because the internal layout and operating and communications systems of each charger are often unique to that Original Equipment Manufacturer (OEM), and incorrect commissioning can result in faulty or inoperable charging stations, which can not only result in violations of California Energy Commission and California Public Utilities Commission standards, but also frustrate users. The third phase is the **operational phase**, which includes ongoing maintenance and repair typically performed by EVSE Technicians.

While EV charger installers must be licensed electricians, the commissioning agent does not require such license. The installer and the commissioning agent do not have to be—and are often not—the same individual or from the same firm. Installation and commissioning are two distinct actions often with two distinct workers. A commissioning agent may also be trained to support several chargers from several different OEMs, or just a singular OEM depending on the firm's business model and relation with an OEM. Commissioning agents—often known as Technicians—do not need to be licensed Electricians, but much of the knowledge, skills, and abilities of Electricians are vital to being a well-trained commissioning agent. For example, the ability to read wiring schematics, having knowledge of electrical safety practices, and familiarity with the National Electric Code are important for a skilled commissioning agent.

Other trades that were identified as having similar supportive skillsets were folks with backgrounds in lighting and HVAC. This means EVSE Technician training can be stackable and supplemental to existing skilled trades programs. EVSE Technician training can also be standalone so long as charging station specific curriculum is paired with relevant safety, basic electrical, and other relevant core trades training.

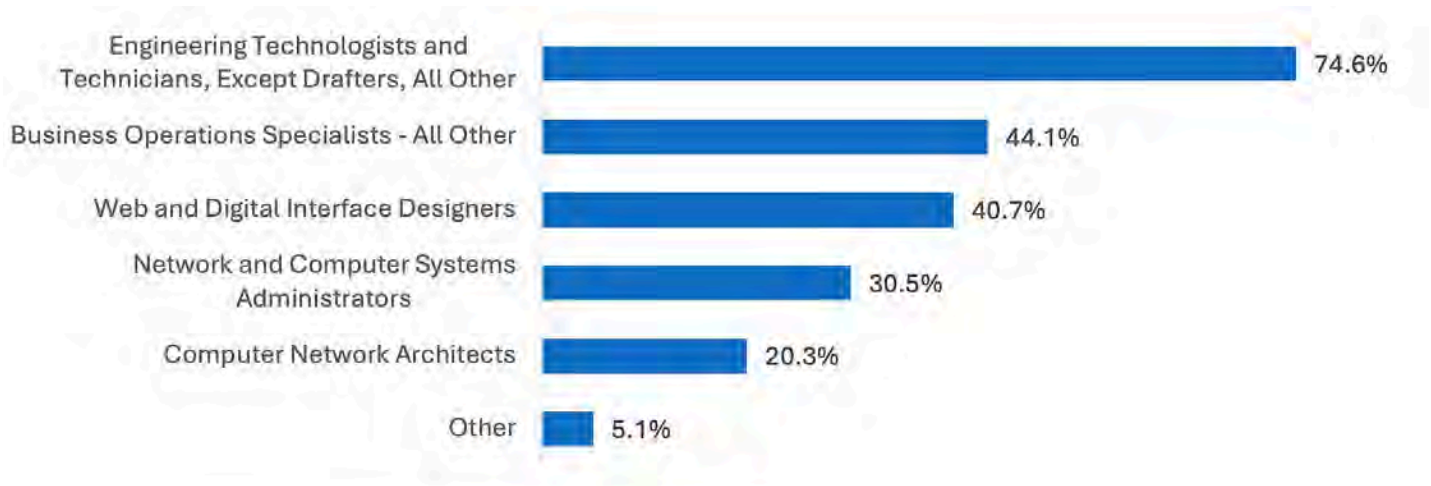
While installation and commissioning are critical to bringing a new EV charger online, the operational phase, encompassing maintenance and repair, is equally important. EVSE technicians play a key role in this phase, ensuring the safe and efficient operation of chargers. Their responsibilities include conducting regular inspections, diagnosing hardware or software faults, repairing components, updating firmware, and ensuring compliance with electrical codes and safety protocols. For maintenance and repair, certifications such as EVSE, EVITP, and CEVT can support skill development and ensure quality work, though specific requirements vary by role and employer.

3.7.1 Design

Firms engaged in ZEV design include vehicle manufacturers as well as specialized engineering and technology companies focused on research and development, system integration, and product design. These firms are involved in the development of vehicle platforms, battery management systems, power electronics, charging hardware, and embedded software that enable ZEV performance and interoperability. Large original equipment manufacturers, such as Tesla, Rivian, and Lucid, maintain in-house design and engineering teams, while firms such as Bosch and Qualcomm support ZEV development through power electronics, control systems, and connectivity solutions.

ZEV design firms reported that **Engineering Technologists and Technicians were the most commonly employed occupation at their business locations (74.6%)**. Other frequently reported occupations included Business Operations Specialists (**44.1%**), Web and Digital Interface Designers (40.7%), and Network and Computer Systems Administrators (30.5%) (Exhibit 18).

Exhibit 18. Percentage of occupations employed by ZEV design firms(n=59)

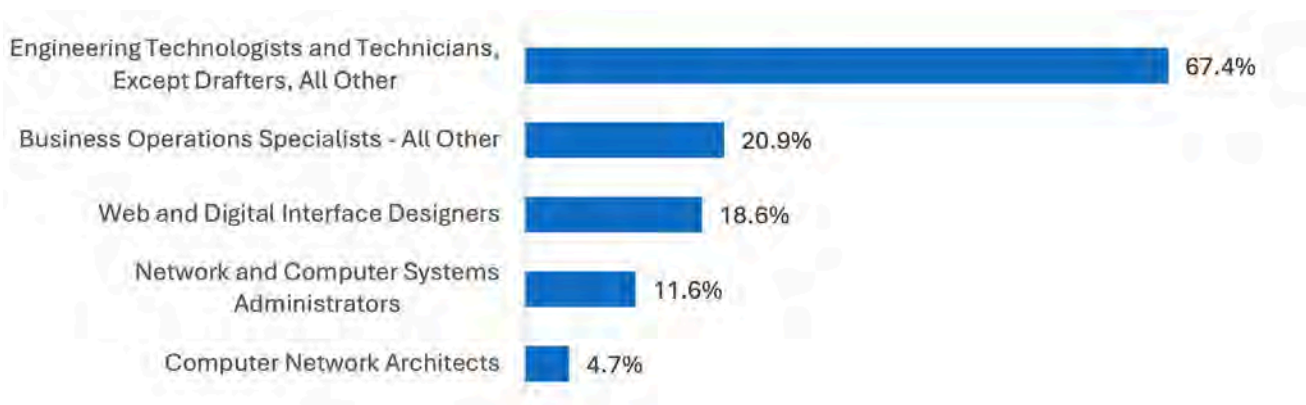


Note: Multiple responses permitted; Percentages may sum to more than 100%.

When asked about occupational transitions to ZEV-related work, a majority of employers (**67.4%**) indicated that Engineering Technologists and Technicians would face the greatest difficulty transitioning. By contrast, only about one in five employers reported that Business Operations Specialists or Web and Digital Interface Designers would experience difficulty transitioning to ZEV-related work (Exhibit 19).

Consistent with this finding, employers also reported the minimum level of prior work experience expected for entry-level workers. Most ZEV design firms (**79.6%**) indicated that Engineering Technologists and Technicians would require more than one year of prior work experience. In contrast, approximately one-third of ZEV design employers reported that Web and Digital Interface Designers (**37.5%**) and Network and Computer Systems Administrators (**33.3%**) would require less than one year of prior experience.

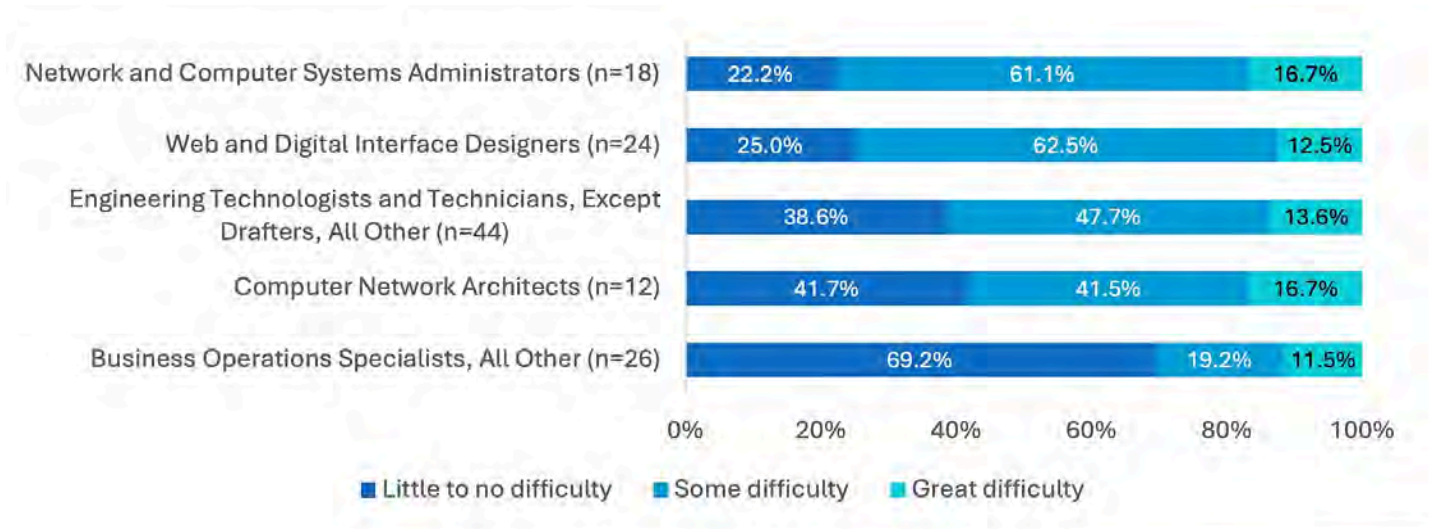
Exhibit 19. Percentage of ZEV design occupations expect to have the most difficult time transitioning to ZEV-related work (n=43)



Note: Multiple responses permitted; Percentages may sum to more than 100%|

Although some occupations were reported to require relatively limited prior work experience at entry, employers nonetheless identified significant hiring challenges for these roles. Surveyed ZEV design firms reported moderate hiring challenges across several technical and professional occupations. Nearly two in three employers reported experiencing "some" or "great" difficulty hiring Network and Computer Systems Administrators (77.8%) and Web and Digital Interface Designers (75.0%). In contrast, employers reported relatively little difficulty hiring Business Operations Specialists, with 69.2% indicating "little" or "no" difficulty.

Exhibit 20. Percentage of surveyed firms reporting the level of difficulty hiring qualified workers for ZEV design occupations

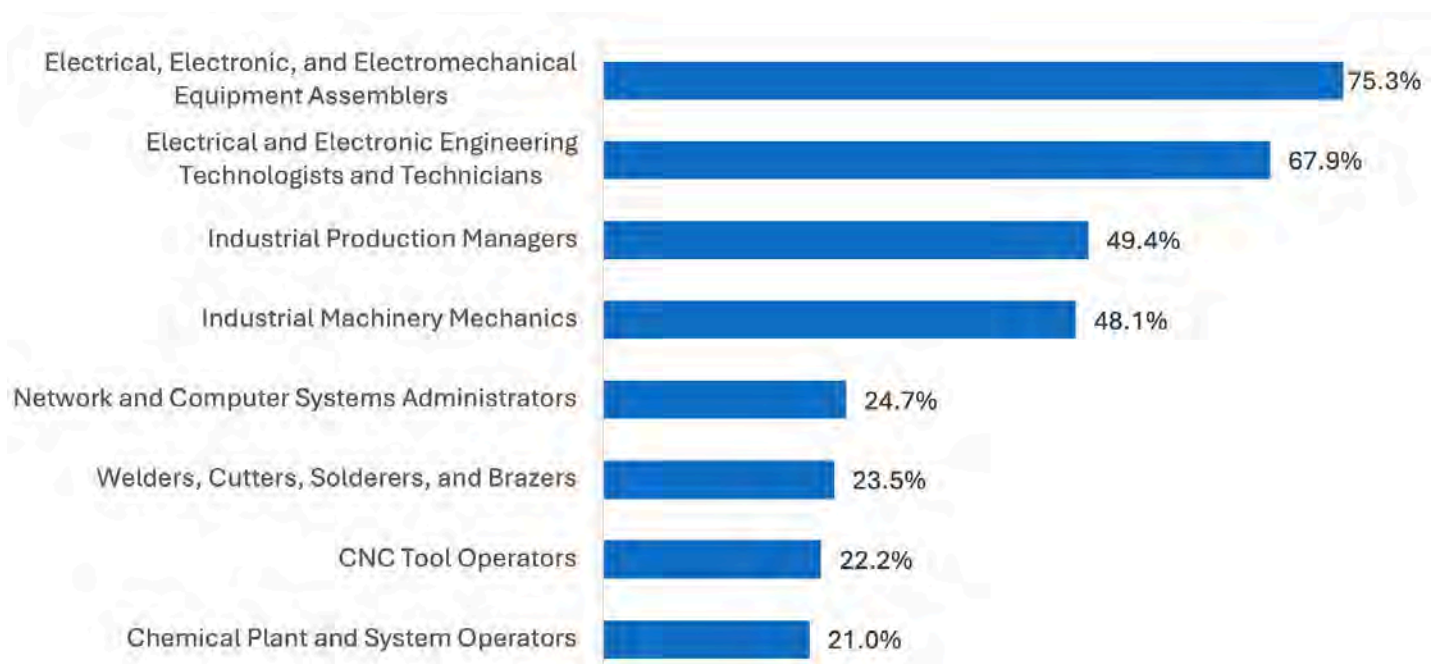


3.7.2 Manufacturing

ZEV manufacturing includes firms that assemble ZEVs and manufacture key components such as battery systems, electric drivetrains, charging equipment, and power electronics. California hosts both large-scale manufacturers and specialized suppliers that fabricate components, assemble subsystems, and conduct testing and quality assurance. Examples include Tesla's manufacturing operations, Proterra's battery and electric drivetrain manufacturing, ChargePoint's charging hardware production, and numerous advanced manufacturing firms supporting ZEV supply chains throughout the state.

Among surveyed ZEV manufacturing firms, **Electrical, Electronic, and Electromechanical Equipment Assemblers were the most commonly reported occupations, with 75.3% of firms** indicating they employ workers in this role. This was followed by Electrical and Electronic Engineering Technologists and Technicians (67.9%). Nearly half of employers reported employing Industrial Production Managers (49.4%) and Industrial Machinery Mechanics (48.1%). CNC Tool Operators (22.2%) and Chemical Plant and System Operators (21.0%) were the least commonly reported occupations (Exhibit 21).

Exhibit 21. Percentage of occupations employed by ZEV manufacturing firms (n=81)

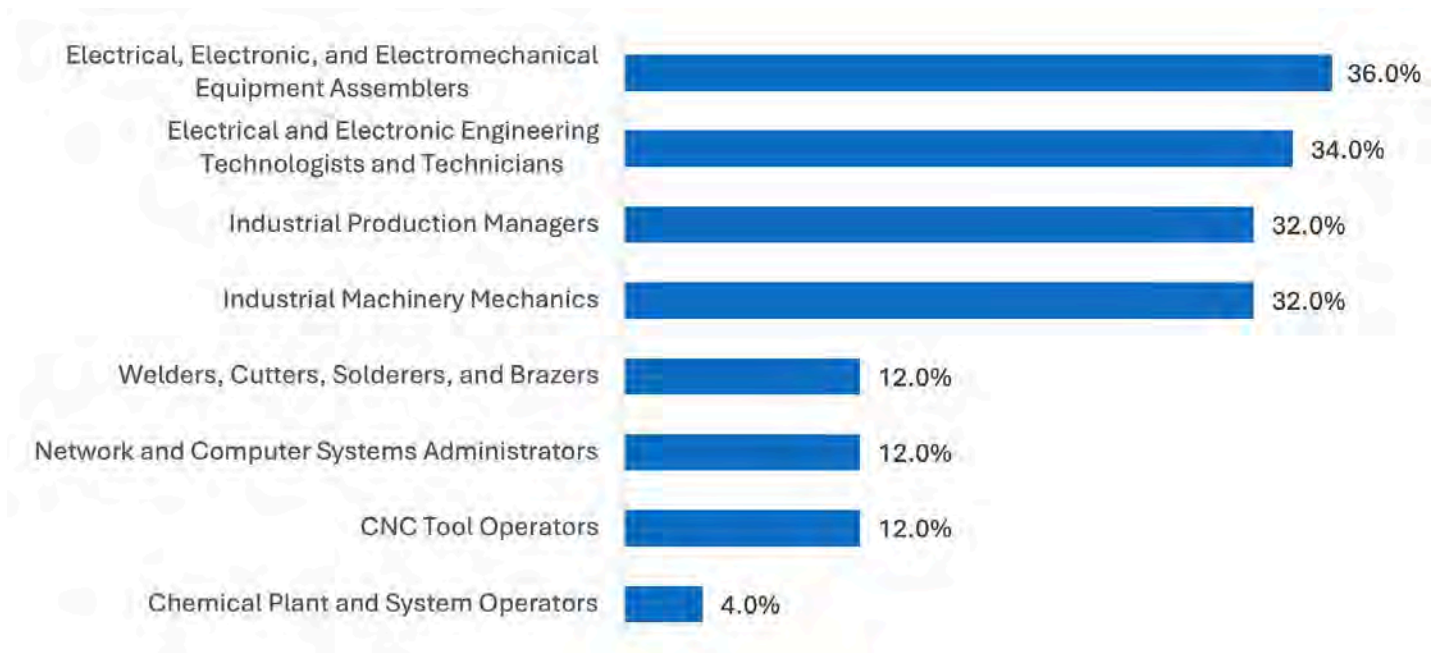


Note: Multiple responses permitted; Percentages may sum to more than 100%.

Although Electrical, Electronic, and Electromechanical Equipment Assemblers and Electrical and Electronic Engineering Technologists and Technicians were the most commonly employed occupations, they were also among those most frequently cited as facing difficulty transitioning into ZEV-related work, with **just over one-third of employers identifying each occupation as challenging to transition**. In addition, about one-third of employers reported that Industrial Production Managers and Industrial Machinery Mechanics (**32.0%**) would have the most difficulty transitioning to ZEV-related work. In contrast, fewer employers identified Welders, Cutters, Solderers, and Brazers, Network and Computer Systems Administrators, and CNC Tool Operators (**12.0%**) as difficult to transition occupations (Exhibit 22).

Employers also reported the minimum level of prior work experience expected for qualified applicants. Approximately three in four ZEV manufacturing firms indicated that Industrial Production Managers (**77.5%**) and Network and Computer Systems Administrators (**75.0%**) would require more than one year of prior work experience. Similarly, a majority of employers reported that Industrial Machinery Mechanics (**71.8%**) and Electrical and Electronic Engineering Technologists and Technicians (68.9%) would require more than one year of experience in a comparable position. In contrast, more than half of firms reported requiring less than one year or no formal work experience for Welders, Cutters, Solderers, and Brazers (**63.1%**) and Electrical, Electronic, and Electromechanical Equipment Assemblers (**56.4%**).

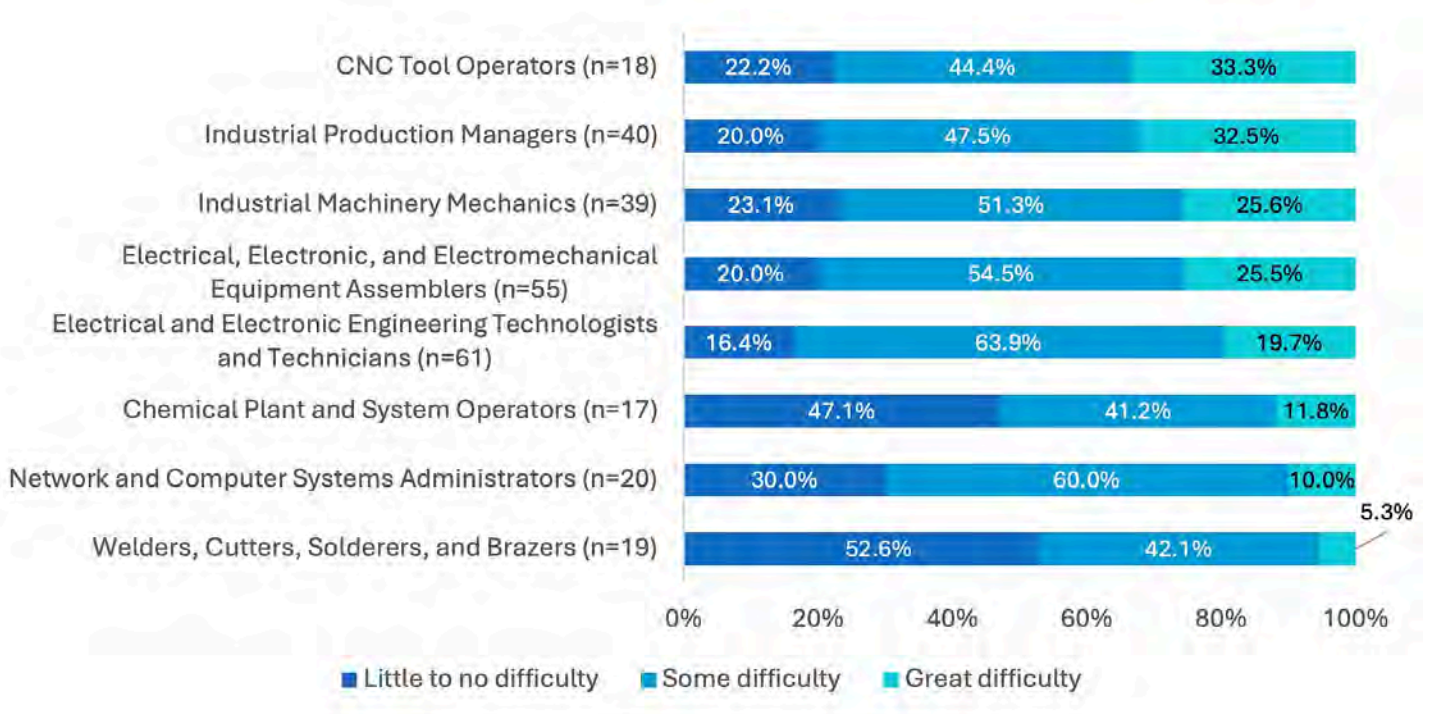
Exhibit 22. Percentage of ZEV manufacturing occupations expect to have the most difficult time transitioning to ZEV-related work (n=50)



Note: Multiple responses permitted; Percentages may sum to more than 100%.

Consistent with these findings, the most commonly employed occupations were also reported as the most difficult to hire. Over three in four surveyed ZEV manufacturing firms reported experiencing “some” or “great” difficulty hiring Electrical and Electronic Engineering Technologists and Technicians (83.6%), Electrical, Electronic, and Electromechanical Equipment Assemblers (80.0%), and Industrial Production Managers (80.0%). By contrast, nearly half of employers reported experiencing little or no difficulty hiring Welders, Cutters, Solderers, and Brazers (52.6%) and Chemical Plant and System Operators (47.1%) (Exhibit 23).

Exhibit 23. Percentage of surveyed firms reporting the level of difficulty hiring qualified workers for ZEV manufacturing occupations

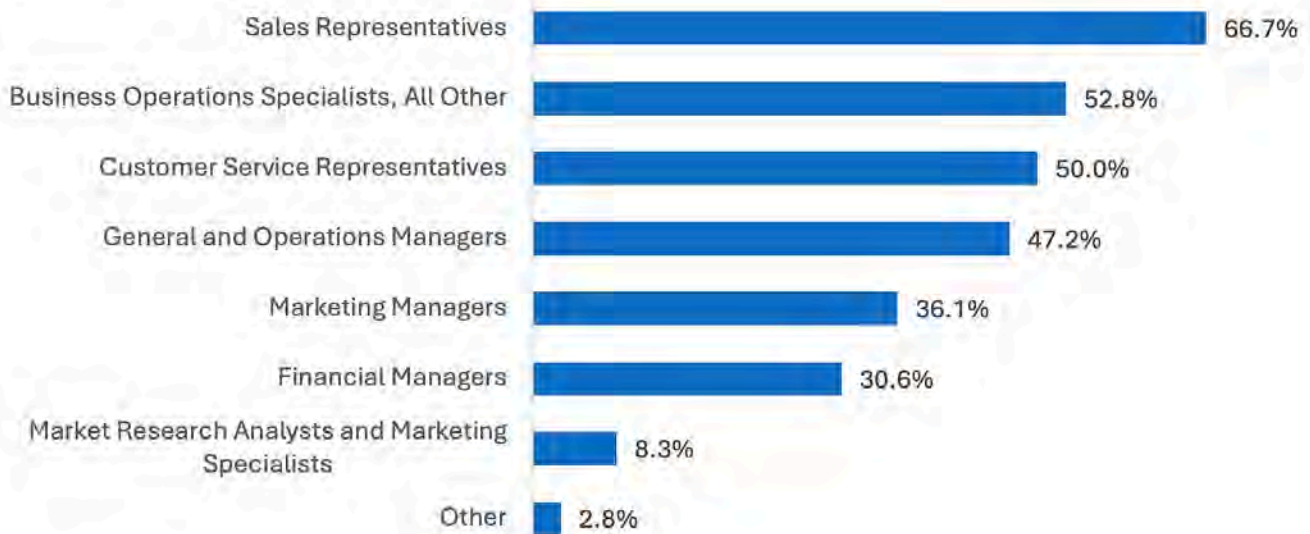


3.7.3 Retail Trade and Sales

Firms involved in retail trade and sales focus on bringing ZEVs and related products to market. These include automobile dealerships, fleet vehicle sellers, leasing and fleet procurement firms, as well as distributors of charging equipment and parts. Their work focuses on vehicle sales and leasing, customer education, fleet procurement support, financing, and coordinating service and maintenance. This sector generally includes independent dealerships and large dealership groups.

Among the ZEV retail trade and sales firms surveyed, **Sales Representatives were the most commonly employed occupation, with two-thirds of firms (66.7%)** reporting employment in this role. More than half of firms indicated employing Business Operations Specialists (52.8%) and Customer Service Representatives (50.0%). Approximately one-third of firms reported employing Marketing Managers (36.1%) and Financial Managers (30.6%), while fewer than one in ten firms (8.3%) reported employing Market Research Analysts and Marketing Specialists (Exhibit 24).

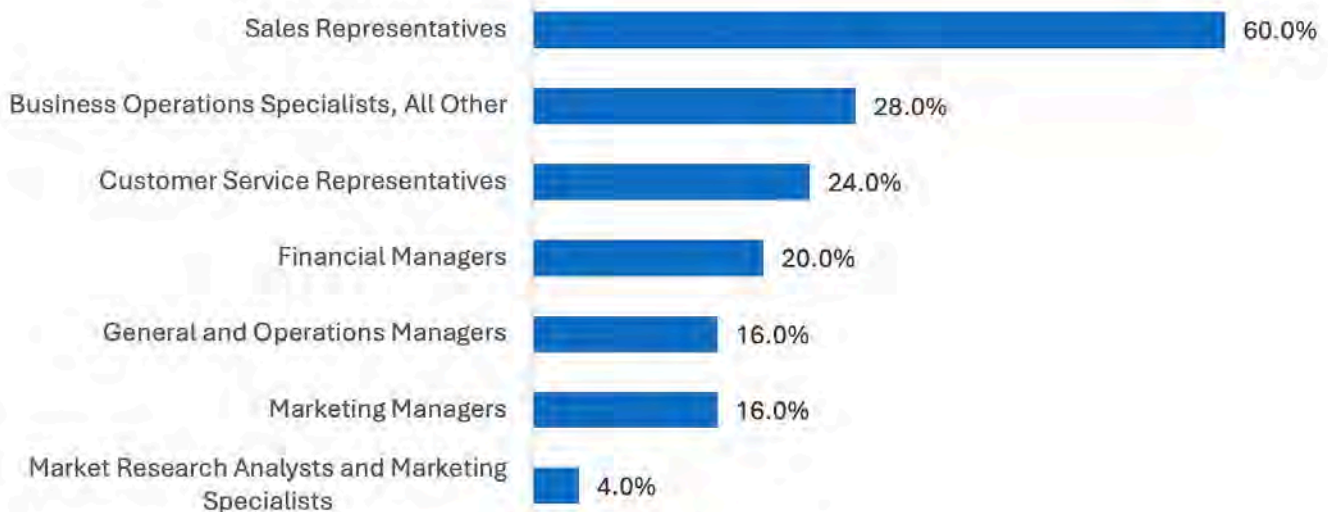
Exhibit 24. Percentage of occupations employed by ZEV retail trade or sales firms (n=36)



Note: Multiple responses permitted; Percentages may sum to more than 100%.

A majority of surveyed retail trade and sales firms (**60.0%**) indicated that Sales Representatives would face the greatest difficulty transitioning into ZEV-related work. Approximately one in four to one in five employers reported that Business Operations Specialists (**28.0%**), Customer Service Representatives (**24.0%**), and Financial Managers (**20.0%**) would also be likely to experience difficulty transitioning.

Exhibit 25. Percentage of ZEV retail trade or sales occupations expect to have the most difficult time transitioning to ZEV-related work (n=25)



Note: Multiple responses permitted; Percentages may sum to more than 100%.

General and Operations Managers were not widely cited as having difficulty transitioning into ZEV-related work; however, employers reported significant hiring challenges for this occupation. Over three in four retail trade or sales firms (76.5%) reported experiencing "some" or "great" difficulty hiring General and Operations Managers. Substantial hiring challenges were also reported for Financial Managers (63.6%), Business Operations Specialists (63.2%), and Sales Representatives (62.5%).

Employers further reported that any entry applicants for Financial Managers are most likely to require a minimum of one year of prior experience in a comparable position (90.9%), followed by Business Operations Specialists (73.7%) and Customer Service Representatives (72.2%). These findings suggest that occupations associated with greater hiring difficulty are also those requiring higher levels of prior work experience, indicating that experience requirements may be a contributing factor to hiring challenges in the ZEV retail trade and sales sector.

Exhibit 26. Percentage of surveyed firms reporting the level of difficulty hiring qualified workers for ZEV retail trade or sales occupations



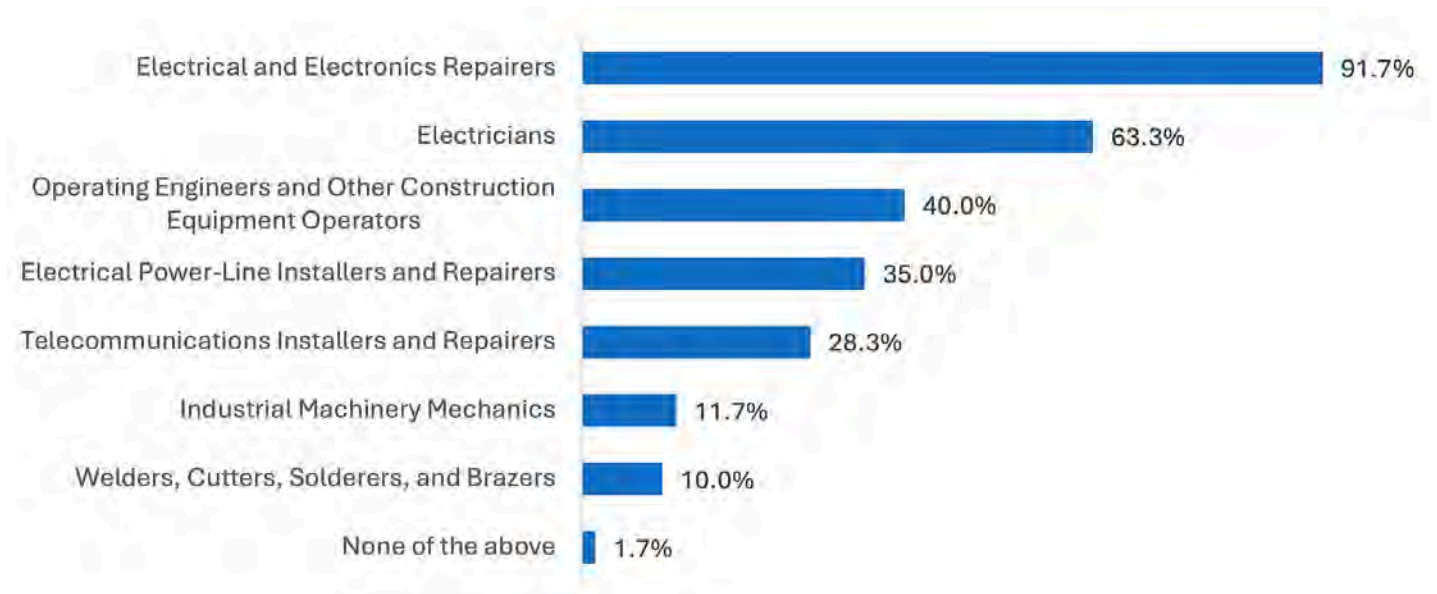
3.7.4 Installation

Installation firms play a critical role in deploying ZEV charging and hydrogen fueling infrastructure across residential, commercial, and public settings. These firms include electrical contractors, design-build engineering companies, civil contractors, and renewable energy installers expanding into EV charging. Their work typically involves site assessment, permitting, electrical upgrades, trenching and conduit installation, equipment installation, commissioning, and coordination with utilities and local jurisdictions. This sector includes large infrastructure and engineering firms such as Siemens, ABB, and Black & Veatch, EV charging-specific companies, such as EVgo and ChargePoint, along with electrical contractors.

Among surveyed installation firms, **Electrical and Electronics Repairers (e.g., EVSE Technicians, EV Charging Infrastructure Technicians, or EV Field Service Technicians) were the most commonly employed occupations, with over nine in ten firms (91.7%)** reporting employment in this role.

Electricians were also widely employed, with **63.3%** of firms indicating they hire workers in this occupation. Other commonly reported occupations include Operating Engineers and Other Construction Equipment Operators (**40.0%**) and Electrical Power-Line Installers and Repairers (**35.0%**). In contrast, fewer firms reported employing Industrial Machinery Mechanics (**11.7%**) and Welders, Cutters, Solderers, and Brazers (**10.0%**) (Exhibit 27).

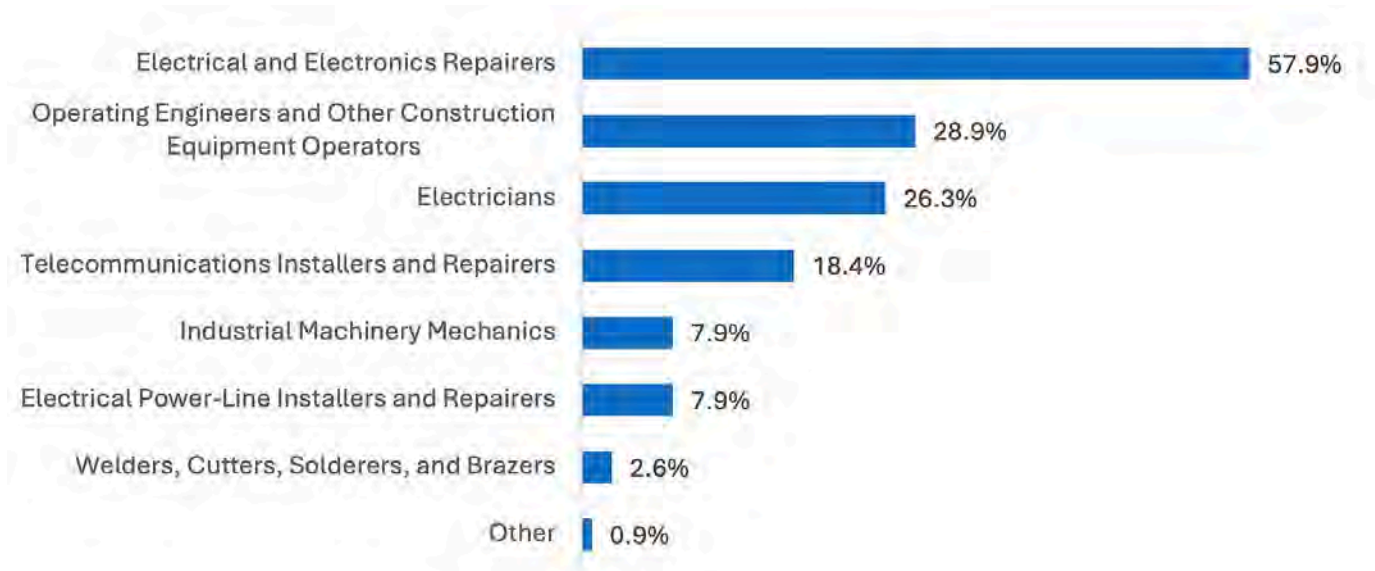
Exhibit 27. Percentage of occupations employed by ZEV installation firms (n=60)



Note: Multiple responses permitted; Percentages may sum to more than 100%.

A majority of surveyed installation firms (**57.9%**) indicated that EVSE Technicians (Electrical and Electronics Repairers) would face the greatest difficulty transitioning to ZEV-related work, as this role requires learning and servicing EV charging equipment, including associated power conversion, control, and communications components. Also, over one-quarter of employers also reported that Operating Engineers and Other Construction Equipment Operators (**28.9%**) and Electricians (**26.3%**) would experience difficulty transitioning to ZEV-related work (Exhibit 28).

Exhibit 28. Percentage of ZEV installation occupations expect to have the most difficult time Transitioning to ZEV-Related Work (n=38)

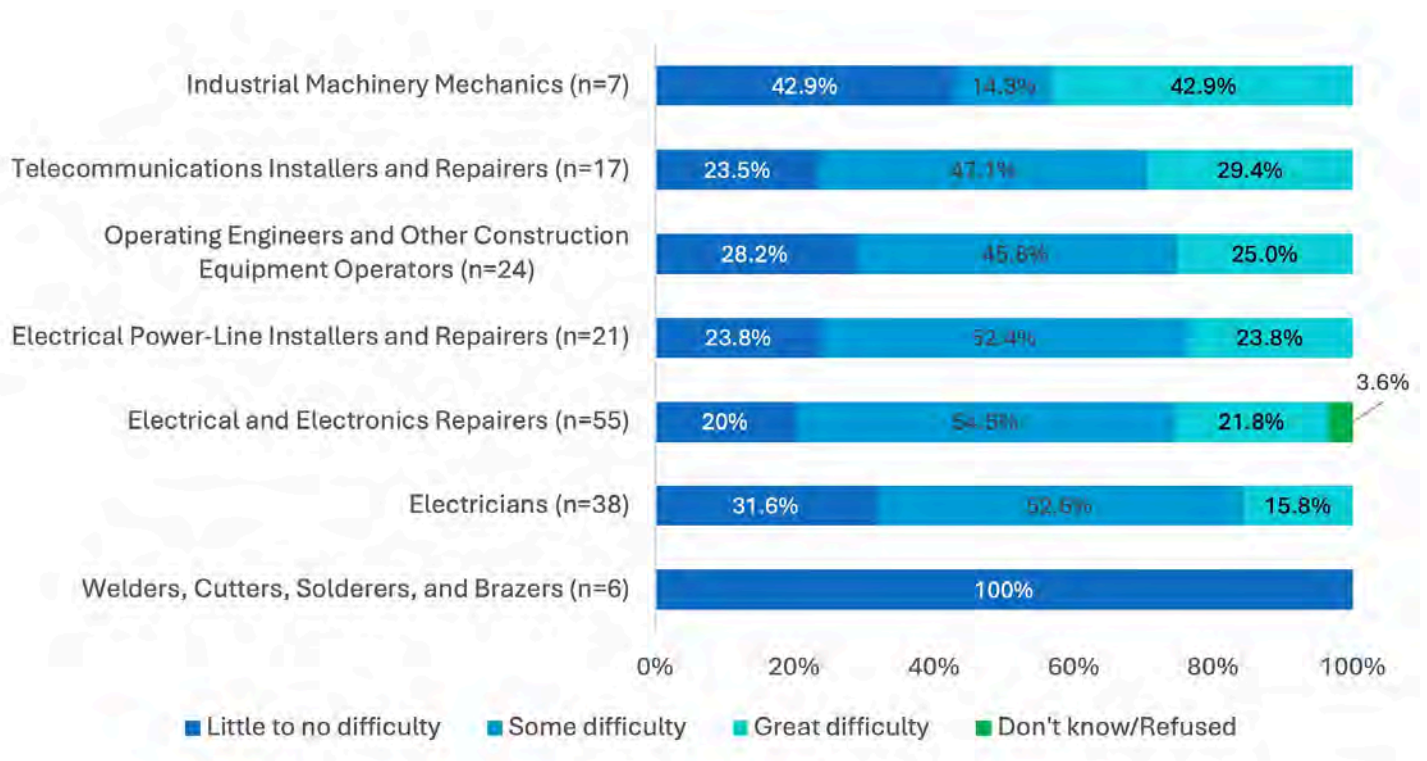


Note: Multiple responses permitted; Percentages may sum to more than 100%.

Surveyed firms also reported substantial hiring challenges for several installation occupations. Over three-quarters of firms reported experiencing "some" or "great" difficulty hiring EVSE Technicians (Electrical and Electronics Repairers) (**76.3%**). Similar levels of hiring difficulty were reported for Electrical Power-Line Installers and Repairers (**76.2%**), Telecommunications Installers and Repairers (**76.5%**), and Operating Engineers and Other Construction Equipment Operators (**70.8%**). In contrast, firms reported little to no difficulty hiring Welders, Cutters, Solderers, and Brazers, with all respondents (**100%**) indicating minimal hiring challenges for this occupation.

These hiring challenges appear to align with reported prior work experience requirements. With the exception of Industrial Machinery Mechanics, most installation occupations were reported to require between one and more than three years of prior experience in a comparable position. Notably, over three in four firms (**76.5%**) indicated that Telecommunications Installers and Repairers would require more than one year of prior work experience. In addition, more than half of firms (**56.4%**) reported requiring more than one year of prior experience for EVSE Technicians (Electrical and Electronics Repairers).

Exhibit 29. Percentage of surveyed firms reporting the level of difficulty hiring qualified workers for ZEV installation occupations

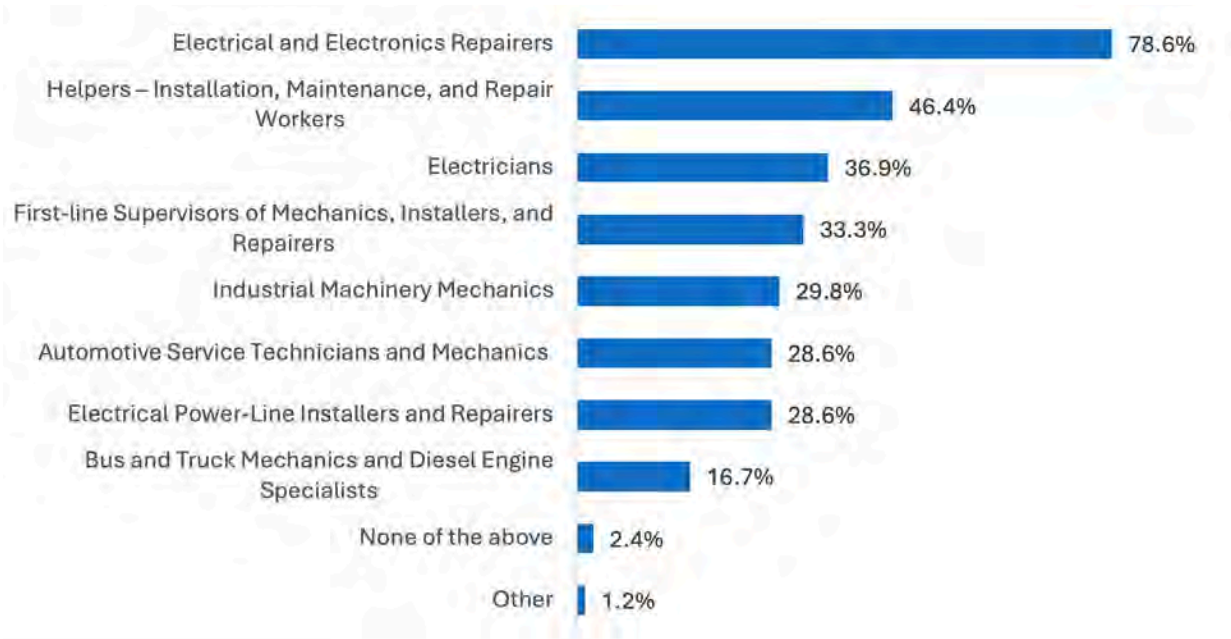


3.7.5 Maintenance or Repair

The ZEV maintenance and repair sector includes firms that service ZEVs (Automotive Service Technicians and Mechanics) and ZEV-related infrastructure (EVSE Technicians, formally classified as Electrical and Electronics Repairers). This group encompasses vehicle dealership service departments, independent automotive repair shops with EV capabilities, fleet maintenance providers, and contractors that specialize in operating and maintaining charging or fueling stations. Typical activities include high-voltage diagnostics, battery and drivetrain servicing, software updates, preventative maintenance, and charger troubleshooting. Most automotive dealerships that sell a ZEV model will have a service department with a technician for servicing that ZEV. ZEV infrastructure maintenance and repair organizations include OEM service networks including Tesla Service and charging network operators including ChargePoint, EVgo, and Electrify America.

Among the maintenance and repair firms surveyed, **Electrical and Electronics Repairers, including EVSE Technicians and other EV Supply Equipment specialists, were the most commonly employed occupations (78.6%)**. Helpers for installation, maintenance, and repair were reported by nearly half of firms (46.4%). Approximately one third of firms employed Electricians (36.9%) and First-line Supervisors of Mechanics, Installers, and Repairers (33.3%). Slightly more than one in four employed Automotive Service Technicians and Mechanics or Electronic Power-Line Installers and Repairers (28.6%). Bus and Truck Mechanics and Diesel Engine Specialists were the least common, reported by 16.7% of firms (Exhibit 30).

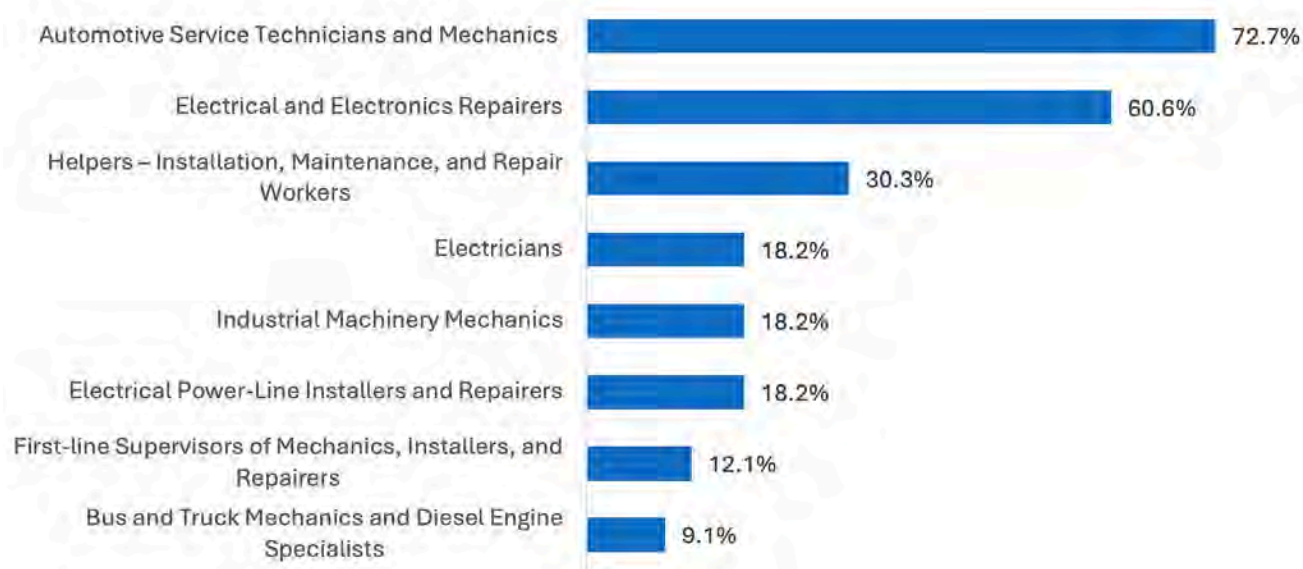
Exhibit 30. Percentage of occupations employed by ZEV maintenance or repair firms (n=84)



Note: Multiple responses permitted; Percentages may sum to more than 100%.

A majority of firms (**72.7%**) indicated that Automotive Service Technicians and Mechanics would face the greatest difficulty transitioning to ZEV-related work, followed by Electrical and Electronics Repairers (**60.6%**). About one-third reported that Helpers for Installation, Maintenance, and Repair (**30.3%**) would experience difficulty. Fewer than one in five firms (**18.2%**) identified Electricians, Industrial Machinery Mechanics, or Electrical Power-Line Installers and Repairers as having difficulty transitioning (Exhibit 31).

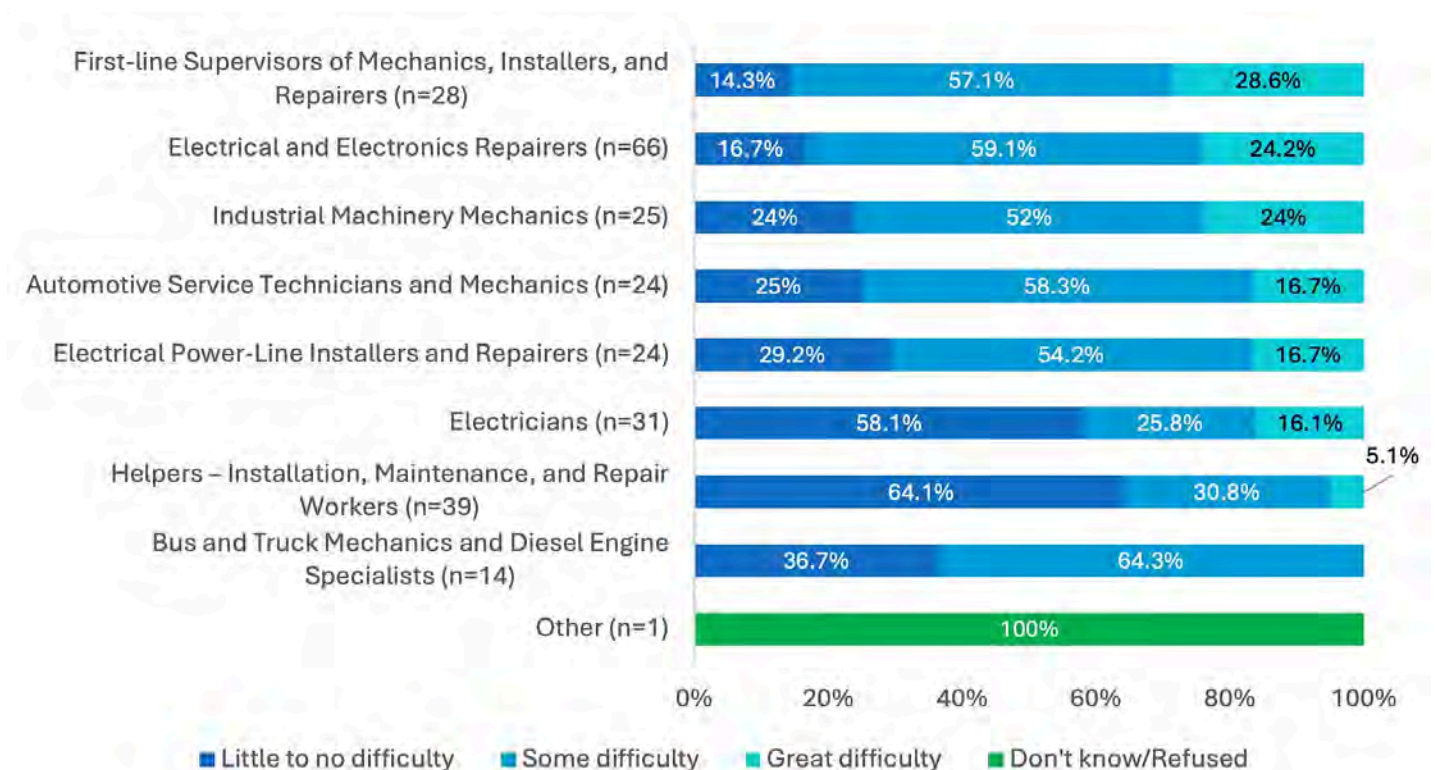
Exhibit 31. Percentage of ZEV maintenance or repair occupations expect to have the most difficult time transitioning to ZEV-related work (n=33)



Hiring challenges were most pronounced for supervisory and specialized technical roles. Over four in five firms reported experiencing "some" or "great" difficulty hiring First-Line Supervisors of Mechanics, Installers, and Repairers (85.7%) and Electrical and Electronics Repairers (83.3%). Substantial hiring difficulty was also reported for Industrial Machinery Mechanics (76.0%), Automotive Service Technicians and Mechanics (75.0%), and Electrical Power-Line Installers and Repairers (70.0%). By contrast, employers reported less difficulty hiring Electricians (41.9%) and Helpers for Installation, Maintenance, and Repair (35.9%).

These hiring patterns partially align with reported minimum prior work experience requirements. Only about one-third of surveyed firms indicated that applicants for Helpers for Installation, Maintenance, and Repair (30.8%) would require more than one year of prior experience in a comparable position. In contrast, nearly three-quarters of employers reported that First-Line Supervisors of Mechanics, Installers, and Repairers (71.4%) would require more than one year of experience. Similarly, about two-thirds of firms indicated that Electrical Power-Line Installers and Repairers (66.7%) and Bus and Truck Mechanics and Diesel Engine Specialists (64.3%) would require more than one year of prior work experience.

Exhibit 32. Percentage of surveyed firms reporting the level of difficulty hiring qualified workers for ZEV maintenance or repair occupations

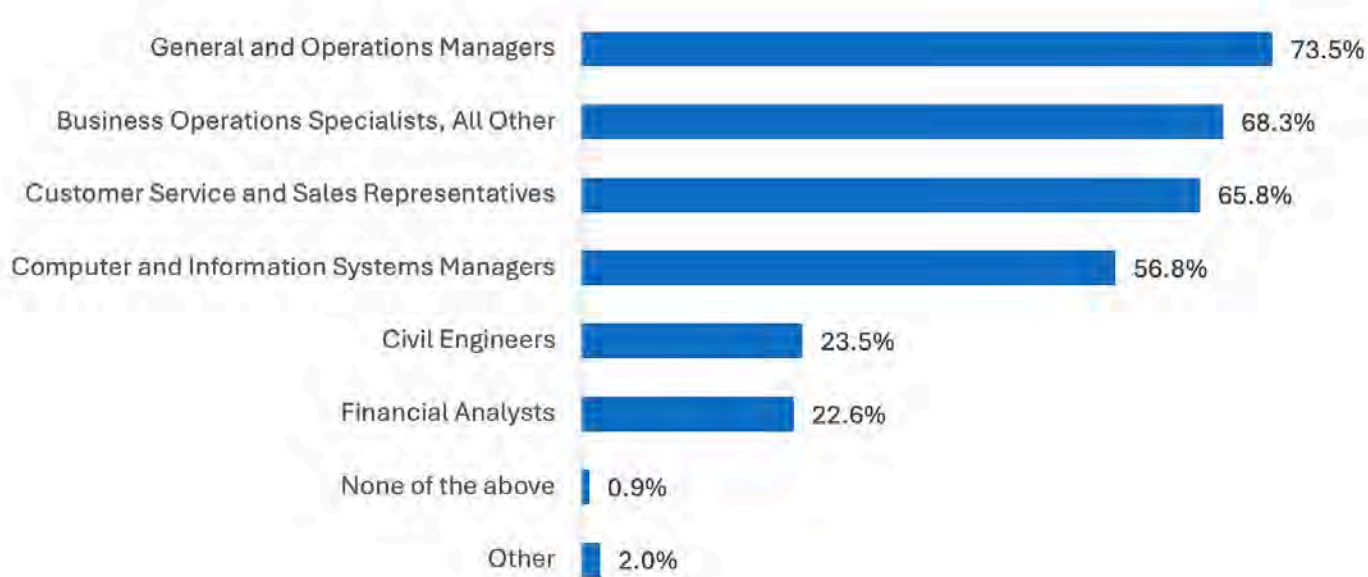


3.7.6 Professional or Business Services (PBS) and Management, Operation, or Ownership of ZEV Fleets or ZEV-Related Infrastructure

A wide range of ZEV-related PBS firms, along with ZEV fleet and infrastructure management-related firms, support ZEV deployment and scaling. Professional service providers offer engineering and environmental consulting, permitting and compliance support, workforce development and training, staffing and recruitment, legal and accounting services, IT and cybersecurity, and logistics and supply chain expertise (e.g. AECOM, WSP, ICF, Deloitte, local workforce boards, and training providers). Fleet operators and charging or fueling network operators manage day-to-day activities such as vehicle procurement, routing and telematics, charging and fueling operations, asset uptime, vendor coordination, and workforce supervision, including Amazon and UPS, public transit agencies and school districts with electric buses, and other government agencies with fleets.

Among surveyed PBS and ZEV management-related firms, nearly three quarters (73.5%) employed General and Operations Managers. About two-thirds employed Business Operations Specialists (68.9%) and Customer Service and Sales Representatives (65.8%). Computer and Information Systems Managers were reported by over half of firms (56.8%). Approximately one in five firms employed Civil Engineers (23.5%) or Financial Analysts (22.6%) (Exhibit 33).

Exhibit 33. Percentage of occupations employed by ZEV PBS or management-related firms (n=119)

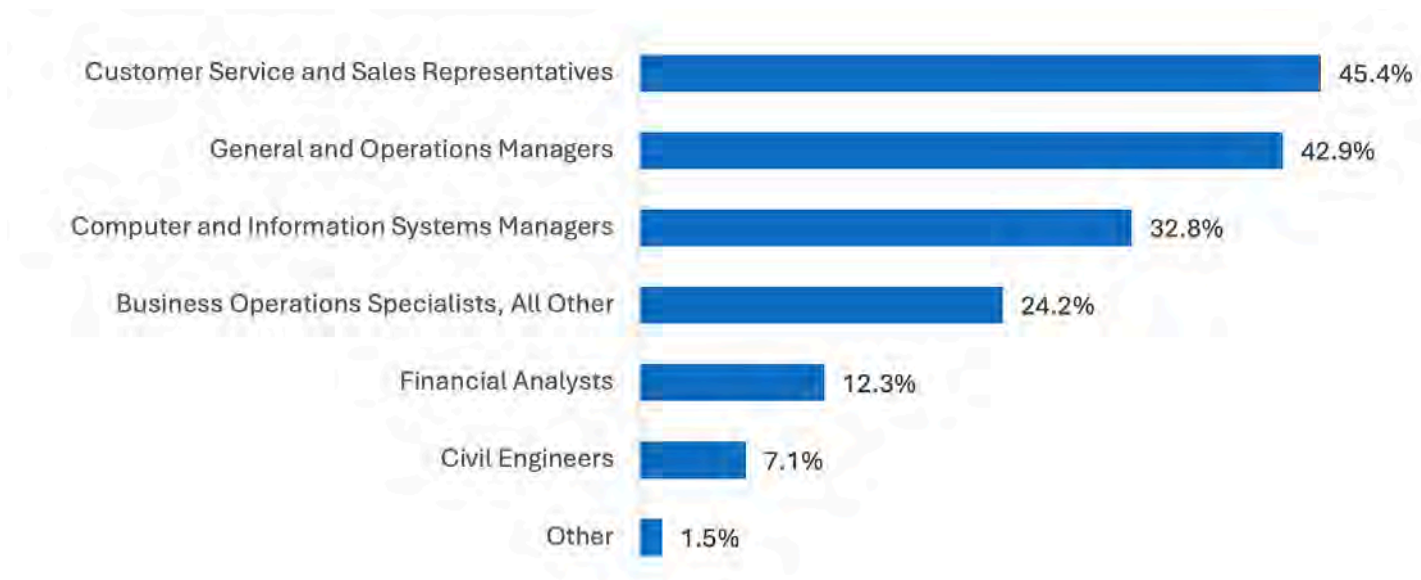


Note: Multiple responses permitted; Percentages may sum to more than 100%.

Overall, employers in the PBS and ZEV management sector reported relatively low levels of difficulty transitioning workers into ZEV-related work. Fewer than half of the firms identified transition difficulty for Customer Service and Sales Representatives (45.4%) and General and Operations Managers (42.9%).

Similarly, only about one-third of employers reported that Computer and Information Systems Managers (**32.8%**) would experience difficulty transitioning, while approximately one in four identified Business Operations Specialists (**24.2%**) as facing transition challenges. Financial Analysts and Civil Engineers were least frequently cited by employers as having difficulty transitioning to ZEV-related work (Exhibit 34).

Exhibit 34. Percentage of ZEV PBS or management-related occupations expect to have the most difficult time transitioning to ZEV-related work. (n=55)

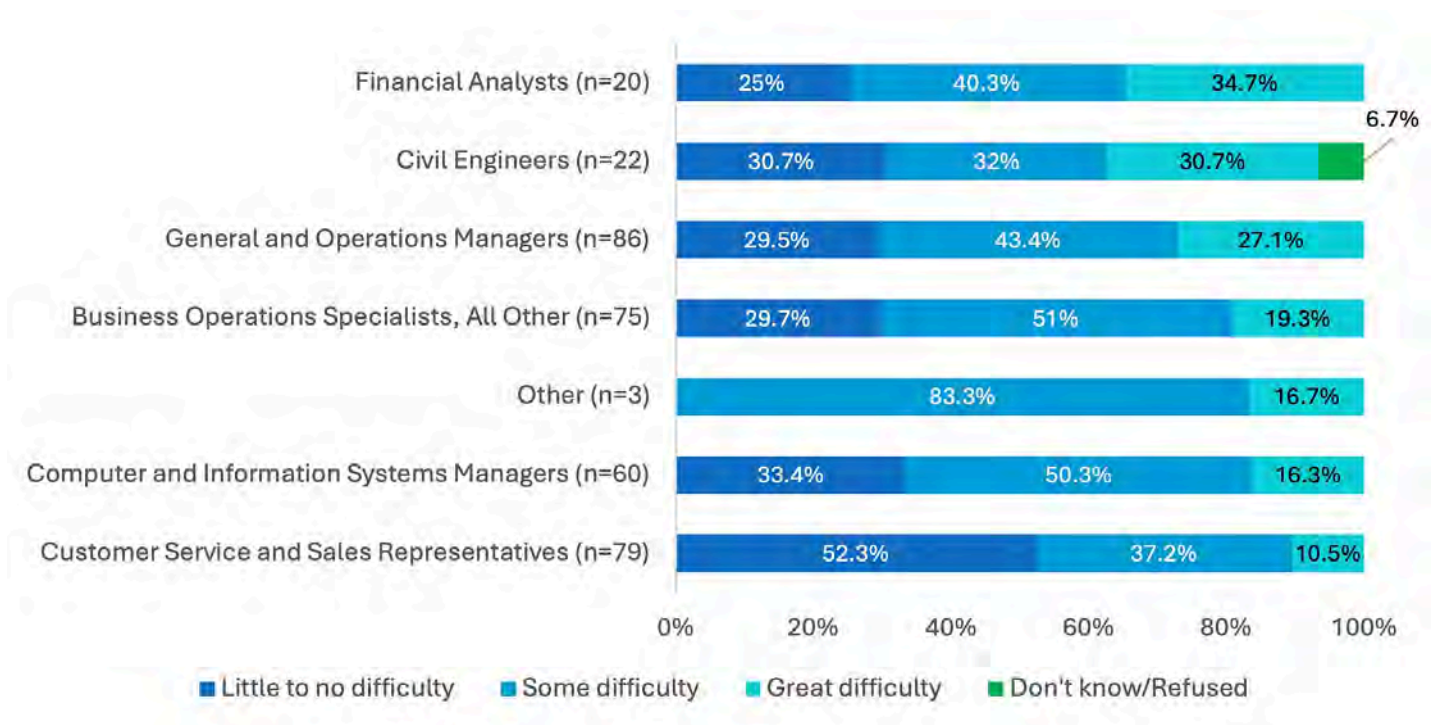


Note: Multiple responses permitted; Percentages may sum to more than 100%.

In contrast to relatively low transition difficulty, employers reported substantial hiring challenges for several PBS and management-related occupations. Three-quarters of surveyed firms (**75.0%**) reported experiencing "some" or "great" difficulty hiring Financial Analysts, followed by General and Operations Managers (**70.5%**) and Business Operations Specialists (**70.3%**). About two-thirds of employers reported hiring difficulty for Computer and Information Systems Managers (**66.6%**) and Civil Engineers (**62.7%**). By comparison, more than half of firms reported little or no difficulty hiring Customer Service and Sales Representatives (Exhibit 35).

These hiring challenges align with reported minimum prior work experience requirements. A large majority of surveyed PBS and ZEV management-related firms indicated that Financial Analysts (**91.0%**) require more than one year of prior experience in a comparable position, followed by Computer and Information Systems Managers (**86.7%**) and Civil Engineers (**84.7%**). In contrast, only about half of firms reported requiring at least one year of prior experience for Customer Service and Sales Representatives.

Exhibit 35. Percentage of surveyed firms reporting the level of difficulty hiring qualified workers for ZEV PBS or management-related occupations



3.8 Employer Hiring and Employment Practices

ZEV employers reported hiring challenges in both applicant availability and workforce readiness. ZEV design and professional or business services firms generally reported having applicants available but emphasized gaps in training, education, and prior experience, particularly for technical, business operations, and managerial roles. In contrast, manufacturing, installation, and maintenance or repair sectors faced more acute labor shortages, especially for skilled trades and technical occupations such as Industrial Machinery Mechanics, Automotive Service Technicians and Mechanics, and specialized production roles, often compounded by insufficient training and experience among available candidates. Retail trade and sales firms reported relatively fewer applicant shortages, though experience gaps remained a concern, particularly in financial and customer-facing roles.

Overall, the findings revealed that ZEV workforce challenges vary by sector but consistently reflect gaps between employer needs and worker preparedness. This highlights that targeted training, education, and workforce development support aligned with specific occupational required qualifications are further needed.

3.8.1 Design

Firms reported a range of reasons for hiring challenges across occupations. Nearly two-thirds of employers indicated that Web and Digital Interface Designers (61.1%), Business Operations Specialists (62.5%), and Network and Computer Systems Administrators (64.3%) have enough applicants, but candidates lack relevant training or education. About half of employers reported a shortage of applicants for Engineering Technologists and Technicians (51.9%). Hiring challenges were linked to employer expectations for specific credentials. Firms identified a variety of certifications across key occupational groups. For Business Operations Specialists, project management, electric vehicle business, and analytics-related certifications were most cited. Computer Network Architects and Network and Computer Systems Administrators were associated with industry-recognized networking and security certifications (e.g. Cisco and CompTIA). For engineering roles, employers emphasized ZEV-specific and safety credentials (e.g. Certified Electric Vehicle Technician, OSHA Safety Certification, and Certified Engineering Technician (CET)) (Exhibit 36).

Exhibit 36. ZEV Design Employer Agreement with Hiring Challenges by Occupation

Occupation	Not enough applicants	Enough applicants, but not training or education	Enough applicants, but no prior experience	Enough applicants, but unable to recruit for the wages
Engineering Technologists and Technicians, Except Drafters, All Other (n=27)	51.9%	40.7%	37.0%	25.9%
Web and Digital Interface Designers (n=18)	50.0%	61.1%	61.1%	38.9%
Business Operations Specialists, All Other (n=8)	37.5%	62.5%	50.0%	12.5%
Network and Computer Systems Administrators (n=14)	35.7%	64.3%	57.1%	42.9%
Computer Network Architects (n=7)	28.6%	42.9%	28.6%	0.0

Note: Values represent the combined percentage of respondents who selected “Somewhat agree” or “Strongly agree.” Darker shading indicates a higher percentage of agreement, while lighter shading indicates a lower percentage of agreement.

These hiring challenges were closely linked to employers' expectations for specific certifications and credentials. Surveyed ZEV design firms identified a variety of certifications as relevant across key occupational groups. For Business Operations Specialists, project management, electric vehicle business, and analytics-related certifications were most frequently cited. Computer Network Architects and Network and Computer Systems Administrators were commonly associated with industry-recognized networking and security certifications, such as Cisco and CompTIA. For engineering-related roles, employers emphasized both ZEV-specific and safety credentials, including Certified Electric Vehicle Technician, OSHA Safety Certification, and Certified Engineering Technician (Exhibit 37).

Exhibit 37. Certifications Preferred or Required by ZEV Design Employers

Occupation	Certification 1	Certification 2	Certification 3
Business Operations Specialists, All Other (n=26)	Project Management Professional (PMP)	Certificate in Electric Vehicle Technology and Business Management	Certified Analytics Professional (CAP)
Computer Network Architects (n=12)	Cisco Certified Network Associate	Cisco Certified Network Professional	Cisco Certified Internetwork Expert
Web and Digital Interface Designers (n=24)	Certified Web Developer	Google UX Design Certificate	Web Design Certificate
Engineering Technologists and Technicians, Except Drafters, All Other (n=44)	Certified Electric Vehicle Technician	OSHA Safety Certification	Certified Engineering Technician (CET)
Network and Computer Systems Administrators (n=18)	Cisco Certified Network Associate	CompTIA Security+	CompTIA Network+

3.8.2 Manufacturing

ZEV manufacturing firms reported widespread hiring challenges across occupations. The most severe shortages were for Chemical Plant and System Operators (**88.9% of employers**) and Welders, Cutters, Solderers, and Brazers (**77.8%**). Even when applicants were available, employers frequently noted gaps in relevant training and education, particularly for Network and Computer Systems Administrators and CNC Tool Operators (**71.4%**). Approximately two-thirds of employers also reported a combination of applicant shortages and insufficient training for Electrical, Electronic, and Electromechanical Equipment Assemblers (**65.9%**) and Electrical and Electronic Engineering Technologists and Technicians (**62.7%**) (Exhibit 38).

Exhibit 38. ZEV Manufacturing Employer Agreement with Hiring Challenges by Occupation

Occupation	Not enough applicants	Enough applicants, but not training or education	Enough applicants, but no prior experience	Enough applicants, but unable to recruit for the wages
Chemical Plant and System Operators (n=9)	88.9%	88.9%	55.6%	55.6%
Welders, Cutters, Solderers, Brazers (n=9)	77.8%	77.8%	44.4%	44.4%
Electrical, Electronic, and Electromechanical Equipment Assemblers (n=44)	65.9%	65.9%	61.4%	36.4%
Electrical and Electronic Engineering Technologists and Technicians (n=51)	62.7%	62.7%	58.8%	41.2%
Network and Computer Systems Administrators (n=14)	57.1%	71.4%	64.3%	57.1%
CNC Tool Operators (n=14)	57.1%	71.4%	57.1%	28.6%
Industrial Production Managers (n=32)	53.1%	65.6%	53.1%	34.4%
Industrial Machinery Mechanics (n=30)	36.7%	60.0%	53.3%	20.0%

Note: Values represent the combined percentage of respondents who selected “Somewhat agree” or “Strongly agree.” Darker shading indicates a higher percentage of agreement, while lighter shading indicates a lower percentage of agreement.

Employers emphasized safety and occupation-specific technical certifications. **OSHA Safety Certification** was widely cited across key EVSE occupations, including Welders, Electrical, Electronic, and Electromechanical Equipment Assemblers, and Electrical and Electronic Engineering Technologists and Technicians, reflecting the safety-critical nature of EVSE component production. Employers also highlighted technical electrical credentials (e.g. ETA and ISCET Certified Electronics Technician certifications and the California General Electrician License (C-10)), particularly for roles supporting EVSE equipment and systems. Welders and CNC Tool Operators require industry-recognized credentials (a.g. American Welding Society (AWS) and ASME certifications, CNC Operator Certification, and Autodesk Certified Professional).

Exhibit 39. Certifications Preferred or Required by ZEV Manufacturing Employers (n=152)

Occupation	Certification 1	Certification 2	Certification 3
Welders, Cutters, Solderers, and Brazers (n=19)	American Welding Society (AWS) Certification	OSHA Safety Certification	ASME Certification
CNC Tool Operators (n=18)	CNC Operator Certification	Autodesk Certified Professional	Battery Handling Certification
Industrial Machinery Mechanics (n=39)	OSHA Safety Certification	Certified Maintenance and Reliability Technician (CMRT)	NCCER Industrial Maintenance Mechanic
Network and Computer Systems Administrators (n=20)	CompTIA Security+	Cisco Certified Network Associate	C++ Programming Certification
Chemical Plant and System Operators (n=17)	Hazardous Materials Handling Certification	HAZWOPER Certification	Certified Chemical Operator

Occupations	Certification 1	Certification 2	Certification 3
Electrical, Electronic, and Electromechanical Equipment Assemblers (n=55)	OSHA Safety Certification	ETA Certified Electronics Technician	Electronics Technician Certification
Electrical and Electronic Engineering Technologists and Technicians (n=61)	OSHA Safety Certification	ISCET Certified Electronics Technician	California General Electrician License (C-10)

3.8.3 Retail Trade or Sales

Compared to other sectors, ZEV retail trade or sales firms report relatively fewer challenges in finding applicants across most occupations. With the exception of Customer Service Representatives (**40.0%**), fewer than 30% of employers indicated an insufficient number of applicants. However, hiring challenges persist in the form of experience gaps. Slightly over half of surveyed firms reported having applicants without prior experience for Financial Managers, suggesting that candidate availability does not always align with employer expectations for job readiness.

ZEV retail trade or sales firms require a hybrid skill set that combines traditional business competencies, such as management, marketing, and financial oversight, with EV- and clean energy-specific knowledge. For customer-facing roles, including Customer Service Representatives and Sales Representatives, employers most frequently prioritize Electric Vehicle Sales and Customer Service Certification, Clean Energy Sales Certification, and Renewable Energy Customer Engagement Certification. This emphasis underscores the importance of sector-specific product knowledge and customer engagement skills for candidates seeking employment in ZEV retail and sales occupations.

Exhibit 40. ZEV Retail Trade or Sales Employer Agreement with Hiring Challenges by Occupation

Occupation	Not enough applicants	Enough applicants, but not training or education	Enough applicants, but no prior experience	Enough applicants, but unable to recruit for the wages
Customer Service Representatives (n=10)	40.0%	30.0%	30.0%	50.0%
Financial Managers (n=7)	28.6%	0.0%	57.1%	28.6%
Sales Representatives (n=15)	26.7%	26.7%	20.0%	33.3%
Marketing Managers (n=7)	14.3%	14.3%	28.6%	0.0%
General and Operations Managers (n=13)	7.7%	15.4%	23.1%	7.7%
Business Operations Specialists, All Other (n=12)	0.0%	25.0%	33.3%	8.3%

Note: Values represent the combined percentage of respondents who selected “Somewhat agree” or “Strongly agree.” Darker shading indicates a higher percentage of agreement, while lighter shading indicates a lower percentage of agreement.

As shown in Exhibit 41, ZEV retail trade or sales firms require a hybrid skill set that combines traditional business competencies, such as management, marketing, and financial oversight, with EV- and clean energy–specific knowledge. For customer-facing roles, including Customer Service Representatives and Sales Representatives, employers most frequently prioritize Electric Vehicle Sales and Customer Service Certification, Clean Energy Sales Certification, and Renewable Energy Customer Engagement Certification. This emphasis underscores the importance of sector-specific product knowledge and customer engagement skills for candidates seeking employment in ZEV retail and sales occupations (Exhibit 41).

Exhibit 41. Certifications Preferred or Required by ZEV Retail Trade or Sales Employers (n=72)

Occupation	Certification 1	Certification 2	Certification 3
Customer Service Representatives (n=18)	Electric Vehicle Customer Service Certification	Renewable Energy Customer Engagement Certification	ASE Certification
Market Research Analysts and Marketing Specialists (n=3)	Project Management Certification	Automotive Technology Sales License	Environmental Responsibility Certification
General and Operations Managers (n=17)	Project Management Professional (PMP)	OSHA Safety Certification	Alternative Fuel Vehicle Sales Training
Marketing Managers (n=13)	Automotive Marketing Strategy Certification	Certificate in Electric Vehicle Sales & Marketing	Certified Digital Marketing Professional
Sales Representatives (n=24)	Electric Vehicle Sales Certification	Certificate in Electric Vehicle Sales Executive	Clean Energy Sales Certification
Business Operations Specialists, All Other (n=19)	Project Management Certification	Environmental Compliance or Sustainability Management Certification	Data Analysis or Business Operations Certification
Financial Managers (n=11)	Certified Finance Manager	Certified Public Accountant (CPA)	Green Business Practices Certification

3.8.4 Installation

ZEV installation firms reported particularly severe hiring challenges for Industrial Machinery Mechanics, driven by both applicant shortages and qualification gaps. **All surveyed employers reported insufficient applicants for Industrial Machinery Mechanics**, while approximately three in four employers indicated a lack of applicants for Telecommunications Installers and Repairers (**76.9%**) and Electrical Power-Line Installers and Repairers (**75.0%**). In addition to applicant shortages, three in four ZEV installation employers reported that available applicants for Industrial Machinery Mechanics lacked relevant training, education, or prior experience, highlighting compounded hiring barriers within this occupation (Exhibit 42).

Exhibit 42. ZEV Installation Employer Agreement with Hiring Challenges by Occupation

Occupation	Not enough applicants	Enough applicants, but not training or education	Enough applicants, but no prior experience	Enough applicants, but unable to recruit for the wages
Industrial Machinery Mechanics (n=4)	100.0%	75.0%	75.0%	50.0%
Telecommunications Installers and Repairers (n=13)	76.9%	53.8%	46.2%	61.5%
Electrical Power-Line Installers and Repairers (n=16)	75.0%	68.8%	62.5%	62.5%
Electricians (n=26)	65.4%	61.5%	57.7%	46.2%
Electrical and Electronics Repairers (n=43)	51.2%	60.5%	51.2%	41.9%
Operating Engineers and Other Construction Equipment Operators (n=17)	47.1%	47.1%	52.9%	41.2%

Note: Values represent the combined percentage of respondents who selected “Somewhat agree” or “Strongly agree.” Darker shading indicates a higher percentage of agreement, while lighter shading indicates a lower percentage

Similar to the manufacturing sector, ZEV installation firms place strong emphasis on safety-related certifications, such as **OSHA Safety**, **High-Voltage Safety**, and **Electrical Safety** certifications, particularly for Electrical Power-Line Installers and Repairers. Employers also prioritized occupation-specific qualifications, including **Certified Electric Vehicle Technician** and **EVITP Certification** for Electricians, as well as **Certified Maintenance and Reliability Technician** and **EPA Section 609 Certification** for Industrial Machinery Mechanics (Exhibit 43).

Exhibit 43. Certifications Preferred or Required by ZEV Installation Employers (n=121)

Occupation	Certification 1	Certification 2	Certification 3
Industrial Machinery Mechanics (n=7)	Certified Maintenance and Reliability Technician (CMRT)	Electrical License	EPA Section 609 Certification
Welders, Cutters, Solderers, and Brazers (n=6)	American Welding Society (AWS) Certification	6G Pipe Welding Endorsement	EPA Section 608 Certification
Telecommunications Installers and Repairers (n=17)	Electrical Lineworker Certification	Open Charge Point Protocol (OCP) Certification	BICSI ITS Technician Certification
Electrical Power-Line Installers and Repairers (n=21)	Journeyman Lineman Certification	High-Voltage Safety Certification	OSHA Safety Certification
Operating Engineers and Other Construction Equipment Operators (n=24)	Open Charge Point Protocol (OCP) Certification	EVITP Certification	EPA Section 609 Certification
Electrical and Electronics Repairers (n=55)	Certified Electric Vehicle Technician (CEVT)	OSHA Safety Certification	High-Voltage Safety Certification
Electricians (n=38)	Certified Electrical Safety Certification	OSHA Safety Certification	EVITP Certification

3.8.5 Maintenance or Repair

Firms reported hiring challenges. Most reported insufficient Automotive Service Technicians and Mechanics applicants (94.4%) and applicants lacking experience (88.9%). About half of employers reported not enough applicants for Electrical and Electronics Repairers (54.5%) and First-line Supervisors of Mechanics, Installers, and Repairers (54.2%). One third reported applicant shortages for Electricians (38.5%) and Bus and Truck Mechanics and Diesel Engine Specialists (33.3%). Hiring challenges were also reported for Electrical Power-Line Installers and Repairers. Nearly two thirds of employers had inexperienced applicants (64.7%) or were unable to recruit at the offered wage (64.7%) (Exhibit 44).

Exhibit 44. ZEV Maintenance or Repair Employer Agreement with Hiring Challenges by Occupation

Occupation	Not enough applicants	Enough applicants, but not training or education	Enough applicants, but no prior experience	Enough applicants, but unable to recruit for the wages
Automotive Service Technicians and Mechanics (n=18)	94.4%	77.8%	88.9%	66.7%
Helpers – Installation, Maintenance, and Repair Workers (n=14)	64.3%	64.3%	57.1%	71.4%
Electrical & Electronics Repairers (n=55)	54.5%	41.8%	43.6%	41.8%
First-line Supervisors of Mechanics, Installers, and Repairers (n=24)	54.2%	45.8%	58.3%	50.0%
Electrical Power-Line Installers and Repairers (n=17)	47.1%	58.8%	64.7%	64.7%
Industrial Machinery Mechanics (n=19)	42.1%	31.6%	47.4%	26.3%
Electricians (n=13)	38.5%	30.8%	30.8%	38.5%
Bus and Truck Mechanics & Diesel Engine Specialists (n=9)	33.3%	44.4%	44.4%	44.4%

Note: Values represent the combined percentage of respondents who selected “Somewhat agree” or “Strongly agree.” Darker shading indicates a higher percentage of agreement, while lighter shading indicates a lower percentage of agreement.

ZEV maintenance or repair employers require a range of certifications that vary by occupation but commonly include safety-related, electric vehicle–specific, and power line technician credentials. For example, employers frequently identified the Electric Vehicle Infrastructure Training Program (EVITP) certification as important for Electricians, Electrical Power-Line Installers and Repairers, Electrical and Electronics Repairers, and Helpers. Just over one-quarter of employers (27.3%) also identified Electric Vehicle Supply Equipment (EVSE) certification (e.g., EVSE technician certification offered by SAE International) as important for Electrical and Electronics Repairers. In addition, ASE Certification was consistently prioritized for Automotive Service Technicians and Mechanics, Bus and Truck Mechanics and Diesel Engine Specialists, and Industrial Machinery Mechanics (Exhibit 45).

Exhibit 45. Certifications Preferred or Required by ZEV Maintenance or Repair Employers (n=181)

Occupation	Certification 1	Certification 2	Certification 3
Helpers – Installation, Maintenance, and Repair Workers (n=39)	OSHA Safety Certification	ASE Certification	EVITP Certification
Electricians (n=31)	Electric Vehicle Infrastructure Training Program (EVITP)	Journeyman Electrician License	High-Voltage Safety Certification
Automotive Service Technicians and Mechanics (n=24)	ASE Certification	OEM EV Training Certifications	California Smog Check Inspector License
Electrical Power-Line Installers and Repairers (n=24)	EVITP Certification	Apprentice Lineman Certification	Electrical Power Line Technician Certification
First-line Supervisors of Mechanics, Installers, and Repairers (n=28)	ASE Certification	OSHA Safety Certification	EVITP Certification

Occupation	Certification 1	Certification 2	Certification 3
Electrical and Electronics Repairers (n=66)	Electric Vehicle Supply Equipment (EVSE) Certification	EVITP Certification	CEVT Certificate
Bus and Truck Mechanics and Diesel Engine Specialists (n=14)	ASE Certification	Certified Electric Vehicle Technician (CEVT)	EPA Section 609 Certification
Industrial Machinery Mechanics (n=25)	OSHA Safety Certification	Certified Maintenance and Reliability Technician (CMRT)	ASE Certification

3.8.6 Professional or Business Services; Management, Operation, or Ownership of ZEV Fleets or ZEV-related Infrastructure

ZEV professional or business services firms reported not having enough applicants, particularly for Financial Analysts and Customer Service and Sales Representatives. More than three quarters of employers indicated insufficient applicants for Financial Analysts (75.9%), while 70.0% reported applicant shortages for Customer Service and Sales Representatives. Even when applicants were available, many employers continued to report difficulty finding candidates with prior experience for both Financial Analysts (73.1%) and Customer Service and Sales Representatives (71.5%). In addition, approximately two thirds of employers reported insufficient applicants for Business Operations Specialists and General and Operations Managers, alongside substantial challenges related to training, experience, and wage alignment. For Computer and Information Systems Managers and Civil Engineers, employers more frequently cited gaps in prior experience, training, and compensation rather than applicant availability (Exhibit 46).

Exhibit 46. ZEV Professional or Business Services Employer Agreement with Hiring Challenges by Occupation

Occupations	Not enough applicants	Enough applicants, but not training or education	Enough applicants, but no prior experience	Enough applicants, but unable to recruit for the wages
Financial Analysts (n=15)	75.9%	73.1%	63.9%	42.6%
Customer Service and Sales Representatives (n=41)	70.0%	71.5%	42.5%	62.0%
Business Operations Specialists, All Other (n=53)	64.4%	67.6%	60.8%	50.7%
General and Operations Managers (n=68)	64.2%	53.9%	62.4%	48.2%
Civil Engineers (n=16)	53.8%	52.9%	56.7%	63.5%
Computer and Information Systems Managers (n=43)	43.6%	63.9%	66.8%	51.9%

Note: Values represent the combined percentage of respondents who selected "Somewhat agree" or "Strongly agree." Darker shading indicates a higher percentage of agreement, while lighter shading indicates a lower percentage of agreement.

ZEV professional or business services employers require a combination of traditional professional credentials and EV-specific certifications. Commonly cited certifications include Certified Sales Professional, Certified Public Accountant, and Project Management Professional, alongside EV-focused credentials such as EVITP Certification and Electric Vehicle Sales Professional (EVSP) Certification, particularly for Customer Service and Sales Representatives and General and Operations Managers. For Computer and Information Systems Managers and Civil Engineers, employers emphasized occupation-specific credentials, including Certified Information Systems Security Professional and Electric Vehicle Fundamentals Certification, reflecting the technical specialization required for these role (Exhibit 47).

Exhibit 47. Certifications Preferred or Required by ZEV Professional or Business Services Employers (n=233)

Occupations	Certification 1	Certification 2	Certification 3
Customer Service and Sales Representatives (n=79)	Certified Sales Professional	Certificate in Electric Vehicle Sales Executive	Electric Vehicle Sales Professional (EVSP) Certification
Financial Analysts (n=20)	Certified Public Accountant (CPA)	Chartered Financial Analyst (CFA)	Certified Financial Modeling and Valuation Analyst (FMVA)
Computer and Information Systems Managers (n=60)	Project Management Professional (PMP)	Certified Information Systems Security Professional (CISSP)	CompTIA A+
General and Operations Managers (n=86)	EVITP Certification	Certified Automotive Fleet Manager (CAFM)	Project Management Professional (PMP)
Business Operations Specialists, All Other (n=75)	Project Management Professional (PMP)	Certified Business Analysis Professional (CBAP)	Green Vehicle Awareness Certification
Civil Engineers (n=22)	Professional Engineer (PE) License	Certified Engineering Technician (CET)	Electric Vehicle Fundamentals Certification

Section IV: Education & Training Capacity Analysis — Supply-Side

The California Community Colleges serve over **2.2 million students statewide** across 116 community colleges, and this network of colleges is critical for preparing students for ZEV jobs. Within the five-county, Southern California region, there are **46 community colleges**, or nearly 40% of the state's total. To better understand current program offerings that prepare students with the knowledge, training, and skills necessary for critical ZEV roles, the Los Angeles Center of Excellence for Labor Market Research (LA COE) analyzed current community college programs and courses offered in the five-county region related to ZEVs, including EVs, battery electric vehicles (BEVs), and hydrogen fuel cell vehicles (FCVs), EV infrastructure and maintenance (training for EVSE Technicians), and EV charging stations. This analysis provides insight into the current capacity to fill roles and meet workforce demand, while also identifying opportunities to strengthen future capacity.

The following section summarizes: (1) existing community college programs that directly train for degrees or certificates focused on ZEV; (2) existing community college programs that may not directly train for ZEV degrees or certificates, but that incorporate ZEV courses as part of the curriculum; and (3) programs that could be expanded to include ZEV knowledge and skills.

4.1 Methodology

First, LA COE used the Chancellor's Office Curriculum Inventory (COCI) to identify existing programs and courses to determine relevant TOP codes for this analysis. Second, the LA COE reviewed existing active or approved programs through January 2026 within the region and flagged any program titles that included ZEV-relevant terms, such as 'electric vehicle (EV),' 'zero-emissions,' or 'EV charging station.' A similar review process was conducted with courses, and any course that included keywords in the title were reviewed and tagged as directly ZEV-relevant courses.

The LA COE then identified additional courses that may not include ZEV terms in the course title, but that may support ZEV preparation, reviewed community college websites to gather course descriptions, and coded these courses as directly train for ZEV or ZEV-relevant. The goal was to capture coursework that

builds foundational knowledge and skills necessary for ZEV-related work, but that may not explicitly focus on ZEVs. Community college websites were used to validate program and course descriptions. The LA COE used the list of programs to identify relevant Taxonomy of Program (TOP) codes, and this list formed the basis of this analysis.

Please note that although efforts were made to capture all ZEV-relevant programs and courses, the availability of these offerings may change, some programs may revise requirements, and some courses may be currently available that are not reflected in this scan.

4.2 ZEV-Relevant TOP Codes and Program Distribution

The following four TOP codes were associated with ZEV-relevant programs:

0934.00

Electronics and Electric Technology

0947.00

Diesel Technology

0948.00

Automotive Technology

0948.40

**Alternative Fuels and Advanced
Transportation Technology**

4.2.1 ZEV Programs

In 2025, L.A. Trade-Tech College advanced development of a new Electric Vehicle Charging Station Installation, Maintenance and Repair program. The program has been approved, but it has not yet been offered due to challenges with implementation. Given that this program is centered in Los Angeles County, expansion across the region is essential.

4.2.2 ZEV-Relevant Programs

Currently, 37 community colleges offer programs within these TOP codes in the five-county, Southern California region, and **12 community colleges provide ZEV-relevant training** through degrees, certificates, or noncredit offerings.

Exhibit 48. Community colleges that offer ZEV-relevant programs in the five-county region

Citrus College	Long Beach City College
Desert College	Rio Hondo College
El Camino College	Riverside City College
Golden West College	San Bernardino Valley College
L.A. Pierce College	Saddleback College
L.A. Trade-Tech College	Santa Ana College

Data Source: California Community College Chancellor's Office data, 2021-22 to 2023-24.

Exhibit 49 lists the number of colleges with programs by TOP code. Most ZEV-relevant programs are listed in **Alternative Fuels and Advanced Transportation Technology** (TOP 0948.40) and **Automotive Technology** (0948.00) in the region. A list of ZEV-relevant programs can be found in Appendix B.

Exhibit 49. Number of community colleges with ZEV-focused training programs by TOP Code

TOP Code	Title	SoCal Programs	SoCal ZEV Programs
0934.00	Electronics and Electric Technology	20	1
0947.00	Diesel Technology	6	1
0948.00	Automotive Technology	28	5
0948.40	Alternative Fuels and Advanced Transportation Technology	11	9

Most ZEV-relevant programs integrate training in electric and hybrid vehicle technologies, and only one is focused on charging stations. In addition to credit and noncredit programs, some regional community colleges offer ZEV-relevant not-for-credit programs (commonly referred to as contract education), like Cerritos College's Community and Fee-Based Courses Alternative and Renewable Maintenance Training, which upskills the existing workforce to current ZEV standards.

4.3 Student Outcomes: Awards and Completions

To estimate the number of ZEV-relevant awards granted, the LA COE analyzed the average number of awards conferred by ZEV-relevant programs between the academic program years of 2021-22 to 2023-24. Across all programs in the four TOP codes, community colleges in Southern California conferred **5,251 awards**, and **655 awards** were from community colleges with ZEV-relevant programs.

Exhibit 50. Number of Awards (Certificates and Degrees) Conferred by Community Colleges in the five-county region and California, Three-Year Average, (2021-22, 2022-23, 2023-24)

TOP Code	Title	SoCal Program Awards	SoCal ZEV Program Awards
0934.00	Electronics and Electric Technology	469	0
0947.00	Diesel Technology	148	10
0948.00	Automotive Technology	1,894	190
0948.40	Alternative Fuels and Advanced Transportation Technology	58	57
TOTAL		2,569	257

Key Finding: Only 10% of awards in ZEV-relevant TOP codes come from ZEV-specific programs (257 of 2,569), indicating substantial opportunity to integrate ZEV content into existing Automotive, Diesel, and Electronics programs.

4.4 ZEV-Relevant Courses

To assess the breadth and types of courses available in Southern California, the LA COE identified **67 active or approved ZEV-relevant courses**. While 12 community colleges offer ZEV-relevant training programs, an additional 12 colleges offer courses that may not directly lead to a ZEV-focused award, but that incorporate ZEV-relevant coursework as part of an existing programs.

To assess the breadth and types of courses available in Southern California, the LA COE identified 67 active or approved ZEV-relevant courses. While 12 community colleges offer ZEV-relevant training programs, an additional 12 colleges offer courses that may not directly lead to a ZEV-focused award, but that incorporate ZEV-relevant coursework as part of an existing program.

The 12 community colleges in the five-county Southern California region that offer coursework but do not have a Chancellor's Office approved ZEV-relevant program of study include:

Exhibit 51. Community colleges that offer ZEV-relevant coursework but do not have an approved ZEV program in the five-county region

College of the Canyons	North Orange Continuing Education
Cerritos College	Oxnard College
Copper Mountain College	Palo Verde College
Cypress College	Pasadena City College
East L.A. College	Santa Monica College
Mt. San Jacinto College	Victor Valley College

Data Source: California Community College Chancellor's Office data, 2021-22 to 2023-24.

The majority of these courses are within Alternative Fuels and Advanced Transportation Technology (TOP 0948.40) and Automotive Technology (TOP 0948.00). Most courses provide an introduction to both hybrid and electric vehicle technologies that cover terminology, systems, and safety basics. A full list of courses can be found in Appendix C.

Example Courses:

- **Introduction to Hybrid and Electric Vehicles (College of the Canyons):** Covers use and service of hybrid electronic generation, plug-in battery-electric power, and high voltage safety.
- **Manufacturer-Specific Programs:** Long Beach City College's Rivian Program; Rio Hondo College's Tesla Student Automotive Technician (START) Program.

4.5 EVITP and Electrical Programs — Critical Expansion Opportunity

This analysis also revealed courses under TOP code Electrical (0952.20), associated with electrical charging stations, including the Electric Vehicle Infrastructure Training Program (EVITP) Certification Exam Preparation Course through L.A. Trade-Tech College. This program trains and certifies electricians installing electric vehicle supply equipment (EVSE), which is a key industry credential as all EV charger installations funded by California Public Utilities Commission (CPUC), California Energy Commission (CEC), or certain state programs must include at least one **EVITP certified electrician**. Although the program has been approved, it has not yet been offered due to implementation challenges.

Critical Finding: Although only one Electrical program clearly lists ZEV-relevant courses based on course titles, there are **nine colleges with Electrical programs** in the Southern California region that could expand coursework to include ZEV training. These programs conferred on average **347 awards annually** from 2021-22 to 2023-24 in the Southern California region.

Exhibit 52 shows the average number of awards conferred by Electrical programs with potential for expansion to include ZEV curriculum. These programs conferred on average 347 awards annually from 2021-22 to 2023-24 in the Southern California region.

Exhibit 52. Number of Electrical Program Awards (Certificates and Degrees) Conferred by community colleges in the five-county region and California, Three-Year Average, 2021-22 to 2023-24

TOP Code	Title	Total Awards
0952.20	Electrical	347

Data Source: California Community College Chancellor's Office data, 2021-22 to 2023-24.

Strategic Implication: Given that **76.3% of ZEV installation firms report difficulty hiring EVSE Technicians** (Section 3.8.4, Installation sector findings), and only one CCC program currently trains for this role, expanding EVITP preparation into other Electrical programs represents the **single highest-impact intervention** to address workforce gaps.

Section V: Integrated Gap Analysis — Demand vs. Supply

This section synthesizes findings from the demand-side employer survey and occupational analysis (Sections III) with the supply-side CCC program inventory and student outcomes (Section IV) to identify critical alignment gaps, geographic mismatches, and occupational shortfalls.

5.1 Occupation-Level Demand–Supply Comparison

EVSE Technicians (SOC 49-2094): CRITICAL SHORTAGE

- **Demand:** 76.3% of installation firms report difficulty hiring; 60.5% report applicants with no training; 83.3% of maintenance/repair firms report difficulty hiring; EVSE Technicians identified as most difficult occupation to transition into ZEV work by installation firms and the second most difficult occupation to transition into ZEV work by maintenance/repair firms.
- **Supply:** Only one CCC program (L.A. Trade-Tech) has been approved but has not yet been implemented for EVSE roles in Los Angeles County.
- **Gap Assessment:** Severe shortage. Immediate expansion needed.

Electricians (SOC 47-2111): CRITICAL SHORTAGE

- **Demand:** 68.4% of installation firms report difficulty hiring; 6% projected growth by 2029; 35,535 electricians as of 2024.
- **Supply:** Nine CCC Electrical programs (347 annual awards); only one explicitly includes EVITP/ZEV content.
- **Gap Assessment:** Severe shortage. Substantial capacity exists but requires ZEV curriculum integration

Automotive Service Technicians and Mechanics (SOC 49-3023): MODERATE GAP

- **Demand:** 72.7% of maintenance/repair firms identify this occupation as the most difficult to transition; 75.0% report difficulty hiring; 94.4% not enough applicants; 1% projected growth 2024-2039.
- **Supply:** 28 CCC Automotive Technology programs; Five have ZEV-relevant programs; 190 ZEV-relevant program awards annually.
- **Gap Assessment:** Moderate gap. Strong base of programs but ZEV content needs broader integration.

Engineering Technologists and Technicians (SOC 17-3023): MODERATE GAP

- **Demand:** 67.4% of design firms identify as most difficult to transition; 61.4% report difficulty hiring; 83.6% of manufacturing firms report difficulty hiring.
- **Supply:** No CCC program in Other Engineering and Related Industrial Technologies.
- **Gap Assessment:** Moderate gap but employers report uncertainty about training quality (65.1% do not partner with training institutions).

5.2 Geographic Alignment

Demand Concentration: 51.4% of ZEV employers are in the five-county Southern California region (Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties).

Supply Distribution: 12 colleges across the five-county region offer ZEV-relevant programs, and Los Angeles County hosts six of these programs (50%).

- ❑ **Geographic Gap:** Southern California employer concentration (52%) exceeds proportional program availability (22%), particularly for EVSE programs (only L.A. County). The Inland Empire is underserved.

5.3 Statewide Scale: Completions vs. Projected Demand

Projected ZEV workforce by 2045: 514,000 jobs (UCLA Luskin study)

Current CCC ZEV-relevant program completions: 521 annually (2021-22 to 2023-24 average)

Implied annual need (2025-2045, 20 years): 25,700 new workers per year

Current pipeline meets: 2.0% of annual need

- ❑ **Scale Gap:** CCC ZEV programs would need to increase completions 49-fold to meet projected demand, assuming all completers enter the ZEV workforce. Even accounting for workers reskilling from ICE roles, substantial expansion is required.

Section VI: Integrated Recommendations

The following recommendations integrate demand-side employer needs with supply-side program capacity to provide specific, actionable guidance.

6.1 Immediate Priority: Expand EVSE Technician Training

1. Add EVITP certification preparation to all CCC Electrical programs.
2. Establish new EV Charging Station Installation, Maintenance and Repair programs beyond Los Angeles County, prioritizing the Inland Empire region.
3. Provide equipment grants to support hands-on EVSE training labs (Level 1, 2, and DC Fast Charging equipment).

Rationale: 76.3% of installation firms report difficulty hiring EVSE Technicians, yet only one program trains for this role. Electrical programs represent an opportunity to expand training capacity.

6.2 Automotive and Diesel Programs: Integrate ZEV Content

1. Require all Automotive Technology programs to integrate high-voltage safety, BEV diagnostics, and ZEV drivetrain systems into core curriculum.
2. Expand manufacturer-specific partnerships (Tesla START, Rivian) to additional colleges.
3. Develop stackable certificate pathways allowing students to add ZEV specialization to existing Automotive credentials.

Rationale: 1,894 annual Automotive program awards but only 190 (10%) awards from ZEV-relevant programs. The employer survey shows 72.7% of maintenance firms identify Automotive Service Technicians as most difficult to transition, indicating a training gap.

6.3 Standards and Quality Assurance

1. CARB and CCCs jointly develop ZEV training standards for high-voltage safety, battery systems, and EVSE installation aligned with industry certifications.
2. Create state-recognized ZEV credentials that employers trust, addressing the 25% of employers who cite uncertainty about training quality.
3. Require all ZEV programs to maintain industry advisory boards with annual employer input on curriculum relevance.

6.4 Equity and Accessibility

1. Establish ZEV Wraparound Services Fund to support language assistance, transportation, childcare, and basic needs for students in ZEV programs, prioritizing disadvantaged communities.
2. Target recruitment in communities with high unemployment and proximity to ZEV employers (Inland Empire).
3. Develop ZEV pre-apprenticeship programs for formerly incarcerated individuals, partnering with regional correctional facilities.

6.5 Employer-CCC Partnership Development

1. Create Regional ZEV Employer Consortia to aggregate small employer hiring needs and coordinate with local CCCs.
2. Establish equipment co-investment program where employers fund 50% of ZEV training equipment in exchange for priority hiring access.
3. Develop work-based learning pathways with all 12 ZEV program colleges by the end of 2026.

Rationale: Only 23.9% of employers work with CCCs. Among those who don't, primary barriers are: don't hire enough to justify partnership (cited by smaller firms) and uncertainty about quality. Consortia should address the first barrier; standards should address the second.

6.6 Funding Priorities (Ranked by Impact)

1. **EVITP Expansion:** Equipment, faculty training, curriculum development for Electrical programs.
2. **EVSE Program Creation:** Launch new charging station programs in underserved regions.
3. **Automotive ZEV Integration:** Curriculum development and faculty professional development for related programs.
4. **Wraparound Services Expansion:** Transportation, childcare, and basic needs support at all ZEV program colleges.
5. **Equipment and Lab Investment:** Training vehicles, charging equipment, high-voltage safety labs.

Appendix A: Definitions

Key Definitions

TOP Code

Taxonomy of Program code used by California Community Colleges to classify instructional programs.

EVITP

Electric Vehicle Infrastructure Training Program, nationally recognized certification for electricians installing EV charging equipment.

EVSE

Electric Vehicle Supply Equipment (EV chargers).

BEV

Battery Electric Vehicle.

FCEV

Fuel Cell Electric Vehicle (hydrogen-powered).

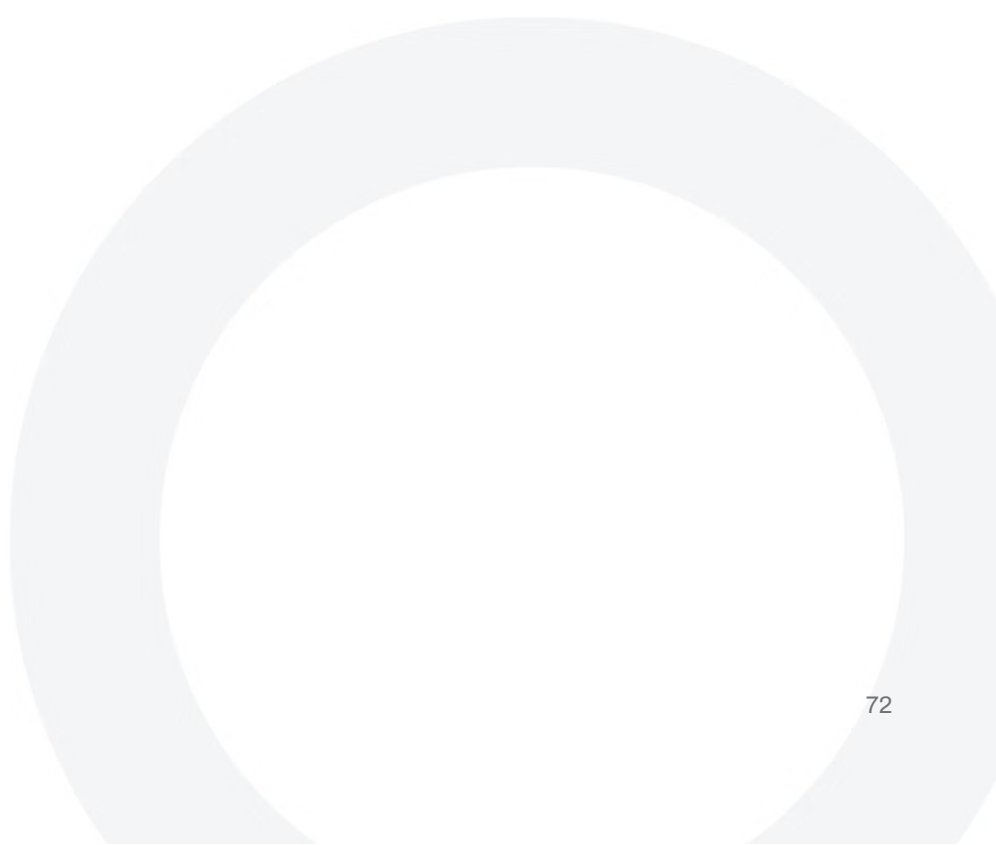
SOC

Standard Occupational Classification, federal system for classifying occupations.

Appendix B: Community College ZEV-Relevant Training Programs

TOP Code and Title	College	Program Title	Award Type
Electronics and Electric Technology (0934.00)	L.A. Trade-Tech	EV Charging Station Installation, Maintenance, and Repair	Certificate
Diesel Technology (0947.00)	Santa Ana	Electric Heavy-Duty Vehicle Service	Certificate
Diesel Technology (0947.00)	Santa Ana	Electric Heavy-Duty Vehicles	A.S. Degree
Automotive Technology (0948.00)	Citrus	Clean Energy and Vehicle Electrification Technology	Certificate
Automotive Technology (0948.00)	L.A. Pierce	Automotive Electric Vehicle Technician	Certificate
Automotive Technology (0948.00)	Riverside City	Automotive Hybrid and Electrical Vehicle	A.S. Degree / Certificate
Automotive Technology (0948.00)	Saddleback	Automotive Electric Vehicle Technician	Certificate
Automotive Technology (0948.00)	Santa Ana	Electric/Hybrid Vehicle Technician	Certificate

TOP Code and Title	College	Program Title	Award Type
Automotive Technology (0948.00)	Santa Ana	Introduction to Electric and Hybrid Vehicles	Noncredit
Alternative Fuels and Advanced Transportation Technology (0948.40)	Desert	Hybrid, Fuel-Cell, & Electric Vehicle	Certificate
Alternative Fuels and Advanced Transportation Technology (0948.40)	El Camino	Hybrid, Electric and Alternative Fuels	A.S. Degree / Certificate



Appendix C: Community College ZEV-Relevant Courses

TOP Code And Title	College	Course Title	Credit Status
Diesel Technology (0947.00)	L.A. Trade-Tech	Advanced Hybrid and Electric Vehicles	For-Credit
	L.A. Trade-Tech	Hybrid and Electric Vehicle	For-Credit
	L.A. Trade-Tech	Introduction to Alternative Fuels & Hybrid and Electric Vehicle Technology	For-Credit
	Santa Ana	Alternative Fuels, Diesel, Emissions, and Zero Emissions Systems	For-Credit
	Santa Ana	High Voltage and Electrical Systems	For-Credit
Automotive Technology (0948.00)	Citrus	Hybrid and Electric Vehicle Technology	For-Credit
	East L.A.	Light Duty Hybrid/Electric Vehicle	For-Credit
	Golden West	Electric Vehicles	For-Credit
	L.A. Pierce	Advanced ZEV Chassis Electronics	For-Credit
	L.A. Pierce	ZEV Battery Management and Technology	For-Credit
	Long Beach City	Light Duty Hybrid and Electric Vehicles	Noncredit
	North Orange Continuing Education	Intro Electric/Hybrid Vehicles	Noncredit
	Palo Verde	Introduction to Hybrid, Electric Vehicle and Alternative Propulsion Technology	For-Credit

TOP Code And Title	College	Course Title	Credit Status
Automotive Technology (0948.00)	Pasadena City	Honda Pact Hybrid, Electric and Alternative Fuels	For-Credit
	Rio Hondo	Hybrid/Electric Vehicles	For-Credit
	Riverside City	Advanced Hybrid and Electric Vehicle Technology	For-Credit
	Riverside City	Hybrid and Electric Vehicle Technology 1	For-Credit
	Riverside City	Introduction to Hybrid and Electric Vehicle Technology	For-Credit
	Saddleback	Automotive Electrical Systems	For-Credit
	Santa Ana	Introduction to Hybrid/Electric Vehicles	For-Credit
	Santa Ana	Introduction to Hybrid/Electric Vehicles	Noncredit
	Santa Ana	Light Duty Hybrid/Electric Vehicles (L3)	For-Credit
	Santa Monica	Introduction to Hybrid and Electric Vehicle Technology	For-Credit
	Victor Valley	Electric Vehicle Design and Construction	For-Credit
	Victor Valley	Electric Vehicle Design and Production	For-Credit
	Victor Valley	Electric Vehicle Design and Maintenance	For-Credit
Victor Valley	Introduction to Hybrid, Electric Vehicle, and Alternative Propulsion Vehicle Technology	For-Credit	

TOP Code And Title	College	Course Title	Credit Status
Alternative Fuels And Advanced Transportation Technology (0948.40)	Canyons	Introduction to Hybrid and Electric Vehicles	For-Credit
	Cerritos	Introduction to High Voltage Vehicles	For-Credit
	Copper Mountain	Introduction to Hybrid and Electric Vehicle Technology	For-Credit
	Cypress	Introduction Electric-Hybrid Vehicles	For-Credit
	Desert	Hybrid, Fuel-Cell & Electric Vehicle Diagnosis & Repair	For-Credit
	Desert	Intro to Hybrid, Electric & Fuel-Cell Vehicle Technology	For-Credit
	El Camino	Hybrid, Fuel-Cell and Electric Vehicle Diagnosis & Repair	For-Credit
	El Camino	Introduction to Hybrid, Electric and Fuel-Cell Vehicle Technology	For-Credit
	Golden West	Hybrid and Electric Vehicle Introduction	For-Credit
	L.A. Pierce	Electric Vehicle Charging Systems and Plug- In Technology	For-Credit
	L.A. Pierce	Introduction to Electric Zero Emissions Vehicle (ZEV) Technology	Noncredit
	L.A. Pierce	Zero Emission Electric and Hybrid Vehicle (ZEV) Safety and Maintenance	Noncredit
	Long Beach City	Intro to Hybrid and Electric Vehicles	For-Credit

TOP Code And Title	College	Course Title	Credit Status
Alternative Fuels And Advanced Transportation Technology (0948.40)	Long Beach City	Intro to Hybrid and Electric Vehicles	Noncredit
	Long Beach City	Intro to Rivian	For-Credit
	Long Beach City	Light Duty EV Powertrain Diagnostics	For-Credit
	Long Beach City	Light Duty Hybrid and Electric Vehicles	For-Credit
	Long Beach City	Rivian Chassis Systems	For-Credit
	Long Beach City	Rivian Electrical and Thermal Management	For-Credit
	Long Beach City	Rivian HV Theory and Diagnosis	For-Credit
	Mt. San Jacinto	Introduction to Hybrid and Electric Vehicle Technology	For-Credit
	Oxnard	Introduction to Hybrid and Electric Vehicle Technology	For-Credit
	Oxnard	Light Duty Electric Vehicles	For-Credit
Rio Hondo	Advanced Hybrid/Electric Vehicle	For-Credit	

TOP Code And Title	College	Course Title	Credit Status
Alternative Fuels And Advanced Transportation Technology (0948.40)	San Bernardino	Electric Vehicle (EV) and Alternative Fuel Vehicle - Laboratory	For-Credit
	San Bernardino	Introduction to Hybrid and Electric Vehicle Technology	For-Credit
	San Bernardino	Zero Emission Heavy Duty Truck	For-Credit
Electrical (0952.20)	L.A. Trade-Tech	Electric Vehicle Charging Installation	For-Credit
	L.A. Trade-Tech	Electric Vehicle Charging Operation And Maintenance	For-Credit
	L.A. Trade-Tech	EVITP Certification Exam Preparation Course	For-Credit

TOP Code And Title	College	Course Title	Credit Status
Alternative Fuels And Advanced Transportation Technology (0948.40) (continued)	Rio Hondo	Automotive EV Electronics I	For-Credit
	Rio Hondo	Automotive EV Electronics II	For-Credit
	Rio Hondo	Introduction to Hybrid and Electric Vehicle Technology	For-Credit
	Rio Hondo	Tesla Student Automotive Technician (Start) Program - A	For-Credit
	Rio Hondo	Tesla Student Automotive Technician (Start) Program - B	For-Credit
	Rio Hondo	Tesla Student Automotive Technician (Start) Program - C	For-Credit
	Rio Hondo	Tesla Student Automotive Technician (Start) Program - D	For-Credit
	Saddleback	Hybrid and Electrical Vehicle Technology	For-Credit
	San Bernardino	Automotive EV Work Experience	For-Credit
	San Bernardino	Electric Vehicle (EV) and Alternative Fuel Vehicle	For-Credit



Southern California's Zero-Emission Vehicle Workforce

Electric Vehicle & Electrical Vehicle Supply Equipment (EV & EVSE) Workforce Needs Assessment

March 2026