Chapter 7:
Sustainable Transportation

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I. Overview of the Sector and Key Climate Policies

A. Overview of the Sector

California’s transportation sector is the state’s largest source of greenhouse gas emissions, accounting for 39 percent of the statewide total.\(^1\) It is also the largest source of criteria air pollutants and toxic diesel particulate matter emissions in the state. At the same time, the transportation system underpins our economy. The freight system moves trillions of dollars of goods each year, supporting nearly one-third of the state economy and more than 5 million jobs. In addition, passenger vehicles move people a total of 342,000 miles per day.\(^2\) The state’s transportation sector depends largely on petroleum-based fuels, with 91 percent of the roughly 29.8 million vehicles in the state relying exclusively on either gasoline or diesel for fuel.\(^3\) The central role of sustainable transportation in mitigating climate change underscores the importance of addressing workforce issues in order to deliver skills to employers in this industry and ensure positive outcomes for workers as the transition to low-carbon transportation proceeds. With emissions from the transportation sector continuing to rise despite increases in fuel efficiency and decreases in the carbon content of fuel, California will not achieve the necessary greenhouse gas emissions reductions to meet mandates for 2030 and beyond without significant changes to how communities and transportation systems are planned, funded, and built.\(^4\)

Exhibit 7.1 shows the current emissions from transportation as a portion of the state’s total emissions.

Exhibit 7.2 shows the trends in emissions (in million metric tons of carbon dioxide equivalent, or MMTCO2e) from transportation over time: first for 1990, the reference year for percentage reductions; for 2017, the most recent data at the time of writing; and finally, the estimated range of emissions in 2030 from implementing the measures identified in the Scoping Plan. Missing from this figure are the expected emission reductions from the Cap-and-Trade Program. Since this market-based program covers all large sources of greenhouse gas emissions across sectors and does not predetermine where emission reductions will occur, its projected impact in each sector cannot be specified.

The transportation sector involves both goods movement and people movement. In general, these two subsectors have quite different dynamics and will be treated separately in this chapter when these differences affect jobs and workers. The term “light-duty” vehicles refers to cars, pick-up trucks, and minivans, which are still mostly operated by individual owners for their personal use, while the terms “medium-duty” and “heavy-duty” vehicles refer to trucks, buses, and other vehicles that are operated for commercial and public purposes.
Exhibit 7.1. Transportation Sector Emissions (MMTCO2E) as of 2017


Exhibit 7.2. Transportation Sector Emissions, 1990 and 2017, and Expected Range of Emissions in 2030 after Implementation of Scoping Plan Measures

Passenger travel accounts for 70 percent of all greenhouse gas emissions within the state’s transportation sector. It is mostly characterized by individual drivers and household car ownership, although a small portion of passenger travel is by public transit, taxis, or transportation network companies (TNCs). In 2017, the state had 25.4 million registered automobiles and 26.9 million licensed drivers.\(^5\)

In 2014, freight-dependent businesses generated an estimated $740 billion in revenue and employed more than 5 million people.\(^6\) Trucking is the primary mode of goods movement within California and serves as a critical link between other freight transportation modes (e.g., rail, air, and ship). While medium- and heavy-duty vehicles make up a small number of the total vehicles in the state—just under 1 million out of 30 million, or around 3 percent—they account for 22 percent of the state’s on-road greenhouse gas emissions because of their size, extensive usage (mileage and hours of operation), and almost complete reliance on petroleum-based fuels, primarily diesel fuel.\(^7\) Because truck freight accounts for most of the demand for cargo movement, developing and deploying zero-and low-emission technologies in trucking is a major priority in reducing greenhouse gas emissions from transportation. Ports, railroads, and warehouse/distribution centers also play vital roles in California’s multi-modal freight system and the state’s economy. Due to resource constraints, however, this report only addresses trucking; more comprehensive research on the entire multi-modal freight sector and its component parts should be investigated in future studies.

As in other sectors, job quality and job access outcomes vary significantly among the subsectors identified in the Scoping Plan transportation sector. Some subsector entities, including public transit agencies and some vehicle manufacturing businesses, invest in training and provide family-supporting jobs to a diverse workforce. Others, such as short-haul port trucking and last mile delivery, have some of the worst labor conditions in California, and these low-road practices create obstacles for climate policy implementation, as discussed in the section on trucking. This chapter highlights current efforts to support high-road labor practices and offer recommendations on expanding their application and replication where feasible.

### B. Key Climate Policies

To meet California’s greenhouse gas emission reduction targets and enhance economic competitiveness, the state has prioritized a comprehensive set of sustainable transportation strategies. These strategies, which include various policies and programs, fall into three broad, but interrelated categories:

1. Supporting the manufacture and purchase of cleaner vehicles;
2. Promoting the development, production, and large-scale use of cleaner fuels; and
3. Reducing the number of vehicle miles traveled through coordinated transportation, housing, and land use planning.
This report focuses on the following select policies, which are included in California’s 2017 Climate Change Scoping Plan:

**Cleaner Vehicles**

1. **Advanced Clean Cars Program [people-moving subsector]**

   Adopted by the California Air Resources Board (CARB) in 2012, the Advanced Clean Cars Program is a suite of regulations that aim to reduce greenhouse gas emissions and smog-forming pollutants by setting phased emission reduction standards for vehicles for sale in the state. The program’s Low Emission Vehicle (LEV) standards set targets for automakers for cars sold in California to reduce smog-forming pollutants by 75 percent and cut greenhouse gas emissions by 35 percent by 2025.

   The policy also establishes mandates for the adoption of zero-emission vehicles (ZEVs) by requiring automakers to produce a growing number of zero-emission passenger cars and light-duty trucks. The ZEV Regulation sets annual sales targets, which are calculated as credits. Automakers can comply with the regulation by earning credits for the ZEVs they produced by purchasing credits from a different manufacturer.

2. **Low Carbon Transportation Investments and Air Quality Improvement Program (AQIP) [both people-moving and goods-moving subsectors]**

   These programs offer incentives and other financial assistance that help consumers and businesses purchase low-emission, advanced technology vehicles and help ease the transition to the State’s various policy and regulatory mandates. Some programs provide grants to support the development and deployment of emerging clean vehicle technologies, particularly in the medium- and heavy-duty classes.

   With over $2 billion appropriated by the Legislature (not all of which has been implemented yet) since fiscal year 2013-14, Low Carbon Transportation Investments have supported the following programs: Clean Vehicle Rebate Project (CVRP), Enhanced Fleet Modernization Program (EFMP) Plus-Up, Clean Mobility Options for Disadvantaged Communities, Financing Assistance for Lower-Income Consumers, Agricultural Worker Vanpools, Clean Truck & Bus Vouchers, Advanced Technology Freight Demonstrations, the Rural School Bus Pilot Project, and others.

   AQIP has funded $362 million worth of investments since fiscal year 2008-09, and had supported a number of different programs prior to the establishment of the aforementioned Low Carbon Transportation Investments. In the last few years, AQIP funding has been dedicated to the Truck Loan Assistance Program,
which helps small-business fleet owners (i.e., fleets with no more than 10 trucks) affected by CARB’s In-Use Truck & Bus Regulation secure financing for newer, lower-emission model trucks or diesel exhaust retrofits.\textsuperscript{12} Implemented through a partnership between CARB and the California Pollution Control Financing Authority (CPCFA), this loan assistance program is dedicated to serving small business truck owners that do not meet conventional lending criteria and therefore cannot qualify for traditional financing for cleaner truck purchases or retrofits.

Within the State’s broader Low Carbon Transportation Investments portfolio, Senate Bill 1204 (Lara, Chapter 524, Statutes of 2014)\textsuperscript{13} sets forth the State’s approach to developing and commercializing heavy-duty vehicles specifically. CARB’s Technology Program develops the SB 1204 ZEV Heavy Duty strategy with the mission of “develop[ing]...a sequenced roadmap, one that recognizes the different stages of the commercialization process for each technology.” This strategy identifies beachhead technologies, notably zero-emission transit buses, medium-duty trucks, and later drayage trucks, as key products that can advance the market, with the aim of enabling future development of strategies to adopt ZEVs in heavier duty markets, where technologies are less ready and market conditions are more challenging.

- **Federal Phase 2 Heavy-Duty Greenhouse Gas Standards [goods-moving subsector]**

Federal Phase 2 heavy-duty greenhouse gas standards are emission standards on medium- and heavy-duty vehicles sold in California. Often referred to simply as Phase 2 standards, these rules cover tractors, trailers, vocational vehicles, heavy-duty pickups, and vans. Phase 2 continues the improvements in engine and vehicle efficiency that were initiated by the Phase 1 efficiency standards, incorporating increasingly stringent requirements that are made possible over time as new technologies become available.

California will largely harmonize with the 2016 Federal Phase 2 greenhouse gas emission standards issued by the Obama Administration. If permissible, the state may go beyond the federal standards in several areas, in particular to encourage the use of zero-emission vehicles (ZEVs) and to set stricter vehicle emissions standards for local trucks, a critical necessity given the growth in last-mile delivery as a result of e-commerce.\textsuperscript{14}

- **Mobile Source Strategy [both subsectors] and Sustainable Freight Action Plan [goods-moving subsector]**

The Mobile Source Strategy (MSS) is a 2016 CARB plan aimed at attainment of federal air quality standards primarily, while aligned with and helping California
to achieve state mandates and targets for reducing greenhouse gas emissions, including short-lived climate pollutants (e.g., methane and black carbon), over the next 15 years. The strategy is a coordinated set of efforts to foster cleaner technologies and fuels and greater efficiencies in the freight sector, and many of the state strategies are still in development. The MSS as a whole encompasses engine emissions standards, including the Phase 2 standards, durability and inspection requirements, sales requirements for new technology, funding for demonstration projects, and consumer and business incentives. A very wide range of technology and fuel options can be drawn upon to achieve the MSS goals, from electric vehicles to cleaner diesel engines. Key provisions for trucks include new standards for 90-percent reduction in emissions of nitrogen oxides (NOx) by 2024 and the introduction of zero-emission vehicles. One major planning tool to carry out the Mobile Source Strategy is the California Sustainable Freight Action Plan, which identifies pathways to transition California freight equipment to zero-emission operation, improve freight system efficiency, and increase the competitiveness of California’s freight sector.15

❖ Cleaner Fuels

➤ Low-Carbon Fuel Standard [both subsectors]

The Low-Carbon Fuel Standard (LCFS) aims to shift California from petroleum-based transportation fuels to low-carbon alternatives through mandates on the carbon intensity of fuels. The program requires a reduction in the carbon intensity of transportation fuels of at least 7.5 percent by 2020 and at least 20 percent by 2030, as compared to 2010 levels. Carbon intensity refers to the amount of greenhouse gas emissions associated with all steps of producing, transporting, and consuming a fuel, measured in grams of carbon dioxide per megajoule of energy. This approach accounts for the full life cycle of a fuel, from well to wheels.16

LCFS sets an average carbon intensity standard that declines annually throughout the term of the program, and it uses a credit system to facilitate the least-cost approach to achieving the targets. LCFS is a market-based mechanism, which allows fuel suppliers to develop blends in response to consumer demand. Low-carbon fuel use has increased.17

The reductions in carbon intensity of fuel have come from two main sources: the electrification of vehicles replacing gasoline and increased use of biomass-based fuels in the diesel sector. Electricity use in California grew from less than 0.5 million gasoline gallons equivalent (gge) in 2011 to 96 million gge in 2018.18 Electrification requires the installation of electric vehicle charging infrastructure.
(including charging stations), and modifications to the LCFS now allow credits to be earned for charging infrastructure that is built.\textsuperscript{19} Biomass-based diesel—i.e., biodiesel and renewable diesel—use in California grew from 14 million gallons in 2011, rising markedly to 568 million gallons in 2018.\textsuperscript{20}

- **Alternative and Renewable Fuel and Vehicle Technology Program [both subsectors]**

  The Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) is a funding program administered by the California Energy Commission (CEC) targeting both cleaner fuels and cleaner vehicles. The program directs nearly $100 million in annual funds to demonstrate advanced, clean fuel and vehicle technologies. Through this program, the CEC has been the state’s principal investor in charging and refueling infrastructure for zero-emission vehicles in California, particularly electric vehicle charging stations.\textsuperscript{21} The funding areas for ARFVTP include: electric vehicle charging infrastructure; hydrogen refueling infrastructure; research, development and demonstration projects for renewable natural gas and biofuels; clean vehicle and equipment manufacturing; and workforce development.

- **Clean Energy and Pollution Reduction Act (Senate Bill 350) [both subsectors]**

  Senate Bill 350 (de León, Chapter 547, Statutes of 2015)\textsuperscript{22} is a comprehensive climate law that emphasizes widespread transportation electrification as a means of achieving California’s 2030 greenhouse gas emission reduction target; the law also advances clean energy deployment in the state as described in Chapter 6. The law includes a requirement to increase access to the use of electricity as a transportation fuel for all mobile sources by directing the large electric utilities to consider transportation electrification in their integrated resource planning, including ensuring sufficient development of electric vehicle charging infrastructure.

- **Cap-and-Trade Program (Assembly Bill 32 and Assembly Bill 398) [both subsectors]**

  In 2015, California’s Cap-and-Trade Program began to cover transportation fuels, requiring fuel sellers to lower emissions or purchase emission allowances. Assembly Bill 398 (E. Garcia, Chapter 135, Statutes of 2017)\textsuperscript{23} codified the state’s Cap-and-Trade Program for the 2021-2030 period. This ensures that the program will continue and will constitute a strong incentive to move away from petroleum-based transportation fuels via electrification and other changes in transportation systems and technologies.
Reduced Vehicle Miles Traveled (VMT)

Sustainable Communities Act (Senate Bill 375) [people-moving subsector]

Senate Bill 375 (Steinberg, Chapter 728, Statutes of 2008) supports the State’s climate goals by helping reduce transportation-sector emissions through coordinated transportation, housing, and land use planning. SB 375 requires each of California’s metropolitan planning organizations (MPOs) to create a Sustainable Communities Strategy (SCS) as an element in Regional Transportation Plans (RTPs). Each SCS must document the regional strategies governments will use to meet 2020 and 2035 greenhouse gas reduction targets set by CARB.

SB 375 supports transportation, housing, and land use strategies and projects that help reduce the number of passenger vehicle miles traveled by light-duty vehicles. The two primary approaches include mode shift from single-occupancy vehicles to active transportation, including walking, bicycling, and public transit, and infill and transit-oriented development to reduce the distance between homes and non-residential areas and increase access to public transit service. Additionally, SB 375 provides California Environmental Quality Act (CEQA) streamlining incentives available to regional and local jurisdictions that demonstrate consistency with the targets for transit priority projects (TPPs) that include the following characteristics: 1) a mix of land uses; 2) a minimum density of at least 20 dwelling units per acre; and 3) close proximity (i.e., within one half-mile) to a major transit stop.

Senate Bill 743 (Environmental Quality & Transit-Oriented Infill Projects) [people-moving subsector]

Signed into law in 2013, Senate Bill 743 (Steinberg, Chapter 386, Statutes of 2013) alters the process for conducting transportation impact analyses for developments under CEQA review. These changes aim to help achieve statewide goals related to promoting infill development, public health, and reduced greenhouse gas emissions by streamlining the approvals process for developments that support transit and non-motorized travel.

The law shifts the primary metric for transportation impact analyses from level-of-service (LOS) to vehicle miles traveled (VMT). Under new guidance, local jurisdictions are now required to incorporate the impact on VMT in their consideration of alternative development projects. This requirement is made operational by assuming that certain developments (e.g., residential, retail, mixed-use, and office buildings) located within a half-mile of a major transit stop or within a high-quality transit corridor “will have a less-than-significant impact on VMT” if they meet higher density and reduced parking requirements.
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Active Transportation Program (Senate Bill 99) [people-moving subsector]

The Active Transportation Program, (Senate Bill 99, Committee on Budget and Fiscal Review, Chapter 359, Statutes of 2013)\(^{30}\) aims to increase the share of trips made using non-motorized (or active) transportation, like walking and bicycling. The program’s total funding for fiscal year 2017-18 was $190 million. This includes 5, Statutes of 2017)\(^{31}\) that will ensure a reliable on-going funding source.\(^{32}\) In the program’s first two-year cycle, it awarded slightly more than $350 million for 267 projects throughout the state.\(^{33}\) Eligible projects include: 1) infrastructure improvements that increase safety for people who walk and bike; 2) non-infrastructure improvements that focus on education and training; and 3) planning for community-wide bicycle and pedestrian improvements.\(^{34}\)

II. Industries and Occupations

To reduce transportation-sector emissions and build sustainable transportation systems, public and private dollars will need to be invested in new and cleaner vehicles, cleaner fuel distribution systems, and planning and infrastructure upgrades that increase public transit use and promote more sustainable land use patterns. For cleaner vehicles and fuels, the state supports this transition through a combination of mandates on the production of vehicles and fuels complemented by subsidies for consumers and businesses who purchase and operate vehicles. For example, the ZEV regulation in the Advance Clean Cars Program requires automakers to produce a certain number of ZEVs based on their total annual vehicle sales in the state. The Low Carbon Transportation Investments and Air Quality Improvement Program (AQIP) then offer rebates, vouchers, grants, and low-interest loans to individuals and fleets to lower the purchase cost of low- and zero-emission vehicles. To reduce vehicle miles traveled, the state uses a combination of public and private infrastructure investment and changes in local transportation and land-use regulations and practices in collaboration with local jurisdictions and private entities such as insurance and development companies.

In terms of overall investment, it is important to note that the state’s suite of policies to support cleaner vehicles, cleaner fuels, and reduced vehicle miles traveled represents a fraction of all such investments in California. According to the most recent estimate available, the private sector provided 91 percent of the total investment in alternative and renewable fuels and cleaner vehicle technologies in 2012, dwarfing public investment in these two areas at that time.\(^{35}\) Still, public investments present unique opportunities to implement policies that promote better labor outcomes and support high-road employers in key advanced transportation industry sectors, including construction, transit and ground passenger transportation,\(^{36}\) alternative motor vehicles and equipment, alternative
fuels, alternative fueling infrastructure, energy storage, and freight logistics. The next few years present a particularly important window for developing high road ZEV policies across sectors.

This report addresses the following industries that are the main focus of the Scoping Plan transportation sector. Due to resource constraints, this report does not address freight rail, maritime, and air transport.

- **Vehicle Manufacturing**
  - Light-, Medium-, and Heavy-Duty Vehicle Manufacturing

- **Trucking Operations and Maintenance**
  - Short- and Long-Haul Truck Driving
  - Truck Repair and Maintenance

- **Transit and Ground Passenger Transportation**
  - Public Transit
  - Private Passenger Mobility Services (Transportation Network Companies, i.e., ride-sourcing platforms)
  - Vehicle Repair and Maintenance

- **Construction**
  - Public Transit Infrastructure Construction
  - Electric Vehicle Charging Infrastructure
  - Infill and Transit-Oriented Construction

For each of these industries, the majority of the workforce is comprised of blue-collar jobs, as shown in Exhibit 7.3, and defined in Chapter 5. These blue-collar workers are employed in a range of areas, predominantly in the following Standard Occupation Classification (SOC) codes: production occupations, construction and extraction
occupations, installation, maintenance, and repair occupations, and transportation and material moving occupations. The figure includes electrical contractors, who install electric vehicle charging stations, the fastest growing segment of clean fuels investment, but other alternative fuel infrastructure businesses were not included due to insufficient information.

Exhibit 7.3. Industries and Occupations in the Transportation Sector

Source: May 2016 OES Research Estimates by State and Industry [https://www.bls.gov/oes/current/oes_research_estimates.htm]
III. Key Subsectors

A. Clean Vehicle Manufacturing

Policy mandates that increase the adoption of zero- and low-emission vehicles will impact jobs in the vehicle manufacturing industry. The state’s long-term vehicle standards, commercialization strategies, and other policies discussed above establish targets and create incentives that can drive the development and adoption of cleaner vehicle technologies. Innovations in hardware and software technologies that reduce pollution and improve fuel economy are found in final assembly and engine manufacturing, and throughout the full supply chain involved in vehicle manufacturing.39

1. Workforce Outcomes

a. Job Growth

Vehicle manufacturing employs 288,000 workers nationwide in more than 1,200 firms. In California, there are currently only 14,000 workers in automobile manufacturing, but there are 120,000 workers in the entire transportation equipment manufacturing industry in the state. This total includes parts manufacturing and all forms of transportation equipment, with most of these workers in the aerospace industry.40

Industry data on the “Clean Transportation Industry Cluster” suggest a total of about 20,000 jobs in California, although this figure includes 3,000 jobs in liquid fuel production and 1,000 jobs in electric vehicle charging infrastructure. The largest zero-emission vehicle manufacturer by employment in California is Tesla, and there are a growing number of ZEV and LEV bus and truck manufacturers.41 Electric vehicle manufacturers that have built plants in the state include BYD, Proterra, Motiv Power Systems, GreenPower Bus, and Karma. There are also electric powertrain manufacturers in the state.42 After a decade of very little investment in new automotive plants anywhere in the United States, this new investment constitutes an important new development. Additionally, key technology companies are also investing in clean vehicles, including Apple, which is developing an electric car; Google, which is investing in autonomous vehicle technology; and Lucid Motors (formerly Atieva), a battery company that is investing in car manufacturing.43

Overall, it is difficult to determine the cumulative effect of clean vehicle adoption on job displacement and creation in the vehicle manufacturing sector. There are some concerns voiced in the media that the increased adoption of zero-emission vehicles will lead to lower labor intensity in auto manufacturing and repair jobs, because the propulsion
systems for ZEVs have fewer moving parts and require less maintenance than internal combustion engine vehicles.\textsuperscript{44} A study from the European Union found the potential for job losses as part of the transition to zero-emission vehicles to be “highly uncertain.”\textsuperscript{45} The study notes that the shift to ZEVs will upset the market, create uncertainty, redistribute power within the industry, and require new strategic orientations as well as stable, forward-looking policies.\textsuperscript{46}

\textit{b. Job Quality}

Manufacturing jobs were once a reliable source of family-supporting wages, but low-wage jobs in manufacturing have grown in recent decades.\textsuperscript{47} Job quality within the clean vehicle manufacturing sector appears mixed in California. Concerns about the labor practices of ZEV manufacturers have been raised. Several firms, in both light- and heavy-duty ZEV manufacturing, have been found to have violations pertaining to unpaid wage claims, lax workplace health and safety, and employer retaliation against workers exercising their legally-protected rights; many additional cases are still under investigation by the California Department of Industrial Relations.\textsuperscript{48} On the other hand, some zero-emission bus and rail manufacturers in California have unionized workforces, which generally indicates higher job quality (including higher average earnings and better health and retirement benefits) compared to non-unionized workforces.\textsuperscript{49}

Two of these heavy-duty ZEV manufacturers with unionized workforces in California have also made commitments to inclusive hiring goals, with one making significant investments in training as well.\textsuperscript{50} The Los Angeles Metropolitan Transit Authority (LA Metro) created incentives for these commitments to good labor practices by inserting inclusive procurement language into its competitive solicitations for bus purchases, which helps promote better job outcomes as described in the \textbf{Promising Practice \#7.1}. A similar approach to include labor practices or standards in EV incentive programs—for both light- and heavy-duty vehicles—could further advance high-road employment outcomes throughout California’s growing clean vehicle manufacturing sector in California.

\textit{c. Job Access}

No specific information about the demographic profile of workers in clean transportation manufacturing businesses is available. As part of the inclusive procurement policies mentioned above, agencies can encourage bidders to commit to hiring disadvantaged and/or under-represented workers in order to expand access to jobs for historically marginalized groups.\textsuperscript{51} To support goal of inclusive hiring, training initiatives are often launched or strengthened to assist employers in recruiting and preparing new workers. These efforts often involve collaboration among employers, community-based organizations, and labor unions, and are a form of “high-road industry training
partnerships.” The combination of legally-enforceable commitments to high quality jobs and hiring targets for disadvantaged and/or under-represented workers, along with investment in industry training partnerships to prepare a pool of qualified applicants from disadvantaged communities, has been a successful mechanism for achieving greater economic equity by expanding job access, as described below.

**PROMISING PRACTICE #7.1**

**Heavy-Duty Transit Vehicle Manufacturing—Procurement for the Public Good**

The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP, a CCI program administered by CARB) incentivizes the purchase of hybrid and zero-emission heavy-duty vehicles to accelerate “early market penetration of clean technologies.”\(^\text{52}\) For the public transit sector, HVIP represents one of the state’s efforts to induce and assist California’s more than 200 transit agencies, which utilize about 10,000 transit buses, to transition to zero-emission fleets. The transition to a fully zero-emission transit bus fleet statewide (by 2040) is now mandated by the State’s Innovative Clean Transit Rule (ICT Rule) adopted by CARB in December 2018. Furthermore, in adopting the rule, CARB also addressed employment and training in the ZEB sector and committed to investing additional resources to increase access to jobs in the manufacture and operation of zero-emission transit buses.

CARB’s regulatory and incentive measures have helped support a growing zero-emission bus manufacturing sector in California. BYD, Ebus, GreenPower Bus, and Proterra are zero-emission bus (ZEB) manufacturers that have recently established production and assembly facilities in the state, in anticipation of a growing ZEB market in California and beyond.\(^\text{53}\) More than 100 zero-emission transit buses are currently in use in California, and there are more than 300 more on order.\(^\text{54}\)

Using procurement policies that explicitly value job creation, job quality, and job access has allowed transit agencies to use their heavy-duty clean vehicle purchases as a tool to help ensure better job quality and local employment outcomes for manufacturing workers. These procurement policies include incorporating solicitation language that incentivizes “bus and rail manufacturers to commit to creating good manufacturing jobs, investing in new or existing manufacturing facilities, and establishing pathways into the industry for people facing barriers to employment.”\(^\text{55}\)

The U.S. Employment Plan (USEP) developed by the nonprofit Jobs to Move America provides a template to incorporate workforce policies and practices into competitive solicitations for public procurement. The USEP involves including procurement language that asks bidders to voluntarily make commitments
and specify plans for job creation, job quality (e.g., wage and benefit levels), and job access (e.g., training partnerships and targeted hiring practices). Agencies responsible for the procurement then score applications to reward applicants that make concrete commitments to creating family-supportive jobs and expanding job access. After comparing the proposals in full and determining which one offers the best overall value (e.g., assessing price, technical specifications, and past performance, as well as job commitments), agencies can then determine which bidder to award the contract.

To ensure job-related commitments detailed in the USEP are actually achieved, agencies can request regular reporting from awarded contractors/vendors to track the key outcomes, namely the quantity and quality of, and access to, new or sustained jobs. The agency can utilize a menu of commonly-used corrective actions to assist the contractor/vendor fulfill its commitments, if the agency determines a company does not reach certain milestones or has fallen out of compliance with its USEP commitments.

Transit agencies like the Los Angeles County Metropolitan Transportation Authority (LA Metro) have permanent U.S. Employment Plan policies, in which all future procurements of new manufactured vehicles and equipment above $100 million will include the USEP. Companies bidding on future LA Metro contracts can now improve their competitive advantage by committing to job quality and job access targets. In LA Metro’s competitive solicitation in 2016 for the procurement of new zero-emission buses, the bidders were given the opportunity to commit up front to hiring targets as part of their application, and job benefits were an explicit part of the ranking of bids.

One of the bidding ZEB manufacturers (BYD, a company with manufacturing facilities in Lancaster, CA) sought to make their proposal more competitive by committing to a community hiring program and pre-hire program under a Community Benefits Agreement (CBA) with the Jobs to Move America coalition. These targeted hire programs have helped expand job access to BYD’s transit bus manufacturing jobs. Specifically, BYD committed to a target of recruiting and hiring 40 percent of its workers from populations facing significant barriers to employment (e.g., veterans and formerly-incarcerated individuals) under the negotiated CBA. Accordingly, the USEP incentivizes companies to enter into CBAs that both increase the competitiveness of their applications and ultimately help strengthen their training and hiring practices to ensure job-seekers that have faced barriers to stable, family-sustaining jobs have a clear pathway into a high-road manufacturing industry.
2. **Workforce Recommendations**

   a. **Demand-Side Workforce Policy Levers for Job Quality**

   - Use inclusive procurement policies for public procurement of buses and other fleet vehicles purchased by state and local government and public agencies.

   The promising practice workforce intervention described above can be replicated and scaled up throughout the vehicle manufacturing sector. For procurement of publicly-owned fleets (e.g., public transit and commuter buses and rail cars, local government vehicles, and public utility and port vehicles), the procurement strategies developed by Jobs to Move America can be incorporated in all solicitations for new zero- and low-emission vehicles. These requirements can help build the high road for the manufacture of public fleet vehicles by setting a standard that can then be a template for the future adoption of heavy-duty fleet LEVs or ZEVs, in line with SB 1204 (Lara, Chapter 524, Statutes of 2014) requirements.

   b. **Supply-Side Workforce Development Strategies**

   - Support high-road industry training partnerships.

   High-road industry training partnerships (see Chapter 3) can be developed, particularly when businesses establish workforce commitments as part of their bids in inclusive procurement solicitations. In the example described in Promising Practice #7.1, the zero-emission bus manufacturer BYD and its labor partner, SMART Local 105, developed an apprenticeship program for production workers who manufacture zero-emission buses. Tesla, a light-duty ZEV manufacturer, has also developed a state-certified apprenticeship program (for tool and die specialists, a type of machinist occupation). It is an employer-sponsored apprenticeship program whereas the one co-sponsored by BYD and SMART Local 105 is a joint labor-management program.

   There is a wealth of experience in high-road industry training partnerships in manufacturing in the U.S. Midwest, both in creating pipelines into good jobs for historically excluded workers and upgrading the skills of incumbent workers as manufacturing processes evolve. Recent developments there include the creation of a new registered apprenticeship program that results in a certification for industrial manufacturing technicians for workers in a wide variety of companies in vehicle parts and other manufacturing companies. Often high-road industry training partnerships collaborate with community-based organizations (CBOs) with deep ties to disadvantaged
communities or populations. CBOs take on the role of helping recruit and support potential applicants and working with training organizations to mentor participants before and after hiring (see Chapter 3). The apprenticeship model ensures on-going employer investment in training and agreements that wages will rise as workers acquire more skills.

B. Trucking

The commercial trucking industry is a major contributor to air and climate pollutant emissions and a critical and challenging industry for climate policy. Medium- and heavy-duty vehicles make up only 3 percent of the total vehicles registered in California, but account for 22 percent of the state’s on-road greenhouse gas emissions. Here, low-road labor practices impede the implementation of climate policy and create the conditions whereby climate policy can hurt an already vulnerable workforce. This section describes the likely impact of climate policy on the workforce, and discusses the environmental costs of current labor practices. Finally, this section presents strategies that could support efforts both to improve workforce and environmental outcomes in the trucking sector.

The main strategy to lower emissions in the trucking sector is to increase vehicle and engine standards to improve fuel efficiency and reduce emissions. CARB worked jointly with the U.S. Environmental Protection Agency (U.S. EPA) and the National Highway Traffic Safety Administration (NHTSA) on the most recent phase of federal greenhouse gas emission standards for medium- and heavy-duty vehicles, often referred to as Federal Phase 2 or simply Phase 2. The Phase 2 standards are projected to reduce fuel consumption and CO2 emissions of medium- and heavy-duty trucks by about 25 percent. California will largely follow the Federal Phase 2 greenhouse gas standards, which cover tractors, trailers, vocational vehicles, heavy-duty pickups, and vans. The state may exceed the targets set in Phase 2 through its portfolio of policies and programs to spur the transition to zero-emission vehicles (ZEVs) in the medium- and heavy-duty sector. A key opportunity is in the short-haul trucking subsector, where electrification is feasible and where growth in demand for last-mile delivery has accelerated as a result of e-commerce.

Phase 2 standards are likely to increase the purchase or lease price of new, lower-emission trucks. Some of the higher purchase price will be recouped via fuel cost savings over the lifetime of the truck as a result of fuel efficiency improvements under Phase 2 rules. However, the additional Phase 2 emission regulations for NOx and particulate matter (PM) may increase maintenance costs and could reduce rather than improve fuel efficiency, as some contend occurred with the 2007 EPA rules on these pollutants. Cleaner fuels will likely play a greater role in lowering emissions from trucking, when alternatives to petroleum-based diesel (e.g., biodiesel, renewable diesel,
hydrogen, biogas and renewable natural gas, compressed and liquefied natural gas, and propane) begin displacing increasing shares of diesel usage in long-haul trucking. The price signals in the LCFS and Cap-and-Trade Program are designed to accelerate innovation in cleaner fuels. However, diesel will likely remain the dominant fuel source for long-haul trucking in the state. During that time, Federal Phase 2 standards and additional air pollutant restrictions will increase vehicle costs due to the new technologies required. These standards work to internalize the social costs, in the form of pollution and emissions that diesel-powered trucks produce.

While standards on the manufacture of new vehicles can ensure the shift to cleaner trucks over time, reducing greenhouse gas emissions from trucking also requires removing high-emission trucks that are currently on the road, retrofitting trucks where feasible, and accelerating the purchase of cleaner trucks so that it occurs more rapidly than the normal turnover of vehicles, which ranges from 8 to 14 years in long-haul trucking and much longer in port drayage trucking. The policy “sticks” (such as emission standards) and policy “carrots” (such as incentive and loan programs) are meant to induce the private trucking industry to make investments that they would otherwise delay or avoid.

1. **Workforce Outcomes**

   a. **Job Growth**

   The main impact of climate policy designed to lower emissions from trucking is an increase in the purchase or lease price of new trucks. Higher truck costs can, in theory, shift the mix of transportation in the goods movement sector away from trucking to rail, air, or other modes, which could slow job growth. However, the demand for trucking is quite inelastic due to the United States’ vast infrastructure of highways and the disadvantage of the fixed location of terminals with other transportation modes.

   Other factors affecting the industry make it difficult to predict employment trends. On the one hand, growth in e-commerce has resulted in a rapid rise in demand for both long-haul and last-mile delivery, potentially leading to a swift increase in vehicle miles traveled (VMT) from freight transportation and presumably, greater demand for labor. At the same time, the industry is currently facing what may be the most important source of uncertainty since the development of the internal combustion engine: self-driving trucks. If successfully developed, self-driving trucks are likely to have a transformative effect on goods movement, including potential job loss, although the impact on jobs is a matter of debate at this time. Self-driving trucks may present opportunities for lower emissions, if large investments in self-driving trucks are tied to electrification or other emission-lowering innovations. If that occurs, truck drivers and the public may conflate climate policy with job loss in the trucking sector, which may raise fears about the policy, even if the more stringent emission standards *per se* do not cause job loss.
b. Job Quality and Job Access

Wages and working conditions for truck drivers, the largest occupational group in trucking, have steadily declined since the trucking industry was deregulated beginning in the late 1970s. Between long hours and low pay, conditions in some segments are so bad that trucks have been characterized as “sweatshops on wheels.” For-hire port truck driving and for-hire long-haul truckload driving have been highlighted in particular as areas where minimum wage laws are regularly violated, workers suffer serious health problems due to exposure to diesel exhaust, and employee misclassification is rampant. There is ample evidence to suggest that workers in these segments, many of whom are immigrants, are extremely vulnerable and could bear a disproportionate share of the cost of the state’s climate mandates unless protected by robust and thoughtful policy.

At first glance, efforts to promote cleaner vehicles might not be expected to impact job quality in trucking. After all, truck drivers perform the same tasks regardless of whether they are driving a high- or low-emission truck. In a number of subsectors of the trucking industry, however, drivers play a unique role: they both operate the vehicles and they bear the costs of ownership and maintenance. Deregulation in the trucking industry has led to widespread use of truck drivers who operate their own trucks (i.e., owner-operators), which they either purchase on credit or lease from trucking firms. This arrangement is common in long-haul trucking and endemic in short-haul trucking between and within major freight hubs (e.g., seaports, rail yards, and warehousing and distribution centers), known as drayage trucking. It is also occurring in some parts of last-mile trucking, which mainly involves parcel delivery to individual consumers. Compared to truck drivers who are treated as employees, independent contractor drivers earn lower incomes after deducting the cost of their trucks; they also lack benefits, work long hours, are exposed to higher levels of diesel exhaust, and are excluded from basic labor protections, such as minimum wage and overtime laws, unemployment insurance, and workers’ compensation.

It is an entirely different proposition to mandate increasingly stringent emission standards for trucks owned and managed by large freight-hauling firms whose drivers are employees, than for trucks driven by independently-contracted owner-operators, especially if, under the law, they should be classified as employees. For the economy as a whole, the costs of cleaner trucks is very small. Shipping costs make up 3.6 percent of consumer food prices and 6 percent of overall retail prices, and the incremental cost of cleaner trucks is only a very small percentage of shipping costs. However, when drivers are misclassified as independent contractors, these costs are not spread over the millions of buyers of trucked cargo but rather, they are borne by truck drivers who lack the market power to raise the price of their services. Implementation of more stringent emission policies in this case can impose serious cost burdens on low-income drivers.
who cannot afford to buy low- or zero-emission trucks. In contrast, when truck drivers are employees, the freight-hauling businesses bear the costs of purchasing and maintaining the trucks and are in a much better position to absorb these costs internally or pass them on to retailers and consumers. When the essential costs of operations are not included in the trucking companies’ cost structure but rather pushed on to truck drivers, there is a market failure, similar to the market failure that occurs when businesses do not internalize the social costs of pollution. Greater subsidies for truck drivers to purchase low- and zero-emission trucks is one solution, but this does not solve the more fundamental problem of low-road labor practices under which social and environmental costs are externalized.

The next two sections describe current labor conditions and the impact of climate policies in two key segments of trucking where the independent contractor model predominates—drayage and long-haul trucking—illustrating how low-road labor conditions increase both emissions and the cost of climate policy implementation.

B1. Short-Haul Trucking

Short-haul trucking between seaports to railyards, warehousing and distribution centers, and other major freight hubs (“port trucking,” or “drayage” in industry parlance) is a segment of the trucking industry that holds great promise for reducing greenhouse gas emissions through the introduction of zero-emission trucks. Drayage is well-suited to zero-emission vehicle technology—and battery-electric propulsion specifically—given the particular duty cycle in which trucks go relatively short distances in a congested area and return to the same area. Electrification will require substantial investment both in advanced technology trucks to replace the current fleet and in electric charging infrastructure.

Misclassification of drivers is a major, widespread problem in port trucking as firms have shifted from employing workers (largely unionized) to independent contracting since enactment of the Federal Motor Carrier Act in 1980, which abolished the regulatory system for freight rates and truck routing. Independent contractors either own their truck, or lease it from a freight-hauling firm, and are commonly referred to as independent owner-operators. In port trucking, employee misclassification is rampant and labor conditions are the worst in the entire trucking industry. Previous efforts to require the use of cleaner trucks for drayage provide lessons for new initiatives to further reduce emissions when low-road labor conditions predominate. In 2008, the Ports of Los Angeles and Long Beach enacted the Clean Trucks Program, which prohibited older model, high-polluting trucks from entering the port complex. While the program was successful in reducing diesel emissions initially, as trucks fall into disrepair, emissions reductions may not be sustained.
Efforts to reduce emissions from port drayage trucking at the ports of Los Angeles and Long Beach provide a powerful example of the challenges of implementing climate policy in low-road industries.

In 2008, the ports of Los Angeles and Long Beach launched the Clean Trucks Program, instituting a phased ban of 2,000 older trucks and providing incentives for the purchase of lower-emission trucks. Community and labor organizations had brought awareness of the terrible conditions under which port truck drivers worked: drivers lacked access to most labor protections, unemployment benefits, disability pay, or workers’ compensation, because trucking firms classified them as independent contractors. To remedy this situation, the City of Los Angeles attempted to insert into the concession program a requirement that companies must own or lease their own trucks and employ their truck drivers. The American Trucking Association sued both ports to stop the entire Clean Trucks Program. After five years of litigation, including numerous appeals, the ports won all the environmental requirements in the program, but the trucking companies prevailed on the employee requirement. The courts ruled that the ports were preempted by federal deregulatory actions on trucking and did not have the legal authority to require trucking firms to stop using independent contractors.

Consequently, the Clean Trucks Program inadvertently led to drivers, who were already facing low-road conditions, bearing much of the cost of the transition to lower-emission trucks. Trucking companies passed on the costs of complying with the clean truck mandates to the already low-wage truck drivers. The companies paid upfront for clean trucks, but then deducted the costs of the trucks from workers’ paychecks through lease agreements that workers were forced to sign. Other expenses were deducted as well, such as insurance, parking, and gas, leaving some workers with pay far below minimum wage and working up to 20 hours per day; at times, drivers paid the company to work and amassed debt. A major USA Today investigation published in June 2017 brought this modern-day indentured servitude to the attention of a national audience. According to the USA Today exposé:

In 2008, California sparked the labor problems at the ports of Los Angeles and Long Beach by banning older trucks from entering the harbor. Companies suddenly faced the prospect of replacing 16,000 aging big rigs with newer, cleaner trucks. To avoid the $2.5 billion price tag, the port trucking industry launched a lease-to-own program that pushed the cost onto truckers, most of them independent contractors who had to cover their own expenses. Trucking companies arranged to finance their cleaner fleet, then passed on the cost of each truck to an individual driver.

A yearlong investigation by the USA TODAY Network found that port trucking companies in southern California have spent the past decade forcing drivers to finance their own trucks by taking on debt they could not afford. Companies then used that debt as leverage to extract forced labor and trap drivers in jobs that left them destitute. If a driver quit, the company seized his truck and kept everything he had paid towards owning it. If drivers missed payments, or if they got sick or became too exhausted to go on, their companies fired them and kept everything. Then they turned around and leased the trucks to someone else.
With the help of the Teamsters, port truck drivers have taken the very labor-intensive and lengthy route to win recognition of their employee status and gain the protections this status includes by filing individual claims against trucking companies for misclassification and wage theft. Between 2011 and 2018, 987 drivers filed complaints with the California Division of Labor Standards Enforcement. They also filed complaints with the federal Department of Labor, the state Workers’ Compensation Appeals Board, and elsewhere. The California Labor Commissioner has awarded more than $45 million to at least 400 drivers to date for unlawful deductions from wages and out-of-pocket expenses. Labor unrest continued, however, as worker misclassification has remained a widespread practice in the industry, affecting the wages owed to drivers.

Elected officials have also recently stepped in to devise policy solutions to help remedy the situation in a more systematic fashion. California Senate Bill 1402 (Lara, Chapter 702, Statutes of 2018) requires the clients of trucking companies, retailers like Target, Amazon, and Walmart, to take responsibility for the labor violations of the trucking companies whose services they use. The law takes effect in January 2019. In January of 2018, Los Angeles District Attorney Mike Feuer filed lawsuits against three trucking firms that operate at the ports—CMI Transportation, K&R Transportation California, and Cal Cartage Transportation Express—which together are the market leaders at the Los Angeles and Long Beach ports. The lawsuits allege that these trucking companies had engaged in schemes to avoid paying minimum wage and employee benefits by classifying hundreds of workers as independent contractors.

There have also been renewed efforts to attach labor standards to publicly-funded clean truck incentives. The South Coast Air Quality Management District (SCAQMD), the air pollution control agency for all of Orange County and parts of Los Angeles and Riverside Counties, adopted rules for district-funded truck replacement projects to address job quality concerns and prevent labor law violations involving district-funded trucks. The rules will require firms to list any labor law violations adjudicated within the past three years in project applications, which may be used to screen applicants; and prohibit lease-to-own arrangements involving district-funded trucks. Firms under contract for truck replacement projects must also follow new processes for disclosure and annual certification related to any labor law violations pertaining to truck drivers, and SCAQMD will conduct audits to verify compliance with these new rules and standards.

The prevailing business model of port trucking continues to place the costs of trucks and truck operations on drivers, rather than internalizing them as a cost, first to the trucking companies, then to retailers who use their services, and finally to the consumers who purchase retail goods that are shipped through ports. Hundreds of millions of public dollars have been invested in lower-emission trucks in California to help buy down the costs of cleaner trucks, but this strategy hasn’t helped the port truckers who continue to face low-road conditions.

Moreover, the independent contractor model creates other inefficiencies that impede emission reductions. Maintenance is jettisoned when impoverished workers are expected to pay for it, and expensive trucks are damaged in accidents when over-tired workers are forced to keep driving. These environmental and public safety externalities are likely insolvable until the industry is rationalized so that port truckers are not bearing all the costs. Time will tell if SB 1402, which is designed to make trucking and retailers accountable for labor and employment violations, is enough to remedy this situation.
B2. Long-Haul Trucking

As in drayage, one effect of the state’s cleaner vehicles policies on the long-haul segment of the trucking industry may be an increase in the purchase or lease price of new vehicles that meet stricter emission standards. Also as in drayage, new emission standards will have a differential impact on independent owner-operators compared with employees of trucking firms. Significant vehicle cost increases may affect who can afford to stay in the long-haul trucking business and the incomes of those who do.

While misclassification of independent contractors is not as rampant in long-haul as in short-haul trucking, there are many misclassified single owner-operators and independents, and this trend may be exacerbated as emission standards become more stringent. The increasing prices of trucks lead trucking companies, already inclined to misclassify employees as independent contractors, to shift these additional costs onto workers through leasing arrangements with drivers.86

Because many workers in long-haul trucking do not have and cannot raise capital for new trucks without going through large carriers, these workers often find themselves in debt peonage—they end up leasing or renting the more expensive trucks from the carrier they work for. Drivers who lease or own and operate their trucks usually work a full seven-day workweek for three weeks, and then return home and work four or five days in the fourth week during their “off-time.” During that four- or five-day workweek, they are still responsible for making truck payments and covering other costs, which can easily exceed $1,000 per week. During these “short weeks,” many drivers put in 40 or more hours but receive no take-home pay at all or end up owing money.87

Freight-hauling firms also use worker training to support the independent contractor strategy. Most new truck drivers enter the industry through large long-haul trucking companies, which are the most likely to misclassify workers.88 These firms receive public funds for workforce training, but also typically charge each worker $3,000-$7,000 for training that is necessary in order to obtain a commercial trucking license. During the training period, trucking firms directly employ workers at low wages, with the promise of higher incomes once they are trained.89 Trucking companies encourage new drivers to enter lease agreements as soon as they get their licenses, so many drivers become independent contractors shortly after they finish training. The most unscrupulous firms use the loans they provided workers for training as leverage to get workers to become contractors, forgiving the training debt in exchange for the worker leasing the truck they will drive.90 Instead of playing a positive role in worker retention and moving workers up a career ladder, the current training scheme is part of the system of low wages, high turnover, and exploitation that has become prevalent since deregulation.91 Government subsidy of job training by large firms, without any or adequate protection for trainees/workers, depresses wages for existing truckers and allows those subsidized firms to externalize the costs of high worker turnover. High turnover results in less-experienced and less-efficient truck drivers operating the vehicles with the highest emissions per mile.92
The retention of trained and experienced workers is important for the fuel-efficient operation of trucks, which impacts fuel costs and emissions. Some estimates suggest that there can be as much as a 25-percent difference in fuel use between the most and the least efficient drivers, due to disparities in basic operation proficiency and knowledge of local traffic patterns and work scheduling.\textsuperscript{93} Current labor practices in long-haul trucking mean that turnover is extraordinarily high, with as many as 90 percent of the drivers having less than a year of experience driving a truck.\textsuperscript{94} Since long-haul trucking is amongst the heaviest uses of diesel fuel in the industry, high worker turnover means that the least experienced and least efficient truck drivers are working in the industry segment in which emissions reductions are very critical.

\textbf{B3. Environmental Costs and Inefficiencies Associated with Independent Contractor Labor Practices}

The widespread practice of independent contracting in short- and long-haul trucking creates challenges for efforts to reduce emissions, because it causes inefficiencies in fuel and truck usage. As described above, inexperienced truckers are the norm because of high truck driver turnover due to the poor labor conditions facing independent contractors, and this reduces fuel efficiency.

In addition, the independent contractor model poses obstacles for the efficient use of trucks. Independent contractors are the sole operator of the truck, so scheduling and other operational decisions are in the hands of individual drivers rather than centrally organized and based on the most efficient use of an entire fleet of trucks. When the state asks industry to make new, large private investments in cleaner trucks and provides subsidies to facilitate these purchases, efficiency of trucking operations matters. In order to justify the large financial investments required for lower-emission trucks, making the most efficient and full use of the trucks improves the payback, to the public as well as to industry, for this investment.

For a number of reasons, large firms that hire employees are more able to organize for efficiency than single operators. First, since they move more freight and have more trucks, large firms can plan routes with fewer “deadhead” miles (miles in which a truck travels empty). Just as importantly, large firms have the ability to “slip seat,” which means using multiple drivers for the same truck on different shifts. Large companies are also far more likely to have sophisticated systems for gathering and processing information about fuel and operational efficiency. Often, smaller operators simply don’t know what kind of fuel economy they get or why. Large companies have the tools, skilled labor, and the scale to make investing in efficient technologies profitable.\textsuperscript{95}

When trucking companies bear the full costs of the trucks and classify drivers as employees rather than independent contractors, the companies have the incentive
and the capacity to economize on the overall cost of purchasing and operating trucks.\(^{96}\)

Trucking companies have access to less-expensive capital, allowing them to make upfront investments in newer, cleaner, and higher-priced trucks. They can afford to carry out regular preventative maintenance that low-income drivers must often delay due to the economic imperative of driving to earn more revenue than they owe. Trucking companies can minimize or may even be able to avoid the idling that occurs in the current system by utilizing scheduling software to make efficient use of trucks.\(^{97}\)

Finally, they can use the trucks more intensively, for more hours per day, which shortens the payback period, compared to the case in a one-driver-one-truck business model. All of these strategies lower the net costs of new, lower-emission trucks.

Poor labor conditions and worker misclassification could slow adoption of and diminish the return on investment in new clean trucks. This in turn could negatively affect the industry’s ability to reduce emissions as required and could lead the state to provide larger subsidies for new truck purchases than would be necessary if workers were properly classified.

**B4. Truck Maintenance and Repair**

There are about 20,000 workers employed as bus and truck mechanics and diesel engine specialists in California, earning an average annual wage of about $55,000 a year or $26.47 per hour.\(^{98}\)

Maintenance and repair jobs in trucking can vary significantly in terms of the skills of workers and the training required. For instance, some lower-skilled maintenance workers may perform regular service on vehicles, such as oil changes or tire replacement. The skill requirements of many of these regular maintenance tasks have not changed much in the recent past. On the other end of the spectrum are a range of technicians and mechanics who work with more advanced technologies on trucks—from increasingly complex diesel engines to communications equipment—and may provide extensive repair and overhaul services. Diesel-powered trucks themselves have become increasingly complex, expensive, and electronically sophisticated over the last several decades, particularly as satellite-linked technologies, emission regulations, hours of service monitoring compliance, numerous safety advances, and concerns about driver health have changed most major systems of the trucks. Much of this training will be transferable to cleaner trucks, and will remain an important component of the broad occupational training needed for skilled truck mechanics.

Most analysts agree that the introduction of lower-emission trucks that do not use diesel (e.g., battery-electric, fuel cell electric, and low-NOx natural gas trucks) will also require significant additional training for truck mechanics, on top of the skills that they already learn. However, the training needs for battery-electric trucks specifically are currently a matter of debate. At present, some potential users expect substantial reductions in
maintenance needs and costs due to the cleaner operation of these zero-emission trucks and fewer moving parts and emission-control needs.

The state is supporting demonstration projects that deploy zero-emission trucks and low-emission, advanced technology trucks, and provides investments in workforce development to ensure a sufficient trained labor supply. The Alternative and Renewable Fuel and Vehicle Technology Program, for instance, provides funding for workforce development. These investments build on partnerships with community colleges to purchase equipment and develop clean transportation workforce training programs, internships, and apprenticeships. The California Workforce Development Board (CWDB) has suggested developing high-road industry partnerships to ensure mechanics are retrained for the new technologies (see Chapter 3).

1. **Workforce Recommendations for the Trucking Industry**

In order to maximize the return on large financial investments in clean trucks, it will be important to use these trucks as intensively as possible. In this case, restructuring the industry for greater efficiency hinges on solving the labor issues and creating the conditions in which trucking companies must internalize both environmental and social costs.

a. **Demand-Side Workforce Policy Levers for Job Quality**

The state should focus its subsidies and other assistance on existing high-road trucking companies that classify truck drivers as employees rather than as independent contractors. This will protect workers from disproportionately bearing the cost of cleaner trucks and help sustain emission reductions from newly-purchased cleaner trucks. The following recommendations provide some tools to accomplish this effort.

- Institute a responsible employer policy for rebates, loans, pilot program grants, and other assistance that could include the following requirements:
  - Require firms receiving public funds for the purchase of clean trucks to operate those trucks with their own employee drivers.
  - Require firms receiving public funds for the purchase of clean trucks to be free of outstanding judgments against them for unpaid wages or other violations of labor laws.
CHAPTER 7: Sustainable Transportation

Incorporate a similar responsible employer policy for all public agencies that contract-out trucking services.

State policy to protect workers should also apply to private companies with procurement contracts with state and municipal governments, in addition to companies receiving grants or subsidies.

b. Supply-Side Workforce Development Strategies

To prevent public workforce training funds from being used to subsidize low-road employers, as was described above:

- Support high-road training partnerships (HRTPs) that work with high-road employers to provide on-the-job training to new truck drivers; redirect funding away from low-road employers who misclassify truck drivers as independent contractors.

- Support HRTPs to retrain existing diesel mechanics for work on new vehicle technologies as they are deployed.

C. Public Transit and Private Passenger Transport

This section addresses passenger transit systems, focusing on the operations and maintenance work performed in-house by public transit agencies. The section above on “Clean Vehicle Manufacturing” addressed the procurement of zero-emission buses, and the section below on “New Transit Infrastructure and Infill Development” addresses new investment in light rail, Complete Streets, and other innovative physical infrastructure to reduce vehicle miles traveled.

Because of California’s car culture and the sprawling nature of urban development, public transit has never been as significant a transportation mode in the state as in American cities east of the Mississippi River, and low transit ridership has been an ongoing challenge for transit agencies. Climate policy has largely taken Californians’ dependence on cars as a given and mainly emphasized emission standards on the existing portfolio of vehicles rather than mode shift strategies that enable people to get people out of cars and into public transit. The most notable exception to this approach, in terms of large-scale transportation projects, is the High Speed Rail project, which has the potential to reduce air and vehicle travel between northern and southern California. While GGRF expenditures have supported transit operations, shared transportation services (e.g., farmworker vanpool and car-sharing in disadvantaged communities programs99),
and programs to encourage bicycling and walking, these have been a relatively small percentage of the total GGRF expenditures on transportation.

At the same time, public transit is facing an existential crisis of downward spiraling ridership, according to industry analysts, due to a number of factors. Scarce and uncertain transit funding (especially for operations and maintenance that make transit systems reliable), the relatively low cost of gas and car ownership, and the tendency for bus transit to operate in mixed traffic (thus, reducing speeds and reliability) have made it challenging to maintain, let alone increase, public transit service. The rise of TNCs (app-based ride hailing services) appears to be another profound threat to public transit systems. Although the taxi industry has been most acutely impacted by TNCs to date, TNCs are also displacing public transit trips due to their relatively low cost, convenience, and reliability, as much as or more than they are substituting for individuals driving their own cars. Even as cities have taken steps to improve transit and support increased density around transit, the growth of TNCs has caused more driving. One study found that the increase in car trips and vehicle miles traveled (VMT) in transit-rich New York City can be attributed in large part to TNCs. The San Francisco County Transportation Authority found that TNCs now account for 15 percent of all intra-San Francisco vehicle trips. The flat or decreasing transit ridership combined with the rise in TNC use means that any effective greenhouse gas emission reduction strategy that targets VMT must consider the impacts to transit and the externalities associated with TNCs.

TNCs are one component of the “Three Revolutions of Urban Transportation”: 1) electrification; 2) mobility as a service; and 3) automation. Together, these emerging technologies and business models hold the possibility of reducing travel costs, greenhouse gas emissions, and congestion. However, their positive impacts are not guaranteed.

TNCs are already on the forefront of emerging vehicle technology development, including self-driving cars, electric vehicles, and the software that allows them to take a role similar to transit. As such, it is critical that TNCs are regulated in a manner that supports wider public benefits and safeguards workers. One such effort underway is implementation of Senate Bill 1014 (2018), which established the Clean Miles Standard and Incentive Program. This regulation will be developed by the California Air Resources Board and implemented by the California Public Utilities Commission. By January, 2021, annual GHG targets will be set for TNCs to reduce grams of carbon dioxide per passenger mile traveled. Absent forward-thinking policymaking, the “Three Revolutions” have the potential to exacerbate existing inequities in the transportation system, generate low-wage jobs, encourage unsustainable development patterns, and increase—rather than reduce—VMT.

Some nascent efforts are underway by transit agencies and others to influence the three transportation revolutions so that the private sector innovations also meet other
public objectives besides individual consumer cost and convenience. Much of this effort addresses how to make public transit and TNCs complementary, with app-based rides providing “first-mile and last-mile connections from home/work to transit stations” so that more, rather than fewer, people use public transit.\footnote{110}

Far less attention has been paid to the labor impacts of declining transit ridership and utilization. Various responses from taxi drivers, ranging from collective organizing to, tragically, driver suicides in response to income loss from TNCs, have been widely covered in the press\footnote{111}—but there has been virtually nothing written about the effects on the public transit workforce\footnote{112}. In addition, there is no central agency or organizing body that can direct a comprehensive industrial planning in this sector. TNCs are currently regulated by the California Public Utilities Commission (CPUC), while automated vehicle (AV) development, also being led by TNCs and technology companies, is regulated by the California Department of Motor Vehicles, the National Highway Traffic Safety Administration, and other bodies, which are largely focused on safety issues and not well positioned to consider other public benefits.

1. **Workforce Outcomes in Public Transit**

   **a. Job Quality and Job Access**

   Public transit in California provides some of the best wages and benefits for workers with no postsecondary education. **Exhibit 7.4** shows the wages for key occupations in public transit.

   **Exhibit 7.4. Wages for Key Occupations in Public Transit Operations, 2017**

<table>
<thead>
<tr>
<th>SOC Code</th>
<th>Occupational Title</th>
<th>Employment</th>
<th>25th Percentile Hourly Wage</th>
<th>50th Percentile (Median) Hourly Wage</th>
<th>75th Percentile Hourly Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>53-3021</td>
<td>Bus Drivers, Transit and Intercity</td>
<td>23,350</td>
<td>$16.21</td>
<td>$21.83</td>
<td>$27.98</td>
</tr>
<tr>
<td>53-4041</td>
<td>Subway and Streetcar Operators</td>
<td>3,930</td>
<td>$27.77</td>
<td>$30.49</td>
<td>$33.41</td>
</tr>
</tbody>
</table>

Since these are largely unionized public-sector jobs, benefit packages are comprehensive and continue to include pensions and retiree health care. They have also provided access to family-supporting jobs for women and people of color.

b. Workforce Development Infrastructure

With an aging workforce, transit agencies have initiated new efforts to build pipelines into transit-sector careers for disadvantaged workers. Labor-management training partnerships have been initiated in many bus transit agencies across California, for example. These high road training partnerships cover transit operators (drivers), as well as maintenance and repair workers who are also public-sector employees of transit agencies. These skilled workers are trained to work on internal combustion engines and need skill-upgrade training to be able to maintain and repair zero-emission and hybrid technology vehicles. Transit agencies with hybrid buses have the unique advantage of a pool of maintenance workers trained in servicing both internal combustion and battery-electric propulsion systems. These labor-management training partnerships, funded in part through the CWDB’s High Road Training Partnership (HRTP) initiative, are discussed as in Promising Practice #7.3, below.

PROMISING PRACTICE #7.3
Transit Vehicle Operators and Maintenance Workers—Labor-Management Partnerships

The San Jose-based Amalgamated Transit Union (ATU) Local 265 and the Santa Clara Valley Transportation Authority (VTA) implemented a joint workforce investment partnership in 2008. This worker-centered job training and mentorship program evolved into the Transit Apprenticeship for Professional Career Advancement (TAPCA). Now operating as a partnership between the Santa Clara VTA, ATU Local 265, and Mission College, TAPCA trains participants to advance their careers in the transit industry while earning wages and college credit. The program relies on the expertise of veteran transit operators and mechanics, with experienced workers providing entry-level and incumbent employees with job training and mentorship to improve technical and interpersonal skills.

Under TAPCA, coach operators, track workers, overhead line workers, and service mechanics receive training that provides linkages from entry-level employment to supervisory roles in VTA’s operations and maintenance departments. The program helps prepare a new generation of skilled transit workers in anticipation of a wave of retirements at Santa Clara VTA. As of December 2017, the program has graduated 84 apprentices.
c. Risk of Job Loss or Job Degradation

If the trends impacting transit service continue, public transit ridership may continue to decline, leading to a contraction of transit’s role as a public service, as an important source of family-supporting, inclusive public sector jobs, and as a key strategy for greenhouse gas emissions reductions.

2. Workforce Outcomes for TNCs

a. Job Quality and Job Access

In contrast to public transit’s family-supporting wages, employer-provided benefits and nascent apprenticeship training infrastructure, jobs in TNCs are of much poorer quality. Job growth is high for TNCs, although many workers in TNCs hold other primary jobs and use this “gig” work to supplement with very part-time hours. The threshold for entry into the TNC workforce is low—requiring only that drivers have a driver’s license, a smartphone and a qualifying vehicle. TNC drivers are currently treated as independent contractors and therefore are responsible for the costs associated with driving, including vehicle operation and maintenance costs, as in some segments of the trucking industry. Consequently, drivers do not receive labor protections afforded to typical employees, such as minimum wage, unemployment insurance, or mandatory breaks.

Currently, the CPUC regulates TNCs, but limits its requirements to mandated background checks and annual reports that include data on accessibility, service by zip code, reported problems with drivers, hours and miles logged by drivers, and the number of drivers who have completed a driver training course. To address the externalities associated with this growing industry and meet California’s climate targets, CARB and CPUC are beginning to implement the California Clean Miles Standard and Incentive Program established by Senate Bill 1014 (SB 1014, Skinner, Chapter 369, Statues of 2018). To that end, CARB will establish a baseline of greenhouse gas emissions for vehicles used on TNC platforms and set annual emission reduction targets and goals that the CPUC must then implement or oversee; TNCs are now required to develop and regularly update plans for achieving the greenhouse gas emission reduction targets and goals. CARB, the TNCs, and other businesses and stakeholders will also evaluate the role of Clean Vehicle Rebate Project (CVRP) incentives in relation to the California Clean Miles Standard and Incentive Program. Importantly, SB 1014 further mandates that CARB, CPUC, and the California Energy Commission (CEC) “ensure minimal negative impact on low-income and moderate-income drivers” in implementing the law.

For public agencies that contract with TNCs to augment transit services, procurement policies and practices can ensure better labor outcomes. For example, public agencies contracting with private entities to provide small-scale, flexible transit service—often
operating with smart-phone platforms and known as micro-transit—can require contractors to meet wage, benefit, and training standards. Agencies may also opt to provide these private entities with vehicle operators and repair services using the agency’s employees; this strategy ensures that labor classification, wage, benefit, and safety standards comply with existing agency rules. The Los Angeles County Metropolitan Transportation Authority has proposed doing the latter as part of its micro-transit pilot project.\(^{125}\)

### 3. Recommendations for Public Transit and Passenger Transport

Public transit is an important part of the state’s climate action plan: it is key to moving more people more miles with fewer emissions, especially once transit vehicles are zero-emission. In addition, its public mission and public ownership give public transit a central role in shaping a future of mobility that meets the state’s climate objectives, while also serving transit-dependent riders and providing family-supporting jobs. Room for improvement and innovation notwithstanding, the public transit sector remains an anchor for the state’s sustainable and equitable transportation system.

However, as noted above, transit ridership is down across the state, in part because of the increase in TNCs as an alternative transportation option in many cities. TNCs have the potential to transform the transportation sector and may spur massive capital investments that support zero-emission technologies along with other changes in mobility services. Where public funds are being expended to expand or regulate these TNC services, the state has an opportunity to shape the industry for the public good, including incorporating the goals of improved job quality and job access.

- **Support funding for public transit operations overall, including for innovative public transit programs that incorporate ride-sourcing and micro-transit services for first- and last-mile trips as part of public transit systems.**

- **Incorporate inclusive procurement policies in programs where public transit agencies contract with TNCs and micro-transit services for first- and last-mile mobility. This effort could include rules or program guidelines that create parity with public transit operator wage, benefit, and safety standards.**
Incorporate worker protections and labor standards in comprehensive regulations of TNCs that also address congestion and VMT, through various policy levers (e.g., licensing or rules and fees on access to curb space and public streets).

Incorporate workforce goals in regional or state planning efforts (e.g., Regional Transportation Plan Guidelines) to shape the Three Revolutions in transportation for broader public benefit.

If incentives for ZEVs are made available to TNCs (specifically, if incentives are provided to private companies buying vehicles for use on a TNC platform), ensure that all relevant labor and employment laws and protections are strictly enforced.

Support funding for professional development and capacity building at public transit agencies and regional transportation planning authorities, including technical assistance for innovative contracting to integrate first- and last-mile travel in transit systems.

D. Clean Fuels Infrastructure

The California Energy Commission (CEC) forecasts that between 1.5 million and 2.4 million zero-emission vehicles (ZEVs) will be on California roads by 2025; most will be battery-electric vehicles powered by electricity while a smaller portion of ZEVs will be fuel cell electric vehicles powered by hydrogen. The CEC expects most of the initial ZEVs in the state to be plug-in electric vehicles, with more than 388,000 sold through March 2018. Likewise, the state expects 37,000 fuel cell electric vehicles using hydrogen fuel on California roads by 2023. Apart from electricity, natural gas, and hydrogen, biofuels (e.g., renewable diesel, ethanol, and bio-methane) represent the largest existing stock of alternative fuel in the California transportation sector. Although still less than 10 percent of the total vehicles on the road, reaching California’s ZEV targets requires investments in fueling infrastructure so that drivers can confidently purchase vehicles that use alternative fuels.

The investments needed for electrification in transportation create an opportunity to employ certified electricians who can upgrade their skills to install, maintain, and retrofit...
electrical vehicle supply equipment (EVSE, more commonly referred to as an EV charging station). Skill upgrades via certifications like the Electric Vehicle Infrastructure Training Program (EVITP), modeled after the CALCTP certification discussed in Chapter 6, build upon certified electricians' foundational skills, rather than train for one specific technology as a one-off training. The EVITP curriculum was developed based on evidence of worker and public safety risk associated with the installation and maintenance of EV charging stations. Because the EVITP is aligned with the state-certified electrical apprenticeship programs, it is part of the best training system in the state for skilled construction trades workers, for reasons explained in detail in Chapter 3.

Similar to EV charging station expansion, investments in other alternative fuel distribution networks will generate jobs; many of these will be jobs for plumbers and pipefitters and other skilled trades. Certifications may be needed to upgrade skills for the installation of infrastructure for hydrogen, renewable diesel, and other low-carbon fuels.

1. Workforce Outcomes

a. Job Growth

The construction and installation of fueling infrastructure (across all fuel types), and the push for more in-state production of renewable fuels and biofuels, are likely to lead to job growth. Statewide, the sector is expected to grow from an estimate of 69,200 positions in 2014 to more than 75,000 positions in 2024, due to the growing push to electrify light-duty vehicles and the consequent need to build the state’s electric vehicle charging infrastructure.

Electric vehicle charging stations involve distributing power from the grid to the charging station and installing the actual charging device that converts AC power from the wall to DC power that charges the battery in the vehicle. Electric vehicle service providers (EVSP) not only install the charging station, but also provide the connectivity across a network of charging stations. Connecting to a central server, EVSPs manage the software, database, and communication interfaces that enable operation of the station.

In California, electric vehicle charging stations are installed both by utilities (and their subcontractors) and unregulated private firms. For EVSE managed by the investor-owned utilities (IOUs), utility employees install the connection to the grid, and electricians who work for electrical contractors install the charger. It should be noted that there may be different skill levels needed for different market segments, such as residential recharging of a single electric car versus commercial and industrial electric charging infrastructure that is larger scale and can recharge vehicles more rapidly.

Growth in the use of low-carbon fuels other than electricity will depend on a network of pipelines for refining and distribution. These pipelines will also likely be constructed or
modified by some combination of utility workers and specialty skilled trades, namely plumbers and pipefitters involved in new gas fueling infrastructure. Apprenticeship programs in the plumbing and pipefitting trade already incorporate a set of skill certifications, which potentially can be used or modified to address alternative fuel infrastructure installation. The United Association of Plumbers, Fitters, Welders, and Service Technicians has a well-developed infrastructure for creating certifications aligned with their trade as the need arises, including such diverse certifications as medical gas technician, HVACR service technician, and nuclear mechanic, most of which are certified by national or international industry and/or quality entities.\(^\text{135}\)

**b. Job Quality**

Job quality in the electric vehicle supply equipment sector is ensured for charging stations that are installed through IOU programs. The California Public Utilities Commission (CPUC) requires of the IOUs that the EVSE installation work be performed by state-certified C-10 electrical contractors and by electricians who have received the skill certification given to graduates of EVITP.\(^\text{136}\) This workforce skill standard screens out unqualified workers and contractors, creates a return on investments in training, and ensures higher wages for workers. Furthermore, the EVITP is an upgrade to an existing credential (the state’s electricians’ certification), adding skills and new work opportunities to a pre-existing defined career pathway.

Job quality can be mixed for installations that are not managed by the IOUs, because those programs typically do not require the use of skilled labor for charging station installation. Neither the CEC’s Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) nor Electrify America, which provides funding for EVSE installation as part of the Volkswagen consent decree, include the EVITP skill certification requirements.\(^\text{137}\)

**c. Job Access**

To the extent that it increases demand for skilled workers in the construction trades (i.e., EVITP-certified electricians), the move toward transportation electrification adds new opportunities for participants in programs that create pathways to good jobs for historically marginalized populations (see Chapter 3). Since the EVITP is a journey-upgrade training program for the electrical trade, it expands opportunities for journey-level electricians and subsequently for apprentices in the state-certified electrical apprenticeship programs. As more work is available, new apprenticeship slots can open up to provide entry for graduates of apprenticeship preparation programs. While the amount of new work from EVSE installation alone may not create large numbers of openings for new apprentices, growth in this line of work does ensure that as work increases for EVITP-certified electricians, the pipeline into middle-class construction jobs also expands.
As long as pre-apprenticeship programs are in place to help disadvantaged workers access and succeed in apprenticeship, inclusion will be supported. These pre-apprenticeship opportunities prioritize populations that face barriers to employment, as discussed in Chapter 3 of this report. Community colleges can also offer EVITP certification, and instructors from a number of community colleges have been trained by EVITP to teach classes.138

2. Workforce Recommendations

- Adopt the requirement that electric vehicle charging stations be installed by EVITP-certified electricians across all incentive programs overseen by the state, including but not limited to ARFVTP and Electrify America programs.

EVITP is the skill standard currently used by the IOUs’ EVSE installation programs and ensures proper installation and family-supporting jobs. Because the EVITP builds upon the state-certified apprenticeship program, as work increases for EVITP-certified installers, new openings for entry-level apprentices will be supported as well, expanding the pipeline for disadvantaged workers into middle-class construction jobs.

- Apply similar labor and skills standards for programs that fund the upgrade, retrofit, or construction of other low-carbon fuel distribution infrastructure.

For non-electrical sectors (e.g., hydrogen, biofuels, natural gas), assess current certifications that could be used or modified for fueling infrastructure-related work.

E. New Transit Infrastructure and Infill Development

CARB’s 2018 Progress Report on California’s Sustainable Communities and Climate Protection Act makes clear that California must include land use policies to reduce vehicle miles traveled (VMT) alongside its investments in zero-emission vehicles, in order for the state to achieve the 2030 climate targets. Reducing VMT requires investments in transit infrastructure and operations, active transportation infrastructure, and construction of multifamily and mixed-use infill development projects. Collectively, these investments provide Californians with alternatives to driving and driving alone, by concentrating housing near jobs and transit options, thus reducing the total miles people must travel by car.
The state’s tools to reduce VMT focus on providing incentives to public transit and to sustainable, affordable housing construction. Funding sources include gas and diesel taxes (for transportation infrastructure) and the GGRF, which is a major source of funding for both High Speed Rail and for projects that combine affordable housing, transit options, urban greening, and other sustainability elements. GGRF funding, along with other state and federal funding sources, supports the High Speed Rail project, the construction of new light rail infrastructure, the Affordable Housing and Sustainable Communities program, and the Transformative Climate Communities program.

For example, Caltrans administers the Active Transportation Program (ATP) to increase the share of trips made using non-motorized (or active) transportation, like walking and bicycling. After years of limited funding from various state and federal sources, the ATP now has a sizable amount of dedicated annual funding, at least $100 million per fiscal year, due to the passage of the Road Repair & Accountability Act (SB 1, Beall, Chapter 5, Statutes of 2017). In ATP’s first two-year cycle, it awarded slightly more than $350 million for 267 projects throughout the state. Eligible projects include: 1) infrastructure improvements that increase safety for people who walk and bike; 2) non-infrastructure improvements that focus on education and training; and 3) planning for more community-wide bicycle and pedestrian improvements.

These policies intend to drive shifts in land use and travel patterns that will necessitate significant infrastructure development and upgrading, including construction and rehabilitation for road improvements, streetscaping, underground utilities, and storm water and drainage systems. A 2016 report by the Southern California Association of Governments (SCAG) forecasts that for every $1 billion spent in active transportation infrastructure region-wide, an additional 5,000 jobs are created in construction and related trades.

Infill housing is also key to lowering VMT. The cost of generating enough residential housing to accommodate growth from 2015-2030 would be lower using infill development rather than a business-as-usual development scenario, according to a recent Next10 study. State investments that focus on multifamily infill development, such as those funded by the Affordable Housing and Sustainable Communities (AHSC) program, support job creation in the construction industry. The AHSC program, specifically the over $400 million in appropriations between Fiscal Years 2013-14 and 2015-16, is estimated to have supported approximately 1,979 direct, full-time equivalent (FTE) job years. Most of these jobs are in the construction industry, with about 1,318 jobs in multifamily residential construction and 598 jobs in transportation infrastructure construction. Together, they make up nearly 97 percent of all direct jobs supported by the AHSC program between 2013 and 2016. Smart growth experts also point out that the transportation and land-use solutions that result in lower vehicle miles traveled, which are associated with denser infill development, also produce better job quality and rates of construction job growth compared to sprawl development.
1. **Workforce Outcomes**

   a. **Job Growth**

   The expansion of investments in transit capital projects, infill development, and other physical infrastructure largely generates jobs in the construction industry. Investment in new transit infrastructure and multifamily housing units provides an opening to expand opportunities for construction jobs. If the state focused efforts to meet local housing needs by targeting investments on infill multifamily housing, an estimated total of 490,000 jobs could be created, according to a study conducted by the UC Berkeley Terner Center for Housing Innovation; the UC Berkeley Center for Law, Energy and the Environment; and Next 10.\(^\text{146}\) The High Speed Rail project was estimated to create 415,000 direct construction job years by 2029 in its Phase 1, from San Francisco to Anaheim.\(^\text{147}\)

   b. **Job Quality and Job Access**

   Job quality in this sector is mixed, with construction wages varying significantly between union and nonunion workers.\(^\text{148}\) Many of the policies related to supporting infill development and transit expansion are considered public works, requiring contractors to pay prevailing wages.\(^\text{149}\) The “skilled and trained” workforce requirement described in Chapter 2 has also been incorporated in recent affordable housing laws, including Senate Bill 35 (Wiener, Chapter 366, Statutes of 2017)\(^\text{150}\) and Assembly Bill 73 (Chiu, Chapter 371, Statutes of 2017),\(^\text{151}\) both of which create streamlined approval processes for certain types of housing developments.\(^\text{152}\) In the residential construction sector, investments focused almost exclusively on multifamily housing can produce “larger collective wage income because the shift to multifamily construction demands more skilled labor than single-family construction,”\(^\text{153}\) so job quality can be higher.

   For transit infrastructure, Project Labor Agreements (PLAs) and Community Workforce Agreements (CWAs) are commonly used in California cities, where local elected officials see them as a mechanism to maximize the economic benefits of development projects and create jobs for local residents (see Chapter 2).\(^\text{154}\) Some agencies that require PLAs for major subsidized housing developments and transit system expansion projects include targets for local hiring, set goals for apprenticeship utilization, and codify goals for participation of disadvantaged workers to expand access to women and other workers underrepresented in the construction trades (turning the PLA into a CWA, as defined in this report). For transit system expansion, the state’s larger transit agencies (e.g., Los Angeles County Metro,\(^\text{155}\) BART,\(^\text{156}\) SFMTA,\(^\text{157}\) and AC Transit\(^\text{158}\)) regularly establish PLAs for large construction projects. Both PLAs and CWAs set standards for wages and expand training opportunities for workers, because they include use of the state-certified apprenticeship system and contributions to apprenticeship training trust funds for every hour worked.\(^\text{159}\).
There is an untapped opportunity to promote high-road approaches and enhance job outcomes in competitive programs that support infill residential construction. The AHSC program funded by the GGRF supports infill affordable housing projects tied to sustainable transportation infrastructure investments. The program awards points for projects that establish workforce inclusion and diversity strategies, and AHSC applicants can receive up to two points (out of a possible 100) if the project advances local workforce development and hiring practices. Program guidelines also support prevailing wage standards, but only when a project is otherwise covered by prevailing wage requirements. Adding extra weight to the workforce development element, to ensure job quality not just job access, in the AHSC and other competitive California Climate Investment programs (like the Transformative Climate Communities program) could lead to enhanced workforce outcomes for the state’s GGRF-funded housing programs.

PROMISING PRACTICE #7.4
Establishing Labor Protections, Increasing Access to Jobs, and Promoting Infill Development Near Transit: Measure JJJ

Passed by 64.8 percent of voters in Los Angeles in 2016, Measure JJJ enacts minimum affordable housing requirements, training standards, and labor and wage regulations on development projects that seek zoning changes, general plan amendments, or height district changes in the City of Los Angeles. Measure JJJ also establishes the Transit-Oriented Communities (TOC) program, which provides incentives for projects that meet affordability thresholds and are within a half-mile radius of a major transit stop.

Measure JJJ was supported by a coalition of labor and affordable housing advocates. The measure has strong labor standards and job access goals that largely focus on local hire and employing historically marginalized groups. Measure JJJ provides added development incentives, such as zoning exemptions and density bonuses, for projects that meet the entire suite of labor standards outlined in the policy. For projects eligible for JJJ incentives, construction workers must be paid prevailing wages, 30 percent of workers must be Los Angeles residents, and 10 percent must be “transitional” (i.e., veterans, single parents, and/or unemployed individuals living within a five-mile radius of the project).

Using language that is very similar to the “skilled and trained” workforce standard discussed in Chapters 2 and 8, projects eligible for Measure JJJ incentives must meet a requirement that 60 percent of the workers on the project must either: 1) have graduated from a joint labor-management, state-certified apprenticeship training program or have at least as many hours of on-the-job experience in the applicable craft as would be required to graduate from such an apprenticeship program; or 2) be registered apprentices in an apprenticeship training program approved by the State of California or an out-of-state, federally-approved apprenticeship program.

This requirement ensures both job quality and a job training pathway through the utilization of registered apprentices whose wages rise as they advance in their training program.
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PROMISING PRACTICE #7.5
Job Access and Inclusion Model—Los Angeles County Metropolitan Transportation Authority (LA Metro) Construction Careers Policy (CCP)

LA Metro’s Construction Careers Policy (CCP) and associated Project Labor Agreement (PLA) programs provide a good example of a far-reaching workforce access and pathways policy. Approved by the LA Metro Board in 2012, the PLA/CCP has the following requirements for federally-funded local transportation construction projects with a value greater than $2.5 million:

- 40-percent participation of construction workers residing in economically disadvantaged areas;
- 20-percent apprentice participation; and
- 10-percent participation of disadvantaged workers that meet specific criteria for individuals.

As of March 2018, LA Metro’s construction projects that are subject to the PLA/CCP have seen participation rates that meet and exceed the targeted workforce thresholds outlined above. Sixty percent of construction workers on these projects live in economically disadvantaged areas, 21 percent are apprentices, and 10 percent are economically disadvantaged. The agency has spent more than $7.5 billion on contracts utilizing the PLA, with more than 5.8 million apprentice hours used across projects.

This program also aims to increase access to construction jobs for women. To date, LA Metro’s female participation average is 3.4 percent. In an effort to boost those numbers, the PLA/CCP also led to the establishment of the Women Build Metro LA (WBMLA), a working group comprised of women and men in construction, community advocates, public officials, and other stakeholders. This committee helps LA Metro achieve its goal of increasing female participation in construction through recruitment, education, and career development for women entering the transportation industry. Their programming includes apprenticeship readiness fairs, workshops, and tours for prospective female construction workers. The committee partners with the organization Women in Non-Traditional Employment Roles (WINTER), and includes the direct involvement of the apprenticeship programs’ training coordinators in assisting applicants with pre-apprenticeship and apprenticeship applications.

LA Metro mandates that contractors entering into a PLA must fill out a quarterly “report card” that tracks women and minority participation in their construction projects, and is used to measure progress towards the hiring goals. Contractors are also required to demonstrate their efforts to “create and promote a diverse and inclusive work environment” by reporting their policies around child care, restrooms, and sexual harassment, as these are factors in the retention of women in construction.
2. **Workforce Recommendations**

- Where public sources contribute funding to infill development projects, awarding agencies can set minimum workforce standards or include scoring criteria that reward applicants who create good jobs and expand access to workers who are under-represented in the construction trades.

- Where the state award grants to local transit agencies, require PLAs or CWAs for transit infrastructure expansion projects.

## IV. Key Recommendations for Sustainable Transportation

### Exhibit 7.5. Key Recommendations for Sustainable Transportation

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<thead>
<tr>
<th>Clean Vehicle Manufacturing</th>
<th>Demand Side</th>
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<tr>
<td></td>
<td>Use inclusive procurement policies for public procurement of buses and other fleet vehicles purchased by state and local government and public agencies.</td>
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<td></td>
<td>Use job impact metrics to measure the impact of clean vehicle incentive and investment programs on quantity of jobs, job quality, and job access.</td>
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<td>Incorporate workforce analysis into emerging technology support programs.</td>
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<th>Cleaner Trucking</th>
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<tr>
<td></td>
<td>Institute a responsible employer policy for rebates, loans, pilot program grants, and other assistance and for all public agencies that contract-out trucking services that requires:</td>
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<td></td>
<td>- Strict enforcement of all applicable labor and employment laws;</td>
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<td></td>
<td>- Firms receiving public funds for the purchase of clean trucks to operate those trucks with their own employee drivers; and</td>
</tr>
<tr>
<td></td>
<td>- Firms receiving public funds for the purchase of clean trucks to be free of outstanding judgments against them for unpaid wages or other violations of labor laws.</td>
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### Demand Side

| **Public Transit and Passenger Travel** | - Support funding for public transit operations including for innovative programs that incorporate micro-transit services for first- and last-mile trips as part of public transit systems.  
- Incorporate inclusive procurement policies in programs where public transit agencies contract with transportation network companies (TNCs) for first- and last-mile mobility.  
- Incorporate responsible employer policies for projects that use public funding to incentivize cleaner vehicles for TNCs.  
- Incorporate worker protections and labor standards in comprehensive regulations of TNCs that also address congestion and vehicle miles traveled, through licensing or rules and fees on access to curb space and public streets or other policy levers that may be considered. |
|---|---|
| **Cleaner Fuels Infrastructure** | - Adopt the requirement that electric vehicle charging stations be installed by EVITP-certified electricians across all incentive programs overseen by the state.  
- Apply labor and skills standards for programs that fund the upgrade, retrofit, or construction of other alternative fuel distribution infrastructure. |
| **Infill Development and Transit Infrastructure** | - Where competitive grants fund infill development projects, include scoring criteria that reward applicants that create good jobs and expand access to disadvantaged groups and communities not well represented in the construction trades.  
- Require PLAs or CWAs for transit infrastructure expansion projects. |
| **All Sustainable Transportation Subsectors** | - Use job impact metrics to measure the impact of climate policies on job numbers, job quality, and job access. |
### Supply Side

| All Sustainable Transportation Subsectors | - Support high-road industry training partnerships for low-carbon vehicle manufacturing, lower-carbon vehicle repair, transit operations, and alternative fuel infrastructure installation.  
- Support professional development and capacity building in transit agencies and regional transportation planning authorities.  
- Track training program outcomes for graduation, attainment of industry-recognized credentials, job placement, retention, wages, and wage progression. |
| Infill Development and Transit Infrastructure | - Fund and participate in High Road Construction Careers, a statewide initiative that includes pre-apprenticeship training linked to expanding the use of CWAs in construction. |
Endnotes


8  Several of the policies listed below affect multiple categories (e.g., the Low Carbon Transportation Investments and AQIP program includes elements that affect the adoption of cleaner vehicles and reduction in VMT). For this report, we have grouped them based on the policy’s primary sphere of influence.


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20 California Air Resources Board, “Alternative Fuel Volumes and Credit Generation.”


Melville et al., “CA’s Advanced Transportation Industry Clusters of Opportunity: Driving Market Expansion, Technology Innovation and Job Growth.”


Original equipment manufacturers (OEMs) that have recently built plants in the state include BYD, Complete Coach Works, Proterra, Motiv Power Systems, TransPower,
Wrightspeed, and Karma—all makers of zero-emission vehicles (ZEVs, i.e., plug-in electric and fuel cell vehicles). These investments follow a decade when very few new automotive plants were built in North America.

43 CALSTART, “California’s Clean Transportation Technology Industry: Time to Shift into High Gear.”


46 Transport & Environment.


48 This is based on review of the California Department of Industrial Relations (Division of Occupational Safety & Health and the Division of Labor Standards Enforcement) inspections and investigations since 2011 of zero-emission vehicle (ZEV) manufacturers that have received state funding for workforce and capital/production investments.


56 Jobs to Move America, “Victories.”


61 California Air Resources Board, “Proposed California Phase 2 Greenhouse Gas Standards (CA Phase 2 GHG) and Potential Amendments to the Tractor-Trailer GHG Regulation.”


64 Michael Belzer, Sweatshops on Wheels: Winners and Losers in Trucking Deregulation (Oxford University Press, 2000).


67 Smith, Marvy, and Zerolnick, “The Big Rig Overhaul: Restoring Middle-Class Jobs at America’s Ports Through Labor Law Enforcement.”

68 Visicelli, The Big Rig: Trucking and the Decline of the American Dream.


70 Smith, Marvy, and Zerolnick, “The Big Rig Overhaul: Restoring Middle-Class Jobs at America’s Ports Through Labor Law Enforcement.”
Time and resource constraints precluded addressing all segments of the trucking industry.


Murphy, “Rigged. Forced into Debt. Worked Past Exhaustion. Left with Nothing.”


Lara, SB-1402 Labor contracting: customer liability.

Percannella, “Under a New Law, Retailers Share Liability for Misclassified Truck Drivers at California Ports.”


86 Viscelli, The Big Rig: Trucking and the Decline of the American Dream.

87 Viscelli.

88 Viscelli.


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95  Viscelli, *The Big Rig: Trucking and the Decline of the American Dream.*

96  Viscelli.

97  Viscelli.


100  Daniel Sperling, professor and American founding director of the UC Davis Institute for Transportation Studies, personal communication with author, December 19, 2017.

101  Matt Nichols, Policy Director, Infrastructure and Transportation, Office of Mayor Libby Schaaf, personal communication with author, December 1, 2018.


103  Anne Elizabeth Brown, “Ridehail Revolution: Ridehail Travel and Equity in Los Angeles” (UCLA, 2018), [https://escholarship.org/uc/item/4r22m57k](https://escholarship.org/uc/item/4r22m57k).


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Fulton, Mason, and Meroux.


See, for instance, this recent work which summarizes current research comparing earnings and other labor conditions between TNC drivers and taxi cab drivers, but does not recognize any impact on paratransit or transit drivers. National Academies of Sciences, Engineering, and Medicine, Between Public and Private Mobility: Examining the Rise of Technology-Enabled Transportation Services (Washington, DC: The National Academies Press, 2016), https://doi.org/10.17226/21875.


California Department of Industrial Relations, “News Release: DIR Recognizes New Apprenticeship Program at the Santa Clara Valley Transportation Authority
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118 California Transit Works!, “Measurable Results.”


123 Bernhardt and Thomason, “What Do We Know About Gig Work in California? An Analysis of Independent Contracting.”


For this report, we define “biofuels” as non-petroleum diesel substitutes, gasoline substitutes, and bio-methane. “Diesel substitutes” refers to liquid fuel that can significantly displace diesel fuel, including biodiesel, renewable diesel, and renewably derived dimethyl ether. “Gasoline substitutes” refers to any liquid fuel that can directly displace gasoline in internal combustion engines, including ethanol and renewable drop-in gasoline substitutes. Orenberg, “2018-2019 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program.”


EVITP is open to any certified electrician, so it does not exclude either non-unions workers or workers who obtained their certifications without going through an apprenticeship program.


California Public Utilities Commission, “Decision on the Transportation Electrification Priority Review Projects,” January 11, 2018, http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M204/K655/204655240.PDF.

California Air Resources Board, “California Air Resources Board’s Guidance to Volkswagen on First 30 Month Electric Vehicle Infrastructure Investment Plan of the 2.0
138 We were unable to find information about enrollment, graduation, or the job placement rates from community college programs.


140 Curry, “CAActive Transportation Program Funding Unchanged for Next Two Years.”

141 California Department of Transportation, “ATP Purpose and Goals.”

142 Urban Design 4 Health and AECOM, “Active Transportation Health and Economic Impact Study” (Southern California Association of Governments, November 7, 2016), http://www.ochealthhiertogther.org/content/sites/ochca/Local_Reports/SCAG_Active_Transportation_Health_and_Economic_Impact_Study_2016.pdf.


144 DeShazo et al., “Employment Benefits from California Climate Investments and Co-Investments.”


146 Decker et al., “Right Type, Right Place: Assessing the Environmental and Economic Impact of Infill Residential Development Through 2030.”


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153 Decker et al., “Right Type, Right Place: Assessing the Environmental and Economic Impact of Infill Residential Development Through 2030.”


164  Los Angeles County Metropolitan Transportation Authority.

165  Los Angeles County Metropolitan Transportation Authority.

166  Los Angeles County Metropolitan Transportation Authority.


