

5A. Environmental Impacts

The freight sector is an important part of California's economy; however, it can also cause significant negative public health and environmental impacts. This chapter will discuss the environmental impacts of freight movement on local air pollution, flooding and stormwater runoff as well as wildlife habitat loss and other environmental considerations. The freight industry is widely distributed within California along and near truck and rail corridors, rail yards, warehouse districts, seaports, airports, intermodal transfer facilities, agricultural processing plants, and industrial and manufacturing facilities. Freight vehicles and equipment (trucks, locomotives, ocean-going vessels, cargo handling equipment, transport refrigeration units, forklifts, and many other types of equipment) traditionally use diesel fuel. The emissions generated by diesel fuel consumption include diesel particulate matter (DPM), other particulate matter (PM), nitrogen oxides (NOx), sulfur oxides (SOx), and other air pollutants which can cause health and environmental challenges. The environmental impacts of goods movement is increased in the construction and operations of freight support facilities and can damage habitat as well as less evident environmental damages. While negative impacts of freight affect all Californians, children, the elderly, pregnant women, and those in poor health are particularly impacted.

Environmental Policies and Impacts

CLIMATE ACTION PLAN FOR TRANSPORTATION INFRASTRUCTURE (CAPTI)

The 2021 Climate Action Plan for Transportation Infrastructure (CAPTI) was driven by Executive Order N-19-19 and Executive Order N-79-20 to develop a collaborative framework for aligning state transportation investments to meet California's climate, health, and social equity goals^{21,2}. CAPTI is a framework to align state transportation infrastructure investments with California's climate, health and social equity goals. This process will build off the Senate Bill 1 "Fix it First Approach" while also providing a framework of changes to transportation development approaches and activities that align with the CAPTI Investment Framework as seen in **Table 5.1**.

Table 5.1: CAPTI Investment Framework Guiding Principals

CAPTI Investment Framework	
Guiding Principles	Action Details
Building toward an integrated, statewide rail and transit network	Centered around the existing California State Rail Plan that leverages the California Integrated Travel Project to provide seamless, affordable, multimodal travel options in all contexts, including suburban and rural settings, to all users.
Investing in networks of safe and accessible bicycle and pedestrian infrastructure	by closing gaps on portions of the State Highway System that intersect local active transportation and transit networks or serve as small town or rural main streets, with a focus on investments in low-income and disadvantaged communities throughout the state.

Including investments in light, medium, and heavy-duty zero-emission vehicle (ZEV) infrastructure	Support the innovation in and development of the ZEV market and help ensure ZEVs are accessible to all, particularly to those in more rural or remote communities.
Strengthening our commitment to social and racial equity by reducing public health and economic harms and maximizing community benefits	to disproportionately impacted disadvantaged communities, low income communities, and Black, Indigenous, and People of Color (BIPOC) communities, in urbanized and rural regions, and involve these communities early in decision-making. Investments should also avoid placing new or exacerbating existing burdens on these communities, even if unintentional.
Making safety improvements to reduce fatalities and severe injuries of all users towards zero	on our roadways, railways, and transit systems by focusing on context appropriate speeds, prioritizing vulnerable user safety to support mode shift, designing roadways to accommodate for potential human error and injury tolerances, and ultimately implementing a safe systems approach.
Assessing physical climate risk	as standard practice for transportation infrastructure projects to enable informed decision making, especially in communities that are most vulnerable to climate-related health and safety risks.
Promoting projects that do not significantly increase passenger vehicle travel,	particularly in congested urbanized settings where other mobility options can be provided and where projects are shown to induce significant auto travel. These projects should generally aim to reduce VMT and not induce significant VMT growth. When addressing congestion, consider alternatives to highway capacity expansion, such as providing multimodal options in the corridor, employing pricing strategies, and using technology to optimize operations.
Promoting compact infill development while protecting residents and businesses from displacement	by funding transportation projects that support housing for low-income residents near job centers, provide walkable communities, and address affordability to reduce the housing-transportation cost burden and auto trips.
Developing a zero-emission freight transportation system	that avoids and mitigates environmental justice impacts, reduces criteria and toxic air pollutants, improves freight's economic competitiveness and efficiency, and integrates multimodal design and planning into infrastructure development on freight corridors.
Source: CAPTI Investment Framework- Guiding Principals	

GREENHOUSE GAS EMISSIONS

California has implemented legislation to reduce greenhouse gas emissions (GHG), including AB 32²¹³ and SB 350.²¹⁴ AB 32 established GHG emissions reduction target of 15 percent below 1990 levels by 2020. SB 350, SB 32²¹⁵ and Executive Order (EO) B-30-15²¹⁶ furthered the GHG reduction goal by setting a new target of 40 percent below 1990 levels by 2030.

In addition, EO N-19-19²¹⁷ leverages California’s pension investments, transportation systems and purchasing power to strengthen and advance the State’s climate leadership and resiliency, with the objective to reduce GHG emissions and mitigate the effects of climate change. Two important bills were also signed into law to strengthen emission standards for trucks, semis and other high-pollution vehicles. The first bill, SB 210 by Senator Connie Leyva (D-Chino) requires CARB to develop and implement a Heavy-Duty Inspection and Maintenance Program for non-gasoline, heavy-duty trucks.²¹⁸ This will be the first ‘smog check’ program of its kind in the nation. The second bill, SB 44 by Senator Nancy Skinner (D-Berkeley) requires CARB to create a comprehensive plan for reducing GHG emissions from medium and heavy-duty vehicles.²¹⁹

In addition to the statewide targets, many regional air quality districts and local agencies have their own GHG emissions thresholds for environmental review, as well as GHG emissions targets. For the purposes of the CFMP, this section focuses only on the State targets²²⁰ and specifically, on reducing carbon emitted from fossil fuels, as well as renewable natural gas. To meet the State’s goals, CARB’s strategies focus on transitioning to zero-emission equipment and operations.

In 2022 California Air resources Board (CARB) released the State Implementation Plan that demonstrate how the state will attain the standards by specific dates. CARB is collaborating with local air districts on development of regional SIPs and solicited stakeholder input on the development of the 2022 State SIP Strategy. This included workshops and participation in local air district outreach efforts. CARB staff finalized the 2022 State SIP Strategy and Environmental Analysis and the Board adopted on September 22, 2022. The measures (freight and non-freight) proposed in the 2022 SIP, in combination with ongoing implementation of current control programs, will reduce NOx emissions from mobile sources by at least 64 percent from today’s levels Statewide by 2037, as well as reduce emissions of Reactive Organic Gases (ROG) by 58 percent. Of these Statewide reductions, a large portion will occur in and around communities near major roadways and freight facilities like ports, airports and warehouses, providing substantial health benefits. The expected emission reductions from new freight measures proposed in the 2022 State SIP Strategy are 149.6 tpd of NOx and 8.6 tpd of ROG in 2037 Statewide.²²¹

Table 5.2: Statewide Expected Emission Reductions Freight Measures

Proposed Measure:	2037 NOx (tpd)	2037 ROG (tpd)
Advanced Clean Fleets Regulation	19.3	1.7
Zero-Emissions Truck Measure	14.3	1.3
TRU Part 2	15.2	2
CHC amendments	8.7	0.5
CHE Amendments	0.7	0.5
In-Use Locomotive Regulation	63.2	2.5
On-Road Heavy-Duty Vehicle Low-NOx Engine Standards	3.8	0.1
More Stringent NOx and PM Standards for OGVs	0.8	Not Quantified in 2022 SIP
Cleaner Fuel and Vessel Requirements for OGVs	23.6	Not Quantified in 2022 SIP
Total	149.6	8.6
<i>Source: 2022 CARB State SIP Strategy (ca.gov)</i>		

DISADVANTAGED COMMUNITIES

The California Department of Transportation (Caltrans) acknowledges that communities of color and under-served communities have experienced fewer benefits and a greater share of the burdens associated with California's transportation system. These disparities largely reflect a history of transportation decision-making, policy, processes, planning, design, and construction that has quite literally put-up barriers, divided communities, and amplified racial inequities, particularly in Black and Brown neighborhoods²²².

To operationalize Caltrans' commitments to equity, the department is developing the Caltrans Transportation Equity Index (EQI). The EQI is a screening and evaluation tool that utilizes multiple transportation-specific and socioeconomic indicators to identify transportation-based priority populations at the Census block level. Many tools exist to evaluate the impact of the built environment. Still, these tools typically consider a wide range of factors that are not explicitly focused on burdens caused or exacerbated by the transportation system. Caltrans aims to bridge this gap by creating an index to inform how the Department can best address and mitigate inequities exacerbated by the transportation system. The EQI is also designed in a manner to support partner agencies and other entities who may voluntarily use the EQI to analyze impacts and evaluate the effectiveness of various transportation projects and solutions.

Caltrans is a recipient of federal financial assistance and incorporates Title VI of the Civil Rights Act of 1964 (11 Title VI¹), the Civil Rights Restoration Act of 1987, Section 162(a) of the Federal-Aid Highway Act of 1973, the Age Discrimination Act of 1975, Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, and Executive Order 12898 into its programs, policies, procedures, activities, and services. Caltrans will not, on the grounds of (race, color, national origin) and related nondiscrimination law (sex, sexual orientation, gender identity, age, or disability) exclude from participation in, deny the benefits of, or otherwise subject any person to discrimination in any Caltrans program, policy, procedure, activity, or service.

Additionally, Caltrans incorporates Environmental Justice into its programs, policies, and activities to ensure there are no disproportionate adverse impacts, particularly on minority and low-income populations. The Department emphasizes the fair treatment and meaningful involvement of people of all races, cultures, and income levels, including minority and low-income populations, from the early stages of transportation planning and investment decision-making through construction, operations, and maintenance.

Community impacts from the freight industry, such as air pollution and noise, have been longstanding issues. Air pollution is the primary freight-related impact of concern for communities near freight facilities due to the potential for significant negative health impacts. Some of these impacts worsen asthma, cancer, hospitalizations, and even premature death related to heart and lung disease. Communities in close proximity to freight facilities disproportionately experience these harmful health effects. For a statewide approach to understanding how and the extent of these impacts, a combination of CalEnviroScreen evaluations of disadvantaged communities and air basin data was used since location specific data for freight related networks and facilities are not consistently available throughout the state.

Disadvantaged communities refer to the areas throughout California which disproportionately experience hardships relating to economic, health, and environmental equity. These areas have high poverty rates, high unemployment, suffer from air and water pollution as well as the presence of hazardous wastes, and the high rates of asthma and heart disease. Programs

funded through proceeds from the State's Greenhouse Gas Reduction Fund (GGRF), use the definition of disadvantaged communities defined by the California Environmental Protection Agency (CalEPA) in accordance with SB 535²²³ (De Leon Chapter 830, Statutes of 2012). CalEPA uses the CalEnviroScreen tool to assess areas that are disproportionately affected by multiple types of pollution and areas with vulnerable populations. CalEnviroScreen includes numerous indicators in two broad categories – “burden of pollution,” which includes exposures and environmental effects, and “population characteristics,” which includes sensitive populations and socioeconomic factors. Additional information regarding CalEnviroScreen for all census tracts, including those defined as SB 535 disadvantaged communities, can be found on the CalEPA website.

The CalEnviroScreen formula calculates a score based on the pollution burden and population characteristics. The Census Tracts in the top 25 percent of the CalEnviroScreen 4.0 score are considered disadvantaged (**Figure 5.2**). CalEnviroScreen includes pollution and environmental effects that are less directly associated with freight and logistics including the following:

- Exposures
 - Pesticide Use
 - Drinking Water Contaminants
- Environmental Effects
 - Groundwater Threats
 - Cleanup Sites
 - Impaired Bodies of Water

To determine the disadvantaged communities with the highest rate of exposure to freight-related emissions, the top 25 percent of tracts were evaluated to determine how many are located within California air basins that are considered nonattainment areas and do not conform to State air quality standards for pollutants that have a known negative impact on human health. These pollutants include particulates (PM2.5 and PM10), carbon monoxide, NOx, and SOx. Because the transportation sector, inclusive of freight, is the primary emitter within these air basins, many of the disadvantaged communities within these air basins are affected by freight. As of June 2017, all California air basins are in attainment for carbon monoxide, NOx, SOx. However, many air basins are in nonattainment for ozone and particulate emissions. Nanoparticles (< PM2.5 or ultrafine) have been linked to lung damage and disease. **Table 5.3** provides a list of air basins that are in nonattainment for particulate emissions (PM2.5 and PM10).

Table 5.3: CalEnviroScreen Top 25 Percent Disadvantaged Census Tracts by Air Basin

Air Basin	Number of Census Tracts
South Coast	1,326
San Joaquin Valley	410
San Francisco Bay Area	106
Sacramento Valley	54*
San Diego	37

Salton Sea	23
Mojave Desert	14
South Central Coast	8
North Central Coast	5
Total	1,983
Source: California Office of Environmental Health Hazard Assessment	
*Sacramento Valley's attainment is mixed, meaning at least some of the counties within it are in nonattainment.	

The majority of California's air basins are in nonattainment for PM2.5 and PM10, both of which are generated in large quantities by the freight industry. All of the CalEnviroScreen top 25 percent disadvantaged Census Tracts are located within a nonattainment air basin, and therefore are likely to experience some level of freight-related pollution burden.²²⁵

The following five counties have the largest share of top 25 percent disadvantaged Census Tracts based on CalEnviroScreen:

- Los Angeles (51 percent of Tracts)
- San Bernardino (8 percent of Tracts)
- Fresno (6 percent of Tracts)
- Riverside (5 percent of Tracts)
- San Joaquin (4 percent of Tracts)

These disadvantaged communities are affected by emissions from the transportation sector, inclusive of the freight network. These communities tend to have a greater share of households living in poverty, greater unemployment, lower educational attainment, more linguistic isolation, and more housing burdened than other communities in the state.



Figure 5.1: California OZONE and PM2.5 Emissions Nonattainment (Source: CARB State SIP Strategy)

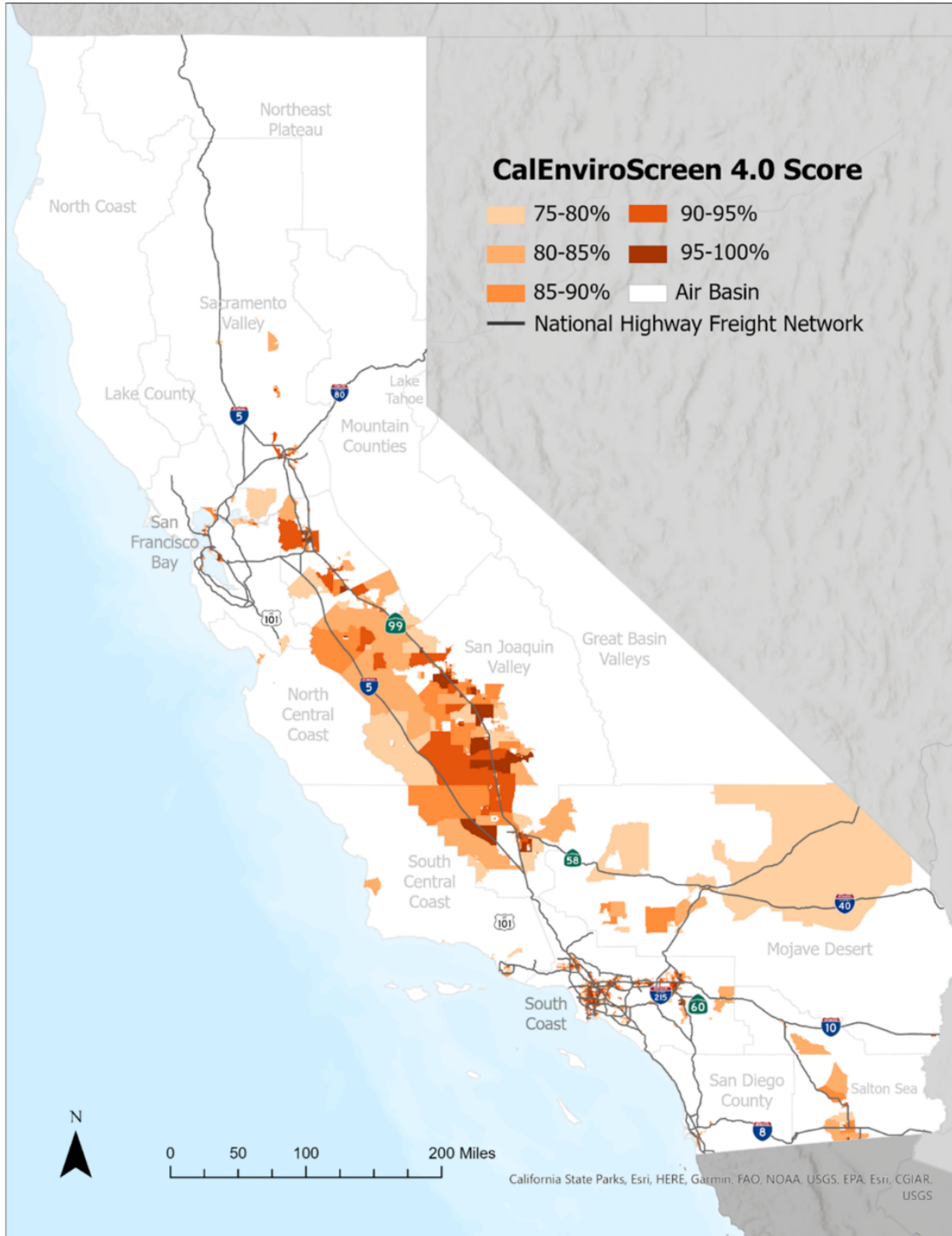


Figure 5.2: CalEnviroScreen 4.0 Top 25 Percent Disadvantaged Census Tracts (Source: CalEnviroScreen 4.0)

COVID-19 SUPPLY CHAIN CRISIS

During the Covid-19 pandemic, restrictions and increasing cargo volumes led to major supply chain disruption that impacted goods movement nationally and internationally. Ships began to pile up in the Pacific Ocean waiting to unload the cargo. This increased offshore idling due to port bottlenecks had resulted in increased emissions to coastal communities around ports. In 2021 a new queuing system was developed to eliminate the number of ships at anchor to keep cargo vessels further off the coast to reduce air quality impacts.

EXECUTIVE ORDER N-79-20

In 2020 Executive Order N-79-20 was signed to accelerate transition from fossil fuels by requiring new in state vehicle and equipment sales to be 100% zero-emission by 2035. For the Goods movement sector this includes all new commercial truck sales to be 100 % zero emission and transition to 100% zero emission of off-road vehicles, drayage trucks, and equipment by 2035 where feasible. It is a goal that 100% of medium and heavy-duty vehicles in the state to be zero-emission by 2045. N-79-20 is a strategy to reduce the harmful impacts of freight movement on air quality and social equity. The requirement targets for freight are summarized in **Table 5.4**.

Table 5.4: Zero-Emission Targets

Type	Description	Target/Metrics	Target Date
Transition to Zero-Emission Off Road Vehicles	Strategies, in coordination with other State agencies, U.S. Environmental Protection Agency and local air districts, to achieve 100 percent zero-emission from off-road vehicles and equipment operations in the State by 2035.	100% of new sales of Off-Road Vehicles and equipment by 2035	2035
Transition to Zero-Emission Drayage Trucks	All drayage trucks to be zero-emission by 2035.	100% of new sales of Drayage Trucks by 2035	2035
Transition to Zero-Emission Trucks	Medium- and heavy-duty vehicle regulations requiring increasing volumes of new zero-emission trucks and buses sold and operated in the State towards the target of 100 percent of the fleet transitioning to zero-emission vehicles by 2045.	100% of new sales of Medium and Heavy-Duty Vehicles by 2035	2045

Source: Executive Order N-79-20

NOISE AND VIBRATION

Freight operations rely on multiple modes of transportation and a variety of cargo handling equipment (CHE) at seaports, airports, intermodal rail yards, warehouses, distribution centers, etc. These activities often generate noise and vibrations from diesel engines of trucks, CHE and locomotives, loading and unloading containers, coupling and de-coupling rail cars, etc. Both at the federal level and at the state level, noise and vibration impacts are identified during the project development process and mitigated to the extent possible. Under the National Environmental Policy Act (NEPA), the Federal Transit Administration established the guidelines for assessing noise for rail, Federal Aviation Administration for air, and Federal Highway

Administration for roadway activities. In addition to NEPA, major airports and seaports in California have established thresholds of significance pursuant to the California Environmental Quality Act (CEQA) aimed at minimizing community impacts.

The true impacts of noise vary, but the latest research shows that long-term impacts of noise can alter how the brain processes speech and increases difficulty in distinguishing speech sounds. In young children, this can impair cognitive development. Excessive noise can also create stress and reduce sleep resulting in hypertension, ischemic heart disease, and psychological disorders. Noise has also been linked to birth defects resulting from vasoconstriction in the mother that reduces oxygen and nutrition to the fetus. This research notes differences in intermittent noise and constant noise, low tones and high tones, as well as the times of day that noise occurs. Some freight-related noise impacts are intermittent, such as blowing train horns at at-grade rail/road crossings, coupling/de-coupling rail cars in rail yards located near residential neighborhoods and loading and unloading trucks at warehouses near residential neighborhoods.

These impacts can be reduced or mitigated by creating adequate separation between land uses when developing new communities, limiting hours of operations for existing freight facilities located near residential areas, and constructing grade separations to minimize the sounds of train horns.

STORM WATER RUNOFF

The Impacts of freight movement on Stormwater runoff share the same adverse effects as all vehicles that occupy the roads. Pollutants include hazardous waste movement, oil spills, fuel leaks, brake dust among other harmful pollutants to ground water and animal habitat. Caltrans Stormwater Management program maintains, reports, and develops tools to comply with the National Pollutant Discharge Elimination System²²⁶. The stormwater management program developed a Water Quality Planning tool to assist in the development and knowledge of storm water issues. Beyond the impacts of the vehicles that use the roadway, transportation infrastructure may also impact the flow and connections of water systems. In Southern California many highways cut through floodplains causing major damages when large storms flood or destroy California Infrastructure. The 2023 California State Highway System Management Plan (SHSMP) states that over the next 10 years \$3,013,000,000 will be spent on storm water mitigation through SHOPP funding to meet state stewardship goals.²²⁷ The goal of the storm water mitigation program is to address 12,186 Total Maximum Daily Loads acres including Areas of Special Biological Significance and 9,142 acres of Significant Trash Generating Areas by 2033.

IMPACTS OF FREIGHT ON WILDLIFE

California is an ecological hot spot with thousands of unique species of flora and fauna. The supply chain highways and railways directly impact road mortality, habitat fragmentation, and reduce wildlife connectivity. Major and secondary roads occur in 96% essential connectivity areas with impacts including roadkill, imbalance in predator/prey wildlife systems, and biological features essential for breeding, feeding and shelter. Beyond the visible effects of that roadways have on wildlife, noise and light created by construction also can alter wildlife activity patterns, increase stress, reduce reproductive success, and increase predation²²⁸. **Figure 5.3** shows where the California Truck Network intersects wildlife connectivity areas. Beyond roadways, the impacts of goods movement on wildlife can be seen in seaports, railways, and Air Cargo environments. In 2022 California approved AB-2344 Wildlife Connectivity: Transportation Projects bill that will

require Caltrans to complete assessments of potential barriers to anadromous fish and identify potential wildlife connectivity barriers in coordination with the Department of Fish and Wildlife.



Figure 5.3: Regions where the California Truck Network Intersects with Essential Habitat Connectivity

Wildlife crossings are areas where animal movement is intercepted by roadways. The impacts of wildlife conflicts in the roadway are most often seen as roadkill, safety concerns to the public, but also have the potential to disrupt goods movement. Roadways will also create barriers to animal movement, dividing a population into more isolated population segments and developing negative ecological impacts. Environmental regulations will also guide transportation professionals to reduce or eliminate effects on special status species and habitats. Wildlife crossings have been implemented throughout the state to assist in mitigating the negative impacts of roadways on animals and habitat see **Figure 5.4**. To expand the protection on natural resources and ecosystems Caltrans strives to integrate advanced engineering and design methods into transportation projects to improve wildlife crossings and enhance aquatic and terrestrial habitat connectivity. **Figure 5.5** displays the wildlife crossings constructed in California to assist wildlife safely under or over roadways. To meet state goals on stewardship the California 2023 SHSHMP will require \$890,000,000 in SHOPP funding on fish and wildlife connectivity.²²⁹ The State goal is to improve 65.4% of wildlife connectivity locations to a state of good repair by 2033.



Figure 5.4: Example of Wildlife Crossing in California

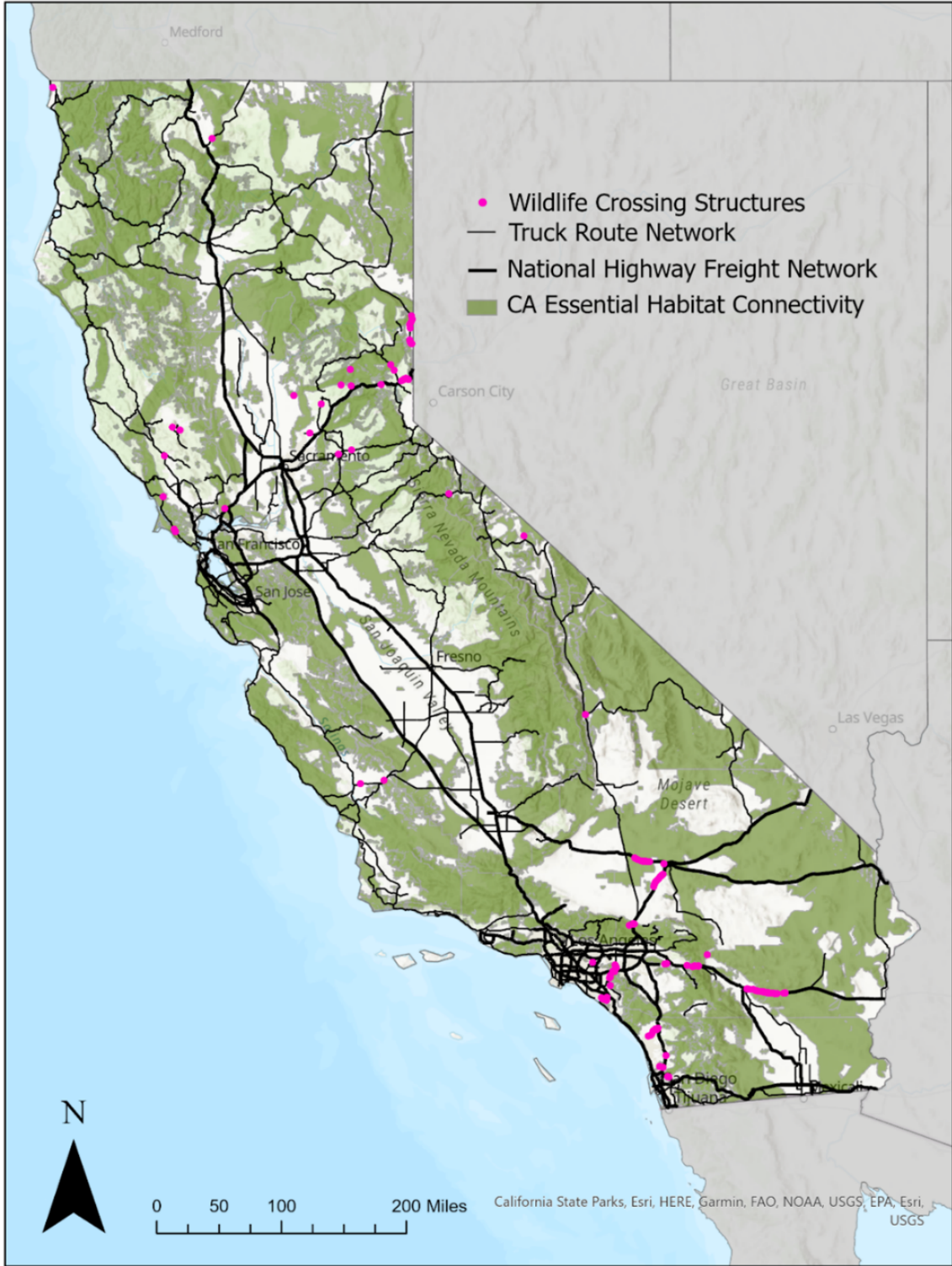


Figure 5.5: California Wildlife Crossings and the California Truck Network

ANALYTICAL APPROACH TO FREIGHT FOCUSED ENVIRONMENTAL IMPACTS

This analysis is based on readily available data to allow for the ongoing monitoring of economic and environmental sustainability of the freight network and its effects on California communities. To understand the benefits and impacts geographically, three metrics have been calculated and mapped.

Metric 1 - Freight-Related Job Distribution

Data from the U.S. Census Bureau's County Business Patterns data for the following sectors are summarized by county and broken into sectors using North American Industry Classification System (NAICS) codes.²³⁰ While the data captures most of the freight sector jobs and mostly excludes other non-freight industries, there is not a one-to-one correlation between NAICS sectors and freight-related jobs. The sectors used for this analysis that directly or indirectly use the freight network included the following (job data obtained for 2010 and 2015):

- Primary: NAICS Sectors 11 [Agriculture], 21 [Mining, Oil & Gas Extraction], 23 [Construction], 31-33 [Manufacturing], 44-45 [Retail Trade]
- Wholesale Trade: NAICS Sector 42
- Transportation & Utilities: NAICS Sectors 22 [Utilities], 48-49 [Transportation & Warehousing]

Metric 2 - Tons of Freight Related Emissions Per Day

Freight emissions data were obtained from CARB estimated annual average emissions estimates for stationary and mobile sources and are summarized by county. The following pollution source categories were selected, as they are either directly related to transportation or rely heavily on the freight network, which makes up a disproportionately large share of the total pollutant emissions from the transportation sector as a whole:

- Industrial Processes
 - Chemical
 - Electronics
 - Food and Agriculture
 - Glass and Related Product
 - Metal
 - Other Industrial
 - Wood and Paper
- On-Road Trucks
 - Light-Duty Trucks
 - Medium-Duty Trucks
 - Heavy-Duty Trucks

Emissions data were obtained for 2010 and 2015 and projected for 2035.

Metric 3 - Freight-Related Emissions per Freight-Related Jobs

Freight emissions per freight jobs were calculated by dividing tons of freight-related emissions per day by the number of freight related jobs in a county for 2010 and 2015. This metric links the economic benefit of freight (jobs) to the negative externalities (emissions) to investigate how benefits and externalities are distributed throughout the state.

FREIGHT-RELATED JOB DISTRIBUTION

Most (81 percent) freight and logistics-related jobs in California are located within counties that are in nonattainment for PM_{2.5} and have a substantial portion of the CalEnviroScreen disadvantaged communities. As part of the South Coast Air Basin, Los Angeles County contains 51 percent of the top 25 percent disadvantaged Census Tracts and more than a quarter of all freight related jobs in California – a greater portion than any other county. Given that the South Coast Air Basin is in nonattainment for PM_{2.5} and PM₁₀, residents of Los Angeles County are exposed to a considerable amount of freight-related pollution.

Figure 5.7 illustrates the distribution of freight jobs by county for 2010, 2015, and the net change between the two years. The greatest freight employment concentration in 2015 was found in 11 counties that had 100,000 or more freight-related jobs. Much of the growth in freight-related jobs from 2010 to 2015 occurred outside of the top 11 counties, except for San Mateo County, which experienced a 40 percent increase in freight-related jobs over that period. Five counties that were not in the top 11 in 2015 experienced between 45 percent and 60 percent growth in freight employment from 2010 to 2015. Of those counties, only Madera County is currently in nonattainment for PM_{2.5} and PM₁₀.

TONS OF FREIGHT RELATED EMISSIONS PER DAY

Freight-related emissions are mapped by county for 2010, 2015, and the net change between the years in **Figure 5.8**. The counties with the largest share of freight-related emissions are also those in nonattainment areas with larger shares of CalEnviroScreen disadvantaged communities. Los Angeles County has the highest freight-related emissions of any county in California. Unfortunately, geography and a pervasive inversion layer that traps ozone in California's valleys creates the perfect environment for the formation of smog. Given these conditions, achieving complete attainment conditions requires extensive and continuous effort.

FREIGHT-RELATED EMISSIONS PER FREIGHT-RELATED JOB

Pollution burden per freight job is another indicator of the balance between the benefits (jobs) of freight and logistics, and the negative impacts (emissions). Freight jobs are more likely to create negative impact in non-attainment areas than other places. However, it is possible to gain economic benefit from freight jobs without impacting communities. For example, a majority of the San Joaquin Valley is in PM and Ozone nonattainment areas. Although, the number of freight jobs within the region have been increasing, causing the reduction of emissions per freight job between 2010 and 2015, larger efforts are still needed to substantially decrease emissions from the freight sector including greater transition to cleaner and more efficient vehicles and equipment.



Figure 5.6: 710 Freeway, Los Angeles, California

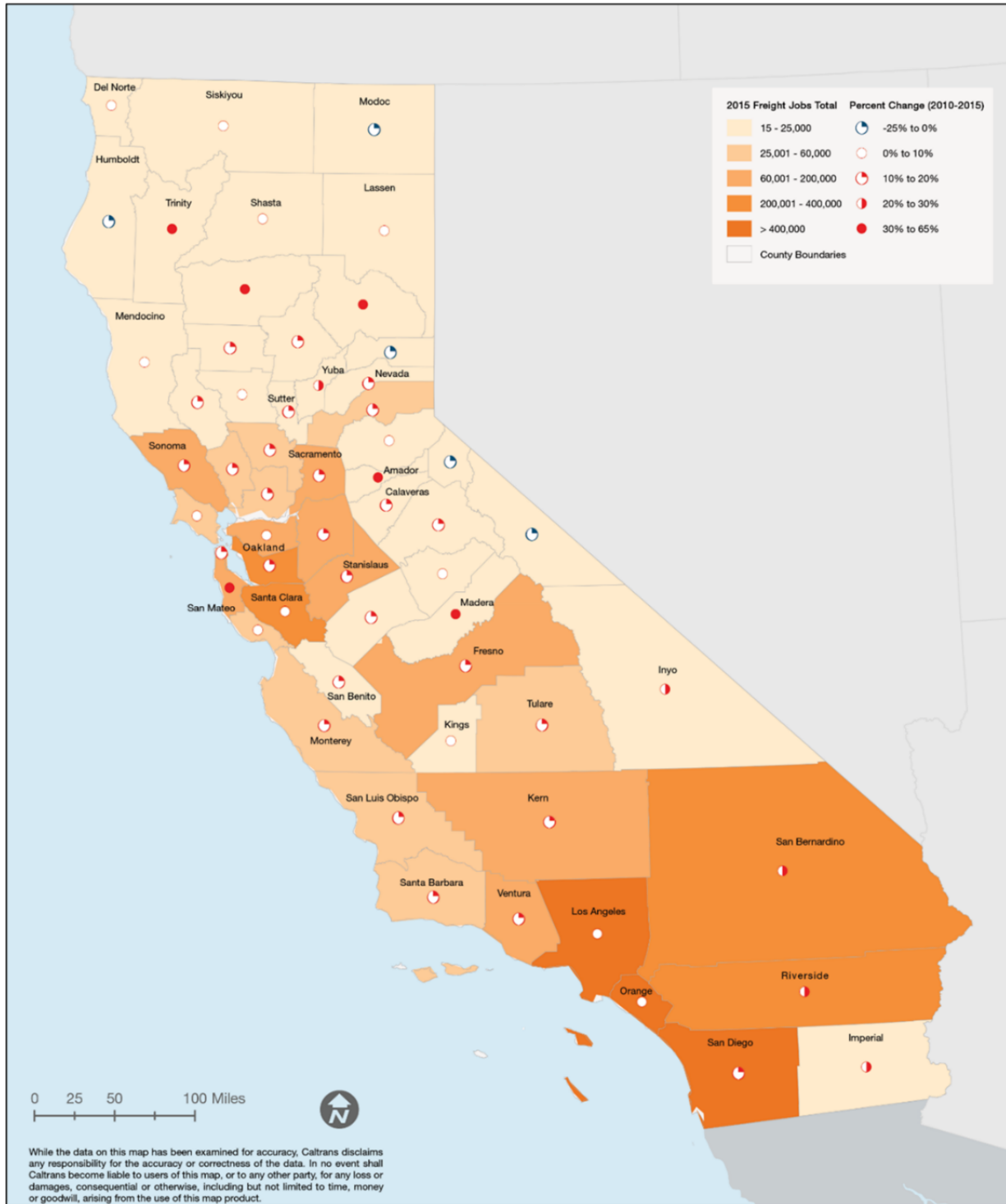


Figure 5.7: Distribution of Freight Jobs by County, 2010-2015 (Source: Census Data, 2010-2015, California Statewide Freight Forecasting model data base. Fehr and Peers)

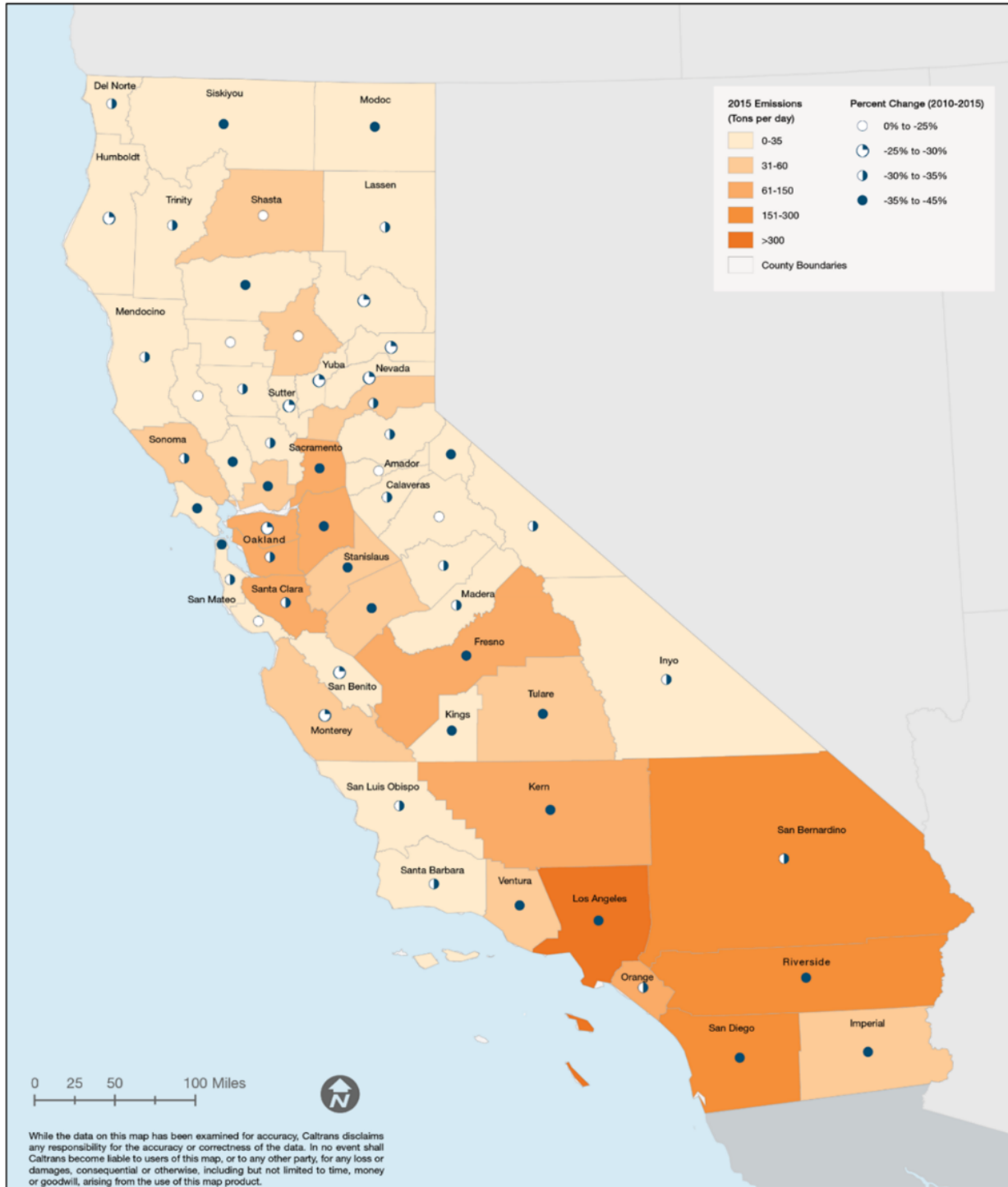


Figure 5.8: Freight-Related Emissions by County, 2010-2015 (Source: California Air Resource Board, EMFAC 2017, Analysis and summaries by Fehr & Peers)

Ongoing Progress for a Healthier California

CARB, various State, and regional agencies, in collaboration with freight partners and stakeholders, continue to implement broad air quality improvement programs through a combination of regulations, incentives, and policies designed to support the transformation of the freight system and reduce community impacts from freight operations in California. These ongoing freight sustainability initiatives focus on emissions reductions through a program of data collection, emissions monitoring, technology advancement, and technology replacement. The following describes some ongoing freight initiatives and key progress.

CAP AND TRADE PROGRAM

CARB oversees the California Cap and Trade program, a system designed to reduce the amount of GHG emissions that are released into the atmosphere by corporate operations (the “cap”). The “trade” part of the system allows companies to buy and sell their emissions allowances, which incentivizes companies to decrease emissions where possible and to sell the extra credits. Each year, the emissions cap is split into allowances that CARB distributes (one allowance equals to one ton of emissions) to companies for free or by auction. The cap total declines every year, which gives an incentive for companies to find ways to continue to decrease its emission totals.²³¹

Since 2017, CARB has used Cap and Trade dollars to implement over \$3 billion worth of projects spanning 60 programs. The programs vary from, focusing on the reduction of climate pollution, building affordable housing, to protecting communities from wildfires. Currently, over 60 percent of all investments fund projects that help low-income and communities disproportionately burdened by pollution.

CARB COMMUNITY AIR PROTECTION PROGRAM

In 2018, in support of AB 617 (Assembly Bill 617) (C. Garcia, Chapter 136, Statutes of 2017), CARB created the Community Air Protection Program (CAPP) focused on reducing emissions exposure in communities most impacted by air pollution.²³² Communities around the State are working together to develop and implement new strategies to measure air pollution and reduce health impacts.

This first-of-its-kind statewide effort includes community air monitoring and community emissions reduction programs. In addition, the Legislature appropriated funding to support early actions to address localized air pollution through targeted incentive funding to deploy cleaner technologies in these communities, as well as grants to support community participation in the AB 617 process. AB 617 also includes new requirements for accelerated retrofit of pollution controls on industrial sources, increased penalty fees, and greater transparency and availability of air quality and emissions data, which will help advance air pollution control efforts throughout the State. This new effort provides an opportunity to continue to enhance our air quality planning efforts and better integrate community, regional, and State level programs to provide clean air for all Californians. **Table 5.5** shows the milestones listed on the program’s webpage.²³³

Table 5.5: AB 617 Summary of Milestones

Summary of Milestones	
July 2017	AB 617 signed by Governor Edmund G Brown Jr.
September 2018	CARB Board approved the Community Air Protection Blueprint and selected the initial 10 communities for community air monitoring and/or community emissions reduction programs.
January 2019	Air Districts developed expedited schedules for implementing BARCT, which must be implemented by the end of 2023.
July 2019	Air districts deployed monitoring in 2018 communities selected for community air monitoring systems.
September 2019	Air districts adopted the 2018 community emissions reduction programs .
December 2019 & annually thereafter	The Board considers additional communities for air monitoring and community emissions reduction programs. The Board considers air districts community emissions reduction programs.
By October 2020 & annually thereafter	Air districts provide annual reports for communities selected for community emissions reduction programs.
By January 2021 & annually thereafter	Within one year after the selection of additional communities, air districts adopt community emissions reduction programs.
By September 2023	CARB updates the Statewide Strategy, which is required to be updated once every five years.
<i>Source: CARB Community Air Protection Program</i>	

CAPP's focus is to reduce exposure in communities most impacted by air pollution, including community air monitoring and community emissions reduction programs. There is appropriated incentive funding²³⁴ to deploy cleaner technologies in these communities, as well as grants to support community participation in the AB 617 process. AB 617 also includes new requirements for accelerated retrofit of pollution controls on industrial sources, increased penalty fees, and greater transparency and availability of air quality and emissions data, which will help advance air pollution control efforts throughout the state.²³⁵

SAN PEDRO BAY PORTS CLEAN AIR ACTION PLAN

The San Pedro Bay Ports, comprised of both Ports of Long Beach (POLB) and Los Angeles (POLA), developed a Clean Air Action Plan (CAAP) which initiated a menu of strategies to reduce emissions generated by port activities. One of those strategies is an emissions reduction of select criteria pollutants. The CAAP set 2023 as the target year in which DPM, NOx, and SOx should fall compared to 2005 levels. Every year since 2006, the two ports have prepared an emissions inventory to monitor and measure annual progress towards the CAAP 2023 goals. **Table 5.6** summarizes the total reduction for each type of emissions and illustrates positive progress the ports are making to meeting the 2023 targets.

Table 5.6: San Pedro Bay Ports Emissions Reductions Compared to 2023 Goal

	Clean Air Action Plan (CAAP) 2023 Goal*	Overall Emissions Reductions (2021)*
DPM	77%	84%
NOx	59%	44%
SOx	93%	95%

*Source: San Pedro Bay 2021 Air Quality Report Card (CRS) *All changes shown compared to 2005 baseline levels*

SAN PEDRO BAY PORTS TECHNOLOGY ADVANCEMENT PROGRAM (TAP)

The TAP, founded by POLB and POLA, in collaboration with SCAG, Metro, SCAQMD, and CARB, has provided support to original equipment manufacturers (OEM) for more than a decade. TAP has led to the deployment of cleaner equipment by providing funding, research, and testing support for over 30 projects spanning test cycle development, hybrid and alternative fuel technology demonstrations, and ZE equipment operation. Through these initiatives, major OEMs have invested in, and developed commercially available clean equipment, such as electric, hybrid, hydrogen and natural gas trucks, and CHE. San Pedro Bay Clean Trucks Program funding has been successful at getting transitioning on-road drayage trucks to Zero-emission and reducing over 90% of air pollution in 3 years²³⁶.

POLB COMMUNITY GRANTS PROGRAM

The POLB Community Grants program, an unprecedented effort to lessen freight effects on local communities, began in 2009 with an investment of \$17.4 million to fund three different program initiatives: Community Health, Facility Improvements, and Community Infrastructure. To date, the community-based grants have funded a variety of community betterments, such as asthma vans providing mobile medical services, tree planting, double-paned windows, and upgrades to heating ventilation/air conditioning filtration systems in sensitive areas, such as schools.

Over the next 12 to 15 years, POLB plans to invest an additional \$46.4 million toward more of these projects that reduce impacts on air quality, traffic, noise, and water quality.

PORT OF OAKLAND

The Port of Oakland began collecting data and monitoring emissions generated by a variety of sources in 2005. Pursuant to reducing port-generated emissions, the Port is actively managing three key programs:

- Seaport Air Quality 2020 and Beyond Plan
- Comprehensive Truck Management Plan (CTMP)
- Port of Oakland Shore Power Program

The Seaport Air Quality 2020 and Beyond Plan envisions a zero-emissions operation for the Port of Oakland. Example of projects envisioned in the plan include converting the port's fleet vehicles and equipment to zero-emission, identifying cleaner fuels and renewable power sources, installing electric infrastructure at container terminals, and monitoring fuel consumption, operations, and performance. This is the successor to the Maritime Air Quality Improvement Plan (MAQIP) that was adopted prior to 2010.

Both the CTMP and the Shore to Ship Power program are key elements of the overall Seaport Air Quality and Beyond Plan 2020. These programs address the deep concerns of the community, including minimizing emissions from ocean-going vessels, the removal of trucks from residential areas for air quality reasons, and minimizing noise, improving safety, and mitigating roadway maintenance impacts. Port of San Diego

In 2021 the Maritime Clean Air Strategy (MCAS) was approved to identify future projects and initiatives to improve the health of the communities around the Port of San Diego. The MCAS establishes a goal of 100% of cargo trucks and cargo handling equipment at the port terminals to be Zero-Emission by 2030. The strategy also includes the implementation of an all-electric tugboat by June 30th, 2026. This electric tugboat will replace the diesel boat that consumes more than 30,000 gallons of diesel per year²³⁷.

PORT OF HUENEME

The Port of Hueneme was the first port in California to become Green Marine Certified in 2017. The Port is an active community partner committed to preserving and protecting the health and viability of the local and regional communities and economies alike. The Port of Hueneme made a commitment, via board resolution, to minimize, mitigate and eliminate the environmental impacts associated with trade operations on the surrounding community and local environment by implementing green initiatives through community and customer partnerships. As part of its commitment to being in full compliance with federal, state and local regulations, and to expand its environmental stewardship program, the Port of Hueneme has partnered with the Ventura County Air Pollution Control District to build a first-of-its-kind climate action plan called PHRESH (Port of Hueneme Reducing Emission, Supporting Health). From the initial conclusions drawn from the first community monitoring sensor, the Port recently made a video in Spanish.

TRUCK SALES REQUIREMENTS (ADVANCED CLEAN TRUCKS AND ADVANCED CLEAN FLEETS)

The approved Advanced Clean Truck Regulation is part of a holistic approach to accelerate a large-scale transition of ZE medium-and heavy-duty vehicles from Class 2B to Class 8. The Advanced Clean Trucks regulation is a manufacturers ZEV sales requirement and a one-time

reporting requirement for large entities and fleets. The Advanced Clean Fleets (ACF) regulation is part of the California Air Resources Board's (CARB or Board) overall approach to accelerate a large-scale transition to zero-emission medium- and heavy-duty vehicles. This regulation works in conjunction with the Advanced Clean Trucks (ACT) regulation which includes Drayage fleets. Beginning January 1, 2024, trucks must be registered in the CARB Online System to conduct drayage activities in California. Non-zero-emission "legacy" drayage trucks may register in the CARB Online System through December 31, 2023. Legacy drayage trucks can continue to operate through their minimum useful life. Beginning January 1, 2024, only zero-emission drayage trucks may register in the CARB Online System. All drayage trucks entering seaports and intermodal railyards would be required to be zero-emission by 2035.

CARB adopted the Advanced Clean Fleets (ACF) rule in April 2023 to fully transition trucks that travel across the state to zero-emissions technology by 2045. In addition, CARB is exploring additional measures such as the Zero Emission Truck Measure which would seek to accelerate the number of zero-emission trucks beyond existing measures. Even after the implementation of the ACT and ACF regulations, about 480,000 heavy-duty combustion powered trucks will still be on the road. In this modified approach, CARB staff would seek to upgrade these remaining heavy-duty combustion trucks to new or used ZE trucks rather than to trucks with cleaner combustion engines. For this measure, CARB staff would implement regulatory strategies to achieve the goal of transitioning the remainder of the heavy-duty combustion fleet to ZE trucks.

OCEAN GOING VESSELS AT-BERTH

The California Air Resources Board approved in April 2020 a new regulation designed to further reduce pollution from ocean-going vessels while docked at California's busiest ports. The rule builds on progress achieved by the groundbreaking At-Berth Regulation adopted in 2007. That rule has achieved an 80 percent reduction in harmful emissions from more than 13,000 vessel visits since 2014. The updated rule adds new vessel categories which will be required to control pollution when they run auxiliary engines or auxiliary boilers (for most tanker vessels) while docked. These auxiliary engines power the electricity and other onboard operations during a vessel's visit, which can run from less than one day to several days.

TRUCK OMNIBUS

The [Heavy-Duty Engine and Vehicle Omnibus Regulation](#) (Omnibus Regulation) was adopted on September 9, 2021, and became effective on December 22, 2021, to drastically cut smog-forming nitrogen oxides (NOx) from conventional heavy-duty engines. The Omnibus Regulation will significantly increase the stringency of NOx emissions standards and will also lengthen the useful life and emissions warranty of heavy-duty diesel engines for use in vehicles with a gross vehicle weight rating (GVWR) greater than 10,000 pounds. The more stringent NOx emission standards begin with the 2024 model year engines and become more stringent with 2027 and subsequent model year engines. ²³⁸

Future Actions for Change

While California has some of the most vigorous environmental standards in the nation because of its shared values in protecting communities and natural resources, more efforts are needed.