

Appendix G: Background for Action Plan Development

This section provides the context for Executive Order B-32-15 (see Appendix A) and information considered when developing this document, including the impact of freight on California's economy, emerging trends in the freight system, existing State policies, programs, plans, and funding for freight, as well as the public process.

A. Freight and the Economy

Freight transport is a vital component of California's regional and statewide economies. In 2014, California's economy was comparable to the eighth largest economy in the world, with the State's gross domestic product at \$2.3 trillion.^{1 2} The State's freight sector, broadly defined to encompass industries that heavily rely on the transportation of their raw materials, intermediate goods and components, as well as their final goods and finished products. The sector includes businesses in the transportation, warehousing, utilities, trade, manufacturing, construction, agriculture, and mining industries. It accounted for over \$740 billion, or 32 percent of California's gross domestic product in 2014, while also comprising 5 million, or 33 percent of jobs in the State the same year.³ California's economy depends on an efficient, integrated, sustainable, and multimodal freight transport system. Understanding the relationship between freight transportation and the economy will be critical for State agencies to consider future freight transport system actions and how to optimize opportunities for growth in California.

Tied to California's diversified economy and its prosperity are exports and imports of both goods and services through the State's key gateways (seaports, airports, and border ports of entry) and the highway and rail corridors that connect the gateways to the rest of the State, nation, and world.

¹ United Nations Statistics Division, National Accounts: World Gross Domestic Product Ranking 2014, <http://unstats.un.org/unsd/snaama/Introduction.asp>, accessed March 11, 2016.

² U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, <http://www.bea.gov/regional/index.htm>, accessed March 11, 2016.

³ State of California Employment Development Department, Labor Market Information by California Geographic Areas, <http://www.labormarketinfo.edd.ca.gov/geography/lmi-by-geography.html>, accessed March 21, 2016.

California's Freight System at a Glance

- Twelve deep water seaports.
- Approximately 6,000 miles of railroad track.
- Twelve airports with major cargo operations.
- Over 5,800 centerline miles of high-traffic volume interstate and state highways.
- Three international commercial land ports of entry.
- Approximately 19,370 miles of hazardous liquid and natural gas pipelines.

California has four key freight gateway regions: the San Diego-Mexico Border region, the Los Angeles-Inland Empire region, the San Francisco Bay Area, and the Sacramento-San Joaquin Valley region. Los Angeles is not only California's main gateway, it is ranked first in the nation for total trade with \$393.7 billion in 2013.⁴

International trade and investment is a major economic engine for the State, broadly benefitting businesses, communities, consumers, and regional, State, and local governments. California's export merchandise in 2015 totaled \$165.4 billion, representing 11 percent of the U.S. total exports. Mexico is the State's largest market (\$26.8 billion), followed by Canada (\$16.9 billion), and China (\$14.4 billion). Computers and electronic products are California's top exports by value, accounting for 26.1 percent of all the State's exports, followed by transportation equipment and agricultural products.⁵ The dairy industry continues to lead California's agricultural economy, followed by almonds and grapes (milk contributes \$9.4 billion, almonds contribute \$5.9 billion, and grapes contribute \$5.2 billion).⁶

Looking forward, the Federal Highway Administration has predicted a 40 percent growth in U.S. transported freight tons and a 92 percent growth in transported freight value between 2015 and 2045.⁷ For California, the equivalent 2015-2045 projections show that transported freight tons and freight value will grow by 59 percent and 133 percent, respectively.⁸ Because of this anticipated growth, the demand for all commercial freight modes (truck, ship, air, and rail) will likely

⁴ U.S. Department of Commerce, International Trade Administration, July 2015.

⁵ U.S. Census Bureau Foreign Trade Statistics, <https://www.census.gov/foreign-trade/statistics/state/data/index.html>, accessed February 15, 2016.

⁶ California Department of Food and Agriculture, California Agricultural Production Statistics Agricultural Statistics Review Report 2015, <https://www.cdffa.ca.gov/statistics/>, accessed February 15, 2016.

⁷ U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, Freight Analysis Framework, V 4.1, 2016, http://www.rita.dot.gov/bts/press_releases/bts013_16, accessed March 21, 2016.

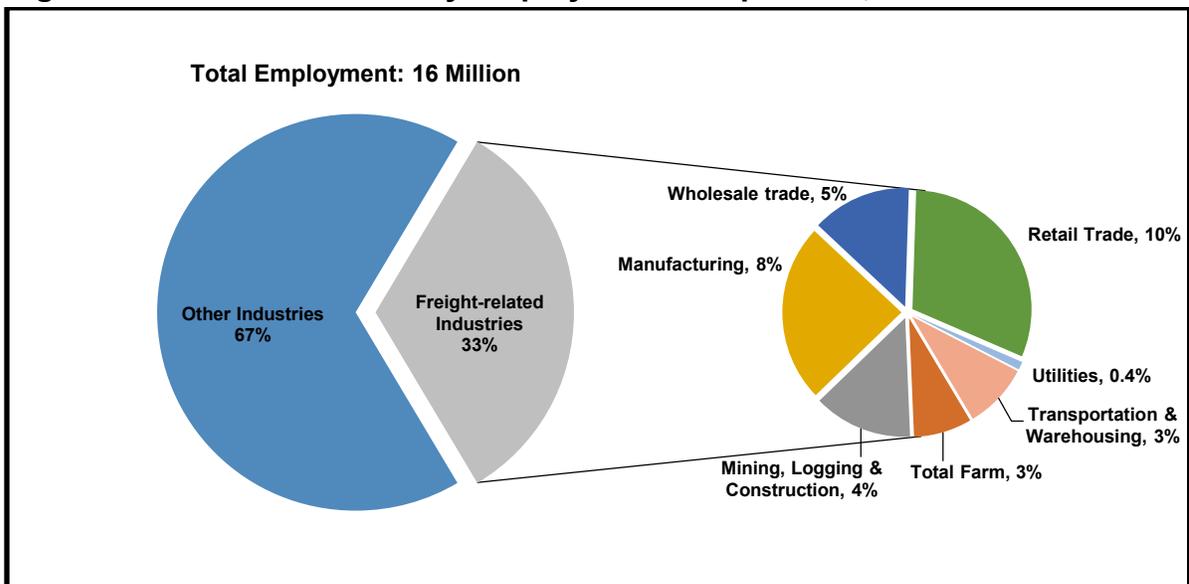
⁸ Ibid.

increase, with the expectation that trucking will continue to have the dominant share of freight transport activity.

In terms of workforce composition, “one out of every seven jobs in the U.S. is transportation related,” according to the U.S. Department of Transportation. Freight, a sub-component of the transportation sector, employs millions of workers nationwide. The range of job types, skill sets, and career paths within California’s freight transportation industry is as diverse and complex as the industry itself.

California’s freight sector provides a wide range of employment across the freight modes, such as for-hire freight carriers, marine terminal workers, rail employees, airport employees (passenger and cargo), truck drivers, private transportation providers, freight forwarders, logistics providers, technicians that service and maintain vehicles, and others. Figure G-1 describes the composition of freight-related employment by sector and its relation to the total number of workers in the State.

Figure G-1: California Industry Employment Composition, 2014



Data source: State of California Employment Development Department, Labor Market Information Division

The following sections discuss the broad cost and benefit areas associated with changes to the freight transport sector.

1. Safety Considerations

Safety is important for the entire passenger and freight transport system. Identifying incident trends can shed light on potential infrastructure and possible operational adjustments that Caltrans and other infrastructure owners/operators can make. In addition, improved technology can eliminate or reduce the severity of certain accidents. California’s freight transport system is generally safe, but when collisions

do occur, the consequences can be extreme because of the large mass of freight vehicles and their loads.

The cost components include productivity losses, property damage, medical costs, rehabilitation costs, congestion costs, legal and court costs, emergency services such as medical, police, and fire services, insurance administration costs, and the costs to employers. Values for more intangible costs such as quality-of-life valuations are additional considerations.

2. Congestion Impacts

Congestion affects economic productivity in several ways. The growth in freight is a major contributor to congestion in urban areas and on intercity routes. Congestion affects the timeliness and reliability of freight transportation. Congestion on the ground and in the air affects both businesses and households, reducing the number of workers and job sites within easy reach of any location. It costs commuters time and money and imposes increased expenses on businesses, shippers, and manufacturers, which are often passed along to the consumer.

Growing freight demand increases recurring congestion at freight bottlenecks, places where freight and passenger service conflict with one another, and where there is not enough room for local pickup and delivery. Congested freight hubs include international gateways such as ports, airports, and border crossings. The need for additional system capacity is acknowledged while also recognizing the need to reduce emissions.

Table G-1 presents a summary of congestion data for the major California urban areas. The Los Angeles region ranks second in the nation, in contrast to Sacramento, which ranks number 35 on the list. No matter the position, congestion is a factor that affects commuters in most larger urban cities. In 2014, congestion cost a total of \$160 billion in the U.S. The average commuter spent an extra 42 hours traveling on the roads, representing 6.9 billion hours of extra time. Similarly, a staggering 3.1 billion gallons of fuel were consumed in the process.

**Table G-1: Highway Congestion in Major California Urbanized Areas 2014
(thousands U.S. \$)**

Description	LA, LB, Anaheim	San Francisco/Oakland	San Diego	Sacramento
Congestion Rank	2	4	61	35
Hrs Delay	622,509	146,013	79,412	60,220
Hrs Delay / Commuter (1,000 persons hrs)	80	78	42	43
Cost of Congestion	\$13,318,000	\$3,143,000	\$1,658,000	1,334,000
Cost of Congestion/Commuter	\$1,711.00	\$1,675	\$887	\$958

Source: Urban Mobility Report 2015

The value of increased time, fuel consumption, and other operating costs experienced by trucks due to congestion is approximately 18 percent (\$28.0 billion) of total congestion costs in U.S. urban areas.⁹ This does not include any value for the freight transported in the trucks.

3. Border Delays

Cross-border commerce is important for the continued success of the economies of California, Mexico, and the U.S. as a whole. Mexico is California's number one export market, purchasing about 15 percent of all California exports. Two-way trade between Mexico and the U.S. has increased dramatically, and continued growth is expected. The vast majority of freight flows (98 percent) are by trucks, many of which use the State highway system.

Inadequate infrastructure at border crossings continues to create traffic congestion, delaying freight movement. Border delays increase transportation costs, interrupt just-in-time manufacturing cycles, add to labor costs, discourage trips across the border, inhibit potential growth in business income, hinder trade in the long term, and generate harmful environmental impacts. Delays cost the U.S. and Mexican economies an estimated \$7.2 billion in foregone gross output and more than 62,000 jobs in 2007.¹⁰ Two hour or longer delays in freight movement at the Otay Mesa–Mesa de Otay and Tecate–Tecate ports of entry are significantly impacting productivity, industry competitiveness, and loss of business income at the regional, State, and national level. By 2050, border crossings in San Diego County will exceed approximately 4.4 million truckloads per year and 39 million tons of freight, valued at \$309 billion.¹¹ This increase in truck traffic will impact California's already strained ports of entry and bottlenecks in its State highway system near the border.

4. Environmental Impacts

The emissions from the heavy equipment that transports freight within and through California contributes to both elevated ambient levels of criteria pollutants such as particulate matter and ozone, as well as localized health impacts near freight hubs and facilities. This freight activity also contributes to community quality of life impacts, such as noise, light, vibration, and safety. ARB and its partners have motivated and required extensive changes across the State, focusing on the use of cleaner technologies. Industry has made substantial investments to transition its

⁹ Texas A&M University, Transportation Institute: Urban Mobility Report, 2015.

¹⁰ U.S. Department of Transportation, Federal Highway Administration, "Measuring Cross-Border Travel Times for Freight: Otay Mesa International Border Crossing Final Report," September 2010.

¹¹ San Diego Association of Governments, "2050 Regional Transportation Plan Technical Appendix 11: San Diego and Imperial Valley Gateway Study: Comprehensive Freight Gateway Study," March 2010.

mostly diesel-fueled freight equipment to cleaner models, while refineries retooled to produce cleaner fuels. However, significant additional reductions from freight equipment are necessary to meet ambient air quality standards and reduce the localized risk impacts associated with exposure to toxic diesel particulate matter, and additional strategies are needed to help reduce community quality of life impacts.

The air quality and health impacts of freight operations in California have been quantified and are well documented. Freight equipment currently accounts for about half of the statewide diesel particulate matter emissions, which are both a toxic air contaminant and a contributor to black carbon, a powerful short-lived climate pollutant. Freight operations also account for approximately 45 percent of the statewide nitrogen oxides emissions and 6 percent of the statewide greenhouse gas emissions.

A peer-reviewed methodology developed by the U.S. Environmental Protection Agency (U.S. EPA) is the basis for the estimation of premature deaths, hospitalizations, and emergency room visits related to particulate matter exposure presented below. It includes observed relationships between emissions and exposure, and California-specific demographic and baseline health incidence rate data.¹² Table G-2 shows the premature deaths, hospitalizations, and emergency room visits associated with freight emissions of both primary and secondary particulate matter (particle nitrates formed from photochemical reactions of the precursor nitrogen oxide).

The costs associated with freight-related health impacts are high. Over 99 percent of the economic impact is from premature death. U.S. EPA established the value of mortality risk reduction as \$7.4 million in 2006 dollars. Adjusted for real income and inflation, the value of mortality risk reduction is equivalent to \$8.9 million in 2013 dollars. Table G-3 lists the economic value of avoiding the adverse health impacts associated with freight emissions in 2013 dollars.

¹² ARB, "Initial Statement of Reasons, Appendix J, Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles," 2010.

TABLE G-2: Statewide Health Effects and Valuation (2013 \$) Associated with Freight Emissions Contributing to PM2.5—Midpoint Projections

PM2.5 and NOx	2012	2030	2050
Mortality	2,200	980	1,100
Hospitalizations*	330	150	160
ER Visits [†]	950	420	450
Valuation (billions)	\$20	\$9	\$10

* Includes respiratory and cardiovascular hospitalizations.

† Includes asthma and cardiovascular emergency room visits.

TABLE G-3: Statewide Health Effects and Valuation (2013 \$) Associated with Freight Emissions Contributing to PM2.5—Uncertainty Ranges**

PM2.5 and NOx	2012	2030	2050
Mortality	1,700-2,700	770-1,200	830-1,300
Hospitalizations*	43-770	19-340	20-370
ER Visits [†]	600-1,300	260-570	280-620
Valuation (billions)	\$16-\$24	\$7-\$11	\$7-\$12

* Includes respiratory and cardiovascular hospitalizations.

**Uncertainty ranges only reflect uncertainty in the concentration-response function, and do not reflect uncertainty in emission projections, spatial interpolation, and aggregation.

† Includes asthma and cardiovascular emergency room visits.

Contingent valuation and wage-risk studies, which examine the willingness to pay for a minor decrease in the risk of premature death, are the basis for the value of mortality risk reduction. As real income increases, people are willing to pay more to reduce their risk of premature death.

The economic values of respiratory and cardiovascular hospitalizations are from Chestnut, et al. (2006).¹³ The authors of this study estimated the value of reducing hospitalizations based on cost of illness and willingness to pay. The economic value of emergency room visits for asthma is from the U.S. EPA's 2011 Regulatory Impact Assessment for Ozone and PM2.5.¹⁴ The values reflect inflation to 2013 dollars using the U.S. Bureau of Labor Statistics Consumer Price Index for medical care.

¹³ Lauraine G. Chestnut, Mark A. Thayer, Jeffery K. Lazo, and Stephen K. Van Den Eeden, "The Economic Value of Preventing Respiratory and Cardiovascular Hospitalizations," *Contemporary Economic Policy*, Vol. 24, 2006, pp. 127–143.

¹⁴ U.S. EPA, "Regulatory Impact Analysis for the Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone in 27 States," June 2011.

5. Labor and Workforce Development

Freight transportation creates jobs (direct, induced, and indirect), fuels economic growth, supports personal and business income, and generates revenue that contributes to federal, State, and local taxes. Like the sector itself, freight-related employment is dynamic and continually changing. The push for California's freight transportation industry is toward improved efficiency and reliability, reduced costs, increased productivity, faster transaction speed, and improved worker and public safety.

As California leads investment and development of these technologies that support a sustainable freight transport system, it must recognize that the transition to advanced technologies will require the development of a skilled workforce to operate and maintain these new technologies and systems. It will be critical to identify training needs and partnerships necessary to innovate, operate, and maintain these technologies over time while benefitting local economies.

B. Emerging Trends

The State agencies also recognize that the freight transport industry is ever evolving, and a number of trends will likely affect the future of freight movement in California. Many different factors affect modal choice, including modal characteristics, commodity characteristics, shipper/receiver characteristics, and logistics costs. Often, the most significant of these are time, cost, and reliability. How the industry weighs these factors in response to system changes illustrates how those changes will drive emerging trends. This section describes the emerging trends, how they might affect freight movement, and associated considerations for future State agency actions and planning.

1. Growth in Freight Volume

The U.S. Department of Transportation Freight Analysis Framework tool projects freight movement in California to significantly increase by the year 2045, with an approximately 133 percent increase in value and 59 percent increase in tons from 2015. The Freight Analysis Framework is a commodity flow database that contains freight movement information by mode, commodity type, and origin-destination zones. Projections indicate that California's population will increase by approximately 33 percent from 2010 to 2050.¹⁵ More freight and resources will be required to foster a growing population, resulting in the rise in freight volumes moving in California. Increase in freight volume will occur across all modes of

¹⁵ California Department of Finance, "Report P-1 (County): State and County Total Population Projections 2010-2060 (5-year increments)", December 2014, http://www.dof.ca.gov/Forecasting/Demographics/Projections/documents/P-1_Total_CAProj_2010-2060_5-Year.xls, accessed March 10, 2016.

transportation but of these projections, freight movement from trucks will continue to be the most used mode to move freight.¹⁶

Technologies such as zero emission and near-zero emission vehicles, intelligent transportation systems, and automated connected vehicles can help alleviate the impacts on the environment and public health, as well as increase system wide efficiencies. Thus, State policies and programs must be prepared to support improvements in technology and system efficiencies across all sectors.

2. Changing Geography of the Supply Chain

The geography of the supply chain is changing as businesses seek to add value, increase efficiency, and minimize costs. Manufacturers have begun to return production to the U.S. or neighboring countries in response to evolving global conditions that have gradually reduced the primary benefit of offshore production. Changes in rising offshore labor costs, automation, advantages to domestic transportation rates, and rightshoring, where a company considers total cost in order to determine the optimal location of facilities for serving a particular market, have led to nearshoring. Nearshoring is the practice of transferring a business process or manufacturing facility to a location that is in close geographic proximity to the company. For example, a U.S. company nearshoring production from Asia to Mexico. In fact, California's manufacturing share of gross domestic product was 11 percent as of January 2015 and California's manufacturing output has grown from \$160 billion in 2002 to almost \$260 billion in 2014.¹⁷ The changing trade dynamics of the supply chain have revived production in the U.S. and in neighboring countries as it allows for improved competitiveness and an increasing domestic job market.

The resulting benefits of domestic job growth favor shorter supply chains and trade between the U.S., Mexico, and Canada. Economic growth and cross-border trade between the U.S. and bordering countries has advanced over the past two decades. As the potential benefits of nearshoring outweigh those of offshore productions, trade among the U.S, Mexico, and Canada will continue to increase freight movement and force a higher demand on the existing infrastructure. To capitalize on nearshoring and the strengthened trade between U.S. and bordering countries, it is necessary to modernize the infrastructure and cargo processing strategies in order to handle the expected higher volume of traffic at border entries.

¹⁶U.S. Department of Transportation, Freight Analysis Framework, http://ops.fhwa.dot.gov/FREIGHT/freight_analysis/faf/index.htm, accessed February 4, 2016.

¹⁷ National Association of Manufacturers, "California Manufacturing Facts," December 2015, <http://www.nam.org/Data-and-Reports/State-Manufacturing-Data/State-Manufacturing-Data/December-2015/Manufacturing-Facts--California.pdf>, accessed February 4, 2016.

Other factors that may influence business decisions on the supply chain may also derive from national and international pressures. California faces domestic competition from other states in the nation to modernize their freight facilities, and global competition from international ports and the expansion of the Panama and Nicaraguan Canal. California's ports of entry, seaports, and airports will need to maintain California's hold on the trade market by improving the efficiency of freight movement in the State.

Below is the first of several case studies that introduce current innovative projects from other entities and provide an example of the type of work that can help make progress towards achieving the State's goals.

3. Transportation Energy and Infrastructure

Transportation energy is used to move freight in medium- and heavy-duty vehicles and off-road equipment. Growth in State freight movement by tonnage will likely increase by 60 percent in 2040, with a commensurate demand in transportation energy.

Transportation energy demand forecasts shows that gasoline and diesel will be the primary sources of transportation fuel through 2026.¹⁸ The development and use of non-petroleum based transportation fuels such as diesel substitutes, gasoline substitutes, biomethane gas, renewable hydrogen, and renewable electricity represent the largest existing stock of alternative fuel in the California transportation sector. Transportation fuels are indexed in price to gasoline, diesel, and conventional natural gas where prices are volatile and unpredictable.

Development and investments in transportation fueling infrastructure for zero emission, near-zero emission, and biofuels is an integral part of the sustainable freight solution. As vehicle and equipment technologies mature, it is critical that infrastructure capacity and costs keep pace as well. In this way, affected freight stakeholders can make informed decision as they transition to low-carbon transportation energy systems.

State and federal policies have encouraged the development and use of renewable and alternative fuels and technologies. Low and very-low carbon transportation fuels have the potential to displace roughly 3.4 billion gallons of diesel used per year in California and represent an immediate and long-term opportunity to reduce greenhouse gas emissions, reduce petroleum dependence, and foster business sustainability through in-state production and consumption. While the State has forged a leadership position in the production, installation, and consumption of low-carbon transportation energy systems, support for the continuation of this trend

¹⁸ California Energy Commission, "2015 Integrated Energy Policy Report," February 2016.

will require active engagement of both the public and private sectors until markets can self-sustain these systems.

4. Larger Ocean Vessels

Ocean carriers around the world have responded to competitive and cost pressures by introducing larger ocean vessels to their fleet. Larger vessels have begun voyages to U.S. seaports. The largest vessel to call at a U.S. seaport first arrived in December 2015, carrying 18,000 twenty-foot equivalent units. The previous record holder arrived in June 2014, carrying 13,000 twenty-foot equivalent units.¹⁹ These larger vessels allow beneficial cargo owners to ship more containers on fewer trips and on more fuel-efficient engines. Furthermore, the coordination of ocean carriers sharing of excess capacity has also created opportunities for ocean carriers to form alliances and to share trade routes that were previously exclusive.

Although the operation of larger vessels allows more opportunities to reduce costs, increase efficiency, and reduce emissions, they inevitably affect the demand on port infrastructure, contribute to port congestion, and increase the time vessels stay at-berth while unloading. Having larger vessels be more common in ocean shipping transport induces further effects to U.S. ports and surrounding freight areas to upgrade facilities and infrastructures in order to handle larger influxes of freight. The large influx of containers arriving at once may in turn cause greater peak period congestion on rail and surrounding highways, and require the port equipment and infrastructure to match the technology of the larger vessels. Operational efficiencies and infrastructure improvements will help accommodate the new norm of larger oceangoing vessels. Improvements to port terminal efficiency, investments in automated cargo handling and coordination with vessel alliances may benefit port efficiency, increase berth and yard productivity, and alleviate congestion. Efforts are already underway. For example, the Port of Los Angeles' Pasha terminal and Port of Long Beach's Long Beach Container Terminal have invested in advanced technology to automate the terminals and improve efficiency.

5. Increased Vulnerability of Freight Facilities

The effects of climate change are a global concern and one that has received international attention. Projections indicate glacial ice caps are melting at alarming rates and sea level will gradually rise approximately 5 to 24 inches by 2050 (relative to 2000) and 17 to 66 inches by 2100. The Paris Agreement, adopted at the United Nations Conference on Climate Change in December 2015, is evidence that leaders around the world are working together to minimize the detrimental impacts resulting from climate change. The Paris Agreement set a global commitment to reduce

¹⁹ APM Terminals, "APM Terminals Pier 400 Los Angeles Sets New Record with the Largest Container Ship Call Ever at US Port," December 2015, <http://www.apmterminals.com/en/news/press-releases/2014/12/apmt-los-angeles-pier400-setting-ulcs-call>, accessed March 14, 2016.

carbon emissions from human activity and limit global warming to less than 2 degrees Celsius compared to pre-industrial levels.²⁰

These efforts are important to reduce the risks to communities, public and private property, and infrastructure from storm surges, flooding, and permanent inundation and erosion. Climate change could affect many different aspects of the freight transport system, including coastal and low-lying seaports, airports, roads, and energy and fueling infrastructure. Extreme weather associated with climate change also threatens freight infrastructure. Severe storm events, floods, and landslides may cause road closures and damage energy and fuel distribution systems as well as transportation infrastructure. Extreme heat may cause pavement to buckle and metal rail lines to kink and break.

Preventive measures will help ensure California's freight transport system can continue operating in the future. This includes developing an understanding of the susceptibilities of the freight transport system. For example, the Energy Commission has released a solicitation to fund research to identify and assess vulnerabilities of California's transportation fuel sector to extreme weather-related events and identify options to promote resilience. At a physical improvement level, facilities need to be safe from extreme currents and flooding above the watermark for expected sea level rise, particularly during storm events. Although important to recognize the first impact of higher tides, a comprehensive outlook on all aspects of freight infrastructure functions will need to be improved.

Building infrastructure resilient to the effects of climate change is critical to preserve the economic advantage of California's location to worldwide markets. Strategies to improve freight infrastructure serve more than a purpose to enhance the safety of those that work and live near the freight corridor, but also provide confidence to beneficial cargo owners that business can continue uninterrupted throughout California. These will have cascading economic effects especially to those who depend on freight transport as a way of living.²¹

6. Expansion in Last Mile Sector of Freight Transport

The high demand of e-commerce has resulted in the expansion of the last mile freight delivery sector. Last mile freight delivery is the freight transit from the final distribution center to the customer or retailer. E-commerce is the sale of goods or services on the internet. Retailers continue to balance the need for drivers and

²⁰ United Nations Framework Convention on Climate Change, "Adoption of the Paris Agreement," December 12, 2015, <http://www.cop21.gouv.fr/wp-content/uploads/2015/12/I09r01.pdf>, accessed March 14, 2016

²¹ California Natural Resources Agency, "Safeguarding California: Reducing Climate Risk", July 2014, http://resources.ca.gov/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf, accessed on February 4, 2016.

delivery capabilities to maintain the expectations and convenience consumers have with online retail without passing along the costs to them. Technology has assisted with the streamlining of e-commerce and the demographic that has grown with technology also largely contribute to the growing e-commerce market.

In the U.S., Generation X, ages 35 to 50 years old, comprise approximately 66 million people of the population while Generation Y, ages 18 to 34 years old, are estimated at 75 million in 2015. With immigration of this age group to the U.S., Generation Y's will peak at 81 million by 2036.²² Sixty percent of consumers shop online, and up until 2013, Generation X's spent more money in e-commerce than other age groups, but today's scientific and industry research indicates that Generation Y's spend more money online than any other demographic.²³ Research suggests that Generation Y's are motivated to shop online based on current trends (i.e. what's popular), indicating that online purchases will continue to grow as the spending power of the generation increases along with the ability to purchase directly from social media websites.²⁴ Projections indicate online retail sales will reach \$385 billion in 2017 and \$414 billion in 2018, up from \$263 billion in 2013.²⁵ Retailers recognizing the growing trend of online purchases may see e-commerce as a benefit with many larger retailers investing in delivery and fulfillment systems, and strategies that focus on the end customer. To meet this need, e-commerce retailers may want to improve urban logistics to optimize solutions for last mile deliveries, such as crowdsourcing and deliveries on shorter delivery routes. Crowdsourcing is the process of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, especially from an online community. For example, an online retailer has experimented with crowdsourcing couriers to make deliveries to their end consumer. The crowdsourcing demand model may provide some benefits but it also requires route strategies to arrange for the final delivery. Implementing this strategy at a larger scale may result in development of smaller urban warehouses to provide quicker deliveries to customers.

²² Fry, Richard, "This Year, Millennials will Overtake Baby Boomers," *Pew Research Center*, January 16, 2015, <http://www.pewresearch.org/fact-tank/2015/01/16/this-year-millennials-will-overtake-baby-boomers/>, accessed on February 4, 2016.

²³ Smith, Cooper, "Gen X and Baby Boomer Present a Huge Opportunity for Online Retailer," *Business Insider*, April 27, 2015, <http://www.businessinsider.com/the-age-demographics-of-who-shops-online-and-on-mobile-2015-4>, accessed on February 4, 2016.

²⁴ Nobel, S.M., et al., "What Drives College Age Generation Y Consumers?," *Journal of Business Research*, Vol. 62, 2009, https://www.researchgate.net/publication/222678642_What_drives_college-age_Generation_Y_consumers, accessed on February 4, 2016.

²⁵ Enright, Allison, "U.S. Online Retail Sales will Grow 57% by 2018; Projected Growth," May 12, 2014, <https://www.internetretailer.com/2014/05/12/us-online-retail-sales-will-grow-57-2018>, accessed on February 4, 2016.

Although crowdsourcing and shorter delivery routes may help facilitate meeting the demands of e-commerce, the increased movement of freight in urban areas will have an impact on the existing infrastructure. Larger volumes of trucks and passenger vehicles increase traffic in urban and residential roads and can contribute to congestion and safety issues. Local infrastructure improvements of city streets and local transportation corridors will be necessary as they provide increasingly vital connections between freight facilities, distribution centers, and homes. State and local partners must continue to develop and implement strategies that help minimize the impacts of increasing numbers of freight vehicles. Such impacts include increased demand on neighborhood parking and streets, increased urban congestion, as well as increased conflicts between last mile delivery trucks and vehicles with light-duty automobiles, pedestrians, and bicycles.

While projections indicate the volume of last mile deliveries made by truck will increase, there are other possible methods of delivery on the horizon that may influence a shift away from trucks. These could include cargo bicycles, delivery by drone, use of transportation network company services in urban areas, increased use of the U.S. Postal Service, or opportunities for customers to pick up packages at stores or strategically located kiosks. Additionally, efficiency measures could optimize shipments by truck, thereby reducing the number of trucks in urban areas.

7. Emerging Technologies

New technologies are revolutionizing the way the freight transport system operates, offering solutions, opportunities, and challenges. By capturing the benefits of emerging technologies such as information systems and facility modernization, these technologies can cut travel time and fueling costs while increasing the capacity of the system to transport more cargo within the existing transportation infrastructure.

The freight transport system has an opportunity to incorporate emerging technologies to improve communication, safety, and facility modernization. Communication and information technology improvements provide a wide range of smart pricing and costing models for smarter management decisions, smart-phone enabled technology to provide for dynamic and real-time load information sharing, and expedited inspection processes. The integration of advanced information technology can improve data collection to enable faster and more accurate analysis of freight routes, travel times, and infrastructure capacity. In addition, freight facility modernization has the potential to increase productivity and decrease operating costs while increasing throughput of existing infrastructure and capacity. The development of emerging technologies in the freight transport system provides potential to improve freight transportation reliability and safety as well as support efforts toward a successful transition to cleaner zero and near-zero emission goals.

C. Integration of Existing State Policies, Programs, Plans, and Funding

Collectively, the following State agencies have responsibility for influencing different and intersecting components of the freight transport system:²⁶

- Caltrans' mission is to provide a safe, sustainable, integrated, and efficient transportation system to enhance California's economy and livability. This includes supporting development of a robust system for the efficient operation and service of freight movement in the State. The department directly manages more than 50,000 lane miles of State and federal highways, as well as over 12,000 highway bridges; administers technical assistance and grants to regional partners for local planning and projects; permits more than 400 public-use airports and special-use hospital heliports; and plays a strong role identifying options for long-term transportation infrastructure funding.
- ARB's mission is to promote and protect public health, welfare, and ecological resources through the effective and efficient reduction of air pollutants while recognizing and considering the effects on the economy of the State. The Board is responsible for providing safe and clean air and provides leadership in implementing and enforcing air pollution control rules, regulations, and incentive programs affecting mobile and stationary sources, including those related to freight, that are based on the best possible scientific and economic information.
- The Energy Commission is the State's primary energy policy and planning agency and is committed to reducing energy costs and environmental impacts of energy use, while ensuring a safe, resilient, and reliable supply of energy. To help advance the State's energy policy, the Commission offers incentives aimed at transforming transportation through the development and deployment of low-carbon alternative fuels and advanced vehicle technologies that can be used to move people and freight in the State, as well as gathers and analyzes data on current petroleum fuel price, supply, and demand issues.
- The Governor's Office of Business and Economic Development (GO-Biz) is the State's point of contact for economic development and job creation efforts, and provides a range of services to business owners including attraction, retention and expansion services, business development services,

²⁶ Other State government agencies and bodies including but not limited to: the California Department of Food and Agriculture, California Department of Public Health, California Workforce Development Board, California Public Utilities Commission, Governor's Office of Planning and Research, and Strategic Growth Council have objectives, policies, and programs that intersect with the freight transport system. Caltrans, ARB, the Energy Commission, and GO-Biz will continue to coordinate with these and other agencies on potential involvement moving forward.

permit streamlining and regulatory assistance, small business assistance, promotion of economic growth and jobs through innovation, assistance with state programs, coordination with local and regional agencies, and international trade development.

As part of the Action Plan development process, the State agencies worked together to consider their existing policies, programs and investments, as well as recent State plans related to California's freight transport system. The State agencies used this information as the starting point for identifying further opportunities to accelerate change through greater coordination across existing programs, and additional actions to address system needs.

The following section briefly describes the State agencies' current activities and planning efforts related to the freight transport system.

1. Current Activities

California has a suite of policies, programs, and investments that intersect with the freight transport system and are aimed at advancing system efficiencies, clean freight vehicle and equipment technologies, and operations across the State, including:

- Implementation of intelligent transportation systems technology, including freight sector demonstrations and expanded integration into State roadside facilities with state-of-the-art truck scale technology, dependable and sophisticated traffic sensors, and the ability to share freight inspection, routing, and weather information. Work is also underway with freight partners to improve communications and telematics, container matching, and connected vehicles, which will reduce greenhouse gases, relieve congestion, improve economic margins for businesses, and benefit disadvantaged communities.
- Programs to promote advanced transportation technology to improve system safety and efficiency such as connected (e.g., truck platooning) vehicles and freight priority traffic management systems (e.g., traffic sensing, preemptive signals).
- Coordination with national and international entities on truck information.
- Use of innovative technology, techniques and materials to encourage system preservation, reduce peak demand, and increase fuel efficiency.
- Development of tools for freight data collection, analysis, and modeling.

- Efforts to improve the existing infrastructure in order to reduce congestion, meet current standards, and improve access for interstate commerce. For example, work is underway to raise the vertical clearance of structures crossing Interstate 80. This allows standard trucks traveling the interstate route to avoid detours through local roads, which have historically caused delays and stresses on the local roadway system.
- Regulations requiring in-use and new fleet upgrades to cleaner technologies across vehicle and equipment types, rules for when vehicles are idling and vessels are docked, as well as incentive programs to help with development and deployment of zero and near-zero emission vehicles and equipment. This builds off the success of other modes and sectors in transitioning technology to electrification. For example, California has led a consortium of other states to expand the availability of electric vehicles, the State is developing the nation's first electric high-speed rail system, and local transit providers are expanding electric service.
- Programs to advance development, market growth, and acceptance of clean, low-carbon fuels and infrastructure for freight movement. This includes rules to help reduce the overall carbon intensity of transportation fuels, incentive programs to support development and manufacturing of low carbon transportation fuels and associated fueling infrastructure, roadmaps and action plans to advance alternative fuels development, as well as specific fuel rules for marine vessels and locomotives.
- Actions to advance building energy efficiency, including at freight-related building and commercial facilities. As identified in the Governor's January 2015 inaugural address and through Senate Bill 350 (De Leon, Chapter 547, Statutes of 2015), efforts to double energy efficiency savings by 2030 will include energy efficiency measures to be implemented by all sectors of the freight movement industry. Energy efficiency measures not only reduce greenhouse gas emissions, but also provide businesses with a favorable return on efficiency investments where financial savings can be used for other building energy investments, such as renewable generation.

2. Recent Plans

Starting in 2014 and throughout 2015, the State agencies released a series of plans and documents related to California's freight transport system, including the *California Freight Mobility Plan*, the *2014 Integrated Energy Policy Report Update*, the *Sustainable Freight Pathways to Zero and Near-Zero Emissions Discussion Document*, the *Heavy-Duty Technology and Fuels Assessments*, and the *Safeguarding California: Implementation Action Plans Report*. Collectively, these documents represent the most recent iteration of the State's work to characterize California's freight transport system, the system's relationship to achieving broader

transportation, air quality, energy, climate and resiliency goals, and identify potential State actions to influence freight transport system.

a. California Freight Mobility Plan

In December 2014, Caltrans finalized the *California Freight Mobility Plan*, which describes the condition and performance of the current system and a forecast for freight volumes in the future.²⁷ The *California Freight Mobility Plan* discusses a variety of freight transport system issues such as: the economic context of freight, labor and workforce development, the community and environmental context, safety, security and resiliency issues, intelligent transportation systems and technology, border issues, and California Native American tribal freight connections. The *California Freight Mobility Plan* also includes a list of potential freight transportation infrastructure projects across the State. Pursuant to the requirements of the Fixing America's Surface Transportation (FAST) Act, Caltrans in conjunction with the California Freight Advisory Committee and the California Transportation Commission will be updating the plan beginning in the Fall of 2016 through December 2017 to bring it into compliance with new federal requirements.

b. 2014 Integrated Energy Policy Report Update

In February 2015, the Energy Commission adopted the *2014 Integrated Energy Policy Report Update*.²⁸ The 2014 update of this biennial policy report is notable for its focus on transportation energy issues. It provides an overview of where transportation technologies are headed in the future, and discusses opportunities and challenges for integrating the transportation system and fueling infrastructure with the electricity and natural gas systems. The report also discusses the role of incentives and opportunities to leverage funding toward transforming the transportation system to achieve the State's climate, air quality, and energy goals.

c. Sustainable Freight: Pathways to Zero and Near-Zero Emissions Discussion Document

In April 2015, ARB staff released the *Sustainable Freight: Pathways to Zero and Near-Zero Emissions Discussion Document* that outlines initial steps ARB intends to take and propose to accelerate progress toward zero and near-zero emission freight

²⁷ California State Transportation Agency and Caltrans, "California Freight Mobility Plan," December 2014, <http://www.dot.ca.gov/hq/tpp/offices/ogm/cfmp.html>, accessed April 11, 2016.

²⁸ Energy Commission, "2014 Integrated Energy Policy Report Update," February 2015, <http://www.energy.ca.gov/2014publications/CEC-100-2014-001/CEC-100-2014-001-CMF.pdf>, accessed April 11, 2016.

vehicle and equipment technology in California.²⁹ It describes the range of potential actions available to ARB for trucks, oceangoing vessels, locomotives, transport refrigeration units, commercial harbor craft, aircraft, and cargo, industrial, and ground service equipment. Immediate, near-, and long-term concepts to achieve a cleaner freight system are included.

d. Heavy-Duty Technology and Fuels Assessments

Throughout 2015, ARB staff, along with South Coast Air Quality Management District staff, released a series of technology and fuels assessment reports for a variety of source categories, including trucks and buses, transport refrigeration units, locomotives, conventional and alternative fuels, oceangoing vessels, commercial harbor craft, cargo handling equipment, and aviation.³⁰ These technology assessments evaluate how the various technologies for each mode work, the fuels necessary to power each technology, as well as the state of market readiness, costs, environmental benefits, technology performance, and current deployment challenges.

e. Safeguarding California: Implementation Action Plans

The California Natural Resources Agency released the *Safeguarding California: Implementation Action Plans* report in March 2016, which sets forth how the State will help residents, communities, and natural systems adapt to the potentially catastrophic effects of climate change.³¹ The report includes implementation plans that identify steps across different sectors including water, transportation, agriculture, biodiversity and habitat, emergency management, and energy, to build the resilience of California's residents, communities, and ecosystems to the emerging impacts of climate change. The key adaptation efforts for sustainable freight transportation include:

- A better understanding of expected climate impacts to inform transportation planning: specifically, regional climate model downscaling and specific vulnerabilities of transportation, energy, and fueling infrastructure.

²⁹ ARB, "Sustainable Freight: Pathways to Zero and Near-Zero Emissions Discussion Document," April 2015, <http://www.arb.ca.gov/gmp/sfti/sustainable-freight-pathways-to-zero-and-near-zero-emissions-discussion-document.pdf>, accessed April 11, 2016.

³⁰ ARB, Technology and Fuels Assessments Reports, April 2015 to April 2016, <http://www.arb.ca.gov/msprog/tech/report.htm>, accessed April 11, 2016.

³¹ California Natural Resources Agency, "Safeguarding California: Implementation Action Plans," March 2016, <http://resources.ca.gov/docs/climate/safeguarding/Safeguarding%20California-Implementation%20Action%20Plans.pdf>, accessed April 11, 2016,

- A better understanding of evolving trends that may impact transportation systems: opportunities with vehicle electrification and other advanced clean vehicles on timing and demand for energy supplies along with better understanding of likelihood of land subsidence events that may compromise transportation systems.
- Improving the reliability of California's transportation and freight systems in the face of expected climate impacts: translating the findings of vulnerability studies into actions that improve the reliability of California's transportation by integrating climate considerations into planning, design, programming, construction, operations, and maintenance.

3. Freight Funding Programs

California's diverse set of funding programs support a wide range of freight movement activities. Some of these programs are direct sources of funding for transportation infrastructure and others are discretionary, and support freight vehicle and equipment technology advancement. Funding and incentives for freight sector buildings are also available to improve energy efficiency, energy conservation, and renewable energy generation. Examples of some of these freight funding sources for California follow.

a. Bond Funding

The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006, approved by the voters as Proposition 1B, provided almost \$20 billion in funding for California's transportation infrastructure. Over \$3 billion in Proposition 1B funds were dedicated to the improvement of the State's freight network through the Trade Corridors Improvement Fund, Goods Movement Emission Reduction Program, and the California Ports and Maritime Security Grants Program.

Trade Corridors Improvement Fund

Proposition 1B made \$2 billion available for infrastructure improvements along federally designated "Trade Corridors of National Significance" in California, or along other corridors within California that have a high volume of freight movement – this program was called the Trade Corridors Improvement Fund. The bond funding was leveraged with other funds to support projects costing over \$7 billion. The Trade Corridors Improvement Fund uses Proposition 1B funds made available to the California Transportation Commission upon appropriation in the annual Budget Bill by the Legislature. The Trade Corridors Improvement Fund is subject to conditions and criteria in statute. The law placed emphasis on projects that improve trade corridor mobility. The California Transportation Commission consulted with ARB to help develop air quality evaluation criteria for proposed projects.

The types of projects funded under this program include highway expansions, grade separations, rail capacity increases, and port access improvements.³² Bond funds for the programs are all programmed on specific projects, with many projects already completed and in use. Notable infrastructure investments were the construction of the Colton Crossing grade separation in San Bernardino County and the replacement of the Gerald Desmond Bridge in Long Beach.

Goods Movement Emission Reduction Program

Proposition 1B also made \$1 billion available to ARB to reduce freight air pollution, and the associated health effects, on impacted communities along California's trade corridors. The Legislature created the Goods Movement Emission Reduction Program at ARB to implement the bond funding. Local agencies (like air districts and seaports) apply to ARB for funding; then those agencies offer financial incentives to owners of equipment used in freight movement to upgrade to cleaner technologies. ARB adopted guidelines and priorities for the last round of Goods Movement Emission Reduction Program funds in June 2015 that incorporated the State's initiative to foster zero and near-zero emission technologies.

The types of projects funded under the Goods Movement Emission Reduction Program include investments to replace, retrofit or upgrade trucks, locomotives, cargo handling equipment, transport refrigeration units, and commercial harbor craft, as well as install shoreside electrical power for ships at-berth. These investments must achieve early or extra emission reductions not otherwise required by law or regulation, which ARB describes as "early or extra" reductions.³³ As of December 2015, the Goods Movement Emission Reduction Program has upgraded almost 13,000 trucks, 25 locomotives, 3 harbor craft engines, and installed electrical infrastructure for ship plug-ins at 37 berths at the Ports of Los Angeles, Long Beach, Oakland, and Hueneme. These projects reduced 2,600 tons of fine particulate matter and 94,000 tons of nitrogen oxides emission throughout the State's trade corridors.³⁴ ARB awarded the final round of approximately \$220 million in funding to five local air districts in 2015 for projects that will be completed over the next one to four years and yield additional benefits. The program bond monies have leveraged substantial match funding from private, local, and federal sources – more than one match dollar for every program dollar invested.

California Ports and Maritime Security Grant Program

Proposition 1B also directed that \$100 million be made available upon appropriation by the Legislature for grants to eligible entities for port and maritime security projects

³² For more information see: <http://www.dot.ca.gov/hq/tpp/offices/ogm/tcif.html>.

³³ For more information see: <http://www.arb.ca.gov/bonds/gmbond/gmbond.htm>.

³⁴ ARB, "Proposition 1B: Goods Movement Emission Reduction Program, Semi-Annual Status Report", June 2016.

such as equipment for security or detection of overweight loads.³⁵ The Governor's Office of Emergency Services administered the program, and program funding has been exhausted. Projects funded under this program include investments such as maritime security risk management, maritime domain awareness, and maritime security mitigation protocols to support resiliency capabilities.

b. Additional Funding

In addition to the bond fund programs discussed above, a number of other funding and financing programs help to improve freight movement across the State. Although none of these programs are dedicated to freight infrastructure and equipment, a portion of the dollars may be allocated to help to fund construction and maintenance of key physical infrastructure, develop and deploy advanced technology engines and equipment, produce alternative and renewable low carbon fuels and associated infrastructure, as well as promote workforce development.

*National Corridor Planning & Development Program
Coordinated Border Infrastructure Program*

The Transportation Equity Act for the 21st Century authorized The National Corridor Planning and Development Program, and the Coordinated Border Infrastructure Program, discretionary grant programs funded by a single funding source. These programs provided funding for planning, project development, construction, and operation of projects that serve border regions near Mexico and Canada and high priority corridors to states and metropolitan planning organizations throughout the nation. Some projects in this category include innovative and problem-solving techniques for proposed border stations or ports of entry, projects to reduce travel time through international border crossings, improvements in Mexico border crossing vehicle safety, and security.

Carl Moyer Memorial Air Quality Standards Attainment Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) provides grant funding for cleaner-than-required engines and equipment. The program is authorized at \$69 million per year and funded through Department of Motor Vehicle smog abatement and tire fees. Typically, most of these funds are allocated to non-freight sources. Local air districts administer Carl Moyer Program grants, selecting cost-effective projects among source categories that include on-road trucks and buses, off-road equipment, locomotives, marine engines, portable and stationary agricultural equipment, and light-duty vehicle scrap. ARB works collaboratively with the air districts and other stakeholders to set guidelines and ensure the program achieves pollutant reductions to help California meet its

³⁵ Governor's Office of Homeland Security, California Port and Maritime Security Grant Program Guidelines and Application Kit, 2007.

clean air commitments. As of December 2015, approximately \$1 billion in State and local funds have been invested through the Carl Moyer Program to clean up dirty engines. To date, the program has cleaned up more than 50,000 engines, reducing approximately 175,000 tons of ozone precursors and 6,500 tons of particulate matter.

Low Carbon Transportation Investments and Air Quality Improvement Program

ARB's Low Carbon Transportation Investments and Air Quality Improvement Program projects provide incentives to reduce greenhouse gas emissions, criteria pollutants, and toxic air contaminants through the development and deployment of advanced technology and clean transportation.

California Cap-and-Trade auction proceeds support Low Carbon Transportation investments. Per statute, these funds must further the purposes of Assembly Bill 32 (AB 32; Núñez, Chapter 488, Statutes of 2006) with a priority for benefitting disadvantaged communities. Each year, the Legislature appropriates funding to ARB for Low Carbon Transportation projects and Air Quality Improvement Program projects. The Air Quality Improvement Program is a voluntary mobile source incentive program administered by ARB to fund clean vehicle and equipment projects, research of biofuels production and air quality impacts of alternative fuels, and workforce training. The Air Quality Improvement Program Guidelines and annual Funding Plans guide ARB's implementation of the Air Quality Improvement Program.³⁶ The current freight-related Low Carbon Transportation and Air Quality Improvement Program Projects include Advanced Technology Demonstration Projects, Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project, Zero-Emission Truck and Bus Pilot Projects, and Truck Loan Assistance Program.

Alternative and Renewable Fuel and Vehicle Technology Program

The Alternative and Renewable Fuel and Vehicle Technology Program authorizes the Energy Commission to develop and deploy alternative and renewable fuels and advanced transportation technologies to help implement the State's climate change policies. The Energy Commission has an annual program budget of approximately \$100 million to support projects around the State. Alternative and Renewable Fuel and Vehicle Technology Program projects help to improve and produce alternative and renewable low carbon fuels for existing and emerging engines in California, as well as expand fueling stations, equipment and fueling infrastructure for existing fleets, public transit, and transportation corridors. Funding is also for demonstration and deployment of advanced vehicle and equipment technologies, including improvement and retrofit of light-, medium-, and heavy-duty vehicle technologies and on-road and non-road vehicle fleets. Technologies are demonstrated on the freight

³⁶ For additional information see: <http://www.arb.ca.gov/msprog/aqip/aqip.htm>.

system at seaports, along freight transportation corridors, warehouse and distribution centers, and retail and commercial centers. Program projects also help to establish workforce training programs, conduct education, and create technology centers that promote workforce development to support advanced vehicle technologies.³⁷

California Alternative Energy and Advanced Transportation Financing Authority

The California Alternative Energy and Advanced Transportation Financing Authority, in the State Treasurer's Office, works collaboratively with public and private partners to provide innovative and effective financing solutions for California's industries. It assists in increasing the development and deployment of renewable energy sources, energy efficiency, and advanced transportation and manufacturing technologies to reduce air pollution, conserve energy, and promote economic development and jobs.

California Pollution Control Financing Authority

The California Pollution Control Financing Authority, in the State Treasurer's Office, provides low-cost innovative financing to California businesses (including freight sector businesses) for qualifying projects that control pollution and improve water supply. Examples of recent assistance include projects to purchase clean air vehicles by waste companies, construct and operate anaerobic digesters, recycle used oil, and convert animal waste to clean burning fuel. Additionally, the California Pollution Control Financing Authority administers the California Capital Access Program, which helps participating financial institutions extend credit to small businesses through microloans and larger loans for start-up, expansion, and working capital up to \$20 million.

The California Pollution Control Financing Authority also partners with State agencies to achieve the State's environmental policy objectives by administering high-impact financing programs designed to assist regulated entities and other stakeholders with accessing private capital.

The Infrastructure State Revolving Fund Program

The California Infrastructure and Economic Development Bank uses its Infrastructure State Revolving Fund program to provide financial assistance to public agencies and non-profit corporations for a wide variety of infrastructure and economic development projects. Recently, Assembly Bill 1533 (Chapter 383, Statutes of 2015) amended the Infrastructure State Revolving Fund program by expanding project criteria to include goods movement-related projects.

³⁷ For additional information see: <http://www.energy.ca.gov/altfuels/>.

Applicants eligible for financial assistance through this program could receive funding in amounts ranging from \$50,000 to \$25 million, with loan terms up to 30 years. Although not ideal to fund capital projects in their entirety, the Infrastructure State Revolving Fund program is a possible funding partner for freight projects that promote economic efficiency, revitalize communities, and enhance the quality of life for people of California.

c. Potential Freight Funding

This section discusses new and proposed freight funding sources that could be used for investing in California's freight transport system, both the infrastructure and the vehicles and equipment that move cargo.

Fixing America's Surface Transportation Act

On December 4, 2015, President Obama signed into law a new five year, \$305 billion surface transportation bill, the "Fixing America's Surface Transportation (FAST) Act," which authorizes funding for existing core highway and transit programs and created two new freight programs funded by the Highway Trust Fund:

- National Highway Freight Program: Established to improve the efficiency of freight movement on the National Highway Freight Network in addition to critical urban and rural freight corridors and support Federal goals for freight. The total formula program authorized \$6.3 billion. Within this framework, the State could receive an estimated \$117 million a year for the next five years.
- Nationally Significant Freight and Highway Projects: A corollary discretionary grant program that will allow the Secretary of Transportation to award grants for nationally or regionally significant transportation infrastructure projects across modes, including freight rail projects. The program is initially funded at approximately \$900 million per year nationwide, with annual increases until it is funded to \$1 billion in 2020. California will work with local and regional partners to put the State in the best position to be awarded as much of this discretionary funding as possible.

Prior to the Fixing America's Surface Transportation Act, the U.S. did not have a coordinated freight investment program. By establishing a dedicated, committed funding source, the law underscores the importance of freight movement and freight supporting infrastructure to both the California and U.S. economies.³⁸

³⁸ For additional information see: <https://www.fhwa.dot.gov/fastact/legislation.cfm>.

Governor Brown's Funding Proposal

On January 7, 2016, the Governor released his proposed 10-year funding plan that will provide a total of \$36 billion for transportation, with an emphasis on repairing and maintaining the existing transportation infrastructure. The Governor's proposal also includes a significant commitment to improving infrastructure on the State's trade corridors. Approximately \$2 billion is slated for freight infrastructure investments. The package includes a combination of new revenues, additional investments of Cap-and-Trade auction proceeds, accelerated loan repayments, Caltrans efficiencies and streamlined project delivery, accountability measures, and constitutional protections for the new revenues.³⁹ The funding proposal addresses the following Administration priorities:

- Focus new revenue primarily on "fix-it-first" investments to repair neighborhood roads and State highways and bridges, including needed maintenance along the State's primary trade corridors. The funding proposal would allocate \$518 million for State highway repairs and maintenance, and \$342 million for local roads in fiscal year 2016-2017.
- Make key investments in trade corridors to support continued economic growth and implementation of a sustainable freight transport strategy. A total of \$211 million has been assigned for trade corridor enhancement. In past investments through the Trade Corridors Improvement Fund program, the State leveraged \$2 for every \$1 spent to improve its trade corridors. The State should expect the same leverage with this proposed investment.
- Provide funding to match locally generated funds for high-priority transportation projects. It is also important to address local freight priorities.
- Continue measures to improve performance, accountability, and efficiency at Caltrans. Taking such measures will enhance project delivery for both the State and project stakeholders.
- Invest in passenger rail and public transit modernization and improvement. Investments in passenger rail can also benefit freight rail. Grade separations, operations improvements, and double tracking can improve the safety, mobility, and carbon footprint of passenger and freight rail operators.

The Governor's proposal also includes a one-year appropriation of funding for cleaner vehicles, equipment, and fuels used to transport passengers and freight, as well as off-road equipment used in agriculture and other applications. This funding would:

³⁹ For additional information see: <http://www.ebudget.ca.gov/FullBudgetSummary.pdf>.

- Continue the Low Carbon Transportation and Air Quality Improvement Program projects. The Governor’s proposal would appropriate \$500 million in Cap-and-Trade auction proceeds to ARB for Low Carbon Transportation and Fuels investments. Typically, passenger transportation projects to help achieve the Governor’s zero emission vehicle targets and implement the Legislature’s low-income equity programs to increase personal mobility in disadvantaged communities receive funds. This appropriation includes \$40 million for very low carbon fuel production incentives, a new element to ARB’s Low Carbon Transportation program.
- Invest in in-state biofuel production through the expansion of existing facilities or construction of new facilities. The Governor’s proposal would appropriate \$25 million in Cap-and-Trade auction proceeds to the Energy Commission for incentives through the Alternative and Renewable Fuel and Vehicle Technology Program. Some of these fuels may support freight transport.

D. Relationship to Plans Under Development

When developing this document, the State agencies also considered the ongoing development of a number of other plans and strategies that intersect with freight transport projects or investments. The following section describes how the Action Plan will inform those plans and strategies as they are developed and updated.

1. National Freight Strategic Plan

The *Draft National Freight Strategic Plan* presents solutions and strategies to address infrastructure, institutional, and financial bottlenecks that hinder the safe and efficient movement of freight.⁴⁰ It also identifies best practices for mitigating the impact of freight movement on communities and proving reliable funding for transportation. The plan is the framework for national freight policy and will guide development of the next iteration of the California Freight Mobility Plan.

2. California Transportation Plan

The *California Transportation Plan 2040* identifies statewide multi-modal transportation system resources to achieve maximum feasible greenhouse gas reductions while meeting the State’s transportation needs.⁴¹ The plan also highlights the need for infrastructure improvements targeted at freight movement

⁴⁰ U.S. Department of Transportation, “Draft National Freight Strategic Plan,” October 2015, https://www.transportation.gov/sites/dot.gov/files/docs/DRAFT_NFSP_for_Public_Comment_508_10%2015%2015%20v1.pdf, accessed April 11, 2016.

⁴¹ Caltrans, “California Transportation Plan 2040 Final Review Draft,” February 29, 2016, <http://www.dot.ca.gov/hq/tpp/californiatransportationplan2040/final-draft-ctp2040/index.shtml>, accessed April 11, 2016.

and increased public benefits such as more efficient, cost-effective, and environmentally-friendly freight. The *California Transportation Plan 2040* refers to the California Sustainable Freight Action Plan and the California Freight Mobility Plan as instrumental in creating freight transportation policy in the coming decades.

3. Regional Transportation Plan Guidelines

The current *2010 California Regional Transportation Plan Guidelines* provide a uniform transportation planning framework throughout the State identifying federal and State requirements for the development of Regional Transportation Plans.⁴² The Regional Transportation Plans, also called Long Range Transportation Plans are used in California by both Metropolitan Planning Organizations and Regional Transportation Planning Agencies to conduct long range (a minimum of 20 years) planning in their regions. Through the regional planning process, Metropolitan Planning Organizations and Regional Transportation Planning Agencies can create strategies for improving the regional freight transportation system so positive impacts (e.g. job creation, access to goods) are maximized and negative impacts (e.g. land use conflicts, air pollution) are minimized. Metropolitan Planning Organizations and Regional Transportation Planning Agencies must plan for freight transportation infrastructure in the same way they plan transportation infrastructure for the movement of people, supporting projected population growth and economic development. The process to update the current *2010 California Regional Transportation Plan Guidelines* has been launched by the California Transportation Commission with adoption anticipated by December 2016, and will include some of the strategies from this document that most pertain to regional transportation agencies.

4. Mobile Source Strategy

ARB staff released a *Mobile Source Strategy* in May 2016 to support multiple planning efforts.⁴³ These include State Implementation Plans required under the Clean Air Act to meet federal air quality standards, California's Scoping Plan Update to meet greenhouse gas emission reductions goals, the Short-Lived Climate Pollutant Reduction Strategy to reduce short-lived climate forcers, and this Action Plan to promote a cleaner, more efficient freight transport system. The *Mobile Source Strategy* outlines ARB's integrated approach to meeting these multiple goals over the next 15 years through a comprehensive suite of

⁴² California Transportation Commission, "2010 California Regional Transportation Plan Guidelines," April 7, 2010,

http://www.catc.ca.gov/programs/rtp/2010_RTP_Guidelines.pdf, accessed April 11, 2016.

⁴³ ARB, "Mobile Source Strategy," May 2016, <http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>, accessed June 16, 2016.

potential actions. In May 2016, ARB also released the Proposed 2016 State Strategy for the State Implementation Plan. The Proposed 2016 State Strategy for the State Implementation Plan will contain the suite of measures that provide the regulatory and programmatic mechanisms necessary to implement the emission reductions needed to meet federal air quality standards.

5. State Implementation Plans (South Coast and San Joaquin Valley)

Areas around the State with poor air quality that do not meet national air quality standards (nonattainment areas) must develop State Implementation Plans to show how the standards will be met. U.S. EPA is required to review the latest health research every five years to ensure standards remain protective of public health. Based on research demonstrating adverse health effects at lower exposure levels, U.S. EPA has recently revised federal standards for ozone and fine particulate matter. State Implementation Plans for meeting these standards are due in 2016. Two areas of the State have the most critical air quality challenges – the South Coast and the San Joaquin Valley. Clean Air Act deadlines will be a driver for the pace of emission reductions needed, especially meeting ozone standards in the South Coast, and fine particulate matter standards in the San Joaquin Valley. Each regional State Implementation Plan that needs emission reductions beyond current control programs will include detailed measures from the State Strategy for the State Implementation Plan to address attainment needs. ARB will consider approval of the regional State Implementation Plans for ozone and fine particulate matter along with the State Strategy for the State Implementation Plan prior to submitting the plans to U.S. EPA. Additional actions identified in this document may also help provide further emission reductions to meet federal air quality standards.

6. Climate Change Scoping Plan

The *Climate Change Scoping Plan* describes how the State intends to meet its greenhouse gas emissions reduction goals of reducing emissions to 1990 levels by 2020, and further reducing emissions to 1990 levels by 2050. The Board considered the first Scoping Plan in 2008 and approved the first update in May 2014.⁴⁴ The update identified the need for substantial new actions to move the heavy-duty sector toward zero emissions. ARB will develop the next update, the 2030 Target Scoping Plan, through fall 2016, and will focus on measures to meet the midterm 2030 greenhouse gas emissions reduction target. ARB released a *2030 Target Scoping Plan Concept Paper* on June 17, 2016, to inform the ongoing stakeholder process for how to most effectively achieve a 40 percent reduction in GHG emissions by

⁴⁴ ARB, “First Update to the Climate Change Scoping Plan,” May 2014, http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc_dd.pdf, accessed April 11, 2016.

2030 as compared to 1990 statewide GHG emissions.⁴⁵ The 2030 Target Scoping Plan will incorporate potential actions from the Action Plan that provide greenhouse gas emissions reduction benefits, and may include development of additional actions related to freight. If ARB identifies additional freight-related actions during this process, they will inform subsequent updates to the Action Plan.

7. Short-Lived Climate Pollutant Reduction Strategy

ARB is required to develop a Short-Lived Climate Pollutant Reduction Strategy under Senate Bill 605 (Lara, Chapter 523, Statutes of 2014). Short-lived climate pollutants are powerful climate forcers that remain in the atmosphere for a much shorter period than longer-lived climate pollutants, such as carbon dioxide. Black carbon, one of the three main types of short-lived climate pollutants, is a component of fine particulate matter emitted by the diesel engines used to move freight. Methane, another short-lived climate pollutant, is the principal component of natural gas. ARB released a *Proposed Short-Lived Climate Pollutant Reduction Strategy* on April 11, 2016, which was presented to the ARB Board in May 2016.⁴⁶ Both the Short-Lived Climate Pollutant Reduction Strategy and the Action Plan will inform development of the 2030 Target Scoping Plan.

E. Public Process

This Action Plan was developed with input from a broad group of stakeholders, including, but not limited to, cargo owners, the logistics industry, labor, ports, utilities, business leaders, community and environmental justice organizations, agencies at all levels, and other interested stakeholders in an open and public process. The State agencies sought input on development of the freight targets, potential actions to support progress towards meeting those targets, pilot project ideas, and the approach to assess the economic impacts of the plan through a variety of venues.

As a starting point, the State agencies built on existing stakeholder input and public processes recently completed for their respective freight-related planning efforts. As part of the development process, each of the agencies continued to convene and participate in regular committees, focus groups, individual meetings, and conference calls with stakeholders who were previously engaged in planning efforts. This included each of the State agencies holding numerous meetings and conference calls with individuals and stakeholder groups such as industry associations, environmental groups, California Native American Tribes, and small businesses on specific issues or recommendations.

⁴⁵ ARB, “2030 Target Scoping Plan Concept Paper,” June 2016, http://www.arb.ca.gov/cc/scopingplan/document/2030_sp_concept_paper2016.pdf, accessed June 17, 2016.

⁴⁶ ARB, “Proposed Short-Lived Climate Pollutant Strategy,” April 2016, <http://www.arb.ca.gov/cc/shortlived/meetings/04112016/proposedstrategy.pdf>, accessed April 11, 2016.

The State agencies also hosted a series of public meetings, regional workshops, and statewide webinars from July 2015 through spring 2016 to solicit input on the development of the Action Plan, as well as help engage audiences beyond the transportation, environmental, and industry interests that were already participating in the State's freight transport efforts. Specifically, the State agencies kicked off the public process at two events. These included a California Freight Advisory Committee meeting on July 28, 2015, where executive representatives from the participating agencies introduced the public to the effort. California Freight Advisory Committee meetings are open to the public. Members of the California Freight Advisory Committee include representatives of seaports, railroads, airports, trucking, shipping, carriers, freight-related associations, freight industry workforce, regional, local, State, and federal agencies, California Native American Tribal governments, environmental organizations, safety organizations, and community organizations. The State agencies hosted a second kick-off event through a webinar on October 1, 2015.

Also in October, the State agencies participated in another public meeting of the California Freight Advisory Committee to share draft targets, discuss a process for evaluating the economic impacts of actions that the agencies would recommend to support those targets, and provide additional information regarding sharing of pilot project ideas with the State agencies.

The State agencies co-hosted public regional workshops and a webinar throughout the State (in Redding, Sacramento, Oakland, Fresno, Modesto, Bakersfield, Monterey, Los Angeles, San Bernardino, El Centro, and San Diego) in January and February 2016. The workshops included discussion of freight system efficiency and zero emission technology targets, preliminary concepts for actions to help make progress toward meeting the targets, initial pilot project ideas, local perspectives on both progress to date, and regional priorities for California's freight transport system. Also in February, the State agencies hosted a public meeting of the California Freight Advisory Committee and a webinar to provide additional opportunities for public engagement.

To maintain improved relationships with tribal governments, Governor Brown issued Executive Order B-10-11 (September 2011), requiring that every State department and agency consult with Native American Tribes before taking action that would impact them. As part of the development process, the State agencies engaged the tribes through meetings of the Native American Advisory Committee in November 2015 and March 2016, as well as by convening three tribal listening sessions in March 2016.

Following the release of the draft Action Plan for public comment on May 3, 2016, State agency staff provided informational updates at public meetings of the California Freight Advisory Committee, California Transportation Commission, and ARB to solicit input. The State agencies also continued to meet with stakeholders to gather additional input and comments on the draft through July 6, 2016.

A broad range of stakeholders representing industry, regional and local government, and community and environmental groups submitted over 85 comments on the draft for consideration. Many of the comments submitted on the draft Action Plan fit into a few major themes, requesting: continued development work between the State and industry partners on data, metrics, and tools to help increase efficiency and competitiveness of the freight transport system; further commitment and prioritization by the State agencies to address localized community and health impacts in the State's infrastructure and regulatory programs; further clarification in the Action Plan on its role and relationship to existing State and regional plans, State funding activities, and regulatory development; as well as consideration of specific partnerships, technologies, and other concepts as the State agencies proceed to develop the identified State agency Actions and supporting implementation steps further. The Action Plan incorporates changes throughout the document and appendices to help address these comments and others, with key additions on:

- Next steps for convening and working with an industry stakeholder workgroup on a suite of metrics to support economic growth and competitiveness.
- Priorities for considering community concerns, with direction to avoid, reduce, or eliminate air toxic hot spots and adverse localized impacts of freight projects on surrounding communities.
- A new task to collaborate with stakeholders on developing a statewide, freight funding strategy to help support investments consistent with the long-term Vision and Guiding Principles presented in this document.
- Next step milestones and engagement opportunities to ensure continuity with our partners on Action Plan implementation.

All written comments received by the State agencies can be viewed at <http://www.casustainablefreight.org/>.

Following consideration of public comments, as well as Board and Commission direction received, State agency staff made appropriate changes and finalized the document. Moving forward, the State agencies expect to begin implementing the Action Plan over the next five years. Full implementation may extend over several decades as we evaluate and adapt to achieve the Targets and the Vision. Further refinement and implementation will be subject to additional public engagement.

1. Actions

The State agency Actions and implementation steps include data collection, research and analysis, planning, regulation, funding and incentives, advocacy, outreach, and coordination. To the extent feasible, the State agencies considered planning and development timelines, developed associated implementation steps, developed estimates of potential direct costs and benefits, and described impacted

sectors for these Actions in Appendix C. State agency staff will develop each proposal through the applicable public processes, including extensive stakeholder outreach and involvement, workshops, and economic and environmental assessments as appropriate. As the State agency actions identified in this Action Plan are further developed, State agency staff will update and adjust their proposals as necessary to ensure that they reflect any new information, additional analyses, new technologies or other factors that emerge during the process.

2. Pilot Projects

The State agencies will continue work on the pilot project concepts through research, outreach, and actions. For each pilot project concept identified in this Action Plan, the State agencies have identified a lead State agency to act as the liaison for the actions, funding, and progress of the project. The State agency leads for each pilot project concept will initiate research and discussions with potential partners to further define the scope and implementation milestones of the project concepts.

3. Discussion Concepts for Potential Future Action

Further implementation of the discussion concepts the State agencies have identified will depend on identification of private, academic, and other government agency partners. The State agencies will continue to discuss these concepts with potential partners as part of the processes to help further define actionable items.

As the State agencies move forward gathering additional information and developing the Actions, pilot projects, and other Action Plan concepts further, the concepts may change, be adjusted, or new concepts may be added. Implementation of the concepts will also be conditional based on the successful completion of applicable public processes, necessary financing approvals, technical analysis, and economic and environmental reviews. The State agencies anticipate the following implementation milestones.

- Late summer 2016: The State agencies will host meetings of both the competitiveness and efficiency stakeholder workgroups.
- September 2016: The State agencies will discuss Action Plan implementation at a meeting of the California Freight Advisory Committee, and anticipate providing additional periodic updates at future California Freight Advisory Committee meetings.
- By January 2017: The State agencies will work on actions to enact a freight transport funding package and distribute federal Fixing America's Surface Transportation Act funds dedicated to addressing key State and regional improvements to freight corridors in California.

- By January 2017: Initiate work to collaborate with industry, regional and local agencies, and others on developing a statewide funding strategy to help support investments in transportation assets and advanced vehicles and equipment consistent with the long-term Vision and Guiding Principles presented in this document.
- Early 2017: The State agencies will host a meeting of the sustainable freight think tank.
- By July 2017: The State agencies will establish work plans for the workgroups on competitiveness, system efficiency, workforce development, and regulatory and permitting process improvements. For pilot projects, the State agencies will prepare work plans for the three project concepts identifying scope, partners, timelines, and funding options.
- By July 2018: The State agencies anticipate providing a full progress report on Action Plan efforts.
- By 2019: The State agencies will evaluate the Action Plan Targets to determine if adjustments are needed.
- By 2019: Statute requires Caltrans to have completed an update of the 2014 *California Freight Mobility Plan*.

Moving forward, the State agencies will also develop ad hoc groups and hold additional stakeholder meetings as necessary to discuss other issues that develop during the Action Plan implementation process.