STATE OF CALIFORNIA
CALIFORNIA AIR RESOURCES BOARD

PUBLIC HEARING TO CONSIDER THE PROPOSED ZERO-EMISSION AIRPORT SHUTTLE REGULATION

STAFF REPORT: INITIAL STATEMENT OF REASONS

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AB	Assembly Bill
AIP	Airport Improvement Program
APS	Air Pollution Specialist
AQMP	Air Quality Management Plan
ARFVTP	Alternative and Renewable Fuel and Vehicle Technology Program
BAU	Business-As-Usual
Board	Board of Directors, California Air Resources Board
BUR	Hollywood Burbank Airport
CAC	California Airports Council
CA DOT	California Department of Transportation
CalETC	California Electric Transportation Coalition
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
CoEZET	Center of Excellence in Zero-Emission Technology
CPUC	California Public Utility Commission
CSE	Center for Sustainable Energy
DAC	Disadvantaged Community
DGE	Diesel Gallon Equivalent
DMV	Department of Motor Vehicles
DOE	United States Department of Energy
DOF	Department of Finance
DPEB	Diesel Programs Enforcement Branch, Enforcement Division, California Air Resources Board
EA	Environmental Analysis
ED	Enforcement Division, California Air Resources Board
EER	Energy Efficiency Ratio
EIA	Energy Information Administration
EMFAC	California Mobile Source Emissions Model
EO	Executive Officer, California Air Resources Board
EVSE	Electric Vehicle Supply Equipment
FAA	Federal Aviation Administration
FAST	Fixing America’s Surface Transportation
FBMSM	Facility Based Mobile Source Measure
FY	Fiscal Year
GDP	Gross Domestic Product

GGRF	Greenhouse Gas Reduction Fund
GHG	Greenhouse Gas
GPO	United States Government Publications Office
GSP	Gross State Product
GVWR	Gross Vehicle Weight Rating
H&SC	Health and Safety Code
HC	Hydrocarbons
HVAC	Heat, Ventilation, and Air Conditioning
HVIP	Hybrid and Zero-Emission Truck and Bus Voucher
ICT	Innovative Clean Transit
ISOR	Initial Statement of Reasons
kWh	Kilowatt Hour
LAX	Los Angeles International Airport
LCFS	Low Carbon Fuel Standard
LHD1	Light Heavy-duty Vehicles with GVWR 8,501 – 10,000 lbs
LHD2	Light Heavy-duty Vehicles with GVWR 10,001 – 14,000 lbs
MMT	Million Metric Tons
MOU	Memorandum of Understanding
Moyer Program	Carl Moyer Memorial Air Quality Standards Attainment Program
MSCD	Mobile Source Control Division, California Air Resources Board
NAAQS	National Ambient Air Quality Standards
NOP	Notice of Preparation
NOx	Oxides of Nitrogen
O&M	Operating and Maintenance
OAK	Oakland International Airport
OEHHA	California Office of Environmental Health Hazard Assessment
ONT	Ontario International Airport
PAH	Polycyclic Aromatic Hydrocarbons
PFC	Passenger Facility Charges
PG&E	Pacific Gas and Electric
PM	Particulate Matter
PY	Personnel Year
RD	Renewable Diesel
REMI	Regional Economics Models, Inc.
RFS	Renewable Fuel Standard
RNG	Renewable Natural Gas
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric
SFO	San Francisco International Airport

SGIP	Self-Generation Incentive Program
SJVAPCD	San Joaquin Valley Air Pollution Control District
SULEV	Super Ultra-Low Emission Vehicles
SIP	State Implementation Plan
T6	Heavy-duty vehicles with GVWR 14,000 – 33,000 lbs
TAC	Toxic Air Contaminants
TCO	Total Cost of Ownership
TNC	Transportation Network Companies
TRUCRS	Truck Regulation Upload, Compliance, and Reporting System
UFPM	Ultrafine Particulate Matter
ULEV	Ultra-Low Emission Vehicles
US EPA	United States Environmental Protection Agency
VALE	Voluntary Airport Low Emissions
VIN	Vehicle Identification Number
VMT	Vehicle Miles Travelled
VW	Volkswagen
WTW	Well-to-Wheel
ZEAS	Zero-Emission Airport Shuttle
ZEB	Zero-Emission Bus
ZEPCert	Zero-Emission Powertrain Certification Regulation
ZEV	Zero-Emission Vehicle

EXECUTIVE SUMMARY

The California Air Resources Board (CARB or Board) is responsible for protecting the public from the harmful effects of air pollution and developing programs and actions to fight climate change. Meeting these public health goals necessitates the transition from internal combustion engines in both light and heavy-duty applications toward zero-emission vehicle (ZEV) technology. The proposed Zero-Emission Airport Shuttle regulation would mandate the use of ZEV technology in a specific heavy-duty vehicle sector that is ideally suited for the technology. The proposed regulation would accelerate the adoption of ZEV technology in airport shuttles and transition these fleets to full ZEV adoption by 2035. The State Implementation Plan (SIP), California's roadmap toward achieving federal health-based standards, identified zero-emission technology measures for this sector. This proposal would virtually eliminate tailpipe emissions from airport shuttles operating at and around California airports, thus improving the air quality in impacted communities both regionally and throughout the State. As part of a comprehensive suite of measures tasked to meet our air quality and climate goals, the proposed regulation is well-positioned to act as a mechanism for increasing adoption of zero-emission technology in a compatible market sector. This acceleration of the use of zero-emission technology is necessary to provide cleaner air for all Californians while slowing down the effects of climate change.

Background

California has a vast network of airports, serving both urban and rural communities, which provide a variety of essential functions critical to California's economy. Eleven of the North America's top 100 passenger airports are located in California, with Los Angeles International Airport and San Francisco International Airport ranking number two and seven, respectively, in terms of annual commercial airline passenger traffic. This level of activity brings commensurate emissions. Reducing emissions of criteria pollutants, toxic air contaminants, and greenhouse gases (GHG) from all sectors, including the aviation sector, will support CARB's mission to meet federal health based National Ambient Air Quality Standards (NAAQS) and California's climate change abatement goals.

In 2016, the California legislature passed and California's Governor Brown Jr. signed, Senate Bill 32, which requires CARB to ensure that California's GHG emissions are reduced to at least 40 percent below the 1990 GHG level, by 2030. In addition, California's SIP strategy calls for aggressive on-road strategies to help achieve necessary emission reductions. Zero emission technology is the pathway to accomplishing these goals and calling upon transit buses, delivery trucks, and airport shuttles to deploy ZEVs is an important part of the blueprint to a greater zero-emissions future. The airport shuttle category is especially suited to employ zero emission technology and thus integrate seamlessly with an emerging market. The proposed regulation is structured to expand current ZEV technology to complete marketplace ZEV adoption.

Currently, almost 1,000 public and private airport shuttles operate in California, transporting travelers to parking lots, rental car offices, hotels, and other destinations at California's 13 largest airports. The shuttles themselves consist of vans, cutaways, and transit style buses and are owned either by local government agencies or by private businesses, such as independent off-airport parking lots and hotels. The majority of airport shuttles currently use gasoline and compressed natural gas, although some use electric, propane, and diesel.

Shuttle operators have already recognized that ZEVs can be a good fit for their operations. Currently over 110 zero-emission airport shuttles are in-use or are on order, including 33 in operation at Wally Park, a private off-airport parking business serving the Los Angeles International Airport that became the first all-electric airport shuttle fleet in the nation. These fleet owners utilized incentive funds to offset the incremental cost of the battery electric shuttles and are seeing operational benefits of reduced fueling and maintenance costs.

Regulatory Proposal

CARB staff worked extensively with stakeholders over the last two years conducting several public meetings to develop this proposal in a way that provides necessary air quality and climate change improvements while working with the industry's normal vehicle turnover rate. Staff's proposal to require ZEV operation by private and public airport shuttle fleet owners that service the 13 largest California airports would ensure successful adoption of ZEV technology, provide opportunity to compete for incentive funding, and provide the requisite time needed to develop supporting infrastructure. The proposal has three major components:

1. Annual reporting requirement, starting in 2022
    - Beginning January 1, 2022, airport shuttle fleet owners must electronically report fleet information to CARB no later than March 1, 2022 and maintain records for at least 36 months from the date of submission to CARB.

2. Zero-Emission Certification requirements
    - For 2026 and latermodel years, heavy-duty zero-emission airport shuttles will be required to certify to the proposed Enhanced Zero-Emission Powertrain Certification requirements to be compliant with this regulation.

3. In-Use Fleet composition requirement with three compliance deadlines:
    - At least 33 percent of the fleet must be ZEVs by December 31, 2027;
    - At least 66 percent of the fleet must be ZEVs by December 31, 2031; and
    - 100 percent by December 31, 2035.

The proposed compliance benchmarks are designed to provide flexibility throughout the transition period, especially in earlier years, in acknowledgement of comments received regarding access to publicly available incentive funding opportunities. The phase-in

approach allows for continued use of funding and the proposal includes a no-backsliding provision to ensure continued progress as well as exemptions and extensions in order to ease the complete transformation to ZEVs.

Major portions of California are not in attainment with the federal ozone 8-hour standards, including areas around commercial airports. Adoption of the proposed regulation will provide cleaner air for all Californians, especially in areas surrounding airports that include disadvantaged and low-income communities, while slowing down the effects of climate change. The proposed regulation also provides a level of certainty to the industry that a market for zero-emission technology will remain in this sector. Replacing combustion vehicles with electric vehicles will contribute to overall reductions of oxides of nitrogen (NOx) and GHG emissions. The proposal will assist in attaining air quality standards, reducing health risks to individuals living in California, and meeting GHG reduction goals.

Environmental and Economic Analysis

The proposed regulation is expected to cumulatively reduce GHG emissions, relative to current conditions, by 500,000 metric tons of carbon dioxide equivalent (CO_2e) from 2017 – 2040. During the same time-period the proposal would reduce the tailpipe emissions of NOx by 138 tons and particulate matter (PM) by 2.5 tons. By 2040, the proposed regulation is expected to have a beneficial economic impact of $30 million, primarily due to lower fuel and maintenance costs.

While the proposed regulation would have a direct cost impact on airport shuttle fleet owners in the early years with a payback period of eight years, staff's cost analyses also show that operating costs, as well as maintenance and fuel costs, are beneficial when compared with combustion vehicles. Furthermore, staff specifically structured the proposal to include a voluntary early action period to facilitate the use of funding incentives to help mitigate the up-front capital costs.

CARB, as the lead agency for the proposed regulation, has prepared a draft environmental analysis (Draft EA), which analyzes the proposed regulation in accordance with the requirements of its regulatory program certified by the Secretary of Natural Resources (California Code of Regulation, title 17, sections 60006-60008; California Code of Regulation, title 14, section 15251, subdivision (d)). The Draft EA assesses the potential for significant adverse and beneficial environmental impacts associated with the proposed actions and provides a programmatic environmental analysis of the reasonably foreseeable compliance responses that could result from implementation of the proposed regulations.

The Draft EA concluded that implementation of the proposed regulation could result in the following short-term and long-term beneficial and adverse impacts: beneficial impacts to energy demand and GHG emissions; less than significant impacts, or no impacts, to long-term air quality, energy, hazards and hazardous materials, hydrology and water quality, mineral resources, noise, population, employment, housing, public

service, recreation, transportation and traffic; and potentially significant adverse impacts to aesthetics, agricultural and forest resources, short-term air quality, biological resources, cultural resources, geology and soil, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, transportation and traffic, and utilities and service systems. The potentially significant and unavoidable adverse impacts are primarily related to short-term, construction-related activities. This explains why some resource areas are identified above as having both less-than-significant impacts and potentially significant impacts. Please refer to the Draft EA for further details.

In addition, the proposed regulation provides benefits from the avoided tailpipe emissions such as improvements to public health and worker safety while also providing toxic emission reductions in disadvantaged communities located near airports. Deployment of ZEVs will also:

- Reduce the reliance on petroleum fuel;
- Provide decreased energy use because of the superior equivalent fuel efficiency;
- Deliver technology transfer of drivetrains, fueling charging systems, workforce training, and operations and maintenance expertise; and
- Support job creation in California from the manufacturing of ZEVs and the installation of fueling infrastructure.

The reductions achieved by staff's proposal will contribute to the reduction of cumulative risk of mortality and morbidity attributable to mobile source emissions in the state. The majority of these health benefits will occur within the four air basins projected to experience nearly all of the emission reductions: South Coast, Bay Area, San Diego, and Sacramento Valley. The proposal will contribute to air quality improvement in low-income and disadvantaged communities, especially those in proximity to major airports.

Staff's Recommendation

Staff recommends that the Board approve the proposed regulation, as it will complement other CARB zero-emission measures to reduce criteria pollutants, GHGs, and other harmful exhaust emissions. The proposed regulation is an opportunity to deploy this evolving technology in a sector for which it is ideally suited, both economically and technologically.

I. INTRODUCTION AND BACKGROUND

A. Introduction

This chapter provides a brief rationale for the adoption of the Zero-Emission Airport Shuttle Regulation, background of other regulations that may apply to airport shuttles, background on airport shuttles used at California commercial airports, an overview of the proposed regulation, a summary of the public process, and funding opportunities.

This regulatory effort, working in concert with other heavy-duty regulations, will continue to improve air quality and reduce the emissions that contribute to climate change. The proposed regulation is a new measure that focuses on a long-term goal of transforming existing in-use airport shuttles from internal combustion engine technologies to electric drivetrain, zero-emission shuttle technologies. Airport shuttles that burn fossil fuels emit criteria pollution and greenhouse gases (GHG) which contribute to adverse health and climate impacts.

Airport shuttles have been identified as an application well-suited for commercially available electric drivetrain shuttle technologies, as they currently exist. Lessons learned from operating battery electric airport shuttles will help drive improvements in zero-emission technology to other sectors. Airport shuttle fleets operating at Ontario International Airport and serving Los Angeles International Airport currently utilize battery electric shuttles, providing early demonstration of both the technical and economic viability for these applications. This transition from combustion engines to electric drivetrain technology will simultaneously decrease the emission of air pollutants, including criteria, toxic and GHG emissions, and increase the use of commercially available zero-emission technologies. The proposed regulation is among the first measures requiring the transition of medium- and heavy-duty vehicles to electric drivetrain technologies, which will increase the demand for the technology. CARB staff is also currently evaluating new regulatory action to move other fleets to ZEVs including rental cars, large employers, delivery vehicles, as well as transportation service fleets (Office of the Governor, 2018). Financial incentives are available that will reduce the economic impacts associated with the proposed regulation on the affected communities.

B. Need for Emission Reductions and Regulatory Authority

Mobile sources and their fuels contribute to over 80 percent of the smog forming oxides of nitrogen (NOx) emissions in the South Coast Air Basin and nearly 50 percent of statewide GHG emissions (CARB, 2016). Major portions of California are not in attainment with the federal 8-hour ozone standards, including population rich centers, such as the South Coast basin, San Diego basin, Bay Area basin, and parts of the Sacramento Valley. California's largest commercial airports are located within these densely populated areas. California requires reduction in NOx and GHG emissions, in order to attain National Ambient Air Quality Standards (NAAQS), reduce individual health risk, and meet climate change goals. Shuttles that serve California's commercial airports are among the first medium- and heavy-duty applications that are able to

transition to the cleanest technologies available because they have already been proven to be technically viable options to combustion powered engines. Lessons learned from operating these zero-emission vehicles will be transferred to other zero-emission applications.

Climate change is one of the most serious threats facing the world today. California is experiencing the effects of climate change and is committed to taking action. In 2016, to further the goals of Assembly Bill 32 (AB 32, 2006), the Legislature enacted Senate Bill 32 (SB 32, 2016) which requires CARB to ensure that California's statewide GHG emissions are reduced to at least 40 percent below 1990 levels by 2030. Additionally, the 2016 Zero Emission Vehicle Action Plan, a roadmap toward 1.5 million ZEVs on California roadways by 2025 directs CARB to consider incentive and regulatory efforts that will increase the number of airport shuttles on the road (Office of the Governor, 2016).

CARB has the authority to regulate mobile sources and to adopt motor vehicle standards and measures to attain ambient air quality standards and climate change requirements and goals. Furthermore, CARB is tasked with developing the State Implementation Plan, California's road map toward achieving the NAAQS. Additional NOx and GHG emissions reductions are needed from the transportation sector in order to attain the NAAQS, reduce individual health risk, and meet climate change goals while promoting the transportation sector's transition to ZEV technology. Shuttles that serve California's commercial airports are among the first that will be required to transition to the cleanest technologies available.

C. Other Regulatory Programs

CARB has developed and implemented a comprehensive regulatory program to reduce emissions that contribute to climate change and smog from on-road heavy-duty engines. These efforts include in-use fleet rules and new engine performance standards for cleaner combustion technologies. Despite these efforts, more measures are needed to achieve additional reductions to meet the new health-based standards and combat climate change.

1. CARB In-Use Fleet Requirements

The proposed regulation builds upon two other CARB in-use regulations that reduced diesel PM and NOx by restricting the use of pre-2010 model year engines in diesel-fueled vehicles weighing more than 14,000 pounds Gross Vehicle Weight Rating (GVWR). If an airport shuttle uses diesel fuel, and is greater than 14,000 pounds GVWR, then it must comply with one of the following state regulations:

- Private entities must comply with the Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen, and Other Criteria Pollutants from In-Use Heavy-Duty Diesel-Fueled Vehicles (CARB, 2014).

- Public agency fleets must comply with California's Diesel Particulate Matter Control Measure for Municipality or Utility On-road Heavy-Duty Diesel Fueled Vehicles (CARB, 2009)

These efforts will soon be reaching full implementation and California's State Implementation Plan (SIP) strategy has demonstrated that additional efforts are needed to reduce NOx. The proposed regulation would achieve additional emission reductions by removing all tailpipe emissions from airport shuttles, currently fueled by gasoline, propane, CNG and diesel fuel, that weigh 8,501 pounds GVWR or more.

2. CARB Certification Procedures

In addition to the in-use fleet rules, CARB has developed certification processes to ensure vehicles meet applicable emission standards throughout their useful life. A rigorous certification process has been the foundation of CARB's emission standards. For the nascent zero-emission technology, excessive or premature deterioration of the emission control system is not a concern. However, other factors become more important. Transparency about system capabilities, warranty, and recall provisions are all critically important protections for the consumer. This is especially true when in-use regulations are requiring their use, as is the case with the proposed regulation. The current certification process for ZEVs used in the airport shuttle sector are in the process of being revised.

CARB conducted separate rulemakings to consider the Proposed California Greenhouse Gas Emissions Standards for Medium- and Heavy-Duty Engines and Vehicles and the Proposed Amendments to the Tractor-Trailer GHG Regulation (CARB, 2018) and the Proposed Alternative Certification Requirements and Test Procedure for Heavy-Duty Electric and Fuel-Cell Vehicles and Proposed Standards and Test Procedures for Zero-Emission Powertrains (CARB, 2018a). These rulemakings were noticed but are not effective because they have not been approved by Office of Administrative Law and filed with the Secretary of State. The federal Phase 2 standards are primarily a package of CO2 standards intended to reduce CO2 and improve fuel economy for medium- and heavy-duty engines and vehicles. It included the first ever U.S. standards for trailer manufacturers to make more efficient trailers. CARB's proposal generally align with the federal Phase 2 GHG regulation with respect to stringency, structure, and timing. The minor differences from the federal Phase 2 GHG regulation would help align with current California requirements and preserve the benefits of California incentive programs.

The proposed Zero-Emission Powertrain Certification Regulation (ZEPCert) would establish new, alternative certification procedures for heavy-duty electric and fuel-cell vehicles, and the zero-emission powertrains they use, to support future zero-emission measures by helping ensure fleet purchasers are provided with consistent and reliable information about zero-emission technology and the vehicles that use it and that heavy-duty electric and fuel-cell vehicles are well supported once deployed.

ZEPCert will help ensure that zero-emission powertrains, along with the heavy-duty vehicles they are designed for, are reliable in their intended applications. The measure is expected to help drive technology innovation and refinement, empower fleet decision-making by increasing consumer confidence in the technology, and provide data to inform future measures that accelerate the overall transition to the zero-emission technologies California needs to meet its long-term air quality and climate goals. Heavy-duty zero-emission airport shuttles with a GVWR of 14,001 pounds and greater, starting with model year 2026 and later will be required to meet ZEPCert requirements to comply with the proposed regulation.

3. Low Carbon Fuel Standard (LCFS) Regulation

Finally, CARB has managed the carbon intensity of fuels since the 2009 adoption of the Low Carbon Fuel Standard (LCFS) regulation (CARB, 2015). The LCFS program uses life cycle assessment to examine the GHG emissions associated with the production, distribution, and end-use of all transportation fuels in California. The carbon intensity scores assessed in the LCFS to each fuel are compared to the declining carbon intensity benchmark for each year. Low carbon fuels below the benchmark generate credits. Fuels above the carbon intensity benchmark generate deficits. Each year, a supplier of fuel must match all deficits. Credits may be generated from the production of ethanol, renewable diesel, biodiesel, biomethane, electricity, and hydrogen. Airport shuttles using these fuels may generate credits. The funding opportunities resulting from airport shuttle fleets deploying ZEVs is covered in Section G of this Chapter and in Chapter VIII. Economic Impact Assessment.

4. South Coast Air Quality Management District (SCAQMD) Rule 1194

Although no other federal or state regulations are applicable to airport shuttles, several southern California policies may apply to these vehicles. Specifically, the South Coast Air Quality Management District (SCAQMD) rule 1194 (SCAQMD, 2000) requirement to buy cleaner burning vehicles. This rule requires light-duty and heavy-duty fleets of 15 or more vehicles to acquire cleaner burning or alternative-fueled vehicles when adding or replacing a vehicle in a fleet that provides passenger pickup service at the following six airports:

1. Hollywood Burbank (BUR)
2. John Wayne, Orange County (SNA)
3. Los Angeles International (LAX)
4. Long Beach (LGB)
5. Ontario International (ONT)
6. Palm Springs (PSP)

This rule applies to private fleets under contract by an airport entity, and to all state and local public fleets. New vehicles must be certified by CARB as ultra-low emission vehicles (ULEVs), super ultra-low emission vehicles (SULEVs), or ZEVs.

5. Los Angeles World Airport (LAWA) Alternative Fuel Vehicle Requirement (AFV)

Airport shuttle operation at LAX must comply with the Alternative Fuel Vehicle Requirement (AFV) Program (LAWA, 2017). This policy applies to all heavy-duty vehicles weighing 8,500 pounds GVWR or more, requires alternative-fuel vehicles to be in use by April 30, 2019, and requires vehicles be equipped with engines less than 13 years old, or with fewer than 500,000 miles.

Although all airport shuttles that operate at LAX must also meet the AFV policy and SCAQMD rule 1194, the proposed regulation builds upon these cleaner vehicles efforts by requiring ZEV operation.

6. SCAQMD Facility-Based Mobile Source Measures (FBMSMs)

An additional effort underway by SCAQMD will impact airports but not directly impact airport shuttles. The 2016 Air Quality Management Plan (AQMP) adopted by the SCAQMD Board in March 2017 included District-proposed Facility-Based Mobile Source Measures (FBMSMs) to assist in implementing the SIP strategy "Further Deployment of Clean Technologies" measures. These measures cover indirect sources including commercial airports, marine ports, warehouse distribution centers, railyards and intermodal facilities, and new development and redevelopment projects. In May 2018, the SCAQMD Board approved staff-recommended approaches to implement these FBMSMs, including a voluntary approach for commercial airports in lieu of an indirect source rule. Under this voluntary approach, SCAQMD would enter into separate Memorandum of Understandings (MOUs) with each of the Basin's five commercial airports, including LAX, SNA, ONT, BUR, and LGB. The MOUs will be based on the Clean Air Action Plans to be developed by each airport, which would include specific strategies to reduce emissions from non-aircraft airport sources (e.g., ground support equipment, passenger and cargo transportation vehicles). The airport MOUs are anticipated to be finalized and approved in late 2019.

Despite these efforts, more measures are needed to achieve additional reductions to meet the new health-based standards and combat climate change. These efforts will soon be reaching full implementation and California's SIP strategy has demonstrated that additional efforts are needed to reduce NOx. The proposed regulation would achieve additional emission reductions by removing all tailpipe emissions from airport shuttles, currently fueled by gasoline, propane, CNG and diesel fuel, that weigh 8,501 pounds GVWR or more.

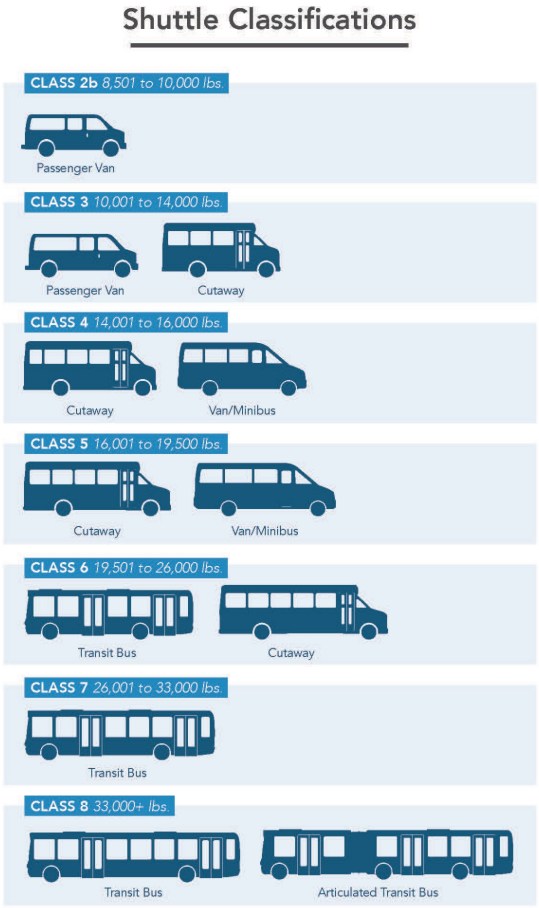
D. Background on Airport Shuttles

California is a leader in aviation-related economic activity, with 26 commercial aviation airports and 217 general aviation airports. The annual economic impact of aviation in California is close to $170 billion (Aviation Caucus, 2015). Over 200 million passengers

and 4.8 million tons of air cargo traveled through California's commercial airports in 2017 (CA-DOT, 2018).

Airport shuttles provide transportation for airport travelers to and from airports and within airports. These short trips are repeated throughout the day, contributing to localized pollution near airports. Airport shuttles include the full spectrum of vehicle sizes, from medium-duty to heavy heavy-duty and the vehicle types include vans, cutaways, and buses. Changes in how people travel are also impacting the airport shuttle sector. Declining vehicle ownership, increased public transportation connectivity, and the introduction of car sharing programs and mobile phone application-based transportation companies (Uber or Lyft) or transportation network companies (TNCs) have decreased airport shuttle activity while increased air travel has increased airport shuttle activity. The popularity of TNCs has resulted in more passengers traveling to airports in light-duty vehicles instead of airport shuttles. This mode shift to TNCs has the potential to increase pollution from the transportation sector. To address this concern the California Legislature recently passed and California's Governor Brown, Jr. signed Senate Bill 1014 Chapter 369, Statutes of 2018 (SB 1014, 2017), will require the TNC sector to reduce greenhouse gasses and transition to ZEVs.

Figure I-1: Vehicle Classifications



As shown in Figure I-1, commercial vehicles are classified according to their gross vehicle weight rating, or GVWR. Medium-duty vehicles include classes 1 through 3, ranging up to 14,000 pounds. Airport shuttles can be found in the medium-duty range, starting with class 2b, which has a GVWR of 8,501 pounds. Light heavy-duty vehicles range from class 4 to class 5, or 14,001 to 19,500 pounds GVWR. These vehicles encompass the majority of the airport shuttles operated by the off-airport entities and hotels. Medium heavy-duty vehicles include the class 6 and class 7 vehicles, ranging from 19,501 pounds to 33,000 pounds GVWR. Heavy heavy-duty vehicles are class 8 vehicles, which are 33,001 pounds and beyond.

Airport shuttles are currently fueled by gasoline, propane, CNG, diesel and electric batteries. CNG is the most popular fuel with 74 percent of airport fleets and 45 percent of the off-airport fleets using it. Diesel and biodiesel represent nine percent of the

airport fleets and 33 percent of the off-airport fleets. Almost 20 percent of the off-airport vehicles are fueled by gasoline.

Airport shuttles have varied ownership structures. Some fleets are owned by public entities that operate at airports and others are owned by private entities. Table I-1 displays the businesses that serve California's large and medium hub airports. These fleets transport passengers to and from airport parking lots, rental car facilities, and airport terminals. Currently, four airport entities own and operate their own fleets and six airports contract some or all of their shuttle services. Two of the airports, San Diego International and Ontario International, contract with more than one service. Hollywood Burbank Airport is the only one that both owns and contracts airport shuttles.

Table I-1: California's Airport Shuttle Service that Transport Passengers between Airport Facilities

Airport Hub Type*	California Airports	Airport Shuttle Ownership		Estimated Number of Airport Shuttles
		Public	Private	
Large	Los Angeles International	1	0	79
	San Diego International	0	2	54
	San Francisco International	1	0	30
Medium	Hollywood Burbank	1	1	13
	Oakland International	0	1	15
	Ontario International	0	2	16
	John Wayne, Orange County	0	1	12
	Sacramento International	1	0	35
	Mineta San Jose International	0	1	10
	Total	4	8	264

**Small hub airports in California (Fresno Yosemite International, Long Beach, Palm Springs International and Santa Barbara) all have compact footprints with all of the facilities within walking distance, and hence do not currently provide airport shuttle service.*

Table I-2 summarizes the total number and types of off-airport private entities that provide airport shuttle service from nearby hotels, private parking lots, and other attractions. Currently, an estimated total of 169 private entities provide shuttle service

to airports. A few of these private entities are contracted by the airports shown in Table I-1. Staff estimates that 50 of the 169 businesses are small businesses. This estimate is derived from survey (CARB, 2017) results and research identifying the number of businesses providing service to and from airports. Further detail of this evaluation is provided in Chapter XII.

Table I-2: Private Airport Shuttle Services that Transport Passengers from Private Off-Airport Parking, Hotels, and other Destinations to California's Airports

Airport Hub Type	Statewide Private Entities				
	Off-Airport Parking	Hotel Courtesy	Other	Total	Estimated Number of Airport Shuttles
Large	33	71	3	107	472
Medium	17	38	0	55	200
Small	0	7	0	7	14
Total	50	116	3	169	686

Altogether, nearly 1,000 airport shuttles operate in California, providing service to 13 airports.

Almost all of the shuttles that transport passengers between airport facilities consist of cutaways and buses. The three large hub airports utilize shuttles that are operated at about 45,000 miles per year, with a range of over 65,000 miles to less than 10,000 miles per year. The six medium hub airports operate shuttles at an average of 30,000 miles per year, with a range of 50,000 to 25,000 miles per year. The lower mileage routes were normally to facilities with consolidated rental car agencies.

Private entities that provide service to airports from private off-airport parking lots, hotels and other attractions typically utilize large vans and cutaways; cutaways are the most popular vehicle. This vehicle's annual operational average range is 30,000 to 70,000 miles per year with some routes over 100 miles, but most of the routes less than 15 miles.

E. Proposed Rule Concepts

The Revised Proposed 2016 State Strategies for the State Implementation Plan (CARB, 2017a) included several areas that are key to launching heavy-duty zero-emission technology in the on-road heavy-duty sector including transit buses, delivery trucks, and airport shuttles. These efforts, besides providing NOx, particulate matter (PM), toxic air contaminant (TAC), and GHG emission reductions needed to clean the air, will increase the first wave of heavy-duty ZEV deployment. Additionally, the experience gained by

operating these zero-emission vehicles will benefit other heavy-duty on-road markets and increase the commercialization, and acceptance, of clean transportation technologies in other applications. These on-road strategies will also contribute to the goal of 50 percent reduction in petroleum use in vehicles needed to help achieve the GHG reduction to 40 percent below 1990 levels by 2030 (CARB, 2016a).

In order to achieve these large emission reductions while also promoting energy diversity, CARB staff identified sectors where “near-zero” and zero-emission technology was commercially available. These efforts, including the Sustainable Freight planning document (CARB, 2015a), solidified the strategy of using zero-emission technology where available, and “near-zero” everywhere else, to meet California’s long-term air quality goals.

Specifically, the Medium- and Heavy- Duty Battery Electric Trucks and Buses Technology Assessments (CARB, 2015b) identified airport shuttles buses as readily suited for battery electric operation. Airport shuttles operation characteristics (i.e., fixed short routes, stop- and go- operation, and low average speeds) are an optimal match to current battery electric vehicle technology, making this category of vehicles a logical initiation point for heavy-duty ZEV implementation from which the technology can expand to the larger population of buses and trucks.

Greater deployment of zero-emission airport shuttles will decrease emissions from the transportation sector while promoting energy diversity. The adoption of the proposed regulation will remove harmful tailpipe emissions from airport shuttles, providing cleaner air for airport travelers that include sensitive receptors (children and the elderly), and communities surrounding airports, as well as reducing fleet operators’ occupational exposure. Operation of zero-emission shuttles requires no use of petroleum fuels and will help California achieve the state’s GHG reduction goals. GHG emission reductions result from the avoided fuel combustion and from the mining and refining processes. GHG emissions can remain in the atmosphere for decades and removal of these emissions will reduce the impacts of climate change on the state’s environment.

Through this rulemaking, staff is proposing to require ZEV operation by private and public airport shuttle fleets to provide criteria pollutant, GHGs, and other harmful exhaust emission reductions as detailed in Chapter V. The transition to a zero-emission transportation future has the additional benefits of spurring economic growth and energy independence.

The proposal’s in-use fleet compliance schedule provides a voluntary and early action period to provide fleets the opportunity to utilize incentive funding, spur manufacturer production of ZEVs, and plan for necessary infrastructure improvements. The fleet annual reporting requirements will start in 2022.

Starting in 2023, fleets that have ZEV shuttles in their fleet cannot replace them with internal combustion vehicles. This no-backsliding provision will ensure progress towards the first in-use fleet ZEV composition requirement of 2027, while providing

regulatory flexibility so fleets can access public incentive funds. Heavy-duty ZEVs (GVWR of 14,001 pounds and greater), starting with model year 2026 and later will need to meet ZEPCert requirements to be certified for sale in California. Starting in 2027, three in-use fleet average compliance milestones will guide fleets toward a 100 percent ZEV fleet by 2035. The 2035 endpoint will allow time for the development of zero-emissions infrastructure, including hydrogen fueling stations and battery electric charging stations. The staged in-use fleet compliance percentage requirements will allow fleets the ability to use existing vehicles for their full useful life.

These components of the proposed regulation work together to establish fair and equitable requirements for all airport shuttle fleets resulting in air quality and climate change benefits from the on-road heavy-duty sector. The proposal also includes exemptions and extensions that would further support a safe and reliable transition to ZEV technology. These allowances address potential concerns regarding the ability to provide requisite space and the potential need for reserve vehicles for use during peak service and the result of unforeseen circumstances.

This proposed phase-in schedule starts after an early action period that allows fleets the opportunity to utilize incentive and cost-sharing opportunities while providing necessary infrastructure. In the last few years, battery chemistry breakthroughs have resulted in increasing miles traveled on a single charge and decreases in the amount of time needed to charge, as well as cost. Technology improvements will continue to decrease the cost of generating hydrogen fuel needed to power fuel cell electric vehicles. Economies of scales will continue to drive down the cost of both fuel cell and battery electric vehicles and the necessary supporting fueling infrastructure. As the ZEV market continues to mature, more platforms and vehicle choices will be available for every shuttle vehicle type. The early action period and gradual phase-in schedule will allow fleets to offset the initial cost with incentives while the zero-emission market is continuing to develop.

The reporting, record retention, and enforcement sections of the proposed regulation work together to allow CARB to audit a fleet and verify that the information reported is accurate and to verify that real and permanent emission reductions are occurring. The major components of the proposed regulation are discussed in detail in Chapter IX.

This effort, along with the proposed ZEPCert, and other light- and heavy-duty efforts will provide a clear market signal to manufacturers that light- and heavy-duty ZEVs are necessary to transform the transportation sector. This effort will help increase consumer acceptance and facilitate the adoption of these new technologies by requiring certification and testing procedures for zero-emission powertrains, as well as a certification process for performance durability.

Adoption of the proposed regulation will fulfill CARB commitments contained in the 2016 State Strategies for the State Implementation Plan and contribute toward AB 32 and SB 32 statewide GHG emission reductions needed in 2030 and 2050.

F. Summary of Public Process

The proposed regulation is informed by input received at two public workshops and three public workgroup meetings. Staff also conducted two informative meetings focused on private businesses potentially impacted by staff's proposal. In addition, staff encouraged the public to provide feedback after the meetings via phone calls, emails and formal letters. In order to develop staff's analysis and evaluation of current fleets, staff designed and conducted surveys of both airport and off-airport entities that transport passengers to and from airports. A comprehensive summary of all the stakeholder outreach activities is included in Chapter XI and Appendix E, which contains CARB public notifications.

G. Funding Opportunities

The upfront capital costs of ZEVs and related infrastructure have been identified as hurdles to the widespread adoption of ZEVs. Although the implementation of ZEV technology is expected to be economically favorable in the long-term due to fuel and maintenance savings, transforming in-use airport shuttles from an internal combustion to electric vehicle platform will require public and private investment.

Incentives can play an important part in overcoming these hurdles and facilitating a successful launch of zero-emission technologies. Staff's proposal is designed to provide time and opportunity for fleets to access funding. The compliance schedule would allow fleets that achieve ZEV milestones early to have continued funding opportunity throughout virtually the entire transition period.

Many cost-sharing opportunities that airports and private businesses can utilize are described in Table I-3. It must be noted that many of these programs are competitive and some fund a variety of projects other than airport shuttles.

Table I-3: Cost Sharing Opportunities for Zero-Emission Airport Shuttle Projects

Program (Dollars in millions)	Vehicle	Infrastructure	Other
FAA Annual Grants ~$33.6 M federal FY 2016-17			
Voluntary Airport Low Emissions (VALE)	75% or more of incremental vehicle cost and up to 75% of the associated infrastructure		-
Zero-Emission Vehicle (ZEV) and Infrastructure Pilot	50% of the cost of the ZEV and associated infrastructure.		-
CARB LCFS ~annual credits	-	-	Fleets earn up to $9,000
SB 350 Utility Make Ready Projects ~$1 billion	-	See specific electric utility program	Special rates charges
Carl Moyer Program ~$79 M State FY 2018-19 (annual funding)	50-80% of capital cost depending on fleet size	50% of hydrogen or charging stations	-
Community Air Protection (AB 617) Incentive Funds* ~$245 M State FY 2018-19	60-90% of capital cost depending on fleet size	60% or more of hydrogen or charging stations	
CARB Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) ~$125M State FY 2018-19	Up to $150,000, depending on shuttle size, technology, project location, and number of vehicles purchased	Up to $30,000	
Volkswagen Environmental Mitigation Trust ~130 M	Up to $160,000 of the capital cost and supportive infrastructure depending on ownership		
California Energy Commission's Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP) ~$100 million State FY 2018-19 (annual funding)	In development	In development	
California's Self-Generation Incentive Program (SGIP) ~$566 million		Incentives to cover installation of qualifying technologies installed to meet electric energy needs of a facility	

*Funding opportunities limited by Community Air Protection Program requirements

1. Federal Aviation Administration Grants

The Federal Aviation Administration (FAA) established the Airport Improvement Program (AIP), which provides funding for capital airport improvement projects and repairs related to capacity, security, and environmental protection including airport shuttle replacement projects. AIP funding is based on national priorities and objectives and is allocated from the Airport and Airway Trust Fund, which collects taxes from aviation fuel and passenger ticket sales in addition to other miscellaneous fees. Another source of funds come from Passenger Facility Charges (PFC) imposed on passengers by commercial airports to assist in funding airport improvements that enhance security, safety, capacity, airline competition, and noise reduction.

AIP grants cover 75 percent of eligible projects for large and medium hub airports and 90 percent for smaller general aviation and relief airports (FAA 2017). The FAA sponsors the Voluntary Airport Low Emission (VALE) program with the focus to reduce airport ground emission sources from voluntary efforts not required by regulations. VALE receives funding from both AIP and PFCs and is available to commercial airports situated in non-attainment areas as designated by the U.S. EPA. VALE grants pay for the incremental vehicle cost, meaning the cost difference from the traditional to cleaner vehicle cost and the associated infrastructure. For example, most airports in California operate CNG fueled airport shuttles. Grants are not available to replace an existing CNG with a new CNG vehicle that has the same emission profile; grants would be allowed for replacing a CNG shuttle with a ZEV.

The FAA Zero-Emission Vehicle and Infrastructure Pilot Program (FAA, 2017a) is another grant program funded by AIP and PFC that helps transition fleets to zero-emission technologies. The ZEV Pilot pays up to 50 percent of the total vehicle and infrastructure capital project.

Both FAA grant programs, in some cases, allow PFCs and state or local funding to complement FAA grant funding. The proposed regulation should allow airports to have access to funding opportunities to both programs. Professional fees associated with the implementation of improvement projects, such as planning and design, are also eligible to receive funding if a project grant is awarded. Airports must commit to operate the ZEV shuttles for a 10-year, or longer period. The VALE program requires funded projects to generate airport emission reduction credits and the utilization of these credits to mitigate air emission resulting from implementing the airport's capital improvement program. The proposed regulation contains a later starting date to allow fleets owners, including airports, to take advantage of available incentives including the FAA VALE and Zero-Emission Vehicle and Infrastructure Pilot Programs.

2. Low Carbon Fuel Standard

The LCFS program lowers the carbon intensity of transportation fuels in California via market-based mechanisms that also incentivize the use of renewable and low-carbon fuels. To isolate the effects of the LCFS, the program does not count GHG benefits that

are resultant from regulations and trends that influence carbon intensities of transportation fuels. According to the LCFS rule's staff report, regulations encourage the adoption of zero-emission vehicles and the generation of these valuable credits can assist that effort (CARB, 2018b), (CARB, 2017b). Fleet owners may opt into the LCFS program and earn credit values from the electricity and hydrogen transportation fuel provided to the zero-emission shuttles. These credit values will have a monetary value when sold to regulated parties who must offset deficits created by their supply of fuels with Carbon Indexing that exceed the LCFS standards. LCFS staff is currently updating the program and proposed changes are scheduled to be considered by the Board in 2018.

LCFS program staff have recently increased the energy efficiency ratio (EER) for heavy-duty battery electric vehicles weighing 14,001 pounds GVWR and more to 5.0 based on new data for battery electric trucks and buses. A fleet that operates a 40 foot battery electric shuttles will earn annual credits worth about $9,000. A recent change to the LCFS program allows credits to go directly to the hydrogen station owner instead of the fuel provider. If an airport would own a hydrogen station then the credits would go directly to the airport.

3. Senate Bill 350 Utility Investments in Transportation Electrification Projects

Senate Bill (SB) 350 Chapter 547, Statutes of 2015 (SB 350, 2015) provides additional opportunities for ZEVs. The California Public Utilities Commission (CPUC) is collaborating with CARB and the California Energy Commission (CEC) to implement requirements set forth by SB 350 to support widespread transportation electrification. The state's three large investor-owned utilities together have been authorized to make over $600 million worth of investment in medium- and heavy-duty infrastructure to support transportation electrification, which could offset most of the costs of making electrical service upgrades and installing charging infrastructure over a 5-year period (CPUC, 2017) (CPUC, 2018).

CPUC approved 16 priority review projects totaling $42 million and standard review projects from Southern California Edison for $554 million and Pacific Gas and Electric projects for $246 million. A proposal from San Diego Gas and Electric is currently before the CPUC and could receive a decision before the end of 2018 (CPUC, 2018a). In addition to utility provision of non-charger infrastructure, these projects will provide a rebate on charger and charger installation for transit buses and vehicles in disadvantaged communities in Pacific Gas & Electric Company (PG&E) and Southern California Edison (SCE) service areas. The programs will reduce the costs to eligible airport shuttle fleets in those utility service areas.

4. Carl Moyer Memorial Air Quality Standards Attainment Program

The Carl Moyer Program (Moyer) began in 1998 as CARB's first incentive program. This program complements CARB's regulatory efforts by providing early or extra ozone precursor and particulate matter emission reductions. It is budgeted at $79 million for State fiscal year 2018-19. The Moyer program will likely have a larger annual budget available in future years thanks to passage of AB 1274 Chapter 663, Statutes of 2017 (AB 1274), which extended the vehicle registration fees that fund the program. Moyer funding is administered by air districts under guidelines approved by CARB.

Moyer grant funding amounts for the conversion or replacement of shuttles are dependent on three factors, the cost-effectiveness of the project, the project funding cap, and the project grant amount cap. The lowest of these three factors will determine the shuttle project grant amount. Large fleets that consist of 10 or more vehicles may receive up to 50 percent of the vehicle capital cost, or $200,000, whichever is lower depending on weight class. Small fleets that consist of less than 10 vehicles have the same $200,000 cap but may receive up to 80 percent shuttle capital cost. A ZEV conversion or replacement project grant amount would be based on the $100,000 cost-effectiveness limit. Conversion projects are capped at $7,500 for a van conversion and up to $15,000 for a bus conversion. A shuttle project life factors into the grant amount and must be surplus to regulatory requirements. Moyer funding cannot fund projects that bring a fleet into regulatory compliance; the proposed regulation's purchase replacement requirement of 2023 will ensure surplus reductions and thus preserve the time that airport shuttle fleets would be eligible for Moyer grants. Airports that take advantage of the early action period are likely to increase their opportunity for funding as well as the actual grant amount.

The Moyer Program can also fund infrastructure projects (CARB, 2017c). Public and private airport shuttle fleets are eligible to receive infrastructure funding up to the 50 percent of the hydrogen station or the battery charging station. Eligible costs include design and engineering fees, cost of equipment, and the installation costs. Infrastructure projects unlike vehicle projects are not subject to a specified cost-effectiveness limit.

5. Community Air Protection (Assembly Bill 617) Incentive Funds

In 2017, Governor Brown signed into law AB 617 Chapter 136, Statute of 2017 (AB 617), which directed the CARB, in conjunction with local air quality management districts and air pollution control districts, to establish the Community Air Protection Program (CAP). CARB must establish community air monitoring plans for TACs and criteria pollutants, determine communities most affected by high cumulative exposure burden, and develop strategies to reduce emissions in those communities.

AB 134 Chapter 254 Statute of 2017 (AB 134, 2017) appropriates $250 million in Greenhouse Gas Reduction Funds (GGRF) to achieve early action emission reductions

in the communities most burdened by air pollution. Targeting engine replacement, repower, and infrastructure projects in disadvantaged and low income areas supports the goals of AB 617. These CAP funds, distributed through the air districts, are to be spent on projects under the Moyer Program with focus on mobile sources and infrastructure (Districts in designated trade corridors may opt to spend up to 40 percent of the funds on clean truck projects under the Proposition 1B Goods Movement Guidelines). An additional $245 million has been appropriated per SB 856, Budget Act of 2018 Chapter 30 Statute of 2018 (SB 856, 2018).

The local air districts engage in public outreach with disadvantaged communities and select projects based on recommendations from those communities. Staff believes airports' shuttle projects serving BUR, LAX, OAK, and ONT airports will provide emission reductions in disadvantaged and low-income areas.

CARB recently approved a CAP Supplement to the 2017 Moyer Program Guidelines with several specific revisions that will better allow CARB and the air districts to serve community needs and to support AB 617 (CARB, 2018c).

6. Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project

The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) is intended to accelerate the deployment of zero-emission trucks and buses, hybrid trucks and buses, and vehicles using engines that meet the optional low NOx standard (CARB, 2018d). HVIP provides vouchers of up to $150,000 per vehicle for zero emission shuttles. An additional $125 million has been allocated to the HVIP program per SB 856 for FY 2018-2019 (SB 856, 2018). As of November 16, 2018, $110 million from FY 2018-2019 is available on a first-come, first-served basis for all eligible technologies. Since HVIP's inception in FY 2009-2010, the program has paid for over 40 zero-emission airport shuttles from ten private entities.
As the incremental costs for Zero Emission Buses (ZEB) decline, the voucher amounts per ZEB are expected to decline over time. The Voucher amount depends on the GVWR of the shuttle, type of zero emission technology, and the location of the vehicle deployed. Tables 1-4 and 1-5 show the zero-emission shuttles and transit size fuel cell voucher amounts (CARB, 2018e). Additional voucher amounts of up to $30,000 per vehicle are eligible for related Electric Vehicle Supply Equipment costs. If a fleet purchases five or more fuel cell buses, they would then be eligible for the hydrogen fueling infrastructure voucher enhancement of up to $100,000 per bus.

Table I-4: Zero-Emission Shuttle Voucher Amounts

Shuttle GVWR (pounds)	Base Vehicle Incentive	
	1 to 100 vehicles	
	Outside Disadvantaged Community	In Disadvantaged Community
8,501 – 10,000	$25,000	$30,000
10,001 – 14,000	$50,000	$55,000
14,001 – 19,500	$80,000	$90,000
19,501 – 26,000	$90,000	$100,000
26,001 – 33,000	$120,000	$135,000
>33,000	$150,000	$165,000

Table I-5: Zero-Emission Fuel Cell Bus Voucher Amounts

Bus Length and Bus Type	Base Vehicle Incentive	
	1 to 100 vehicles	
	Outside Disadvantaged Community	In Disadvantaged Community
≥ 40 ft. Hydrogen Fuel Cell Electric Bus	$300,000	$315,000

7. The Volkswagen Environmental Mitigation Trust

The Volkswagen Environmental Mitigation Trust provides California approximately $423 million to fund specified eligible actions to mitigate the lifetime excess NOx emissions caused by Volkswagen's emissions test defeat device (CARB, 2018f). As the lead agency, CARB has developed a Beneficiary Mitigation Plan with public input that describes how California's Trust allocation will be spent. The plan will allocate $130 million for zero-emission transit, school, and shuttle replacements vehicle Class 4-8, with at least 50 percent of the allocation expected to benefit disadvantaged or low-income communities (CARB, 2018f). Staff anticipates program implementation to start in late 2018 or early 2019.

8. Alternative and Renewable Fuel and Vehicle Technology Program

AB 118 Chapter 750 Statute of 2007, (AB 118, 2007) created the CEC's Alternative and Renewable Fuel and Vehicle Technology Program (ARFVTP). The statute,

subsequently amended by AB 109 Chapter 313 Statute of 2008 (AB 109, 2008) and AB 8 Chapter 401 Statute of 2013 (AB 8, 2013), authorizes the CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies. The CEC has an annual program budget of approximately $100 million to support projects. Funding priorities for the ARFVTP are outlined in an annual *Investment Plan Update* that is developed with input from subject matter experts, stakeholders, and the public. Funding is disbursed primarily through competitive grant solicitations for fuel production, vehicle demonstration, and infrastructure deployment projects.

9. Self-Generation Incentive Program

AB 970 requires the CPUC to initiate load control and distributed generation activities. In compliance with AB 970, the CPUC decision-D 01-03-073 established the Self-Generation Incentive Program (SGIP) (CPUC, 2001). This program offers rebates to customers to offset costs incurred in installation of clean and energy-efficient on-site electricity generation and storage technologies. SB 861 authorized PG&E, SCE, Southern California Gas Company (SCG), and the Center for Sustainable Energy (CSE) to collect funds from ratepayers for the SGIP. CSE is the program administrator for San Diego Gas and Electric’s service territory. The SGIP budget of approximately $566 million supports projects through 2020. Funding may be used to pay for environmental and building permitting costs, equipment capital costs, electric grid interconnection application fees, and metering costs associated with interconnection. Maximum project grants cannot exceed $5 million.

II. THE PROBLEM THAT THE PROPOSAL IS INTENDED TO ADDRESS

California's citizens suffer from exposure to the worst air quality in the nation. The American Lung Association's State of the Air 2017 report lists the 25 most polluted cities in the country. The ozone pollution top 25 list includes 11 cities located in California – far more than any other state in the nation. Some of the most populated areas in California are struggling to meet the health based NAAQS (CARB, 2018h). Recent federal revisions to air quality standards for ozone will require substantial reductions from mobile sources, including the regulations that require technology transformation to achieve additional NOx reductions that will result in lower ozone levels thereby improving the air all Californians breathe.

Airport-related activity is a significant source of ozone (a byproduct of photochemical reactions between unburnt hydrocarbons (HC) and NOx), carbon monoxide (CO), $PM_{2.5}$, and ultrafine particles (UFPM). Evidence from epidemiological studies has shown that exposure to high levels of $PM_{2.5}$ and ozone cause an increase in respiratory and cardiovascular problems. Airport shuttles that burn fossil fuels emit NOx and GHG emission. Major airports in California are located in densely populated areas, which struggle to meet the health-based NAAQS.

GHGs are the primary cause of anthropogenic climate change. Climate change is already having dramatic impacts in California in the form of reduced snowpack, intense drought, increased wildfire intensity, and rise in sea level. Climate change threatens both public health and public welfare. Extreme weather events, changes in air quality, increases in food- and water-borne pathogens, and increases in temperatures are anticipated to have adverse health effects. GHG emissions can remain in the atmosphere for decades to millennia. GHG reductions from transitioning the transportation sector from internal combustion to zero-emission vehicles will provide critical GHG reductions that will slow the impact of global warming while providing energy diversity and security.

To address these concerns, CARB has been authorized and directed to reduce criteria and GHG emissions and to transform the State's transportation system. These directives require CARB to:

- Achieve Federal health-based ambient air quality standards (key milestones in 2023 and 2031);
- Reduce GHG emissions to 40 percent from 1990 levels by 2030;
- Reduce GHG emissions to 80 percent from 1990 levels by 2050;
- Achieve carbon neutrality no later than 2045, and achieve and maintain net negative emission thereafter (Office of Governor, 2018a);
- Reduce petroleum use in vehicles by up to 50 percent by 2030 (Office of Governor, 2016); and
- Contribute zero-emission airport shuttles towards the 1.5 million ZEV operating in California by 2025 (Office of Governor, 2016).

Additional NOx and GHG emissions are needed from the transportation sector, in order to attain national air quality standards, reduce individual health risk, and meet climate change goals while promoting the transportation sector's transition to ZEV technology.

As noted previously, airport shuttles are small in number, relative to the larger transportation vehicle populations, and therefore their impact on air pollution is similarly small. However, airport shuttle operation characteristics (i.e., fixed short routes, stop- and go- operation, and low average speeds) are an optimal match to current battery electric vehicle technology. Therefore, this category of vehicles (along with transit buses) is a logical initiation point for medium- and heavy-duty ZEV implementation from which the technology can expand to the larger population of buses and trucks. Technology transformation regulations, like the proposed regulation, contribute to CARB's air quality and climate change goals by increasing the use of ZEVs in the medium- and heavy-duty on-road sector while providing a bridge toward zero-emission pathways in other sectors. This regulatory effort will expand medium- and heavy-duty electric charging and hydrogen fueling infrastructure, build consumer awareness and public visibility of ZEVs, send a market signal to assist in encouraging economies of scale, and support technology transfer to other heavy-duty on-road and off-road sections.

III. BENEFITS ANTICIPATED FROM THE REGULATORY ACTION, INCLUDING THE BENEFITS OR GOALS PROVIDED IN THE AUTHORIZING STATUTE

A. Air Quality and Climate Benefits

The demanding air quality and climate protection goals that California faces require cleaner technologies be deployed, especially in the transportation sector. The proposed regulation, as part of a larger portfolio for clean transportation and fuels, would assist in meeting California's climate change and air quality goals while having a positive net impact on the economy. The proposal helps reduce emissions several ways:

1) Beneficial impacts to disadvantaged and low-income communities;
2) Eliminate tailpipe emissions and excess emissions caused by deteriorated vehicles;
3) Reduce emissions from the oil and gas extraction and production processes; and
4) Establish zero emissions vehicle technology in a specific heavy-duty vehicle sector ideally suited for the technology.

The details of the air quality benefits are shown in Chapter IV.

B. Health and Benefits in Disadvantaged Communities

The proposed regulation reduces NOx, $PM_{2.5}$, emissions, resulting in health benefits for Californians, including in disadvantaged and low-income communities. Eleven of the nation's top 100 passenger airports are in California (CA-DOT, 2018). A large road network supporting this high level of activity results in disproportionate pollutant burden in regions surrounding airports. Although California is making progress towards meeting the health-based NAAQS, some of the most populated areas surrounding major commercial airports continue to experience disproportionately high levels of pollution. The impact is even more severe for disadvantaged communities. Figure III-1 shows the overlap of such communities, as designated by CalEnviroScreen 3.0 (OEHHA, 2017).

C. Public Health and Worker Safety Benefits

The adoption of the proposed regulation will provide criteria pollutant, GHG, and other harmful exhaust emission reductions providing immediate air quality benefits to communities surrounding airports and reducing the impact of climate change. Reduced emissions will likely improve worker safety by reducing their exposure to harmful exhaust emissions. In addition, this benefit will extend to all people at airports including children and elderly sensitive subgroups.

Figure III-1: Disadvantaged Communities around Major Airports

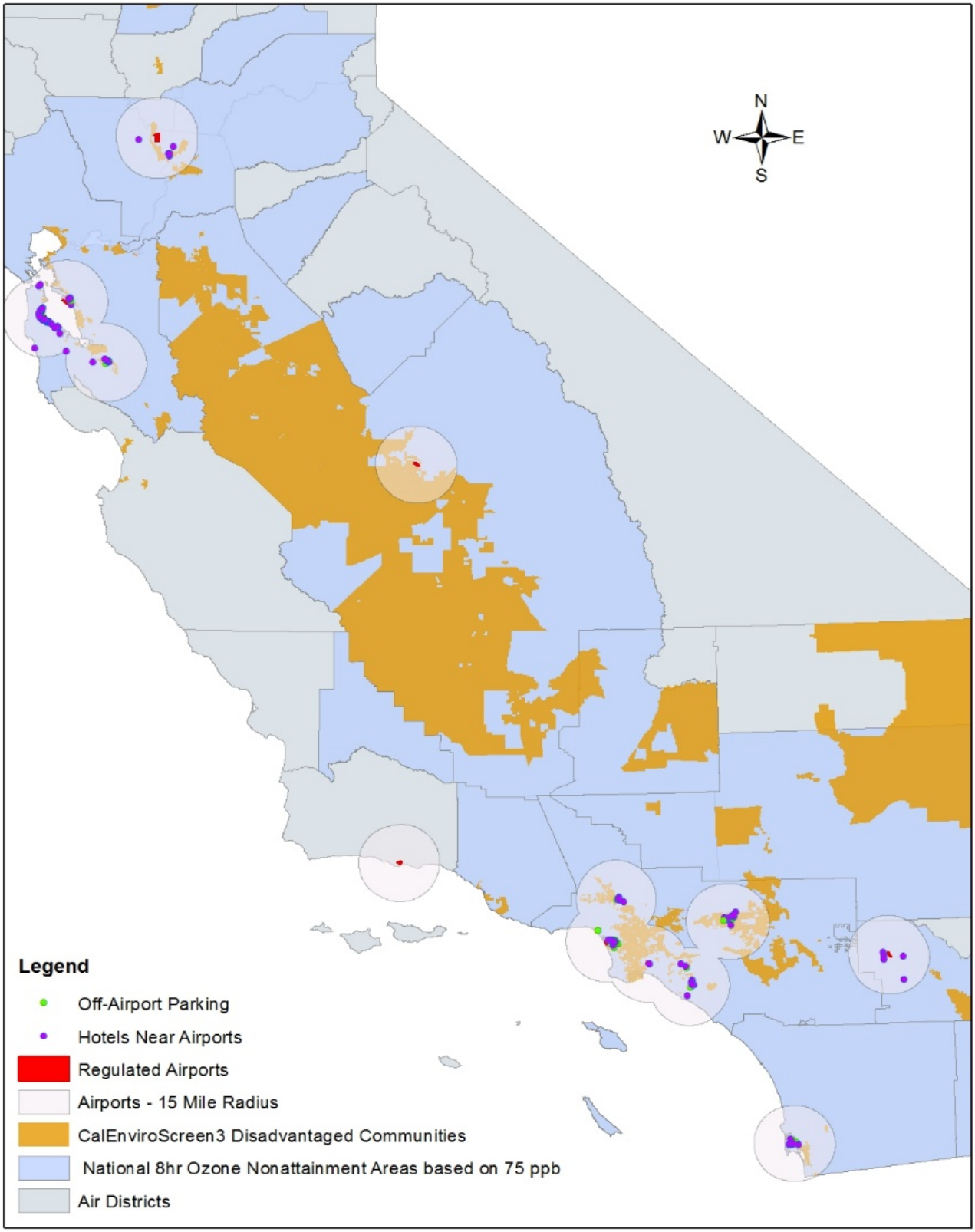
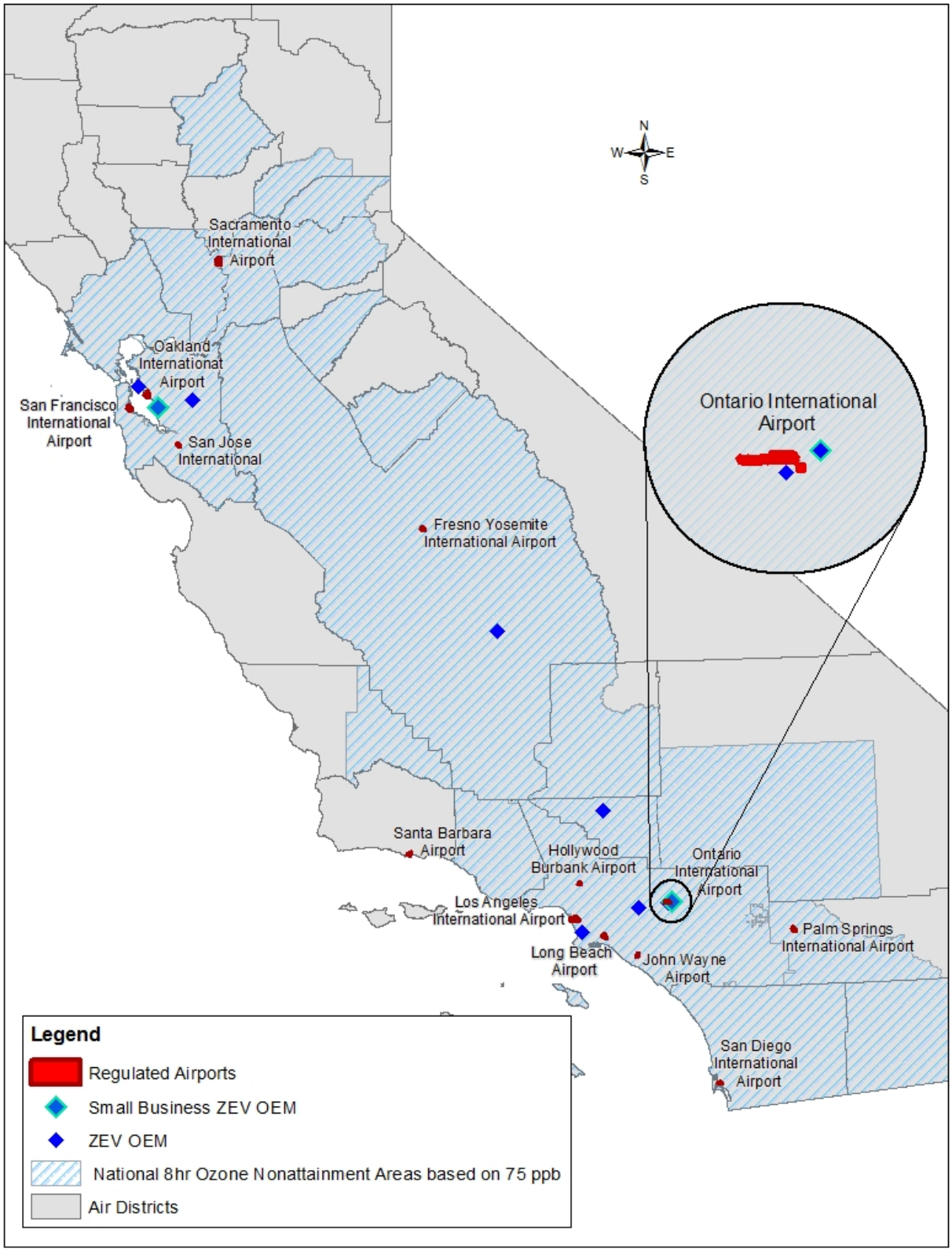


Figure III-2: ZEV Manufacturers Located in California



D. Increase in Employment Opportunities

With more than ten ZEV Original Equipment Manufacturers (OEM) currently located in California, it is highly plausible that the increased demand for this technology would result in higher employment opportunities in the manufacturing sector, including employment in disadvantaged communities. Examples include Motiv Power and Phoenix Motorcars, two small business ZEV manufacturers located in economically disadvantaged communities (as displayed in Figure III-2).

E. Establishing Zero Emissions Technology in the Medium- and Heavy-Duty Sector

Success of any new technology heavily depends on consumer acceptance. By transporting a large volume of passengers at airports, manufacturers of zero-emission airport shuttles have the exclusive opportunity to create positive impressions across a wide sector of the population through direct real-life experience. The projected increase in air travel would mean increased visibility and exposure to ZEV operation.

1. Vehicle Technology

The niche sector of airport shuttles provides a unique opportunity to increase ZEV use in the heavy-duty market. Airport shuttles typically transport passengers from parking lots, rental car facilities and nearby hotel guests to and from the airport terminals. In California, a majority of these shuttles operate on compressed natural gas with a small number of shuttles using diesel. This is an exclusive sector, having short fixed routes with frequent stops making it ideal for transitioning to ZEV. The superior fuel efficiency of ZEVs operating in this sector improves with the low speeds and frequent stops operation. The airport shuttle sector is of optimum size to initiate the introduction of ZEV technology cutaway vans and buses to consumers.

2. Infrastructure

An important aspect of the proposed regulation is increased demand for charging infrastructure. Multi-modal charging infrastructure, supporting both heavy- and light-duty ZEVs, at hotel and airport parking facilities would send a strong signal to ZEV manufacturers and consumers. It would also create a favorable environment for employment growth in infrastructure manufacturing, installation, and maintenance markets.

As mentioned in Chapter I Section G, the CPUC is partnering with local utilities to provide significant investment to support energy infrastructure demands of the growing ZEV landscape. Similar efforts are in the works for zero-emission buses. Recently, a public and transit infrastructure project in the San Joaquin Valley was funded through a

local air district grant and Caltrans funding that paid for the installation of charging stations and solar panels, providing local residents cleaner technology vehicles and on-site job training opportunities (SJV-APCD, 2017).

3. Noise

An additional benefit is that ZEVs are quieter than their fossil-fueled counterparts. The appreciation of the lower noise level would further increase consumer acceptance and could become a vital catalyst for the supply-chain market growth.

IV. AIR QUALITY

Mobile sources and their fuels contribute to over 80 percent of the smog forming NOx emissions in South Coast Air Basin and nearly 50 percent of Statewide GHG emissions. Many densely populated areas of California, including the South Coast basin, San Diego basin, Bay Area basin, and parts of the Sacramento Valley, are not in attainment with the federal 8-hour ozone standard. These areas of the state are also home to several commercial airports. In a multifaceted effort to attain air quality standards, reduce health risks to individuals living in California, and meet climate change goals, large NOx and GHG emission reductions are needed from the transportation sector, including shuttles that serve California commercial airports.

The California Revised Proposed 2016 SIP strategy included several on-road heavy-duty strategies, including the Zero-Emission Airport Shuttle measure, that will help achieve the necessary emission reductions of NOx, PM, TACs, and GHG, while simultaneously increasing the first wave of ZEV deployment. Staff identified airport shuttles as readily suited for battery electric operation because of the well-defined routes, with the added benefit of less maintenance. Although internal combustion engines have improved over time, and optional low-NOx vehicles are available, growth in California's vehicle activity has resulted in increased emissions and increased dependence on petroleum fuels in the transportation sector. Deployment of ZEV technologies in well-suited applications, such as airport shuttles, will both reduce emissions and promote transportation sector energy diversity.

Upon full implementation, the proposed regulation will eliminate tailpipe emissions from the affected fleet and reduce lifecycle GHG emissions by 90 percent as compared to no action. For the purpose of this regulation, staff's analysis accounted for criteria pollutant emissions from tank to wheel and GHG emissions from well to wheel.

A. Air Quality Modeling Analysis

Staff estimated the changes in emissions from airport shuttles that would result from the proposed regulation by modeling criteria and GHG emissions from the airport shuttle fleet with and without the proposed regulation in place, or Business-As-Usual (BAU). Tank-to-wheel vehicle emissions are derived from CARB's EMFAC2017 (https://www.arb.ca.gov/msei/msei.htm) mobile source model. Well-to-Tank emissions were derived from CARB's Vision2.1 model (https://www.arb.ca.gov/planning/vision/downloads.htm). Emissions were estimated by the product of shuttle activity (in terms of vehicle miles traveled or VMT) and emission rates (in terms of pollutant mass per VMT). Staff estimated the amount of reduced emissions that would result from compliance scenarios of the zero-emission measure. The BAU scenario describes the air pollution impact of the airport shuttle fleet in the absence of the Proposed Regulation, which indicates a 2017 tailpipe baseline of 0.19 tons/day of NOx, 2.7 lbs/day of $PM_{2.5}$, 0.32 tons/day of HC, and on a lifecycle basis, 0.042 million metric tons CO_2e/year of GHG. The Proposed regulation Scenario describes the Staff-modeled air pollution impact of the proposal, which indicates that by

2040, airport shuttle tailpipe emissions are virtually eliminated and GHG emission are reduced by about 90 percent compared to the BAU scenario. The following discusses modeling assumptions and then pollutant specific observations.

Inputs to the models such as airport shuttle population, demographics, and activity VMT are based on surveys and research conducted by staff. Vehicle population growth is assumed constant throughout the period evaluated, 2017 - 2040, due to expected contraction in specific segments of the population. This notably includes the addition of light rail connectivity to airports in San Francisco and Los Angeles, which will eliminate up to 60 airport shuttles from the public fleet. Staff derived the 15 mph average speed assumption from in-use data recorded from an airport shuttle(CARB (2017), Collection of Activity Data from On-Road Heavy-Duty Diesel Vehicles, Final Report (ARB Agreement No. 13-301). Survey data indicate that airport shuttles travel an average of 31,000 miles/year. Usage of reserve internal combustion vehicles during this period was assumed to be minimal.

Surveys indicate public fleet airport shuttles have a 12-year average life and private fleet shuttles have a 10.7-year average life. However, since the private fleet response rate was low, staff aligned private fleets to match the public fleet 12-year average life, which is used for the BAU Scenario. The parameters used for the analysis are listed in Table IV-1.

Table IV-1: Assumptions for Modeling Air Pollution Impacts

Parameter	Notes
Vehicle Population	Constant (i.e., no growth is assumed) 929 vehicles
Vehicle Useful Life	12 years
Vehicle Weight Class	Shuttles were categorized into four EMFAC2017 vehicle classes (LHD1, LHD2, UBUS T6, and UBUS T7) based on reported gross vehicle weight rating (GVWR)
Reserve Shuttle & Exemptions	These variances were not modeled since they were deemed to have minimal impact due to limited occurrences.
Fuel Type	Gasoline, diesel, natural gas, electricity
VMT	31,000 miles average annual VMT
Average Speed	15 mph
Pollutants Modeled	HC, NO_X, $PM_{2.5}$, GHG (CO_2e)

The population and activity survey was conducted in fourth quarter, 2017, to determine the population, population demographics and activity of airport shuttles in California. Information collected included total number of vehicles in the fleet, and vehicle specific make, model, model year, weight classification and annual miles. Surveys were conducted with public and private entities as it was envisioned that the two classes of shuttle operations would have different demographics. The survey had a 100 percent response rate from public entities and a 15 percent response rate from private entities.

Specific to private entities, it was determined that the population and activity data had similar characteristics across airport hub sizes (small, medium and large), therefore the data collected for privately owned airport shuttle operation was extrapolated over the population of private airport shuttle entities across California.

As of 2017, there were a total of 950 airport shuttles providing passenger ground transport service in California; 264 vehicles in publicly-owned service and 686 vehicles in privately-owned service. 21 ZEV privately-owned shuttles currently in operation were omitted from emission analysis. However, there is no change in emissions from these shuttles due to the proposed regulation. The airport shuttle market is dominated by CNG, (83 percent), followed by gasoline (9 percent) LPG (4 percent) and diesel (4 percent). In 2017, there is a modest battery electric presence in the California airport shuttle fleet (less than 1 percent). In public shuttle fleets, after CNG, LPG is the next dominant fuel, whereas in private fleets, gasoline is the next dominant fuel.

As a result of the proposal, the airport shuttle fleet composition is expected to change, as shown in Figure IV-1, where the fleet shifts to ZEV technologies as a function of natural turnover. Staff has modeled the airport shuttle fleet to completely transition to ZEV by 2035, when the proposal is fully implemented.

Figure IV- 1: Forecast of Airport Shuttle Population as a Function of Fuel Type, 2020 – 2040

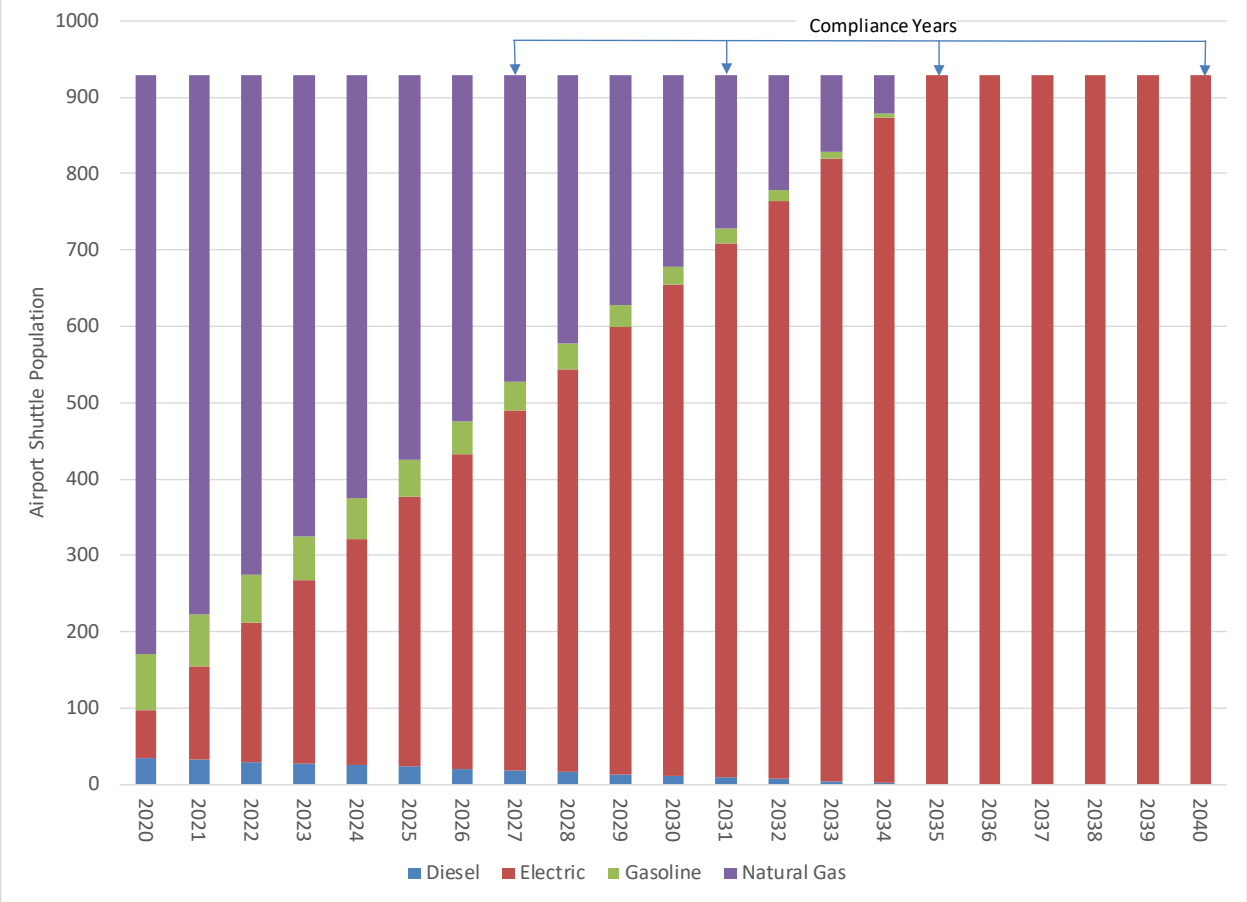


Table IV-2 shows the breakdown of airport fleets by GVWR, percent of fleet, and average activity per day. For modeling purposes, the vehicles were given an Emission Factor (EMFAC) vehicle classification for the applicable range of vehicles, which are light heavy-duty (LHD), T6, and T7. These classifications are based on size and activity of the vehicle. As noted in the table, T6 makes up most of the vehicles in an airport shuttle fleet.

Table IV-2: Airport Shuttle Population and Activity by EMFAC Vehicle Classification

EMFAC Vehicle Classification	GVWR range	Percent of total Airport Shuttle Fleet	Average Shuttle Activity
LHD1	8,501 – 10,000 lbs	8%	59 miles/day
LHD2	10,001 – 14,000 lbs	22%	96 miles/day
T6	14,001 – 33,000 lbs	53%	95 miles/day
T7	33,001+ lbs	17%	108 miles/day

B. NOx Analysis

NOx emissions create significant health concerns. NOx is a respiratory irritant that can react photochemically in the atmosphere with unburned hydrocarbons to form atmospheric ozone, also a strong respiratory irritant. Additionally, it contributes to the formation of secondary PM. Tailpipe emissions of NOx are summarized in Figure IV-2 and Table IV-3. The proposed measure would spur an additional decrease in NOx emissions until they are eliminated in 2035, due to a complete transformation of the airport shuttle fleets to ZEV. In 2040, the addition of the proposed measure would achieve 0.03 tons/day reduction in statewide NOx emissions and will stimulate a total reduction of 138 tons NOx over the 20-year implementation/transition period. Fluctuations in baseline NOx emissions are due to modeled engine system deterioration.

Figure IV-2: Airport Shuttle Tailpipe NOx Emissions, 2017 – 2040, Baseline Emissions Compared with the Regulatory Scenario

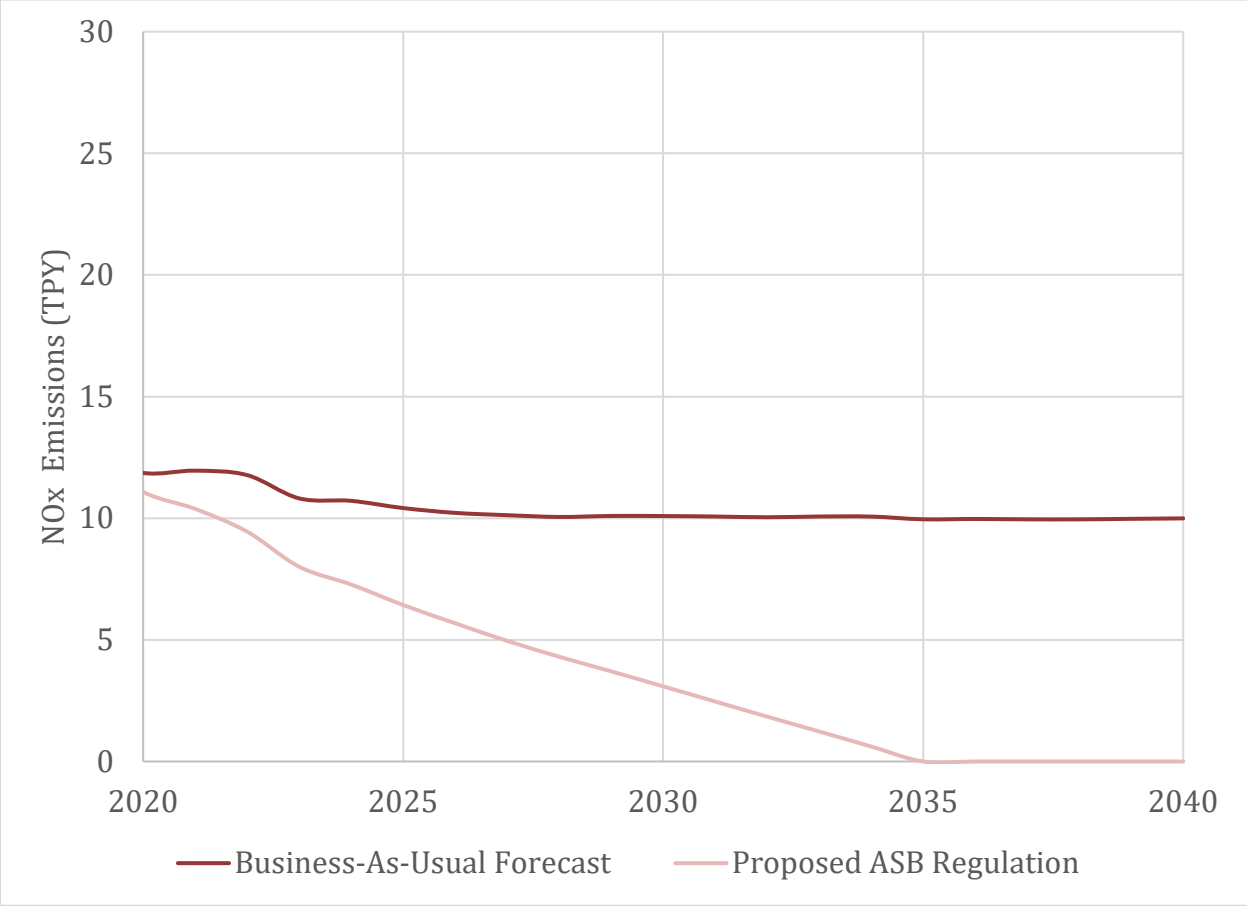


Table IV-3: Airport Shuttle Tailpipe NOx Emissions (tons/year)

Calendar Year	Business-As-Usual	Proposal	Benefit	Percent Reduction
2020	11.86	11.08	0.78	7%
2027	10.12	4.96	5.17	51%
2031	10.07	2.47	7.60	76%
2035	9.96	0.00	9.96	100%
2040	9.99	0.00	9.99	100%

C. PM Analysis

$PM_{2.5}$ is defined as airborne particles having an aerodynamic diameter of 2.5 microns and smaller, which are capable of evading the body's defenses that block larger particles. Issues that result from extended exposure to $PM_{2.5}$ include premature death, irregular heartbeat, nonfatal heart attacks, aggravated asthma, decreased lung function, and increased respiratory symptoms like coughing or difficulty breathing (US EPA, 2018). Subsequently, policies such as CARB's Truck and Bus regulation established $PM_{2.5}$ emission control requirements on heavy-duty vehicles. Staff modeling indicates the existing regulations reach maturity in 2018, exemplified by the leveling out of BAU Scenario $PM_{2.5}$ emissions (Figure IV-3 & Table IV-3). BAU Scenario $PM_{2.5}$ emissions have a similar trend to NOx; fluctuations in baseline $PM_{2.5}$ emissions are due to modeled engine system deterioration.

The Proposed Regulatory Scenario will stimulate a cumulative reduction of 2.5 tons $PM_{2.5}$ over the transition period. Whereas BAU shows a leveling off of $PM_{2.5}$ in 2018, the proposed regulation extends the $PM_{2.5}$ downward trend beyond 2018, continuing through 2035, when $PM_{2.5}$ emissions are completely eliminated from the airport shuttle fleet due to full ZEV implementation. CARB's existing measures to reduce PM2.5 have been account for in the BAU scenario.

Figure IV-3: Airport Shuttle Tailpipe $PM_{2.5}$ Emissions, 2020 – 2040, Baseline Emissions Compared with the Regulatory Scenario

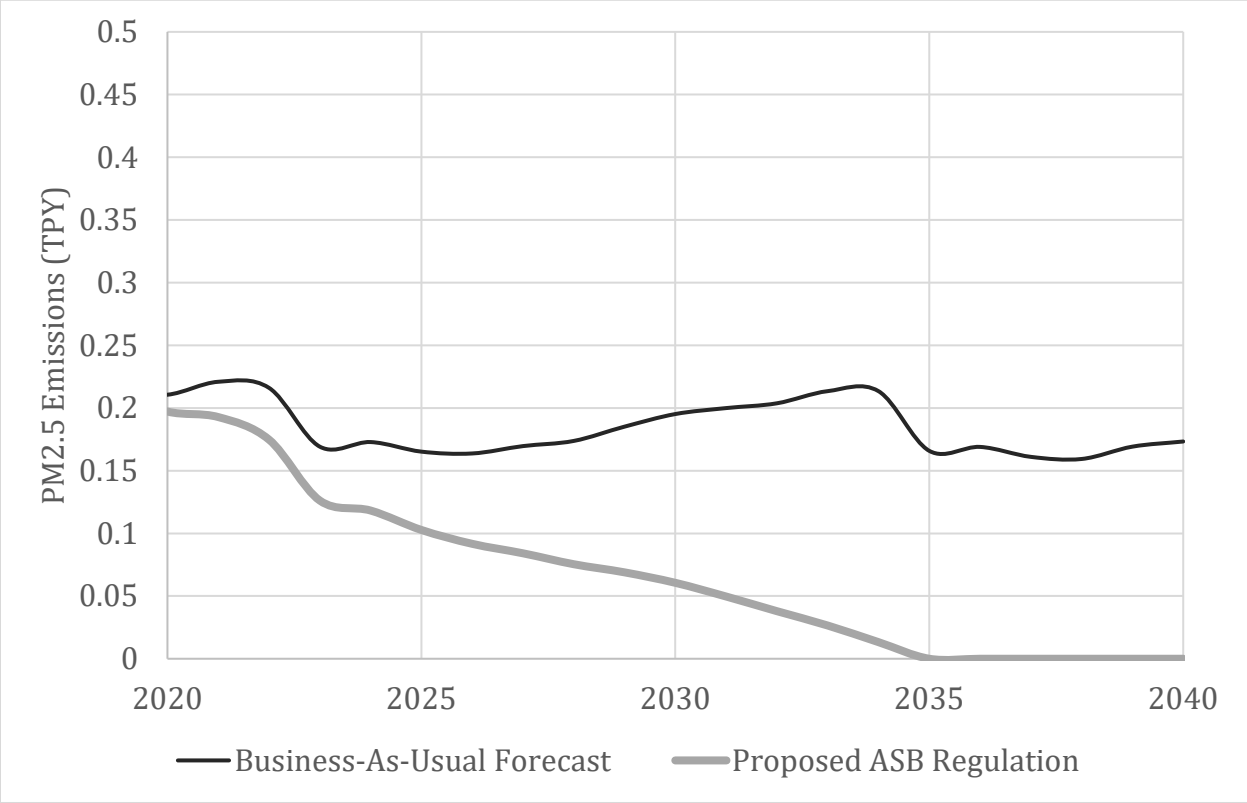


Table IV-4: Airport Shuttle Tailpipe $PM_{2.5}$ Emissions (tons/year)

Calendar Year	Business -As- Usual	Proposal	Benefit	Percent Reduction
2020	0.21	0.20	0.01	6%
2027	0.17	0.08	0.09	50%
2031	0.20	0.05	0.15	75%
2035	0.17	0.00	0.17	100%
2040	0.17	0.00	0.17	100%

D. GHG Analysis

Airport Shuttle GHG emissions are reported as carbon dioxide equivalents (CO_2e) and calculated on a total lifecycle basis, accounting for emission associated with both upstream electricity and fuel production (electricity was selected as the ZEV standard based on the current state- and availability- of heavy-duty commercial ZEV) and fuel combustion in the engine. GHG emissions are summarized in Figure IV-4 and Table IV-5, respectively. The BAU Scenario GHG emissions are driven primarily by CO_2, a byproduct of fossil fuel combustion. These emissions show slight decline over time that is driven by modest improvements in vehicle efficiency. As combustion powered airport shuttles are phased out and replaced by zero-emission technologies, GHG emissions begin a downward trajectory that levels-off in 2035, when all combustion-powered shuttles are phased out and tailpipe GHG emissions are eliminated. Total GHG emissions, however, are not modeled to reach zero in the time period modeled (2020 - 2035), due to upstream emissions of GHG associated with energy production. Staff anticipate GHG will continue to decline from 2035 - 2050, at which time the airport shuttle fleet will be fully electric and the electric power grid will achieve full conversion to renewable sources of power. The BAU Scenario indicates GHG is 126 metric tons/day in 2020 and this decreases to 118 metric tons/day by 2035. By 2035, the proposal Scenario indicates GHG emissions at 12 metric tons/day, representing a 90 percent reduction from the BAU Scenario.

Figure IV-4: Airport shuttle lifecycle CO_2e emissions, 2020 – 2040, Baseline emissions compared with the regulatory scenario

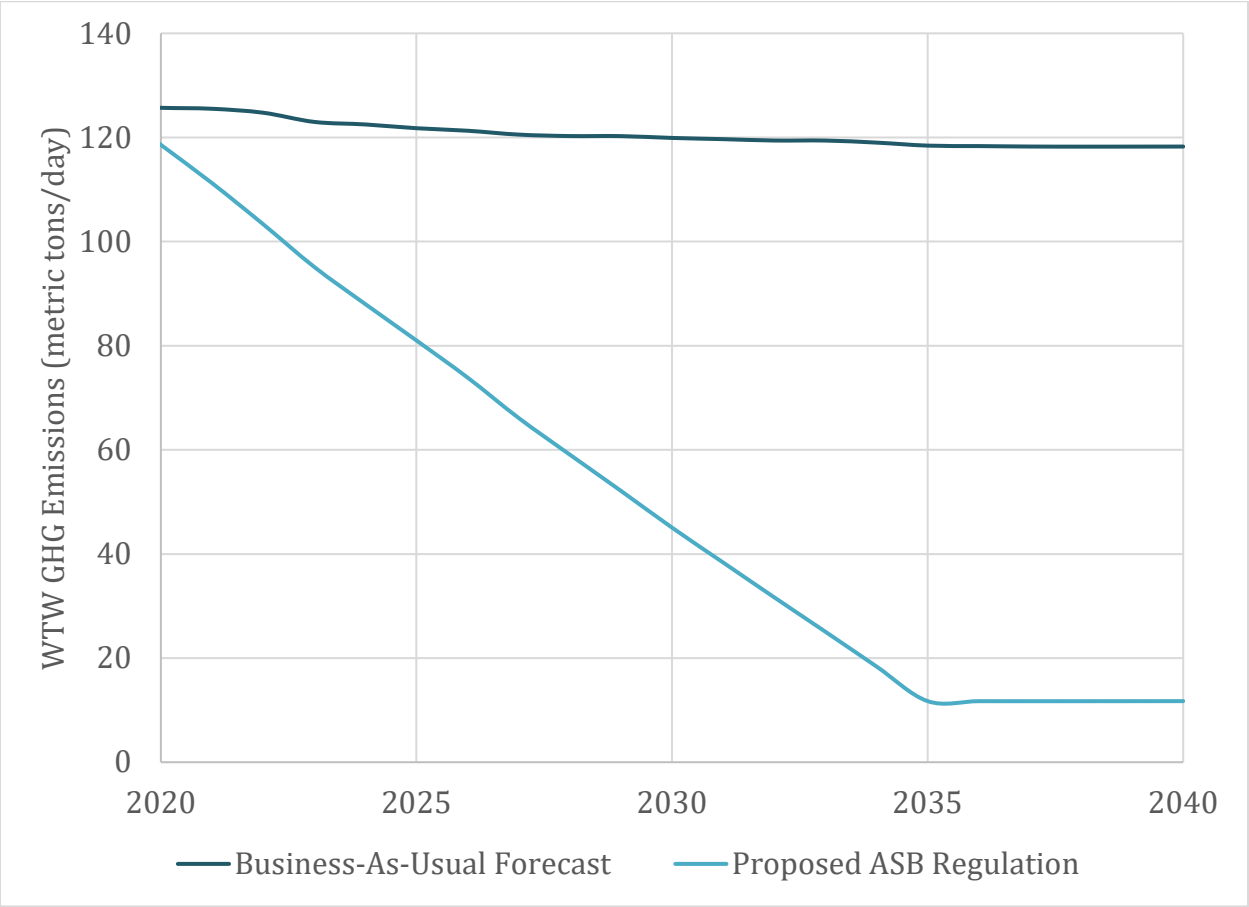


Table IV-5: Airport Shuttle Lifecycle GHG Emissions (metric ton/day)

Calendar Year	Business-As-Usual	Proposal	Benefit	Percent Reduction
2020	126	119	7	6%
2027	121	66	54	45%
2031	120	38	81	68%
2035	118	12	107	90%
2040	118	12	107	90%

E. Toxic Air Contaminants Analysis

Staff anticipate additional air pollution benefits in the form of reduced exposure to TACs, as several are known to be emitted from mobile sources, including diesel PM, benzene, and 1,3-butadiene (Propper, et. al., 2015). In 1998, California identified diesel PM as a TAC, a substance for which airborne toxic control measures were established.

Research of Californians' exposure to measurable TACs has shown the largest known cancer risk is associated with exposure to diesel PM (Propper, et. al., 2015). Polycyclic aromatic hydrocarbons (PAHs) are also products of diesel combustion.

Replacing gasoline, CNG, and diesel vehicles with electric vehicles will contribute to overall reductions in $PM_{2.5}$, diesel PM, NOx, PAHs, benzene, and 1,3-butadiene, among other TACs.

F. Summary

The cumulative emissions reductions are shown in Table IV-6. The modest emissions benefits of this proposal are proportional to the size of the fleet and the level of activity associated with the individual vehicles; however full deployment of ZEVs in the airport shuttle fleet is an initial step in CARB's strategy to reduce heavy-duty vehicle fossil fuel consumption. The airport shuttle fleet was identified as ideal for ZEV deployment in the on-road heavy-duty sector due to their proximity to the public and an ideal compatibility between the duty cycle and the state of development in commercial battery electric, heavy-duty vehicle technology, i.e., light heavy-duty vehicles, fixed short routes, stop- and go- operation, and low average speeds.

Table IV-6: Cumulative Emission Reductions, 2020 – 2040

NOx (tons)	$PM_{2.5}$ (tons)	CO_2e (million metric tonnes)
138	2.5	0.5

V. ENVIRONMENTAL ANALYSIS

CARB is the lead agency for the proposed regulation and has prepared an environmental analysis pursuant to its certified regulatory program to comply with the requirements of the California Environmental Quality Act (CEQA). CARB's regulatory program, which involves the adoption, approval, amendment, or repeal of standards, rules, regulations, or plans for the protection and enhancement of the State's ambient air quality has been certified by the California Secretary for Natural Resources under Public Resources Code section 21080.5 of CEQA California Code of Regulations (CCR), Title 14 §15251(d) (Resources Agency, 2006). Public Resources Code section 21080.5 , allows public agencies with certified regulatory programs to prepare a "functionally equivalent" or substitute document in lieu of an environmental impact report or negative declaration, once the program has been certified by the Secretary for the Resources Agency as meeting the requirements of CEQA. CARB, as a lead agency, prepares a substitute environmental document (referred to as an "Environmental Analysis" or "EA") as part of the Staff Report to comply with CEQA 17 CCR § 60005 (CARB, 2018i).

The Draft EA for the proposed regulation is included in Appendix B to this Staff Report. The Draft EA provides a programmatic environmental analysis of an illustrative, reasonably foreseeable compliance scenario that could result from implementation of the proposed regulation. The Draft EA states that implementation of the Proposal could result in beneficial impacts to GHG, and air quality through PM and NOx emission reductions from shuttles in California, long-term beneficial impacts to air quality through reductions in criteria pollutants, and beneficial impacts to energy demand. For the purpose of determining whether the proposed regulation will have a potential adverse effect on the environment, CARB evaluated the potential physical changes to the environment resulting from a reasonable foreseeable compliance scenario for the proposed regulation.

Implementation of the proposed regulation could result in an increase in manufacturing and associated facilities to increase the supply of ZEVs, along with construction of new hydrogen fueling stations and electric vehicle charging stations to support ZEV operations. This could also cause an associated increase in demand for hydrogen fuel supply and transportation. Increased deployment of ZEVs could result in a relatively small increase in production of electricity and hydrogen fuel, reduce rates of oil and gas extraction, and result in associated increases in lithium and platinum mining and exports from source countries or other states. This could also result in increased rates of disposal of lithium batteries and hydrogen fuel cells; however, disposal would need to comply with California law, including but not limited to California's Hazardous Waste Control Law and implementing regulations. For lithium-ion batteries, it is anticipated they still have a useful life at the end of bus life, and thus are likely to be repurposed for a second life. To meet an increased demand for refurbishing or reusing batteries and fuel cells, new facilities or modifications to existing facilities could be constructed to accommodate recycling activities. Fleet turnover largely would be unaffected since the regulation would be implemented at the time of normal shuttle purchase.

While many impacts associated with the proposed regulation could be reduced to a less-than-significant level through conditions of approval applied to project-specific development, the authority to apply that mitigation lies with land use agencies or other agencies approving the development projects, not with CARB. Consequently, the Draft EA takes the conservative approach in its significance conclusions and discloses, for CEQA compliance purposes, that impacts from the development of new facilities or modification of existing facilities associated with reasonably foreseeable compliance responses to the proposed regulation could be potentially significant and unavoidable. Table V-1 on the following pages summarizes potential impacts of approving the proposed regulation.

Table V-1: Summary of Potential Environmental Impacts

Resource Area Impact	Significance
Short-Term Construction-Related and Long-Term Operational Impacts on Aesthetics	Potentially Significant and Unavoidable
Conversion of Agricultural and Forest Resources Related to New Facilities	Potentially Significant and Unavoidable
Short-Term Construction-Related Air Quality Impacts	Potentially Significant and Unavoidable
Long-Term Operation Air Quality Emissions	Beneficial
Short-Term Construction-Related and Long-Term Operational Impacts on Biological Resources	Potentially Significant and Unavoidable
Short-Term Construction-Related and Long-Term Operational Impacts on Cultural Resources	Potentially Significant and Unavoidable
Short Term Construction-Related Impacts on Energy Demand	Less than Significant
Long-Term Operational Impacts on Energy Demand	Beneficial
Short-Term Construction-Related and Long-Term Operational Effects on Geology and Soil Related to New Facilities	Potentially Significant and Unavoidable
Short-Term Construction- and Long-Term Operational-Related Greenhouse Gas Impacts	Beneficial
Short-Term Construction-Related and Long-Term Operational Impacts on Hazard Impacts	Potentially Significant and Unavoidable

Resource Area Impact	Significance
Long-Term Effects on Hydrology and Water Quality Related to Changes in Land Use	Potentially Significant and Unavoidable
Short-Term Construction-Related and Long-Term Operational-Related Impacts on Land Use and Planning	Potentially Significant and Unavoidable
Short-Term Construction-Related Impacts on Mineral Resources	Less than Significant
Long-Term Operational-Related Impacts on Mineral Resources	Potentially Significant and Unavoidable
Short-Term Construction- and Long-Term Operational-Related Noise Impacts	Potentially Significant and Unavoidable
Short-Term Construction-Related Impacts and Long-Term Operational-Related Impacts on Population, Employment, and Housing	Less than Significant
Short-Term Construction-Related Impacts and Long-Term Operational-Related Impacts on Public Services	Less than Significant
Short-Term Construction-Related Impacts and Long-Term Operational-Related Impacts on Recreation	Less than Significant
Short-Term Construction-Related Impacts on Traffic and Transportation	Potentially Significant and Unavoidable
Long-Term Operational-Related Impacts on Traffic and Transportation	Potentially Significant and Unavoidable
Increased Demand for Water, Wastewater, Electricity, and Gas Services	Potentially Significant and Unavoidable

A Notice of Preparation (NOP) was prepared and made available for review and comment for 30 days, per the CEQA Guidelines (Resources Agency, 2007). The comment period for this NOP began on November 17, 2017 and ended on December 18, 2017. A public workshop that also served as the CEQA scoping meeting to solicit input on the scope and content of the Draft EA was held on December 4, 2017.

Written comments on the Draft EA will be accepted starting October 26, 2018, through 5 p.m. on December 10, 2018. The Board will consider the final EA and responses to comments received on the Draft EA before taking action to adopt the proposed regulation.

VI. ENVIRONMENTAL JUSTICE

State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies Government Code, section 65040.12, subdivision (c). CARB is committed to making environmental justice an integral part of its activities. The Board approved its Environmental Justice Policies and Actions (Policies) on December 13, 2001, to establish a framework for incorporating environmental justice into CARB's programs consistent with the directives of State law (CARB, 2001). These policies apply to all communities in California, but recognize that low-income communities and communities of color bear a disproportionate share of California's air pollution burden.

Staff does not believe that the proposed regulation will have any adverse environmental justice impacts because accelerating the use of zero-emission airport shuttles will provide immediate air quality improvements at airports, such as BUR, LAX, OAK, and ONT, which are located in disadvantaged communities as designated by CalEnviroScreen 3.0 (see Figures V!-1 and VI-2). Disadvantaged communities are defined based on their cumulative impacts which include exposures, public health, or environmental effects from the combined emissions and discharges, in a geographic area, including environmental pollution from all sources, whether single or multi-media, routinely, accidentally, or otherwise released (OEHHA, 2017).

Additionally, adoption of the proposed regulation will help shape the infrastructure framework necessary for a zero-emissions landscape. Zero-emission infrastructure projects that are planned include the San Diego Gas and Electric proposal to install charging ports, metering equipment, and data loggers in partnership with the San Diego International Airport and its tenants. These projects will include a pilot program to install two Level 2 chargers and one DC fast charger for airport shuttles. A related program will retrofit the existing electrical vehicle supply equipment (EVSE) to gather data on electric ground support equipment (GSE) usage as well as install new EVSE for new electric GSE.

Figure VI-1: Map of Southern California airports and the surrounding disadvantaged communities

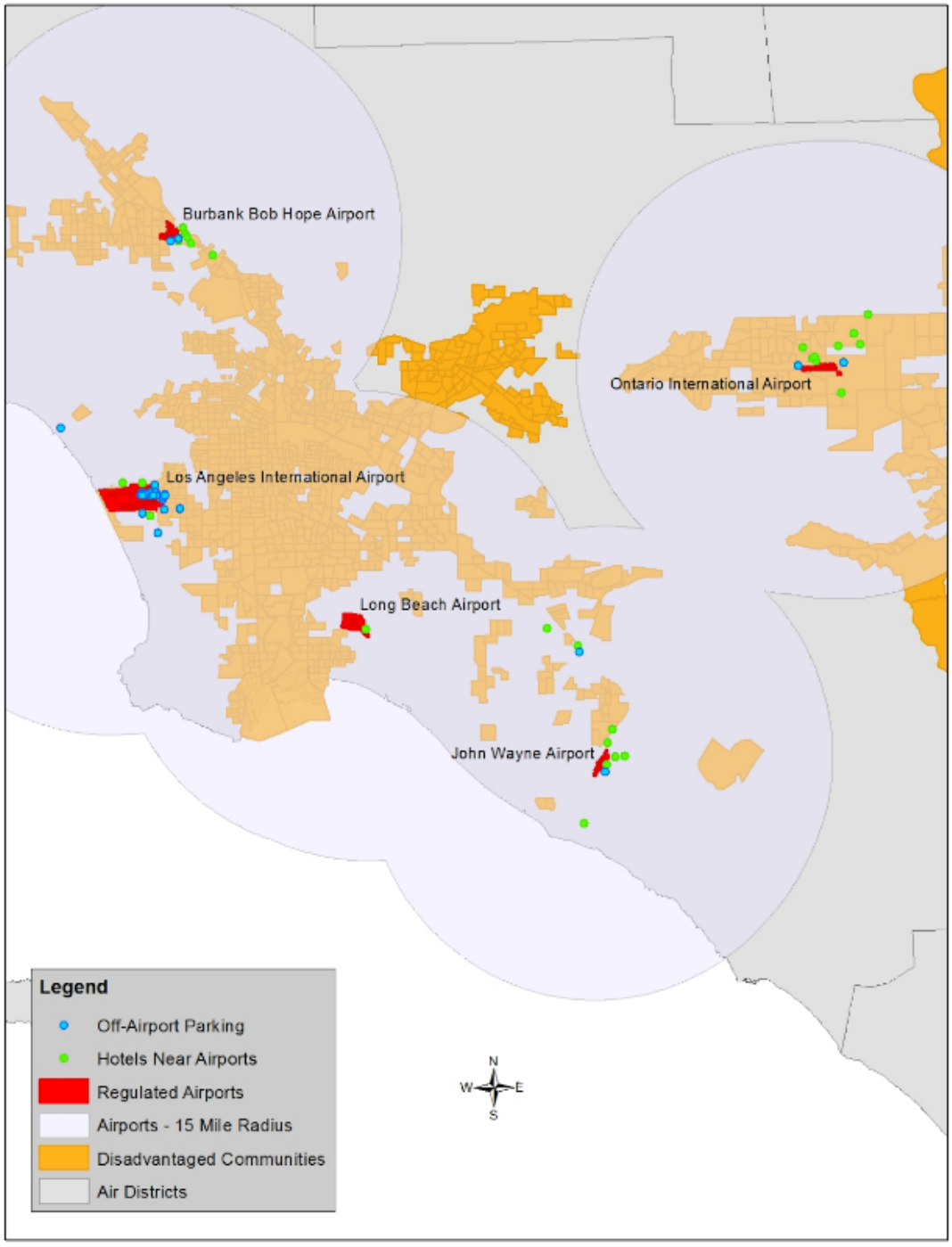
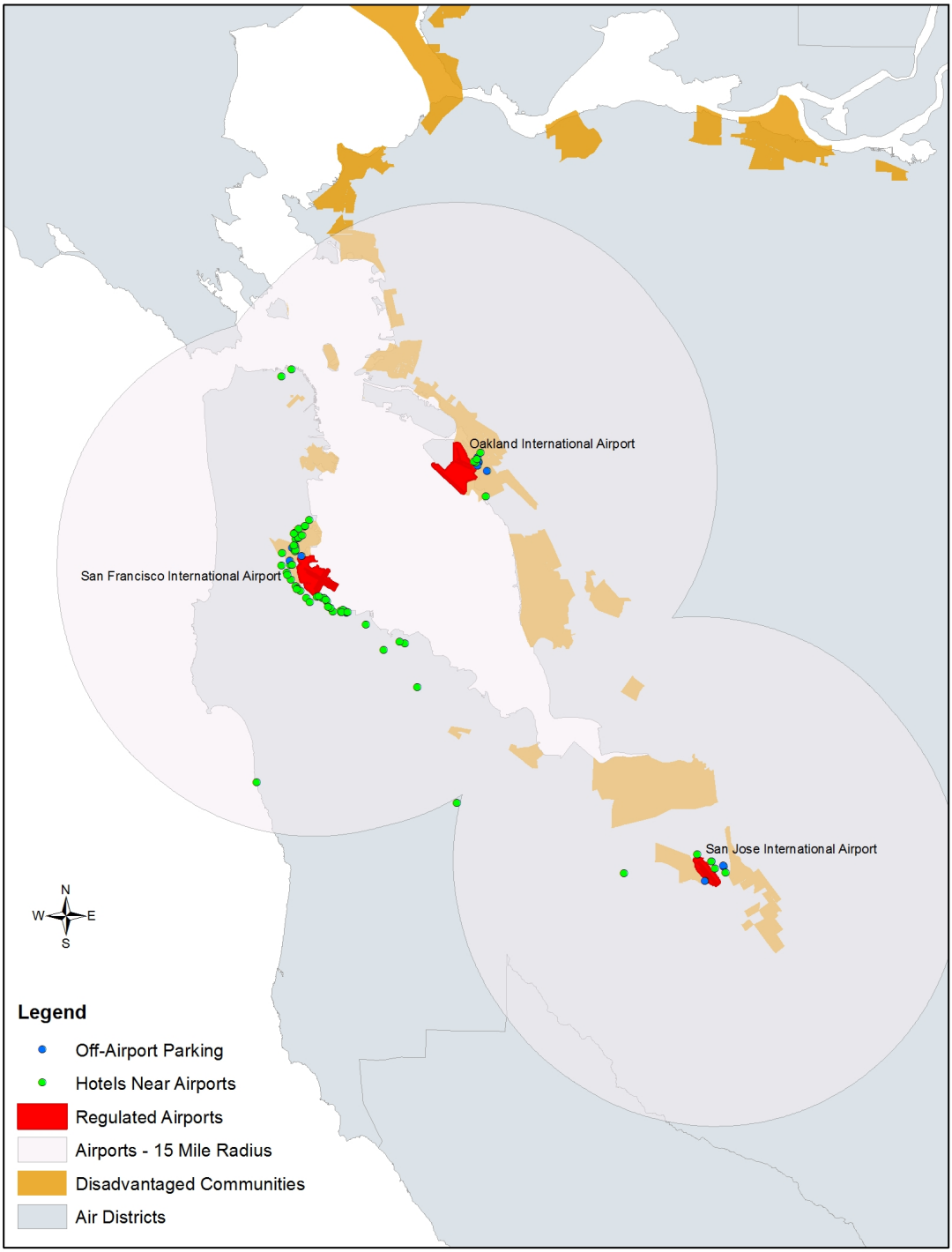


Figure VI-2: Map of Bay Area airports and the surrounding disadvantaged communities



VII. TECHNICAL FEASIBILITY OF THE REGULATION

The proposed regulation would require the transition from internal combustion engines to ZEV technology by 2035. Similar to other heavy-duty zero-emission regulatory efforts, the proposed regulation would mandate the use of ZEV technology in a specific heavy-duty sector that is ideally suited. The technology transformation of these sectors will aid the transition of ZEV technology to other similar heavy-duty applications. The transition to zero emissions technology is necessary to meet our environmental and public health goals.

The proposed Zero-Emission Powertrain Certification Regulation (CARB, 2018a) being considered by the Board separately would support this effort by establishing standards and test procedures for zero-emission powertrains. Specifically, the proposed regulation, starting with model year 2026, will require heavy-duty airport shuttle ZEVs (GVWR of 14,001 pounds and greater) to contain powertrains certified to the new proposed Zero-Emission Powertrain standard, meaning the powertrain produces no criteria pollutant and greenhouse gas emissions. The "powertrain" in this context refers to the components, such as the energy storage system, the electric motor, and on-board charger, which are responsible for storage, delivery, and conversion of energy within the vehicle to mechanical power. [1]

The proposed regulation does not prescribe a single set of technologies, but instead allows any zero-emission technology to be used, such as battery electric or fuel cell vehicles. The proposed requirements for ZEV technology can be met through the application of existing technologies that are available and in use today. The following sections describe the availability of ZEV technology, production availability, deployment of products, incremental cost of the technology, lifetime costs of ZEV technology, and summary of recent state ZEV investments.

A. Technology Currently Available

Currently, throughout California, there are over 110 ZEV airport shuttles either already in operation or on order and a significant number of similar buses in the transit sector. ZEVs currently being manufactured in this sector include battery electric vehicles (BEV) or fuel cell electric vehicles (FCEV). The requirements of the proposed regulation can be achieved by using either.

BEVs are electric powertrain vehicles powered by on-board rechargeable batteries and a motor. The batteries in these vehicles are charged with electricity sourced from the electrical grid or generated on-site from sources such as solar panels or micro-wind

[1] CARB conducted a separate rulemaking to consider the Proposed Zero-Emission Powertrain Certification Regulation (ZEPCert). This rulemaking has been noticed and will become effective once it has been approved by Office of Administrative Law and filed with the Secretary of State. The proposed regulation, starting with model year 2026, will require zero-emission airport shuttles to contain powertrains certified to ZEPCert, meaning the powertrain produces no criteria pollutant and greenhouse gas emissions.

turbines. BEVs do not have an internal combustion engine in the powertrain; therefore, no tailpipe or localized emissions are emitted from a combustion process.

FCEVs are electric powertrain vehicles powered by on-board fuel cell stack and a battery. The fuel cell stack generates electricity on board to charge the battery that powers the on-board motor. Like BEVs, FCEVs do not have an internal combustion engine in the powertrain; in this case, the only emission produced is water vapor. A FCEV does not need to be equipped with a large battery for energy storage and relies on its hydrogen tank and on-board fuel cell stack for its energy supply.

Figure VII-1: Pictures of some Airport Shuttle ZEVs

Van and Transit Bus

Cutaway

In 2015, CARB released the “Draft Technology Assessment: Medium- and Heavy-Duty Battery Electric Trucks and Buses,” which determined that the shuttles that service airports are readily converted to electric operation due to the well-defined routes (CARB, 2015b). In addition, the Draft Technology Assessment cited continuing progress in the development of fuel cell technology for transit buses, shuttles, delivery vehicles, refuse trucks, and drayage trucks. Furthermore, fuel cells have also successfully penetrated the forklift category and the lessons learned there should be transferrable to the on-road market (CARB, 2018a). Transit agencies, including Alameda-Contra Costa Transit District and SunLine Transit Agency, use fuel cell electric buses in California without having to dedicate a special route (CARB, 2018j). Many manufacturers of transit buses also produce airport shuttles.

The commonality of these ZEV applications is that battery electric shuttles travel a fixed route that is less than 30 miles, have frequent stops, and travel at low speeds. In addition, these vehicles are charged at the depot or the location where they are dispatched. The proposed regulation is designed to capture these commonalities, as they are best suited for deploying ZEVs currently being produced. BEVs in this sector are able to operate within the current battery range. In addition, FCEVs currently operating in the transit sector are also able to achieve these conditions.

B. Production Availability

As shown in Table VII-1, airport shuttles include the full spectrum of vehicle sizes from medium-duty to heavy heavy-duty. Staff estimates that less than 1,000 airport shuttles are currently in-use in California. Some of the vehicle types within the airport shuttle sector overlap with the transit sector, specifically cutaways, coaches, and transit buses. For example, the transit bus is modified for airport shuttle use by changing the seating configuration and installing luggage racks. Many of these transit buses have passed the Altoona testing required for the transit sector and also meet the Buy America requirements of the FAA grant programs.

Table VII-1: Airport Shuttle Vehicle Classifications

<table>
<tr><th>Vehicle Type</th><th>Federal Vehicle Classification</th><th>California Vehicle GVWR Category</th></tr>
<tr><td>Van</td><td>Class 2b: 8,501-10,000 lbs.</td><td rowspan="2">Medium-Duty (MD)</td></tr>
<tr><td>Cutaway</td><td>Class 3: 10,001-14,000 lbs.</td></tr>
<tr><td>Cutaway, Mini Bus</td><td>Class 4: 14,001-16,000 lbs.</td><td rowspan="2">Light Heavy-Duty (LHD)</td></tr>
<tr><td>Cutaway, Coach, Mini Bus, Transit Bus</td><td>Class 5: 16,001-19,500 lbs.</td></tr>
<tr><td>Cutaway, Coach Mini Bus</td><td>Class 6: 19,501-26,000 lbs.</td><td rowspan="2">Medium Heavy-Duty (MHD)</td></tr>
<tr><td>Transit Bus</td><td>Class 7: 26,001- 33,000 lbs.</td></tr>
<tr><td>Coach, Transit Bus</td><td>Class 8: > 33,001</td><td>Heavy Heavy-Duty (HHD)</td></tr>
</table>

Some local delivery truck vehicles also overlap with the airport shuttle sector. Vehicle manufacturers may use the same powertrain and chassis in many ZEVs, altering them by installing either seats for passengers or shelves for packages. An example of this flexibility is with cutaway vehicles. Many ZEV manufacturers use the identical powertrain and chassis for airport shuttles and local delivery trucks

ZEV technologies are currently commercially available through 15 U.S. and international companies. Table VII-2 summarizes the ZEV products currently available with one product becoming available soon. Table VII-3 contains ZEV products that are converted by from new internal combustion vehicle that are currently available. Manufacturers recently introduced mini-bus and coach vehicles that will be ideal for the airport shuttle sector. Since the numbers anticipated from the proposed regulation are

small, current ZEV Manufacturers have the ability to meet the slightly increased demand.

C. Product Deployment

1. Fuel Cell Vehicles

Although no fuel cell vehicles are currently operating in this sector, a recent project announcement on the development of a hydrogen fuel cell battery electric bus, the first of its kind, may become in use at Honolulu's Daniel K. Inouye International Airport, shuttling passengers between the airport's terminal and car rental facility (Mass Transit Magazine, 2018). As stated previously, the buses operated in the transit sector have overlap with the airport shuttle sector. California Transit Agencies currently operate or have in procurement (on order, awarded or planned) over 50 fuel cell vehicles (CARB, 2018k).

2. Battery Electric Vehicles

Cutaways and vans are a popular choice for hotels, private airport parking, and bus transportation companies that serve the airport shuttle sector. Currently, approximately 69 battery- electric cutaways or vans are in operation or being procured for use in southern California and in the San Francisco Bay Area (CARB Staff, 2018; CARB Staff, 2018a; Businesswire, 2018).

Currently, 35 battery electric transit style buses are in operation, or in procurement, that will operate at Los Angeles International Airport, Mineta San Jose International Airport, and Sacramento International Airport (LAWA, 2018; CARB Staff, 2018a; CARB Staff, 2018b). These buses will transport travelers between airport facilities. As stated previously, buses that operate in airport shuttle sector are very similar to buses operating in the transit sector. California Transit Agencies currently operate or have in procurement (on order, awarded or planned) over 700 battery electric vehicles (CARB, 2018k).

The ZEV market will continue to expand with many businesses committing to reduce their GHG emissions. The International Council on Clean Transportation white paper "Transitioning to Zero-Emission Heavy-Duty Freight Vehicles" lists dozens of companies and organizations with electric vehicle demonstration deployments worldwide, including medium-duty, heavy-duty, and in-ground and catenary charging heavy-duty electric vehicle demonstration projects (CARB, 2018a).

Table VII-2: ZEV Manufacturers

Manufacturer	Vehicle Type	GVWR Category	Technology	Range (miles)	Max. Power (kWh)	Max. Seating
Zenith[1]	Van	LHD	BEV	< 145	135	16
BYD[2]	Coach	MHD	BEV	< 124	125 x 2	18
		HHD		< 200	180 x 2	51-59
	Bus	MHD	BEV	< 135	90 x 2	24
		HHD		230-255	100-180 x 2	34-47
Phoenix Motorcars[3]	Cutaway	MHD	BEV	< 100	N/A	12-18
El Dorado National[4]	Bus	HHD	FCEV	N/A*	150 (cell), 200 (motor)	50-60
Gillig[5]	Bus	HHD	BEV	150-200	200	60
GreenPower Bus[6]	Coach	MHD	BEV	< 140	N/A*	72
	Bus	HHD	BEV	175-240	N/A*	25-100
New Flyer[7]	Bus	HHD	BEV / FCEV	N/A*	190	80
Proterra[8]	Bus	HHD	BEV	< 350	190 x 2	40
E-Bus[9]	Bus	MHD	BEV	< 50	70	23
AVM[10]	Bus	MHD	BEV	< 150	90	22-42
NOVA Bus (coming soon)[11]	Bus	HHD	BEV	10-15	230	60

*Information is not available (N/A)

[1] (UQM Technologies, 2015) UQM Technologies Receives Increased Orders from Zenith Motors for Powerphase Pro 135 Electric Motor Systems for the Medium Duty Truck Delivery Market, September 14, 2018. https://www.uqm.com/investors/press-releases/press-release-details/2015/UQM-Technologies-Receives-Increased-Orders-from-Zenith-Motors-for-PowerPhase-Pro-135-Electric-Motor-Systems-for-the-Medium-Duty-Truck-Delivery-Market/default.aspx

[2] (BYD Motors Inc., 2018) The World's Largest Selection of Battery-Electric Buses, September 14, 2018. http://en.byd.com/usa/bus/

[3] (Phoenix Motorcars, 2017) Products, September 14, 2018. http://www.phoenixmotorcars.com/products/#1504526529831-d1c9ab72-86fe

[4] (LTI Bus Research and Testing Center, 2015a) Federal Transit Bus Test, September 14, 2018. http://apps.altoonabustest.psu.edu/buses/reports/491.pdf?1527101492

[5] (LTI Bus Research and Testing Center, 2015b) Federal Transit Bus Test, September 14, 2018. http://apps.altoonabustest.psu.edu/buses/reports/490.pdf?1527777395

[6] (GreenPower Motor Company, Inc., 2018) Product Line, September 14, 2018. http://www.greenpowerbus.com/product-line/

[7] (NFI Group Inc., 2018) Electric Bus Competitive Comparison, September 14, 2018. https://www.newflyer.com/site-content/uploads/2017/10/Xcelsior-CHARGE-Competitive-Comparison.pdf.pdf

[8] (Proterra, 2016) Proterra Catalyst Buses, September 14, 2018. https://www.proterra.com/products/

[9] (LTI Bus Research and Testing Center, 2015c) STURAA Test, September 14, 2018. http://apps.altoonabustest.psu.edu/buses/reports/166.pdf?1268425136

[10] (Advanced Vehicle Manufacturing, Inc., 2018) Introducing the EV Shuttle, September 14, 2018. https://static1.squarespace.com/static/5a131611d74cff363a3cc76b/t/5b221cc5aa4a99020f7c9963/1528962246641/AVM_Vehicle+%2B+Charger+Brief_FINAL.pdf

Table VII-3: ZEV Conversion Manufacturers

Manufacturer	Vehicle Type	GVWR Category	Vehicle Manufacturers	Conversion Product	Range (miles)	Max. Power (kWh)	Max. Seating
Lightning Systems[1]	Van	LHD	Ford	Battery electric drivetrain	50-150	135	15
Motiv, Ameritrans[2]	Cutaway	LHD	Ford	Battery electric drivetrain	< 75	150	23
		MHD	Ford	Battery electric drivetrain	< 90	180	48
Complete Coach Works[3]	Bus	MHD	Gillig, New Flyer	Battery electric drivetrain	< 150	150	50-70
Hybridrive, BAE Systems[4, 5]	Bus	MHD & HHD	Gillig	Battery electric drivetrain	N/A*	145	28-43
	Bus	HHD	El Dorado National, Gillig	Fuel cell electric drivetrain	< 260	150 (cell), 200 (motor)	33-43
US Hybrid[6]	Cutaway	MHD	US Hybrid	Battery or fuel cell electric drivetrain	< 200	30 (cell), 150 (motor)	25

*Information is not available (N/A)

[1] (Lightning Systems, 2018) Lightning Electric, September 14, 2018. https://lightningsystems.com/ford-transit-passenger-wagon

[2] (Motiv Power Systems, Inc., 2018) EPIC 4 Dearborn, September 14, 2018. http://www.motivps.com/motivps/portfolio-items/epic4dearborn/

[3] (Complete Coach Works, 2018) ZEPS Electric Bus, September 14, 2018. https://completecoach.com/electric-bus/

[4] (BAE Systems, 2018a) DDTM-100 Direct Drive Traction Motor, September 14, 2018. www.hybridrive.com/pdf/bus/DDTM-100.pdf

[5] (BAE Systems, 2018b) Series-H Propulsion System Hydrogen Fuel Cell Bus, September 14, 2018. www.hybridrive.com/pdf/fuel_cell/fuel_cell_datasheet.pdf

[6] (US Hybrid, 2017) H2Ride 30 Fuel Cell Plug-In Shuttle Bus, September 14, 2018. https://ushybrid.com/wp-content/uploads/2017/05/H2Ride30.pdf

D. Incremental Cost of Technology

Battery electric shuttles have higher upfront costs than shuttles with internal combustion engines, but their operational and maintenance costs will provide significant savings over the useful life. The major component cost differential between battery and combustion powered vehicles is the battery cost. The cost of these battery packs is

anticipated to decrease over time due to manufacturing economies of scale associated with higher production volume of zero-emission heavy-duty vehicles. Battery electric shuttles vary in size and price based on vehicle type and range requirements, and can be as small as a passenger van-sized vehicle with a battery size of 100 kilowatt-hour (kWh) to a transit bus with a battery size of 330 kWh.

CARB staff estimates that the incremental capital cost for a Class 4 battery electric cutaway with 100 kWh battery in 2027 will be $57,000 (Appendix C). Vehicle purchases by businesses are assumed to be financed at five percent interest rate over five years. Using these assumptions, the total vehicle incremental cost is expected to be $66,600. The vehicle incremental cost includes a $185 cost due to added cost of compliance with the proposed Zero-Emission Powertrain Certification Regulation.

Initial charging infrastructure installations also have upfront incremental capital costs. The infrastructure costs include costs for labor and materials associated with construction and electrical upgrades, as well as costs for vehicle chargers. Electrical infrastructure (e.g. trenches, transformers, switchboards, and conduit) may need to be upgraded or installed in order to accept the high-power service necessary to support multiple chargers at the fleet depot. While chargers of various power (kilowatt or kW) capabilities are available, class 4 airport shuttles operate as much as 20 hours per day and require rapid charging speeds offered by 50kW depot chargers. Cutaway vehicles in the transit sector generally have longer opportunities for night time charging than the airport shuttle sector allowing them to utilize less expensive 19kW chargers.

Infrastructure capital and installation costs are highly variable because each site is unique. The costs in this report are based on data from airport shuttle infrastructure projects at two California airports and two off-airport parking companies (Appendix C). CARB staff estimates that costs of the infrastructure necessary to support one Class 4 battery electric cutaway will be $50,000, or $58,000 if five percent interest rate over five years for financing is considered (Appendix C). This cost includes $25,000 for a 50 kW depot charger and $25,000 for any necessary site construction and electrical upgrades.

The costs used in this evaluation are conservative estimates that do not include the use of incentives. Many cost sharing opportunities are currently available to fleets to off-set the initial vehicle and infrastructure capital costs; refer to Chapter I.G for more details. For example, on May 31, 2018, the California Public Utility Commission (CPUC) unanimously approved transportation electrification projects proposed by three major Investor Owner Utilities, with a total of $738 million including $236 million from Pacific Gas and Electric and $343 million from Southern California Edison on medium- and heavy-duty infrastructure, required under Senate Bill 350, chapter 547, statutes of 2015 (CPUC, 2018). This approval will reduce the infrastructure costs to airports in those utility service areas. In addition, on May 25, 2018, CARB approved allocations of Volkswagen Environmental Trust Funds that included up to $65 million for zero-emission shuttles (CARB, 2018e). Funds from both of these programs are available to public and private fleet shuttle owners.

E. Lifetime Cost of Technology

Examining lifetime costs involves comparing the purchase and operation of a zero-emission airport shuttle to a CNG powered shuttle. Battery electric shuttles have higher upfront costs than shuttles with internal combustion engines, but their operational costs, which include expenditures associated with fuel purchasing (electricity) and maintenance costs, will provide significant savings over the useful lifetime.

Zero-emission shuttles will cost less to maintain on a per mile basis than a similar internal combustion engine vehicle. CARB staff estimates that the annual maintenance savings during the 12 year vehicle life will be $44,400 for a Class 4 battery electric cutaway (Appendix C).

Both fuel consumption (as a result of vehicle fuel efficiency) and fuel price affect the fuel cost. Electricity costs vary by utilities and charging strategies. CARB staff estimates that the total fuel cost savings of operating a Class 4 battery electric cutaway relative to a CNG shuttle would be $103,200 over the 12 year vehicle life. While the fuel cost for a CNG cutaway is $192,000, the electricity cost for a battery electric cutaway would be $88,800. This is based on an annual mileage of 31,000 miles per year. The assumptions about fuel efficiency and average fuel price of battery electric and CNG cutaways are shown in Table VII-4. Further details on electricity costs and fuel savings can be found in Appendix C.

Costs associated with the reporting requirements of the proposed regulation are examined in Appendix C. There is no differential lifetime reporting cost between zero-emission airport shuttles and internal combustion airport shuttles as reporting is required for shuttles powered by each technology.

Table VII-4: Assumptions of Fuel Efficiency and Average Fuel Price: Class 4 Cutaway Example.

Vehicle Type	**Fuel Efficiency**	**Average Fuel Price**
Battery Electric Cutaway	1.27 kWh/mile	$0.17/kWh
CNG Cutaway	5.3 mile/DGE	$2.50 DGE

In addition to the operational savings attributable to zero emission drivetrains, CARB's Low Carbon Fuel Standard (LCFS) program offers an additional, market based financial benefit to fleets which reduces the overall fuel (electricity) costs. LCFS is a regulation designed to reduce carbon intensity associated with the lifecycle of transportation fuels used in California. LCFS is a well-established program and businesses and local governments are eligible to receive credits. Credits are generated by the purchase and/or usage of electricity or hydrogen to displace internal combustion fuel such as CNG or diesel. The credits will have a monetary value when sold to regulated parties who must offset deficits created by their supply of fuels with carbon intensities that exceed the LCFS standards. Airport shuttle operators will be eligible for this program as they replace shuttles with internal combustion engines with ZEVs. A Class 4 battery

electric cutaway is expected to generate $57,600 worth of LCFS credits over the 12 year lifespan of the vehicle (Appendix C). Vehicle and infrastructure capital costs, operational costs, and LCFS credit generation are combined to determine the total lifetime cost of an airport shuttle.

A Class 4 battery electric cutaway shuttle expected to have a net savings of about $80,600 over its useful 12-year lifetime, as shown in

. The useful lifetime of shuttles is estimated based on the discussion with fleets and survey data. The payback period is around 8 years, at which time total savings begin to exceed total costs.

Table VII-5: Incremental Cost (2016$) between a CNG and Zero-Emission Shuttle: Taking Class 4 Battery Electric Cutaway as an Example (See Chapter VIII for additional details).

Category	Costs Over 12 Year Lifetime[1]
Capital costs[2]	
Vehicle	$66,600
Infrastructure	$58,000
Operational Costs	
Electricity	$88,800
Cost Savings	
Maintenance	($44,400)
Fuel	($192,000)
Low-Carbon Fuel Standard Credits	($57,600)
Combined Cost and Savings	
Total Savings	($80,600)

[1] *Reporting costs are identical for internal combustion and ZEV shuttles are not included in this example*

[2] *Capital costs amortized over a five year period 5% interest*

The proposed regulation is designed to allow fleets the ability to take advantage of funding opportunities available from many cost share programs. The payback period shown in Table VII-5 can be reduced if incentive funds are utilized. Chapter 1 section G discusses the programs currently available for airport shuttles. Fleets have the option to apply for incentive programs and are encouraged but not required to participate in these programs as part of the proposed regulation. However, the proposed regulation is designed to maximize the time fleets have to access these programs by extending the regulatory compliance dates.

Currently, ZEV shuttle technology is estimated to have a payback period on the order of 8 years, when compared to an equivalent CNG shuttle. As ZEV technologies mature and achieve manufacturing economies of scale, prices are predicted to decrease and become increasingly competitive with internal combustion counterparts.

F. Recent State ZEV Investments

The following is a list of some of the zero-emission heavy-duty vehicle projects funded by CARB incentives, and the vehicles and infrastructure that have been deployed from these programs.

1. Hybrid & Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

HVIP is a statewide program that provides vouchers for California purchasers to buy battery electric and fuel cell zero-emission heavy-duty vehicles. Currently, there are 16 manufacturers that offer an HVIP-eligible electric or fuel cell vehicle. As of March 31, 2018, this program has helped deploy 936 zero-emission trucks, shuttles, and buses in California.

2. Zero-Emission Urban Transit Bus Projects

Battery electric and fuel cell buses better serve community transit needs by reducing GHG and criteria pollutant emissions, and providing economic benefits. The following is a list of projects that funded such buses:

<u>San Joaquin Valley Transit Electrification Project</u>
- 15 electric buses
- 13 depot charging stations
- Two fast chargers

<u>City of Porterville Transit Electrification Project</u>
- Ten 40-foot electric buses
- Depot charging station

<u>SunLine Transit Agency Fuel Cell Bus Deployment</u>
- Five fuel cell buses
- Upgraded hydrogen refueling station with onsite renewable generation

<u>Center for Transportation and the Environment Fuel Cell Bus Project</u>
- 20 fuel cell electric buses

<u>The Sacramento Regional Zero-Emission School Bus Deployment Project</u>
- Eight battery electric school buses currently in service
- 29 state-of-the-art zero-emission battery electric school buses coming soon
- 29 charging ports

In addition, over 100 zero-emission delivery trucks were funded and are being utilized by UPS, Goodwill Industries, and the United States Postal Service.

VIII. ECONOMIC IMPACTS ASSESSMENT

This chapter provides a summary of the estimated costs incurred to industry and local and state agencies to comply with the proposed regulatory measure.

The proposed regulation costs and economic impacts are discussed further below. For more detail regarding how they were determined, refer to Appendix C: Economic Analysis.

A. Introduction

As previously discussed, the proposed regulation applies to airport shuttles weighing 8,501 pounds GVWR and greater and requires existing fleets of airport shuttles to transition to zero-emission vehicles. The proposed regulation will impact companies that provide shuttle services at California's large, medium and small hub airports. This will include shuttles that meet the following conditions:

- Operates on a fixed destination route of 30 miles or less,
- Makes at least one stop at one of the 13 regulated airports, and
- Dispatched for service within a 15-mile radius from an airport.

In the absence of this measure, shuttle fleets would likely continue to purchase internal combustion vehicles, the corresponding fuel to run those vehicles, as well as continue to pay for maintenance, and the necessary upkeep to extend a vehicle's useful life. The proposed regulation will require shuttles to transition from internal combustion powertrains to zero-emission technologies, which would require the purchase of zero-emission vehicles and may require the purchase of the associated infrastructure and equipment to refuel/repower electric powertrain shuttles as well. This chapter identifies expected economic costs and benefits to the parties directly affected by the proposed regulation.

Staff estimates 177 businesses will be impacted by the proposed regulation. Based on research[2] and survey[3] data, CARB staff estimated approximately 169 businesses that provide fixed destination route shuttle service to small, medium, and large hub airports in California using shuttles subject to the proposed regulation. Survey data shows that eight companies are contracted to provide ownership of airport-controlled fleets. Any costs and savings incurred by these eight businesses are examined in Section E as the financial effects are expected to be passed on to local government (airports).

Other indirectly impacted entities include companies that are contracted to provide maintenance, ownership, and/or operation for airport-controlled fleets. Additionally, manufacturers of zero-emission shuttles will be impacted by this regulation. Currently, California is host to ten businesses that manufacture zero-emission shuttles, including

[2] Research done by CARB staff using internet data and permitted ground transportation data from airports
[3] Survey conducted by CARB staff in October 2017. Surveys were sent to airport-controlled shuttle fleets and businesses providing ground transportation to and from airports.

five businesses that convert existing shuttles from internal combustion to zero-emission technologies.

Along with the purchase of ZEVs, impacted businesses will likely choose to install the required electric infrastructure at their business location(s). Electric charging infrastructure requires the purchase of a vehicle charger(s), construction, and may require electrical upgrades at the business site to service the increase in power demand.

While ZEV manufacturers and ZEV conversion businesses are likely to see an increase in demand as a result of the required purchases of zero emission shuttles and turnover of existing shuttles, maintenance service industries for internal combustion engines are likely to see a decrease in demand. General vehicle maintenance will likely decrease over time due to efficiencies and durability of electric drivetrain vehicles.

B. Costs of the Proposed Regulation

The proposed regulation specifies the complete transformation of existing airport shuttle fleets from vehicles powered by internal combustion engines to those powered by zero-emission technologies by December 31st, 2035. The economic analysis examines the effects of the proposed regulation from the year 2020 through 2040. The calculated economic impact of this transformation is a net savings of $290 million, which includes capital outlay and interest for purchases of vehicles and installation of charging infrastructure, changes in vehicle maintenance, changes in fueling economics and financial benefits.

Staff modeled the economics of the proposed regulation using the Regional Economics Models, Inc. (REMI) model. Inputs are a combination of capital equipment costs provided by manufacturers and resellers, economic data specific to the California airport shuttle industry, and economic indicators, such as the price of fuel and electricity. The baseline for the analysis is the BAU scenario, where fleets are assumed to continue operations with, predominantly, internal combustion engine-powered shuttles and is fueled by either natural gas, gasoline, or diesel. Cost assumptions are based on current commercially available technology, which is predominantly battery electric drivetrains. However, the proposed regulation defines zero-emission vehicle, which allows for diversity in zero-emission technology, including the potential use of hydrogen fuel cell technology.

Direct costs and cost-savings (Table VIII-1) related to the proposed regulation consists of changes in the purchase price of airport shuttles, infrastructure purchases, infrastructure installation labor, electricity expenditures, savings in fuel, and savings in maintenance, reporting costs, and LCFS credit generation.

Table VIII-1: Cost to Businesses over Regulation Lifetime

	Factor	Proposed Regulation	Alternative 1: No Phase-in of the 100 Percent Requirement*	Alternative 2: Accelerated Phase-In*
Costs	Shuttle Purchases	$59,844,961	$44,115,589	$76,142,039
	Infrastructure Improvements	$28,741,926	$28,741,926	$28,741,926
	Electricity Purchases	$56,198,840	$40,546,422	$70,602,394
	Administrative (Reporting)	$139,200	$34,800	$165,300
Total Costs		**$144,924,927**	**$113,438,738**	**$175,651,659**
Benefits	Fuel Savings	($117,627,836)	($84,866,305)	($147,775,414)
	Maintenance Savings	($29,782,593)	($21,487,589)	($37,415,761)
	LCFS Credits	($31,500,427)	($22,374,184)	($39,903,791)
Net Cost		**($33,985,928)**	**($15,289,341)**	**($49,443,307)**

*See Section H for an explanation of Alternatives 1 and 2.

1. Initial Costs

This section describes the expected initial costs incurred by businesses in order to comply with the proposed regulation. Initial costs included vehicle costs as well as the purchase and construction of the electrical charging infrastructure.

Shuttle Costs

During the regulation implementation period, shuttle fleets will transition from internal combustion shuttles to those powered by electric drive trains until full regulation implementation, where airport shuttle fleets will be 100 percent ZEVs. Staff assumes that existing internal combustion shuttle fleets will be converted to ZEVs at a consistent rate of 6.25 percent per year from 2020-2035. Zero-emission airport shuttles purchased

between 2020 and 2028 will reach the end of their 12-year useful life[4] during the regulatory compliance schedule and will need to be replaced prior to December 31st, 2040. Replacement purchases for zero-emission airport shuttles purchased from 2020 through 2028 are accounted for in years 2032 through 2040 respectively.

Table VIII-2 examines the base costs of internal combustion shuttles and their zero-emission counterparts, of which, currently, only battery electric drivetrains are currently available. Comparison of conventional to ZEV costs indicates that a more robust commercial market exists in the transit-size (low-floor) ZEV bus market, therefore the incremental cost for these class of shuttle is smaller, on a percentage basis, than shuttles outside typical transit sizes. The cost differential is indicative of the need for increased demand, and ultimately production, of cutaway ZEVs in order to bring the cost of ZEVs closer to similar internal combustion shuttles.

[4] The 12-year average life was derived from survey results. The private fleet limited survey results provided an average vehicle life of 10.7 years that staff aligned to match the 12 years average vehicle life from the public fleet inventory.

Table VIII-2: Airport Shuttle Populations and Vehicle Costs

Existing Internal Combustion Shuttle Type (Fuel Type[1])	Private Business Population	Local Government Population	Internal Combustion Shuttle Cost	Zero-Emission Shuttle Cost[2]	Incremental Cost 2016$ (percent increase)
Class 2b Van (Gasoline)[2]	75	0	$45,000	$120,000	$75,000 (+167%)
Class 3 Cutaway (CNG)	203	0	$70,000	$170,000	$100,000 (+182%)
Class 4 Cutaway (CNG)	381	55	$80,000	$180,000	$100,000 (+143%)
Class 5 Cutaway (CNG)	6	27	$100,000	$200,000	$100,000 (+100%)
Class 7-8 32'-35' Low-Floor (CNG)[3]	0	69	$460,000	$700,000	$235,000 (+52%)
Class 8 40' Low-Floor (CNG)	0	46	$485,000	$770,000	$285,000 (+59%)
Class 8 40' Low-Floor (Diesel)	0	26	$435,000	$770,000	$335,000 (+77%)
Class 8 60' Low-Floor (CNG)	0	21	$700,000	$1,100,000	$400,000 (+57%)

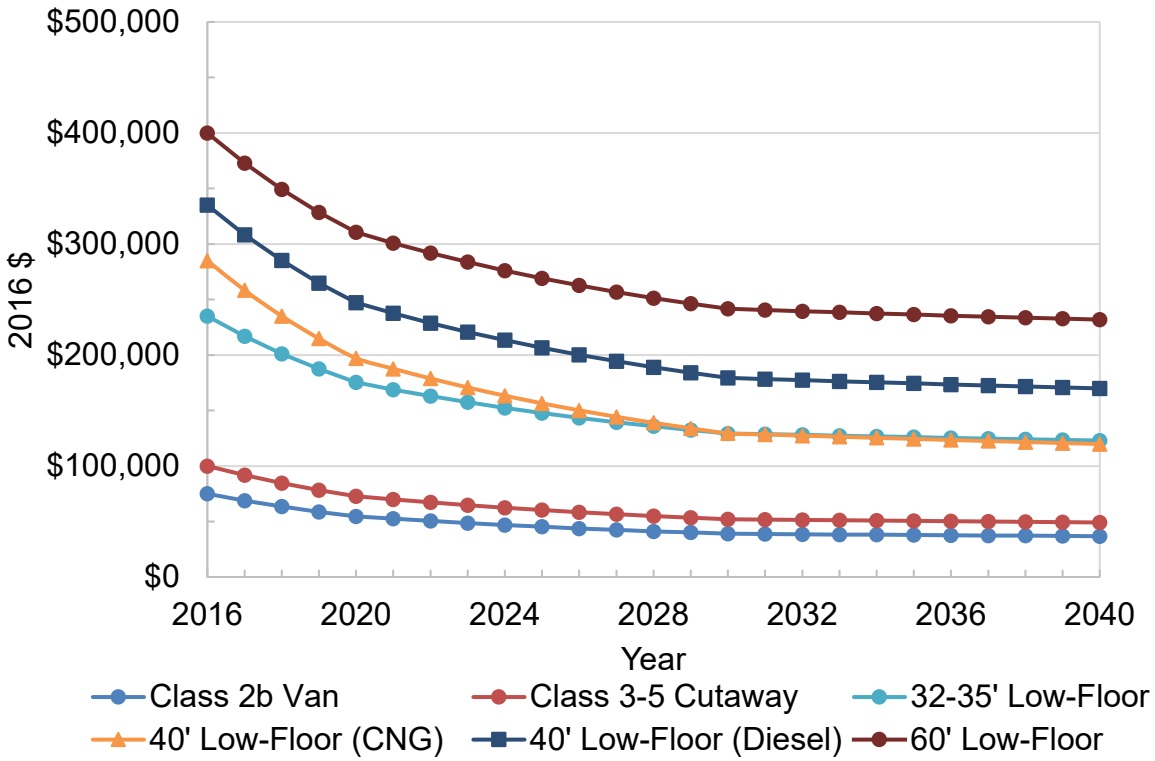
[1] Using survey data, the most common fuel type for a given vehicle type and class was assumed for all vehicles in that type/class.
[2] Class 2b Internal combustion vans are expected to be replaced with Class 3 ZEVs.
[3] Class 7-8 32'-35' Low-Floor shuttles are expected to be replaced by Class 8 35' ZEVs.

Shuttle Cost Projections

In order to account for the future changes in the incremental costs between internal combustion vehicles and battery-electric vehicles, staff utilizes the price projection analysis done by ICT (CARB, 2018l). Incremental costs are expected to decrease over time due to the reduction of battery costs. Staff estimates that battery costs for buses will decrease over time from $725/kWh in 2015 to $405/kWh in 2020, and to $218/kWh in 2030 for batteries used in depot-charging shuttles. Using the assumptions for shuttle replacement rates and useful life from the Vehicle Cost section above, as well as the shuttle price projections shown in Figure VIII-1, staff estimates that, over the period of 2020-2040, there will be a statewide vehicle cost of $59,844,961 to private businesses

to comply with this regulation, due to a higher initial cost of ZEVs compared to internal combustion vehicles. Further detail regarding vehicle costs is available in Appendix C.

Figure VIII-1: Incremental Costs of Replacing Internal Combustion Shuttles with Equivalent Zero-Emission Airport Shuttles



Zero-Emission Powertrain Certification (ZEPCert)

Zero-emission airport shuttles that are model year 2026 and later will be required to meet ZEPCert requirements in order to comply with the proposed regulation. ZEPCert requirements apply to vehicles that are Class 4 and higher. Compliance costs for ZEPCert are expected to result in a price increase of $185 per ZEV (CARB, 2018a). Staff expects 2026 model year zero-emission airport shuttles to begin being sold in 2025. ZEPCert costs were added to the annual vehicle incremental cost and included in cost calculations from 2025-2040.

Infrastructure Costs

Airport shuttle providers may decide that their fleets will require additional infrastructure support equipment to provide refueling/charging of the vehicles' energy system as they transition to zero-emission airport shuttles. During the regulation implementation period, shuttle fleets will either need to install their own energy infrastructure, or purchase energy from a third-party provider of energy infrastructure. CARB staff assumed fleets will choose to purchase and install their own infrastructure.

Infrastructure costs include capital costs to purchase recharging/refueling equipment, construction costs to build the recharging/refueling station, and costs to upgrade the electric power grid to bring power to the charging station.

One charger is expected to be needed for every zero-emission shuttle that is purchased. Survey data shows that one third of private business shuttles operate less than 75 miles per day and staff assumes that Level II chargers between 6-19 kilowatts (kW) will be sufficient to meet the daily charging requirements. All other private business shuttles are assumed to need 50 kW Level III chargers. Chargers are assumed to be purchased simultaneously with the corresponding shuttles and will follow the annual purchasing rates shown in Table VIII-4.

Electrical Infrastructure upgrades and construction becomes more economical on a per unit basis as more units are simultaneously installed due to savings in labor and material costs (CARB Staff, 2018c). Annual infrastructure construction, installation, and associated costs are based on a percentage of the total infrastructure needed to accommodate the entire regulated vehicle inventory and are displayed in Table VIII-4. Population and cost data for infrastructure and electrical charger equipment are displayed in Table VII-3. Total costs for infrastructure purchases and construction are expected to be $28,741,926.

Table VIII-3: Infrastructure Costs

Infrastructure Type	**Cost**	**Private Business Population**	**Local Government Population**
Charging Equipment			
Level II Cutaway Shuttle Charger	$2,500	442	82
Level III Cutaway Shuttle Charger	$25,000	223	0
Low-Floor Shuttle Charger	$50,000	0	162
Infrastructure Construction: Location-Shuttle Type			
Business - Cutaway	$25,000	665	0
Airport - Cutaway	$50,000	0	82
Airport - Low-floor	$100,000	0	162

Table VIII-4: Expected Annual Infrastructure Construction

Calendar Year	Private Business		Local Government	
	Charger Purchases	Infrastructure Construction	Charger Purchases	Infrastructure Construction
2020	6.25%	12.5%	7%	14%
2021	6.25%	12.5%	7%	14%
2022	6.25%	12.5%	7%	14%
2023	6.25%	12.5%	6%	12%
2024	6.25%	6.25%	6%	6%
2025	6.25%	6.25%	6%	6%
2026	6.25%	6.25%	6%	6%
2027	6.25%	6.25%	7%	4%
2028	6.25%	3.125%	6%	4%
2029	6.25%	3.125%	6%	3%
2030	6.25%	3.125%	6%	3%
2031	6.25%	3.125%	6%	3%
2032	6.25%	3.125%	6%	3%
2033	6.25%	3.125%	6%	3%
2034	6.25%	3.125%	6%	3%
2035	6.25%	3.125%	6%	2%
2036	-	-	-	-
2037	-	-	-	-
2038	-	-	-	-
2039	-	-	-	-
2040	-	-	-	-

2. Ongoing Costs

This section examines the expected ongoing costs businesses will experience as a result of compliance with the proposed regulation. These include electricity costs and reporting costs.

Electricity Costs

Businesses that replace internal combustion shuttles with ZEVs will have to purchase electricity in order to charge the vehicles. This would result in increased electricity costs compared to the baseline scenario. CARB's Truck and Bus charging calculator estimated an average price of $0.17 per kilowatt-hour (kWh) for shuttles operating at airports in California (CARB, 2018m). The annual electricity expenditures include the assumption of 90 percent charger efficiency (CARB, 2018n). This results in 1.1 kWh of electricity being purchased for every 1 kWh of vehicle charge. Annual electricity expenditures by vehicle type are presented in Table VIII-5. The total expected electricity costs are $56,198,840, as shown in table VIII-1.

Table VIII-5: Vehicle Electricity Costs

Zero-Emission Airport Shuttle Type	Energy Usage (kWh per mile)	Annual Miles Per Vehicle	Annual kWh Purchased Per Vehicle	Annual Electricity Cost Per Vehicle
Class 3 Van	0.65	19,426	13,890	$ 2,361
Class 3 Cutaway	0.93	31,660	32,388	$ 5,506
Class 4 Cutaway	1.27	31,084	43,424	$ 7,382
Class 5 Cutaway	1.5	33,000	54,450	$ 9,257
Class 8 35’ Low-floor	2	20,489	45,076	$ 7,663
Class 8 40’ Low-floor	2	57,069	125,552	$21,344
Class 8 60’ Low-floor	3	4,703	15,520	$ 2,638

Reporting Costs

The proposed regulation requires reporting for airport shuttle fleets starting in 2022. During the first year of reporting, fleets would need to input all the required fleet and vehicle information into the CARB database for all vehicles subject to the proposed regulation. In subsequent years, fleets would not have to re-input vehicle information already on file in the database. Fleets instead would only need to add vehicle information for those vehicles new to the fleet or delete vehicles that are no longer part of the fleet. Therefore, staff estimates that the proposed reporting requirements would require a larger time commitment in the first year than in subsequent years (Table VIII-6). Staff assumes a cost of $50 per hour for a clerical employee to input data to meet the proposed regulation reporting requirements. Time estimates for the first year of reporting are based on reporting cost assumptions used in the development of the Truck and Bus Regulation (CARB, 2008) and are assumed to decrease by 50 percent in subsequent years. Estimated statewide reporting costs are $139,200 for private fleets, as displayed in Table VIII-1.

Table VIII-6: Estimated Reporting Times by Fleet Size

Fleet Size	Number of Private Fleets in California	Number of Public Fleets in California	First Year Estimates	Subsequent Year Estimates
50+ Vehicles	1	2	8 hours	4 hours
20-49 Vehicles	2	2	4 hours	2 hours
2-19 Vehicles	166	5	2 hours	1 hours

C. Benefits

This section discusses economic benefits for the businesses and industries impacted by the proposed regulation. Non-economic benefits linked to the proposed regulation are discussed in Chapter IV, Benefits and Chapter V, Air Quality Benefits.

1. Fuel and Maintenance Savings

During the regulation implementation phase, fossil fuel consumption will be completely replaced by a zero-tailpipe emission energy source, presumably electricity or hydrogen. CARB staff estimate that over the regulatory transition period, 2020 - 2035, there will be a monetary benefit for the fleets, as electricity displaces fossil fuel. As displayed in Table VIII-1, fleets are expected to spend $56,198,840 on electricity as propulsion energy, while saving $117,627,836 on reduced, and ultimately eliminated, fossil fuel spending. This results in an estimated $61,428,996 in savings by businesses. Fuel savings by vehicle type are displayed in Table VIII-7 and are based on the average annual miles traveled displayed in Table VIII-5.

ZEVs have lower maintenance costs on a per mile basis than similar internal combustion vehicles. Businesses replacing internal combustion shuttles with ZEV technologies will experience monetary benefits from maintenance savings, dependent upon the vehicle type and annual miles driven. Data regarding maintenance savings for ZEV performing airport shuttle duty cycles is limited. Projected maintenance savings were estimated from ZEV manufacturer information and a maintenance report from CARB's ICT team (CARB, 2016b). Staff examined this information along with ZEV manufacturer data comparing internal combustion vehicles to ZEVs and calculated savings by comparing differential costs related to brakes, starter motor, alternator, cooling system, emission controls, fuel systems, as well as costs related to oil and filter changes.

Annual maintenance savings by vehicle type are displayed in Table VIII-7 and are based on the average annual miles traveled displayed in Table VIII-5. The total annualized maintenance savings for businesses over the period from 2020 to 2040 is estimated at $29,782,593, as presented in Table VIII-1.

Table VIII-7: Estimated Annual Fuel and Maintenance Savings by Vehicle Type

Existing IC Vehicle Type	Replacement Zero-Emission Airport ShuttleType	Annual Fuel Savings Per Vehicle	Annual Maintenance Savings Per Vehicle
Class 2b Van (Gasoline)	Class 3 Van	$ 5,298	$ 1,554
Class 3 Cutaway (CNG)	Class 3 Cutaway	$11,307	$ 3,166
Class 4 Cutaway (CNG)	Class 4 Cutaway	$15,542	$ 3,730
Class 5 Cutaway (CNG)	Class 5 Cutaway	$16,500	$ 4,290
Class 7-8 32'-35' Low-Floor (CNG)	Class 8 35' ZEV	$11,708	$ 5,122
Class 8 40' Low-Floor (CNG)	Class 8 40' ZEV	$33,058	$14,463
Class 8 40' Low-Floor (Diesel)	Class 8 40' ZEV	$42,215	$10,694
Class 8 60' Low-Floor (CNG)	Class 8 60' ZEV	$ 2,687	$ 1,176

2. Low Carbon Fuel Standard Credits

CARB's LCFS Program offers monetized credits to businesses that power their shuttles with low-carbon fuels, such as hydrogen and electricity (CARB, 2017b). The proposed regulation will require regulated business to adopt zero-emission technology, which will allow them to take advantage of the LCFS program and generate monetary benefits through the use of low carbon fuels. While fuels currently being utilized by airport shuttles are eligible for LCFS credits, survey data shows that the vast majority of businesses and local governments are not participating in the program. Using this data, staff assumes a baseline scenario in which airport shuttle bus owners are not participating in or currently receiving monetary benefits from the LCFS program. Over the 20-year lifetime of the regulation, businesses are expected to be eligible for $31,500,427 in LCFS credits, as displayed in Table VIII-1. Average annual credits generated by vehicles in public and private fleets are displayed in Table VIII-8.

Table VIII-8: Annual LCFS Credit Generation

Year	Private Business Fleets		Public Fleets	
	$/kWh	Average Credits Generated Per Vehicle	$/kWh	Average Credits Generated Per Vehicle
2020	$0.1107	$4,160	$0.134	$9,508
2021	$0.1087	$4,087	$0.131	$9,347
2022	$0.1068	$4,015	$0.129	$9,186
2023	$0.1048	$3,942	$0.127	$9,025
2024	$0.1028	$3,870	$0.124	$8,863
2025	$0.1009	$3,797	$0.122	$8,703
2026	$0.0989	$3,725	$0.120	$8,542
2027	$0.0970	$3,652	$0.118	$8,381
2028	$0.0950	$3,580	$0.115	$8,220
2029	$0.0931	$3,508	$0.113	$8,060
2030	$0.0911	$3,435	$0.111	$7,898
2031	$0.0911	$3,435	$0.111	$7,898
2032	$0.0911	$3,435	$0.111	$7,898
2033	$0.0911	$3,435	$0.111	$7,898
2034	$0.0911	$3,435	$0.111	$7,898
2035	$0.0911	$3,435	$0.111	$7,898
2036	$0.1107	$3,435	$0.111	$7,898
2037	$0.1087	$3,435	$0.111	$7,898
2038	$0.1068	$3,435	$0.111	$7,898
2039	$0.1048	$3,435	$0.111	$7,898
2040	$0.1028	$3,435	$0.111	$7,898

D. Affected Businesses

1. Business Types

Survey[5] and research data suggest approximately 177 private entities will be directly impacted by the regulation. These businesses provide fixed route destination shuttle service to small, medium, and large hub airports in California, using shuttles subject to the proposed regulation. These businesses provide lodging, transportation, and parking services will be directly affected by the proposed regulation. These companies will be required to replace internal combustion shuttles with ZEVs. Along with the purchase of ZEVs, businesses in the transportation and hospitality industries that are impacted by this regulation may choose to install electric infrastructure at their business location(s). Electric charging infrastructure requires the purchase of a vehicle charger, construction, and may require electrical upgrades at the business site to service the increase in power demand.

Included in the 177 directly impacted private entities are 8 companies that are contracted by California airports to owner and operate their shuttle fleets. These transportation businesses will also be subject to the proposed requirements. All costs associated with the proposed regulation by these contracted businesses are expected to be passed on to local governments

Additionally, approximately 117 businesses will be indirectly impacted by the regulation. Also among the indirectly impacted industries are approximately 102 businesses that provide vehicle maintenance for the regulated shuttle fleets. These businesses are expected to see a decrease in demand for their services, as electric shuttles require less maintenance than internal combustion shuttles of similar size (CARB, 2016b). The vehicle inventory impacted by the proposed regulation represents a less than one percent of heavy-duty passenger vehicles in California. The reduction in maintenance demands is expected to have a negligible impact on the industry as a whole.

Among the 117 indirectly impacted businesses will be the zero-emission airport shuttle manufacturers in California. Staff has confirmed 10 businesses that manufacture zero-emission shuttles and 5 businesses that convert existing shuttles from internal combustion engine to zero-emission technologies. The required replacement of internal combustion shuttles with ZEVs will increase the number of ZEVs purchased by the regulated businesses. This is expected to cause ZEV manufacturers and ZEV conversion businesses to experience an increase in demand of their products.

[5] Survey conducted by CARB staff in October 2017. Surveys were sent to airport-controlled shuttle fleets and businesses providing ground transportation to and from airports.

2. Potential Impacts on Jobs and Business Creation, Elimination or Expansion

Staff expects the proposed regulation to have a minimal impact on business creation or elimination, however some business contraction may occur. Similarly, staff expect minimal net impact on the total number of jobs as any contraction among some vocations may be met with an expansion in others.

Business Creation, Elimination, or Expansion

Staff expects the proposed regulation to have a minimal impact on business creation or elimination. Increased costs to businesses that operate airport shuttle fleets could be addressed through a variety of options. Detailed per business annual costs and cost savings are calculated in Appendix C. While there are multiple years of net costs, these calculations show that over the lifetime of the regulation the net impact is likely to be a cost savings to business. In early years, when upfront investments outweigh cost savings, businesses may decide to pass on costs to the consumer or could consider decreasing service or other cost savings measures. As seen in Appendix C, compliance costs could be passed on with a small price impact of between one and three percent. That is not anticipated to impact consumer behavior, thus it is less likely that businesses would decrease service. As a result of this analysis, staff does not expect that the proposed regulation to have a significant statewide adverse economic impact directly affecting businesses. In addition, the cost analysis does not estimate the ability of regulated fleets to obtain incentive funding which could further offset the compliance costs and reduce the need to pass through costs to the consumer.

The increase in demand for ZEVs, batteries, and drivetrains as a result of the proposed regulation is not likely to be large enough to incentivize the creating of new businesses in the manufacturing and installation market, but the increased visibility to the public and operational history are anticipated to indirectly support the market for these technologies. There are 9 ZEV manufacturers located in California who could benefits from increased demand.

The proposed regulation will require installation of charging infrastructure at the location where the ZEVs are domiciled, which will require general construction and electrical upgrades. The increased demand for these services will provide a benefit to those California businesses, but is not anticipated to be large enough to cause an expansion of current businesses or creation of new businesses.

Job Creation and Elimination

Overall, staff expects to see a minimal impact on the number of jobs created or eliminated because of the proposed regulation. As described in Section A.4., the overall impact of the proposed regulation is likely a cost savings to business. There are net costs in early years for initial ZEV and infrastructure investments which could be passed on to the consumer or could result in a decrease in service or other cost saving measures. If a fleet decreased service then some jobs in the industry could be lost. However, since Appendix C shows costs could be passed to consumers with a small increase in price, it is anticipated that decrease in service will be minimal if any.

A small number of jobs could be created in industries associated with zero-emission shuttle manufacturing, conversion, maintenance, and support due to the increased demand for these technologies.

ZEVs, require less maintenance per mile traveled than those powered by internal combustion engines. Requiring the replacement of internal combustion-powered shuttles with ZEVs could slightly decrease the demand for businesses that provide maintenance for internal combustion powered shuttles which could slightly reduce the number of jobs in this sector. The proposed regulation impacts on the order of 1,000 airport shuttle buses however, there are on the order of hundreds of thousands of internal combustion vehicles in California which have similar characteristics as airport shuttle buses (Class 2b-Class 8 vehicles). Repair shops that maintain internal combustion airport shuttle buses are anticipated to also repair many of these Class 2b - 8 vehicles. Given the small population of vehicles impacted by the proposed amendments, any potential decrease in demand for maintenance and resulting decrease in employment is anticipated to be small.

Effect on Business Competitiveness

No significant impacts to the competitive advantages or disadvantages for businesses currently doing business in the state are anticipated. All businesses owning or operating fleets that service airports in California would be subject to the same proposed zero-emission vehicle requirements, regardless of in-state and out-of-state ownership status. The proposed requirements would not create any competitive disadvantage to businesses located in California.

Potential Impact on Small Businesses

Staff estimates that 61 out of the 177 businesses directly impacted by the regulation are small businesses, which is approximately 34 percent of the business population. This estimate was derived by extrapolating the percentage of small businesses, from the survey responses, to the total number of businesses, statewide, which was determined from research and survey data.

The two small business types that will be impacted by the proposed regulation are hotels and off-airport parking companies. Small business cost estimates are based on survey data which reports that the average small business hotel has one Class 3 Cutaway shuttle. Using the cost assumptions outlined in Section B and Section C, the cost incurred by this business from 2020 to 2040 due to the proposed ASB regulation is $126,890. Over the 20-year time period, fuel and maintenance savings as well as LCFS credit generation are expected to surpass the total costs. Incorporating these monetary savings results in an overall net savings of $1,373 over the same time period. Further details on cost calculations for a small business hotel are located in Appendix C.

Survey data shows that an a average small business off-airport parking company has three Class 3 cutaway shuttles and three Class 4 cutaway shuttles. Using the cost assumptions outlined in Section B and Section C, the cost incurred by this business from 2020 to 2040 due to the proposed ASB regulation is $1,212,255. Over the 20-year time period, fuel and maintenance savings as well as LCFS credit generation are expected to surpass the total costs. Incorporating these monetary savings results in an overall net savings of $88,055 over the same time period. Further details on cost calculations for a small business hotel are located in Appendix C.

E. Fiscal Impact Local Agencies

The proposed regulation does not cause any additional expenditures in the current state fiscal year. The proposed regulation will incur administrative costs to the state over the implementation period, which primarily include staffing costs.

The proposed regulation will have direct impacts to local government entities that either operate or contract airport shuttle operations at their airport facilities. These local entities will need to comply with the proposed regulation’s zero-emission airport shuttle requirements.

1. Impacts to Local Governments

The proposed regulation does not cause any additional expenditures in the current State Fiscal Year. However, it directly impacts local government entities with airport-controlled fleets in California by requiring the internal combustion shuttles be replaced with ZEVs. Along with public ownership of the airport-controlled fleets, twelve private businesses also participate in the ownership and/or operation of these shuttles. All of the additional expenditures will ultimately be incurred by local governments, which fund airport operations. Increased local government expenditures and fiscal savings over the life of the proposed regulation will be examined in this section. Annualized costs to local governments are detailed in Table VII-9 on the following page.

Table VIII-9: Cost to Local Governments over Regulation Lifetime

	Factor	Proposed Regulation	Alternative 1: No Phase-in of the 100 Percent Requirement*	Alternative 2: Acceleration Phase-In
Costs	Shuttle Purchases	$49,437,614	$35,643,807	$63,384,210
	Infrastructure Improvements	$31,809,019	$31,809,019	$31,809,019
	Electricity Purchases	$38,123,291	$27,103,712	$47,194,965
	Administrative (Reporting)	$13,600	$3,400	$16,150
Total Cost		**$119,383,524**	**$94,561,450**	**$142,403,685**
Benefits	Fuel Savings	($65,525,004)	($46,584,930)	($81,117,085)
	Maintenance Savings	($22,501,494)	($15,997,413)	($27,855,864)
	LCFS Credits	($26,975,842)	($19,069,515)	($33,631,459)
Net Cost		**$4,381,184**	**$12,909,592**	**($200,724)**

*See Section H for an explanation of Alternatives 1 & 2.

Vehicle Costs

Incremental vehicle cost assumptions are displayed in Table VII-2 and Figure VII-2. A higher rate of vehicle turnover is assumed from 2020-2022 due to the availability of federal incentive programs, including the Airport Zero Emissions Vehicle and Infrastructure Pilot Program (FAA, 2017). From 2020-2022, staff estimates that airport-controlled shuttles will be converted to ZEVs at an annual rate of 7 percent and from 2023-2035 the annual ZEV conversion rate is expected to 6 percent. Zero-emission airport shuttles purchased between 2020 and 2028 will reach the end of their 12-year useful life[6] during the regulatory compliance schedule and will need to be replaced prior to December 31st, 2040. Replacement purchases for zero-emission airport shuttles purchased from 2020 through 2028 are accounted for in years 2032

[6] The 12-year average life was derived from survey results. The private fleet limited survey results provided an average vehicle life of 10.7 years that staff aligned to match the 12 years average vehicle life from the public fleet inventory.

through 2040 respectively. CARB staff estimates that, over the period of 2020-2040, there will be a statewide vehicle cost of $49,437,614 to local governments to comply with this regulation, due to a higher cost of ZEVs compared to internal combustion vehicles.

Infrastructure Costs

Staff assumes that during the first three years of the regulatory lifetime, 2020-2022, infrastructure installation and electrical charging equipment purchases will outpace shuttle turnover due to economies of scale. Due to savings regarding labor and materials, construction costs associated with charging infrastructure become more economical on a per charger basis as more units are simultaneously installed. Annual infrastructure purchases/construction (Table VII- 4) are expressed as a percentage of the total infrastructure needed to accommodate the entire regulated vehicle inventory. One charger is assumed to be needed per zero-emission airport shuttle. Staff assumes that all zero-emission airport shuttles owned by or operating on behalf of local governments will require 50 (kW) Level III chargers due to the long duty cycles of shuttles operating on behalf of airports.

The Site Construction Costs (Table VII-3) for charging infrastructure is expected to be $50,000 for each Cutaway shuttle and $100,000 for each Class 7 and 8 Low-Floor zero-emission airport shuttles. Staff assumed that construction costs for Cutaway infrastructure at airports will be twice as expensive compared to similar infrastructure at private businesses. This conservative assumption accounts for the additional labor and materials needed for airport charging stations that may not be in proximity of existing electrical infrastructure. These costs are within ranges vetted with the public and stakeholders at Workshops. CARB staff estimates that from 2020 to 2040 there will be a statewide infrastructure cost of $31,809,019 local governments to comply with this regulation.

Electricity Costs

An explanation of electricity costs, including expected annual electricity costs by vehicle type, can be found in Section B. Total electricity costs to local governments during the regulatory lifetime are expected to be $38,123,291, as detailed in Table VIII-9.

Reporting Costs

An explanation of electricity costs can be found in Section B. Total electricity costs to local governments during the regulatory lifetime are expected to be $13,600, as detailed in Table VIII-9.

2. Fiscal Savings

Fiscal savings to local governments will be generated from the same sources as the monetary benefits to private businesses: fuel savings, maintenance savings, and LCFS

credit generation. During the period of 2020 to 2040 local governments are expected to save $65,525,004 in reduced fuel costs and $22,501,494 in reduced maintenance costs as a result of complying with the proposed regulation. In addition, local governments will generate an estimated $26,975,842 in LCFS credits over the same time period. An explanation of these savings, along with annual fuel and maintenance savings by vehicle type can be found in Section C.

F. Fiscal Impacts to State Government

Staff does not anticipate capital expenditures to be required to purchase state vehicles, however it is anticipated that the proposed regulation will incur state-level administrative costs. Staff estimates one Air Pollution Specialist (APS) will be needed in the Enforcement Division (ED) to help increase CARB's enforcement presence throughout the state. Other duties for this APS may include: conducting investigations of complains, developing and preparing relevant case documentation, managing forms, validating reported data, coordinating with legal to ensure enforcement is consistent with state law, assisting with regulation interpretation, and conducting interviews associated with case development and penalty assessment. Existing staff of the Diesel Programs Enforcement Branch (DPEB) currently enforce a multitude of regulations, some of which regulate well over a million on-road heavy-duty diesel vehicles, off-road vehicles, and Transport Refrigeration Units. The additional workload to enforce the proposed regulation will impact the DPEB and an additional personnel year (PY) is needed to absorb this workload. In absence of the additional PY, DPEB would be required to divert a PY from other high priority programs, affecting ED's ability to maintain compliance in those other programs.

The second APS will be needed in the Mobile Source Control Division (MSCD) to manage the reporting data submitted by the regulated businesses and airports on an annual basis beginning in 2020. Other duties may include performing outreach to the regulated community, coordination with the ED regarding reported non-compliance, and coordinating with legal staff to ensure the implementation of the regulation is consistent with state law and assistance with regulation interpretation.

The cost for an APS position (salary + benefit + overhead) is $173,000 for the first year with an annual cost in subsequent years of $172,000. The hiring of those two requested positions would be spread out from 2020 to 2023, specifically: one APS in MSCD starting in FY 2020-2021 and the other APS in ED starting in FY 2022-2023. Funding for the MSCD position could come from the Motor Vehicle Account or other funding sources. The APS in ED will not cause any additional costs during this time period.

G. Major Regulations

For a major regulation, a standardized regulatory impact analysis (SRIA) is required. A major regulation is one that has "an estimated economic impact to business enterprises and individuals located in or doing business in California exceeding $50 million in any

12-month period between the date that the major regulation is estimated to be filed with the Secretary of State through 12 months after the major regulation is estimated to be fully implemented." The annual economic impacts of the proposed regulation do not exceed $50 million and hence a SRIA is not required. Therefore, this proposal is not a major regulation as defined by title 1 CCR section 2000(g).

H. Regulatory Alternatives

Government Code section 11346.2, subdivision (b)(4) requires CARB to consider and evaluate reasonable alternatives to the proposed regulatory action and provide reasons for rejecting those alternatives. This section discusses alternatives evaluated and provides reasons why these alternatives were not included in the proposal. As explained below, no alternative proposed was found to be less burdensome or equally effective in achieving the purposes of the regulation in a manner than ensures full compliance with the authorizing law. Further, the Board has not identified any reasonable alternatives that would lessen any adverse impact on small business.

1. Alternative 1: No Phase-in of the 100 Percent Requirement (100 percent fleet requirement by December 31st, 2035)

Alternative 1 includes a single compliance date, December 31, 2035, for affected fleets to meet a 100 percent zero-emission conversion requirement (Table D1). This scenario has no phase-in period and therefore does not include the 33 percent and 66 percent fleet compliance deadlines found in the proposed regulation. Staff assumes that the existing internal combustion shuttle inventory will be converted to ZEVs at the rate described in Table D2. Reporting is not required until the year prior to the 100 percent compliance date of 2035. While businesses would likely begin to replace existing shuttles with ZEVs at least five years before the compliance deadline for logistical reasons, staff believes that the majority of purchases would be delayed when compared to the proposed regulation. Delayed ZEV purchase would decrease the cost to businesses as battery and ZEV prices are expected to decrease over time. Zero-emission airport shuttles purchases made prior to the compliance date would be voluntary and would allow more opportunities for impacted businesses to utilize local, state, and/or federal incentive funds to aid in the new ZEV purchases.

Staff rejected this alternative due to lack of interim year fleet conversion requirements that consequently impart no reporting or enforcement mechanisms to ensure that the impacted businesses are progressing towards 100 percent compliance. Airport shuttle fleet planning is a minimum 18-month process to complete, which includes timing of ZEV purchasing and delivery, and infrastructure design, construction, and installation. Impacted fleet owners attempting to rapidly convert their fleets to ZEVs in a delayed effort to comply may face delays and unforeseen circumstances that jeopardize compliance as well as the intended emission reductions.

Costs and benefits to private businesses in the Alternative 1 scenario are displayed in Table VII-1. Increased costs and savings to local governments in the Alternative 1 Scenario are displayed in Table VII-9.

2. Alternative 2: Accelerated Phase-In (100 percent fleet turnover by December 31st, 2028)

Alternative 2 shifts regulation compliance to the schedule described in Table D1, which are sooner than the proposed regulation. Staff assumes that the existing internal combustion shuttle inventory will be converted to ZEVs at the rates described in Table D2. Reporting is required beginning 2019.

The compliance mechanisms of Alternative 2 are similar to those found in the Proposed Regulation. However, Alternative 2 proposes an accelerated rate of ZEV adoption by implementing fleet percentage requirements three years earlier than the proposed regulation. Alternative 2's final compliance year, 2028 is seven years sooner than the proposed regulation's 2035 compliance year.

Staff rejected Alternative 2 because the accelerated fleet conversion requirements are impractical. ZEV technology, especially for the Class 3, 4, and 5 vehicles, is currently in its early stages. Few manufacturers, as well maintenance support systems, currently exist for these vehicles. The proposed regulation is part of a suite of efforts by CARB to promote the adoption of zero-emission technologies. Staff believes that implementing the requirements in tandem with increased availability and diversity of ZEV products, as well as the expansion of support systems, is the most effective method towards total and successful implementation.

Alternative 2's regulatory compliance requirements negatively impact future incentive program eligibility by establishing the end of the surplus emission reduction period (i.e. this means the emission reductions must be realized several years ahead of any regulatory deadlines). The proposed regulatory schedule is designed to maximize future incentive opportunities in the near term yet also provide a framework with which future actions must occur in order to reach CARB overall needed emission reduction goals. CARB staff will continue to work with local air districts to identify opportunities to airport shuttle fleet owners in deploying zero-emission airport shuttles while continuing to ensure incentive achieve surplus emission reductions.

Costs and benefits to private businesses in the Alternative 2 scenario are displayed in Table VII-1. Increased Fiscal Expenditures and Savings to Local Governments in the Alternative 2 Scenario are displayed in Table VII-7.

I. Incentive funding

Airport shuttle fleets may be eligible for various cost-sharing opportunities in the form of State, Local, and Federal incentive programs. These programs help offset a portion of the costs incurred when purchasing ZEVs, charging infrastructure, and electricity. By

lowering the cost barrier to zero-emission technologies, staff expects incentives to play an important role in helping businesses and local governments replace internal combustion shuttles with zero-emission shuttles in the voluntary and early action period of the proposed regulation. The proposed requirements are expected to increase the demand for incentive programs. State and local programs are not specific to airport shuttles and increased demand for these funds will make the application process more competitive and incentive programs will not be able to assist every fleet. More information on incentive funding available to airport shuttle fleets is available in Section G of Chapter 1.

J. Other Impacts

Increase in manufacturing, production, and use of ZEVs could require the construction or modification of associated manufacturing and maintenance facilities to increase the supply of zero-emission airport shuttles. The increase in ZEV production to meet airport shuttle demand would be accompanied by an increase in the production of propulsion batteries. Current BEV battery technology involves use of nickel-metal or lithium-ion propulsion batteries.

The development of battery electric vehicle charging infrastructure will increase as the share of battery electric ZEVs grows as a result of the proposed regulation. Infrastructure development would require the purchase and installation of charging station hardware and potentially hardware associated with connecting these charging stations with the electrical grid. In some cases, transformers and substations may be required. Excavation and trenching would likely be required for these installations.

As a result of the new ZEV requirements adopted by the Board, the number of EVs in California will substantially increase over the next decade. As the ZEV program ramps up over the next decade, EV infrastructure needs to meet the needs of consumers, and keep pace with the expanding EV market. Successful market expansion will depend on enhancing current education, marketing, and outreach efforts. This includes increasing consumer confidence in EV technology, including charging infrastructure.

IX. EVALUATION OF REGULATORY ALTERNATIVES

Government Code section 11346.2, subdivision (b)(4) requires CARB to consider and evaluate reasonable alternatives to the proposed regulatory action and provide reasons for rejecting those alternatives (Government Code 11346.2, 2015). The proposed regulation is a zero-tailpipe performance-based standard that may be achieved through purchase of battery electric or fuel cell shuttles or by conversion of existing internal combustion powered shuttles to electric drive train. This section discusses evaluated alternatives and provides reasons why these alternatives were not included in the proposal. As explained below, no alternative proposed was found to be less burdensome and equally effective in achieving the purposes of the regulation in a manner than ensures full compliance with the authorizing law. The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business.

CARB solicited public input regarding alternatives to achieving the regulatory goals. Three public meetings were specifically devoted to the discussion of regulatory alternatives, including:

- June 30, 2017 at Sacramento: CARB staff held a workgroup seeking input on the proposed regulatory concept.
- December 4, 2017 at Sacramento: CARB staff held another workgroup meeting on the regulatory compliance schedule.
- March 7 2018 at Sacramento and March 8, 2018 at Los Angeles International Airport, CARB staff solicited input on the revised regulatory concept that increased the implementation phase-in schedule allowing fleets more time to transition to ZEVs and on the draft proposed regulation language.

Reasonable alternatives include but are not limited to:

A. Small Business Alternative

Government Code section 11346.2(b)(4)(B) requires a description of reasonable alternatives to the regulation that would lessen any adverse impact on small business and the agency's reasons for rejecting those alternatives. This alternative is a less ambitious version of the proposed regulation that would require, in 2035, a 75 percent ZEV in-use fleet composition requirement as opposed to the regulation’s 100 percent in-use fleet percentage requirement. Such an alternative would achieve some reduction of criteria air pollutants and GHG, and move the heavy-duty ZEV market directionally towards expanded commercial usage, at a lower overall capital cost than the proposed regulation, to impacted fleets.

Therefore, for this alternative, after a voluntary early action period, the fleet compliance schedule would begin with a purchase replacement requirement, starting in 2023, that will require any zero-emission airport shuttles that a fleet replaces replaced by other zero-emission airport shuttles such that the ZEV composition of the

fleet remains constant or greater. This is followed by in-use fleet percentage requirements that requires a certain percentage of a fleet to consist of ZEVs by:

- 2027: 33 percent ZEV fleet requirement;
- 2031: 66 percent ZEV fleet requirement;
- 2035: 75 percent ZEV fleet requirement.

This Small Business Alternative does not meet California's SIP strategy goals of maximum NOx, PM, TAC, and GHG emission reductions, nor does it fully meet California's SIP strategy goals of increasing the first wave of ZEV deployment or spurring economic growth, fuel diversity and energy independence. Furthermore, this alternative potentially prolongs fleets maintenance of dual fueling infrastructure (pre- and post- regulation), which could be an economic burden. This alternative would regulate a smaller population of vehicles resulting in less impact to the environment from factories that manufacture vehicles and related fueling infrastructure support products. This alternative would also have lower impacts related to refueling, infrastructure construction, and electric power grid upgrades.

This Small Business Alternative would result in lower overall demand for vehicle manufacturing and would therefore have lower environmental impact as related to manufacturing. Decreased environmental impacts are related to less infrastructure installations needed with the smaller scope reducing construction related activities and therefore lessen short-term construction-related impacts to biological resources, geology and soil, cultural resources impacts, and hydrology and water quality, associated with installation of electric vehicle charging/refueling infrastructure. Furthermore, this Small Business Alternative is a less impactful contribution toward a more robust ZEV market, due to the reduced number of shuttles, which is a secondary goal of this Regulatory Proposal.

Accordingly, alternatives that do not achieve the mandate of air emission reductions are inconsistent with CARB's legislative direction. The primary goals of the proposed regulation would not be achieved using this alternative.

B. Accelerated Phase-in Alternative

The Accelerated Phase-in Alternative shifts regulation compliance to require full compliance by 2028, which is more stringent than the proposed regulation. The compliance mechanisms of this alternative are similar to those found in the proposed regulation. However, this accelerated phase-in alternative proposes an accelerated rate of zero-emission airport shuttles adoption by implementing fleet percentage requirements three years earlier than the proposed regulation. This alternative's final compliance year, 2028 is seven years sooner than the proposed regulation's 2035 compliance year.

This alternative's accelerated purchases would similarly accelerate emission reductions, as the fleet would turn over seven years sooner than the proposed regulation and the

estimated cumulative emission reductions of NOx, and CO_2e over the analysis period, 2017 - 2035, are approximately 1.4 times those of the proposed regulation.

However, this Accelerated Phase-in Alternative would be more costly to affected fleets. The earlier compliance dates would significantly truncate the voluntary early action period from four- to two-years. Allowance of time for fleets to leverage incentive funding is a function that staff believes is critical for the proposed regulation's success. In the majority of cases, incentive funding is provided for voluntary action, therefore, when the regulatory requirements become effective, many fleets will be ineligible from accessing these funds. Furthermore, shortening of the overall regulatory clock creates a limitation on fleets' ability to advantageously leverage predicted economies of scale, in later years that are associated with increased production of heavy-duty ZEV.

The combination of these economic impacts would increase compliance costs for affected businesses. Staff believes that this is an economic burden that would threaten the success of the proposed regulation.

C. No Phase-in of the 100% Requirement

Under this alternative, fleets would not have to follow a specific phase-in schedule, but would still meet a 100% ZEV composition requirement in the compliance year, 2035. Therefore, any zero-emission airport shuttles purchases made by regulated fleets in the years leading up to the compliance year would be entirely voluntary. This would significantly extend the regulation's voluntary early action period for all fleets to apply for incentive grant funding. Retaining the final end-point and mandatory reporting would ensure that emission reductions would be achieved by replacing internal combustion vehicles with ZEVs.

This alternative would not, in early years, provide the market a signal that technology should be adopted and increases the risk of noncompliance in the first regulatory compliance year, 2035, should fleets procrastinate on purchasing technology to meet the fleet composition requirement. Conversely, the rate of voluntary adoption of technology has potential for being very low and therefore, in this scenario, there is very high risk for minimal to no early deployment and an increased risk of incurred penalties for companies that fail to meet the requirement by the compliance date.

The combination of these two outcomes would significantly hinder the ability to appropriately plan infrastructure and would magnify the impact to the environment by requiring all construction-related activities to happen in a few years instead of being spread out over two decades, which include air emissions resulting from construction activities. Delay in technology adoption would also result in the rush of zero-emission airport shuttle production orders which would force manufacturers to scale-up manufacturing facilities in a short period of time. This would add potential adverse environmental impacts associated with manufacturing due to inefficiencies in the comparatively rapid scaling of manufacturing systems (a few years rather than over a decade) and subsequent increases in resource consumption such as energy, fuel, etc.

Such a surge in production would transfer pressure up the supply chain due to increased demand for raw materials and parts, such as increased mining activities for the precious/exotic metals needed for batteries.

Procrastination would also result in short-term or reactive planning by electric utilities and/or merchant hydrogen suppliers in meeting transportation energy demand that results in more infrastructure upgrade activities. This is in contrast to the proposed regulation's long compliance schedule, which includes incremental milestones that encourage systematic infrastructure improvements to meet stepwise energy demand, improving overall system efficiency.

This alternative would result in lower overall air pollutant emission reductions due to a predicted shorter period in which zero-emission technologies will be in-use. While airport shuttle fleets could decide to transition to ZEVs before the regulatory requirement, regardless of CARB's action on the proposed regulation, it would not be due to CARB's regulatory authority.

This alternative would provide minimal early commercial development impact due to a reduced number of shuttles, which is contrary to the secondary goal of the proposed regulation, a contribution toward a more robust heavy-duty ZEV market.

Accordingly, alternatives that do not achieve the mandate of air emission reductions are inconsistent with CARB's legislative direction. While airport shuttle fleets could decide to take early action on the purchase of ZEVs and installation of energy infrastructure, since it will not be mandated under CARB's action on the proposed regulation, there is no guarantee that this will occur and there is significant risk that compliance procrastination will undermine the intent of the regulation.

D. Ultra-low NOx Engine Emission Rate Averaging Alternative

This alternative introduces an ultra-low NOx vehicle option as an interim compliance alternative instead of a 100 percent ZEV requirement. Ultra-low NOx is defined as an internal combustion engine that complies with a 0.02 g/bhp-hr NOx emission rate. Under this alternative, fleets would have the option to purchase shuttles powered by an internal combustion engine that complies with the ultra-low NOx emission rate. These vehicles would also be required to operate on renewably derived fuel. In 2027, the fleet would need to comply with an emission rate that averages 33% zero tailpipe emissions into their total fleet ramping up in 2031 to 66% of fleet zero-tailpipe emissions and then in 2035 to 100% of fleet zero tailpipe emissions.

This alternative does not meet the requirements of California's SIP strategy, which calls for both the elimination of tailpipe criteria pollutant emissions within the nonattainment areas and a shift of the vehicle population towards zero-emission technologies. Although a renewable fuel component would reduce lifecycle GHG emissions, the criteria emission reduction will not occur within the areas these shuttles are operated. Furthermore, the intent of the regulation is the requirement of zero-emission technologies in a fleet that is especially suited for those technologies, as they exist

contemporarily. The scope of the proposed regulation has been limited to impact fleets that have specific operating characteristics that are compatible with zero-emission technologies. The introduction of an internal combustion option during the fleet transformation period would undermine the heavy-duty ZEV commercialization component of the regulation.

Accordingly, alternatives that do not achieve the mandate of air emission reductions are inconsistent with CARB's legislative direction. While privately-owned airport shuttle fleets could decide to buy zero-emission airport shuttles, it is likely that fleets will gravitate to the option closest to business-as-usual, i.e., the ultra-low NOx combustion pathway, given the option. Fleets that choose the ultra-low NOx option will have difficulty complying with the zero-emission airport shuttles mandate in later years, as early action incentive funding will no-longer be available, increasing risk of noncompliance. The primary goals of the proposed regulation would not be achieved using this alternative.

E. Performance Standards in Place of Prescriptive Standards

Government Code section 11346.2(b)(4)(A) (Government Code, 2015) requires that when CARB proposes a regulation that would mandate the use of specific technologies or equipment, or prescribe specific actions or procedures, it must consider performance standards as an alternative. The proposed regulation, requiring zero-emission airport shuttles be purchased when shuttles are otherwise being purchased, is a performance standard, as it does not prescribe which technology must be deployed or explicitly require the purchase of any specific shuttle or by a specific date.

This proposed standard would allow regulated entities the flexibility to decide whether battery electric or fuel cell zero emissions technology would best fit their application. The proposed regulation requirements for ZEV technology can be met through application of existing technology that is available and in use today. The proposed regulation does not prescribe a single set of technologies, but instead allows any zero-emission technologies to be used, such as battery-electric or fuel-cell vehicles. A zero emission powertrain certification process is also currently being developed that will help drive technology innovation and refinement, empower fleet decision-making by increasing consumer confidence in the technology, and provide data to inform future measures that accelerate the overall transition to zero-emission technologies

F. Health and Safety Code section 57005 Major Regulation Alternatives

CARB estimates the proposed regulation will have an economic impact on the state's business enterprises of more than $10 million in one or more years of implementation. CARB evaluated alternatives, including those submitted by stakeholders, to consider whether there is a less costly alternative or combination of alternatives that would be equally as effective in achieving increments of environmental protection in full compliance with statutory mandates within the same amount of time as the proposed regulatory requirements, as required by Health and Safety Code (HSC 57005, 1996).

Staff reviewed and consolidated alternative proposals submitted to date in this chapter, none of which are as equally effective within the same amount of time.

X. THE SPECIFIC PURPOSE AND RATIONALE OF EACH ADOPTION, AMENDMENT OR REPEAL

The proposed regulation is designed to reduce criteria pollutants, toxic air contaminants, and GHG emissions from airport shuttles to reduce community and regional air pollution. The proposed regulation is necessary to protect public health and to meet federal air quality standards and climate protection goals. It requires airport shuttle fleet owners and operators to transition to ZEV technology from internal combustion.

Airport shuttles are ideal candidates for zero-emission technologies. Airport shuttles usually operate on fixed routes in high traffic areas at low speed with stop-and-go driving cycles, which are optimal for electric drivetrains and conducive to regenerative breaking.

Experience gained from operating zero-emission airport shuttles will demonstrate viability to private and public fleet owners and will benefit zero-emission technology in other heavy-duty applications. For these reasons, the operation of airport shuttles and transit buses have been identified as beachheads for operating ZEV technologies and for providing technology footholds for light-, medium, and heavy-duty vehicles for transformation to other heavy-duty sectors.

Regulatory authority, summarized in Chapter I Section B, captures CARB's responsibility and obligation to regulate and control vehicle emissions necessary to attain health-based and climate change goals. The proposed regulatory language is contained in Appendix A.

Staff is proposing to adopt new sections 95690.1, 95690.2, 95690.3, 95690.4, 95690.5, 95690.6, and 95690.7, title 17, California Code of Regulations. Staff is proposing to adopt these sections in a new subarticle, subarticle 14, in Title 17, Division 3, Chapter 1, Subchapter 10, Article 4.

A. Section 95690.1 Purpose.

Summary of section 95690.1

Section 95690.1, in its entirety, describes the purpose of the regulation, which is to reduce criteria pollutants, toxic contaminants, and GHG emissions from airport shuttles.

Rationale of section 95690.1

This section is necessary to identify the purpose of these regulations. CARB fleet rules contain purpose sections and the inclusion of this is consistent with other CARB fleet rules contained in the California Code of Regulations. This proposed regulation requiring the use of zero-emission technologies to achieve the purpose of

reducing criteria pollutants, toxic contaminants and GHG emissions from airport shuttles will:

- Fulfill CARB commitments contained in the 2016 State Strategies for the State Implementation Plan;
- Contribute toward AB 32 and SB 32 statewide GHG emission reductions needed in 2030 and 2050;
- Help achieve 50 percent vehicle petroleum reductions by 2030;
- Add Zero-Emission Vehicles (ZEV) toward the 1.5 million 2025 goal; and
- Provide a bridge toward zero-emission pathways in other sectors.

B. Section 95690.2 Definitions.

Summary of section 95690.2(a)

This section proposes definitions to the terms used in the regulation.

Rationale of section 95690.2(a)

This section is necessary for CARB to define terms with particular meanings in the zero-emission airport shuttle regulation in order to provide clarity.

Airport Shuttle

Summary

Section 95690.2(a) defines "Airport Shuttle" to mean a "commercial vehicle with a Gross Vehicle Weight Rating of 8,501 pounds or greater, which transports passengers, in a fixed destination route, to or from a regulated airport" to capture heavy-duty on-road vehicles commonly used for airport shuttle services, including vans, cutaways, or buses.

Rationale

This definition of airport shuttle is necessary to inform regulated entities and other interested persons of the specific type vehicles that are subject to the requirements. California's SIP strategy identifies this measure as a strategy for heavy-duty vehicles that includes vans, cutaway and buses that shuttle travelers at regulated airports. This definition of airport shuttle is necessary to ensure light-duty vehicles that have a Gross Vehicle Weight Rating of 8,500 pounds or less that operate at airports will not be subject to the requirements. Such light duty vehicles includes personal vehicles, taxi cab, or transportation network company (Uber/Lyft) vehicles.

This proposal captures all of the federally classified heavy-duty airport shuttles or California classified medium- and heavy-duty ranges that shuttle airport passengers to or from a California regulated airport to meet the strategy commitment contained in California's SIP strategy.

Depot

Summary

Section 95690.2(a) defines "Depot" to mean "a place where airport shuttles are housed and from which they are dispatched for service" to identify a locational reference within a geographic boundary close to airport.

Rationale

This definition of depot is necessary to inform regulated entities and other interested persons of the specific type of vehicles that are subject to these requirements. The term depot is used to capture the location where airport shuttles are kept or dispatched for service. Only airport shuttles that house or dispatched for service within a 15-mile radius of a regulated airport are subject to these regulations.

Fixed Destination Route

Summary

Section 95690.2(a) defines "Fixed Destination Route" to mean a "predetermined route that transports passengers between the same locations, although the number of stops along the route may vary" to identify the types of shuttle services that are subject to these requirements.

Rationale

This definition of fixed destination route is necessary to inform regulated entities and other interested persons of the specific type of vehicles that are subject to these requirements. This definition excludes vehicles that do not operate a predetermined route, such as dial-a-ride shuttles.

The CARB's Medium- and Heavy- Duty Battery Electric Trucks and Buses Technology Assessments[7] identified airport shuttles as readily suited for battery electric operation because of the well-defined routes. Survey results confirmed that many shuttles operational characteristic match the operational characteristics identified as being well suited for airport shuttles (i.e. fixed short routes, stop- and go- operation, and low average speeds). The current battery electric technology supports the use of vehicles operating a predetermined and consistent route. Fixed routes allow fleets to develop refueling strategies.

Staff learned about many different route types during our tours of individual airports, our participation in the Airport's Clean Vehicle Working group meetings, and surveying the

[7] Same footnote as 1: https://www.arb.ca.gov/msprog/tech/techreport/bev_tech_report.pdf

potentially regulated community. Limousines and some van businesses operate a dial-a-ride or hailing service where the route is specific to each call. Other vans, cutaway, and transit bus businesses provide shuttle service between the same locations consistently although the route may vary depending on traffic conditions. This consistent fixed routes were found for shuttle service between airport facilities and from nearby hotels and off-airport parking to airports.

Other routes are fixed but may vary on the number of stops. Staff learned that the shuttle service between airport locations have stops for letting passengers off for airline gate access. If the shuttle contains passengers that are all flying the same airline then the shuttle will stop only once not at each airline gate. This also applies to hotel and off-airport parking shuttle service.

Fleet

Summary

Section 95690.2(a) defines “Fleet” to mean “one or more airport shuttle(s) that are subject to this regulation and are under common ownership” to identify the size of the fleet that are subject to these requirements.

Rationale

The definition of fleet is necessary to communicate to the regulated entities and to CARB staff the airport shuttles subject to these requirements. This definition is necessary for the regulated entities and CARB when determining the percentage of total that must met the compliance schedule. This definition is consistent with other CARB in-use fleet rules and is based on CARB experience in designing, implementation, and enforcing fleet rules. It is designed to prevent circumventing regulations by dividing their fleets into smaller fleet to fall outside of the fleet size requirement.

Fleet Owner

Summary

Section 95690.2(a) defines “Fleet Owner” to mean the “person business, or government agency registered as the owner of the vehicle by the California Department of Motor Vehicles or is the owner as defined in California Vehicle Code section 460” identifies to the regulated community and to CARB staff who is fleet owner.

Rationale

The definition of fleet owner is necessary to communicate to the regulated entities and to CARB staff who is applicable to the regulation [section 95690.3], the responsible party to submit reports [section 95690.4], comply with the proposed requirements

[section 95690.5], file for an exception or extension [section 95690.6], and is subject to enforcement requirements [section 95690.7].

General Aviation Airport

Summary

Section 95690.2(a) defines a “General Aviation Airport” to be the same “as defined in section 47102 of title 49 of the United States Code” so that these airports will be excluded from the Regulated Airport definition and from these regulations.

Rationale

This definition is necessary to exclude General Airports from the “Regulated Airport” definition since these airports do not have any airport shuttles.

Nonhub Airport

Summary

Section 95690.2(a) defines a “Nonhub Airport” to be the same as defined in section 40102 of title 49 of the United States Code” so these airports will be excluded from the “Regulated Airport” definition.

Rationale

This definition is necessary to exclude Nonhub Airports from the “Regulated Airport” definition because these airports have only a few airport shuttles. Currently California contains 12 airports classified as Nonhub airports and a majority of these airports do not have any airport shuttles. A few of these airports have one or two hotels offering shuttle service.

Airport classification (i.e. nonhub, small, medium, or large hub) is based on passenger boarding. If the passenger traffic increases than the airport may be reclassified from Nonhub to small hub. This reclassification would result in the airport now be included into the “Regulated Airport” definition and being subject to the proposed regulation. Likewise if a small hub airport is reclassified as nonhub then the airport will no longer be captured by this regulation.

Operator

Summary

Section 95690.2(a) defines “Operator” to mean “the person responsible for the overall operation of the fleet” identifies to the regulated entity and to CARB staff who is the operator.

Rationale

The definition of operator is necessary to clarify to the regulated entities and to CARB staff who is applicable to the regulation [section 95690.3(a)], who is responsible for providing records to CARB, and who may be subject to penalties for providing false information to CARB [section 95690.7(c)].

Regulated Airport

Summary

Section 95690.2(a) defines "Regulated Airport" to mean "a large, medium, or small hub airport as those terms are defined in section 40102 of title 49 of the United States Code" but does not include "Nonhub Airport" or "General Aviation Airport" as defined in section 47102 of title 49 of the United States Code to identify the limited type of airports that captured by these regulations. The proposed requirements will apply to airport shuttles operating at large, medium, or small hub airports located in California. Currently 13 airports in California meet this classification.

Rationale

This definition of regulated airport is necessary to identify the airports that are within the scope of the proposed regulation and capture the airports that have significant airport shuttle activity. General Aviation airports were excluded since they have no airport shuttles. Nonhub airports were excluded since only they have a few airport shuttles currently exist that operate occasionally.

Small, medium and large hub airports were included since these airports have the most airport shuttles. Currently the four small hub airports located in California staff have estimated to have a total of 14 airport shuttles providing service from nearby hotels and no airport shuttles between airport facilities. These small hub airports have compact footprints with all of the facilities within walkable distances and do not need shuttle service between airport facilities.

Staff estimates that the six medium hub airports currently have a total of 301 airport shuttles and the three large hub airports have a total of 633 airport shuttles. These airports have shuttle service from nearby facilities and between airport facilities.

Reserve Airport Shuttle

Summary

Section 95690.2(a) defines "Reserve Airport Shuttle" to means an "airport shuttle used to increase flexibility during peak service times or to provide backup service when other airport shuttles are not in operation" to identify the types of shuttles that may qualify for a limited exemption to these requirements.

Rationale

This definition of fixed destination route is necessary to inform regulated entities and other interested persons of the specific type vehicles that are not subject to these requirements. Based on comments received from the California Airport Council and individual airports (CAC, 2017), staff included an exemption for reserve airport shuttles from the fleet requirements. Fleet owners and operators are allowed to use internal combustion vehicles as reserve airport shuttles for limited use of up to 3,000 hours per year to supplement the operational deployment of zero-emission airport shuttles to increase flexibility during peak service times or to provide backup service when other airport shuttles are not in service.

Staff considered airports request to use the internal combustion vehicles as substitutes for short-term periods during when other vehicle in the shuttle fleet are undergoing maintenance and repair or during peak travel days. During the transformation toward zero-emission fleets will be a mix of ZEVs and combustion fueled vehicles. Fleets will be able to use the reserve fleet vehicle while the existing combustion fueled vehicle is getting an oil change or new brakes.

Staff also learned that fleets generally keep older vehicles around as substitutes. By 2027 fleets are required to have some of their fleets be ZEVs but it will be many years until fleets have older ZEVs for use as substitutes.

TRUCRS

Summary

Section 95690.2(a) defines "TRUCRS" to be the "Truck Regulation Upload, Compliance, and Reporting System" to the fleet owners and CARB staff that this existing on-line CARB reporting system will be modified to be used for the proposed regulation reporting requirements [section 95690.4].

Rationale

This definition is necessary to communicate the public that CARB plans to modify an existing on-line report tool to accept report required for this proposed regulation. The CARB staff time estimates for implementing this regulation is based on modifications to the existing on-line reporting tool.

Zero-Emission Airport Shuttle or ZEAS

Summary

Section 95690.2(a) defines that a "Zero-Emission Airport Shuttle or ZEAS" to mean " a battery electric vehicle or fuel cell airport shuttle that is certified or approved for sale in California"

Rationale

This definition of zero-emission airport shuttle is necessary to inform regulated entities and other interested persons of the specific type technology and vehicles that are acceptable for use in California. This regulation requires airport shuttle fleets to transition their internal combustion powered airport shuttle vehicles to ZEVs.

All vehicles sold in California must be certified. The current certification process for heavy-duty ZEVs used in the airport shuttle sector are in the process of being revised.

CARB conducted separate rulemaking to consider the Proposed California Greenhouse Gas Emissions Standards for Medium- and Heavy-duty engines and Vehicles and the Proposed Amendments to the Tractor-Trailer GHG Regulation (CARB, 2018) and the Proposed Zero-Emission Powertrain Certification Regulation (CARB, 2018a). These rulemakings were noticed but is not effective because it has not been approved by Office of Administrative Law and filed with the Secretary of State. The federal Phase 2 standards are primarily a package of CO2 standards intended to reduce CO2 and improve fuel economy for medium- and heavy-duty engines and vehicles. It included the first ever U.S. standards for trailer manufacturers to make more efficient trailers. CARB's proposal generally align with the federal Phase 2 GHG regulation with respect to stringency, structure, and timing. The minor differences from the federal Phase 2 GHG regulation would help align with current California requirements and preserve the benefits of California incentive programs.

The proposed ZEPCert regulation would establish new, enhanced certification procedures for heavy-duty electric and fuel-cell vehicles, and the zero-emission powertrains they use, to support future zero-emission measures by helping ensure fleet purchasers are provided with consistent and reliable information about zero-emission technology and the vehicles that use it and heavy-duty electric and fuel-cell vehicles are well supported once deployed.

This proposed regulation in section 95690.5(c)(1) requires heavy-duty Zero-Emission Airport Shuttles starting with model year 2026 to be certified to the proposed ZEPCert regulation.

C. 95690.3 Applicability.

Summary of sections 95690.3

Section 95690.3, in its entirety, establishes the applicability of the regulations by specifying which fleet owners or operators of airport shuttles are subject to the regulations.

Rationale of sections 95690.3

Each of the provisions within section 95690.3 is necessary to establish which fleet owners or operators are subject to the regulations.

Summary of sections 95690.3(a)(1), (2), and (3)

Section 95690.3(a)(1), (2), and (3) establishes the applicability of the regulations by specifying which fleet owners or operators of airport shuttles are subject to these regulations. This section specifies that the following fleet owners or operators are subject to the regulations: Regulated airports; Fleet owners or operators that have an airport shuttle depot location within a 15-mile radius of a regulated airport; and fleet owners or operators that operate an airport shuttle on a fixed route equal to or less than 30 miles from a regulated airport that includes stops at a regulated airport. These fleet owners or operators who operate one or more airport shuttles are subject to this regulation.

Rationale of sections 95690.3(a)(1), (2), and (3)

Section 95690.3(a)(1), (2) and (3) are necessary to establish which fleet owners or operators are subject to the regulations. Section 95690.3(a)(1) specifies that a regulated airport, as a fleet owner or operator of airport shuttles, is subject to the regulations. Based on staff analysis of survey results and information provided by airports, staff determined that currently, four regulated airports own and operate their own fleets and six regulated airports contract with another entity to provide some or all of their shuttle service. Two of the airports, San Diego International and Ontario International, contract with more than one service provider. Hollywood Burbank Airport is the only regulated airport that both owns and contracts for airport shuttle services.

Section 95690.3(a)(2) specifies that fleet owners or operators that have an airport shuttle depot location within a 15-mile radius of a regulated airport are subject to the regulations. Based on staff analysis of survey results, ZEV manufacturer input, information provided by airports, research conducted by staff, and public comments received during workgroup and workshop meetings, staff determined that this condition was necessary to capture limitations of current zero-emission technology operational characteristics best suited for zero-emission airport shuttles deployment today. CARB's Medium- and Heavy- Duty Battery Electric Trucks and Buses Technology Assessments[8] identified airport shuttles as readily suited for battery electric operation because of the well-defined routes. The depot radius limiter captures the low-mileage, stop and go operation, and low average speeds operational characteristic that are advantageous to the fuel (energy) economy benefits of electric vehicle operation.

[8] Same footnote as 1: https://www.arb.ca.gov/msprog/tech/techreport/bev_tech_report.pdf

Section 95690.3(a)(3) specifies fleet owners or operators that operate an airport shuttle on a fixed route equal to or less than 30 miles from a regulated airport that includes stops at a regulated airport are subject to these requirements. Based on staff analysis of survey results, ZEV manufacturer input, information provided by airports, research conducted by staff, and public comments received during workgroup and workshop meetings, staff determined that this condition was necessary to capture limitations of current zero-emission technology operational characteristics best suited for zero-emission airport shuttles deployment today. The route limitation is necessary to allow for fleets to operate within current vehicle range limits.

The 30 mile limiter was necessary to remove shuttles that operate a long distance albeit a fixed route from the requirements. The currently produced ZEVs are not able to support these long distances. Traveling in hot or cold climate conditions will have significant impact on vehicle range and battery pack state of charge. In congested traffic situations cabin comfort needs may place significant drain on the battery pack.

Survey results found several airport shuttles entities that operate fixed but higher mileage routes. The battery-electric vehicle technology that is available now, does not support transporting passengers the 60 miles from the Napa Valley to San Francisco International Airport or the 100 miles from Santa Barbara to Hollywood Burbank Airport. These routes are commonly impacted by traffic congestion and require use of vehicle heating or cooling for passenger comfort.

Summary of section 95690.3(b)

Section 95690.3(b) specifies that regulated airports that contract, lease or permit airport shuttle service on their property must also comply with specific provisions in section 95690.5(d).

Rationale of section 95690.3(b)

This section is necessary so that all airport shuttle fleets, regardless of ownership, have the same requirements. This is necessary to require airport entities that contract airport shuttle service to incorporate the regulations into their service contract requirements. Regulated airports will be responsible to verify that contracted fleets comply with requirements.

Based on staff analysis of survey results and information provided by airports, staff determined that currently, six regulated airports contract with another entity to provide some or all of their shuttle service. Two of the airports, San Diego International and Ontario International, contract with more than one service provider. Hollywood Burbank Airport is the only regulated airport that both owns and contracts for airport shuttle services. Regulated airports that permit or contract for airport shuttle service at the airport are in the best position to ensure that these requirements are complied.

Many of the regulated airports currently permit or grant access for airport shuttle to operate at the airport. Prior to granting access the regulated airports will verify that the airport shuttle has a current Certificates of Reported Compliance. These certificates will be issued via the reporting requirements of section 9560.5(g).

D. 95690.4 Fleet Reporting and Recordkeeping Requirements.

Summary of section 95690.4

Section 95690.4, in its entirety, establishes the fleet reporting and record keeping requirements of the regulations.

Rationale of sections 95690.4

Overall, this section is necessary to specify the contents of information that is required to be submitted to CARB. Each of the provisions within section 95690.4 is necessary so that CARB staff can substantiate fleet owner information and to confirm that the airport shuttles are subject to the proposed regulation. This information is needed to better enable CARB to assess the implementation of this subarticle, as well as to focus compliance and enforcement efforts.

Summary of section 95690.4(a)

Section 95690.4(a) proposes to require all airport shuttle fleet owners to submit information via Truck Regulation Upload, Compliance, and Reporting System (TRUCRS) for each vehicle in their airport shuttle fleet by March 1, 2022. Fleet owners will be required to create a unique identification number in order to use the on-line reporting system.

Rationale of section 95690.4(a)

This section is necessary as it identifies which entity is required to submit information to the on-line reporting or TRUCRS, the reporting start date, and the method for fleet owners to submit information to CARB. A unique identification number is necessary so fleets and CARB can distinguish businesses with similar names.

Summary of section 95690.4(a)(1), (A), (B), (C), (D), and (E)

Section 95690.4(a)(1) would require fleet owners to submit owner, contact, and business information. Subsections (A), (B), (C), (D), and (E) require fleet owners to provide California Department of Motor Vehicle registration business name and address [95690.4(a)(1)(A)], business contact information [95690.4(a)(1)(B), (C), and (D)], and to confirm that fleet depot location is within 15-mile radius of the regulated airport [95690.4(a)(1)(E)].

Rationale of section 95690.4(a)(1), (A), (B), (C), (D), and (E)

Section 95690.4(a)(1) is necessary so that CARB staff can collect, file, organize, and substantiate fleet owner information and to confirm that the airport shuttles are subject to the proposed regulation. This information is also needed to better enable CARB to focus compliance and enforcement efforts.

Summary of section 95690.4(a)(2), (A), (B), (C), (D), (E), (F), (G), (H), and (I)

Section 95690.4 (a)(2) specifies specific vehicle information that fleet owners must report for each airport shuttle in the fleet as of December 31, 2021 [95690.4(a)(2)]. Subsections would require fleet owners to submit license plate number [95690.4(a)(2)(A)], and vehicle information [95690.4(a)(2)(A), (B), (C), (D), (E), (F)], vehicle odometer and date of reading [95690.4(a)(2)(G)], mileage if vehicle is a reserve airport shuttle [95690.4(a)(2)(H)], and if the vehicle is exempt due to applicable extension [95690.4(a)(2)(I)].

Rationale of section 95690.4(a)(2), (A), (B), (C), (D), (E), (F), (G), (H), and (I)

Section 95690.4 (a)(2) is necessary so that CARB staff can collect, file, organize, and improve the existing CARB airport shuttle inventory. Collection of individual vehicle information allow CARB staff to identify duplicate vehicle reporting, verify information,

and to track exemptions [95690.4(a)(2)(A), (B), (C), (D), (E), (F), (H), and (I)]. The collection of odometer readings and corresponding dates allows CARB staff to verify applicability of exemptions for reserve airport shuttles to ensure that reserve airport shuttles operate within the annual mileage cap [95690.4(a)(2)(G)]. In addition, pertinent vehicle information is necessary to calculate emission reductions associated with the proposed regulation for inclusion into the State Implementation Plan.

Summary of sections 95690.4(a)(3), (A), (B), (C), (D), (E), and (F)

Section 95690.4 (a)(3) specifies specific vehicle information for internal combustion powered airport shuttles that fleet owners are required to submit. Subsections 95690.4(a)(3), (A), (B), (C), (D), (E), and (F) require fleet owners to submit specific shuttle information including manufacturer, model number, model year, engine family name, fuel date, and if the engine has been replaced the date.

Rationale of sections 95690.4(a)(3), (A), (B), (C), (D), (E), and (F)

Section 95690.4 (a)(3) is necessary so that CARB staff verify that fleet compliance requirements are met and can model the emission reductions happening from the combustion powered shuttles and determine the emission reductions resulting from the proposed regulation.

Summary of sections 95690.4(a)(4), (A), (B), (C), (D), (E), (F), and (G)

Section 95690.4 (a)(4) specifies specific vehicle information zero-emission airport shuttle fleet owners are required to submit. This section requires fleet owners to provide information in specified reporting fields on airport shuttles. If the owner received incentives for a zero-emission airport shuttle purchase the incentive program name and the length of the grant agreement or contract term will be reported.

Rationale of sections 95690.4(a)(4), (A), (B), (C), (D), (E), (F), and (G)

Section 95690.4(a)(4) is necessary to better enable CARB to assess the implementation of this subarticle, as well as to focus compliance and enforcement efforts. The collection of zero-emission airport shuttle information is consistent with other CARB regulations and is necessary for CARB to understand and track the performance choices fleets are using toward meeting the 100 percent fleet requirement by collecting information on the ZEV technology [95690.4(a)(4)(A)], manufacturer [95690.4(a)(4)(B)], model number [95690.4(a)(4)(C)], model year [95690.4(a)(4)(D)], vehicle family names [95690.4(a)(4)(E)], and purchase and retired date, if applicable [95690.4(a)(4)(F)]. This section also requires the fleet owner to identify if grants were used to purchase the zero-emission airport shuttles and the grant agreement or contract term length, if applicable. This is necessary so that CARB staff can determine if the resulting emission reductions were already attributed to the SIP via the incentive program [95690.4(a)(4)(G)].

Some grant programs are the result of mitigation action and the funded zero-emission airport shuttle project will not result in additional emission reduction since it is making up for the excess emission already released. For example, a federal grant program implemented by the FAA requires projects to generate emission reduction credits that then will be used toward alleviating the impacts of airport improvement projects. Other grant programs require surplus emission reductions beyond any required action to be reported to the State Implementation Plan. The information required in section 95690.4(a)(4) is necessary so that emission reduction resulting from the proposed regulation will be determined and that emission reductions will not be double counted.

Summary of section 95690.4(b)

Section 95690.4(b) proposes to require fleet owners to submit reports via TRUCRS or other EO approved reporting tool annually starting in by March 1, 2022 and ending in March 1, 2036. Fleet owners must submit vehicle information as it was on December 31 of the year prior and provide updates if the vehicle reported on the previous year was retired, sold or scrapped.

Rationale of section 95690.4(b)

Section 95690.4(b) is necessary for CARB to assess the implementation of this subarticle, as well as for compliance and enforcement efforts. This section is necessary to ensure compliance with section 95690.5 and will allow CARB staff to determine if fleet owners or operators are meeting compliance requirements. Section 95690.4(b) specifies that annual reporting must begin by March 1, 2022; however, section 95690.5(a) specifies that fleet owners must first comply with specified percentage of airport shuttles by the compliance deadline of December 31, 2027. By requiring fleet owners to report several years prior to the first fleet percentage compliance requirement allows fleet owners the ability to, under the proposed requirements, determine the action necessary to meet future compliance schedule requirements, consider cost sharing opportunities, and take action on infrastructure installation and zero-emission airport shuttle procurement.

CARB will also be able to track fleets' progress toward in-use fleet percentage requirements and have the ability to reach out to fleets that may need additional assistance in understanding the requirements. Finally, reporting will allow CARB to quantify and verify that real and permanent emission reductions are achieved for submittal to the State Implementation Plan.

Summary of section 95690.4(c)

Section 95690.4(c) states that new airport shuttle fleet owners must comply with the proposed regulation immediately upon purchase of vehicles or bringing vehicles to the state. In addition, fleet owners must report within 30 days of purchasing or bringing vehicles into the state.

Rationale of section 95690.4(c)

Section 95690.4(c) is necessary to prevent new fleet owners from circumventing the proposed regulation.

Summary of section 95690.4(d)

Section 95690.4(d) requires fleet owners to report owner information, fleet composition changes, and exempt status within 30 days of changes or if less than 30 days in the required annual reporting.

Rationale of section 95690.4(d)

This section is necessary to keep fleets from circumventing the proposed regulation requirement between the annual reporting by requiring information on fleet changes within 30 days of the change.

Summary of section 95690.4(e)

Section 95690.4(e) specifies that fleet owners or a designee must provide written affirm that the reporting information is correct and that fleet owners are subject to State perjury requirements.

Rationale of section 95690.4(e)

This section is necessary to inform fleet owners that a written affirmation is required. CARB staff has the responsible party for verifying information and for potential enforcement requirements. The fleet owners is subject to State perjury requirements and subject to civil or criminal penalties outlined in this section and other applicable State requirements.

Summary of section 95690.4(f)

Section 95690.4(f) establishes a process for fleet owners to request an extension from the reporting deadlines to avoid penalties for not reporting on time. The request must be submitted 14 days prior to the reporting deadline, be submitted in writing to the Executive Officer and include the reason for requesting the extension.

Rationale of section 95690.4(f)

This section is necessary to allow fleet owners the ability to avoid penalties for not reporting due to unforeseen, temporary, or extenuating circumstances outside of the fleet owner’s control.

Summary of section 95690.4(g)

Section 95690.4(g) communicates that after receipt of the required annual reporting and if the fleet owner is in compliance with the regulations, CARB will issue a Certificate of Reported Compliance to the fleet owner.

Rationale of section 95690.4(g)

This section outlines the process CARB will used to issue a Certificate of Reported Compliance for fleet owners that report annually and that meet compliance requirements in section 95690.5. This certificate is a way for fleet owners to have documentation that they are in reported compliance with the regulations, and to communicate with the regulated airports and other entities that they are in compliance to the proposed regulation. Section 95690.5 requires regulated airports to, prior to a regulated airport entering into a contract, lease, or permit for airport shuttle service, they must obtain the Certificate of Reported Compliance from fleets.

Summary of section 95690.4(h)

Section 95690.4(h) specifies the requirements for how long fleet owners must maintain fleet information and records and specifies the records fleet owners must keep these records for 36 months from the date of submission to CARB or as long as the owner has a fleet, whichever is shorter. In addition, it requires fleet owners to supply these records to an agent or employee of CARB within five business days of receiving the request.

Rationale of section 95690.4(h)

Section 95690.4(h) is necessary to allow CARB staff the ability to verify information reported to demonstrate compliance. This section is necessary to support CARB's compliance and enforcement efforts on the proposed regulation by allowing CARB staff the ability to request records including but not limited to purchase invoices, records of contracts, leases, or permits for airport shuttle service, and any Certificate of Reported Compliance issue by CARB that will verify and determine the accuracy of fleet owner reporting information in section 95690.4 and to determine compliance with section 95690.5.

E. Sections 95690.5 Airport Shuttle Fleet Requirements.

Summary of section 95690.5(a)

Section 95690.5(a) proposes the minimum number of zero-emission airport shuttles a fleet owner is required to purchase or operate in each calendar year. The required minimum number of zero-emission airport shuttles are phased in and are a percentage of the total number of airport shuttles. This forms the backbone of this proposed regulatory effort requiring fleets to transition from fossil fuel combustion to electric

drivetrain technologies in a phase-in compliance schedule containing three milestones for in-use airport shuttles. By December 31, 2027, each airport shuttle fleet owner must have 33 percent zero-emission airport shuttles. By December 31, 2031, this requirement increases to 66 percent of the fleet must consist of zero-emission airport shuttles. Finally, by December 31, 2035, 100 percent of airport shuttles in the fleet must be zero-emission airport shuttles.

Rationale of section 95690.5(a)

This section is necessary because it identifies the minimum number of zero-emission airport shuttles an airport shuttle owner should have to comply with the airport shuttle fleet requirement. The required percentage increases gradually with time to reflect continued technology improvements, availability of new technology, and to allow time to expand infrastructure. In addition, the later starting date allows airport shuttle owners to take advantage of available incentives. The fleet average compliance milestones will guide fleets toward a 100 percent zero-emission airport shuttle fleet by 2035 allowing fleets the ability to use existing vehicles for the full useful life.

Summary of subsection 95690.5(a)(1)

This subsection contains the compliance schedule table and proposes the methodology for the calculation of the required fleet percentage requirements.

Rationale of subsection 95690.5(a)(1)

The compliance schedule table communicates to the regulated entities and to CARB staff the requirements for fleet owners. A rounding methodology is necessary because the in-use fleet percentage calculation may not always result in a whole number. Fleet owners cannot purchase a partial shuttle to comply with the fleet percentage requirements.

Summary of section 95690.5(b)

This section requires airport shuttle fleet owners and operators, if replacing a zero-emission airport shuttle on or after January 1, 2023, to replace that vehicle with another zero-emission airport shuttle.

Rationale of section 95690.5(b)

This section is necessary to prevent the loop hole of regulated entities replacing a zero-emission airport shuttle with an internal combustion vehicle. Regulated entities must comply and maintain compliance with the requirements. This no-backsliding section is necessary for three purposes. First, to guide fleets towards keeping their in-use zero-emission airport shuttle fleet percentages. Second, it sends a strong market signal to zero-technology manufacturers that the regulated entities must continue to buy zero-emission airport shuttles. Finally it ensures emission reductions from operations of zero-emission airport shuttles are continued.

Summary of section 95690.5(c)(1)

This subsection requires heavy-duty zero-emission airport shuttles starting with vehicle model years 2026 and subsequent model years, to be certified to new proposed ZEPCert regulation in the process of amending section 95663, of title 17 of the California Code of Regulations last amended [insert date]. ZEPCert is a separate rulemaking efforts, which is currently being proposed for adoption by the Board.

Rationale of section 95690.5(c)(1)

This subsection is necessary because zero-emission airport shuttles must be certified and approved for sale in California. 2026 and later model year heavy-duty vehicles must certify using the Enhanced Electric and Fuel-Cell Vehicle Certification Procedures contained in section 95663 of title 17 of the California Code of Regulations, in order to be counted toward the fleet requirement. This proposed alternative certification pathway would begin with model year 2021. The regulation would give manufacturers five years to achieve these new certification requirements before requiring fleets to purchase zero-emission airport shuttles certified to the alternative procedures.. Requiring zero-emission airport shuttles to be certified to the enhanced pathway helps ensure ZEVs are well-supported once deployed and that consistent and reliable information is available to prospective buyers.

Summary of section 95690.5(d)

Section 95690.5(c) proposes to require that by January 1, 2036 no fleet owner shall operate an airport shuttle at a regulated airport unless that airport shuttle is a zero-emission airport shuttle or qualifies for an exemption outlined in section 95690.6(a).

Rationale of section 95690.5(d)

This section is necessary to ensure that fleet owners maintain the transition from internal combustion engines to 100 percent zero-emission airport shuttles. This provision ensures that this proposed regulation will achieve real emission reductions and that experience gained from fleets operating zero-emission pathways will provide benefits to other heavy-duty sectors.

Summary of sections 95690.5(e)(1), (2), and (3)

This subsection requires regulated airports starting January 1, 2022, that outsource their shuttle service by contract or lease and permit airport shuttles [95690.5(e)] to ensure that these entities comply with air pollution laws including this proposed regulation [95690.5(e)(1)]. Regulated airports must also obtain and maintain Certificates of Reported Compliance from contracted, leased or permitted fleets for a minimum of three years [sections 95690.5(e)(2)]. In addition, regulated airports shall

maintain necessary records including records of contracts, leases or permits for a minimum of three years [95690.5(e)(2)].

Rationale of section 95690.5(e)(1), (2) and (3)

This subsection is necessary to close any potential compliance loop holes of regulated airports outsourcing shuttle service that does not comply with this proposed regulation and other air pollution control laws [section 95690.5(e)(1)]. Furthermore, airports through a letter from the California Airport Council offered to support enforcement of these requirements and this section codifies that regulated airports will obtain Certificate of Reported Compliance prior to regulated airports issuing permits [95690.5(e) and (e)(2)]. Regulated airports are required to maintain this documentation for three years to support in fleets implementation efforts [95690.5(e)(3)].

F. Section 95690.6 Exemptions and Extensions.

Summary of section 95690.6(a)(1), (2), (3)(A), (3)(B), and (4)

The subsection contains an exemption from the fleet compliance requirements for a reserve airport shuttle [95690.6(a)]. Fleet owners are allowed to operate an internal combustion powered shuttle as a reserve airport shuttle if all of the conditions are outlined in section 95690.6(a)(1) through (4) are met. These conditions include: operating the shuttle within the annual usage cap less than 3,000 miles each year [95690.6(a)(1)]; if the vehicle is identified and designates as a reserve airport shuttle in the annual reporting [95690.6(a)(2)]; and the fleet owner submits annual reporting information on the reserve airport shuttle [95690.6(a)(3)]. Specifically, the reporting designation of this exemption status section is limited to the reporting designation as “reserve” for as long as the fleet owns the vehicle [95690.6(a)(3)(A)] and fleet owners reporting the annual mileage [95690.6(a)(3)(B)]. This exemption is limited to vehicles owned or used by the fleet owner prior to use [95690.6(a)(4)].

Rationale of section 95690.6(a)(1), (2), (3)(A), (3)(B), and (4)

The purpose of the reserve airport shuttle exemption is to allow fleets increased flexibility to meet peak service days, or provide backup service when primary vehicles are out of operation for scheduled maintenance [95690.6(a)]. Staff also learned that fleets generally keep older vehicles around as substitutes. By 2027 fleets are required to have some of their fleets be zero-emission airport shuttles but it will be many years until fleets have older zero-emission airport shuttles for use as substitutes. This exemption was included because fleets asked for increased flexibility from vehicles already contained in their fleets [95690.6(a)(4)]. The 3,000-annual mileage cap was determined from survey results and stakeholder input [95690.6(a)(1))].

Staff added additional requirements that this exemption status must be maintained for as long as the fleet owns the vehicle to prevent fleets from sidestepping the in-use fleet percentage requirements [95690.6(a)(2) and 95690.6(a)(3)(A)] . Fleet owners must

report annually reporting on the reserve airport shuttle mileage so that CARB staff can check that fleets maintain the mileage cap [95690.6(a)(3)(B)]. All airport shuttles, including reserve airport vehicles, will be required to report annually starting in 2022 [95690.6(a)(3)(A)]. These additional requirements provide flexibility while also including safeguards to prevent fleets from circumventing the in-use fleet compliance percentage requirements and supports the complete transformation of this sector to zero-emission technology.

Summary of section 95690.6(b)

Section 95690.6(b) clarifies that transit agency vehicles that delivery passengers to regulated airports that are subject to the fleet rule for public transit agencies (Title 13, California Code of Regulations, section 2023 et seq.) are exempt from this regulation.

Rationale of section 95690.6(b)

Buses operated by transit agencies that have a route that stops at regulated airport must follow the existing CARB Fleet Rule for Transit Agencies (Transit Fleet Rule) adopted in 2000 and the approved Innovative Clean Transit regulatory amendments[9]. This provision was added based on public comments received at meetings to clarify that transit vehicles that have routes that stop at regulated airports would not be included in this proposed regulation scope.

Summary of section 95690.6(c)

Section 95690.6(c) outlines an additional exemption process for the CARB Executive Officer (EO) to grant extension to a fleet compliance deadline for infrastructure facility for situations that in which safe vehicle access would be impeded by infrastructure. Fleets owner must file the request 90 days before the requirement deadlines and include pertinent documentation. CARB EO may grant a one-time extension for up to two-year delay if a fleet owner proves the zero-emission airport shuttle charging infrastructure will limit safe ingress and egress to domiciled facility.

Rationale of section 95690.6(c)

This section is necessary to provide for fleet owners an extension to compliance deadlines because, for reasons that are beyond their control, the fleet owners are unable to install necessary zero-emission airport shuttle infrastructure prior to the compliance date. Transforming fleets from combustion fuel to electric vehicles requires significant changes and planning efforts. Existing fleet domiciled facilities may not have enough usable space to support necessary battery charging infrastructure. Charging infrastructure is evolving rapidly requiring less time to charge batteries and less space required for the chargers. This extension will allow fleets up to two additional years to address infrastructure installation challenges.

Summary of section 95690.6(d)

Section 95690.6(d) specifies that fleet owners may request an extension from the compliance requirements of section 95690.5(a), (b) and (c). A compliance extension may be granted by the Executive Officer on specific situations, including but not limited to, unforeseen, temporary, or extenuating circumstances outside of the fleet owner's control. This situations may include delays due to local permitting requirements, utility unable to supply sufficient power to the property in time to place zero-emission airport

[9] Innovative Clean Transit regulation amendments is a separate rulemaking underway.

shuttles in service, or airport capital improvement project delays. Section 95690.6(d) requires that fleet owners must still comply with reporting requirements outlined in section 95690.4.

Rationale of section 95690.6(d).

This section is necessary to allow fleet owners the ability to request extensions to the fleet compliance requirements in 95690.6 (a) through (c), from the EO for unforeseen, temporary, or extenuating circumstances outside of the fleet owner's control. The EO after review of the supporting documentation has the discretion to grant or deny the requested extension.

G. Sections 95690.7 Enforcement of Fleet Requirements.

Summary of section 95690.7(a)

Section 95690.7(a) specifies that CARB has a right of entry for the purpose of inspecting airport shuttle fleets. This right of entry section proposes authority for CARB staff to enter any facility where an airport shuttle fleet is located or records are kept.

Rationale of section 95690. 7(a)

Section 95690.7(a) is necessary to clarify that CARB staff may inspect an airport shuttle fleet or enter locations where records are retained per section 95690.4(h).

Summary of section 95690.7(b)

Section 95690.7(b) specifies that CARB may direct fleet owners or operators to make records available to CARB for CARB to verify or audit. In addition, section 95690.7(b) specifies that in the event the records are not made available to CARB within 30 days of the request, CARB may assess penalties for noncompliance or for submitting false information.

Rationale of section 95690.7(b)

Section 95690.7(b) is necessary to allow CARB staff the ability to request records to verify fleets reporting information correctly in proposed section 95690.4 and to assess penalties for not providing records or for providing false information.

Summary of section 95690.7(c)(1), (c)(2), and (c)(3)

Section 95690.7(c)(1) specifies that a single separate violation will be issued for each failure to comply action for vehicle for each day until the requirements have been met. Section 95690.7(c)(2) specifies any person that submits false information may be subject to civil or criminal penalties. The CARB EO will utilize existing state law in determining the penalty amounts [95690.7(c)(3)].

Rationale of section 95690.7(c)(1), (c)(2), and (c)(3)

These sections are necessary to clarify that that CARB EO [95690.7(c)(3)] may assess penalties as specified in state law for failure to report, reporting false information and failure to comply with the in-use fleet percentage requirements [95690.7(c)(1) and (c)(2)]. The provisions in this section are consistent with other CARB regulations and follow existing state law for accessing the civil or criminal penalties.

XI. JUSTIFICATION FOR ADOPTION OF REGULATIONS DIFFERENT FROM FEDERAL REGULATIONS CONTAINED IN THE CODE OF FEDERAL REGULATIONS

Currently, there are no federal requirements on the use of zero-emission technologies for airport shuttles.

Diesel and alternative-fueled shuttles less than 14,000 GVWR are not subject to any in-use fleet regulations, but they are subject to new state engine emission standards of 0.20 g/bhp-hr NOx and 0.01 g/bhp-hr PM that harmonize with federal emission standards (CARB, 2016). Additionally, engine manufacturers may also choose to certify engines to state Optional Low NOx Standards of 0.10, 0.05, or 0.02 g/bhp-hr.

XII. PUBLIC PROCESS FOR DEVELOPMENT OF THE PROPOSED ACTION (PRE-REGULATORY INFORMATION)

Consistent with Government Code sections 11346, subdivision (b), and 11346.45, subdivision (a), and with the Board's long-standing practice, CARB staff held public workshops and had other meetings with interested persons during the development of the proposed regulation. These informal pre-rulemaking discussions provided staff with useful information that was considered during development of the regulation that is now being proposed for formal public comment.

CARB staff developed the proposed regulation through an extensive public process. To ensure an open and transparent process, CARB staff created a public workgroup comprised of stakeholders representing the airports, environmental groups, public utilities, ZEV manufacturers, fuel providers, and off-airport fleet owners that provided feedback in assistance to the development of this measure.

CARB staff developed the proposed regulatory actions through an extensive public process described below:

- Staff met with several individual airport authorities including San Francisco, Los Angeles, Ontario, San Diego, Burbank, Oakland, San Jose, and Sacramento airport at their locations from February, 2016 through May, 2017.

- Staff held the initial public workshop on February 24, 2017 (CARB, 2018o). The workshop focused on initiating a dialogue on strategies to accelerate the deployment of zero-emission vehicles utilized for transporting passengers to and from airport and airport facilities such as parking lots. The workshop was webcast for facilitating remote participation.

- After this meeting CARB staff created a workgroup, consisting of interested stakeholders and affected industry members, to develop regulatory concepts for this measure. The workgroup met several times:
    - June 30, 2017: Workgroup meeting to discuss potential regulatory concepts for fleet transition to zero-emission shuttles, cost-sharing opportunities, infrastructure needs, and draft surveys;
    - December 4, 2017: Workgroup meeting to discuss outreach efforts, incentives, proposed regulatory compliance, environmental analysis, and other concerns; and
    - January 17, 2018: Conference call with stakeholders to discuss infrastructure needs, utility upgrades, charges, and cost-sharing opportunities.

- Staff also engaged in over two dozen phone calls with several organizations such as the California Electric Transportation Coalition (CalETC), California Airports Council (CAC), California Airport Clean Air Working Group, as well as various ZEV manufacturers on the development of the surveys.

- Based on comments received at the June 30th workgroup meeting, staff increased outreach efforts to potentially regulated fleet owners that provide hotel courtesy and off-airport private parking companies by contacting several hotel, trade and parking organizations including: California Hotel & Lodging Association, California Lodging Industry Association, Asian American Hotel Owners Association, Hotel Council of San Francisco, Gateway Los Angeles Airport Business District, LAX Coastal Chamber of Commerce, National Parking Association, American Ground Transportation Association, International Parking Institute and California Public Parking Association informing.

- Staff developed a primer postcard for airport shuttle fleet owners and operators that invited fleets to participate in the upcoming survey effort while informing them of the proposed regulation, and providing a link to the CARB Zero-Emission Airport Shuttle webpage. The goals of this outreach effort were to increase the awareness of the regulatory effort and to increase survey participation. Staff mailed and emailed postcards in fall of 2017, a few weeks before the release of the surveys. The California Airport Council and the airports were instrumental in this effort.

- Staff designed two different surveys titled On-Airport Shuttle Buses and Off-Airport Passenger Shuttles, based on stakeholder direction, for surveying airport shuttle fleet owners and operators. The On-Airport Shuttle Buses survey targeted fleet owners and operators controlled by the airports while the Off-Airport Passenger Shuttles surveyed private businesses that transport passengers to and from airports. Both surveys contained a questionnaire, fleet, and route sections to collect critical information for determining the air quality and cost impacts of the proposed regulation. Staff shared draft surveys at the June workgroup meeting and final surveys were distributed via mail and email in mid-September. The distribution list contained many sources, including addresses provided by airports and fleets returned surveys to CARB in the fall (CARB, 2017).

This information, along with multiple discussions with workgroup participants for over a year, assisted staff with making modifications to the proposal, including a revision of the scope.

- On March 7 and 8, 2018: CARB staff held a second set of workshops to discuss regulatory options, draft regulatory language, and the total cost of the regulation. To enable greater participation by shuttle operators in the southern California region, one workshop was specifically held at LAX.

- Finally, on July 20, 2018 staff presented on the draft regulatory proposal to the South Coast Air Quality Management District Mobile Source Committee meeting.

Each of these meetings was open to all members of the public and most were webcast online and/or had a phone line to allow for remote participation. Prior to each meeting,

emails were sent to members of the zero-emission airport shuttle list serve. As of March 22, 2018, this list serve includes about 1,000 subscribers, including individuals from airport authorities, State government, fuel providers, manufacturers, utilities, trade organizations, private businesses, and environmental groups. CARB staff posted information regarding these workshops and meetings and other associated materials on the zero-emission airport shuttle website (CARB, 2018o).

These pre-rulemaking discussions gave an opportunity for government, industry and other stakeholders to engage in an open discussion regarding CARB's efforts. CARB staff developed the proposal based on research, survey results, analysis, and feedback from stakeholders.

XIII. REFERENCES

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APPENDICES

Appendix A Proposed Regulation Order

Appendix B Draft Environmental Analysis

Appendix C Economic Analysis

Appendix D Public process for development of the proposed action