APPENDIX C

Economic Analysis

For the Proposed

Zero-Emission Airport Shuttle Regulation

California Air Resources Board

1001 I Street

Sacramento, California, 95814

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Appendix C- Economic Analysis

This appendix details the methods and assumptions utilized to calculate the economic impacts that includes both costs and benefits from the proposed regulation that would require all in-use airport shuttles to transition from internal combustion to zero-emission airport shuttles (ZEVs) by 2035. This analysis covers the impact to the state and to the potentially impacted fleet owners. Airport shuttles are owned by airports and by private businesses. Fleets may use fuel-cell or battery electric shuttles to achieve the 100 percent ZEV fleet requirement. The economic analysis is based on battery electric shuttles and the necessary charging infrastructure since only battery electric shuttles currently operate in this sector in the United States.

The economic analysis compares the battery electric shuttle deployment and operation to combustion fueled operation. The cost and benefits impact to private and public airport shuttle fleet owners are modeled through 2040 using 2016 dollars.

A. Vehicle Populations

In order to estimate the costs associated with ZEV purchases, staff had to determine the population of airport shuttles as well as the differential cost between internal combustion powered shuttles and ZEVs (Table C-1 on page C-3). For the purposes of this economic analysis staff excluded the current ZEVs in the airport shuttle population since these shuttles have already transformed to zero-emission operation.

Vehicle populations were determined by a pair of surveys conducted by CARB staff in the fall of 2018. Surveys were distributed to commercial airports in California as well as the businesses that provide transportation to and from the airports from private parking lots, nearby hotels and other destinations. Using resulting data staff estimates that there are 665 privately owned internal combustion powered shuttles providing service to and from airports and 244 shuttles that shuttle passengers between airport facilities.

B. Vehicle Prices

1. Current Vehicle Prices

Staff gathered cost data for internal combustion vehicles from multiple sources. Cost estimates for 40-foot low-floor internal combustion [compressed natural gas (CNG) and diesel] were obtained from the Innovative Clean Transit Discussion on Bus Prices (CARB 2017). Prices for the 32 through 35, and 60-foot low-floor CNG shuttle prices were taken from the Washington State master purchasing contract, and pricing and ordering which is used by many agencies in Washington and other states for heavy-duty transit vehicle purchases. In the absence of 32-foot CNG shuttle prices, 30-foot and 35-foot CNG shuttle were used in the estimate for the 32-35 foot CNG shuttle category (Washington State, 2018), (Washington State-Pricing and Ordering-Selected Sheets, 2018). Cost estimates for Class 2b vans and Class 3, 4, and 5 Cutaways were estimated using data from the California Association for Coordinated Transportation

(CalACT)/the Morongo Basin Transit Authority (MBTA) Vehicle Purchasing Cooperative (the Cooperative) offers a variety with the Americans with Disabilities Act (ADA) compliant vehicles (CalACT, 2015). Staff assumed that all cutaway shuttles use CNG fuel and Class 2b vans use gasoline.

Staff assumes for statewide consistency that all public and private ZEVs will be depot charged and is basing the bus prices on the batteries required for depot charging. Public heavy-duty charging stations throughout the state are not adequate to support current airport shuttle population and the roll out of future stations may not be located near airports therefore this analysis assumes impacted fleets will be installing depot charging stations at their own facilities. Staff realizes that some airports may choose to have the additional flexibility of in-route charging but is assuming only depot charging for this analysis. It is also unclear if airports will allow private fleets' access to in-route charging.

Low Floor Shuttles: Cost estimates for 40-foot low-floor ZEVs were obtained from the Innovative Clean Transit Discussion on Bus Prices (CARB, 2017). Estimates for 35-foot low floor ZEV costs of $700,000 is from staff communication with Proterra staff that has been adjusted to reflect depot charging (CARB_Staff, 2018). Cost estimates for 60 foot low-floor ZEVs are estimated from the Washington State Master Purchasing Contract (Washington State-Pricing and Ordering-Selected Sheets, 2018).

Cutaway Shuttles: Staff has limited information of the price of a battery electric cutaway shuttles and battery electric vans. Staff assumes the incremental cost of a ZEV cutaway with a 100 kWh battery is $100,000 over that of a CNG cutaway and, for vans, an incremental cost of $75,000 for a 100 kWh battery-electric van over a gasoline van (CARB, 2018).

1. Zero-Emission Powertrain Certification (ZEP CERT)

The proposed ZEPCert regulation would establish a new, alternative certification process for manufacturers of airport shuttles. The proposed alternative certification would be optional, and thus, manufacturers would have the discretion to certify to either the proposed requirements or the more-relaxed certification requirements that exist today.

Staff determined ZEPCert costs for airport shuttles using the assumption that the increased demand for ZEVs due to the proposed ASB regulation will not necessitate the creation of new vehicle certification families. According the ISOR for the proposed ZEPCert regulation compliance costs per vehicle is $185 when a new certification family is not needed (CARB 2018a). This cost includes the $160 for a label and $25 for service manual. ZEPCert requirements apply to vehicles Class 4 and heavier. ZEVs Class 4 and heavier that are model year 2026 and later will be required to meet ZEP Cert requirements in order to comply with the proposed ASB regulation. Staff expects

2026 model year ZEVs to begin being sold in 2025. ZEPCert costs were added to annual vehicle incremental costs and included in cost calculations from 2025-2040.

Table C-1: Airport Shuttle Populations and Vehicle Costs (2016 $)

Existing ICE Shuttle Type (Fuel Type[1])	Private Business Population	Local Government Fleet Population[2]	Internal Combustion Fueled Shuttle Cost	ZEV Cost	ZEV Incremental Cost
Class 2b Van (Gasoline)[3]	75	-	$45,000	$120,000	$75,000
Class 3 Cutaway (CNG)	203	-	$70,000	$170,000	$100,000
Class 4 Cutaway (CNG)	381	55	$80,000	$180,000	$100,000
Class 5 Cutaway (CNG)	6	27	$100,000	$200,000	$100,000
Class 7-8 32'-35' Low-Floor (CNG)[4]	-	69	$460,000	$700,000	$235,000
Class 8 40' Low-Floor (CNG)	-	46	$485,000	$770,000	$285,000
Class 8 40' Low-Floor (Diesel)	-	26	$435,000	$770,000	$335,000
Class 8 60' Low-Floor (CNG)	-	21	$700,000	$1,100,000	$400,000

[1] Using survey data, the most common fuel type for a given shuttle type and class was assumed for all shuttles in that type/class.
[2] The Local government fleet population includes 152 publicly owned vehicles and 23 privately owned vehicles
[3] Class 2b IC vans are expected to be replaced with Class 3 ZEVs.
[4] Class 7-8 32'-35' Low-Floor shuttles are expected to be replaced by Class 8 35' ZEVs.

2. Vehicle Cost Projections

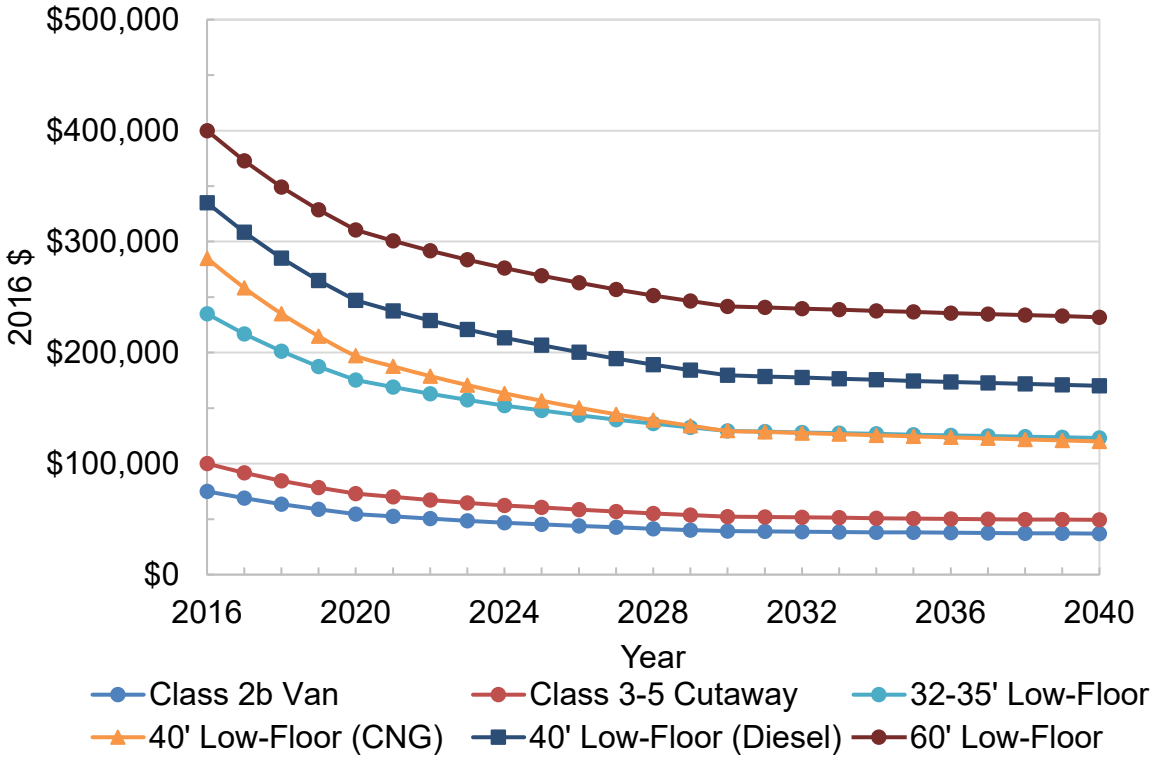
In order to account for the future changes in the incremental costs between internal combustion vehicles and battery-electric ZEVs, staff utilizes the price projection analysis done by ICT (CARB, 2018b). Incremental costs are expected to decrease over time due to the reduction of battery costs. Staff 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, as shown in ICT ISOR Appendix E Figure C-4 of staff's discussion document about battery costs (CARB, 2018c). Using the incremental costs in Table C-1, the battery capacities in Section B, and the expected future battery costs, staff projecting the incremental costs for replacing all shuttle types. Expected incremental costs during the period of economic analysis are shown in Figure C-1 on the following page. The incremental costs and graph curves for

each vehicle are based on current vehicle prices (Table C-1) and the expected battery capacities for each shuttle, shown in Table C-2.

Table C-2: Expected ZEV Battery Capacity

ZEV Type	Battery Capacity (kWh)
Class 3 Van	100
Class 3-5 Cutaway	100
Class 8, 35' Low-Floor	220
Class 8, 40' Low-Floor	330
Class 8, 60' Low-Floor	660

Figure C-1: Incremental Costs of Replacing Internal Combustion Shuttles with Equivalent ZEVs



3. Vehicle Purchases

Vehicle purchase prices are based on the expected incremental cost for a vehicle in the year of purchase (Figure C-1). Publically owned vehicles are assumed to be paid for in full upon purchase. Privately owned vehicle purchases, including those made by private businesses contracted to own/operate a local government (airport) fleets are amortized over a five year period with an interest rate of five percent. The Capitol Recovery Factor (CRF) was used in order to annualize the cost of vehicle purchases:

$$\text{CRF} = \frac{interest\ rate\ \times (1 + interest\ rate)^{number\ of\ years}}{(1 + interest\ rate)^{number\ of\ years} - 1}$$

Using the CRF, annual costs for each amortized ZEV purchase were calculated using the following formula:

$$Annual\ Cost\ for\ Each\ ZEV\ purchase\ (5\ year\ duration) = ZEV\ Incremental\ Cost\ \times\ CRF$$

Using the annual incremental cost values and vehicle populations, staff modeled the expected annual vehicle turnover and corresponding costs incurred by private businesses and local governments (Table C-3 & Table C-4). ZEVs purchased between 2020 and 2023 will reach the end of their 12 year useful life[1] during the regulatory compliance schedule and will need to be replaced prior to December 31st, 2035. Replacement purchases for ZEVs purchased from 2020 through 2028 are accounted for in years 2032 through 2040 respectively. With the exception of Class 5 Cutaways, which average less than one vehicle purchase per year, annual vehicle turnover figures are rounded to the nearest whole number.

[1] 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 C-3: Private Business Expected Vehicle Turnover and Annual Costs

Year	ZEV Replacement Rate	ZEV Purchases				Annual Cost
		Class 3 Van	Class 3 Cutaway	Class 4 Cutaway	Class 5 Cutaway	
2020	6.25%	5	13	24	0.4	$679,969
2021	6.25%	5	13	24	0.4	$1,332,538
2022	6.25%	5	13	24	0.4	$1,959,863
2023	6.25%	5	13	24	0.4	$2,563,920
2024	6.25%	5	13	24	0.4	$3,146,539
2025	6.25%	5	13	24	0.4	$3,030,464
2026	6.25%	5	13	24	0.4	$2,923,585
2027	6.25%	5	13	24	0.4	$2,825,169
2028	6.25%	5	13	24	0.4	$2,734,562
2029	6.25%	5	13	24	0.4	$2,651,148
2030	6.25%	5	13	24	0.4	$2,573,333
2031	6.25%	5	13	24	0.4	$2,510,697
2032	6.25%	9	25	48	0.8	$2,941,967
2033	6.25%	9	25	48	0.8	$3,382,891
2034	6.25%	9	25	48	0.8	$3,832,370
2035*	6.25%	9	25	48	0.8	$4,289,379
2036	-	5	13	24	0.4	$4,275,134
2037	-	5	13	24	0.4	$3,781,078
2038	-	5	13	24	0.4	$3,290,196
2039	-	5	13	24	0.4	$2,802,430
2040	-	5	13	24	0.4	$2,317,731
Total	**100.0%**	**117**	**317**	**595**	**9**	**$59,844,961**

*Fleets achieve 100% ZEV in 2035.

Table C-4: Local Government Vehicle Turnover and Annual Costs

Year	ZEV Replacement Rate	ZEV Purchases						Annual Cost
		Cutaway		Low-floor				
		Class 4	Class 5	Class 35'	Class 8 40' [1]	Class 8 40' [2]	Class 8 60'	
2020	7%	4	2	5	3	2	1	$2,253,977
2021	7%	4	2	5	3	2	1	$2,333,030
2022	7%	4	2	5	3	2	1	$2,411,874
2023	6%	3	2	4	3	2	1	$2,202,907
2024	6%	3	2	4	3	2	1	$2,270,173
2025	6%	3	2	4	3	2	1	$2,173,295
2026	6%	3	2	4	3	2	1	$2,081,631
2027	7%	4	2	5	3	2	1	$2,249,754
2028	6%	3	2	4	3	2	1	$1,955,964
2029	6%	3	2	4	3	2	1	$1,902,051
2030	6%	3	2	4	3	2	1	$1,852,148
2031	6%	3	2	4	3	2	1	$1,830,831
2032	6%	3	2	4	3	2	1	$3,413,736
2033	6%	7	4	9	6	3	3	$3,503,959
2034	6%	7	4	9	6	3	3	$3,596,270
2035[3]	6%	7	4	9	6	3	3	$3,462,985
2036	-	3	2	4	3	2	1	$2,184,750
2037	-	3	2	4	3	2	1	$2,060,312
2038	-	3	2	4	3	2	1	$1,936,811
2039	-	3	2	4	3	2	1	$2,036,861
2040	-	4	2	5	3	2	1	$1,724,295
Total	**100%**	**67**	**33**	**83**	**56**	**31**	**25**	**$49,437,614**

[1] Replaces existing Class 8 low-floor CNG shuttles
[2] Replaces existing Class 8 low-floor Diesel shuttles
[3] Fleets Achieve 100% Compliance in 2035

B. Infrastructure Costs

1. Infrastructure Prices

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. Using those assumptions, vehicle population data, as well as cost information from current electrical infrastructure installations at businesses and airports in California, staff estimates the infrastructure

purchase prices and populations for private businesses and local governments (Table C-5 and Table C-6). One charger purchase is assumed for every ZEV purchased to provide refueling/charging of the vehicles' energy system as they transition to zero-emission vehicles. Chargers are assumed to be purchased simultaneously with the corresponding shuttles and will follow the annual purchasing rates shown in Table C-3 and C-4.

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. Staff assumes that cutaway ZEVs owned by or operating on behalf of local governments will require 50 (kW) Level III chargers and low-floor ZEVs will require 50 kW-80kW Level II chargers.

CARB staff assumed fleets will choose to install their own infrastructure. Infrastructure costs for off-airport (private business) were estimated using data from two projects at two airport parking companies (CARB_Staff, 2017). Costs for on-airport (local government) infrastructure were estimated using cost data from infrastructure installations at Sacramento International Airport (CARB-Staff, 2018a) and Norman Y. Mineta International Airport in San Jose (City of San Jose-Airport, 2015).

Table C-5: Private Business Infrastructure Cost and Populations

Item	Per Unit Purchase Cost	Population	Total
Charging Equipment			
Level II (6-20 kW) Depot Charger	$2,500	223	$557,500
Level III (50 kW) Depot Charger	$25,000	442	$11,050,000
Total Charger Purchase Cost			$11,607,500
Electrical Infrastructure and Construction			
Level II Charger Electrical Infrastructure and Construction	$10,000	223	$2,230,000
Level III Charger Electrical Infrastructure and Construction	$25,000	442	$11,050,000
Total Electrical Infrastructure and Construction Purchase Cost			$13,285,000

Table C-6: Local Government Infrastructure Cost and Populations

Item	Per Unit Purchase Cost	Population	Cost
Charging Equipment			
Level III (50 kW) Depot Charger - Cutaway Shuttle	$25,000	82	$2,050,000
Level III (50-80 kW) Depot Charger - Low-Floor Shuttle	$50,000	162	$8,100,000
Total Charger Purchase Cost			$10,150,000
Low-Floor Shuttle			
Level III Charger (50kW) Electrical Infrastructure and Construction - Cutaway Shuttle	$50,000	82	$4,100,000
Level III Charger (50-80 kW) Electrical Infrastructure Construction - Low-Floor Shuttle	$100,000	162	$16,200,000
Total Electrical Infrastructure and Construction Purchase Cost			$20,300,000

2. Infrastructure Purchases

Construction costs associated with charging infrastructure become more economical on a per unit basis as more units are simultaneously installed due to savings in labor and material costs (CARB-Staff, 2017a). Based on this factor, staff expects infrastructure purchases to occur at an accelerated rate compared to vehicle turnover during the first four years of the regulatory period (2020-2023). Annual infrastructure purchases are based on a percentage of the total infrastructure needed to accommodate the entire regulated vehicle inventory.
Staff assumed publicly owned infrastructure would be paid for in full upon purchase while privately owned infrastructure amortized over a five year period with an interest rate of five percent. Annual costs for private infrastructure purchases are calculated using the following formula, which includes the CRF formula from Section A:

$$\begin{aligned} &Annual\ Cost\ (5\ year\ duration) \\ &\quad = [Annual\ Infrastructure\ Purchases(percentage\ of\ total) \\ &\quad \times\ Per\ Unit\ Purchase\ Cost \\ &\quad + Annual\ Charger\ Purchases(percentage\ of\ total) \\ &\quad \times Per\ Unit\ Purchase\ Cost] \times\ CRF \end{aligned}$$

Annual infrastructure purchase rates and the associated costs are shown in Table C-7 and C-8

Table C-7: Annual Private Business Infrastructure Construction Rates and Costs

Calendar Year	Infrastructure Construction	Charger Purchases	Annual Infrastructure Costs
2020	12.5%	6.25%	$550,983
2021	12.5%	6.25%	$1,101,966
2022	12.5%	6.25%	$1,652,949
2023	12.5%	6.25%	$2,203,933
2024	6.25%	6.25%	$2,563,207
2025	6.25%	6.25%	$2,371,498
2026	6.25%	6.25%	$2,179,789
2027	6.25%	6.25%	$1,988,079
2028	3.125%	6.25%	$1,700,516
2029	3.125%	6.25%	$1,604,661
2030	3.125%	6.25%	$1,508,807
2031	3.125%	6.25%	$1,412,952
2032	3.125%	6.25%	$1,317,098
2033	3.125%	6.25%	$1,317,098
2034	3.125%	6.25%	$1,317,098
2035*	3.125%	6.25%	$1,317,098
2036	-		$1,053,678
2037	-		$790,259
2038	-		$526,839
2039	-		$263,420
2040	-		$0
Total	**100%**		**$28,741,926**

*2035 is the final year that electrical infrastructure is purchased. Costs in subsequent years are due to annual payments for purchases made by private businesses, including those associated with local governments, in years 2032-3035.

Table C-8: Annual Local Government Infrastructure Construction Rates and Costs

Calendar Year	Charger Purchases	Infrastructure Construction	Annual Infrastructure Costs
2020	7%	14%	$2,765,210
2021	7%	14%	$3,001,671
2022	7%	14%	$3,238,131
2023	6%	12%	$3,079,562
2024	6%	6%	$2,334,170
2025	6%	6%	$2,219,318
2026	6%	6%	$2,104,466
2027	7%	4%	$1,752,595
2028	6%	4%	$1,572,249
2029	6%	3%	$1,387,213
2030	6%	3%	$1,346,677
2031	6%	3%	$1,306,141
2032	6%	3%	$1,285,873
2033	6%	3%	$1,272,361
2034	6%	3%	$1,272,361
2035*	6%	2%	$1,114,349
2036	-	-	$310,777
2037	-	-	$229,704
2038	-	-	$148,632
2039	-	-	$67,560
2040	-	-	$0
Total	**100%**	**100%**	**$31,809,019**

*2035 is the final year that electrical infrastructure is purchased. Costs in subsequent years are due to annual payments for purchases made by private businesses, including those associated with local governments, in years 2032-3035.

C. Electricity Costs

Electricity needed to charge the electric shuttles will be an ongoing cost to businesses. CARB's Truck and Bus charging calculator (CARB, 2017a), was used to estimate an average price of $0.17 per kilowatt-hour (kWh). Annual kWh purchases include assumption of 90% charger efficiency which results 1.1 kWh of electricity being purchased for every 1 kWh of electricity used by a shuttle.

Staff estimated electricity usage (kWh per mile) for each vehicle type is estimated using data from multiple sources. For Class 3 and Class 4 electric vehicles, data was used from San Diego Airport Parking Company, (CARB_Staff, 2017a), Zenith Motors, (Zenith Motors, 2018), Phoenix Motorcars (Phoenix Motorcars-ZEV Economy, 2018) and Motiv Power Systems (Motiv Power Systems, 2017) as well as a case study conducted by

Phoenix Motorcars (Phoenix Motorcars, 2017). Staff estimated Class 5 ZEV energy usage based on the data for Class 3 and 4 ZEVs.

Energy Usage for Class 8 40 foot ZEV was obtained from information from Los Angeles Metropolitan Transportation Authority (Los Angeles MTA, 2016). Staff estimated the per mile energy usage of Class 7 and 8 32-35 foot ZEVs to be equivalent to that of Class 8 40 foot ZEVs. Class 8 60 foot ZEV energy usage was estimated using product information from BYD (BYD, 2018).

Annual electricity costs for each shuttle type, shown in Table C-9, are calculated using the following equation:

$$Annual\ Electricity\ Cost\ per\ Vehicle = \frac{kWh\ Usage}{Mile} \times Annual\ Miles \times \frac{1}{Charger\ Efficiency} \times kWh\ Price$$

Table C-9: Annual Electricity Cost by Vehicle Type

Existing ICE Vehicle Type	Replacement ZEV Vehicle Type	Energy Usage (kWh per mile)[1]	Annual Miles Per Vehicle[1]	Annual kWh Purchased Per Vehicle[2]	Annual Electricity Cost Per Vehicle
Class 2b Van	Class 3 Van	0.65	19,426	13,890	$2,361
Class 3 Cutaway	Class 3 Cutaway	0.93	31,660	32,388	$5,506
Class 4 Cutaway	Class 4 Cutaway	1.27	31,084	43,424	$7,382
Class 5 Cutaway	Class 5 Cutaway	1.5	33,000	54,450	$9,257
Class 7-8 32-35' Low-floor	Class 8 35' Low-floor	2	20,489	45,076	$7,663
Class 8 40' Low-floor (CNG)	Class 8 40' Low-floor	2	57,852	127,274	$21,637
Class 8 40' Low-floor (Diesel)	Class 8 40' Low-floor	2	56,286	123,829	$21,051
Class 8 60' Low-floor	Class 8 60' Low-floor	3	4,703	15,520	$2,638

[1]*Annual Miles and kWh/Mile are weighted averages based on survey and research data for Class 4 and Class 5 vehicles.*
[2]*Average Annual kWh per Vehicle accounts for 90% charger efficiency. 1.1 kWh of purchased electricity are needed for every 1 kWh of vehicle charge.*

Weighted average vehicle annual electricity costs were calculated for the private business and local government fleet populations shown in Table 1. The annual electricity costs of the entire vehicle inventory are determined by multiplying the weighted average annual electricity cost per vehicle by the yearly cumulative number of vehicles expected to be converted to ZEVs. Annual electricity costs for private business and local government fleet are shown in Table C-10.

Table C-10: Total Electricity Costs

Year	Private Business Fleets			Local Government Fleets		
	Cumulative Number of Vehicle Converted to ZEVs	Annual Weighted Average Electricity Cost per Vehicle	Annual Electricity Cost	Cumulative Number of Vehicle Converted to ZEVs	Annual Weighted Average Electricity Cost per Vehicle	Annual Electricity Cost
2020	42	$6,260	$260,180	17	$11,405	$194,791
2021	83	$6,260	$520,360	34	$11,405	$389,581
2022	125	$6,260	$780,539	51	$11,405	$584,372
2023	166	$6,260	$1,040,719	66	$11,405	$751,335
2024	208	$6,260	$1,300,899	81	$11,405	$918,298
2025	249	$6,260	$1,561,079	95	$11,405	$1,085,262
2026	291	$6,260	$1,821,259	110	$11,405	$1,252,225
2027	333	$6,260	$2,081,439	127	$11,405	$1,447,015
2028	374	$6,260	$2,341,618	142	$11,405	$1,613,979
2029	416	$6,260	$2,601,798	156	$11,405	$1,780,942
2030	457	$6,260	$2,861,978	171	$11,405	$1,947,905
2031	499	$6,260	$3,122,158	185	$11,405	$2,114,869
2032	540	$6,260	$3,382,338	200	$11,405	$2,281,832
2033	582	$6,260	$3,642,517	215	$11,405	$2,448,795
2034	623	$6,260	$3,902,697	229	$11,405	$2,615,759
2035*	665	$6,260	$4,162,877	244	$11,405	$2,782,722
2036	665	$6,260	$4,162,877	244	$11,405	$2,782,722
2037	665	$6,260	$4,162,877	244	$11,405	$2,782,722
2038	665	$6,260	$4,162,877	244	$11,405	$2,782,722
2039	665	$6,260	$4,162,877	244	$11,405	$2,782,722
2040	665	$6,260	$4,162,877	244	$11,405	$2,782,722
Total			**$56,198,840**			**$38,123,291**

D. Reporting Costs

The Proposed Regulation requires reporting for airport shuttle fleets starting in 2022 and ending after 2036. 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 ASB. 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. Staff assumes a cost of $50 per hour for a clerical employee to input data to meet the ASB 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 $130,500 for private fleets, as displayed in Table VIII-1. Estimated reporting times and labor rates, along with associated annual costs per fleet are shown in Table C-11.

Table C-11: Estimated Reporting Times by Fleet Size

Fleet Size Category	Number of Private Business Fleets	Number of Local Government Fleets	Estimated Annual Reporting Times		Labor Costs ($/Hour)
			First Year	Subsequent Years	
50+ Vehicles	1	2	8 hours	4 hours	$50
20-49 Vehicles	2	2	4 hours	2 hours	$50
2-19 Vehicles	166	5	2 hours	1 hours	$50

Using the data in Table C-11, the annual reporting costs for each fleet size category can be calculated:

$$Annual\ Reporting\ Costs\ per\ Fleet\ Size\ Category = Number\ of\ fleets \times Annual\ Reporting\ Time \times Labor\ Cost$$

Applying this equation to each fleet size for private business fleets and local government fleets yields the annual reporting costs Table C-12 and Table C-13.

Table C-12: Private Business Annual Reporting Costs

Year	Fleet Size			Annual Combined Cost
	1-19 Vehicles	20-49 Vehicles	50+ Vehicles	
2022	$16,600	$400	$400	$17,400
2023	$8,300	$200	$200	$8,700
2024	$8,300	$200	$200	$8,700
2025	$8,300	$200	$200	$8,700
2026	$8,300	$200	$200	$8,700
2027	$8,300	$200	$200	$8,700
2028	$8,300	$200	$200	$8,700
2029	$8,300	$200	$200	$8,700
2030	$8,300	$200	$200	$8,700
2031	$8,300	$200	$200	$8,700
2032	$8,300	$200	$200	$8,700
2033	$8,300	$200	$200	$8,700
2034	$8,300	$200	$200	$8,700
2035	$8,300	$200	$200	$8,700
2036*	$8,300	$200	$200	$8,700
2037	-	-	-	-
2038	-	-	-	-
2039	-	-	-	-
2040	-	-	-	-
Total				**$139,200**

*2036 is the final year in which fleets are required to report to CARB

Table C-13: Local Government Annual Reporting Costs

Year	Fleet Size			Annual Combined Cost
	1-19 Vehicles	20-49 Vehicles	50+ Vehicles	
2022	$500	$400	$800	$1,700
2023	$250	$200	$400	$850
2024	$250	$200	$400	$850
2025	$250	$200	$400	$850
2026	$250	$200	$400	$850
2027	$250	$200	$400	$850
2028	$250	$200	$400	$850
2029	$250	$200	$400	$850
2030	$250	$200	$400	$850
2031	$250	$200	$400	$850
2032	$250	$200	$400	$850
2033	$250	$200	$400	$850
2034	$250	$200	$400	$850
2035	$250	$200	$400	$850
2036*	$250	$200	$400	$850
2037	-	-	-	-
2038	-	-	-	-
2039	-	-	-	-
2040	-	-	-	-
Total				**$13,600**

*2036 is the final year in which fleets are required to report to CARB

E: Low Carbon Fuel Standard (LCFS) Credits

Businesses and local governments who replace internal combustion powered vehicles with ZEVs are eligible to receive credits through CARB's LCFS program (CARB, 2015). In the case of battery electric shuttles, credits are generated based on kilowatt-hours (kWh) of electricity consumed by the battery electric shuttles in a business' fleet. The monetary value of each kWh consumed depends on the current credit price, energy economy ratio (EER), and carbon intensity scores (CI) of the reference fuel and replacement fuel. The values in Tables C-14 and C-15 entered into the LCFS calculator to determine the kWh monetary value. The LCFS calculations assumes gasoline as a reference fuel for Class 2b-3 shuttles and diesel fuel for Class 4-8 vehicles. All inputs used for the LCFS calculations are taken from Low Carbon Fuel Standard and Alternative Diesel Regulation 2018, Second Notice of Public Availability of Modified Text, Attachment A (CARB, 2018e).

Table C-14: LCFS Calculator Inputs

Calculator Field	**Class 2b-3**	**Class 4-8**
Reference Fuel	Gasoline	Diesel (CNG Replacement)
EER	3.4	5
Replacement Fuel	Electricity	Electricity
Electricity Energy Density (ED)	3.6 Mega J/kWh	
Conversion Factor (C)	$1x10^{-6}$ (Metric Tons/gCO_{2e})	
Credit Price	$100	

Table C-15: LCFS Calculator Inputs

Year	Carbon Intensity (CI) Score by Year (gCO_{2e}/MJ)		
	Electricity	Gasoline	Diesel
2020	93.75	91.98	92.92
2021	93.75	90.74	91.66
2022	93.75	89.50	90.41
2023	93.75	88.25	89.15
2024	93.75	87.01	87.89
2025	93.75	85.77	86.64
2026	93.75	84.52	85.38
2027	93.75	83.28	84.13
2028	93.75	82.04	82.87
2029	93.75	80.80	81.62
2030	93.75	79.55	80.36
2031	93.75	79.55	80.36
2032	93.75	79.55	80.36
2033	93.75	79.55	80.36
2034	93.75	79.55	80.36
2035	93.75	79.55	80.36
2036	93.75	79.55	80.36
2037	93.75	79.55	80.36
2038	93.75	79.55	80.36
2039	93.75	79.55	80.36
2040	93.75	79.55	80.36

Entering the values from Table C-14 and Table C-15 into the following equation yields the expected monetary value of each kWh purchase for use by electric shuttles:

$$kWh\ Value\ (\$) = (CI^{Reference\ Fuel} \times EER - CI^{Replacement\ Fuel}) \times ED^{Reference\ Fuel} \times Credit\ Price \times Conversion\ Factor$$

The results of this equation for years 2020 through 2040 are shown in Table C-16.

Table C-16 – Monetary Value of Each kWh Purchased ($/kWh)

Year	Class 2b-3	Class 4-8
2020	$0.079	$0.134
2021	$0.077	$0.131
2022	$0.076	$0.129
2023	$0.074	$0.127
2024	$0.073	$0.124
2025	$0.071	$0.122
2026	$0.070	$0.120
2027	$0.068	$0.118
2028	$0.067	$0.115
2029	$0.065	$0.113
2030	$0.064	$0.111
2031	$0.064	$0.111
2032	$0.064	$0.111
2033	$0.064	$0.111
2034	$0.064	$0.111
2035	$0.064	$0.111
2036	$0.064	$0.111
2037	$0.064	$0.111
2038	$0.064	$0.111
2039	$0.064	$0.111
2040	$0.064	$0.111

Once the monetary value of each kWh has been calculated, the average annual value of LCFS credits earned by each vehicle can be determined using the following equation:

$$Annual\ LCFS\ Credit\ Value\ (\$) = \frac{kWh\ Value \times Annual\ Miles \times kWh\ per\ Mile}{Charger\ Effiency\ \%}$$

The average annual credit value generated per vehicle is displayed in the Table C-17a, Table C-17b, and Table C-18 below.

Table C-17a- Class 3
ZEV Private Business Shuttles: Average LCFS Credit Value per Vehicle

Year	kWh Value	Annual Average Miles[1]	Average kWh/Mile[2]	Average Annual kWh per Vehicle[3]	Annual Credits Value per Vehicle
2020	$0.079	28,211	0.85	26,377	$2,079
2021	$0.077	28,211	0.85	26,377	$2,039
2022	$0.076	28,211	0.85	26,377	$1,999
2023	$0.074	28,211	0.85	26,377	$1,959
2024	$0.073	28,211	0.85	26,377	$1,919
2025	$0.071	28,211	0.85	26,377	$1,879
2026	$0.070	28,211	0.85	26,377	$1,839
2027	$0.068	28,211	0.85	26,377	$1,799
2028	$0.067	28,211	0.85	26,377	$1,758
2029	$0.065	28,211	0.85	26,377	$1,718
2030	$0.064	28,211	0.85	26,377	$1,678
2031	$0.064	28,211	0.85	26,377	$1,678
2032	$0.064	28,211	0.85	26,377	$1,678
2033	$0.064	28,211	0.85	26,377	$1,678
2034	$0.064	28,211	0.85	26,377	$1,678
2035	$0.064	28,211	0.85	26,377	$1,678
2036	$0.064	28,211	0.85	26,377	$1,678
2037	$0.064	28,211	0.85	26,377	$1,678
2038	$0.064	28,211	0.85	26,377	$1,678
2039	$0.064	28,211	0.85	26,377	$1,678
2040	$0.064	28,211	0.85	26,377	$1,678

[1]*Annual Miles are weighted averages based on survey and research data for existing Class 2b and Class 3 vehicles*
[2]*Average kWh/mile is based research data for Class 3 ZEVs*
[3]*Average Annual kWh per Vehicle accounts for 90% charger efficiency. 1.1 kWh of purchased electricity are needed for every 1 kWh of vehicle charge*

Table 17b- Class 4-5 Private Business Shuttles: Average LCFS Credit Value per Vehicle

Year	$/kWh	Average Annual Miles[1]	Average kWh/mile[2]	Average Annual KWh per Vehicle[3]	Annual Credit Value per Vehicle
2020	$0.134	30,312	1.27	42,346	$5,653
2021	$0.131	30,312	1.27	42,346	$5,557
2022	$0.129	30,312	1.27	42,346	$5,462
2023	$0.127	30,312	1.27	42,346	$5,366
2024	$0.124	30,312	1.27	42,346	$5,270
2025	$0.122	30,312	1.27	42,346	$5,175
2026	$0.120	30,312	1.27	42,346	$5,079
2027	$0.118	30,312	1.27	42,346	$4,983
2028	$0.115	30,312	1.27	42,346	$4,887
2029	$0.113	30,312	1.27	42,346	$4,792
2030	$0.111	30,312	1.27	42,346	$4,696
2031	$0.111	30,312	1.27	42,346	$4,696
2032	$0.111	30,312	1.27	42,346	$4,696
2033	$0.111	30,312	1.27	42,346	$4,696
2034	$0.111	30,312	1.27	42,346	$4,696
2035	$0.111	30,312	1.27	42,346	$4,696
2036	$0.111	30,312	1.27	42,346	$4,696
2037	$0.111	30,312	1.27	42,346	$4,696
2038	$0.111	30,312	1.27	42,346	$4,696
2039	$0.111	30,312	1.27	42,346	$4,696
2040	$0.111	30,312	1.27	42,346	$4,696

[1]*Annual Miles and kWh/Mile are weighted averages based on survey and research data for Class 4 and Class 5 vehicles.*
[2]*Average kWh/mile is based research data for Class 4 and Class 5 ZEVs*
[3]*Average Annual kWh per Vehicle accounts for 90% charger efficiency. 1.1 kWh of purchased electricity are needed for every 1 kWh of vehicle charge*

Table C-18: Class 4-8 Local Government (Airport Owned) Shuttles: Average LCFS Credit Value per Vehicle

Year	$/kWh	Average Annual Miles*	Average kWh/mile*	Average Annual kWh per Vehicle**	Annual Credit Value per Vehicle
2020	$0.134	34,809	1.86	42,346	$9,508
2021	$0.131	34,809	1.86	42,346	$9,347
2022	$0.129	34,809	1.86	42,346	$9,186
2023	$0.127	34,809	1.86	42,346	$9,025
2024	$0.124	34,809	1.86	42,346	$8,863
2025	$0.122	34,809	1.86	42,346	$8,703
2026	$0.120	34,809	1.86	42,346	$8,542
2027	$0.118	34,809	1.86	42,346	$8,381
2028	$0.115	34,809	1.86	42,346	$8,220
2029	$0.113	34,809	1.86	42,346	$8,060
2030	$0.111	34,809	1.86	42,346	$7,898
2031	$0.111	34,809	1.86	42,346	$7,898
2032	$0.111	34,809	1.86	42,346	$7,898
2033	$0.111	34,809	1.86	42,346	$7,898
2034	$0.111	34,809	1.86	42,346	$7,898
2035	$0.111	34,809	1.86	42,346	$7,898
2036	$0.111	34,809	1.86	42,346	$7,898
2037	$0.111	34,809	1.86	42,346	$7,898
2038	$0.111	34,809	1.86	42,346	$7,898
2039	$0.111	34,809	1.86	42,346	$7,898
2040	$0.111	34,809	1.86	42,346	$7,898

[1]*Annual Miles and kWh/Mile are weighted averages based on survey and research data for Class 4, 5, 7, and 8 vehicles.*
[2]*Average Annual kWh per Vehicle accounts for 90% charger efficiency. 1.1 kWh of purchased electricity are needed for every 1 kWh of vehicle charge.*

The total value of LCFS credits for the entire vehicle inventory, displayed on the next page in Table C-19, are determined by multiplying the Average Annual Credit Value per vehicle by the annual cumulative total number of vehicles expected to be converted to ZEVs. In order to calculate this for privately-owned shuttle population, the Annual Credit Values per Vehicle from Tables C-17a and C-17b must be combined into a single weighted average Annual Credit Value per Vehicle.

Table C-19: Annual LCFS Credit Generation

Year	Private Business Fleets			Local Government Fleets		
	Cumulative Number of Vehicles Converted to ZEVs	Weighted Average Credit Value per Vehicle	Annual Value of Earned Credits	Cumulative Number of Vehicles Converted to ZEVs	Weighted Average Credit Value per Vehicle	Annual Value of Earned Credits
2020	42	$4,160	$172,900	17	$9,508	$162,397
2021	83	$4,087	$339,732	34	$9,347	$319,294
2022	125	$4,015	$500,620	51	$9,186	$470,691
2023	166	$3,942	$655,358	66	$9,025	$594,567
2024	208	$3,870	$804,234	81	$8,863	$713,649
2025	249	$3,797	$946,877	95	$8,703	$828,177
2026	291	$3,725	$1,083,742	110	$8,542	$937,912
2027	333	$3,652	$1,214,290	127	$8,381	$1,063,381
2028	374	$3,580	$1,339,144	142	$8,220	$1,163,294
2029	416	$3,508	$1,458,013	156	$8,060	$1,258,650
2030	457	$3,435	$1,570,439	171	$7,898	$1,348,978
2031	499	$3,435	$1,713,206	185	$7,898	$1,464,605
2032	540	$3,435	$1,855,973	200	$7,898	$1,580,232
2033	582	$3,435	$1,998,741	215	$7,898	$1,695,859
2034	623	$3,435	$2,141,508	229	$7,898	$1,811,485
2035	665	$3,435	$2,284,275	244	$7,898	$1,927,112
2036	665	$3,435	$2,284,275	244	$7,898	$1,927,112
2037	665	$3,435	$2,284,275	244	$7,898	$1,927,112
2038	665	$3,435	$2,284,275	244	$7,898	$1,927,112
2039	665	$3,435	$2,284,275	244	$7,898	$1,927,112
2040	665	$3,435	$2,284,275	244	$7,898	$1,927,112
Total			$31,500,427			$26,975,842

F. Fuel Savings

Businesses impacted by the proposed regulation will decrease and ultimately eliminate their need to purchase fuel (e.g. diesel gasoline, and compressed natural gas (CNG)) as they adopt ZEVs to replace the existing internal combustion powered shuttles. Elimination of fuel costs associated with ICE vehicles represent monetary savings once those vehicles are replaced by ZEVs. In order to calculate annual fuel savings, staff needed to estimate the per-unit cost of fuel and the fuel economy of the internal combustion shuttles.

Fuel Prices

Staff used multiple sources to estimate fuel costs. For Gasoline prices, staff used data from the California Energy commission to calculate the average price of regular grade gasoline during 2017 (CEC, 2017). Diesel prices were estimated using West Coast Region 2017 prices for ultra-low-sulfur diesel from the United States Energy Information Administration (EIA, 2018). CNG prices for Cutaway shuttles were estimated using West Coast data from the Clean Cities January 2018 Alternative Fuel Report (US DOE 2018). CNG prices for all low-floor shuttles, which are part of larger fleets that buy their fuel in bulk, were estimated by using information from CARB staff correspondence with San Francisco International Airport (CARB_Staff, 2018b) and Los Angeles International Airport (CARB_Staff, 2018c).

Fuel Economy

Fuel economy data for airport shuttles are scarce. Staff used multiple data sources to estimate the fuel economy of internal combustion shuttles. Data from Zenith Motors (Zenith), San Diego Airport Parking Company (CARB_Staff, 2017b), and from correspondence with Sunrise LAX Parking (CARB_Staff, 2018d), were used to estimate the fuel economy of Class 2b vans. Data from Zenith Motors (Zenith Motors, 2018),and Phoenix Motorcars (CARB_Staff, 2017c) were used to estimate fuel economy for Class 3 cutaway shuttles. Fuel economy data from Phoenix Motorcars (CARB_Staff, 2017c), along with data from correspondence with John Wayne International Airport (CARB_Staff, 2017d and Oakland International Airport (CARB_Staff, 2017e were used by staff to estimate the fuel economy for Class 4 cutaway shuttles. Due to the lack of data for Class 5 cutaway shuttles, staff estimate the fuel economy using Class 4 cutaway data. Data from Appendix D of the ICT ISOR (CARB, 2018d) and San Francisco International Airport (CARB_Staff, 2018b) were used to estimate fuel economy for Class 8, 40 foot low-floor CNG and diesel shuttles. Class 8, 40 foot low-floor fuel economy data were used to estimate the fuel economies of Class 7-8, 35 foot low-floor and Class 8, 60-foot low-floor CNG shuttles.

Using the fuel economy, fuel price, and annual miles, average annual fuel savings Table C-20 are calculated using the following equation:

$$Annual\ Fuel\ Savings = Fuel\ Price \times \frac{1}{Fuel\ Efficiency} \times Annual\ Miles$$

Table C-20: Fuel Savings by Vehicle Type

Existing ICE Vehicle Type (Fuel Type)	Replacement ZEV Vehicle Type	Fuel Price ($/gallon)[1]	Fuel Efficiency (mpg)	Annual Miles[2]	Annual Fuel Savings
Class 2b Van (Gasoline)	Gasoline	$3.00	11	19,426	$5,298
Class 3 Cutaway (CNG)	CNG	$2.50	7	31,660	$11,307
Class 4 Cutaway (CNG)		$2.50	5	31,084	$15,542
Class 5 Cutaway (CNG)		$2.50	5	33,000	$16,500
Class 7-8 32'-35' Low-Floor (CNG)		$2.00	3.5	20,489	$11,708
Class 8 40' Low-Floor (CNG)		$2.00	3.5	57,852	$33,058
Class 8 60' Low-Floor (CNG)		$2.00	3.5	4,703	$2,687
Class 8 40' Low-Floor (Diesel)	Diesel	$3.00	4	56,286	$42,215

[1]CNG prices are dollars per diesel gallon equivalent
[2]Annual Miles based on survey and research data.

Using the annual fuel savings for each vehicle type and the expected rate of ZEV adoption, staff calculated the weighted average annual fuel savings are calculated for private business and local government fleets, shown in Table C-21 on the following page.

Table C-21: Annual Fuel Savings

Year	Private Business Fleets			Local Government Fleets		
	Cumulative Number of Vehicle Converted to ZEVs	Weighted Average Fuel Savings per Vehicle	Annual Fuel Savings	Cumulative Number of Vehicle Converted to ZEVs	Weighted Average Fuel Savings per Vehicle	Annual Fuel Savings
2020	42	$13,103	$544,573	17	$19,602	$334,799
2021	83	$13,103	$1,089,147	34	$19,602	$669,599
2022	125	$13,103	$1,633,720	51	$19,602	$1,004,398
2023	166	$13,103	$2,178,293	66	$19,602	$1,291,369
2024	208	$13,103	$2,722,867	81	$19,602	$1,578,340
2025	249	$13,103	$3,267,440	95	$19,602	$1,865,310
2026	291	$13,103	$3,812,013	110	$19,602	$2,152,281
2027	333	$13,103	$4,356,587	127	$19,602	$2,487,080
2028	374	$13,103	$4,901,160	142	$19,602	$2,774,051
2029	416	$13,103	$5,445,733	156	$19,602	$3,061,022
2030	457	$13,103	$5,990,306	171	$19,602	$3,347,993
2031	499	$13,103	$6,534,880	185	$19,602	$3,634,964
2032	540	$13,103	$7,079,453	200	$19,602	$3,921,935
2033	582	$13,103	$7,624,026	215	$19,602	$4,208,905
2034	623	$13,103	$8,168,600	229	$19,602	$4,495,876
2035	665	$13,103	$8,713,173	244	$19,602	$4,782,847
2036	665	$13,103	$8,713,173	244	$13,103	$4,782,847
2037	665	$13,103	$8,713,173	244	$13,103	$4,782,847
2038	665	$13,103	$8,713,173	244	$13,103	$4,782,847
2039	665	$13,103	$8,713,173	244	$13,103	$4,782,847
2040	665	$13,103	$8,713,173	244	$13,103	$4,782,847
Total			**$117,627,836**			**$65,525,004**

G. Maintenance Savings

ZEVs have lower maintenance costs on a per mile basis than similar internal combustion powered vehicles (CARB, 2016). Businesses and local governments adopting ZEV technologies will experience monetary benefits from maintenance savings, dependent upon the vehicle type and annual miles driven. Data regarding maintenance savings for ZEVs performing airport shuttle duty cycles is limited. Staff examined manufacturer data for internal combustion powered vehicles and ZEVs and calculated savings by comparing estimated differential costs related to items such as brakes, starter motor, alternator, cooling system, emission controls, fuel systems, as well as costs related to oil and filter changes. Maintenance savings per mile for Class 3 vans was estimated based on data from Zenith Motors (Zenith Motors, 2018). Savings for Class 3 cutaways was estimated using data from Phoenix Motorcars (CARB_Staff,

2017c), and Zenith Motors (Zenith Motors, 2018). Due to lack of available maintenance savings data for Class 4 and Class 5 cutaway ZEV shuttles, staff approximated these values by using data for Class 3 cutaways and using the assumption that maintenance savings increase by $.01 per mile for Class 4 shuttles and another $.01 for Class 5 shuttles. Expected maintenance savings for Class 8 low-floor 40 foot CNG and diesel shuttles were estimated from maintenance report from CARB's ICT team (CARB, 2016). Due to the lack of available data, maintenance savings per mile for Class 8 35-foot and 60-foot CNG shuttles were assumed to be the same as 40-foot low-floor CNG shuttles.

The expected average annual maintenance savings by vehicle type are outlined in Table C-22 and are calculated using the following equation:

$$Annual\ Maintenance\ Savings = \frac{Maintenance\ Savings}{Mile} \times Annual\ Miles$$

Table C-22: Maintenance Savings by Vehicle Type

Existing ICE Vehicle Type (Fuel Type)	Replacement ZEV Vehicle Type	Maintenance Savings per Mile ($/mile)	Annual Miles*	Annual Maintenance Savings Per Vehicle
Class 2b Van (Gasoline)	Class 3 Van	0.08	19,426	$1,554
Class 3 Cutaway (CNG)	Class 3 Cutaway	0.1	31,660	$3,166
Class 4 Cutaway (CNG)	Class 4 Cutaway	0.12	31,084	$3,730
Class 5 Cutaway (CNG)	Class 5 Cutaway	0.13	33,000	$4,290
Class 7-8 32'-35' Low-Floor (CNG)	Class 8 35' Low-Floor	0.25	20,489	$5,122
Class 8 40' Low-Floor (CNG)	Class 8 40' Low-Floor	0.25	57,852	$14,463
Class 8 40' Low-Floor (Diesel)	Class 8 40' Low-Floor	0.19	56,286	$10,694
Class 8 60' Low-Floor (CNG)	Class 8 60' Low-Floor	0.25	4,703	$1,176

**Annual Miles based on survey and research data.*

Using the Annual Maintenance Savings for each vehicle type and the vehicle populations shown in Table C-21, weighted average annual maintenance savings are calculated for private business and local government fleets. Annual and total expected maintenance savings, shown in Table C-23 are calculated using the weighted average annual maintenance savings and ZEV adoption rate.

Table C-23: Annual Maintenance Savings

Year	Private Business Fleets			Local Government Fleets		
	Cumulative Number of ZEVs	Weighted Average Annual Maintenance Savings per Vehicle	Total Annual Maintenance Savings	Cumulative Number of ZEVs	Weighted Average Annual Maintenance Savings per Vehicle	Total Annual Maintenance Savings
2020	42	$3,317	$137,882	17	$6,731	$114,971
2021	83	$3,317	$275,765	34	$6,731	$229,942
2022	125	$3,317	$413,647	51	$6,731	$344,913
2023	166	$3,317	$551,530	66	$6,731	$443,460
2024	208	$3,317	$689,412	81	$6,731	$542,007
2025	249	$3,317	$827,294	95	$6,731	$640,553
2026	291	$3,317	$965,177	110	$6,731	$739,100
2027	333	$3,317	$1,103,059	127	$6,731	$854,071
2028	374	$3,317	$1,240,941	142	$6,731	$952,618
2029	416	$3,317	$1,378,824	156	$6,731	$1,051,165
2030	457	$3,317	$1,516,706	171	$6,731	$1,149,711
2031	499	$3,317	$1,654,589	185	$6,731	$1,248,258
2032	540	$3,317	$1,792,471	200	$6,731	$1,346,805
2033	582	$3,317	$1,930,353	215	$6,731	$1,445,351
2034	623	$3,317	$2,068,236	229	$6,731	$1,543,898
2035	665	$3,317	$2,206,118	244	$6,731	$1,642,445
2036	665	$3,317	$2,206,118	244	$6,731	$1,642,445
2037	665	$3,317	$2,206,118	244	$6,731	$1,642,445
2038	665	$3,317	$2,206,118	244	$6,731	$1,642,445
2039	665	$3,317	$2,206,118	244	$6,731	$1,642,445
2040	665	$3,317	$2,206,118	244	$6,731	$1,642,445
Total			**$29,782,593**			**$22,501,494**

H. Combined Annual and Total Costs

Using the annual costs and savings figures calculated Sections A through H, annual costs, annual savings, net costs for private businesses and local governments are displayed in Table C-24 and Table C-25 respectively.

Table C-24: Annual and Total Costs or Cost-Savings to Private Businesses*

Year	Capital Purchases		Ongoing					Net Impact
	Shuttle	Infrastructure	Electricity	Fuel Savings	Maintenance Savings	Reporting	LCFS Credits	
2020	$679,969	$550,983	$260,180	($544,573)	($137,882)	$0	$172,900	$635,776
2021	$1,332,538	$1,101,966	$520,360	($1,089,147)	($275,765)	$0	$339,732	$1,250,221
2022	$1,959,863	$1,652,949	$780,539	($1,633,720)	($413,647)	$17,400	$500,620	$1,862,764
2023	$2,563,920	$2,203,933	$1,040,719	($2,178,293)	($551,530)	$8,700	$655,358	$2,432,092
2024	$3,146,539	$2,563,207	$1,300,899	($2,722,867)	($689,412)	$8,700	$804,234	$2,802,832
2025	$3,030,464	$2,371,498	$1,561,079	($3,267,440)	($827,294)	$8,700	$946,877	$1,930,129
2026	$2,923,585	$2,179,789	$1,821,259	($3,812,013)	($965,177)	$8,700	$1,083,742	$1,072,401
2027	$2,825,169	$1,988,079	$2,081,439	($4,356,587)	($1,103,059)	$8,700	$1,214,290	$229,452
2028	$2,734,562	$1,700,516	$2,341,618	($4,901,160)	($1,240,941)	$8,700	$1,339,144	($695,848)
2029	$2,651,148	$1,604,661	$2,601,798	($5,445,733)	($1,378,824)	$8,700	$1,458,013	($1,416,262)
2030	$2,573,333	$1,508,807	$2,861,978	($5,990,306)	($1,516,706)	$8,700	$1,570,439	($2,124,634)
2031	$2,510,697	$1,412,952	$3,122,158	($6,534,880)	($1,654,589)	$8,700	$1,713,206	($2,848,168)
2032	$2,941,967	$1,317,098	$3,382,338	($7,079,453)	($1,792,471)	$8,700	$1,855,973	($3,077,795)
2033	$3,382,891	$1,317,098	$3,642,517	($7,624,026)	($1,930,353)	$8,700	$1,998,741	($3,201,914)
2034	$3,832,370	$1,317,098	$3,902,697	($8,168,600)	($2,068,236)	$8,700	$2,141,508	($3,317,479)
2035	$4,289,379	$1,317,098	$4,162,877	($8,713,173)	($2,206,118)	$8,700	$2,284,275	($3,425,512)
2036	$4,275,134	$1,053,678	$4,162,877	($8,713,173)	($2,206,118)	$8,700	$2,284,275	($3,703,177)
2037	$3,781,078	$790,259	$4,162,877	($8,713,173)	($2,206,118)	$0	$2,284,275	($4,469,352)
2038	$3,290,196	$526,839	$4,162,877	($8,713,173)	($2,206,118)	$0	$2,284,275	($5,223,654)
2039	$2,802,430	$263,420	$4,162,877	($8,713,173)	($2,206,118)	$0	$2,284,275	($5,974,840)
2040	$2,317,731	$0	$4,162,877	($8,713,173)	($2,206,118)	$0	$2,284,275	($6,722,958)
Total	**$59,844,961**	**$28,741,926**	**$56,198,840**	**($117,627,836)**	**($29,782,593)**	**$139,200**	**($31,500,427)**	**($33,985,928)**
Costs Only	$59,844,961	$28,741,926	$56,198,840	-	-	$139,200	-	$144,924,927
Cost Savings Only	-	-	-	($117,627,836)	($29,782,593)	-	($31,500,427)	($178,910,855)

Table C-25: Annual and Total Direct Costs and Cost-Savings to Local Governments

Year	Capital Purchases		Ongoing					Net Impact
	Shuttle	Infrastructure	Electricity	Fuel Savings	Maintenance Savings	Reporting	LCFS Credits	
2020	$2,253,977	$2,765,210	$194,791	($334,799)	($114,971)	$0	($162,397)	$4,601,811
2021	$2,333,030	$3,001,671	$389,581	($669,599)	($229,942)	$0	($319,294)	$4,505,447
2022	$2,411,874	$3,238,131	$584,372	($1,004,398)	($344,913)	$1,700	($470,691)	$4,416,075
2023	$2,202,907	$3,079,562	$751,335	($1,291,369)	($443,460)	$850	($594,567)	$3,705,258
2024	$2,270,173	$2,334,170	$918,298	($1,578,340)	($542,007)	$850	($713,649)	$2,689,496
2025	$2,173,295	$2,219,318	$1,085,262	($1,865,310)	($640,553)	$850	($828,177)	$2,144,683
2026	$2,081,631	$2,104,466	$1,252,225	($2,152,281)	($739,100)	$850	($937,912)	$1,609,879
2027	$2,249,754	$1,752,595	$1,447,015	($2,487,080)	($854,071)	$850	($1,063,381)	$1,045,681
2028	$1,955,964	$1,572,249	$1,613,979	($2,774,051)	($952,618)	$850	($1,163,294)	$253,078
2029	$1,902,051	$1,387,213	$1,780,942	($3,061,022)	($1,051,165)	$850	($1,258,650)	($299,781)
2030	$1,852,148	$1,346,677	$1,947,905	($3,347,993)	($1,149,711)	$850	($1,348,978)	($699,102)
2031	$1,830,831	$1,306,141	$2,114,869	($3,634,964)	($1,248,258)	$850	($1,464,605)	($1,095,137)
2032	$3,413,736	$1,285,873	$2,281,832	($3,921,935)	($1,346,805)	$850	($1,580,232)	$133,320
2033	$3,503,959	$1,272,361	$2,448,795	($4,208,905)	($1,445,351)	$850	($1,695,859)	($124,150)
2034	$3,596,270	$1,272,361	$2,615,759	($4,495,876)	($1,543,898)	$850	($1,811,485)	($366,021)
2035	$3,462,985	$1,114,349	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($991,498)
2036	$2,184,750	$310,777	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($3,073,306)
2037	$2,060,312	$229,704	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($3,279,666)
2038	$1,936,811	$148,632	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($3,484,238)
2039	$2,036,861	$67,560	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($3,465,261)
2040	$1,724,295	$0	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($3,845,387)
Total	**$49,437,614**	**$31,809,019**	**$38,123,291**	**($65,525,004)**	**($22,501,494)**	**$13,600**	**($26,975,842)**	**$4,381,184**
Costs Only	$49,437,614	$31,809,019	$38,123,291			$13,600		$119,383,524
Cost Savings Only				($65,525,004)	($22,501,494)		($26,975,842)	$115,002,340

I. 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.

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

Alternative 1 includes a single compliance date, December 31, 2035, for affected fleets to meet a 100 percent ZEV conversion requirement (Table D1). This scenario has no phase in period and therefore does not include the 33 percent and 66 percent fleet ZEV compliance deadlines found in the Proposed Regulation. Staff assumes that the existing ICE 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. ZEV 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.

- Alternative 2: Accelerated Fleet Turnover

Alternative 2 accelerates regulation compliance to the schedule described in Table D1, which are sooner than the Proposed Regulation. Staff assumes that the existing ICE shuttle inventory will be converted to ZEV at the rates described in Table D2. Reporting is required beginning 2019 the year before the new purchase requirement in 2020. 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 the new purchase requirement and 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.

The economic impacts of Alternatives I & II are calculated using the same underlying assumptions for vehicle costs, infrastructure costs, electricity costs ($/kWh), reporting costs ($/hour), LCFS credit value ($/kWh), maintenance savings ($/mile), fuel savings ($/mile). The differential costs and benefits between Alternatives I & II and ASB are due to the different compliance dates and resulting ZEV adoption rates (Table C-26). In the alternative scenarios, private business fleets and local government fleets are expected to have identical rates of vehicle adoption and infrastructure purchases.

Table C-26: Expected Annual Vehicle Turnover
And Infrastructure Completion for Public and Private Fleets

Calendar Year	Alternative I		Alternative II	
	Vehicle Turnover*	Infrastructure Construction	Vehicle Turnover*	Infrastructure Construction
2020	-	-	11%	15%
2021	-	-	11%	15%
2022	-	-	11%	15%
2023	3%	5%	11%	15%
2024	3%	5%	11%	10%
2025	3%	5%	11%	10%
2026	3%	8%	11%	10%
2027	3%	8%	11%	5%
2028	5%	8%	12%	5%
2029	5%	8%	-	-
2030	5%	8%	-	-
2031	13%	8%	-	-
2032	13%	8%	-	-
2033	14%	10%	-	-
2034	15%	10%	-	-
2035	15%	9%	-	-

*Electric shuttle chargers are expected to be purchased simultaneously with the corresponding shuttles and will purchased at identical annual rates.

Using the expected rates of ZEV adoption and infrastructure completion, the public and private costs for Alternative Scenarios I & II. Table C-27 and Table C-28 show the Private and Public Fleet Costs for the Alternative I Scenario. Tables C-29 and Table C-30 show the Private and Public Fleet Costs for the Alternative II Scenario. All costs have been rounded to the nearest dollar.

Table C-27: Alternative I Costs for Privately Operated Airport Shuttle Fleets

Year	Capital Purchases		Ongoing					Net Impact
	Shuttle Purchases	Infrastructure	Electricity	Fuel Savings	Maintenance Savings	Reporting	LCFS Credit Generation	
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$289,948	$233,798	$124,886	($261,395)	($66,184)	$0	($78,643)	$242,411
2024	$569,605	$467,597	$249,773	($522,790)	($132,367)	$0	($154,413)	$477,404
2025	$840,273	$701,395	$374,659	($784,186)	($198,551)	$0	($227,250)	$706,341
2026	$1,102,205	$1,027,214	$499,545	($1,045,581)	($264,734)	$0	($297,255)	$1,021,395
2027	$1,356,081	$1,353,033	$624,432	($1,306,976)	($330,918)	$0	($364,287)	$1,331,365
2028	$1,476,894	$1,498,674	$832,575	($1,742,635)	($441,224)	$0	($476,140)	$1,148,146
2029	$1,596,600	$1,644,315	$1,040,719	($2,178,293)	($551,530)	$0	($583,205)	$968,607
2030	$1,714,794	$1,789,957	$1,248,863	($2,613,952)	($661,835)	$0	($685,283)	$792,544
2031	$2,457,618	$2,058,061	$1,790,037	($3,746,664)	($948,631)	$0	($982,238)	$628,182
2032	$3,202,328	$2,326,165	$2,331,211	($4,879,377)	($1,235,426)	$0	($1,279,194)	$465,706
2033	$3,860,466	$2,628,805	$2,914,014	($6,099,221)	($1,544,283)	$0	($1,598,993)	$160,789
2034	$4,599,523	$2,958,256	$3,538,445	($7,406,197)	($1,875,200)	$17,400	($1,941,634)	($109,407)
2035	$5,568,706	$3,257,033	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($206,250)
2036	$4,788,979	$2,663,111	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($1,579,899)
2037	$4,014,133	$2,069,188	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($2,957,368)
2038	$3,167,710	$1,387,108	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($4,485,872)
2039	$2,250,530	$678,217	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($6,111,942)
2040	$1,259,195	$0	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($7,781,494)
Total	**$44,115,589**	**$28,741,926**	**$40,546,422**	**($84,866,305)**	**($21,487,589)**	**$34,800**	**($22,374,184)**	**($15,289,341)**
Costs Only	$44,115,589	$28,741,926	$40,546,422			$34,800		$113,438,738
Cost Savings Only				($84,866,305)	($21,487,589)		($22,374,184)	($128,728,079)

Table C-28: Alternative I Total Costs for Publicly Owned Shuttle Fleets

Year	Capital Purchases		Ongoing					Net Impact
	Shuttle Purchases	Infrastructure	Electricity	Fuel Savings	Maintenance Savings	Reporting	LCFS Credit Generation	
2022	$0	$0	$0	$0	$0	$0	$0	$0
2023	$862,838	$1,027,078	$0	($143,485)	($49,273)	$0	($69,599)	$1,711,041
2024	$896,471	$1,114,906	$0	($286,971)	($98,547)	$0	($136,840)	$1,655,984
2025	$930,993	$1,202,735	$83,482	($430,456)	($147,820)	$0	($201,725)	$1,604,171
2026	$964,607	$1,764,599	$166,963	($573,942)	($197,093)	$0	($264,252)	$2,027,845
2027	$998,163	$1,892,963	$250,445	($717,427)	($246,367)	$0	($324,386)	$2,020,354
2028	$1,461,748	$2,091,511	$333,927	($956,569)	($328,489)	$0	($424,706)	$2,400,039
2029	$1,457,092	$2,145,559	$417,408	($1,195,712)	($410,611)	$0	($521,062)	$2,170,947
2030	$1,454,409	$2,199,607	$556,544	($1,434,854)	($492,733)	$0	($613,489)	$1,947,756
2031	$3,335,475	$2,845,167	$695,681	($2,056,624)	($706,251)	$0	($862,442)	$3,751,895
2032	$3,477,876	$2,912,728	$834,817	($2,678,394)	($919,769)	$0	($1,101,318)	$3,249,446
2033	$3,815,702	$3,361,806	$1,196,570	($3,347,993)	($1,149,711)	$0	($1,348,978)	$3,278,730
2034	$4,168,787	$3,528,640	$1,558,324	($4,065,420)	($1,396,078)	$1,700	($1,638,045)	$2,964,897
2035	$4,991,691	$3,465,212	$1,947,905	($4,782,847)	($1,642,445)	$850	($1,927,112)	$2,888,072
2036	$1,651,151	$885,038	$2,365,314	($4,782,847)	($1,642,445)	$850	($1,927,112)	($3,032,643)
2037	$1,482,460	$689,113	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($3,398,109)
2038	$1,298,655	$459,409	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($3,811,618)
2039	$1,099,923	$222,948	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($4,246,811)
2040	$1,297,276	$0	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($4,272,405)
Total	**$35,645,318**	**$31,809,019**	**$27,103,712**	**($46,584,930)**	**($15,997,413)**	**$3,400**	**($19,069,515)**	**$12,909,592**
Costs Only	$35,645,318	$31,809,019	$27,103,712	-	-	$3,400	-	$94,561,450
Cost Savings Only	-	-	-	($46,584,930)	($15,997,413)	-	($19,069,515)	($81,651,858)

Table C-29: Alternative 2 Total Statewide Costs for Privately Operated Airport Shuttle Fleets

Year	Capital Purchases		Ongoing					Net Impact
	Shuttle Purchases	Infrastructure	Electricity	Fuel Savings	Maintenance Savings	Reporting	LCFS Credit Generation	
2019	$0	$0	$0	$0	$0	$17,400	$0	$17,400
2020	$1,196,745	$755,016	$457,916	($958,449)	($242,673)	$8,700	($304,304)	$912,952
2021	$2,345,268	$1,510,032	$915,833	($1,916,898)	($485,346)	$8,700	($597,928)	$1,779,661
2022	$3,449,358	$2,265,049	$1,373,749	($2,875,347)	($728,019)	$8,700	($881,092)	$2,612,398
2023	$4,512,500	$3,020,065	$1,831,666	($3,833,796)	($970,692)	$8,700	($1,153,429)	$3,415,013
2024	$5,537,909	$3,621,714	$2,289,582	($4,792,245)	($1,213,365)	$8,700	($1,415,453)	$4,036,842
2025	$5,333,616	$3,468,346	$2,747,499	($5,750,694)	($1,456,038)	$8,700	($1,666,503)	$2,684,926
2026	$5,145,510	$3,314,979	$3,205,415	($6,709,143)	($1,698,711)	$8,700	($1,907,386)	$1,359,364
2027	$4,972,298	$3,008,245	$3,663,332	($7,667,592)	($1,941,384)	$8,700	($2,137,150)	($93,552)
2028	$4,894,982	$2,728,321	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,380,700)	($1,505,112)
2029	$3,869,573	$2,126,672	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,332,820)	($3,084,289)
2030	$2,877,121	$1,525,023	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($4,629,846)
2031	$1,916,704	$923,374	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($6,191,911)
2032	$1,830,782	$475,092	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($6,726,114)
2033	$1,684,807	$0	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($7,347,182)
2034	$2,519,648	$0	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($6,512,341)
2035	$3,349,565	$0	$4,162,877	($8,713,173)	($2,206,118)	$8,700	($2,284,275)	($5,682,424)
2036	$4,174,670	$0	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($4,857,319)
2037	$4,150,090	$0	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($4,890,599)
2038	$4,125,986	$0	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($4,914,703)
2039	$4,102,359	$0	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($4,938,330)
2040	$4,152,549	$0	$4,162,877	($8,713,173)	($2,206,118)	$0	($2,284,275)	($4,888,140)
Total	**$76,142,039**	**$28,741,926**	**$70,602,394**	**($147,775,414)**	**($37,415,761)**	**$165,300**	**($39,903,791)**	**($49,443,307)**
Costs Only	$0	$28,741,926	$70,602,394	-	-	$165,300	-	$175,651,659
Cost Savings Only	-	-	-	($147,775,414)	($37,415,761)	-	($39,903,791)	($225,094,966)

Table C-30: Alternative 2 Total Statewide Costs for Publicly Owned Shuttle Fleets

Year	Capital Purchases		Ongoing					Net Impact
	Shuttle Purchases	Infrastructure	Electricity	Fuel Savings	Maintenance Savings	Reporting	LCFS Credit Generation	
2019	$0	$0	$0	$0	$0	$1,700	$0	$1,700
2020	$3,541,964	$3,239,247	$306,099	($526,113)	($180,669)	$850	($255,195)	$6,126,183
2021	$3,666,190	$3,516,243	$612,199	($1,052,226)	($361,338)	$850	($501,747)	$5,880,170
2022	$3,790,087	$3,793,240	$918,298	($1,578,340)	($542,007)	$850	($739,657)	$5,642,472
2023	$3,913,674	$4,070,236	$1,224,398	($2,104,453)	($722,676)	$850	($968,924)	$5,413,106
2024	$4,036,995	$3,557,173	$1,530,497	($2,630,566)	($903,345)	$850	($1,189,415)	$4,402,190
2025	$3,902,841	$3,489,612	$1,836,597	($3,156,679)	($1,084,014)	$850	($1,401,531)	$3,587,676
2026	$3,776,405	$3,422,052	$2,142,696	($3,682,792)	($1,264,683)	$850	($1,604,871)	$2,789,658
2027	$3,659,929	$2,564,432	$2,448,795	($4,208,905)	($1,445,351)	$850	($1,799,568)	$1,220,182
2028	$3,799,049	$2,508,318	$2,782,722	($4,782,847)	($1,642,445)	$850	($2,005,680)	$659,967
2029	$831,681	$709,381	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,966,640)	($4,067,297)
2030	$617,719	$499,945	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($4,451,168)
2031	$411,094	$290,509	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($4,867,229)
2032	$2,755,705	$148,632	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($2,664,495)
2033	$2,710,182	$0	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($2,858,650)
2034	$2,875,008	$0	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($2,693,823)
2035	$3,038,958	$0	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($2,529,873)
2036	$3,202,060	$0	$2,782,722	($4,782,847)	($1,642,445)	$850	($1,927,112)	($2,366,772)
2037	$3,184,138	$0	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($2,385,543)
2038	$3,166,570	$0	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($2,403,111)
2039	$3,149,351	$0	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($2,420,331)
2040	$3,353,948	$0	$2,782,722	($4,782,847)	($1,642,445)	$0	($1,927,112)	($2,215,733)
Total	**$63,383,551**	**$31,809,019**	**$47,194,965**	**($81,117,085)**	**($27,855,864)**	**$16,150**	**($33,631,459)**	($200,724)
Costs Only	$63,383,551	$31,809,019	$47,194,965	-	-	$16,150	-	$142,403,685
Cost Savings Only	-	-	-	($81,117,085)	($27,855,864)	-	($33,631,459)	($142,604,409)

J. Fiscal Impact to Local Governments

Costs and cost savings were examined for the current FY of 2019-2020, and the two subsequent fiscal years, 2020-2021 and 2021-2022. The economic analysis was originally analyzed in calendar years; in order to convert the annual figures to FYs the average of two calendar years was taken. For example, the impact to local government in fiscal year 2020-2021 is assumed to be the average of the impact in calendar years 2020 and 2021. The economic analyses for the current FY assumes that local governments will take voluntary early action to comply with the ZEV fleet requirements. Because ZEV purchases during this FY are not mandated by the Proposed Regulation, local governments may defer ZEV purchases to the following FYs do accommodate budgetary constraints.

During the three fiscal years that were examined, the costs to local governments are expected to exceed the cost-savings. However, similar to the business costs outlined in Table C-31, annual cost-savings eclipse annual costs in later years. This is due to increased cost savings from the ZEV adoption and decreased infrastructure spending in later years.

Table C-31: Annual Change in Local Government Expenditures and Expected Fiscal Savings

Fiscal Year	Capital Purchases		Ongoing					Net Impact
	Shuttle	Infrastructure	Electricity	Fuel Savings	Maintenance Savings	Reporting	LCFS Credit Revenue	
2019-2020	$1,126,989	$1,382,605	$97,395	($167,400)	($57,486)	$0	($81,198)	$2,300,906
2020-2021	$2,293,503	$2,883,441	$292,186	($502,199)	($172,457)	$0	($240,845)	$4,553,629
2021-2022	$2,372,452	$3,119,901	$486,976	($836,998)	($287,428)	$850	($394,992)	$4,460,761
Total	$5,792,944	$7,385,947	$876,557	($1,506,597)	($517,370)	$850	($717,035)	$11,315,296

J. Statewide Impact Conclusion

As detailed in Tables C-23 and C-24, once roughly half of the existing internal combustion shuttles have been replaced by ZEVs, the annual savings from fuel and maintenance, as well as the generation of LCFS, will be greater than the annual costs. Private business fleets are expected to see an annual net savings beginning in 2027 and local government fleets will begin to experience an annual net savings in 2029. The annual savings for both private and public fleets increase every year through the end of the analysis in the year 2040. Over the lifetime of the economic analysis, the combined net savings to California businesses and local governments is expected to be $19.7 million dollars.

Multiple Federal, State, and local financial incentive programs (Section I, Subjection G of the ISOR) exist to promote ZEV adoption by offsetting some of the costs of the fleet transition. While cost-sharing programs are not used in this economic analysis, the proposed ASB regulation is designed to allow businesses and local government's time and opportunity to access funding into the compliance schedule if fleets achieve the in-use compliance milestones early. The utilization of cost-sharing opportunities could offset much of the costs incurred in the early years of the regulatory period and result in greater savings for businesses and local governments. The proposed ASB regulation, along with the availability of cost-sharing opportunities, provides a cost-feasible opportunity for California to completely transition airport shuttle fleets to ZEV technologies by 2035.

K. Cost for Individual Businesses

In order to determine the cost impact on regulated businesses, staff examined three different scenarios using different business type/sizes: a small business hotel, a small business off-airport parking company, and an off-airport parking company that is not classified as a small business. Small businesses are defined as businesses that have fewer than 100 full time employees, are independently owned and operated, are not dominant in their field, and have annual receipts of less than $2 million.

Each of the three scenarios outline the assumptions for the number of shuttles and corresponding infrastructure that will be needed to comply with the proposed regulation. Expected annual costs and annual savings are outlined for each business. Additional costs as a result of the proposed regulation are expected to be passed on to customers of the impacted businesses and cost increases are expressed as a percentage of the current prices that customers currently pay for services at these businesses.

1. Small Business- Hotel

a. Cost Impacts to the Business

Survey results show that a hotel classified as a small business is likely to have one shuttle. For the purposes of this analysis, a small business is assumed to comply by purchasing one Class 3 ZEV van 2026. The shuttle purchased in 2026 will reach the

end of its 12 year useful life in 2038 and the costs associated with the replacement purchase has been included in the analysis. Infrastructure to support the corresponding ZEV is assumed to be purchased concurrently with the shuttles. Survey data shows that shuttle operations at a small business hotel provide several opportunities for shuttle charging throughout the day. Therefore, a Level II depot charger is expected to provide sufficient support for the shuttle duty cycle. Table C-32 summarizes the assumptions used to estimate annual costs to a small business.

Table C-32: Shuttle and Infrastructure Estimates for a Small Business

Capital Purchase	Quantity
Class 3 ZEV Van	1
Level II Depot Charger	1
Construction for Level II Depot Charger	1

These assumptions, along with the methodology outlined in Sections A through Section F, are used to generate costs to a small business. Total costs that a small business would incur over 2020 through 2040 is approximately $126,980, as shown in Table C-33. Considering cost-savings and LCFS credit revenue results in a net savings to a small business hotel of $1,373.

The initial and ongoing costs to a small business hotel depend on the specific assumptions about timing and number of shuttles purchased. Using the assumptions described above, annual costs could vary from zero to $15,412 (Table C-33). The net costs, which includes cost-savings and LCFS credit revenue, is anticipated to vary annually from a net cost of $6,882 to net savings of $6,169.

Table C-33: Costs for a Small Business

Year	Initial Costs		Ongoing Costs		Total Annual Costs	Total Annual Cost-Savings[2]	Annual Net Costs
	Shuttle	Infrastructure	Electricity	Reporting			
2020	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-
2022	-	-	-	$100	$100	-	$100
2023	-	-	-	$50	$50	-	$50
2024	-	-	-	$50	$50	-	$50
2025	-	-	-	$50	$50	-	$50
2026	$10,156	$2,887	$2,361	$50	$15,412	($8,691)	$6,721
2027	$10,156	$2,887	$2,361	$50	$15,412	($8,651)	$6,761
2028	$10,156	$2,887	$2,361	$50	$15,412	($8,610)	$6,801
2029	$10,156	$2,887	$2,361	$50	$15,412	($8,570)	$6,841
2030	$10,156	$2,887	$2,361	$50	$15,412	($8,530)	$6,882
2031	$0	$0	$2,361	$50	$2,411	($8,530)	($6,119)
2032	$0	$0	$2,361	$50	$2,411	($8,530)	($6,119)
2033	$0	$0	$2,361	$50	$2,411	($8,530)	($6,119)
2034	$0	$0	$2,361	$50	$2,411	($8,530)	($6,119)
2035	$0	$0	$2,361	$50	$2,411	($8,530)	($6,119)
2036	$0	$0	$2,361	$50	$2,411	($8,530)	($6,119)
2037	$0	$0	$2,361	-	$2,361	($8,530)	($6,169)
2038	$8,587	$0	$2,361	-	$10,948	($8,530)	$2,418
2039	$8,587	$0	$2,361	-	$10,948	($8,530)	$2,418
2040	$8,587	$0	$2,361	-	$10,948	($8,530)	$2,418
Total[2]	$76,329	$14,436	$35,415	$800	$126,980	($128,353)	($1,373)

[1]Total LCFS revenue, maintenance savings, fuel savings
[2]Totals may not add up due to rounding

b. Costs Passed on to Customers

Costs associated with the proposed regulation are expected to be passed on to the customers of the impacted businesses. Costs impacts are examined on a per-customer (shuttle passenger) basis and are examined during the year of the highest annual cost and the year of the highest annual net cost. In order to determine the per-customer cost impact, the annual number of shuttle passengers is estimated using survey data. Survey data shows that a shuttle operating for a small business hotel completes 3,000 annual round trips to an airport and has the capacity to carry 15 passengers. In order to generate a conservative estimate and to account for trips to or from the airport with zero passengers, shuttles were assumed to operate at an average of 40 percent capacity.

Customers who patronize hotels providing airport transportation typically stay for one night prior to their departing flight. On average, the hotel is expected to generate one night's room fee for every one and a half passengers on board the shuttle in order to

account for multiple passengers who are sharing a single room. Current hotel room prices are estimated by using Trip Advisor to search hotel rates near five major airports: San Francisco International Airport (Trip Advisor, 2018), San Diego International Airport (Trip Advisor, 2018a), Los Angeles International Airport (Trip Advisor, 2018b), Oakland International Airport (Trip Advisor, 2018c), and Norman Y. Mineta San Jose International Airport (Trip Advisor, 2018d). Annual passenger data and estimated room fees are displayed in Table C-34.

Table C-34: Hotel Shuttle Operation

Number of Shuttles	1
Annual Trips Round Trips to Airport	3,000
Average Number of Passengers (Assuming 40% Shuttle Capacity)	6
Average Room Fees Paid per Trip (1 room fee for every 1.5 passengers)	4
Fee-Paying Passenger Trips per Year	12,000
Average Room Fee	$150

Using the number annual airport trips and the annual fee-paying passengers, the price impacts on a per shuttle trip and per customer are calculated and displayed in Table C-35.

Table C-35: Shuttle Pricing Impacts

Annual Costs Only	
Average Annual Cost (from 2026 to 2040)	$8,449
Cost Increase per Trip	$2.82
Cost Increase per Paying Passenger	$0.70
Average Nightly Room Fee	$150
Cost Increase (% of Room Fee)	0.47%
Annual Net Costs	
Average Annual Net Cost (from 2026 to 2040 and excluding years with a net cost-savings)	$5,158
Cost Increase per Trip	$1.72
Cost Increase per Paying Passenger	$0.43
Cost Increase (% of Room Fee)	0.29%

The per-customer pricing impact in both scenarios are less than a one percent of the nightly average room fee for a hotel. This impact is not expected to cause a decrease in jobs for this type of business, and it is not expected to cause customers to seek an alternate method of transportation to and from the airport.

2. Small Business- Off-Airport Parking

    a. Cost Impacts to the Business

Survey results show off-airport parking small businesses own an average of 6 shuttles. For this scenario, the business is assumed to purchase one Class 3 cutaway ZEV and one Class 4 cutaway ZEV in 2024, 2029, and again in 2035. The shuttles purchased in 2024 will reach the end of their 12 year useful life in 2036 and the costs associated with the replacement purchases have been included.

Airport parking shuttle operate nearly twenty four hours per day and do not have extended charging opportunities. A mixture of Level II and Level III chargers are expected to be purchased to provide rapid charging which is necessary for continuous operation. One charger is assumed for each vehicle. Each charger is assumed to be purchased simultaneously with the corresponding vehicle. Electrical infrastructure construction for two chargers is expected to take place in 2024 The construction of the electrical infrastructure for the four remaining chargers is expected to occur in 2029..Table C-36 summarizes the assumptions used to estimate annual costs to a small business.

Table C-36: Shuttle and Infrastructure Estimates for a Small Business

Capital Purchase	Quantity
Class 3 Cutaway ZEV	3
Class 4 Cutaway ZEV	3
Level II Depot Charger	2
Level III Depot Charger	4
Level II Charger Electrical Infrastructure and Construction	2
Level III Charger Electrical Infrastructure and Construction	4

These assumptions, along with the methodology outlined in Sections A through Section F, are used to generate costs to a small business. Total costs that a small business would incur from 2020 through 2040 is approximately $1,212,255 as shown in Table C-37. Considering cost-savings and LCFS credit revenue results in a net savings to a small business of $88,055.

The initial and ongoing costs to a small business depend on the specific assumptions about timing and number of shuttles purchased. Using the assumptions described above, annual costs could vary from zero to $96,809 (Table C-37). The net costs, which includes cost-savings and LCFS credit revenue, is anticipated to vary annually from a net cost of $18,961 to net savings of $49,434.

Table C-37: Costs for a Small Business

Year	Initial Costs		Ongoing Costs		Total Annual Costs	Total Annual Cost-Savings[2]	Annual Net Costs
	Shuttle	Infrastructure	Electricity	Reporting			
2020	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-
2022	$0	$0	$0	$100	$100	$0	$100
2023	$0	$0	$0	$50	$50	$0	$50
2024	$28,849	$14,436	$12,888	$50	$56,223	($37,583)	$18,640
2025	$28,849	$14,436	$12,888	$50	$56,223	($37,503)	$18,720
2026	$28,849	$14,436	$12,888	$50	$56,223	($37,422)	$18,801
2027	$28,849	$14,436	$12,888	$50	$56,223	($37,342)	$18,881
2028	$28,849	$14,436	$12,888	$50	$56,223	($37,262)	$18,961
2029	$24,710	$25,985	$25,776	$50	$76,521	($74,364)	$2,157
2030	$24,710	$25,985	$25,776	$50	$76,521	($74,202)	$2,319
2031	$24,710	$25,985	$25,776	$50	$76,521	($74,202)	$2,319
2032	$24,710	$25,985	$25,776	$50	$76,521	($74,202)	$2,319
2033	$24,710	$25,985	$25,776	$50	$76,521	($74,202)	$2,319
2034	$0	$0	$25,776	$50	$25,826	($74,202)	($48,376)
2035	$23,341	$11,549	$38,664	$50	$73,603	($111,304)	($37,700)
2036	$46,546	$11,549	$38,664	$50	$96,809	($111,304)	($14,495)
2037	$46,546	$11,549	$38,664	$0	$96,759	($111,304)	($14,545)
2038	$46,546	$11,549	$38,664	$0	$96,759	($111,304)	($14,545)
2039	$46,546	$11,549	$38,664	$0	$96,759	($111,304)	($14,545)
2040	$23,205	$0	$38,664	$0	$61,869	($111,304)	($49,434)
Total[2]	**$500,528**	**$259,847**	**$451,080**	**$800**	**$1,212,255**	**($1,300,309)**	**($88,055)**

[1]Total LCFS revenue, maintenance savings, fuel savings
[2]Totals may not add up due to rounding

b. Costs Passed on to Customers

Costs associated with the proposed regulation are expected to be passed on to the customers of the impacted businesses. Costs impacts are examined on a per-customer (shuttle passenger) basis and are examined based on the average annual cost and average annual net cost. In order to determine the per-customer cost impact, the annual number of shuttle passengers is estimated using survey data. Survey data shows that a shuttle operating for a small business off-airport parking company completes 4,254 annual round trips to an airport and has the capacity to carry 15 passengers. In order to generate a conservative estimate and to account for trips to or from the airport with zero passengers, shuttles are assumed to operate at an average of 40 percent capacity.

Shuttles are parked at off airport parking lots for varying lengths of time. The number of shuttle trips suggests that there is a high rate of shuttle turnover. Based on this, the

average stay of a shuttle at an off-airport parking long is estimated to be one and a half days. A single shuttle parked at an off-airport facility may have multiple passengers who will be transported to the airport. On average, the off-airport parking business is expected to generate one parking fee for every one and a half passengers on board the shuttle. Off-Airport parking prices are estimated by examining parking rates at multiple companies and locations Staff examined prices at Park 'N Fly parking locations serving Oakland International Airport (Park 'N Fly 2018), San Francisco International Airport (Park 'N Fly 2018a), Norman Y. Mineta San Jose International Airport (Park 'N Fly 2018b), Los Angeles International Airport (Park 'N Fly 2018c) and Ontario International Airport, (Park 'N Fly 2018d), and San Diego International Airport (Park 'n Fly, 2018e). Staff also examined prices for Wally Park Premier (WallyPark 2018) and WallyPark Express (WallyPark 2018a) locations serving Los Angeles International Airport as well as one WallyPark location serving San Diego International Airport (WallyPark 2018b). Staff also examined parking rates at VSP Parking (VSP Parking 2018) serving Hollywood Burbank Airport and San Diego Airport Parking Company (SDPAC 2018) serving San Diego International Airport. Annual passenger data and estimated parking fees are displayed in Table C-38.

Table C-38: Off-Airport Parking Shuttle Operation

Number of Shuttles	6
Annual Round Trips to Airport per Shuttle	4,254
Total Annual Shuttle Trips	25,521
Average Number of Passengers (Assuming 40% Shuttle Capacity)	6
Average Fee-Paying Passengers per Trip (1 parking fee for every 1.5 passengers)	4
Fee-Paying Passengers per Year	102,084
Average Parking Fee (1.5 days of parking)	$25.50

Using the number annual airport trips and the annual fee-paying passengers, the price impacts on a per shuttle trip and per customer are calculated and displayed in Table C-39.

Table C-39: Shuttle Pricing Impacts

Annual Costs Only	
Average Annual Cost (from 2024 to 2040)	$71,300
Cost Increase per Trip	$2.79
Cost Increase per Paying Passenger	$0.70
Average Parking Fee	$25.50
Cost Increase (% of Parking Fee)	2.74%
Annual Net Costs	
Average Annual Net Cost (from 2024 to 2040 and excluding years with a net cost-savings)	$10,544
Cost Increase per Trip	$0.41
Cost Increase per Paying Passenger	$0.10
Average Parking Fee	$25.50
Cost Increase (% of Parking Fee)	0.41%

The average annual net cost will result in a price increase of less than one percent of the average airport parking fee. Using the Annual Cost Only scenario, the price increase is less than three percent of the average airport parking fee. This impact is not expected to cause a decrease in jobs for this type of business, and it is not expected to cause customers to seek an alternate method of transportation to and from the airport.

3. Typical Business- Off-Airport Parking Company

    a. Cost Impacts to the Business

Staff classified “typical businesses” as businesses that did not declare to be small businesses in their response to the survey. The majority of shuttles belonging to typical businesses are owned by off-airport parking companies which that own an average of twenty shuttles. Assumptions used to estimate costs and cost savings for a typical business are shown in Table C-40. Based on survey responses, a typical business is assumed to purchase three Class 3 ZEVs and three Class 4 ZEVs in 2022 and again in 2027, two Class 3 ZEVs and two Class 4 ZEVs in 2031 and one Class 3 ZEV and three class 4 ZEVs 2035. The shuttles purchased in 2022 and 2027 will reach the end of their 12 year useful life in 2034 and 2039 and the costs associated with the replacement purchases have been included.

Airport parking shuttle operate nearly twenty four hours per day and do not have extended charging opportunities. A mixture of Level II and Level III chargers are expected to be purchased to provide rapid charging necessary for continuous operation. One charger is assumed for each shuttle. Each charger is assumed to be purchased simultaneously with the corresponding shuttle. Electrical infrastructure construction for 6 chargers is expected to take place in 2022, followed by construction of the electrical infrastructure for the next 10 chargers in 2027, and the infrastructure construction for the final four chargers is expected to occur in 2035.

Table C-40: Shuttle and Infrastructure Assumptions for a Typical Business

Capital Purchase	Quantity
Class 3 Cutaway ZEV	9
Class 3 Cutaway ZEV	11
Level II Depot Charger	6
Level III Depot Charger	14
Level II Charger Electrical Infrastructure and Construction	6
Level III Charger Electrical Infrastructure and Construction	14

These assumptions, along with the methodology outlined in Sections A through Section F, are used to generate costs and cost savings to a typical business, shown in Table C-41. Total costs that a typical business would incur over 2020 through 2040 is approximately $4,416,677. Considering cost savings and LCFS credit revenue results in a net cost-savings to a typical business of $902,958 over 2020 through 2040.

The initial and ongoing costs to a typical business depend on the specific assumptions about timing and number of shuttles purchased. Because of the overlapping purchase schedule, initial and ongoing costs are mixed within each year. As described in Table C-41, annual costs vary from $183,922 to $354,738 depending on the year. The net cost, which includes cost-savings and LCFS credit revenue, is anticipated vary annually from a net cost of $61,935 to net savings of $209,809.

Table C-41: Total Costs for a Typical Business

Year	Initial Costs		Ongoing Costs		Total Annual Costs	Total Annual Cost-Savings[1]	Annual Net Costs
	Shuttle	Infrastructure	Electricity	Reporting			
2020	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-
2022	$93,189	$51,969	$38,664	$200	$184,022	($123,619)	$60,403
2023	$93,189	$51,969	$38,664	$100	$183,922	($123,210)	$60,712
2024	$93,189	$51,969	$38,664	$100	$183,922	($122,802)	$61,120
2025	$93,189	$51,969	$38,664	$100	$183,922	($122,396)	$61,526
2026	$93,189	$51,969	$38,664	$100	$183,922	($121,987)	$61,935
2027	$78,544	$68,138	$77,328	$100	$224,109	($243,162)	($19,053)
2028	$78,544	$68,138	$77,328	$100	$224,109	($242,345)	($18,236)
2029	$78,544	$68,138	$77,328	$100	$224,109	($241,533)	($17,424)
2030	$78,544	$68,138	$77,328	$100	$224,109	($240,715)	($16,606)
2031	$126,365	$103,939	$103,104	$100	$333,508	($320,953)	$12,554
2032	$47,821	$35,801	$103,104	$100	$186,827	($320,953)	($134,127)
2033	$47,821	$35,801	$103,104	$100	$186,827	($320,953)	($134,127)
2034	$118,259	$35,801	$103,104	$100	$257,264	($320,953)	($63,689)
2035	$164,983	$58,899	$130,756	$100	$354,738	($409,009)	($54,271)
2036	$117,162	$23,097	$130,756	$100	$271,115	($409,009)	($137,893)
2037	$117,162	$23,097	$130,756	$0	$271,015	($409,009)	($137,993)
2038	$117,162	$23,097	$130,756	$0	$271,015	($409,009)	($137,993)
2039	$115,168	$23,097	$130,756	$0	$269,021	($409,009)	($139,987)
2040	$68,444	$0	$130,756	$0	$199,200	($409,009)	($209,809)
Total[2]	**$1,820,466**	**$895,027**	**$1,699,584**	**$1,600**	**$4,416,677**	**($5,319,636)**	**($902,958)**

[1]Total LCFS revenue, maintenance savings, fuel savings
[2]Totals may not add up due to rounding

b. Costs Passed on to Customers

Costs associated with the proposed regulation are expected to be passed on to the customers of the impacted businesses. Costs impacts are examined on a per-customer (shuttle passenger) basis and are examined based on the average annual cost and average annual net cost. In order to determine the per-customer cost impact, the annual number of shuttle passengers is estimated using survey data. Survey data shows that a shuttle operating for an off-airport parking company completes 4,254 annual round trips to an airport and has the capacity to carry 15 passengers. In order to generate a conservative estimate and to account for trips to or from the airport with zero passengers, shuttles are assumed to operate at an average of 40 percent capacity.

Shuttles are parked at off airport parking lots for varying lengths of time. The number of shuttle trips suggests that there is a high rate of shuttle turnover. Based on this, the average stay of a shuttle at an off-airport parking long is estimated to be one and a half

days. A single shuttle parked at an off-airport facility may have multiple passengers who will be transported to the airport. On average, the off-airport parking business is expected to generate one parking fee for every one and a half passengers on board the shuttle. Annual passenger data and estimated room fees are displayed in Table C-42.

Table C-42: Off-Airport Parking Shuttle Operation

Number of Shuttles	20
Annual Round Trips to Airport per Shuttle	4,254
Total Annual Shuttle Trips	340,280
Average Number of Passengers (Assuming 40% Shuttle Capacity)	6
Average Fee-Paying Passengers per Trip (1 parking fee for every 1.5 passengers)	4
Fee-Paying Passengers per Year	196,315
Average Parking Fee (1.5 days of parking)	$25.50

Using the number annual airport trips and the annual fee-paying passengers, the price impacts on a per shuttle trip and per customer are calculated and displayed in Table C-43.

Table C-43: Shuttle Pricing Impacts

Annual Cost	
Average Annual Cost (from 2022 to 2040)	$232,457
Cost Increase per Trip	$2.73
Cost Increase per Paying Passenger	$0.68
Average Parking Fee	$25.50
Cost Increase (% of Parking Fee)	2.68%
Annual Net Cost	
Average Annual Net Cost (from 2022 to 2040 and excluding years with a net cost-savings)	$53,042
Cost Increase per Trip	$0.62
Cost Increase per Paying Passenger	$0.16
Average Parking Fee	$25.50
Cost Increase (% of Parking Fee)	0.61%

The average annual net cost will result in a price increase of less than one percent of the average airport parking fee. Using the Annual Cost Only scenario, the price increase is less than three percent of the average airport parking fee. This impact is not expected to cause a decrease in jobs for this type of business, and it is not expected to cause customers to seek an alternate method of transportation to and from the airport.

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