Appendix J

Cost and Economic Analysis Methodology

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APPENDIX ON COST AND ECONOMIC ANALYSIS METHODOLOGY

This appendix provides additional details to supplement the chapters on the cost methodology and economic impacts on individual sectors. Included are the detailed results of the analysis on the impacts on the California economy and individual business sectors. Finally, additional case studies are included for a number of companies.

A. Methodology for Estimating Cost and Economic Impact

The cost and economic impacts of this regulation are based on the anticipated compliance paths of the affected statewide fleets. To perform this analysis, staff estimated the cost that fleets are already incurring under their normal vehicle replacement practices. Staff then estimated the costs that fleets would incur to meet the requirements of the proposed regulation. The difference between these two numbers is the regulatory costs of staff's proposal. These costs have been estimated for the years between 2010 and 2025.

Staff developed the ARB On-Road Compliance Model (cost model) to estimate the capital expenditures of normal vehicle replacement during the analysis period compared to the capital expenditures required to comply with the proposed regulation over the same period. Using actual fleet data reported in the ARB fleet survey on over 13,000 vehicles, the costs to the statewide fleets were calculated by predicting and evaluating the compliance paths for real individual fleets using the cost model.

Staff used the cost model to analyze over 6,700 vehicles from 688 actual individual company fleets for each calendar year from 2009 to 2030, both with the regulation and without the regulation. The fleets evaluated varied by fleet age, vehicle type and weight class, and provided a representation of in-state and out-of-state fleets operating in California. The analysis determined the costs beyond those of estimated normal vehicle replacement; all costs calculated are additional costs fleets would incur by complying with the regulation.

In addition to capital costs, various annual operational and maintenance costs are attributable to the regulation. Operational and maintenance costs associated with NOx and PM controls would include annual PM filter cleaning expenses, changes in fuel economy, urea costs for SCR systems, and costs associated with regeneration of active PM systems. Potential cost savings include fuel economy improvements with replacement of older vehicles with newer vehicles. In addition, companies would incur annual reporting costs when required to report to ARB. These annual costs were modeled separately and added to the capital cost estimates to arrive at an overall cost estimate.

1. ARB fleet survey

Staff conducted a detailed fleet information survey with participation by fleet organizations and individual stakeholders. The fleet survey collected information from fleets throughout the state regarding their company business operations such as the

fleet's primary business use categories and number of vehicles in each fleet. The survey data also includes vehicle specific information for heavy-duty diesel vehicles including model year, weight ratings, and annual mileage data. Table 1 lists the reported vehicle counts by body type.

Table 1: ARB Survey Results Number of Vehicles by Body Type

Vehicle Body Type	Count	Vehicle Body Type	Count
Beverage HHDDT	166	Service/Utility/Mechanic MHDDT	143
Beverage MHDDT	579	Stake HHDDT	17
Bucket/Boom HHDDT	30	Stake MHDDT	16
Bucket/Boom MHDDT	5	Sweeper MHDDT	197
Bus - Coach HHDDT	590	Tank Truck: Asphalt HHDDT	1
Bus - Coach MHDDT	408	Tank Truck: Chemical HHDDT	69
Bus - Shuttle MHDDT	98	Tank Truck: Chemical MHDDT	28
Cab & Chassis HHDDT single	6	Tank Truck: Gasoline/Fuel HHDDT	68
Cab & Chassis HHDDT tandem	60	Tank Truck: Gasoline/Fuel MHDDT	7
Cab & Chassis MHDDT	16	Tank Truck: LPG HHDDT	10
Car Carrier HHDDT	2	Tank Truck: LPG MHDDT	14
Cotton Module HHDDT Tandem	23	Tank Truck: Vacuum HHDDT	6
Crane HHDDT	17	Tank Truck: Water HHDDT single	2
Crane MHDDT	1	Tank Truck: Water HHDDT tandem	138
Drill Rig HHDDT	11	Tank Truck: Water MHDDT	48
Dump HHDDT	260	Tow Truck: Roll-back HHDDT tandem	8
Dump MHDDT	76	Tow Truck: Roll-back MHDDT	13
Dump/Transfer HHDDT	92	Tow Truck: Wrecker HHDDT	17
Expeditor/Hot Shot HHDDT	2	Tow Truck: Wrecker MHDDT	21
Farm/Grain HHDDT	9	Tractor: Cab-Over HHDDT single	11
Farm/Grain MHDDT	9	Tractor: Cab-Over HHDDT tandem	126
Flatbed HHDDT	220	Tractor: Cab-Over MHDDT	5
Flatbed MHDDT	243	Tractor: Conventional HHDDT single	737
Flatbed-Dump HHDDT	21	Tractor: Conventional HHDDT tandem	3031
Flatbed-Dump MHDDT	15	Tractor: Conventional MHDDT	337
Fuel/Lube HHDDT single	4	Tractor: Sleeper HHDDT	311
Fuel/Lube HHDDT tandem	52	Van: Dry HHDDT single	11
Fuel/Lube MHDDT	13	Van: Dry HHDDT tandem	394
Garbage Trucks: Packer HHDDT	17	Van: Dry MHDDT	199
Garbage Trucks: Roll-Off HHDDT	8	Van: Moving HHDDT	2
Hooklift HHDDT	2	Van: Moving MHDDT	4
Logging HHDDT	128	Van: Reefer HHDDT	9
Mixer/Asphalt/Concrete HHDDT	108	Van: Reefer MHDDT	18
Other	3741	Winch HHDDT	1
Service/Utility/Mechanic HHDDT	79	Yard Spotter HHDDT	92

Table 2 summarizes the survey responses by fleet average age and fleet size category. A total of 900 trucks are owned by fleets with 3 or fewer vehicles. Most were single truck owners. An additional 12,000 vehicles are owned by companies with more than 3 vehicles. Although not easily evident from the table, the proportion of older trucks in small fleets is higher than in the larger fleets consistent with staff analysis of DMV data.

Table 2: Fleet Size by Average Fleet Age

Fleet Age Group	Fleet Size (# of Vehicles)		
	1 to 3 Vehicles	>3 Vehicles	Total
<=3	30	71	101
>3 & <=6	49	4,093	4,142
>6 & <=10	152	3,687	3,839
>10 & <=13	118	1,904	2,022
>13 & <=16	148	1,496	1,644
>16 & <=20	132	519	651
>20	271	552	823
Totals	900	12,322	13,222

Staff also met with several individual companies and obtained information about their normal business practices, and had meetings with various stakeholder groups (such as the agricultural groups, dump truck association and California Trucking Association). The meetings and survey responses confirmed trends in vehicle replacement cycles that are common for various groups. Normal vehicle replacement practices are dependent on a number of factors, but in general are best correlated to annual miles traveled and how a vehicle is used.

2. Vehicle Capital Costs

To determine truck price inputs into the cost model, for sale vehicle price data was downloaded from Truckpaper.com and other online sources. Price curves were developed for over 50 truck body types by weight. Table 3 provides price data for the top ten types of vehicles that were reported on in the fleet survey.

Table 3: Price Data for the Most Commonly Reported Vehicles in the Fleet Survey

Vehicle Type	Value (new)	Value (10 Years)	Value (20 Years)
Beverage MHDDT	$ 55,205	$ 10,315	$6,129
Bus - Coach MHDDT	$ 99,081	$ 15,866	$5,813
Bus - Coach HHDDT	$ 449,954	$ 111,832	$ 18,633
Dump HHDDT	$ 96,685	$ 25,852	$ 10,651
Dry Van HHDDT (Tandem)	$ 98,469	$ 19,519	$8,907
Flatbed MHDDT	$ 48,792	$ 14,482	$8,408
Tractor Convention MHDDT	$ 61,565	$ 14,169	$7,595
Tractor Convention HHDDT (Single)	$ 92,201	$ 17,119	$ 10,644
Tractor Convention HHDDT (Tandem)	$ 105,151	$ 23,216	$ 16,275
Tractor Sleeper HHDDT	$ 131,961	$ 22,166	$ 12,128

Staff had obtained data from the National Automobile Dealers Association (NADA) (http://www.nada.com/b2b/products/commerical_truck_guide.asp) vehicle pricing information, but data was only available for a limited number of vehicle types. Staff compared the NADA data for a conventional tractor and found that it matched favorably with for sale prices downloaded. Here, the Truckpaper.com prices are from February 29, 2008 and the NADA retail prices are from March 25, 2008. NADA price data was available for model year 1999 to 2008 and was limited to heavy-duty tractors, and medium-duty tractors or cab and chassis.

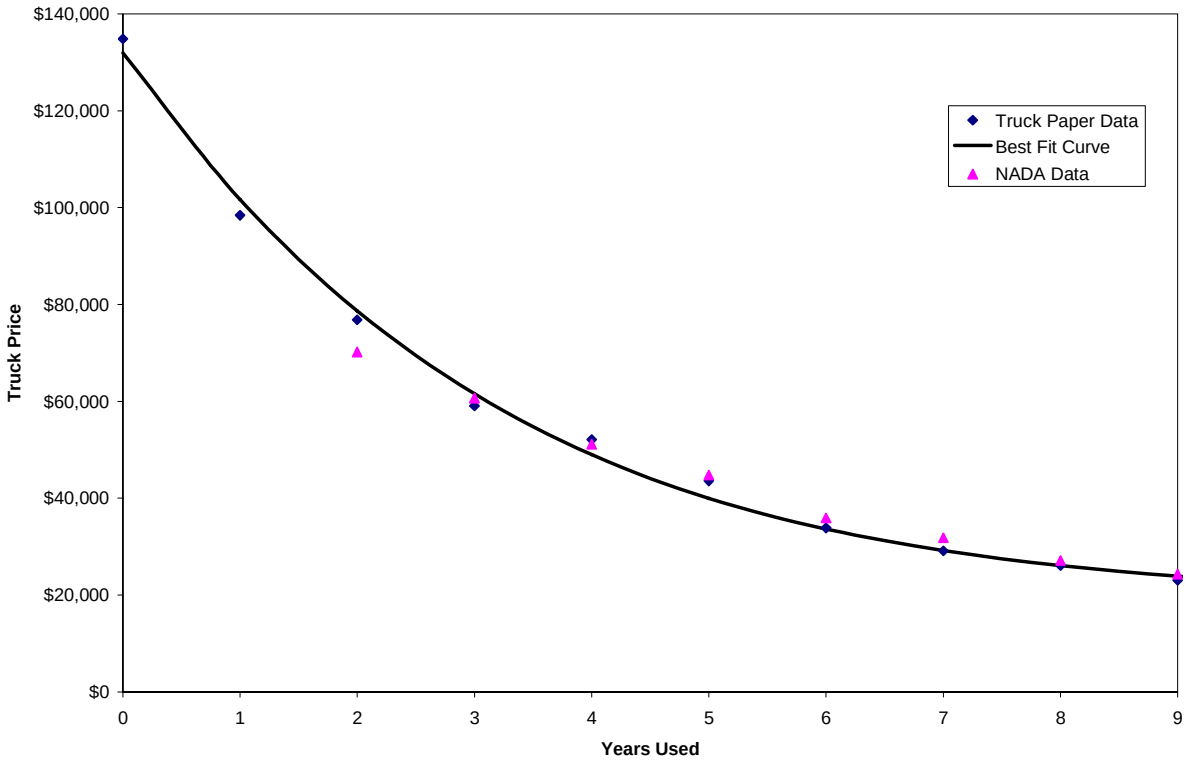
The price of four truck manufacturer of conventional sleeper tractors for each model year was averaged to determine the NADA price. The price was based on the following manufacturers, models, engine type, and transmission type:

- Freightliner, Century Class S/T 120" series and CST12064ST Aero body with 13-18 speed manual transmission and 15L-16L engine with ≥ 500 horsepower
- International, 9200-9900 series and 9200i Aero body with 13-18 speed manual transmission and 15L-16L engine with ≥ 550 horsepower
- Mack, CHN/CXN series and CHU Aero body with 13-18 speed manual transmission
- Peterbilt 378/379/385/387 series and 379 body (389 for 2008) with 13-18 speed manual transmission and 15L-16L engine ≥ 550 horsepower

The price for a used 2007 Freightliner conventional sleeper tractor was not available from NADA. The price for new 2008 Freightliner conventional sleeper tractor was available from NADA at $151,287. This price did not seem realistic since it was even higher than a Peterbilt 389 at $138,144.

The comparison between Truckpaper.com and NADA prices were compared from model years 1999 through 2006 since the data was either incomplete or not realistic for model years 2007 and 2008. The price difference between the two sources is not significantly difference and is shown in Figure 1.

Figure 1: HD Conventional Sleeper Tractor Price Comparison of Truckpaper.com and NADA



Source: Truckpaper.com. February 9, 2008. http://www.truckpaper.com/
NADA. March 25, 2008. http://www.nada.com/

Staff also assessed whether a truck body type could be transferred to a new cab and chassis and what the costs of the body transfer would be. If a body transfer is feasible and costs less than a replacement vehicle, the estimated transfer costs for the cab and chassis is another cost in addition to the cab and chassis price. The vehicle price data and body transfer costs used in the cost model are shown in Table 20 through Table 22.

3. Costs by Fleet Age and Fleet Size

The cost model must be run for many groups using data specific to the types of vehicles, fleet sizes and ages, and with the modeling code aligned with the various provisions for vehicle subpopulations. Subpopulations by instate and out-of-state groups (see next section for more information) need to be further segregated into groups related to specific rule provisions. For example, individual model runs need to be made by state inventory populations for large fleets with no special provisions, for small fleets with no special provisions, for vehicles with low mileage use provisions or other special provisions (such as exemptions related to mileage, specialty vehicles, etc.).

The cost associated with the “regulation run” is compared with the “baseline run” cost to determine any increased cost due to the proposed regulation. The increased cost is then divided by the number of vehicles in the company fleet to determine the average increased cost per vehicle. For the statewide analysis, individual company fleet increased costs per vehicle are grouped by fleet age and fleet size. The average increased costs by fleet age and fleet size groups reflect that individual companies with newer fleets will have no increased costs while companies with older fleets will have increased costs due to the regulation. As shown in Figure 2 through Figure 7, the average increased cost per vehicle associated with the regulation varies by the average age of the fleet and depends upon the value of each vehicle.

Figure 2: Average Increased Cost for Instate Heavy Heavy-Duty Vehicles in Fleets with 4 or More Vehicles (excluding special provisions)

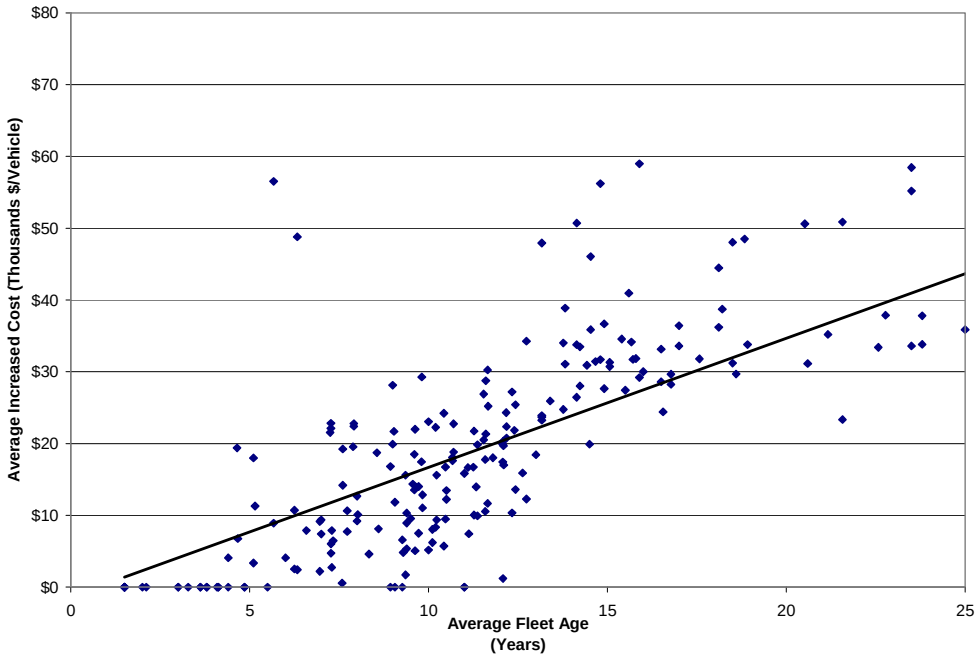


Figure 3: Average Increased Cost for Instate Medium Heavy-Duty Vehicles in Fleets with 4 or More Vehicles (excluding special provisions)

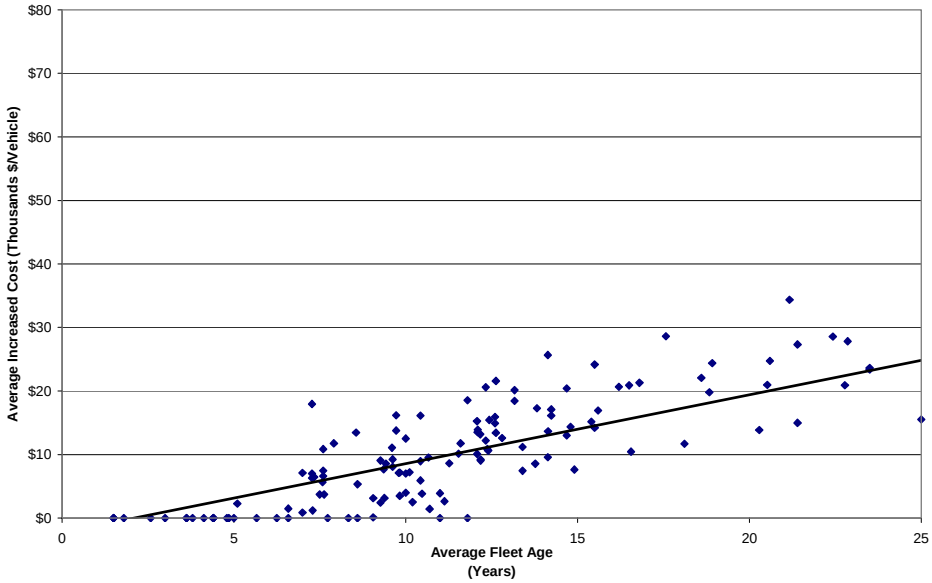


Figure 4: Average Increased Cost for Instate Heavy Heavy-Duty Vehicles in Fleets with 1 to 3 Vehicles (excluding low use provisions)

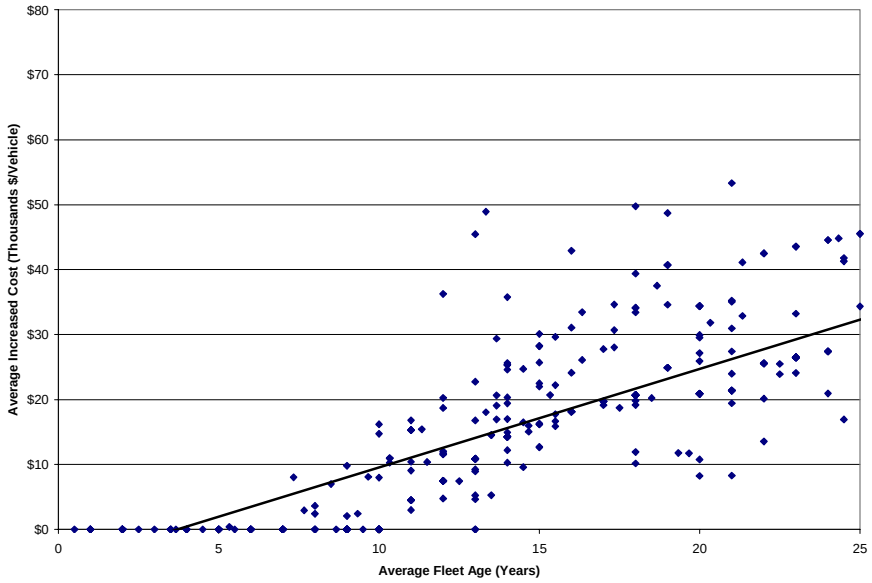


Figure 5: Average Increased Cost for Instate Medium Heavy-Duty Vehicles in Fleets with 1 to 3 Vehicles (excluding low use provisions)

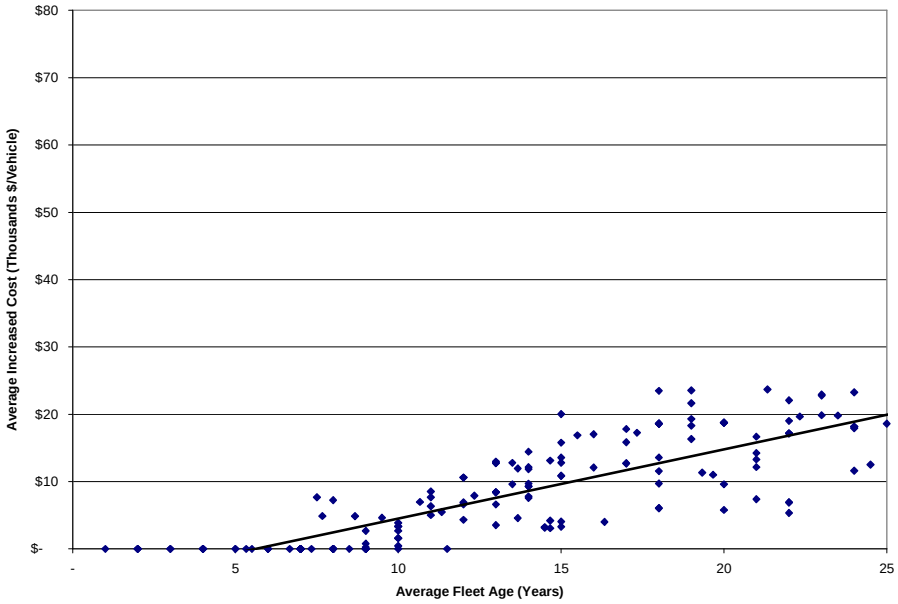


Figure 6: Average Increased Cost for Instate Heavy Heavy-Duty Vehicles in Fleets with Low Mileage (Less than 7500 Miles)

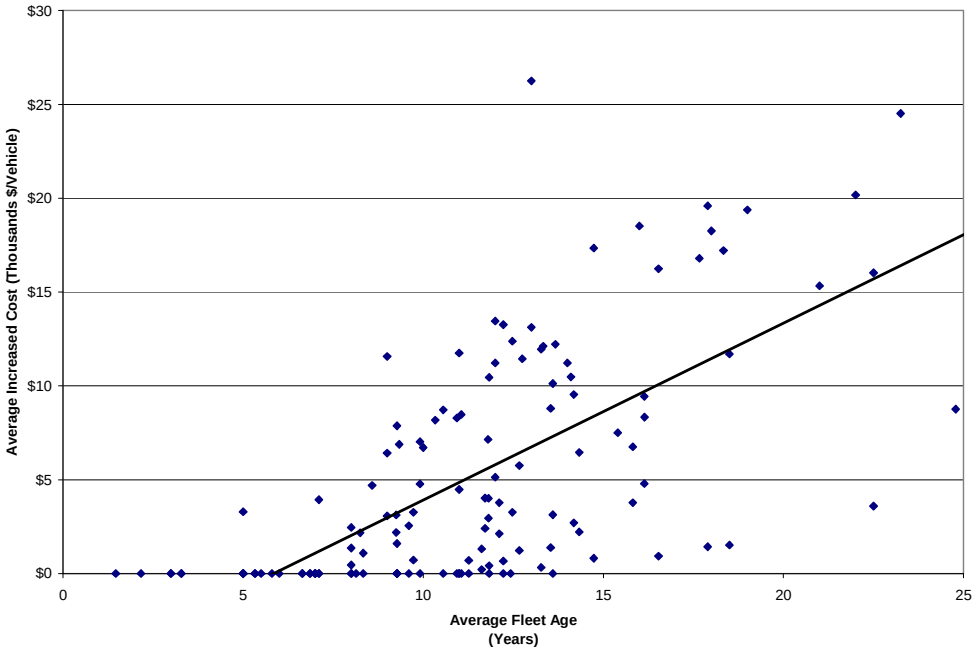
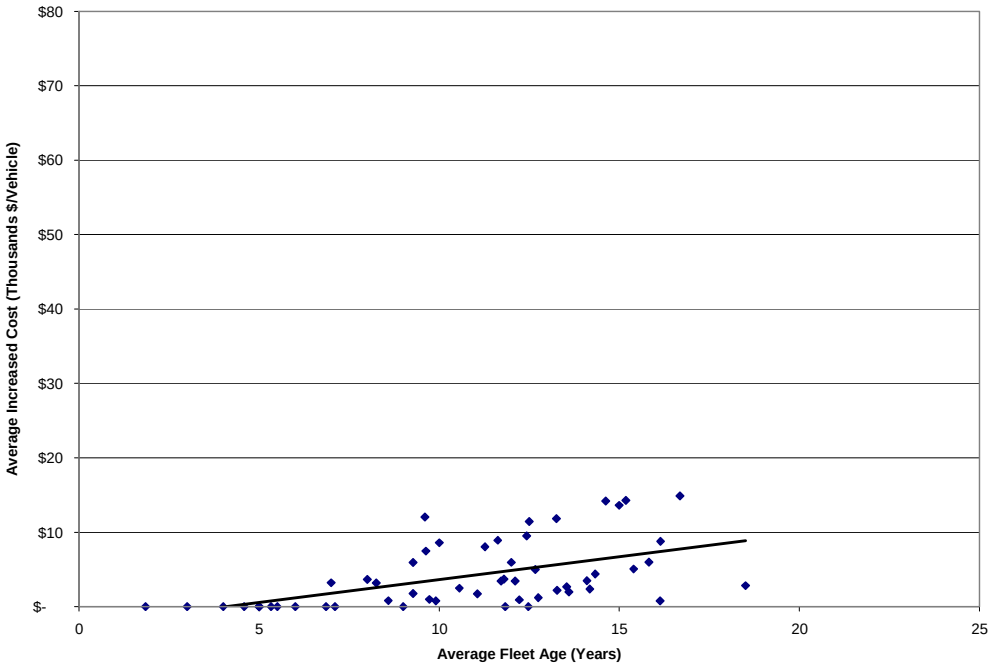


Figure 7: Average Increased Cost for Instate Medium Heavy-Duty Vehicles in Fleets with Low Mileage (Less than 5000 Miles)



4. Scaling to Statewide Costs

The cost model output provides the average increased cost per vehicle by fleet age and fleet size for individual company fleets (see Table 22 for sample individual company fleet annual costs). For determining the statewide costs, staff matched vehicle types to the emission inventory from real fleets who responded to the ARB survey. Staff used DMV and IRP data to determine the distribution of medium duty vehicles, heavy duty vehicles, fleet size, and fleet age distributions. The vehicle population counts were derived from statewide emissions inventory database and include the following population categories:

- Intrastate
  - Heavy Heavy-Duty Vehicles (HHD) – Tractors
  - Heavy Heavy-Duty Vehicles – Non Tractors
  - Medium Heavy Duty (MHD) Vehicles
  - Ag vehicles

- Interstate
  - California International Registration Plan (CA-IRP) Vehicles
  - Out-of-state neighboring vehicles (AZ, BC, ID, NV, OR, WA)
  - Out of state non-neighboring vehicles

In addition to the statewide vehicle population groups, there are some additional sub-group vehicle counts needed because the regulatory requirements differ, such as for:

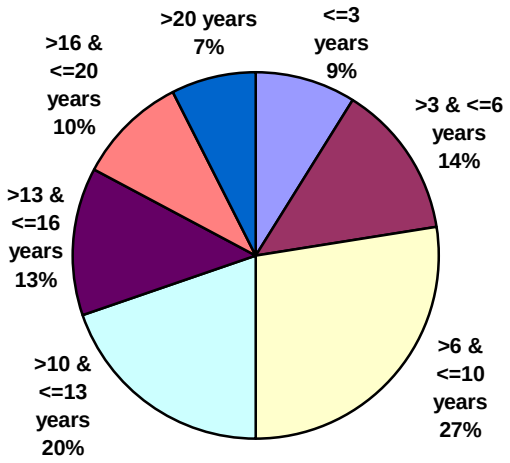
- Low Mileage (<7500 for HHD & <5000 for MHD) Vehicles
- Small Fleets (1-3 Vehicles)
- Exempted Vehicles

The characteristics of the fleet and vehicle information were used to match each vehicle to the emissions inventory categories. For example, a company may have some vehicles that are registered in the CA-IRP, and also some that are medium and heavy heavy-duty vehicles that are registered instate. Based on DMV instate and CA-IRP data, weighting percentages were developed by fleet age and size group to apply to the statewide emissions inventory populations to get the vehicle counts by fleet age and size groups. The statewide cost can be calculated for each fleet age group by multiplying the increased average cost per vehicle by the population vehicle counts.

a) Instate Heavy Heavy-Duty Vehicles

To put fleet age distributions in perspective, the following figure provides statewide data showing the percentage of vehicles, by fleet age, for instate heavy heavy-duty vehicles registered in California, per 2006 Department of Motor Vehicle (DMV) data. As can be seen in Figure 8, 47 percent of California heavy heavy-duty vehicles reside in individual company fleets with an average vehicle age of 6 to 13 years. Only 7 percent of the vehicles are in fleets with an average age over 20 years and 9 percent of the vehicles are in fleets with an average age of less or equal to 3 years.

Figure 8: Instate Heavy Heavy-Duty Vehicles by Fleet Age (2006 DMV data)

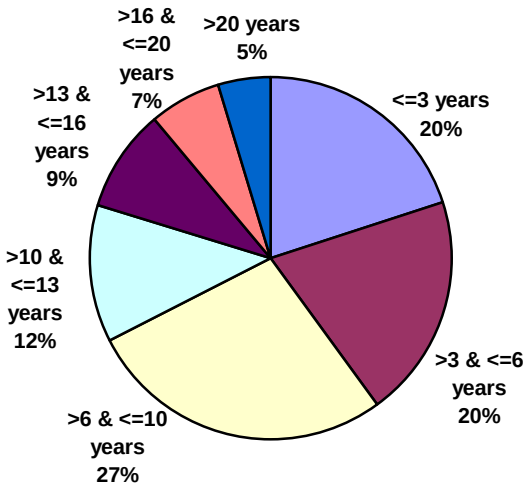


b) Instate Medium Heavy-Duty Vehicles

Similar to the heavy heavy-duty, the following figure provides statewide data showing the percentage of vehicles, by fleet age, for instate medium heavy-duty vehicles registered in California, per 2006 DMV data. As can be seen in Figure 9, 48 percent of

these vehicles reside in individual company fleets with an average vehicle age of over 3 to 10 years. Only 5 percent of the vehicles are in fleets with an average age over 20 years while 20 percent of the vehicles are in fleets with an average age of less or equal to 3 years.

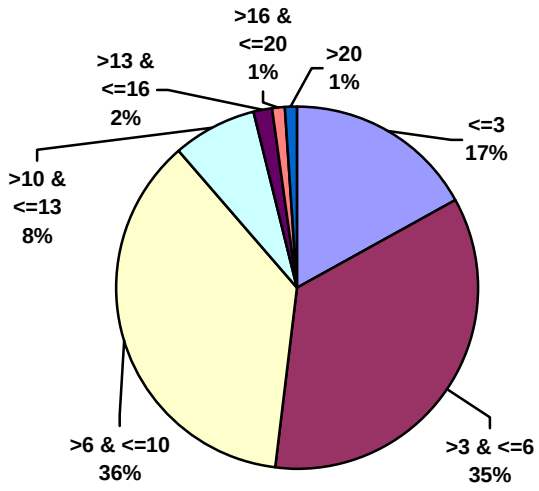
Figure 9: Instate Medium Heavy-Duty Vehicles by Fleet Age (Per 2006 DMV data)



c) Interstate Vehicles

Interstate vehicle populations include instate registered vehicles, neighboring out-of-state vehicles (AZ, BC, ID, NV, OR, WA) and non-neighboring out-of-state vehicles. Neighboring out-of-state vehicles are expected to have the same vehicle age distributions as vehicles in the California International Registration Program (CA-IRP). Vehicle age distributions for the CA-IRP vehicles (per 2006 CA-IRP registration data) are shown in Figure 10 below. Most or 52 percent of the CA-IRP vehicles reside in fleets with an average fleet age of less than or equal to 6 years, and only 12 percent are in fleets with an average age greater than 10 years.

Figure 10: California International Registration (CA-IRP) Vehicles by Fleet Age (Per 2006 DMV data)

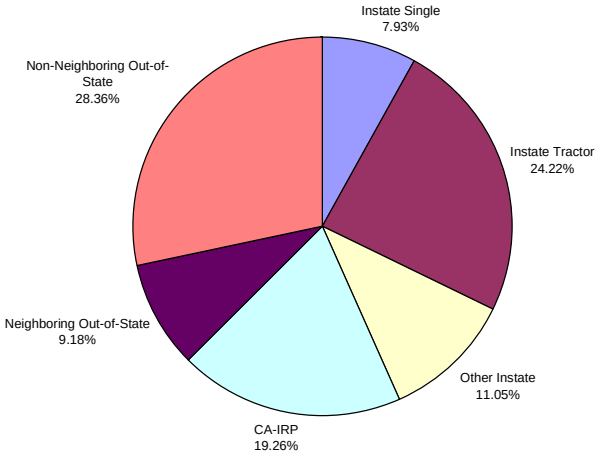


Interstate vehicles that are based in the mid-west and eastern states are the most likely to be newer than any other category. Non-neighboring interstate vehicles have an average age of 3.4 years per the emissions inventory database (in comparison to the 6 year age average of the CA-IRP vehicles), indicating that non-neighboring fleets are comprised mostly of very new vehicles that will already exceed the regulation requirements. Fleets that have vehicles older than 6 years old would also have the ability to route only their cleaner vehicles to California to comply with the regulations without any significant increase in costs.

d) Annual Mileage

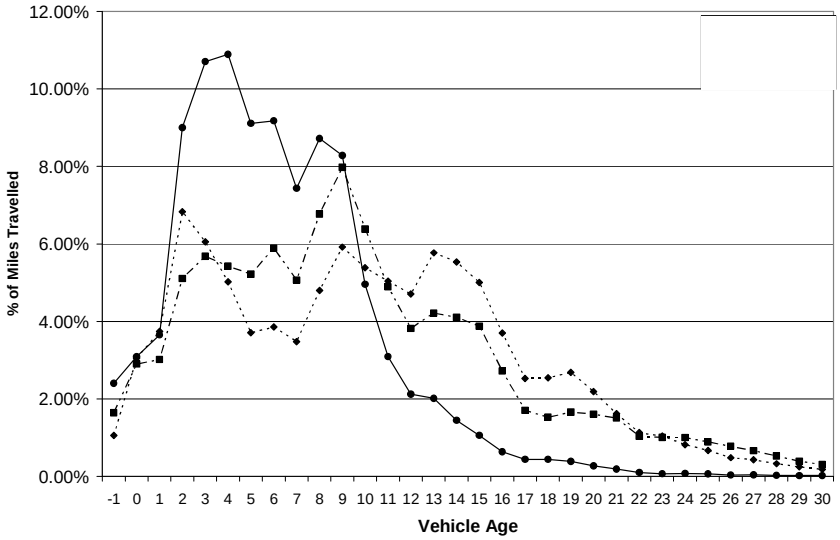
Per the statewide emission inventory database, heavy heavy-duty vehicles travel approximately 13.4 billion cumulative miles per year in California and medium heavy-duty vehicles travel approximately 4.3 billion cumulative miles in California. Figure 11 displays the percent of annual mileage travelled by vehicle population categories for heavy heavy-duty vehicles. Vehicles that operate only within California comprise 43 percent of the heavy heavy-duty annual miles and 99 percent of the medium heavy-duty annual miles. Interstate and international vehicles comprise 57 percent of the heavy heavy-duty annual miles and 1 percent of the medium heavy-duty annual miles.

Figure 11: Heavy Heavy-Duty Vehicle Annual Mileage



As displayed in Figure 12, the CAIRP vehicles travel the highest percentage of the total annual miles travelled by CAIRP vehicles at the age of 3 years and then the miles travelled decrease over time as the vehicles are sold into other types of instate and out-of-state fleets, or are retired. After the age of 13 years, the annual miles travelled by the instate tractor and single (non-tractor) vehicles decreases significantly as the population declines and individual vehicle annual miles travel decreases. The annual miles travelled for vehicles over the age of 25 years are only 0.1 percent of the CAIRP miles, 1.2 percent of the non-tractor miles and 1.8 percent of the tractor miles.

Figure 12: HHDDT Vehicle Miles Travelled (VMT) by Vehicle Age



e) Sample Results

Table 4 shows sample results for the heavy heavy-duty vehicles subject to the large fleet requirements that would not qualify for any of the special provisions. The DMV data provides the weighting percentages (similar to the prior pie chart figure with all fleet sizes) to apply to the total vehicles from the statewide emissions inventory to get the number of vehicles by fleet age groups.

Table 4: Instate Heavy Heavy-Duty Vehicles by Fleet Age for Large Fleets (excluding special provisions)

Fleet Age	# Vehicles (Per Updated Emissions Inventory for 2008)	% (per 2006 DMV Data)	$/Vehicle (Per Model Output)	Statewide $
<=3	5,772	12.3%	$ -	$ -
>3 & <=6	7,933	17.0%	$ 7,688	$ 60,989,901
>6 & <=10	13,567	29.0%	$ 13,981	$189,692,574
>10 & <=13	8,765	18.8%	$ 20,274	$177,705,029
>13 & <=16	6,126	13.1%	$ 25,668	$157,242,209
>16 & <=20	3,003	6.4%	$ 31,961	$ 95,972,700
>20	1,372	2.9%	$ 40,052	$ 54,939,191
Unknown	209	0.4%	$ 15,756	$ 3,286,004
	46,750	100.0%		$739,827,609
			Overall Average $/Vehicle	$ 15,827

The statewide cost estimate for this sub-population can then be estimated by multiplying the number of vehicles by the increased $/vehicle for each age group and summing the statewide $ per fleet age. In the above example, the highest increased costs due to the regulation are found in the >20 fleet age category with an average $/vehicle of $40,052 and the least cost increases due to the regulation are found in the three or fewer fleet age category with no average increased costs. Medium duty vehicles and vehicles qualifying for the special provisions including low use vehicles would have separate population counts and lower costs.

Similar analysis is done for all the remaining population categories including:

- Low mileage vehicles (by MHD and HHD groups)
- Higher use instate HHD vehicles for small fleets
- Higher use instate MHD vehicles (by small & non-small fleets)
- Higher use CA-IRP and neighboring out-of-state vehicles (by small & non-small fleets)
- Bus Fleets (by MHD and HHD)
- Non-Neighboring out-of-state vehicles
- Low mileage and specialty agricultural vehicles (special provisions)

Other populations that have differing requirements and are modeled separately include:

- School Buses (PM only)
- Ag Fleets
- Cranes
- Sweepers

5. Annual Costs

In addition to capital costs of the proposed regulation, various annual operational and maintenance costs will also be incurred. In determining the total regulatory costs of staff's proposal, these annual costs are added to the total statewide capital cost estimates. Operational and maintenance costs associated with PM DECS include annual filter cleaning expenses, fuel economy losses and costs associated with regeneration of active systems. Other costs or savings include fuel economy improvements with replacement of older vehicles with newer vehicles and urea costs for SCR. At this time, staff has not included anticipated cost savings associated with lower maintenance and less down time by fleets having newer vehicles as compared to having older vehicles.

The operating and maintenance costs associated with the use of PM DECS are determined using the anticipated population of vehicles equipped with aftermarket PM controls, as well as the population of 2007 and newer engines. The number of PM controls in each calendar year was estimated by extrapolating the results of the capital cost model to the affected vehicle population.

Operating and maintenance costs attributable to the proposed regulation were broken into four main categories: regeneration cost for active DPFs, changes in fuel economy, urea usage, and annual maintenance. Regeneration costs for active filters are incurred for electricity or fuel usage for a vehicle to regenerate the filters on a regular basis. Annual maintenance costs for vehicles with PM control devices are for the cleaning servicing of the filters by external parties. Engines manufactured after 2009 with SCR would also have annual costs associated with the use of urea. Also, there is likely to be a fuel economy improvement and associated cost savings through the use of 2004-2006 MY engines utilizing EGR.

a) Annual Retrofit Costs

When calculating the statewide costs, additional costs due to retrofits were also incorporated. These costs included:

- Regeneration costs due to active retrofits
- Maintenance costs due to yearly filter cleanings required
- Fuel costs associated with the 2 percent fuel penalty per retrofit

i. Regeneration Costs

Staff expects the majority of diesel emission control systems will use active fuel-based systems to regenerate in order to avoid the need to plug in because most vehicles, such

as dump trucks, may not have on the job access to electricity or the extended time for a full electricity-based regeneration cycling. Electricity-based regenerating may remain commonplace in day-use only applications where the vehicle returns to the same facility each night, such as school bus fleets. Diesel emission control systems contain sensors that permit operators to anticipate the majority of regenerations. Subsequently, regenerations can take place during non business hours with no impact on productivity. Given the close comparison of cost between the two technologies, staff used fuel-based filters exclusively in its analysis. To estimate the number of in-use active diesel emission control systems the retrofit population was scaled by the weighted in-state percentage of pre-1994 medium heavy-duty and heavy heavy-duty vehicles, which is 15 percent of the population. Based on 2 regenerations per week at a quarter hour of down time per regeneration and 0.2 gallon of fuel burned per regeneration the total cost to the statewide fleet is $181.7 million at a rate of $3.69 per gallon of diesel. At $4.00 per gallon the cost would increase to $182.3 million and at $5.00 per gallon the price would be $184.2 million. The cost estimates are insensitive to fuel prices because the down time costs represent a vast majority of the total cost estimate.

ii. Maintenance Costs

In 2010 through 2013, the proposed regulations would require the installation of diesel particulate matter filters (DPFs) on existing vehicles. After 2013 all vehicles would have PM filters and the total number decreases as vehicles are retired. By 2021, nearly all pre-2007 vehicles would be phased out and no aftermarket PM retrofits would remain in use. The estimated number of retrofits in the statewide fleet is shown in Table 5.

Table 5: Total Number of Aftermarket and Originally Equipped DPFS

Calendar Year	Number of Aftermarket DPFs	Increased Number of Engines with OEM equipped DPF
2010	11,700	7,675
2011	35,152	16,345
2012	136,233	69,090
2013	154,240	81,306
2014	139,120	70,222
2015	113,955	72,013
2016	79,053	87,528
2017	50,929	96,517
2018	48,725	83,895
2019	45,823	82,317
2020	0	93,663
2021	0	87,647
2022	0	80,011
2023	0	67,356
2024	0	57,259
2025	0	53,791

Staff has conservatively estimated that each retrofit will result in maintenance costs of about $400 per year for PM filters (ARB 2003; ARB 2006a; ARB 2007). Using this estimate, the total statewide costs due to retrofit maintenance was calculated using Equation 1 in 2008 equivalent dollars.

Equation 1: Total Maintenance Costs = Σ [maintenance cost/year per vehicle x # of vehicles in the state retrofitted]

The total increased in maintenance costs for the statewide fleet from 2010 to 2025 is estimated at 516 million (in 2008 equivalent dollars), as shown in Table 6.

Table 6: Cumulative Increased Retrofit Maintenance Costs ($2008)

Per Filter Costs	Cumulative Costs (millions $)
OEM equipped DPFs	$ 275
Aftermarket DPFs	$ 241
TOTAL	$ 516

iii. Fuel Costs

The statewide fleet uses over 3 billion gallons of diesel fuel per year for California miles traveled at an average cost of approximately $4.00 per gallon (CEC 2008). Fleets reported vehicle fuel usage and miles traveled in the fleet survey. Statewide inventory

data (including vehicle miles traveled) was used to compute fuel penalty costs associated with particulate matter filters and fuel efficiency offsets from vehicle replacements using the fuel usage rates in Table 7.

Table 7: Fuel usage rates

Model Year	MPG for HHD	MPG for MHD
<1988	5.200	6.916
1988-1990	5.388	7.165
1991-1993	5.575	7.415
1994-1995	5.763	7.664
1996-1998	5.950	7.914
1999-2002	5.480	7.288
2003-2006	5.750	7.648
2007	5.610	7.461
2008	5.590	7.435
2009	5.580	7.421
2010	5.780	7.687
2011	5.780	7.687
>2011	5.800	7.714

The total statewide costs from 2010 to 2025 due to increased fuel consumption from the 2 percent fuel penalty in vehicles with aftermarket retrofits installed is a total of approximately $113 million in 2008 equivalent dollars. The total statewide offset from 2010 to 2025 due to decreased fuel consumption from the increased fuel efficiencies from vehicle replacements is a total of approximately $126 million in 2008 equivalent dollars. Thus there is a net reduction in costs anticipated of approximately $13 million at a rate of $4.00 per gallon. At a rate of $3.69 per gallon, the net reduction in costs drop to $12.2 million and at a rate of $5.00 per gallon the net reduction in costs increase to $16.5 million.

The proposed regulation will also accelerate the replacement of existing vehicles to newer vehicles that utilize SCR technology. The result is an increased number of vehicles in the statewide fleet that have SCR relative to what would occur without the proposed regulation. SCR technology utilizes urea to reduce NOx emissions, so an additional cost will be realized. It is expected that after 2023, the increased number of vehicles having SCR because of the accelerated vehicle replacement requirement will slowly decrease as the statewide fleet returns to normal vehicle replacement cycles. Projecting in 2008 equivalent dollars, and considering urea costs of $4.00 per gallon and that urea consumption in SCR is expected to be about 3 percent of the diesel fuel used, the estimated cost is approximately $240 million.

iv. Cost for Reporting

For small fleets, initial reporting will cost between $0 and $ 100 (for up to 2 hours needed to compile fleet data). This assumes a cost of $50/hr for either work time lost, or a hired consultant. For large fleets, the cost will be between $200 and $400 (assuming an average of 4 to 8 hours to compile larger fleet data).

For estimating the total statewide costs, the number of fleets present in the state was estimated using 2006 DMV and CA-IRP data with the number of registered vehicles grouped by fleet size bins. The number of fleets was calculated by using Equation 2.

Equation 2: Fleets in State = Σ [Registered Vehicles / Fleet Size]

Per 2006 DMV data for instate heavy heavy-duty, medium heavy-duty and CAIRP vehicle populations, there are approximately 171,500 company fleets. There are approximately 156,000 small fleets with less than 4 vehicles and there are approximately 15,500 large fleets in California. Excluding single owner fleet trucks that would only have a vehicle with a model year of 2007 or greater in 2010, the revised estimate for small fleets would be 138,000. Out of state vehicles will be minimally impacted as the majority of out-of-state fleets are comprised of newer vehicles and are ahead of the proposed requirements.

Fleets using the BACT compliance schedule would not need to report in the years they use this method of compliance. For the reporting costs calculations, it is estimated that approximately 75 percent of the fleets would be reporting in any given year as reflected in Equation 3.

Equation 3: Fleet initial reporting costs = # of fleets x 75% x average initial reporting costs

In 2008 dollars, the statewide cost for company fleets initial reporting in 2010 is shown in Table 8.

Table 8: Initial Reporting Costs (2010)

Fleet Type	Cost ($2008) Millions
Small fleet	$11.4
Large fleet	$ 5.1
Total cost for initial reporting	$16.5

The annual reporting costs for small fleets will be approximately $50 per fleet per year, assuming that on average one hour is needed to update the fleet in the ARB reporting system. For a large fleet, the cost is estimated to be $200 per fleet per year, assuming that on average, 4 hours is needed to update the fleet in the ARB reporting system. The 4 hours for large fleets is based on a weighted average using estimating 1.5 hours for

fleets with 4 to 5 vehicles, 2 hours for fleets with 6 to 10 vehicles, 4 hours for fleets with 11 to 20 vehicles and 20 hours for fleets with over 20 vehicles. The total cost per year for small fleet reporting will be 75 percent of the number of fleets multiplied by $50, or $5,175,000. For a large fleet, the cost per year will be 75 percent of the number of fleets multiplied by $200, or $2,325,000.

The reporting costs over the life of the regulation were calculated using Equation 4, assuming that for all fleets reporting ends in 2022.

Equation 4: Total annual reporting cost = Σ [Annual reporting cost x NPV (for every year of reporting)]

The total annual reporting cost over the life of the regulation is shown in Table 9.

Table 9: Total Annual Reporting Costs

Fleet Type	Cost ($2008) Millions
Small fleet	$41.6
Large fleet	$18.7
Total cost for annual reporting	$60.3

The total costs for reporting are the initial and annual reporting costs in 2008 dollars (Table 10).

Table 10: Total Reporting Costs

Fleet Type	Cost ($2008) Millions
Small fleet	$53.0
Large fleet	$23.8
Total cost for reporting	$76.8

6. Total Costs

Statewide, there are a number of different types of fleet vehicles that will experience different costs:

- Large fleets – all PM and NOx requirements:
  - Medium heavy duty vehicles Instate,
  - Heavy heavy-duty vehicles instate,
  - CAIRP Vehicles,
  - Motor Coach Bus Fleets,
  - Neighboring out of state vehicles,
  - Far out of state vehicles.
- Small fleets - alternative schedule for requirements per vehicle for fleets with less than 4 vehicles.
- Low Mileage fleet vehicles – PM only requirements until 2020.

- Port Trucks – must replace 2007MY vehicles by end of 2020.
- School Buses - PM only requirements completing in 2013.
- Low mileage and specialty agricultural vehicles (special provisions).
- Utility Fleets
- Two Engine Cranes
- Sweepers

The statewide fleet inventory for 2008 includes approximately 220,000 medium heavy-heavy duty vehicles, more than 695,000 heavy heavy-duty vehicles and approximately 25,000 buses that conduct business in California. This includes vehicles that also operate in other states including California. Over 940,000 of the statewide fleet inventory vehicles are in fleets that could be subject to provisions in the proposed regulations.

The results of multiplying the number of vehicles for each fleet type by the costs per vehicle are shown in Table 11. This table also incorporates reporting costs for company fleets to comply with the rule including the initial reporting costs and the total annual reporting costs. Retrofit costs for annual maintenance and a 2 percent fuel penalty are also included. The reporting and retrofit costs are discussed above in this document.

Table 11: Total Statewide Compliance Costs (2008$)

Fleet/Population Type	Total Cost (Millions)	# Vehicles
Instate MHD Fleets - Small	$399	77,739
Instate MHD Fleets - >3 Vehicles	$565	88,522
Instate MHD - Low Mileage	$122	32,264
MHD CAIRP & Out-of-State	$46	8,896
Instate HHD Fleets - Small	$432	37,097
Instate HHD Fleets - >3 Vehicles	$740	46,754
HHD - Low Mileage*	$142	25,841
HHD Buses	$252	7,211
MHD Buses	$26	2,763
CA-IRP - Small	$156	25,126
CA-IRP - >3 Vehicles	$343	32,273
Neighboring States - Small	$48	7,773
Neighboring States - >3 Vehicles	$339	31,928
Non-Neighboring	$471	225,328
Non-Neighboring - <1000 Miles	$0	225,329
Agricultural MHD Fleets - Mid Miles	$30	1,946
Agricultural MHD Fleets - High Miles	$30	1,750
Agricultural MHD Fleets - Exempt	$0	5,742
Agricultural HHD Fleets - Mid Miles	$30	1,442
Agricultural HHD Fleets - High Miles	$108	4,099
Agricultural HHD Fleets - Exempt	$0	6,459

Port Trucks	$106	21,650
School Buses	$69	16,469
Two Engine Cranes	$0	2,113
Utility Fleets	$4	4,154
Reporting Costs	$77	n/a
Operating Costs	$928	n/a
Grand Total	$5,461	940,667

*Includes CA-IRP, Neighboring States, Instate HHD

For most fleets, the costs are highest in 2012-2013 and lowest in 2014. In general, businesses with newer fleets and lower proportions of equipment subject to other ARB rules will have little to no cost impacts to absorb. Businesses with significantly older fleets and higher proportions of equipment subject to other ARB rules will have higher cost impacts to absorb or pass on.

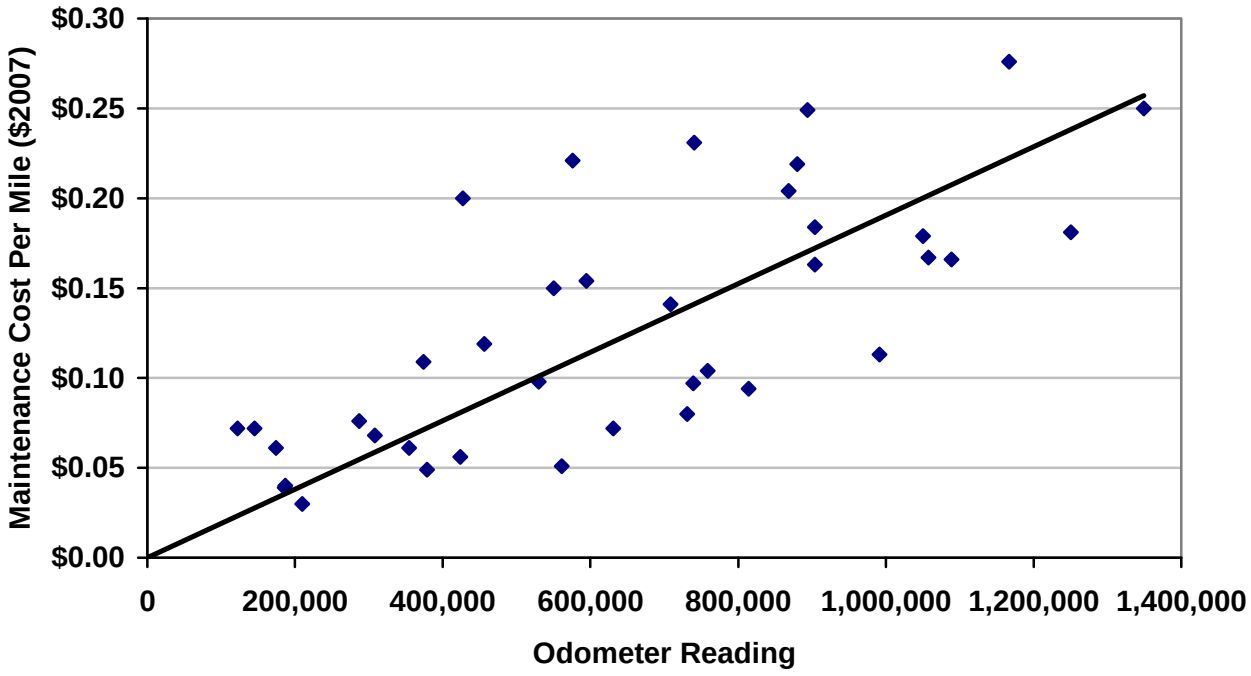
7. Vehicle Maintenance and Repair Costs

In staff's analysis, the cost estimates are conservative because cost savings for truck replacements to newer more reliable trucks with lower operating costs were not included. In meeting with individual fleets, and evaluating the impact on cash flow, income and total debt load, staff did consider these factors. Cost savings per for newer vehicles is dependent on a number of factors including vehicle weight class and use of the vehicles. The importance of the cost savings is greater for vehicles that travel more miles and less important for those that operate relatively few miles. The following discussion shows how significant repair and maintenance costs can be.

Figure 13 shows maintenance and repair cost of 6 conventional without sleeper tandem drive axle class 8 tractors. All tractors were new and 4 were place into service in year 2000 and 2 in year 2003. The tractors are typically driven by two drivers per day normally 5 to 5.5 days per week at a maximum of 1,000 miles per day and averaged about 170,000 miles per year. The duty cycle is rated as high in which these trucks operate regionally and average 4.95 miles per gallon. A long haul tractor that runs between Seattle and San Diego on the Interstate 5 corridor normally average closer miles per gallon. The maintenance cost portion included brakes, tires and other preventative maintenance repairs. The repair cost portion was the labor cost to perform non-routine or preventative maintenance repairs at a shop rate of $100 per hour.

For example, a new truck driven 100,000 miles (beginning odometer reading = 0) in the first year would expect $0.038 per mile maintenance and repair cost of $3,800 for year one. If in the fourth year the same truck continues traveling another 100,000 miles (ending odometer reading = 400,000 miles) and $0.076 maintenance cost or $15,248 for year four.

Figure 13: Odometer Mileage vs. Maintenance/Repair Cost Per Mile



B. Industry Groups

The impact of the proposed regulation on each business sector will depend on the number and types of vehicles that are impacted and the fleet ages for each business sector. A comparison of the California Gross Domestic Product (GDP) dollars for these same time periods provides an indication of the rate increases that would be needed for each industry group as a whole. The GDP projections are based on normal historical growth patterns.

As seen in Table 12 below using VIUS 2002 business categories (VIUS 2002), the transportation industry would incur the highest costs in relation to their GDP with an average increase of 0.07 percent needed in GDP over 2010-2025 to absorb the costs. The increased rule costs would be highest for the Transportation industry in 2012. The construction industry would need an average increase of 0.03 percent in GDP over 2010-2025 to absorb costs. Since the construction industry has experienced a downturn, primarily in the residential sector, for sensitivity purposes this analysis was also examined using no growth projections for GDP, resulting in the need for an average increase of 0.06 percent in GDP over 2010-2025 to absorb costs of the construction industry. Most industries would experience the highest cost year in 2013.

Table 12: Increased Capital Costs as a Percentage of California Gross Domestic Product

Business Type per 2002 VIUS for Diesel Heavy-Duty Vehicles	Total from 2010-2025	Maximum Year
Accommodation or Food Services	0.0061%	0.022%
Agriculture, Forestry, Fishing, or Hunting	0.0257%	0.082%
Arts, Entertainment or Recreation Services	0.0027%	0.007%
Construction	0.0503%	0.116%
For-Hire Transportation or Warehousing	0.0958%	0.325%
Manufacturing	0.0013%	0.005%
Mining	0.0450%	0.148%
Other Services	0.0111%	0.021%
Retail & Wholesale Trade	0.0046%	0.013%
Utilities	0.0005%	0.000%
TOTALS	0.0144%	0.044%

1. The E-DRAM Model

ARB Staff assessed the overall impact that the proposed regulation could potentially have on the California economy using the Environmental-Dynamic Revenue Analysis Model (E-DRAM). The E-DRAM is a model of the California economy, developed by the University of California, Berkeley. The ARB has used the E-DRAM to assess the economic impacts of several major regulations and plans.

The E-DRAM describes the flow of dollars among California producers, California households, California governments, and the rest of the world. Data for the 120 industrial sectors originate from the U.S. Department of Commerce's Bureau of Economic Analysis and are based on the Census of Business—a detailed survey of U.S. companies conducted every five years. The survey contains information about intermediate purchases, factor (labor, capital, land, and entrepreneurship) payments, and taxes. National data are disaggregated to a California level using a combination of state-level employment data and estimates from the Department of Finance's econometric modeling. The model is updated as industrial data becomes available and the current version of the model is based on the industrial data obtained in 2003.

Household income data come from the California Franchise Tax Board Personal-income Tax "sanitized" sample. Data on consumption by income class are derived from national survey data. Government sector data are culled from published federal, state, and local government reports.

a) Annualized Costs of Compliance

The annualized cost of the proposed regulatory measure is the basic input to the E-DRAM. The Policy Scenario is implemented in the model by increasing the total amount spent by the affected sectors in the Vehicle Manufacturing sector by a total of $556

Million. The vehicle manufacturing sector in the E-DRAM model includes the Heavy Duty Truck Manufacturing sector (NAICS 33612). The impacts were estimated for the year 2013, which represents the year with the greatest increase in spending. Costs to the specific sectors are indicated in Table 13.

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Table 13: 2013 Sector Cost Allocations

Sector	NAICS	2013 Annualized Cost
Accommodation and Food Services	72	$15,120,984
Agriculture, Forestry, Fishing	11	$41,440,107
Arts, Entertainment or Recreation Services	71	$1,945,808
Construction	23	$117,081,446
Transportation and Warehousing	48-49	$182,115,623
Manufacturing	31-33	$18,899,204
Mining	21	$17,723,411
Motor Coach Bus Lines*	485, 5324	$43,223,763
Other Services	Many	$9,432,622
Wholesale and Retail Trade	42,44-45	$55,717,069
Schools*	4854	$26,044,209
Utilities	22	-
Vehicle Leasing or Rental*	5321	$37,073,903
Total		$565,818,151

* These sectors are treated as part of Transportation and Warehousing in the analysis described below.

The E-DRAM consists of 120 industrial sectors which means that the costs detailed in Table 13 need to be further apportioned among these 120 sectors. This cost apportionment was done proportionally, based on each sectors share of spending in the Vehicle Manufacturing sector established in the models' 2003 dataset. The Vehicle Manufacturing sector is broad enough that it likely includes vehicle types that would not be affected by this regulation. The effect of the proportional apportionment would mean that some sectors that would not be affected by this regulation are being affected to some extent.

As indicated in Table 13, the costs to the Transportation and Warehousing sector are a substantial share of the total costs of this regulation. The Transportation and Warehousing sector is made up of nine individual sectors in E-DRAM, some of which may not be affected by this regulation. To get some idea of the effects of misallocating costs, two different cost allocation scenarios were analyzed.

The first assumes that costs are proportional to spending in the Vehicle Manufacturing sector, as described above. The second tried to be more explicit about which sector would bear the brunt of the costs. These two scenarios are displayed below.

Table 14: Allocation of Transportation and Warehousing

Transportation and Warehousing	NAICS	Scenario 1	Scenario 2
Air Transportation	481, 488	0%	0%
Other Transportation	486, 488, 5324	13%	0%
Public Transportation (Motor Coach Bus Lines and Schools)	485	2%	15%
Railroad Transportation	482, 488	2%	0%
Transportation	49	15%	0%
Truck Transportation	484	42%	60%
Vehicle Transportation (Includes Vehicle Leasing or Rental)	485, 487, 488, 5321	23%	25%
Waterway Transportation	483, 488	4%	0%

b) State Level Economic Impacts

The proposed plan will require increased spending for vehicle replacements. Increased spending by the affected sectors will directly increases the cost of producing goods and services and therefore the prices of goods and services in these sectors. Price changes will in turn have secondary effects on other sectors of the California economy. Using E-DRAM model, it is possible to estimate the net effects of the proposed regulatory plan on the aggregate California economy.

Table 15 summarizes the impacts of the proposed regulation on the California economy for the year 2013. Changes are all relative to the Business as Usual case. For Scenario 1, the results of analysis indicate the state output would be reduced by about $1.3 billion (0.04 percent), and personal income would increase by roughly $500 million (0.02 percent) in 2013. California employment would be reduced by 13,600 (less than 0.08 percent) in 2013. Therefore, the impacts of the proposed regulation are small compared to the growth that is expected to occur in California over the next few years.

For Scenario 2, the results of analysis indicate the state output would be reduced by about $1.3 billion (0.04 percent), and personal income would decrease by roughly $600 million (0.02 percent) in 2013. California employment would be reduced by 4,600 (less than 0.03 percent) in 2013. Therefore, the impacts of the proposed regulation are small compared to the growth that is expected to occur in California over the next few years.

Table 15: Economic Impacts of the Proposed Regulation on the California Economy in 2013

	Business as Usual	Scenario 1	Scenario 2
Real State Output (billions of 2008 dollars)	3,104	3,103	3,102
Personal Income (billions of 2008 dollars)	1,800	1,800	1,799
Income Per Capita (thousands of 2008 dollars)	44.13	44.15	44.13
Employment (thousands of jobs)	17.63	17.62	17.63
Total Imports (billions of 2008 dollars)	2,417	2,418	2,417

Total Exports (billions of 2008 dollars)	2,359	2,358	2,358
Percent Change from Business as Usual			
Real State Output (billions of 2008 dollars)	-	-0.04%	-0.04%
Personal Income (billions of 2008 dollars)	-	0.02%	-0.02%
Income Per Capita (thousands of 2008 dollars)	-	0.05%	-0.01%
Employment (thousands of jobs)	-	-0.08%	-0.03%
Total Imports (billions of 2008 dollars)	-	0.04%	0.01%
Total Exports (billions of 2008 dollars)	-	-0.02%	-0.02%

A source of uncertainty in the E-DRAM analysis is the industry data that the model is dependent upon. The model uses data for 2003 and the data are extrapolated to future years based on growth forecasts from the California Department of finance and the UCLA Anderson School of Business. These growth rates apply to all E-DRAM sectors. If the affected sectors grow faster than the rate used in E-DRAM, this analysis would overstate the relative impact of the regulation. Conversely, if sector growth is slower than anticipated, this analysis would understate the relative impact of the regulation.

c) Sector Economic Impacts

A model such as E-DRAM is most useful for characterizing economic impacts at the state level. It can also be informative at the sector level with the understanding that some sector details that may be important in characterizing how producers will respond to a policy change may not be fully reflected in the model.

Table 16 and Table 17 reports sector level changes. Again, the overall effects are small and largely consistent across both costs allocation scenarios. There is one noticeable effect for employment within the Trucking and Warehousing sector. With a general apportionment (Scenario 1) Railroad Transportation sees substantial change in employment. This effect is not seen in Scenario 2, where the total Trucking and Warehousing costs are shared among the Truck Transportation, Public Transportation and Vehicle Transportation sectors. In fact, the total employment change for Trucking and Warehousing is substantially reduced in Scenario 2.

Table 16: Sector Change in Real State Output Billions of 2008 dollars

Sector	Business as Usual	Scenario 1	Scenario 2
Agriculture, Forestry, Fishing	94	94	94
Mining	28	28	28
Construction	141	140	140
Utilities	62	62	62
Manufacturing	819	818	818
Transportation and Warehousing	94	93	93

Wholesale and Retail Trade	402	402	402
Arts, Entertainment or Recreation Services	49	49	49
Accommodation and Food Services	93	93	93
Other Services	1,323	1,323	1,323
Grand Total	3,104	3,103	3,102
Agriculture, Forestry, Fishing	-	-0.10%	-0.10%
Mining	-	-0.10%	-0.11%
Construction	-	-0.15%	-0.15%
Utilities	-	-0.07%	0.02%
Manufacturing	-	-0.05%	-0.05%
Transportation and Warehousing	-	-0.38%	-0.22%
Wholesale and Retail Trade	-	-0.01%	-0.03%
Arts, Entertainment or Recreation Services	-	0.04%	0.01%
Accommodation and Food Services	-	-0.02%	-0.02%
Other Services	-	-0.01%	-0.02%
Grand Total	-	-0.04%	-0.04%

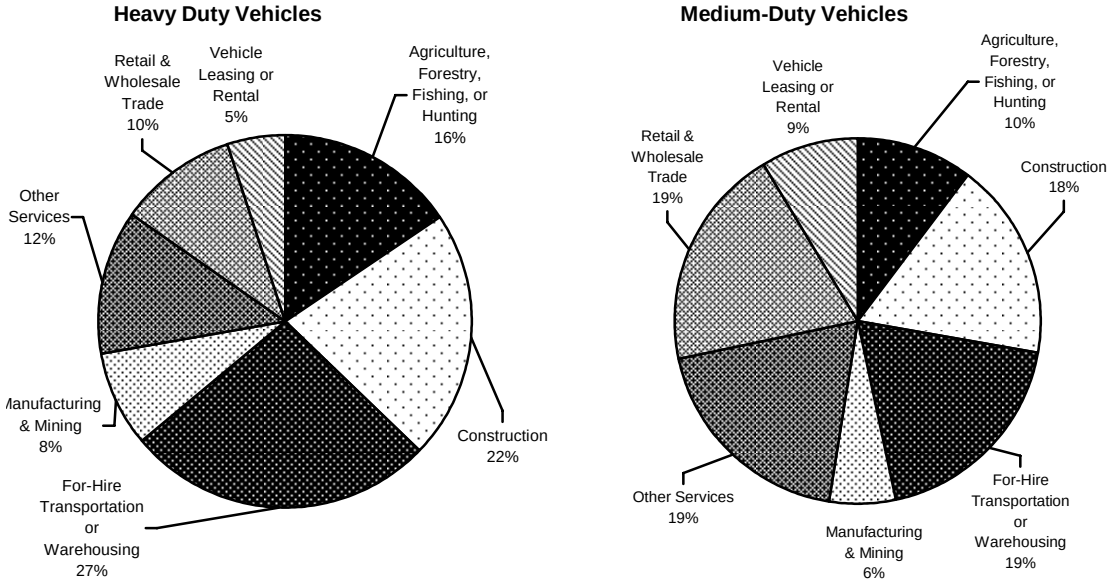
Table 17: Sector Change in Employment Millions

Sector	Business as Usual	Scenario 1	Scenario 2
Agriculture, Forestry, Fishing	0.43	0.43	0.43
Mining	0.03	0.03	0.03
Construction	0.89	0.89	0.89
Utilities	0.06	0.06	0.06
Manufacturing	1.96	1.96	1.96
Transportation and Warehousing	0.48	0.47	0.48
Wholesale and Retail Trade	2.58	2.58	2.58
Arts, Entertainment or Recreation Services	0.26	0.26	0.26
Accommodation and Food Services	1.33	1.33	1.33
Other Services	6.27	6.27	6.27
Grand Total	14.29	14.28	14.29
Agriculture, Forestry, Fishing	-	-0.09%	-0.10%
Mining	-	0.01%	0.00%
Construction	-	-0.14%	-0.15%
Utilities	-	-0.06%	0.02%
Manufacturing	-	-0.06%	-0.05%
Transportation and Warehousing	-	-2.51%	-0.18%
Wholesale and Retail Trade	-	-0.01%	-0.03%
Arts, Entertainment or Recreation Services	-	0.09%	0.03%
Accommodation and Food Services	-	-0.01%	-0.02%
Other Services	-	0.00%	-0.01%
Grand Total	-	-0.11%	-0.04%

2. Diesel Vehicles by Business Type

The impact of the proposed regulation on each business sector will depend on the number and types of vehicles that are impacted and the fleet ages for each business sector. Figure 14 summarizes the National 2002 VIUS data by the percent of the vehicle population to business type for heavy heavy-duty and medium heavy-duty diesel trucks.

Figure 14: Percentage of Vehicle Population by Business Sector from National 2002 VIUS Data



The total in-state heavy heavy-duty and medium heavy-duty inventory vehicle population's were multiplied by the appropriate National 2002 VIUS vehicle percentages for each industry sector type to get the total number of vehicles allocated to each industry by weight class. The in-state annual operating and reporting costs were apportioned to each industry sector based on the annual miles travelled for each industry sector, as per the 2002 VIUS national data. The increased costs by sector are summarized below in Table 18.

Table 18: Increased Costs by Business Sector

Business Sector	Increased Capital Costs (in millions of $2008)	Annual Costs (in millions of $2008)	Total Increased Costs (in millions of $2008)
Accommodation or Food Services	$ 83.5	$ 14.7	$ 98
Agriculture, Forestry, Fishing, or Hunting	$ 197.7	$ 68.0	$ 266
Arts, Entertainment or Recreation Services	$ 14.0	$ 0.9	$ 15
Construction	$ 960.1	$ 100.4	$1,061
For-Hire Transportation or Warehousing	$1,359.0	$ 486.2	$1,845
Manufacturing	$ 124.9	$ 43.3	$ 168
Mining	$ 117.1	$ 20.1	$ 137
Other Services	$ 84.6	$ 48.5	$ 133
Retail & Wholesale Trade	$ 401.3	$ 105.5	$ 507
Utilities	$ 3.9	$ 10.2	$ 14
Vehicle Leasing or Rental	$ 207.9	$ 71.1	$ 279
TOTALS	$3,554.0	$ 968.9	$4,523

This industry sector cost analysis computes the increased capital costs for vehicles registered in-state and does not include costs to out-of-state fleets. However, staff expects the majority of costs to out-of-state fleets to be borne by the transportation and warehousing sector.

Table 19: Type of Vehicle Purchases per 2002 VIUS (National), Diesel Heavy-Duty Vehicles

Business Group	HHDDT Purchases		MHDDT Purchases	
	New Vehicles	Used Vehicles	New Vehicles	Used Vehicles
Accommodation or Food Services	65.3%	34.7%	83.2%	16.8%
Agriculture, Forestry, Fishing, or Hunting	16.6%	83.4%	21.1%	78.9%
Arts, Entertainment or Recreation Services	26.1%	73.9%	24.0%	76.0%
Construction	32.8%	67.2%	38.0%	62.0%
For-Hire Transportation or Warehousing	56.2%	43.8%	67.1%	32.9%
Information Services	56.3%	43.8%	90.1%	9.9%
Manufacturing	61.2%	38.8%	56.9%	43.1%
Mining	37.1%	62.9%	42.8%	57.2%
Other Services	52.5%	47.5%	54.2%	45.8%
Retail Trade	61.1%	38.9%	63.0%	37.0%
Utilities	49.5%	50.5%	70.0%	30.0%
Vehicle Leasing or Rental	86.9%	13.1%	87.8%	12.2%
Waste Mgmt, Landscaping or Admin/Support Services	56.7%	43.3%	47.4%	52.6%
Wholesale Trade	65.7%	34.3%	70.6%	29.4%

C. For-Hire Transportation or Warehousing

ARB fleet survey data submitted by 179 companies with a total of 1,712 vehicles included 6.0% low mileage vehicles that would have delayed replacement requirements and almost no very low mileage vehicles that would be exempt from the cleanup requirements. These fleets had a median fleet age of 11.0 years.

As displayed in Figure 15 and Figure 16, the vast majority of vehicles in this industry sector are purchased new; approximately 62% of the vehicles are less than 7 years old and only 38% of these vehicles remain after the age of 10 years. The average U.S. tractor travels 65,000 miles each year and typically accrues more than 500,000 miles before being replaced.

Figure 15: For-Hire Transport or Warehousing Vehicle Ages per 2002 VIUS (National), Diesel Heavy-Duty Vehicles

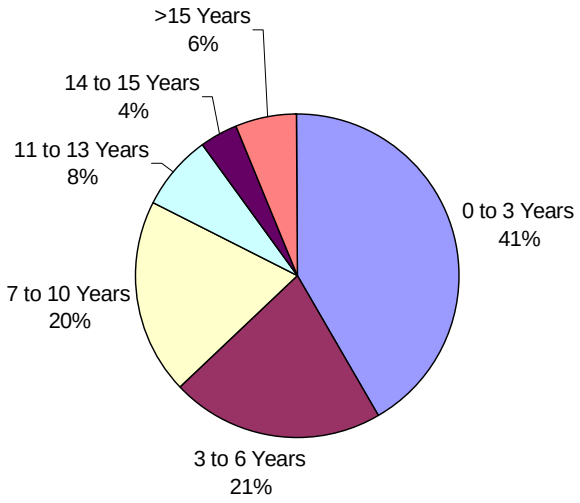
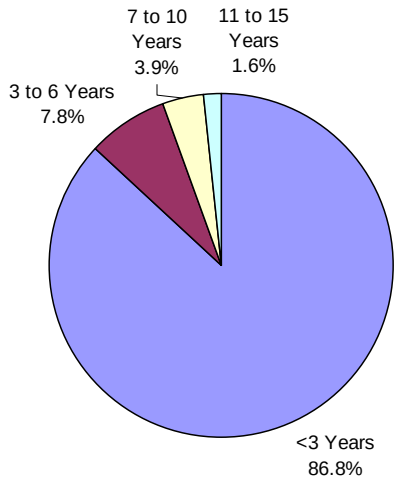


Figure 16: For-Hire Transport or Warehousing Vehicle Age at Purchase per 2002 VIUS (National), Diesel Heavy-Duty Vehicles (>15 Years is Unknown)



1. Small Fleet Case Study

A California company has 3 flatbed tractor and trailer combinations for hauling various goods. The oldest vehicle is a 1995 model year which travels about 15,000 miles per year. A 2001 and a 2000 model year vehicle both travel about 95,000 miles per year, and over half of these miles are in California. The company has 1 employee, annual revenue of between $250,000 to $500,000 and assets valued at about $2 million. On average, this company would replace a vehicle every 6 years with a new to 3 year old vehicle. Staff modeled that replacement would be with a 1 year old vehicle.

The proposed regulation would require replacing two of the vehicles earlier than normal. The 1995 model year vehicle would get replaced as normal with a 2010 model year vehicle in the year 2011. The 2000 model year vehicle would get replaced 4 years earlier than normal in 2013 instead of 2017. And the 2001 model year vehicle would be replaced 8 years earlier than normal in 2015 instead of 2023.

For this company, staff estimates the increased costs to comply with the proposed regulation would be about $28,000 above what would normally be spent for vehicle replacements from 2010 to 2025 ($2008). This compares to about $157,000 that would normally be spent for capital upgrades over this time period. Annual revenues for this company estimated at $375,000 are cumulatively projected to be $4.6 million in 2008 equivalent dollars over the same time period. To offset the increased capital costs of these regulations, this fleet would need to increase revenue by about 0.6 percent. To substantially lower the upfront capital investment, the fleet could have purchased a used 3 to 5 year old vehicle in 2015 instead of a new vehicle. This would lower the capital investment considerably. In this example the fleet owner would have fully met the 2023 goals of the regulation 8 years early and would have no additional requirements.

2. Fuel Transport Case Study

A fuel company owns 12 vehicles with an average fleet age of 4.6 years and annual revenue of approximately $15,000,000. There are 2 heavy heavy-duty Tank Trucks, 6 heavy heavy-duty Tractors, and 4 medium heavy-duty Tank Trucks with 73,000 average miles per truck. The company reported a total of 26 trucks and the remaining 14 vehicles are outside of the scope of the proposed regulation.

Because this fleet typically replaces its vehicles within 10 years, it would likely accelerate their vehicle replacements by a few years to avoid filter retrofits. For this fleet, they would replace most vehicles as normal, but would replace the vehicles that would normally be replaced in 2014 to 2016 2 to 3 years early. There would then be no replacements required until 2021; however, starting in 2017, the oldest vehicle in the fleet would be 10 years old and the company would return to a normal replacement cycle of replacing 10 year old vehicles. The fleet would be able to continue business as usual because it would have all 2010 engines in its fleet before the regulation would require it. Staff estimates the increased costs to comply with the proposed regulation would be about $26,400 in 2008 equivalent dollars over the calendar years of 2010-2025. To offset the increased capital costs, this fleet would need to increase revenue by about 0.014 percent.

3. General Freight Transport Case Study

A general freight trucking company owns 60 vehicles with an average fleet age of 13.4 years. All the vehicles are heavy heavy-duty Tractors with an average of 85,000 miles per vehicle. Three of the vehicles have low mileage of less than 7500 and thus have delayed replacement requirements.

For this company, staff estimates the increased costs to comply with the proposed regulation would be about $1.52 million in 2008 equivalent dollars over the calendar years of 2010-2025.The annual revenues of this company were not provided; however, gross revenues of $1.50 per mile is not unusual for a general freight company. To offset the increased capital costs of these regulations, this fleet would need to increase revenue by about $0.014 per mile or about 0.1 percent, during 2010 to 2025.

4. Motor Coach Case Study

A California bus company comprised of 138 diesel buses with an average fleet age of 6.4 years. This company operates a range of bus types including small shuttle buses and motor coaches with an average of 31,000 miles per bus. The shuttle buses are primarily operated locally and the motor coaches are used for both local trips and longer trips. On average, this company would spend about $1.7 million annually for normal replacements of 11 to 12 vehicles.

For this analysis, staff estimated that shuttle vehicles cost about $70,000 when new, and that new motor coaches cost about $400,000 when new. This large disparity in cost is important in considering compliance options. For this company, staff estimates the increased costs to comply with the proposed regulation would be about $0.9 million in

2008 equivalent dollars over the calendar years of 2010-2025.Annual revenue for this company is approximately $9.8 million which is cumulatively projected to be about $119 million in 2008 equivalent dollars over the same time period. To offset the increased capital costs of these regulations, this fleet would need to increase revenue by about 0.8 percent during 2010 to 2025.

5. Refrigerated Transport Case Study

As a case study, staff analyzed the economic impact of the proposed regulations and the existing transportation refrigeration unit regulation for a refrigerated transport company that owns 228 tractors and 270 refrigerated trailers used in long haul operations. The average tractor age was 7 years and the average trailer age was about 6 years old. This particular company normally purchases refrigerated trailers new and purchases a range of new-to-3 year old trucks.

For this company, staff estimates the increased costs to comply with the In-Use Heavy-Duty Vehicle proposed regulation would be about $1.5 million in 2008 equivalent dollars over the calendar years of 2010-2025. Annual revenues for this company are approximately $47.8 million, which are cumulatively projected to be $583 million in 2008 equivalent dollars over the same time period. To offset the increased capital costs of the proposed regulations, this fleet would need to increase revenue by about 0.25 percent, or $0.0031 per mile, during 2010 to 2025.

This company would also be subject to the transport refrigeration unit (TRU) regulation. Staff estimate increased TRU costs of $2.1 million in 2008 equivalent dollars would be incurred over 2008-2018 to meet the TRU requirements. Thus, the increased costs of both rules would be approximately $3.6 million in 2008 equivalent dollars over the calendar years of 2010-2025. To offset the increased capital costs of these combined regulations, this fleet would need to increase revenue by about 0.61 percent, or $0.0074 per mile, during 2010 to 2025.

D. Construction

ARB fleet survey data submitted by 50 companies with a total of 1,116 vehicles included 21.6% below the mileage thresholds that would not be subject to replacement prior to 2020 requirements and 9.5% very low mileage vehicles that would be exempt from the performance requirements. These fleets had an average fleet age of 16 years, and the median vehicle age was 13.0 years.

As seen in Figure 17 and Figure 18, while the majority (52.6%) of these vehicles are purchased new, only 29% of the vehicles are less than 7 years and 30% are over 15 years indicating many of these vehicles are kept in fleets for many years.

Figure 17: Construction Vehicle Ages per 2002 VIUS (National), Diesel Heavy-Duty Vehicles

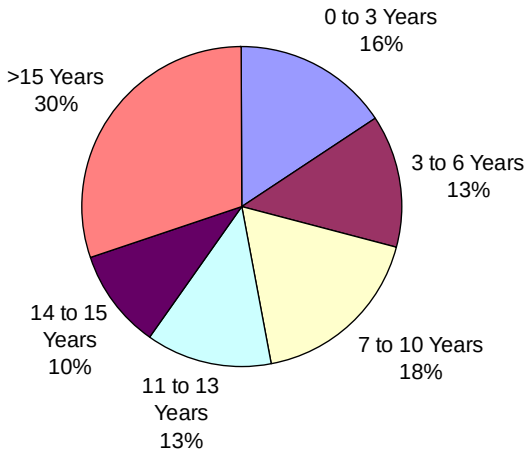
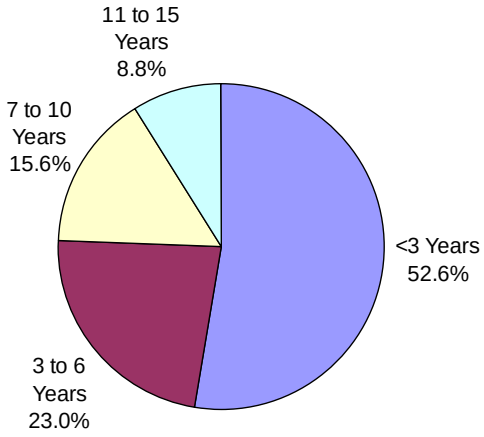


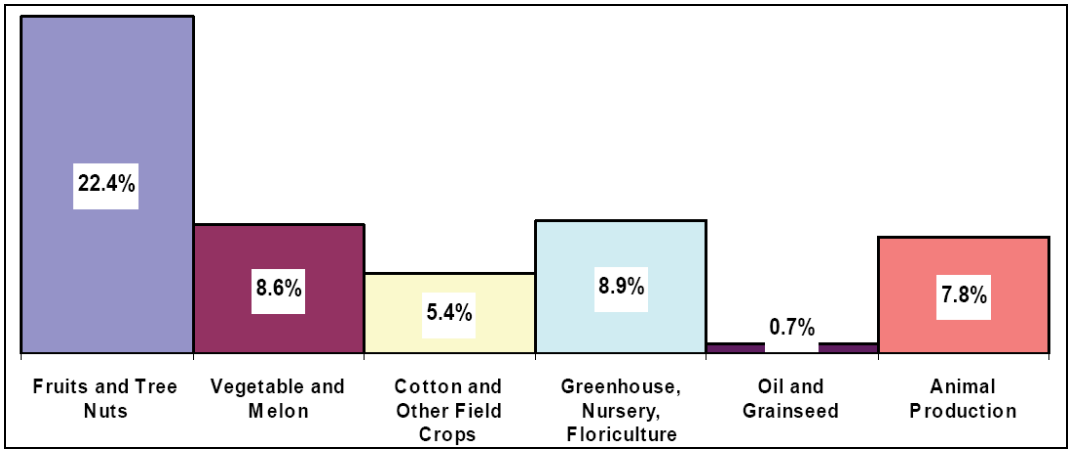
Figure 18: Construction Vehicle Age at Purchase per 2002 VIUS (National), Diesel Heavy-Duty Vehicles (>15 Years is Unknown)



E. Agricultural Sector

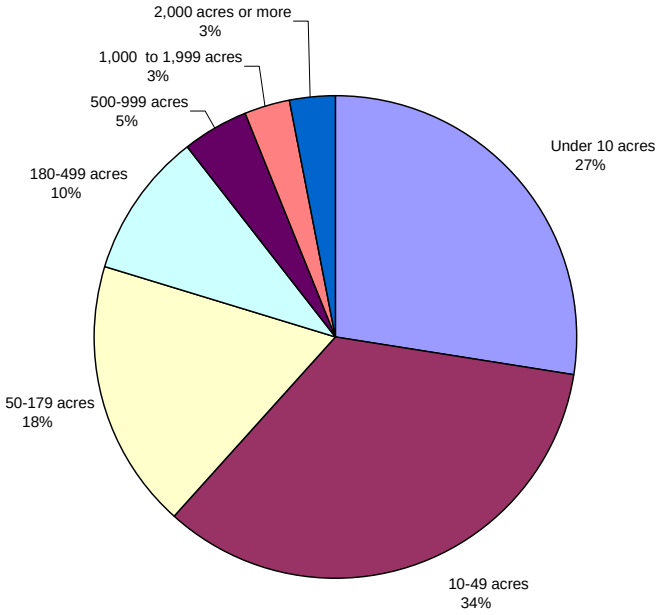
California is home to the biggest agricultural economy in the United States. California's farmers and ranchers have made this state the leader in agricultural production for more than 50 years. The agriculture sector includes agriculture production crops, agriculture production livestock and animal specialties, agricultural services, forestry, fishing, hunting and trapping. Figure 19 shows the agricultural employment percentages in California by major crop/activity based on 2007 annual averages.

Figure 19: Percentage of Agricultural Employment in California by Selected Major Crop/Activity (2007 Annual Average Data)



Per the 2002 U.S. Census, California farm land covers 28 million acres with a harvested cropland of 8.5 million acres. The average size of a California farm is 346 acres. As seen in Figure 20, about 61 percent of California farms have less than 50 acres. In 2000, California farms made up 4% of the nations farm total. California has some of the most agriculturally productive counties in the nation. Eight of the nation's top 10 producing counties are in California. Fresno is the leading agricultural county in the nation. As reported August 28, 2008 by the USDA's National Agricultural Statistics Service and Economic Research Service, California agriculture saw a 15 percent gain in the sales value of its products in 2007. The state's 75,000 farms and ranches received a record $36.6 billion for their output in 2007, a 15 percent gain from 2006.

Figure 20: California Number of Farms by Size Group (2002 U.S. Census)



Per the statewide emission inventory database, there are about 22,000 agricultural trucks statewide, of which about 55% are heavy-heavy duty trucks (>33,000 pounds) and 45% are medium-heavy duty trucks (14,000-33,000 pounds). As seen in Figure 21 and Figure 22, while approximately one-third of these vehicles are purchased new, only 17 percent of the vehicles are less than 7 years and 41% are over 15 years indicating many of these vehicles are kept in fleets for the life of the vehicle.

Figure 21: Agriculture, Forestry, Fishing, or Hunting Vehicle Ages per 2002 VIUS (National), Diesel Heavy-Duty Vehicles

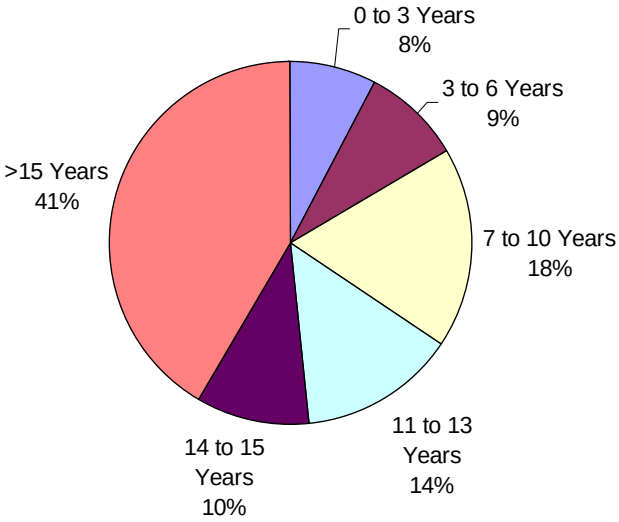
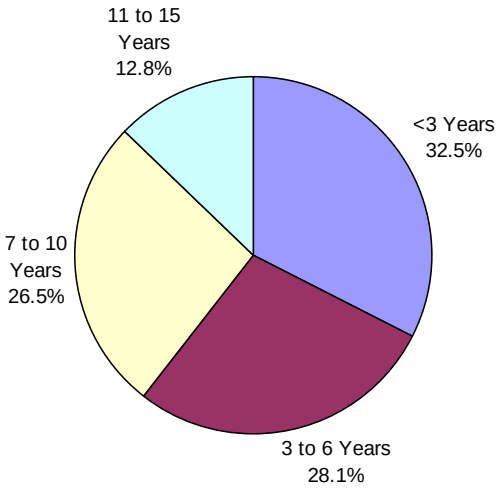
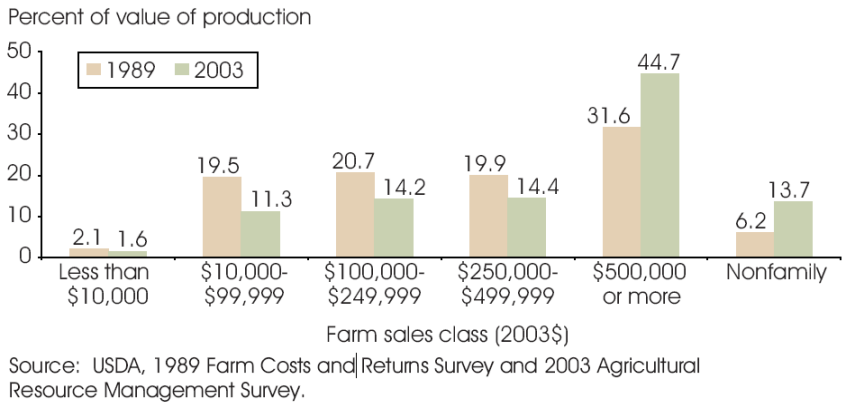


Figure 22: Agriculture, Forestry, Fishing, or Hunting Vehicle Age at Purchase per 2002 VIUS (National), Diesel Heavy-Duty Vehicles (>15 Years is Unknown)



Agricultural production and farmland trends over time are displayed in Figure 23. Per the USDA, between 1989 and 2003 the national trend demonstrates a shift in agricultural production to larger farms.

Figure 23: Agricultural Production is Shifting to Larger Farms



1. Almond Farm Case Study

Staff did not receive financial information from any farms or ranches. Therefore, to evaluate specific costs, staff used an economic study from the University of California (UC), Davis of a typical almond orchard (UC, 2008). The example almond orchard had typical gross returns of $4,200 per acre, with net revenues (excluding tractor costs) of $213 per acre. The study indicates that a single truck tractor would be needed for an orchard of approximately 125 acres.

Survey data from an Almond Board survey suggests that a typical farm truck would be 16 years old (a 1992 model year) truck and would be driven about 13,000 miles. If this truck would be normally replaced when it was 25 years old it would need to be replaced in 2017. Under the agricultural provisions of the proposed regulation, this vehicle would be required to be replaced by January 1, 2017. The ARB cost model would reflect that this type of fleet would normally replace the vehicle with a 10 year old vehicle. Therefore, if the farmer chose to purchase a truck with a 2010 model year engine, staff estimates that the farmer would need to pay about $12,000 more than normal to replace this vehicle.

For a farm of this size, the total amount of almonds harvested from 2010 to 2025 would be about 7,350,000 pounds, valued at $6,400,000 in $2008, yielding a net income of $325,000. The increased capital costs to comply with the proposed regulation represents about 0.025 percent of the gross revenue received. To offset the increased capital costs, of replacing this vehicle, the farmer would need to increase prices by $0.001 per pound of almonds. If the farmer operated the truck less than 10,000 miles, the truck would not be required to be replaced until 2022.

F. Retail/Wholesale

As seen in Figure 24 and Figure 25, approximately three quarters of the vehicles used in the retail or wholesale markets are purchased new and only a 9 percent are over 15 years old.

Figure 24: Retail/Wholesale Trade Vehicle Ages per 2002 VIUS (National), Diesel Heavy-Duty Vehicles

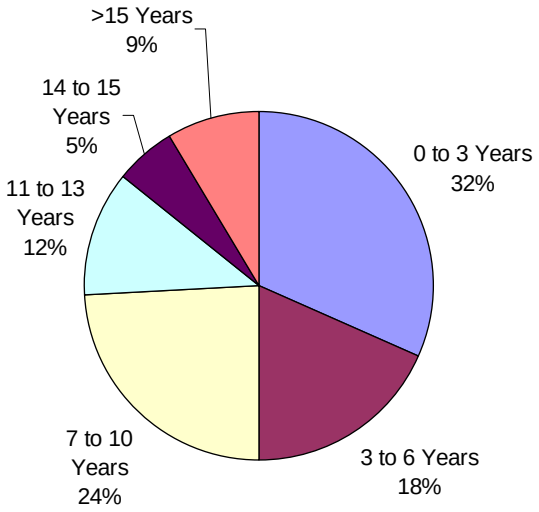
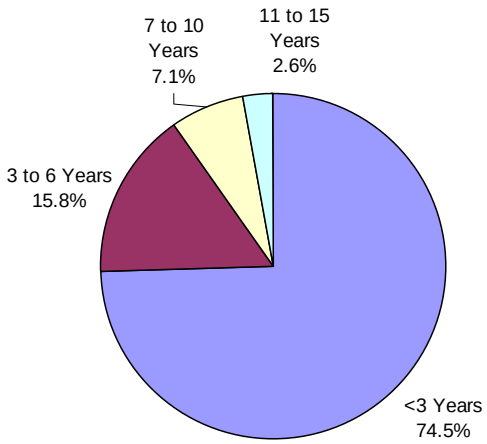


Figure 25: Retail/Wholesale Trade Vehicle Age at Purchase per 2002 VIUS (National), Diesel Heavy-Duty Vehicles (>15 Years is Unknown)



1. Produce Company Case Study

A produce company owns 7 vehicles with an average fleet age of 4.4 years. There are 3 heavy heavy-duty vehicles with annual mileage of 15,000 each and 4 medium heavy-duty vehicles with annual mileage of 25,000 each. The company reported a total of 10 vehicles for their fleet with 3 vehicles not subject to the rule requirement.

If this company were to install PM retrofits and do the minimum replacements required. For this fleet, the proposed regulation would require the installation of PM filters on five of the fleet vehicles. Staff estimates the increased costs to comply with the proposed regulation would be about $44,900 in 2008 equivalent dollars from 2010 to 2025. Annual revenues for this company are approximately $15 million which are cumulatively projected to be $183 million in 2008 equivalent dollars over the same time period. To offset the increased capital costs of these regulations, this fleet would need to increase revenue by about 0.025 percent from 2010 to 2025.

Alternatively, the company could also choose to make early vehicle replacements to avoid these filter retrofits. This would result in increased investments of about $158,000 ($2008) in the years 2010-2013 but no additional replacement would be required until 2021. Because of the early replacements, the fleet would not make any replacements until 2018 when the oldest vehicle would be of an age that would normally be replaced. Starting in 2018, the company would return to a normal replacement cycle. The increased costs to comply using this option would be approximately $18,000 in 2008 equivalent dollars over the calendar years of 2010-2025 compared to normal capital expenditures.

2. Beverage Company Case Stud

A company that distributes beverage products has 687 vehicles with an average fleet age of 5.8 years. The fleet includes 213 heavy heavy-duty tractors, 8 medium heavy-

duty dry vans and 466 medium heavy-duty beverage trucks with approximately half of the vehicles in California. The fleet includes 41 vehicles with less than 1000 annual miles which would be exempt from the Truck and Bus rule requirements.

For this company, staff estimates the increased costs to comply with the proposed regulation would be about $2.1 million in 2008 equivalent dollars over the calendar years of 2010-2025. This compares to about $52 million that would normally be spent for capital upgrades on diesel heavy-duty vehicles over this time period. The annual revenues of this company were not provided. To offset the increased capital costs of these regulations, this fleet would need to increase revenue by about $0.0028 per mile, during 2010 to 2025.

G. Other Services

The Other Services (except Public Administration) sector comprises establishments engaged in providing services not specifically provided for elsewhere in the classification system. Establishments in this sector are primarily engaged in activities such as equipment and machinery repairing, promoting or administering religious activities, grant making, advocacy, and providing dry-cleaning and laundry services, personal care services, death care services, pet care services, photofinishing services, temporary parking services, and dating services.

As seen in Figure 26 and Figure 27, the majority (65%) of Other Service vehicles are purchased new and only 10% of the vehicles are over 15 years.

Figure 26: Other Services Vehicle Ages per 2002 VIUS (National), Diesel Heavy-Duty Vehicles

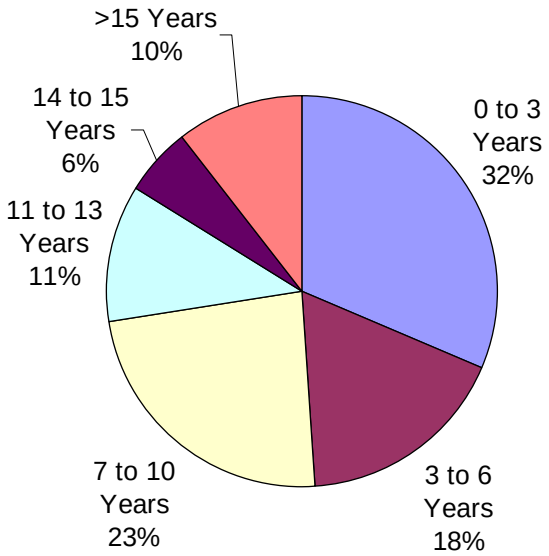
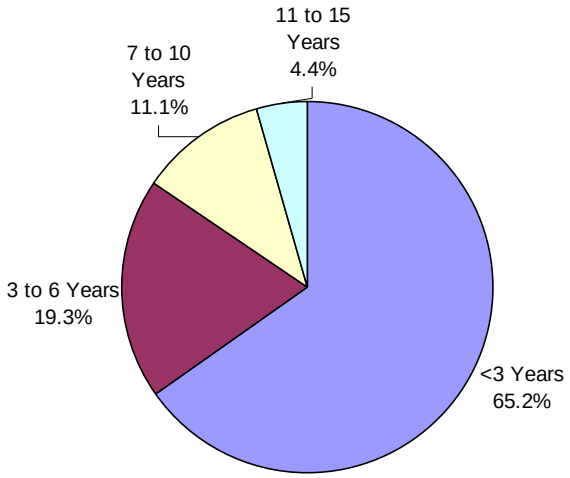


Figure 27: Other Services Vehicle Age at Purchase per 2002 VIUS (National), Diesel Heavy-Duty Vehicles (>15 Years is Unknown)



1. Street Sweeper Case Study

A sweeper company has 22 vehicles with an average age of 14 years and has revenue of $1.6 million per year with a 3 percent growth rate. The fleet includes 15 active mainline medium heavy-duty street sweepers and 7 vehicles either for low use or awaiting sale. The fleet's active mainline vehicles average annual mileage is 10,000 with all miles instate. The increased capital costs would be approximately $994,000 in 2008 equivalent dollars and the revenue received would be approximately $25,700,000 in 2008 equivalent dollars. The increased capital costs represent 3.8% of the revenue received over this time period absent existing regulations. However, because this sweeper fleet has several sweepers with uncontrolled auxiliary engines they would not be able to operate in 2010 and could only be replaced with new ones because they are currently subject to the portable engine BACT requirements. Staff's proposal to remove the auxiliary engine from the scope of the portable equipment ATCM and to treat the auxiliary engines at the same time as the main drive engine in the current proposal, the net cost of the current proposal would be lower than the status quo.

2. Towing Case Study

A towing company has 5 vehicles with an average fleet age of 18.2 years and receives annual revenue of approximately $1,000,000. The fleet includes 1 heavy heavy-duty tractor, 3 heavy heavy-duty tow trucks and 1 medium heavy-duty tow trucks. The fleet's total annual mileage is 175,000 with 155,000 miles specific to California. The fleet has 1 low mileage vehicle which would have delayed rule requirements. On average, this company would replace a vehicle every 5 to 6 years with a used vehicle of 6 to 10 years. Staff modeled that replacement would be with an 8 year old vehicle.

For this company, staff estimates the increased costs to comply with the proposed regulation would be about $429,000 in 2008 equivalent dollars over the calendar years of 2010-2025. This compares to about $135,500 that would normally be spent for capital upgrades over this time period. Annual revenues for this company are approximately $1 million which are cumulatively projected to be $12.2 million in 2008 equivalent dollars over the same time period. To offset the increased capital costs of these regulations, this fleet would need to increase revenue by about 3.5 percent during 2010 to 2025.

Table 20: Medium Heavy-Duty Vehicle Price Data

MHD Vehicle Type	Rear Axle	Transfer Body ($)	Age in 2008																
			0	1	2	3	4	5	6	7	8	9	10	15	20	25	30	35	40
Beverage	Single		$55,205	$46,492	$39,040	$32,712	$27,380	$22,926	$19,241	$16,226	$13,787	$11,842	$10,315	$6,781	$6,129	$5,477	$4,163	$2,663	$1,501
Bucket/Boom	Single		$52,071	$48,687	$45,518	$42,553	$39,785	$37,207	$34,809	$32,583	$30,521	$28,615	$26,856	$19,985	$15,560	$12,548	$9,915	$6,628	$1,653
Bus/Shuttle	Single		$71,850	$54,703	$40,872	$29,945	$21,534	$15,274	$10,821	$8,141	$7,293	$6,618	$6,068	$4,344	$3,427	$2,852	$2,235	$1,617	$1,000
Bus (Motor Coach)	Single		$99,081	$83,136	$69,485	$57,870	$48,052	$39,814	$32,953	$27,287	$22,649	$18,887	$15,866	$8,085	$5,813	$4,490	$3,252	$2,529	$1,649
Cab & Chassis (Cabover)	Single		$40,972	$35,101	$30,075	$25,804	$22,206	$19,197	$16,701	$14,645	$12,962	$11,590	$10,470	$7,127	$5,534	$4,651	$3,767	$2,884	$2,000
Cab & Chassis	Single		$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Car Carrier	Single		$66,424	$57,786	$50,344	$43,959	$38,508	$33,874	$29,951	$26,643	$23,862	$21,530	$19,575	$13,487	$10,112	$7,224	$4,591	$2,701	$1,488
Chipper	Single	$10,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Crane	Single		$95,284	$86,348	$77,713	$69,498	$61,800	$54,689	$48,216	$42,413	$37,293	$32,852	$29,074	$18,741	$15,902	$13,177	$10,452	$7,727	$5,002
Dump	Single		$55,561	$49,636	$44,323	$39,584	$35,383	$31,683	$28,445	$25,633	$23,210	$21,138	$19,381	$14,116	$11,919	$9,950	$7,068	$4,389	$3,000
Expeditor/Hot Shot	Single	$6,000	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Farm/Grain	Single	$8,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Flatbed	Single		$48,792	$42,264	$36,681	$31,933	$27,917	$24,539	$21,713	$19,362	$17,415	$15,807	$14,482	$10,535	$8,408	$6,591	$5,346	$4,729	$4,074
Flatbed: Dump	Single		$53,143	$47,313	$42,108	$37,473	$33,357	$29,712	$26,491	$23,654	$21,160	$18,973	$17,061	$10,613	$7,399	$5,763	$4,842	$3,921	$3,000
Fuel/Lube	Single		$84,104	$75,392	$67,746	$61,038	$55,155	$49,992	$45,455	$41,461	$37,933	$34,805	$32,019	$21,652	$14,762	$10,055	$7,493	$6,719	$5,484
Garbage: Packer	Same	$24,000	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Garbage: Roll-off		$11,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Grapple		$18,000	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Hooklift	Single	$8,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Landscape	Single		$50,056	$43,888	$38,641	$34,205	$30,476	$27,361	$24,773	$22,634	$20,872	$19,422	$18,227	$14,483	$11,748	$8,454	$4,873	$2,140	$1,280
Logging	Tandem		$200,744	$162,704	$132,920	$109,845	$92,155	$78,722	$68,598	$60,997	$55,272	$50,902	$47,474	$35,827	$25,964	$17,956	$13,636	$9,316	$4,996
Mixer/Concrete	Same		$160,796	$145,511	$130,973	$117,235	$104,339	$92,314	$81,179	$70,941	$61,598	$53,140	$45,548	$19,439	$8,792	$6,634	$6,578	$5,189	$4,000
Service/Utility	Single	$9,000	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Stake	Single		$39,214	$35,236	$31,640	$28,405	$25,511	$22,938	$20,666	$18,673	$16,939	$15,445	$14,170	$10,358	$8,954	$7,466	$5,977	$4,489	$3,000
Tank: General	Single	$9,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Tank: Asphalt	Single	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: Chemical	Single	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: Liq. Fuel	Same	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: LPG	Same	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: Milk	Single	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: Vacuum	Single		$95,088	$80,568	$68,202	$57,740	$48,951	$41,623	$35,562	$30,590	$26,548	$23,291	$20,689	$13,907	$11,272	$8,751	$5,883	$3,383	$736
Tank: Water	Single	$9,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Tow: Roll-back	Single	$9,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Tow: Wrecker	Single		$62,830	$56,319	$50,345	$44,884	$39,911	$35,402	$31,332	$27,676	$24,409	$21,507	$18,945	$9,335	$6,372	$5,221	$4,071	$2,920	$1,997
Tractor: Cabover w/o Sleeper	Single		$45,893	$40,029	$34,923	$30,501	$26,692	$23,429	$20,651	$18,301	$16,326	$14,677	$13,310	$9,376	$7,693	$6,216	$4,811	$3,406	$2,001
Sleeper	Single		$61,565	$53,654	$46,531	$40,174	$34,559	$29,650	$25,408	$21,790	$18,745	$16,223	$14,169	$8,983	$7,595	$5,897	$4,492	$3,247	$2,002
Van: Dry	Single		$52,868	$45,055	$38,506	$33,051	$28,532	$24,806	$21,743	$19,223	$17,143	$15,409	$13,944	$8,755	$5,672	$4,754	$3,836	$2,918	$2,000
Van: Moving	Single		$60,621	$51,703	$43,969	$37,314	$31,636	$26,838	$22,828	$19,518	$16,824	$14,666	$12,971	$9,116	$8,135	$6,351	$4,567	$2,783	$999
Van: Reefer	Single		$74,028	$58,819	$47,295	$38,667	$32,267	$27,537	$24,021	$21,355	$19,257	$17,521	$16,003	$9,985	$7,698	$6,148	$4,598	$3,048	$1,498
Winch	Single		$90,712	$82,206	$74,232	$66,787	$59,863	$53,450	$47,537	$42,109	$37,151	$32,644	$28,570	$13,938	$6,715	$3,955	$3,205	$3,106	$2,800
Yard Spotter (Goat)	Single		$58,484	$52,833	$48,465	$44,869	$41,678	$38,650	$35,651	$32,633	$29,613	$26,661	$23,873	$15,473	$13,378	$11,283	$9,188	$7,093	$4,998
Tractor: Cabover w/o Sleeper	Single		$45,893	$40,029	$34,923	$30,501	$26,692	$23,429	$20,651	$18,301	$16,326	$14,677	$13,310	$9,376	$7,693	$6,216	$4,811	$3,406	$2,001
Tractor: Conv w/o Sleeper	Single		$61,565	$53,654	$46,531	$40,174	$34,559	$29,650	$25,408	$21,790	$18,745	$16,223	$14,169	$8,983	$7,595	$5,897	$4,492	$3,247	$2,002
Tank: LPG	Same	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: Milk	Single	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: Vacuum	Single		$95,088	$80,568	$68,202	$57,740	$48,951	$41,623	$35,562	$30,590	$26,548	$23,291	$20,689	$13,907	$11,272	$8,751	$5,883	$3,383	$736
Tank: Water	Single	$9,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Tow: Roll-back	Single	$9,500	$52,409	$43,888	$36,822	$31,026	$26,326	$22,564	$19,591	$17,270	$15,477	$14,102	$13,045	$9,896	$6,781	$4,774	$3,849	$2,924	$1,999
Tow: Wrecker	Single		$62,830	$56,319	$50,345	$44,884	$39,911	$35,402	$31,332	$27,676	$24,409	$21,507	$18,945	$9,335	$6,372	$5,221	$4,071	$2,920	$1,997
Tractor: Cabover w/o Sleeper	Single		$45,893	$40,029	$34,923	$30,501	$26,692	$23,429	$20,651	$18,301	$16,326	$14,677	$13,310	$9,376	$7,693	$6,216	$4,811	$3,406	$2,001
Sleeper	Single		$61,565	$53,654	$46,531	$40,174	$34,559	$29,650	$25,408	$21,790	$18,745	$16,223	$14,169	$8,983	$7,595	$5,897	$4,492	$3,247	$2,002
Van: Dry	Single		$52,868	$45,055	$38,506	$33,051	$28,532	$24,806	$21,743	$19,223	$17,143	$15,409	$13,944	$8,755	$5,672	$4,754	$3,836	$2,918	$2,000
Van: Moving	Single		$60,621	$51,703	$43,969	$37,314	$31,636	$26,838	$22,828	$19,518	$16,824	$14,666	$12,971	$9,116	$8,135	$6,351	$4,567	$2,783	$999
Van: Reefer	Single		$74,028	$58,819	$47,295	$38,667	$32,267	$27,537	$24,021	$21,355	$19,257	$17,521	$16,003	$9,985	$7,698	$6,148	$4,598	$3,048	$1,498
Winch	Single		$90,712	$82,206	$74,232	$66,787	$59,863	$53,450	$47,537	$42,109	$37,151	$32,644	$28,570	$13,938	$6,715	$3,955	$3,205	$3,106	$2,800
Yard Spotter (Goat)	Single		$58,484	$52,833	$48,465	$44,869	$41,678	$38,650	$35,651	$32,633	$29,613	$26,661	$23,873	$15,473	$13,378	$11,283	$9,188	$7,093	$4,998

Table 21: Heavy Heavy-Duty Vehicle Price Data

HHD Vehicle Type	Rear Axle	Transfer Body ($)	Age in 2008																
			0	1	2	3	4	5	6	7	8	9	10	15	20	25	30	35	40
Beverage	Single		$75,611	$61,861	$50,456	$41,113	$33,565	$27,565	$22,881	$19,301	$16,628	$14,683	$13,307	$10,539	$7,895	$5,619	$4,307	$2,994	$1,682
Bucket/Boom	Tandem	$25,000	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Bus (Motor Coach)	Tandem		$449,954	$404,277	$360,925	$320,078	$281,879	$246,436	$213,822	$184,072	$157,187	$133,131	$111,832	$41,687	$18,633	$14,475	$10,317	$6,159	$2,001
Cab & Chassis	Single		$59,836	$51,269	$43,898	$37,589	$32,218	$27,670	$23,840	$20,634	$17,963	$15,750	$13,923	$8,621	$6,250	$4,520	$3,127	$2,515	$2,640
Cab & Chassis	Tandem		$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Cab & Chassis Dual Frame	Tandem		$105,738	$90,581	$77,693	$66,800	$57,649	$50,010	$43,674	$38,451	$34,171	$30,679	$27,841	$19,764	$15,742	$12,201	$9,069	$6,974	$5,136
Car Carrier	Tandem		$261,761	$228,860	$199,472	$173,394	$150,421	$130,351	$112,980	$98,103	$85,517	$75,018	$66,403	$44,448	$38,338	$32,228	$26,118	$20,008	$13,898
Chipper	Single	$10,500	$59,836	$51,269	$43,898	$37,589	$32,218	$27,670	$23,840	$20,634	$17,963	$15,750	$13,923	$8,621	$6,250	$4,520	$3,127	$2,515	$2,640
Cotton Module	Tandem	$10,500	$105,738	$90,581	$77,693	$66,800	$57,649	$50,010	$43,674	$38,451	$34,171	$30,679	$27,841	$19,764	$15,742	$12,201	$9,069	$6,974	$5,136
Crane (Boom)	Same		$152,706	$129,256	$109,978	$94,253	$81,524	$71,294	$63,121	$56,616	$51,440	$47,303	$43,956	$33,087	$24,646	$18,559	$16,142	$13,350	$10,558
Drill Rig	Tandem		$756,478	$652,807	$565,406	$492,256	$431,507	$381,463	$340,583	$307,469	$280,861	$259,631	$242,777	$196,921	$170,102	$137,416	$102,037	$74,408	$51,422
Dump	Tandem	$9,250	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Dump: Transfer	Single		$208,875	$180,973	$157,445	$137,712	$121,248	$107,578	$96,272	$86,948	$79,265	$72,923	$67,661	$50,749	$39,311	$29,234	$22,401	$19,262	$14,000
Expeditor/Hot Shot	Tandem		$114,960	$88,866	$72,526	$61,322	$52,460	$44,494	$36,917	$29,803	$23,518	$18,478	$14,980	$11,473	$9,678	$7,883	$6,088	$4,293	$2,498
Farm/Grain	Same		$113,235	$97,606	$84,512	$73,630	$64,662	$57,339	$51,415	$46,669	$42,903	$39,939	$37,622	$31,543	$27,867	$22,990	$17,262	$11,945	$6,627
Flatbed	Tandem		$79,035	$69,876	$61,783	$54,662	$48,426	$42,989	$38,271	$34,195	$30,689	$27,684	$25,118	$16,904	$12,423	$8,344	$5,517	$3,757	$1,997
Flatbed: Dump	Tandem		$80,422	$70,173	$61,191	$53,369	$46,602	$40,790	$35,838	$31,656	$28,158	$25,262	$22,892	$16,568	$14,534	$11,399	$8,264	$5,129	$1,994
Fuel/Lube	Single	$25,500	$59,836	$51,269	$43,898	$37,589	$32,218	$27,670	$23,840	$20,634	$17,963	$15,750	$13,923	$8,621	$6,250	$4,520	$3,127	$2,515	$2,640
Fuel/Lube	Tandem	$25,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Garbage: Packer	Tandem	$24,000	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Garbage: Roll-off	Tandem	$11,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Grapple	Tandem	$18,000	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Hooklift	Tandem	$8,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Logging	Tandem		$200,744	$162,704	$132,920	$109,845	$92,155	$78,722	$68,598	$60,997	$55,272	$50,902	$47,474	$35,827	$25,964	$17,956	$13,636	$9,316	$4,996
Mixer/Concrete	Tandem		$160,796	$145,511	$130,973	$117,235	$104,339	$92,314	$81,179	$70,941	$61,598	$53,140	$45,548	$19,439	$8,792	$6,634	$6,578	$5,189	$4,000
Service/Utility	Single	$9,000	$59,836	$51,269	$43,898	$37,589	$32,218	$27,670	$23,840	$20,634	$17,963	$15,750	$13,923	$8,621	$6,250	$4,520	$3,127	$2,515	$2,640
Stake	Single		$106,567	$85,350	$67,970	$53,902	$42,672	$33,849	$27,045	$21,913	$18,146	$15,472	$13,654	$11,046	$9,836	$8,626	$7,416	$6,206	$4,996
Sweeper	Single		$207,024	$180,509	$157,184	$136,727	$118,842	$103,254	$89,707	$77,969	$67,827	$59,085	$51,567	$27,283	$15,804	$9,840	$6,633	$5,185	$3,480
Tank: General	Tandem	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tank: Asphalt	Same		$108,330	$96,090	$85,561	$76,531	$68,806	$62,210	$56,582	$51,778	$47,668	$44,137	$41,085	$30,293	$22,710	$16,427	$12,298	$8,948	$5,598
Tank: Chemical	Same		$108,330	$96,090	$85,561	$76,531	$68,806	$62,210	$56,582	$51,778	$47,668	$44,137	$41,085	$30,293	$22,710	$16,427	$12,298	$8,948	$5,598
Tank: Liq. Fuel	Same		$108,330	$96,090	$85,561	$76,531	$68,806	$62,210	$56,582	$51,778	$47,668	$44,137	$41,085	$30,293	$22,710	$16,427	$12,298	$8,948	$5,598
Tank: LPG	Same		$108,330	$96,090	$85,561	$76,531	$68,806	$62,210	$56,582	$51,778	$47,668	$44,137	$41,085	$30,293	$22,710	$16,427	$12,298	$8,948	$5,598
Tank: Milk	Tandem		$108,330	$96,090	$85,561	$76,531	$68,806	$62,210	$56,582	$51,778	$47,668	$44,137	$41,085	$30,293	$22,710	$16,427	$12,298	$8,948	$5,598
Tank: Vacuum	Same		$162,565	$137,737	$117,636	$101,496	$88,633	$78,442	$70,393	$64,027	$58,949	$54,827	$51,385	$38,161	$25,565	$17,483	$12,988	$8,493	$3,998
Tank: Water	Single	$9,500	$59,836	$51,269	$43,898	$37,589	$32,218	$27,670	$23,840	$20,634	$17,963	$15,750	$13,923	$8,621	$6,250	$4,520	$3,127	$2,515	$2,640
Tank: Water	Tandem	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Toter	Same		$140,987	$118,185	$98,844	$82,549	$68,917	$57,599	$48,276	$40,658	$34,486	$29,524	$25,565	$15,122	$10,747	$6,878	$3,641	$2,577	$2,363
Tow: Roll-back	Single	$9,500	$59,836	$51,269	$43,898	$37,589	$32,218	$27,670	$23,840	$20,634	$17,963	$15,750	$13,923	$8,621	$6,250	$4,520	$3,127	$2,515	$2,640
Tow: Roll-back	Tandem	$9,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Tow: Wrecker	Tandem		$300,478	$270,655	$243,293	$218,257	$195,415	$174,638	$155,799	$138,776	$123,449	$109,703	$97,424	$54,347	$33,170	$24,175	$20,422	$18,014	$16,358
Tractor: Cabover w/o Sleeper	Single		$92,201	$77,615	$65,065	$54,362	$45,327	$37,789	$31,582	$26,554	$22,558	$19,456	$17,119	$12,965	$10,644	$8,322	$6,001	$3,679	$1,358
Tractor: Cabover w/o Sleeper	Tandem		$105,151	$88,278	$73,997	$62,035	$52,132	$44,044	$37,539	$32,401	$28,425	$25,422	$23,216	$18,968	$16,275	$13,044	$10,334	$7,624	$4,914
Tractor: Cabover w/ Sleeper	Tandem		$131,961	$101,674	$78,671	$61,516	$48,967	$39,964	$33,617	$29,193	$26,099	$23,873	$22,166	$15,628	$12,128	$9,988	$7,848	$5,708	$3,568
Tractor: Conventional w/ Sleeper	Tandem		$131,961	$101,674	$78,671	$61,516	$48,967	$39,964	$33,617	$29,193	$26,099	$23,873	$22,166	$15,628	$12,128	$9,988	$7,848	$5,708	$3,568
Tractor: Conventional w/o Sleeper	Single		$92,201	$77,615	$65,065	$54,362	$45,327	$37,789	$31,582	$26,554	$22,558	$19,456	$17,119	$12,965	$10,644	$8,322	$6,001	$3,679	$1,358
Tractor: Conventional w/o Sleeper	Tandem		$105,151	$88,278	$73,997	$62,035	$52,132	$44,044	$37,539	$32,401	$28,425	$25,422	$23,216	$18,968	$16,275	$13,044	$10,334	$7,624	$4,914
Van: Dry	Single		$54,910	$47,717	$41,364	$35,794	$30,950	$26,774	$23,211	$20,203	$17,692	$15,623	$13,937	$9,273	$7,370	$6,155	$4,940	$3,725	$2,510
Van: Dry	Tandem		$98,469	$85,185	$73,317	$62,783	$53,502	$45,391	$38,368	$32,351	$27,259	$23,009	$19,519	$10,599	$8,907	$7,607	$6,307	$5,007	$3,707
Van: Moving	Single		$75,179	$60,443	$48,520	$39,009	$31,538	$25,766	$21,384	$18,115	$15,711	$13,957	$12,668	$8,920	$7,241	$5,931	$4,621	$3,311	$2,001
Van: Reefer	Same		$78,491	$64,827	$53,746	$44,836	$37,726	$32,090	$27,640	$24,126	$21,335	$19,084	$17,227	$10,562	$5,871	$4,778	$3,685	$2,592	$1,499
Winch	Tandem	$8,500	$96,685	$82,337	$70,285	$60,228	$51,895	$45,038	$39,433	$34,881	$31,202	$28,238	$25,852	$18,928	$14,717	$10,651	$8,813	$6,974	$5,136
Yard Spotter (Goat)	Single		$79,950	$66,817	$56,304	$47,958	$41,382	$36,229	$32,200	$29,038	$26,528	$24,495	$22,796	$16,334	$11,106	$8,908	$7,106	$5,303	$3,501
Two-Engine Crane ($/HP by Yr) (Lattice Boom/All-Terrain/Mounted Hydraulic)	Tandem	0	1	2	4	6	8	10	15	20	25	30	35	40	45	50	55	60	64
		$2,909/hp	$2,690/hp	$2,488/hp	$2,129/hp	$1,821/hp	$1,557/hp	$1,332/hp	$902/hp	$610/hp	$413/hp	$279/hp	$189/hp	$128/hp	$98/hp	$83/hp	$70/hp	$56/hp	$46/hp

Table 22: Sample Individual Company Fleet Costs

Capital Cost Analysis ($2008)

Number of Vehicles: 16
Average Age: 8.3

Year	Normal Turnover # Vehicles	Cost	%	Minimum Actions Required by Regulation: Turnover # Vehicles	Cost	%	Retrofit # Vehicles	Cost	%	Total	Net Difference
Fleet 1454											
2008	0		0.0%	0		0.0%	0		0.0%		
2009	1	$40,101	6.3%	1	$53,655	6.3%	0	$0	0.0%	$53,655	$13,555
2010	1	$49,801	6.3%	1	$50,377	6.3%	1	$10,776	6.3%	$61,152	$11,351
2011	1	$50,022	6.3%	1	$48,492	6.3%	0	$0	0.0%	$48,492	($1,530)
2012	1	$47,392	6.3%	1	$47,105	6.3%	6	$58,642	37.5%	$105,748	$58,356
2013	1	$45,371	6.3%	3	$127,036	18.8%	3	$34,695	18.8%	$161,731	$116,360
2014	1	$42,563	6.3%	0	$0	0.0%	0	$0	0.0%	$0	($42,563)
2015	1	$40,939	6.3%	1	$39,894	6.3%	0	$0	0.0%	$39,894	($1,045)
2016	1	$38,066	6.3%	0	$0	0.0%	0	$0	0.0%	$0	($38,066)
2017	1	$36,253	6.3%	1	$37,542	6.3%	0	$0	0.0%	$37,542	$1,289
2018	1	$35,016	6.3%	1	$34,462	6.3%	0	$0	0.0%	$34,462	($554)
2019	1	$33,681	6.3%	1	$33,477	6.3%	0	$0	0.0%	$33,477	($204)
2020	1	$32,244	6.3%	2	$62,386	12.5%	0	$0	0.0%	$62,386	$30,142
2021	1	$30,248	6.3%	2	$63,971	12.5%	0	$0	0.0%	$63,971	$33,722
2022	1	$29,095	6.3%	3	$86,189	18.8%	0	$0	0.0%	$86,189	$57,095
2023	1	$27,709	6.3%	0	$0	0.0%	0	$0	0.0%	$0	($27,709)
2024	2	$46,018	12.5%	0	$0	0.0%	0	$0	0.0%	$0	($46,018)
2025	1	$24,886	6.3%	0	$0	0.0%	0	$0	0.0%	$0	($24,886)
2026	1	$23,700	6.3%	1	$24,532	6.3%	0	$0	0.0%	$24,532	$831
2027	1	$22,572	6.3%	1	$23,363	6.3%	0	$0	0.0%	$23,363	$791
2028	1	$21,497	6.3%	1	$22,251	6.3%	0	$0	0.0%	$22,251	$754
2029	1	$20,473	6.3%	1	$21,395	6.3%	0	$0	0.0%	$21,395	$921
2030	1	$19,498	6.3%	1	$20,479	6.3%	0	$0	0.0%	$20,479	$981
		$757,145			$796,607			$104,112		$900,719	$143,575

Average Cost/Vehicle *$8,973*

SAMPLE INDIVIDUAL COMPANY FLEET COSTS

Capital Cost Analysis ($2008)

Number of Vehicles: 9
Average Age: 8.4

Year	*Normal Turnover* # Vehicles	Cost	%	*Minimum Actions Required by Regulation* *Turnover* # Vehicles	Cost	%	*Retrofit* # Vehicles	Cost	%	*Total*	*Net Difference*
Fleet 100096											
2008	0		0.0%	0		0.0%	0		0.0%		
2009	1	$80,268	11.1%	1	$85,030	11.1%	0	$0	0.0%	$85,030	$4,762
2010	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2011	1	$76,758	11.1%	1	$81,077	11.1%	0	$0	0.0%	$81,077	$4,319
2012	0	$0	0.0%	0	$0	0.0%	4	$42,649	44.4%	$42,649	$42,649
2013	1	$67,693	11.1%	2	$142,556	22.2%	2	$20,309	22.2%	$162,865	$95,172
2014	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2015	1	$61,986	11.1%	1	$58,562	11.1%	0	$0	0.0%	$58,562	($3,424)
2016	1	$55,347	11.1%	0	$0	0.0%	0	$0	0.0%	$0	($55,347)
2017	0	$0	0.0%	1	$55,584	11.1%	0	$0	0.0%	$55,584	$55,584
2018	1	$50,673	11.1%	0	$0	0.0%	0	$0	0.0%	$0	($50,673)
2019	0	$0	0.0%	1	$51,838	11.1%	0	$0	0.0%	$51,838	$51,838
2020	1	$47,134	11.1%	0	$0	0.0%	0	$0	0.0%	$0	($47,134)
2021	0	$0	0.0%	1	$47,541	11.1%	0	$0	0.0%	$47,541	$47,541
2022	1	$41,301	11.1%	2	$86,585	22.2%	0	$0	0.0%	$86,585	$45,285
2023	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2024	1	$39,957	11.1%	0	$0	0.0%	0	$0	0.0%	$0	($39,957)
2025	1	$37,694	11.1%	0	$0	0.0%	0	$0	0.0%	$0	($37,694)
2026	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2027	1	$34,190	11.1%	1	$36,168	11.1%	0	$0	0.0%	$36,168	$1,979
2028	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2029	1	$31,011	11.1%	1	$32,806	11.1%	0	$0	0.0%	$32,806	$1,795
2030	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
		$624,012			$677,749			$62,958		$740,707	$116,695

Average Cost/Vehicle *$12,966*

SAMPLE INDIVIDUAL COMPANY FLEET COSTS

Capital Cost Analysis ($2008)

Number of Vehicles: 50
Average Age: 10.0

Year	*Normal Turnover* # Vehicles	Cost	%	*Minimum Actions Required by Regulation* *Turnover* # Vehicles	Cost	%	*Retrofit* # Vehicles	Cost	%	*Total*	*Net Difference*
Fleet 100597											
2008	0		0.0%	0		0.0%	0		0.0%		
2009	3	$175,097	6.0%	3	$177,954	6.0%	0	$0	0.0%	$177,954	$2,857
2010	3	$190,469	6.0%	3	$193,190	6.0%	0	$0	0.0%	$193,190	$2,721
2011	2	$118,728	4.0%	2	$120,456	4.0%	0	$0	0.0%	$120,456	$1,728
2012	3	$181,419	6.0%	13	$796,843	26.0%	14	$149,271	28.0%	$946,114	$764,695
2013	3	$175,676	6.0%	11	$647,937	22.0%	10	$101,545	20.0%	$749,482	$573,806
2014	3	$169,844	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($169,844)
2015	2	$109,185	4.0%	5	$273,147	10.0%	0	$0	0.0%	$273,147	$163,962
2016	3	$157,349	6.0%	5	$263,349	10.0%	0	$0	0.0%	$263,349	$106,000
2017	3	$150,470	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($150,470)
2018	3	$143,830	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($143,830)
2019	2	$91,487	4.0%	4	$185,063	8.0%	0	$0	0.0%	$185,063	$93,576
2020	3	$131,411	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($131,411)
2021	3	$125,834	6.0%	3	$126,744	6.0%	0	$0	0.0%	$126,744	$910
2022	3	$120,491	6.0%	9	$329,366	18.0%	0	$0	0.0%	$329,366	$208,876
2023	3	$115,371	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($115,371)
2024	2	$73,643	4.0%	0	$0	0.0%	0	$0	0.0%	$0	($73,643)
2025	3	$105,391	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($105,391)
2026	3	$100,728	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($100,728)
2027	3	$81,967	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($81,967)
2028	2	$58,973	4.0%	0	$0	0.0%	0	$0	0.0%	$0	($58,973)
2029	3	$84,401	6.0%	0	$0	0.0%	0	$0	0.0%	$0	($84,401)
2030	3	$80,236	6.0%	3	$81,261	6.0%	0	$0	0.0%	$81,261	$1,026
		$2,742,000			$3,195,310			$250,816		$3,446,126	$704,126

Average Cost/Vehicle ***$14,083***

SAMPLE INDIVIDUAL COMPANY FLEET COSTS

Capital Cost Analysis ($2008)

Number of Vehicles: 30
Average Age: 13.0

Year	Normal Turnover # Vehicles	Normal Turnover Cost	Normal Turnover %	Minimum Actions Required by Regulation: Turnover # Vehicles	Turnover Cost	Turnover %	Retrofit # Vehicles	Retrofit Cost	Retrofit %	Total	Net Difference
Fleet 246											
2008	0		0.0%	0		0.0%	0		0.0%		
2009	1	$73,998	3.3%	1	$78,760	3.3%	0	$0	0.0%	$78,760	$4,762
2010	2	$140,282	6.7%	2	$149,352	6.7%	3	$35,265	10.0%	$184,617	$44,336
2011	1	$46,028	3.3%	1	$50,347	3.3%	6	$67,172	20.0%	$117,519	$71,491
2012	1	$67,457	3.3%	5	$340,573	16.7%	2	$21,324	6.7%	$361,897	$294,440
2013	1	$76,493	3.3%	7	$400,528	23.3%	2	$20,309	6.7%	$420,837	$344,343
2014	2	$107,435	6.7%	0	$0	0.0%	0	$0	0.0%	$0	($107,435)
2015	1	$52,133	3.3%	2	$82,632	6.7%	0	$0	0.0%	$82,632	$30,498
2016	1	$45,083	3.3%	3	$117,201	10.0%	0	$0	0.0%	$117,201	$72,118
2017	1	$38,329	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($38,329)
2018	2	$92,099	6.7%	0	$0	0.0%	0	$0	0.0%	$0	($92,099)
2019	1	$45,788	3.3%	2	$90,660	6.7%	0	$0	0.0%	$90,660	$44,872
2020	1	$52,656	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($52,656)
2021	1	$30,030	3.3%	4	$124,069	13.3%	0	$0	0.0%	$124,069	$94,039
2022	1	$28,600	3.3%	7	$232,571	23.3%	0	$0	0.0%	$232,571	$203,971
2023	2	$54,144	6.7%	0	$0	0.0%	0	$0	0.0%	$0	($54,144)
2024	1	$25,783	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($25,783)
2025	1	$24,705	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($24,705)
2026	1	$32,541	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($32,541)
2027	2	$53,584	6.7%	0	$0	0.0%	0	$0	0.0%	$0	($53,584)
2028	1	$21,342	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($21,342)
2029	1	$20,325	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($20,325)
2030	1	$19,472	3.3%	0	$0	0.0%	0	$0	0.0%	$0	($19,472)
		$1,148,306			$1,666,692			$144,071		$1,810,763	$662,457

Average Cost/Vehicle *$22,082*

SAMPLE INDIVIDUAL COMPANY FLEET COSTS

Capital Cost Analysis ($2008)

Number of Vehicles: 6
Average Age: 16.0

Year	Normal Turnover # Vehicles	Normal Turnover Cost	Normal Turnover %	Minimum Actions Required by Regulation: Turnover # Vehicles	Turnover Cost	Turnover %	Retrofit # Vehicles	Retrofit Cost	Retrofit %	Total	Net Difference
Fleet 100306											
2008	0		0.0%	0		0.0%	0		0.0%		
2009	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2010	0	$0	0.0%	0	$0	0.0%	2	$22,531	33.3%	$22,531	$22,531
2011	1	$33,568	16.7%	1	$34,432	16.7%	0	$0	0.0%	$34,432	$864
2012	0	$0	0.0%	2	$56,667	33.3%	0	$0	0.0%	$56,667	$56,667
2013	0	$0	0.0%	1	$24,641	16.7%	2	$20,309	33.3%	$44,950	$44,950
2014	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2015	1	$29,528	16.7%	1	$17,033	16.7%	0	$0	0.0%	$17,033	($12,496)
2016	0	$0	0.0%	1	$20,814	16.7%	0	$0	0.0%	$20,814	$20,814
2017	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2018	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2019	0	$0	0.0%	1	$19,531	16.7%	0	$0	0.0%	$19,531	$19,531
2020	1	$23,438	16.7%	1	$22,486	16.7%	0	$0	0.0%	$22,486	($952)
2021	0	$0	0.0%	1	$18,365	16.7%	0	$0	0.0%	$18,365	$18,365
2022	0	$0	0.0%	1	$17,491	16.7%	0	$0	0.0%	$17,491	$17,491
2023	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2024	1	$19,531	16.7%	0	$0	0.0%	0	$0	0.0%	$0	($19,531)
2025	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2026	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2027	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2028	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
2029	1	$15,887	16.7%	0	$0	0.0%	0	$0	0.0%	$0	($15,887)
2030	0	$0	0.0%	0	$0	0.0%	0	$0	0.0%	$0	$0
		$121,952			$231,459			$42,840		$274,299	$152,347

Average Cost/Vehicle *$25,391*

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