Chapter 173-423 WAC

Cost, Benefit, and Least Burdensome Analysis for the Proposed Low Emission Vehicles Chapter 173-423 WAC

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1. SUMMARY

RCW 34.05.328 requires that proposed rules be reviewed to determine whether the probable benefits are greater than the probable costs and that it be the least burdensome approach for those who are required to comply.

The proposed rules for Low Emission Vehicles have been reviewed. The Department of Ecology (Ecology) has determined that the benefits are greater than the costs.

2. BACKGROUND

To reduce air pollution, motor vehicles must be designed and built to meet either federal emissions requirements or California emissions requirements. Because of California's extreme air pollution problems, they regulated motor vehicle emissions before the federal government. The U.S. Clean Air Act allows California to continue to have their own regulations as long as they are at least as stringent as federal vehicle emission regulations. In fact, California vehicle emission regulations have generally been more stringent than the comparable federal regulations.

To address air pollution problems, section 177 of the U.S. Clean Air Act allows other states to adopt the CA vehicle emissions standards rather than the federal standards.

Chapter 295, 2005 laws (Engrossed Substitute House Bill 1397), the Washington State Legislature adopted the California motor vehicle emission standards and directed the Department of Ecology to adopt rules to implement these standards for passenger cars, light duty trucks, and medium duty passenger vehicles and to amend the rules over time to maintain consistency with the California motor vehicle emission standards and 42 U.S.C. Sec. 7507 (section 177 of the federal clean air act). The California vehicle emission regulations have three main vehicle emission reducing provisions, low emission vehicles, zero emission vehicles, and greenhouse gas emission reductions. Consistent with ESHB 1397, The Department of Ecology does not propose to adopt the zero emission vehicle program regulations contained in Title 13 section 1962 of the California Code of Regulations.

ESHB 1397 recognizes the importance of mitigating climate change by limiting emissions of greenhouse gases from motor vehicles. Cars and trucks account for over 55% of CO_2 emissions in Washington. The control and mitigation of climate change will have positive economic impacts on Washington in areas such as public health, water supply, agricultural productivity, and reduced environmental degradation.

In ESHB 1397, the legislature of the State of Washington found that:

> (1) Motor vehicles are the largest source of air pollution in the state of Washington, and motor vehicles contribute approximately fifty-seven percent of

criteria air pollutant emissions, eighty percent of air toxics emissions, and fifty-five percent of greenhouse gas emissions;
(2) Air pollution levels routinely measured in the state of Washington continue to harm public health, the environment, and the economy. Air pollution causes or contributes to premature death, cancer, asthma, and heart and lung disease. Over half of the state's population suffers from one or more medical conditions that make them very vulnerable to air pollution. Air pollution increases pain and suffering for vulnerable individuals. Air pollution imposes several hundred million dollars annually in added health care costs for air pollution-associated death and illness, reducing the quality of life and economic security of the citizens of Washington;
(3) Reductions of greenhouse gas emissions from transportation sources are necessary, and it is equitable to seek such reductions because reductions in greenhouse gas emissions have already been initiated in other sectors such as power generation;
(4) Reductions in greenhouse gas emissions made under this act should be credited toward any future federal, state, or regional comprehensive regulatory structure enacted to address reducing greenhouse gas emissions;
(5) Under the federal clean air act, the state of Washington has the option to implement either federal motor vehicle emission standards or California motor vehicle emission standards for passenger cars, light duty trucks, and medium duty passenger vehicles;
(6) Opting into the California motor vehicle standards will provide significant and necessary air quality benefits to residents of the state of Washington; and
(7) Adoption of the California motor vehicle standards will increase consumer choices of cleaner vehicles, provide better warranties to consumers, and provide sufficient air quality benefit to allow additional business and economic growth in the key airsheds of the state while maintaining conformance with federal air quality standards.

3. DESCRIPTION AND PURPOSE OF THE COST BENEFIT ANALYSIS

This cost benefit analysis evaluates the economic efficiency of Chapter 173-423 WAC. The law requires Ecology to determine whether the probable benefits of the rule are larger than the probable additional costs. RCW 34.05.328(d) further describes the requirements under the Administrative Procedure Act:

“Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented”

The cost benefit analysis provided below includes quantitative information where available and qualitative information where the economic or physical science is not to the point of providing values for benefits and costs. Ecology did not quantify the economic benefits in such areas as public health, water supply, agricultural productivity,

or reduced environmental degradation for Washington State. Ecology did quantify the impacts to Washington's total population and most noticeable impacts on its economy.

This rule adopts the specific provisions of Title 13 of the California Code of regulations needed to implement the legislature's adoption of the California Vehicle Emission Standards. Without this rule to identify the specific applicable provisions of Title 13, it would be extremely difficult to put the legislature's adoption of the standards into effect. Consequently, this analysis describes the overall economic effects of the implementing the California standards.

At the same time, Ecology also has very little discretion over the content of these rules. As explained, the technical standards must be identical to California's requirements which is why this rule adopts those provisions by reference. Those provisions are what leads to the primary costs associated with this rule i.e. the design and production of automobiles. The rule provisions over which Ecology has discretion include reporting requirements for manufacturers, phase-in of manufacturer compliance with the fleet average requirement, and vehicle dealer compliance provisions. The least burdensome analysis describes the alternatives considered by Ecology for these discretionary aspects and shows that in most cases less burdensome approaches were specified in the rule.

The costs associated with the phase-in, reporting, and compliance provisions are minimal and are not analyzed in detail in this report. They are a very tiny fraction of the costs associated with design and manufacture of the vehicles and have no possibility of making the overall costs of the rule exceed the benefits.

4. COSTS AND BENEFITS OF THE NEW RULE

Economic Impacts of the Low Emission Vehicle Regulation

Ecology has determined that Chapter 173-423 WAC will achieve the most cost effective reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other noncommercial personal vehicles, beginning in 2009. This rule recognizes the importance of mitigating climate change by limiting emissions of greenhouse gases from motor vehicles. Cars and trucks account for over 55% of greenhouse gas emissions in Washington. The control and mitigation of greenhouse gases from motor vehicles will help diminish the potential consequences of global warming such as diminished domestic and agricultural water supplies and degradation of salmon habitat, especially when Washington's activities help encourage other similar actions around the world.

In addition to the mitigation of greenhouse gas (GHG) emissions, the legislature acknowledged that adoption of the California standards will reduce ozone forming emissions and cancer causing air toxics emissions. The California emission standards will help prevent major urban areas of the state from violating the ozone standards and possibly avoids being forced to implement expensive ozone control measures. They

will also reduce adverse health impacts both from ozone and from the numerous cancer causing compounds associated with motor vehicle emissions.

4.1 Potential Impacts on Business Creation, Elimination, or Expansion

This rule proposal affects only light duty vehicles whose primary use is noncommercial personal transportation. Therefore, many vehicles that businesses use would not be covered under the proposed regulations.

Ecology finds that reduced operating costs will more than outweigh the effect of the increase in price over the life cycle of the vehicle. It is assumed that savings from reduced vehicle operating costs would end up as expenditures for other goods and services. These expenditures would flow through the economy possibly causing expansion or creation of new businesses in several sectors. It is also likely that some sectors of the economy such as fuel producers, distributors, and retailers will be adversely impacted. This analysis shows that such impacts are more than offset. The Department of Ecology's economic analysis demonstrates that as consumer expenditures occur, jobs and personal income increase. Jobs increase by 519 in 2010, by 9,506 in 2020, and 14,345 in 2030 compared to the baseline economy that excludes the proposed regulations. Similarly, personal income grows by $28 million in 2010, by $911 million in 2020, and $1.5 billion 2030[1].

4.1.1 Compliance Cost Estimates

Ecology estimates that the proposed near-term (2009-2012) regulations would increase the average retail prices of passenger cars (PC) and small trucks (T1) from $17 to $367, and large trucks (T2) from $36 to $277. In the mid-term (2013-2016) the price increases for PC/T1 vehicles as compared to the 2009 baseline would range from $504 to $1064, and for T2 vehicles would range from $434 to $1029.

The incremental retail prices for all affected vehicles would remain unchanged after 2016.[2] These price increases are expected to be passed on to consumers in one form or another.

This section annualizes these costs and estimates the corresponding operating cost savings for an analysis of impacts on Washington's economy. The net impact of vehicle price increases on consumers is discussed later in this section.

[1] California Department of Finance's Environmental Dynamic Revenue Analysis Model (E-DRAM)

[2] See California Air Resources Board Final Statement of Reasons

Ecology made the following assumptions for this analysis:

- The new PC/T1 (passenger car/light duty truck 1) vehicles are expected to have a median life of 16 years with the T2 vehicles expected to have a median life of 18.5 years (CARB finding).
- "California Cars" cost the same for Washington dealers and are the same car that would be required to purchase and sell in Washington.
- Washington's economy acts in similar ways that California's does.
- Adjusted gas prices will stay at or above $1.74 and Washington uses cars in similar ways California does.
- Population expansion/contraction in Washington will be similar to California's over the next 25 years.
- Throughout its life, each vehicle will provide transportation at lower operating costs, a benefit.

Ecology used the following as the basis for calculations:

- To match the costs to the16 years of benefits, Ecology annualized the costs over the life of the vehicles.
- Annualized costs are estimated using a real discount rate of five percent based on an average of the past ten-year interest rates on car loans. Table 1 provides estimates of total annualized costs of the proposed low emission vehicle regulations from 2009 to 2030.
- The total cost was derived by multiplying new vehicle sales by the average cost increase per vehicle.

Ecology estimated the following results:

- The total costs to consumers vary each year from 2009 to 2030. Cumulative annualized costs of the proposed regulations are estimated to be approximately $1.5 million in 2010, $110 million by 2020, and about $271 million by 2030.

- The cumulative annualized cost increases over time, due to additional sales of new cars at the higher price as multiple model years are annualized over the same period. For example, the annualized cost in 2011 of $5.4 million reflects the annualized costs of model years 2009, 2010, and 2011. Thus, the annualized costs for each year are for cumulative sales of new cars since 2009.

- $110 million in cumulative annualized cost in 2020 represents the cost, in 2020, of all complying vehicles sold from 2009 through 2020. The new vehicle sales for Washington are scaled from the projected numbers of vehicles sold in that year as forecast by California's EMFAC[3] model.

[3] EMFAC (short for EMIssion FACtor) A FORTRAN computer model used to estimate vehicle emissions. It has both current year, as well as back-cast and forecast inventories for calendar years 1970 to 2040.

Table 1. Estimates of Total Annual Costs of the Proposed Low Emission Vehicle Regulation for 2009 through 2030 (thousands of 2004 Dollars)

Model Year	Annualized Costs to the Consumers of PC/T1	Annualized Costs to the Consumers of T2	Incremental Annualized Costs to Consumers of MY 2009+ Vehicles	Cumulative Annualized Costs
2009	$264	$132	$396	$396
2010	$792	$396	$1,188	$1,585
2011	$3,037	$792	$3,829	$5,414
2012	$4,622	$1,188	$5,810	$11,224
2013	$5,150	$1,453	$6,602	$17,826
2014	$6,074	$1,981	$8,055	$25,881
2015	$7,791	$3,037	$10,828	$36,709
2016	$10,168	$3,961	$14,129	$50,838
2017	$10,300	$4,093	$14,393	$65,232
2018	$10,564	$4,226	$14,789	$80,021
2019	$10,696	$4,226	$14,921	$94,943
2020	$10,828	$4,358	$15,186	$110,128
2021	$10,564	$4,226	$14,789	$124,917
2022	$10,828	$4,358	$15,186	$140,103
2023	$10,960	$4,358	$15,318	$155,420
2024	$11,224	$4,358	$15,582	$171,002
2025	$11,356	$4,490	$15,846	$186,848
2026	$11,488	$4,622	$16,110	$202,958
2027	$11,752	$4,886	$16,638	$219,596
2028	$11,884	$5,018	$16,902	$236,498
2029	$12,148	$5,150	$17,298	$253,796
2030	$12,280	$5,282	$17,562	$271,359

Source: Sales data from ARB EMFAC model adjusted for 2004 NADA new registered Car Sales.

Many of the technologies that reduce greenhouse gas emissions will also reduce the operating costs of vehicles, primarily by providing improved fuel consumption. Lifetime maintenance costs are also expected to remain the same or decline, depending on the technologies chosen by manufacturers. Due to a lack of comprehensive data, Ecology used the conservative assumption of no change in maintenance costs for the purpose of this analysis.

Table 2 provides estimates of annual operating cost savings from 2009 through 2030. Data used to derive estimated reductions in operating costs are generated from the EMFAC model. Given recent rapid increases in gas prices and the uncertainty

surrounding these prices, Ecology is using the conservative assumption of a gasoline price of $1.74 per gallon[4] . As shown in Table 2, for every dollar of the cost, the regulations could yield $5 to $11 in savings for the consumers. The $1.74 per gallon is very conservative. If gasoline prices increased to a rate of around $2.00 to 2.25/gallon, (2004 dollars) these saving and ratios would grow considerably.

Table 2. Estimates of Total Annual Value of New Vehicle Operating Cost Savings

Model Year	Annual Fuel Savings (millions of gallons)	Operating Cost Savings (millions of dollars)	Savings to Cost Ratio
2009	2.1	$4	9.2
2010	9.2	$16	10.3
2011	31.1	$54	10.4
2012	68.8	$120	11.0
2013	105.0	$183	10.5
2014	143.1	$249	9.8
2015	184.3	$321	8.9
2016	227.4	$396	7.9
2017	270.4	$470	7.3
2018	312.0	$543	6.9
2019	351.1	$611	6.5
2020	389.6	$678	6.2
2021	428.7	$746	6.0
2022	463.1	$806	5.8
2023	495.8	$863	5.6
2024	526.8	$917	5.4
2025	556.3	$968	5.3
2026	591.6	$1,029	5.2
2027	619.6	$1,078	5.1
2028	645.6	$1,123	5.1
2029	670.5	$1,167	5.2
2030	695.2	$1,210	5.5

Overall, purchasers of new vehicles in 2009 and beyond should experience a significant reduction in their operating costs.

[4] 2004 California Energy Commission (CEC) Integrated Energy Policy Report

4.2 Consumer Expenditures and Savings

This section provides the details of the cost calculations used for the E-DRAM economic impact analysis. Table 3 shows the costs of control in terms of increased annual consumer expenditures for the PC/T1 and T2 new purchase prices.

Table 3. PC/T1 and T2/T3 Sales, and (2004$)

Model	PC/T1 Vehicles			T2/T3 Vehicles		
	New Sales	Average Cost	Increased Expenditures	New Sales	Average Cost	Increased Expenditures
2009	168,838	$16	$2,701,414	43,638	$16	$698,204
2010	172,046	$52	$8,946,376	45,394	$93	$4,221,617
2011	169,387	$194	$32,861,009	45,522	$199	$9,058,921
2012	169,718	$292	$49,557,681	46,365	$308	$14,280,566
2013	171,216	$330	$56,501,205	47,753	$382	$18,241,609
2014	173,374	$383	$66,402,279	49,041	$491	$24,079,211
2015	175,880	$483	$84,950,281	50,352	$723	$36,404,594
2016	175,240	$626	$109,700,033	50,724	$955	$48,441,151
2017	178,818	$626	$111,940,257	52,019	$955	$49,678,375
2018	182,085	$626	$113,984,902	53,098	$955	$50,708,281
2019	184,950	$626	$115,778,503	53,826	$955	$51,403,502
2020	188,154	$626	$117,784,545	54,590	$955	$52,133,403
2021	183,989	$626	$115,177,054	53,144	$955	$50,752,292
2022	187,771	$626	$117,544,660	54,480	$955	$52,028,357
2023	190,815	$626	$119,450,102	55,186	$955	$52,702,770
2024	193,392	$626	$121,063,417	55,809	$955	$53,297,990
2025	195,480	$626	$122,370,634	56,198	$955	$53,668,867
2026	198,559	$626	$124,297,652	58,272	$955	$55,649,359
2027	202,605	$626	$126,830,912	61,197	$955	$58,443,107
2028	206,201	$626	$129,081,964	63,290	$955	$60,441,884
2029	209,787	$626	$131,326,734	64,825	$955	$61,908,116
2030	212,641	$626	$133,113,226	66,201	$955	$63,221,508

4.2.1 Annual Direct Costs to Consumers

The incremental consumer expenditures to purchase new vehicles beginning with model year 2009 are incurred as a lump sum. Since the vehicles last for several years, the lump sum expenditure is not a cost for the year in which it was purchased. It needs to be spread over the life of the vehicle. The capital recovery factor method, also known as the amortization method, is one way to spread the costs over the life of a vehicle at a specified interest rate. The following formula is used to calculate the annualized (equivalent annual) cost of vehicle replacement:

$$AC = (ICE)(CRF)$$

Where,
AC = Annualized cost of vehicle replacement

ICE = Incremental consumer expenditure for vehicle purchase

CRF = Capital recovery factor = $[i (1 + i)^{n}] / [(1 + i)^{(n-1)}]$

Note that "i" in the CRF formula represents the interest rate (or "opportunity cost") for the incremental consumer expenditure, while "n" represents the vehicle life. By using the capital recovery factor method, Ecology accounts for both the annual depreciation expense of a vehicle and the opportunity cost of the incremental consumer expenditures for the new vehicles.

Using the capital recovery factor method, Ecology estimated the cumulative annualized costs of the proposed regulations to consumers to be approximately $1.5 million in 2010, $110 million by 2020, and $271 million by 2030. Table 2 provides estimates of total annual direct costs of the proposed climate change regulations to consumers from 2009 to 2030. Annual sales values of the vehicles were calculated by multiplying sales projections for each year by the increase in the average retail price equivalent (RPE) of vehicles in that year. The vehicle sales represents the projected number of vehicles sold in the year generated scaled from the CARB's EMFAC model[5]. Annualized costs to consumers are estimated using a real interest rate (opportunity cost) of 5 percent based on an average of the past ten-year interest rates on car loans and the median vehicle life of 16 years for PC/T1 and 19 years for T2/T3.

[5] For a complete description of vehicle climate change technology and cost assessment, please see "Draft Technology and Cost Assessment for Proposed Regulations to Reduce Vehicle Climate Change emissions," California Air Resources Board.

Table 4. Estimates of Total Annualized Costs of the Proposed Climate Change Regulations for 2009 through 2030 (2004 Dollars)

Model	PC/LDT1	LDT2/T3	PC/LDT1 and T2/T3	Cumulative
2009	$249,259	$129,989	$379,248	$379,248
2010	$825,481	$349,318	$1,174,799	$1,554,047
2011	$3,032,082	$749,580	$3,781,663	$5,335,710
2012	$4,572,683	$1,181,646	$5,754,328	$11,090,038
2013	$5,213,361	$1,509,402	$6,722,763	$17,812,801
2014	$6,126,932	$1,992,435	$8,119,367	$25,932,168
2015	$7,825,150	$3,012,298	$10,837,448	$36,769,616
2016	$10,122,012	$4,008,264	$14,130,275	$50,899,892
2017	$10,328,717	$4,110,638	$14,439,355	$65,339,247
2018	$10,517,377	$4,195,857	$14,713,234	$80,052,480
2019	$10,682,872	$4,253,383	$14,936,255	$94,988,736
2020	$10,867,969	$4,313,779	$15,181,748	$110,170,484
2021	$10,627,376	$4,199,499	$14,826,875	$124,997,359
2022	$10,845,835	$4,305,087	$15,150,922	$140,148,281
2023	$11,021,650	$4,360,891	$15,382,541	$155,530,822
2024	$11,170,510	$4,410,143	$15,580,653	$171,111,475
2025	$11,291,127	$4,440,831	$15,731,958	$186,843,433
2026	$11,468,933	$4,604,707	$16,073,640	$202,917,073
2027	$11,702,677	$4,835,875	$16,538,552	$219,455,625
2028	$11,910,381	$5,001,264	$16,911,645	$236,367,270
2029	$12,117,506	$5,122,588	$17,240,093	$253,607,363
2030	$12,282,345	$5,231,264	$17,513,609	$271,120,973

* Beginning 2025 the accumulation is net of vehicles that have operated for 16 years, the assumed life of a vehicle, i.e., the total annualized cost in 2025 excludes the 2009 model year annual cost for PC/T1, 2026 excludes the 2009 and 2010 costs. Beginning 2028 when T2/T3 vehicles are 19 years old, the cumulative cost is adjusted similar to PC/T1 approach.

4.2.2 Operating Cost Reductions

Many of the technologies that reduce greenhouse gas emissions will also have the potential to lower the operating costs of vehicles. Lifetime maintenance costs are also expected to remain the same or decline, depending on the technologies chosen by manufacturers. Due to a lack of comprehensive data, however, Ecology assumed no change in maintenance operating costs for the purpose of this analysis. Estimates of the reduction in fuel consumption of vehicles, during the studied period, range from about 1 percent to 21 percent for PC/T1, and about 2 percent to 26 percent for T2/T3. Table 3 provides estimates of annual fuel consumption savings from 2009 through 2030. Data on fuel consumption are generated from the EMFAC model. Fuel prices adjusted for inflation are derived from the 2004 California Energy Commission (CEC) Integrated Energy Policy Report[6] and adjusted for Washington's new registered car sales (2004).

[6] California Energy Commission, Integrated Energy Policy Report, Fuel Division, 2004.

The value of fuel consumption savings is estimated by multiplying annual reduction in fuel consumption by a gasoline price of $1.74 per gallon. This represents the total direct savings to consumers.

Table 5. Daily PC/LDT1 and LDT2/T3 Gasoline Consumption Reductions

Year	PC/T1 Daily Gasoline Consumption 2009-2030 vintages, baseline (gallons/day)	T2/T3 Daily Gasoline Consumption 2009-2030 vintages, baseline (gallons/day)	PC/T1 Reduction in gasoline consumption (gallons/day)	T2/T3 Reduction in gasoline consumption (gallons/day)	Total Reduction in Gasoline Consumption (gallons/day)
2009	**355,011**	**128,928**	**3,905**	**1,805**	**5,710**
2010	**700,883**	**253,248**	**17,522**	**8,104**	**25,626**
2011	**1,031,394**	**372,581**	**63,946**	**22,355**	**86,301**
2012	**1,335,615**	**484,067**	**146,918**	**44,534**	**191,452**
2013	**1,629,077**	**593,599**	**226,442**	**65,890**	**292,331**
2014	**1,912,402**	**701,337**	**309,809**	**88,368**	**398,178**
2015	**2,184,782**	**807,494**	**399,815**	**113,049**	**512,864**
2016	**2,442,746**	**909,999**	**493,435**	**139,230**	**632,665**
2017	**2,691,082**	**1,010,432**	**586,656**	**165,711**	**752,367**
2018	**2,928,491**	**1,108,783**	**676,481**	**191,819**	**868,301**
2019	**3,155,854**	**1,203,799**	**760,561**	**216,684**	**977,245**
2020	**3,373,179**	**1,295,611**	**843,295**	**240,984**	**1,084,278**
2021	**3,590,951**	**1,388,270**	**926,465**	**266,548**	**1,193,013**
2022	**3,775,665**	**1,469,790**	**1,000,551**	**288,079**	**1,288,630**
2023	**3,949,650**	**1,547,779**	**1,070,355**	**309,556**	**1,379,911**
2024	**4,112,699**	**1,622,443**	**1,135,105**	**330,978**	**1,466,083**
2025	**4,262,700**	**1,692,537**	**1,197,819**	**350,355**	**1,548,174**
2026	**4,447,056**	**1,783,468**	**1,271,858**	**374,528**	**1,646,386**
2027	**4,580,947**	**1,858,087**	**1,328,475**	**395,772**	**1,724,247**
2028	**4,707,424**	**1,931,344**	**1,379,275**	**417,170**	**1,796,446**
2029	**4,828,618**	**2,003,547**	**1,429,271**	**436,773**	**1,866,044**
2030	**4,944,225**	**2,074,258**	**1,478,323**	**456,337**	**1,934,660**

Table 6. Estimates of Total Annual Value of Vehicle Fuel Consumption Savings

Model Year	Annual Fuel Consumption Savings for PC/T1 (Gallons)	Annual Fuel Consumption Savings for T2/T3 (Gallons)	Annual Value of Fuel Consumption Savings ($1.74 per gallon, 2004$)
2009	1,425,369	658,820	$3,626,490
2010	6,395,556	2,957,939	$16,275,082
2011	23,340,439	8,159,530	$54,809,945
2012	53,624,943	16,254,961	$121,591,032
2013	82,651,227	24,049,671	$185,659,563
2014	113,080,322	32,254,495	$252,882,581
2015	145,932,546	41,262,967	$325,720,192
2016	180,103,671	50,818,912	$401,805,296
2017	214,129,405	60,484,482	$477,828,163
2018	246,915,733	70,014,104	$551,457,916
2019	277,604,697	79,089,624	$620,648,120
2020	307,802,543	87,959,037	$688,625,148
2021	338,159,831	97,289,994	$757,682,696
2022	365,201,170	105,148,797	$818,408,941
2023	390,679,610	112,987,876	$876,381,426
2024	414,313,264	120,807,107	$931,109,445
2025	437,203,813	127,879,611	$983,245,159
2026	464,228,177	136,702,791	$1,045,619,883
2027	484,893,279	144,456,941	$1,095,069,382
2028	503,435,484	152,267,172	$1,140,922,623
2029	521,683,873	159,422,207	$1,185,124,580
2030	539,587,944	166,562,945	$1,228,702,547

4.3 Impacts on Washington's Economy

Higher vehicle prices provide a means to estimate the direct expenditures that will be incurred by Washington's businesses, governments, and individuals to meet the requirements of the low emission vehicle regulations. These expenditures would in turn bring about additional (indirect) changes in Washington's economy that may change the overall costs of the regulations to the economy. Increased vehicle prices, for example, may result in a reduction of demand for other goods and services as consumers use more of their money to pay for the price increase. On the other hand, in response to the proposed regulations automobile manufacturers are expected to choose technologies that reduce vehicle operating costs, leaving consumers with additional money to spend on products and services other than gasoline. This would, in turn, induce firms supplying those products and services to expand their production and increase their hiring of workers. A third effect occurs when purchase of the new vehicles directly

lowers demand for the petroleum refining and gasoline distribution sectors. The changes caused by the proposed regulations can affect industries both negatively and positively. The Washington industries and individuals affected most by the proposed low emission vehicle regulations are those engaged in the use of light-duty passenger vehicles, as well as the refining and distribution of gasoline. The economic model, however, does not account for the environmental improvement benefits to Washington's businesses and citizens that the low emission vehicle regulations will bring. The Washington State legislature believes that Washington's actions to reduce greenhouse gas emissions from motor vehicles, especially if followed by other states and nations, will diminish the potential consequences from global warming and environmental degradation.

4.3.1 Environmental Impacts

The Washington State legislature recognizes and cites the following environmental conditions in support of its adopting the California vehicle emissions standard. motor vehicles are the largest source of air pollution in the state, and motor vehicles contribute approximately fifty-seven percent of criteria air pollutant emissions, eighty percent of air toxics emissions, and fifty-five percent of greenhouse gas emissions. Air pollution levels routinely measured in the state of Washington continue to harm public health, the environment, and the economy. Air pollution causes or contributes to premature death, cancer, asthma, and heart and lung disease. They also recognize that over half of the state's population suffers from one or more medical conditions that make them very vulnerable to air pollution. Air pollution increases pain and suffering for vulnerable individuals. Air pollution imposes several hundred million dollars annually in added health care costs for air pollution-associated death and illness, reducing the quality of life and economic security of the citizens of Washington.

While Ecology agrees with the legislative findings that opting into the California motor vehicle standards over the federal standard will provide significant and necessary air quality benefits to residents of the state of Washington, this cost benefit analysis does not quantify or rely on these benefits in this analysis.
Ecology estimates the following reduced emissions of air pollutants between the cleaner California car and the federal standard for the entire fleet[7]; although we have not estimated ozone reductions and health benefits associated with these reductions. Consequently this discussion of environmental and health benefits is qualitative.

Year 2020	**Year 2030**
Carbon Monoxide (CO) ~ 7%	**Carbon Monoxide (CO) ~ 12%**
Volatile Organic Compounds (VOC) ~5%	**Volatile Organic Compounds (VOC) ~9%**
Oxides of Nitrogen (NO_x) ~4%	**Oxides of Nitrogen (NO_x) ~10%**
Air Toxics ~ 8%	**Air Toxics ~ 14%**

[7] Findings from Oregon Dept. of Environmental Quality and Washington Dept. of Ecology 2005 model of emissions reduction benefits.

4.3.2 Government and Regulation

Combining the taxing and spending effects of the three levels of government (federal, state, and local) gives additional considerations to costs and benefits that will not be covered in this document. Generally, the only additional costs associated with this new regulation for Washington State are minimal. Washington has the option to inspect sales or distribution businesses once per year. Ecology has estimated costs to these businesses at 2-3 hours of each businesses time. The costs associated with compliance to business is too minimal for further analysis. Benefits of compliance inspections would support a level playing field for businesses involved in distribution, sales, and service of passenger vehicles in Washington State.

Additional cost savings can be calculated for the consumer and government through the phasing out of individual inspection programs throughout the state. Although these savings will not be presented here, the discontinuation of these programs from 2014, and on, would amount to moderate savings to consumers and the government.

4.4 Overall Economic Impact Estimates

Higher vehicle prices associated with the proposed regulations would affect Washington's economy through many complex interactions. To further understand these interactions one could review California's E-DRAM program and findings. E-DRAM was developed to simulate many of these interactions.[8]

The changes caused by the proposed regulations can affect industries both negatively and positively. Washington's industries and individuals most affected by the proposed climate change regulations are those engaged in the refining and distribution of gasoline and the usage of light-duty passenger vehicles. Distribution, sales, and service will have minimal economic impacts.

Table 7 summarizes the impacts of the proposed climate change regulations on Washington's economy for fiscal years 2010, 2020 and 2030. The E-DRAM model is built to reproduce the economic conditions of fiscal year 1998/99 in California. Ecology assumed similar economic conditions in Washington and extrapolated the model out to 2010 based on rescaling State population, personal income, and industry-specific forecasts[9]. The scaling ratio was created using estimated population data from the Census Bureau for the years 2000-2004. Higher vehicle prices were adjusted to fiscal year 2010, 2020, and 2030.

The results of the E-DRAM simulation scaled to Washington's populations show that the changes caused by the proposed regulations would reduce the economic output by roughly $7 million in 2010, $437 million in 2020, and $835 million in 2030. Personal

[8] California Department of Finance's Environmental Dynamic Revenue Analysis Model

[9] For a more detail description of the E-DRAM extrapolation to "without years", see "Benefits of Reducing Demand for Gasoline and Diesel," a joint report to California Air Resources Board and California Energy Commission prepared by Arthur D. Little, Inc., March, 2002.

income, however, would increase by roughly $28 million in 2010, $911 million in 2020, and $1.5 billion in 2030. As a result, Washington's net employment impact due to the proposed regulations would also increase by over 519 jobs in 2010, 9,506 in 2020, and 14,345 in 2030.

Table 7. Economic Impacts of the Proposed Low Emission Vehicle Regulations on the California Economy In fiscal year 2010, 2020, 2030

Washington Economy 2010	Without Climate Change Regulations	With Climate Change Regulations	Difference
Output (millions)	**$385,092**	**$385,085**	**-$7**
Personal Income (millions)	**$250,789**	**$250,816**	**$28**
Employment	**$2,826,582**	**$2,827,100**	**519**
Washington Economy 2020			
Output (millions)	**$531,997**	**$531,559**	**-$437**
Personal Income (millions)	**$347,324**	**$348,234**	**$911**
Employment	**$3,225,317**	**$3,234,823**	**9,506**
Washington Economy 2030			
Output (millions)	**$733,096**	**$732,262**	**-$835**
Personal Income (millions)	**$480,737**	**$482,201**	**$1,464**
Employment	**$3,761,459**	**$3,775,804**	**14,345**

These results indicate that higher vehicle prices cause consumers to redirect their expenditures. Consumers would spend more on the purchase of motor vehicles, thus having less money to spend on the purchase of other goods and services. Since most automobile manufacturing occurs outside of the State, the increased consumer expenditures on motor vehicles would be a small drain on Washington's economy. The reduction in operating costs that results from improved vehicle technology would, however, reduce consumer expenditures and would therefore leave Washington consumers with more disposable income to spend on other goods and services. Businesses that serve local markets are most likely to benefit from the increase in consumer expenditures. This increase would in turn boost the Washington economy, resulting in the creation of additional jobs. In the context of the State's economy, the economic impacts of the proposed regulations are small and are not expected to impose a noticeable impact on Washington's economy. However, Ecology finds the proposed regulations are expected to take an important step toward promoting economic benefits to Washington in many areas such as reduced health costs due to lower levels of air pollutions and a reduced risk of adverse effects from greenhouse gasses including lower summer water supplies with attendant impacts on fish and agriculture, and increased risk of winter flooding. These benefits, which are difficult to quantify, are not included in this analysis. Overall, implementation of the proposed regulations would be expected to improve the well-being of Washington and its citizens.

5. CONCLUSIONS

The State of Washington has adopted the California motor vehicle emission standards in Title 13 of the California Code of Regulations, effective January 1, 2005.

Costs associated with the new standards for vehicle emissions and greenhouse gas reduction will likely be passed on to consumers in the marketplace. Ecology estimates that the proposed near-term (2009-2012) regulations would increase the average retail prices of passenger cars (PC) and small trucks (T1) from $17 to $367, and large trucks (T2) from $36 to $277. In the mid-term (2013-2016) the price increases for PC/T1 vehicles as compared to the 2009 baseline would range from $504 to $1064, and for T2 vehicles would range from $434 to $1029. In Washington, Ecology estimates cumulative annualized costs of the proposed regulations to consumers to be approximately $1.5 million in 2010, $110 million by 2020, and $271 million by 2030.

Washington's Cost/Benefit	Annual Costs to Consumers (LEV regulation)	Annual Savings in Fuel Consumption ($1.74 per gallon, 2004 dollars)
Year 2010	1.2 million	$16.2 million
Year 2020	$15 million	$688 million
Year 2030	$17.5 million	$1.2 billion

The good news is Washington drivers will save approximately 16 million in fuel costs for 2010, $688 million in 2020, and $1.2 billion in 2030. From this fuel savings and other factors, it is estimated that personal income, would increase by roughly $28 million in 2010, $911 million in 2020, and $1.5 billion 2030. As a result, Washington's net employment impact due to the proposed regulations would also increase by over 519 jobs in 2010, 9,506 in 2020, and 14,345 in 2030.

Evaluating fuel savings alone allows consumers to see about $10 of benefit for every dollar spent for the regulation in the first 5 years, and about $6 for every dollar spent after that. This benefit alone substantially exceeds all costs of the regulation.

In addition to the huge savings, adoption of the California motor vehicle standards will increase consumer choices of cleaner vehicles and provide sufficient air quality benefit to allow additional business and economic growth in Washington while maintaining conformance with federal air quality standards.

The benefits of this Low Emission Vehicle regulation greatly exceed the costs for Washington.

LEAST BURDENSOME ANALYSIS

RCW 34.05.328 (1)(e) requires Ecology to perform a Least Burdensome Analysis to:

"Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection."

Pursuant to the federal clean air act, the State of Washington has adopted the California motor vehicle emission standards in Title 13 of the California Code of Regulations, effective January 1, 2005. The Department of Ecology proposes to adopt rules that implement the emission standards of the state of California for passenger cars, light duty trucks, and medium duty passenger vehicles, and will amend the rules over time to maintain consistency with the California motor vehicle emission standards and 42 U.S.C. Sec. 7507 (section 177 of the federal clean air act). Consistent with the legislature's direction in ESHB 1397, the Department of Ecology will not adopt the zero emission vehicle program regulations contained in Title 13 section 1962 of the California Code of Regulations.

The major substantive requirements of this rule specify the emission standards to which motor vehicles are built. Under section 177 of the federal Clean Air Act, there is no discretion about those emission specifications; they must be the same as California's. Consequently, the major sections of this rule adopt the California motor vehicle emission standards by reference. Ecology had some discretion regarding phase-in provisions, compliance and reporting, specifically:

1. Reporting requirements for manufacturers
2. Phase-in for manufacturer compliance with the fleet average requirement
3. Vehicle dealer compliance provisions

1. Reporting requirements for manufacturers:
Ecology requires a more specific report from manufacturers than California in order to help pinpoint possible non-compliance activity. This report will require a special query to manufacturer data bases which will have additional cost relative to California. It is not a large cost. The cost is offset by the potential benefits of limiting possible non-compliance which would result in costs to vehicle dealers due to lost sales. This burden on manufacturers is also offset by a more lenient approach to the phase-in of fleet average requirements than that used in California.

2. Phase-in for manufacturer compliance with the fleet average requirement:
During the initial years of new requirements such as the LEV II standards, California allows a three year phase-in for full compliance with the averaging standard. Ecology

allowed four years to achieve full compliance rather than three. This reduces the potential for financial penalties for not meeting the fleet average requirement.

3. Ecology evaluated proposals for vehicle dealers to report on sales of non-California certified vehicles (which are allowed if the sale is for out of state use). Ecology also proposed during the first drafts that vehicle dealers place signs on any such non-California certified vehicles displayed on their lots. After discussion with the advisory committee, Ecology did not impose any extra reporting requirements on vehicle dealers and dropped the proposal for signs to be placed on “federal vehicles”.

Ecology finds the proposed regulations take an important step toward the control and mitigation of greenhouse gases from motor vehicles. In Washington this will help diminish the potential consequences of global warming such as diminished domestic and agricultural water supplies and degradation of salmon habitat. These benefits are not included in the Cost Benefit Analysis. Overall, implementation of the proposed regulations is expected to improve the well-being of Washington and its citizens.

The rule achieves the goals and specific objectives as stated in the rule at lowest cost given the above alternatives.

REFERENCES

California Air Resources Board (CARB)
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Additional supporting GHG California
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APPENDIX

Table A: Average Vehicle Cost Increase under Pavley (Greenhouse Gas, CARB)

	Year	Average Cost Increase of Initial Purchase Price (Passenger Cars & Small trucks/SUVs)	Average Cost Increase of Initial Purchase Price (Larger Trucks/SUVs)
Near Term	2009	$17	$36
	2010	$58	$85
	2011	$230	$176
	2012	$367	$277
Mid Term	2013	$504	$434
	2014	$609	$581
	2015	$836	$804
	2016	$1,064	$1,029

Table B: 2004 New Registrations NADA (National Automobile Dealers Association)

2004 NEW REGISTRATIONS RANKING

State	2004 New Registrations	State	2004 New Registrations
California	**2,121,161**	Oklahoma	179,648
Florida	1,443,699	Nevada	174,819
Texas	1,254,679	**Oregon**	**168,977**
New York	**909,332**	Kentucky	159,070
Pennsylvania	737,271	Arkansas	134,246
Michigan	712,747	Iowa	125,138
Illinois	693,615	Kansas	116,931
New Jersey	**633,358**	Mississippi	115,560
Ohio	628,236	Hawaii	109,542
Georgia	493,244	Utah	108,686
Virginia	476,309	New Mexico	103,096
North Carolina	458,012	New Hampshire	91,989
Maryland	406,147	West Virginia	87,062
Massachusetts	**383,474**	Nebraska	84,231
Arizona	364,497	**Maine**	**62,593**
Indiana	316,057	**Rhode Island**	**61,228**
Missouri	304,431	Delaware	58,715
Tennessee	290,317	Idaho	57,783
Minnesota	286,228	Montana	47,791
Washington	**280,095**	**Vermont**	**43,085**
Colorado	265,625	South Dakota	35,725
Wisconsin	262,983	Alaska	35,555
Louisiana	243,297	North Dakota	28,675
Alabama	233,424	Wyoming	27,296
Connecticut	**214,865**	D.C.	18,804
South Carolina	205,939		

Source: National Automobile Dealers Association 2005 Annual Report

Table C: Population Estimations: (US Census Bureau)

Geographic Area	Population estimates				
	July 1, 2004	July 1, 2003	July 1, 2002	July 1, 2001	July 1, 2000
United States	**293,655,404**	**290,788,976**	**287,941,220**	**285,102,075**	**282,192,162**
California	35,893,799	35,462,712	34,988,261	34,532,163	34,002,467
Washington	6,203,788	6,131,298	6,067,146	5,992,767	5,911,182

April 1, 2000	
Estimates base	Census
281,424,602	**281,421,906**
33,871,653	33,871,648
5,894,140	5,894,121

Table D: Discretionary Elements of the Rule

The specific areas where Ecology had discretion and the nature of the costs imposed or avoided due to the final Ecology rule include:

<u>173-423-060 Exemptions</u>

Ecology had discretion on which exemptions to include. This section of the proposed rule:

- Will cause a small increase in the workload of licensing agents which will have to require and inspect the documentation required for exemptions. Only small numbers of vehicles will be exempted, it's likely that less than 1% of the registrations will be exemptions.
- Will benefit manufacturers and dealers because they are allowed to sell vehicles certified to the federal standards to non-Washington residents
- Will benefit dealers because the exemptions are tightly drawn to help eliminate possible illegal sales through abuse of exemptions. Illegal sales of federal vehicles would drain sales from vehicle dealers abiding by the law.

<u>173-423-070 Emission standards, warranty, recall and other California provisions adopted by reference</u>

Ecology could not include the Zero Emission Vehicle (ZEV) requirement per ESHB 1397. Ecology had discretion on non-emission related California provisions such as vehicle testing.

- This provision of the Washington program reduces cost to manufacturers since they do not have to provide ZEV vehicles or the PZEV vehicles that can substitute for ZEVs.

<u>173-423-080 Fleet average non-methane organic gas (NMOG) exhaust emission requirements, reporting, and compliance.</u>

Ecology had discretion regarding phase-in timeframe, credits and debits and considered approaches used by California and the other California emission states. In the end, our approach is slightly more permissive than California's.

- Manufacturers are allowed to defer compliance and credits against possible non-compliance with the fleet average for one additional year beyond what California allows. For some manufacturers, this could save considerable possible money in penalties.

173-423-100 Manufacturer delivery reporting requirements.

Ecology had discretion regarding reporting requirements.

- Ecology required an additional report not required by Calfiornia. The costs of that report are more than offset by the benefits from the more lenient phase-in and the fact that the Washington program does not include ZEV requirements or apply to larger pick-up trucks such as ¾ and 1 ton pick-ups, whereas those vehicles are covered in California requirements and most other states.

173-423-130 Surveillance.

Ecology had discretion regarding surveillance of dealer transactions.

- There is some cost to vehicle dealers to accommodate Ecology staff sight visits and compile requested sales documents, see discussion under least burdensome approach.

173-423-140 Enforcement.

- There is a cost only if manufacturers, dealers or private citizens intentionally evade the law. These costs could be substantial, but there is an incalculably greater benefit here due to the level playing field effects of enforcement