Governor's Vehicle Emissions Workgroup Report

November 2005

State of Oregon

Preface

In March of 2005, the Governor's Advisory Group on Global Warming submitted its final report to Governor Kulongoski, which recommended that the Governor convene an interim Workgroup on California's motor vehicle emission standards, with the LEV II and Pavley components. The Governor established this Workgroup, made up of citizens, environmental, and business interests. Members included:

Mark Reeve (Chair)	Reeve Kearns
Bob Anderson	NW Auto Trades Association
Alan DeBoer	Oregon Auto Dealers Association
Steven Douglas	Alliance of Automobile Manufacturers
Elliott Eki	AAA
Steve Gutmann	Flexcar
Chris Hagerbaumer	Oregon Environmental Council
Ashley Henry	Oregon Business Association
Al Jubitz	Citizen, retired, Jubitz Corporation
Mitch Rofsky	Better World Club
Don Taylor	City of Portland Fleet Administrator
Ex-Officio Members:	
David Van't Hof	Governor's Office
Andy Ginsburg	Oregon Department of Environmental Quality

The Governor asked the Workgroup to explore issues surrounding the implementation of California standards in Oregon. The Workgroup was specifically charged with providing information on the costs, benefits, and impacts of the following California motor vehicle emission requirements and issues:

1. Legal requirements and issues;
2. Expected benefits to human health and the environment;
3. Costs of new vehicles (including potential vehicle owner benefits); and
4. Effect on vehicle model availability (including diesel vehicles) and the biodiesel market.

The Workgroup was further charged with identifying the pros and cons of the implementation features associated with the California motor vehicle emission requirements. Those features or requirements were:

1. Zero emission vehicle (ZEV) requirements, including the effect on the auto repair industry,
2. Compliance verification and enforcement, and
3. Administrative costs and funding.

Sam Imperati, J.D., Executive Director of the Institute *for* Conflict Management, Inc., facilitated the process. Rachel Sakata, Dave Nordberg, and David Collier of the Oregon Department of Environmental Quality staffed the Workgroup. Members met over the course of 4 ½ days in September and October 2005, and this report summarizes their discussions. The Workgroup reviewed drafts of this document and the facilitator participated in the creation of this final report.

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I. Background on California's On-Road Motor Vehicle Regulations

A. Introduction

The federal Clean Air Act (CAA) provides the framework for regulating emissions from motor vehicles. In 1970, it established nationwide air quality standards to protect public health. Recognizing the large contribution motor vehicles make to air pollution, the CAA also set the first federal vehicle emissions standards. Because California had emission standards before the federal government, the CAA authorized California to continue setting its own vehicle emissions standards. California's standards must be at least as protective of human health as the federal standards and are typically more stringent.

B. What States have Adopted California's Emissions Standards?

The CAA allows other states to opt into California's standards. In the early 1990s, Massachusetts, New York, Maine and Vermont adopted California's motor vehicle regulations. Connecticut, New Jersey, and Rhode Island are in the process of developing their opt-in programs. These states initially opted into California vehicle standards for criteria pollutants (LEV-II), and are now at various stages of adopting California new regulations on greenhouse gases (Pavley). Pennsylvania recently discovered it had a provision in its rules that adopted the LEV-II standards once the voluntary federal LEV standards (NLEV) were no longer in effect. Currently, Pennsylvania is in the process of sorting out the details of the program. The state of Washington enacted a law[1] to opt-in to California's regulations on the condition that Oregon adopts the standards as well. The Washington law has three prominent features:

1) There is no requirement for Zero Emission Vehicles,

2) Vehicles that comply with California vehicle emission standards are exempted from Washington's emissions testing (Inspection/Maintenance) program; and

3) The Washington requirement shall only take effect for years in which Oregon also requires California compliant vehicles.

C. Overview of the Motor Vehicle Emission Standards

Current federal motor emission regulations are known as the Tier 2 standards. These regulations reduce pollutants such as oxides of nitrogen (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO), and are phased in between 2004 and 2009. The Tier 2 limits establish the same emission requirements for both gas and diesel-fueled vehicles. Tier 2 requirements extend beyond the previous Tier 1 standards to include the new category of Medium Duty Passenger Vehicles from 8,500 to 10,000 lbs. Gross Vehicle Weight (GVW).

[1] State of Washington, House Bill 1397, Chapter 295, Laws of 2005, Motor Vehicle Emission Standards, 59th Legislature, 2005 Regular Session. http://www.leg.wa.gov/pub/billinfo/2005-06/Htm/Bills/Session%20Law%202005/1397-S.sl.htm **(Reference 1)**

California's vehicle emission standards are more stringent than federal standards and have two main parts. The first is the Low Emissions Vehicles (LEV) standards[2] that reduce criteria pollutants such as ground-level ozone and carbon monoxide. The second part establishes "Pavley" standards that reduce the emissions of greenhouse gases. California's current LEV-II requirements began taking effect with model year 2004 vehicles and will be completely phased-in by 2010.

The European Union (EU) is planning to propose (Fall 2005) criteria pollution emission limits for new light duty vehicles. The European vehicle rules have separate standards for diesel and gasoline cars. In this future proposal, the EU is planning to reduce emissions of particulates from diesel cars by 80%, and NOx emissions by 20% compared to the existing standards. The proposal will also require further emissions reductions of NOx and hydrocarbons (HC) from gasoline cars.[3]

Table 1 on the next page provides a general overview of the California motor vehicle program, including the types of air pollutants addressed and the types of vehicles that are affected.

[2] California Code of Regulations, Title 13, Section 1900-1961. http://www.arb.ca.gov/msprog/levprog/cleandoc/cleancompletelevregsasof8-14-04.pdf **(Reference 2)**

[3] European Union, Preliminary draft proposal for a Regulation of the European Parliament and of the Council relating to emissions of atmospheric pollutants from motor vehicles (Euro 5) http://europa.eu.int/comm/enterprise/automotive/pagesbackground/pollutant_emission/stakeholder_consultation/euro_5_draft_reg.pdf

Table 1: California Motor Vehicle Emission Standards: Key Features

Regulatory Program	Date Standards Take Affect	Pollutants Addressed	Requirements	Types of Vehicles Affected	How Requirements May be Met by Manufacturers

Low Emissions Vehicles - Phase II (LEV-II)[4]	Basic LEV-II requirements are phased in from model year 2004 to 2010.
	
	ZEV requirements are phased in from 2005 through 2018.
		"Criteria" pollutants linked to National Ambient Air Quality Standards.
		
		• Precursors of ground level ozone
		  o Non-methane organic gases (NMOG). These are similar to Volatile Organic Compounds (VOC).
		  o Oxides of Nitrogen (NOx)
		• Carbon Monoxide (CO)
		• Particulate Matter (PM)
		
		Hazardous air pollutants (HAP) listed in the Clean Air Act; also called air toxics
			1. A statewide fleet average emission standard.
			
			2. Standards applicable to different vehicle classifications
			
			California's fleet average emission standard focuses on NMOG.
			
			(For specific standards see **Appendix A**)
				• Passenger cars
				• Light duty trucks
				• Medium duty vehicles up to 14,000 lbs.
				
				California vehicle technology classifications are:
				
				LEV-II: Low Emission Vehicle - (phase II)
				
				ULEV: Ultra-Low Emission Vehicle
				
				SULEV: Super Ultra-Low Emission vehicle
				
				ZEV: Zero Emission Vehicle
				
				PZEV: Partial Zero Emission Vehicle
				
				ATPZEV: Advanced Technology Zero Emission Vehicle
				
				(See **Appendix B**)
					Manufacturers meet the tighter standards by using a more intensive application of the same emission reduction techniques used to comply with less stringent requirements.

[4] California Code of Regulations, Title 13, Section 1961. http://www.arb.ca.gov/msprog/levprog/cleandoc/cleancompletelevregsasof8-14-04.pdf (**Reference 2**)

Regulatory Program	Date Standards Take Affect	Pollutants Addressed	Requirements	Types of Vehicles Affected	How Requirements May be Met by Manufacturers
Pavley[5]	Requirements are phased in from the 2009 model year through 2016.	Greenhouse gases to address Global Warming Focuses mostly on carbon dioxide (CO_2) but also includes methane (CH_4), nitrous oxide (N_2O), and hydrofluorocarbon (HFC) 134a reductions as well.	The purpose of the Pavley requirement is to achieve the "maximum feasible and cost effective reduction in greenhouse emissions from motor vehicles." The emissions reductions are based on grams per mile CO_2 equivalent. (CO_2E) (See **Appendix C**)	• Passenger cars • Light duty trucks up to 8500 lbs. gross vehicle weight (GVW) • Medium duty passenger vehicles to 10,000 lbs. GVW	California and other opt-in states expect that automobile manufacturers will apply technological improvements to meet Pavley requirements. This includes using a combination of existing technology, selling a greater number of advanced technology vehicles, or using alternative compliance methods. (See **Appendix D**)

[5] Final Regulation Order, Amendments to Sections 1900 and 1961, and Adoption of new Section 1961.1,Title 13, California Code of Regulations http://www.arb.ca.gov/regact/grnhsgas/fro.pdf **(Reference 3)**

D. Similarities and Differences between Federal (Tier 2) and California (LEV/Pavley) Vehicle Standards

There are many notable similarities and differences between the federal Tier 2 standards and California's standards (sometimes referred to as Cal-LEV/Pavley because they include both LEV-II and Pavley standards). For a more detailed description of both the California and federal certification requirements see **Appendix E**.

Both California and federal standards become progressively more stringent over time as vehicle technology advances, although the fleet average in each program emphasizes different pollutants. The federal standards and California's standards are similar in that they both classify vehicle types into several different groupings, then set emissions standards for each vehicle grouping (i.e., classes).

Both the California and federal programs create a range of vehicle classifications based on emission levels. Manufacturers have broad flexibility to certify vehicles to any emission category they choose, but vehicles are generally distributed among the emission categories according to their size. That is, larger vehicles are typically in the higher emission categories and smaller vehicles are in the lower emission categories.

Each program sets overall fleet average emissions limits. These standards reflect the average certified emissions of all vehicles sold each year by a manufacturer and are the primary controlling features of both programs. The fleet average emission limits allow manufacturers the flexibility to produce vehicles that emit both more and less than the fleet average as long as the mathematical average is within the fleet average limit. The programs differ in that the California fleet average limit applies to NMOG and the federal fleet average limit applies to NOx. A side benefit of reducing NMOG is that many NMOG compounds are also hazardous air pollutants (air toxics). The effect of NOx reductions on air toxic emissions has not been determined. However, NOx is a precursor to particulate matter (PM) so NOx reductions also reduce PM emissions.

In addition, the California Pavley standards set fleet average greenhouse gas emission standards for light duty vehicles. The federal Tier 2 program does not regulate greenhouse gases.

Finally, the California program requires a portion of a manufacturer's fleet to be Zero Emission Vehicles or ZEVs. No such provision exists in the federal program. The effect of the ZEV requirement is to lower total emissions about 3% (from 11% down to 8%) beyond the level achieved by the NMOG fleet average emission standard alone.

E. California's Zero Emissions Vehicle (ZEV) Requirement

In addition to setting standards for emissions limits for particular pollutants and establishing fleet average emissions standards, the California LEV rules require the use of Zero Emission Vehicles (ZEVs). ZEVs were originally conceived as battery-electric vehicles but the category broadened to include fuel-cell vehicles as well. The California Air Resources Board (CARB) set technology-forcing targets for the state's future fleet. The standards require ZEVs to comprise an increasing percentage of a manufacturer's light duty fleet, going from 10% in 2005 to 16% in 2018.

F. California's NMOG Fleet Average Emission Requirement

As mentioned earlier, California sets an overall fleet average emission limit for NMOG. The opt-in states allow manufacturers a transitional period before the NMOG fleet average emissions requirement applies. To do so, there are basic rules for NMOG fleet average debits and credits. First, if the average emissions of all a manufacturer's models delivered for sale in that state, for any model year, exceed the fleet average requirement, the manufacturer earns debits. If the manufacturer's fleet average is lower than the requirement, they earn credits. Secondly, debits must be made up or "equalized" the following year using previously earned credits and/or credits earned during the following year. Lastly, if debits are not made up the following year, the manufacturer becomes liable for penalties.

G. Role of Reformulated Gas

Reformulated gasoline (RFG) is gasoline blended to burn cleaner and reduces smog-forming and toxic pollutants in the air. RFG is required by the Clean Air Act in cities with the worst smog pollution. When the federal reformulated gasoline program was phased in, there were 17 states and the District of Columbia that used this fuel.

The State of California implements its own reformulated gasoline program because California had the most serious air quality problems in the nation. The state required the production of even lower-polluting gasoline, California RFG. This fuel reduces air pollution emissions more than federal RFG and satisfies federal RFG requirements.

Reformulated gasoline provides emission reductions with or without the LEV II program. RFG only provides reductions for criteria pollutants but not for greenhouse gases. California estimates reformulated fuel reduces hydrocarbon emissions 17%, oxides of nitrogen 11% and air toxics 40% (potency-weighted basis). Reformulated gasoline has the advantage of not depending on fleet turnover as it immediately lowers emissions from all gasoline vehicles in a fleet.

This Workgroup is not charged with reviewing the reformulated gasoline component as of California's vehicle emissions program.[6]

H. Discussion of Background Material

1. Summary of Guest Speaker Comments

Chuck Shulock (CARB): Provided an overview of the California motor vehicle emission standards. Essentially, the California regulations pertain to light and medium duty vehicles, there is a declining fleet average emission requirement for NMOG emissions, and they include a zero emission vehicle (ZEV) program. California has revised the rules a number of times to reflect the changes, such as revising the ZEV program and specifying the types of vehicles that are regulated under the vehicle classes. Under the ZEV program, revisions included establishing new classes of vehicles, such as Partial Zero Emission Vehicles (PZEVs) and an associated extended warranty of 15 years/150,000 miles to help keep cars running cleanly.

[6] Some members of the Workgroup would like to recommend to the Governor that this issue be considered by a separate workgroup that would explore the advantages and disadvantages of such a program in Oregon given our current air quality conditions.

California also adopted the greenhouse gas (GHG) emission standards. Under the GHG standards, it stipulates CARB may not ban the sale of any vehicle category. The purpose of the rules was to require the use of existing technology to meet the GHG standards. Chuck also discussed the types of emerging technologies potentially available under the GHG standards. A summary of the current lawsuits against California and their status concluded the talk.

Dennis McLerran (Puget Sound Clean Air Agency): Began with a discussion of the Washington efforts to address climate change. He talked about the Legislature's efforts to address climate change through the adoption of the California standards. The Washington Legislature considered the actual air quality benefits, effects on vehicle model availability, whether its proposed laws are pre-empted, and the potential for out-of-state dealer sales resulting in loss of WA dealer business. The Washington legislature adopted the California standards contingent upon Oregon adopting them. In addition, the legislature excluded the ZEV portion of the program and exempted California certified vehicles from their emissions testing program. Dennis cautioned that Oregon should not necessarily follow Washington's lead on their changes to the program.

Bob Saunders (Washington Department of Ecology): Bob addressed the implementation side of the California standards and gave background on the committee process used to develop Washington's rules. The main issues addressed how the requirements are phased-in, what kind of data should be reported, how the program will be implemented, and inspection and dealer requirement issues. Washington is allowing a four-year phase in process for the fleet average emission requirements, is asking for more reporting information from auto manufacturers than other states (by tracking how many federal cars are sold to dealers), and conducting dealer inspections while looking for large instances of noncompliance. Additionally, the Department of Ecology is working with the Department of Licensing (DOL) to track how many vehicles are being registered under their exemptions.

2. Summary of Public Comments

During the course of the Workgroup meetings, the public was invited to provide oral comment. The following thirty people spoke in favor of the adopting the California standards in Oregon: Jenny Holmes (Ecumenical Ministries of Oregon), Bernice Hirtzel (OSPIRG), Bill Bugbee (Washington County resident), Jim Lester (Multnomah County resident), Marylou Noble (Multnomah County resident), Jim Edelson (Oregon Interfaith Global Warming Steering Committee), Jean Fitzgerald (citizen), Jerry McIntyre (small business owner), Charles Kilo (Physicians for Social Responsibility), Eli Lamb (citizen), Martha Perez (student), Tom Barron (citizen), Barbara McLean (citizen), Paul Fox (citizen), Ruth Phinney (citizen), Alison Hill (citizen), Rick Durst (citizen), Marvin Moore (citizen), Henry Germond (citizen), Margaret Noel (League of Women Voters), Laura Etherton (OSPIRG), Gavin Clark (citizen), Sue Bartlett (citizen), Cyd Manro (citizen), Walt Mintkeski (citizen), Jonathan Dubay (citizen), Jerry Magee (citizen), Caroline Kincaid (citizen), Mark Freidberg (citizen), and Barbara Crest (NW Automotive Trades Association).

One member of the public spoke against the adoption of the California standards in Oregon: John Charles (Cascade Policy Institute).

In addition, through DEQ's website, the public had the opportunity to submit written comments. DEQ received 1,128 comments in support of adopting the California standards in Oregon and 78 comments against the adoption of the California standards. Their comments are in **Appendix K** and are at the DEQ's Headquarters in Portland for viewing in person.

3. Summary of Workgroup Comments

Workgroup members asked the Washington guests about the details of implementation, for example: (1) costs of implementing the rules and its effect on dealers; (2) how many cars currently in Washington are California compliant; (3) registration denial in Washington; (4) types of exemptions; (5) dealer inspections; and (6) the possibility of including a sign in the cars that notify the purchaser if the car is California compliant. In response, Dennis McLerran and Bob Saunders replied that they (1) do not believe it imposes costs on dealers and will not be an expensive program to implement; (2) estimate about 70% of vehicles in Washington are California-compliant (although Steve Douglas (Alliance of Automobile Manufacturers - AAM) clarified the 70% of CA-compliant vehicles does not include the CO_2 emissions reduction component because the Pavley requirements have not gone into effect); (3) have the authority to do "registration denial"; (4) have a list of exemptions in their rules, which can include military service or job transfer from out of state; (5) have worked with dealers regarding compliance and dealer inspections; and (6) decided not to go forward with including a sign in the cars notifying that the car is not California-compliant.

Workgroup members asked if there were ways to tie the VIN number to California compliance information or to add information about the car into the vehicle licensing database. Washington replied they did not look into the database issue and the VIN and compliance information cannot be tied together. For Washington, the bigger issue was how to deal with cars that are registered out of state and whether they are California compliant. Workgroup members also discussed whether the labels under the hood were tamper proof (yes) and if labels identify the amount of emissions coming from the vehicle (yes).

Steve Douglas, AAM, sought to clarify the passage about reformulated gas in the briefing paper. He pointed out reformulated gas provides a benefit and is a reason for some of the biggest emission reductions in California. Chuck Shulock, CARB, agreed but said that reformulated gas is not needed to get emissions benefits under the California standards. The group agreed to include a clarifying statement in the briefing paper. Additionally, Chris Hagerbaumer, Oregon Environmental Council (OEC), mentioned reformulated gasoline provides small GHG emissions benefits so a separate emissions standard for vehicles is needed to reduce GHG.

Al Jubitz asked if it were true that under the California standards, CO_2 levels (tons/year) would remain the same. Chuck Shulock, CARB, confirmed it and attributed it to large vehicle miles traveled (VMT) growth. The Oregon Department of Transportation's (ODOT) projection for the next ten years is 1.95% average annual VMT growth, non-compounded. VMT growth is a combination of population growth and growth in VMT per capita. Steve Douglas, AAM, commented that he does not consider CO_2 to be a pollutant in the same way that CO is a pollutant.

Andy Ginsburg, DEQ, asked if the technology to reduce CO_2 emissions is patented. Both Chuck Shulock and Steve Douglas replied that the technology itself may or may not be patented. Accessing the technology should not be a problem for manufacturers.

Alan DeBoer, OADA, asked if CO_2 emission controls directly affect gas mileage. Dave Nordberg, DEQ, responded the Pavley rules do not directly require increased fuel economy as other techniques can be used to reduce GHGs that are far more potent than CO_2. These include reducing nitrous oxide emissions through catalytic converter improvements and reducing refrigerant losses by improving air conditioning systems. Dave Nordberg, DEQ, also

indicated most industry observers expect auto manufacturers to comply with GHG requirements using techniques that will also produce significant fuel savings.

According to CARB, 97 percent of the GHG emissions from a vehicle are related to tailpipe CO_2 emissions. Steve Douglas, AAM, indicates the U.S. EPA states that the only way to reduce tailpipe CO_2 emissions is by improving fuel economy[7]. He asserts the California standards cannot be met without improving fuel economy. CARB asserts it has clear legal authority to adopt GHG standards and disagrees with EPA's conclusion, believing there are other ways to reduce CO_2 emissions, (e.g. propane, bio-fuels, hydrogen, electric, future technologies, etc).

Federally, the National Highway Traffic Safety Administration sets fleet average fuel economy for light-duty vehicles (CAFE Standards). AAM indicates these standards have the collateral effect of reducing greenhouse gases, the extent of which is debated.

[7] He cites the following portion of 68 Federal Register (September 8, 2003) at 52922-52933. "Even if GHGs were air pollutants generally subject to regulation under the CAA, Congress has not authorized the Agency [EPA] to regulate CO2 emissions from motor vehicles to the extent such standards would effectively regulate the fuel economy of passenger cars and light duty trucks. No technology currently exists or is under development that can capture and destroy or reduce emissions of CO2, unlike other emissions from motor vehicle tailpipes. At present, the only practical way to reduce tailpipe emissions of CO2 is to improve fuel economy. Congress has already created a detailed set of mandatory standards governing the fuel economy of cars and light duty trucks, and has authorized DOT--not EPA--to implement those standards..."

II. Legal Requirements and Issues for States Opting into California's Motor Vehicle Regulations

A. Federal Preemption and Exceptions

Section 209 of the federal Clean Air Act (CAA) generally prohibits states from adopting or enforcing standards relating to the control of emissions from new motor vehicles. However, California is exempted from this federal preemption and may set its own motor vehicle emissions standards if, in the aggregate, the California standards are at least as stringent as federal requirements. Congress allowed this exemption, in part, because California was the only state that regulated new-vehicle emissions before Congress required such standards in the federal CAA.

When California chooses to establish its own emission standards, it must apply to EPA for a waiver of the general preemption. EPA may deny California a waiver only in very limited circumstances. California has already received a waiver for the LEV II standards and plans to request a waiver for the Pavley standards at the end of 2005.[8]

California has requested a waiver for the ZEV requirements, and EPA is in the process of reviewing that waiver request.

B. Process for Opting in to California's Standards

Section 177 of the CAA allows most other states to adopt and enforce standards relating to motor vehicle emissions controls if such standards are "identical to the California standards for which a waiver has been granted." This is commonly referred to as "opting in." States that are eligible for adopting the California standards are commonly referred to as "opt-in states" or "section 177 states."

An opt-in state that chooses to adopt California's emission standards must adopt them at least 2 years before the beginning of the model year affected by the standards. A given model year actually begins as early as January 2 of the previous calendar year. Therefore, for the Pavley standards to go into effect in Oregon for the 2009 model year, the standards must be adopted by January 1, 2006. If Oregon adopts the standards after January 1, 2006 but before January 1, 2007, the first model year affected would be 2010.

Opt-in states can opt out of the California standards at any time. A state opting out of California's program would return to the federal standards.

C. Identicality Provision and "Third Vehicles"

Section 177 requires opt-in states to adopt standards that are "identical" to California's standards (referred to as the "Identicality provision"). The limits of the Identicality requirement, however, are not well defined. It does not require that the two sets of rules contain the exact same language; rather they cannot diverge in any substantive aspects such that a vehicle or engine manufacturer would be required to make a "third vehicle." That is, automakers currently must design one type of vehicle to meet federal regulations and another type of vehicle to meet California's standards. The state adopting California's standards must not alter California's

[8] 68 *Fed. Reg.* 19811 (April 22, 2003).

regulations such that auto manufacturers would need to design yet another automobile to meet these altered standards. Requiring manufacturers to design and produce different vehicles or engines for each state would be untenable.

According to EPA, all standards applicable to a segregatable program must be implemented in order to assure that specified vehicles required by a particular program are subject to the same emissions requirements. For example, a state could not adopt only California's NMOG standards for a LEV without adopting the NOx and CO standards. However, EPA believes that the ZEV mandate is separable from the rest of the LEV program. This interpretation remains untested in the courts.

It appears that states can adopt certain variations without violating the Identicality provision. The Second Circuit Court of Appeals has explained in broad terms that "standards relating to the control of emissions" describe regulatory measures intended to lower the level of auto emissions. For example, the tailpipe emission requirements contained in the LEV Program clearly are "standards, and such measures must be identical. However, "enforcement mechanisms," such as periodic testing and maintenance requirements and the level of penalties that can be assessed for rule violations, are regulatory devices intended to ensure that the "standards" are effective. These provisions need not be identical. Still, this distinction does not always provide a bright line.

EPA stated in 1994, that they believe the ZEV production or sales mandate is not required to ensure consistency with section 177. [9] EPA asserted that the ZEV sales mandate was not an emission standard but, instead, was an accompanying enforcement procedure because it did not limit the quantity, rate, or concentration of emissions. The federal D.C. Circuit vacated EPA's OTC rule in 1997. [10] Subsequently, EPA noticed approval of Maine's program on January 24, 2005. That program did not include any requirements for ZEVs sold. Because the emission reductions are controlled by the fleet average hydrocarbon curve and can be achieved without any specific ZEV sales mandates, EPA proposes to approve the rule.[11]

D. Prior Litigation

The auto manufacturers sued both New York and Massachusetts when they first opted in to California's standards. The most prominent claim was that the states' failure to adopt California's reformulated gasoline regulations violated the "Identicality" requirement and "third vehicle" prohibition of the CAA Section 177. After several rounds of appeals and remands, both the First and Second Federal Circuit Courts upheld the states' rules.[12]

Another key issue was whether the ZEV sales requirement was a "standard relating to the control of emissions" or merely an "enforcement mechanism." Both the First and Second

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[9] *See* 59 FED. REG. (Sept 22, 1994) at 48690-48692. Ozone Transport Commission: Low Emission Vehicle Program for Northeast Ozone Transport Region; Proposed Rule. www.deq.state.or.us/aq/aqplanning/CalLev/Index.htm (**Reference 11**)

[10] Although the D.C. Circuit Court subsequently vacated EPA's OTC rule directing the OTC states to adopt the Cal LEV standards, this issue was not before the court. *See Virginia v. EPA,* 108 F.3d 1397 (DC. Cir. 1997).

[11] See 70 Federal Register (January 24, 2005) at 3335-3339.

[12] *See Motor Vehicle Manuf. Assoc. v. New York State Dept. of Envt'l. Conservation,* 79 F.3d 1298 (2d Cir. 1996).

Circuits ruled that the ZEV sales requirement is a command that has a direct effect on the level of emissions and, therefore, is a "standard relating to the control of emissions."[13]

E. Current Lawsuits

Other legal issues may affect whether Oregon can implement the newest elements of the California vehicle emission standards, i.e., the Pavley standards, which reduce greenhouse gas emissions. These issues are discussed below.

1. Regulation of CO_2 as a Pollutant

On July 15, 2005, the District of Columbia, Federal Circuit Court of Appeals decided a case brought under section 202 of the CAA[14]. That section obligates EPA to regulate motor vehicle pollutants that cause air pollution or endanger public health and welfare. Several states (including Oregon) and nongovernmental organizations asserted that this provision requires EPA to regulate greenhouse gases from new motor vehicles. A split panel upheld EPA's decision not to regulate CO_2 as a pollutant. However, the ruling resulted in three distinct opinions, and several of the parties, including Oregon, have petitioned for a rehearing *en banc*. Because the court did not rule that EPA lacks authority to regulate CO_2 and did not address California's authority, some assert that it appears unlikely this ruling will directly affect California's request for a preemption waiver for the Pavley standards.

2. Fuel Economy Standards

The Alliance of Automobile Manufacturers, several California car dealers, and the Tulare County Farm Bureau challenged California's Pavley standards in federal district court on several grounds, including that the standards are an attempt to impose fuel economy standards for new motor vehicles and, thus, are preempted by federal law.[15] The Energy Policy and Conservation Act of 1976 established new car corporate average fuel economy (CAFE) standards, beginning with model year 1978, and it preempts state laws "related to fuel economy standards."[16] Plaintiffs contend that the Pavley standards are an attempt to regulate fuel economy by increasing vehicle fuel efficiency. California asserts, among other things, that fuel economy is not the only means of reducing CO_2, and that the Pavley requirements are authorized by the federal Clean Air Act because they are motor vehicle emission standards. The trial date is set for January 2007.

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[13] *See American Automobile Manufacturers Assoc.v. Cahill,* 152 F3d 196, 200 (2d Cir. 1998), *Ass'n. of Internat'l. Auto Mfrs. v. Mass. Dept. of Envt'l. Protection*, 208 F.3d 1, 6-7 (1st Cir. 2000).
[14] *Commonwealth of Massachusetts, et al., vs. Environmental Protection Agency,* 415 F.3d 50 (D.C. Cir 2005)
[15] *Central Valley Chrysler-Jeep, Inc. et al v. Witherspoon,* (E.D. Cal., No. CIV F-04-6663 REC LJO), filed Dec. 7, 2004.
[16] 49 U.S.C. § 32919(a).

3. California Environmental Quality Act (CEQA)

On September 2, 2005, two auto manufacturers filed a lawsuit under the California Environmental Quality Act (CEQA).[17] Plaintiffs allege that CARB failed to comply with CEQA's procedural requirements and challenge CARB's finding that the greenhouse gas rule approved by the Board will not have a significant adverse environmental impact.[18]

4. Oregon's Expenditures to Adopt California Standards

Three Oregon legislators, several automobile retailers, and the Alliance of Automobile Manufacturers filed a lawsuit against the DEQ and the Environmental Quality Commission (EQC) on September 9, 2005.[19] They challenge the Governor's line-item veto of a legislative appropriations bill, which struck the provision that neither the DEQ nor the EQC may spend money on adopting or enforcing the California standards. Oral argument is scheduled for November 7, 2005, and a ruling is expected by December 21, 2005, prior to EQC's December 22-23, 2005 meeting.

F. Impact of Pavley Lawsuits if Successful

If the federal court decides federal law preempts Pavley standards, California will need to modify its program accordingly. Any state that has already opted-in to Pavley will have to update its rules. Opt-in states would still have LEV II in place, which would continue to provide benefits by reducing ozone- forming emissions and air toxics. Further, California may be able to alter the Pavley requirements in response to an adverse ruling as they did with the ZEV requirements in response to similar challenges.

G. Discussion of Legal Issues and Requirements

In preparation for the workgroup discussion, Rachel Sakata (DEQ) briefed the workgroup on the Clean Air Act requirements that allow California to adopt motor vehicle emission standards and how other states can opt into this program.

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

2. Summary of Public Comments

During the public meetings, Jim Edelson of the Oregon Interfaith Global Warming Steering Committee presented testimony that the biggest obstacle to adopting the standards is the lawsuits filed by auto manufacturers. He encouraged the auto manufacturers to drop the lawsuits.

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[17] *General Motors Corp. v. California Air Resources Board,* No. 05CE CG 02787 (Cal. Super. Ct., Fresno County, Central Div.).

[18] Another state court action concerns alleged procedural defects in the rulemaking process under both the California Administrative Procedure Act and the California Health & Safety Code.
Fresno Dodge, Inc., et al. v. California Air Resources Board et al., No. 04CECG03498 (Cal. Super. Ct., Fresno County, Central Div., Dec. 7, 2004).

[19] *Ferrioli et al. v. Oregon Department of Environmental Quality et al.,* No. 05C18514 (Or. Cir. Ct., Marion County).

3. Summary of Workgroup Comments

Questions were raised regarding the issue of Washington's rules and Identicality because Washington did not adopt the ZEV requirements. Dennis McLerran, Puget Sound Clean Air Agency, and Bob Saunders, WA Ecology, indicated that the Identicality issue was a gray area for them and they hope to put the ZEV requirements back in during the next Legislative session.

The workgroup discussed opting out of the program or excluding various components of the California standards, such as the ZEV program. Shelley McIntyre, Department of Justice (DOJ), representative said there are no instances of any states opting out after opting in, but it is a simple process to do so. Steve Douglas, AAM, stated several states initially adopted the LEV program without adopting the ZEV provisions. He referenced an EPA opinion that states the ZEV provision can be excluded without violating Identicality. A copy of the opinion is included as Reference 12.

The workgroup discussed ZEV and whether excluding the ZEV requirement would violate Identicality. Shelley McIntyre, DOJ, explained some states did exclude ZEV but adopted it later and the ZEV issue and Identicality remains unclear. As of October 2005, all opt-in states with the exception of Washington and Pennsylvania, have adopted the ZEV program. California explained that they were optimistic about the ZEV program when it was first introduced. However, because of the emerging ZEV technology and early uncertainties before adoption of compliance alternatives, some northeast states did not initially adopt the ZEV portion of the program. Once California revised the rules again, the northeast states did adopt ZEV.

Andy Ginsburg, DEQ, asked if the number of lawsuits regarding the California program was unusual. Chuck Shulock, CARB, thought that it was. Mitch Rofsky, Better World Club, asked Steve Douglas, AAM, why they are suing in the opt-in states when they are already making California-compliant cars. Steve Douglas did not know the answer as it was a policy decision and he is an engineer. Additionally, the workgroup discussed the pending lawsuit from the automobile manufacturers against Oregon DEQ. The lawsuit asserts the Governor cannot veto the provision that prohibits the DEQ from working on the California standards.

III. Expected Benefits to Human Health and the Environment in Oregon

A. Overview

As discussed previously, California vehicle emission standards include two components: LEV (Low Emission Vehicle) standards that address a variety of air pollutants (i.e. smog forming emissions, particulate, air toxics); and "Pavley" standards designed to reduce greenhouse gases. The expected emission benefits from each program are discussed below. The Governor's Advisory Group on Global Warming, December 17, 2004 consensus report, "Oregon Strategy for Greenhouse Gas Reductions", recommended the adoption of California vehicle standards as a key strategy to reduce greenhouse gas emissions in Oregon. Adopting California vehicle standards would also provide a secondary benefit of reduction in smog forming emissions and hazardous air pollutants (air toxics).

B. Pollution Impacts

1. Pavley

As discussed in the Governor's Advisory Group on Global Warming, greenhouse gas emissions contribute to a broad range of harmful effects. The report also states emissions will affect water resources, human health, coastal environments, agricultural production and the forest industry among others. Further information on the impact of global warming in Oregon is provided in Sections 3.2.1 to 3.2.5 of the report. Additional information on this topic is available at Oregon Department of Energy's website at: http://egov.oregon.gov/ENERGY/GBLWRM/Strategy.shtml

2. LEV

The LEV portion of California's emissions standards will reduce a variety of criteria pollutants that are linked to air quality public health standards. These include precursors of ground level ozone (volatile organic compounds (VOC), oxides of nitrogen (NOx), and carbon monoxide (CO). Ground level ozone, also known as smog, is an air pollutant formed in the atmosphere by a chemical reaction of VOCs and NOx. This reaction is most intense on hot summer days with poor ventilation. Ozone is a strong respiratory system irritant that aggravates respiratory illnesses, impairs physical activity, and can cause permanent respiratory system damage. Ozone can be especially harmful to older people and children, and can damage crops and other materials.

A secondary benefit of the LEV program is that it also reduces air toxics. Air toxics are generally defined as air pollutants known or suspected to cause cancer or other serious health problems. The U.S. Environmental Protection Agency (EPA) regulates 188 air toxics, also known as hazardous air pollutants. The emission reductions expected from California vehicle emissions standards would help reduce Oregonians' exposure to these hazardous air pollutants, as well as help ensure continued compliance with national ambient air quality standards.

C. Emissions Reductions

1. Background

Because of the federal vehicle standards, today's motor vehicles in Oregon are far cleaner than those of the early 1970s. However, since that time, both the population and the number of vehicle miles traveled (VMT) have increased dramatically. This increase in motor vehicle travel can erode the air quality benefits achieved from cleaner cars. Reducing air pollution in the face of continued growth is a key reason why motor vehicle emission control technology must continue to advance. However, even with continued increase in VMT and population, emissions of criteria pollutants and air toxics from the vehicle fleet will decline by 50 percent over the next two decades because of the federal and California vehicle standards. (For additional information on this subject please refer to "Summary of Workgroup Comments" p. 26-27). For GHG pollutants, emissions will increase proportionally to VMT growth unless further action is taken.

2. Greenhouse Gases (Pavley)

The Pavley requirements of the California standards are designed specifically to reduce greenhouse gases. In 2012, new vehicles are expected to have 22% lower greenhouse gas emissions compared to the 2002 fleet. When the standards are fully implemented in 2016, new vehicles will emit 30% lower greenhouse gas emissions.

California (CARB) staff estimate that the Pavley regulation will reduce climate change emissions from the light duty passenger vehicle fleet in California by 87,000 CO_2 equivalent tons per day in 2020 and 155,200 CO_2 equivalent tons per day in 2030. This equates to an 18 percent reduction in climate change emissions from the light-duty fleet in 2020 and a 27 percent reduction in 2030.

Fleet-wide greenhouse gas emission reductions for Oregon are expected to be similar to those predicted in California. Assuming that vehicle use in Oregon increases about 1.8% per year, California's vehicle emission standards will reduce CO_2 equivalent emissions in Oregon by an estimated 9,000 tons per day in 2020 and 16,000 tons per day in 2030.[20] **Figure 1** shows the reductions of GHG emissions in California under the Pavley standards.

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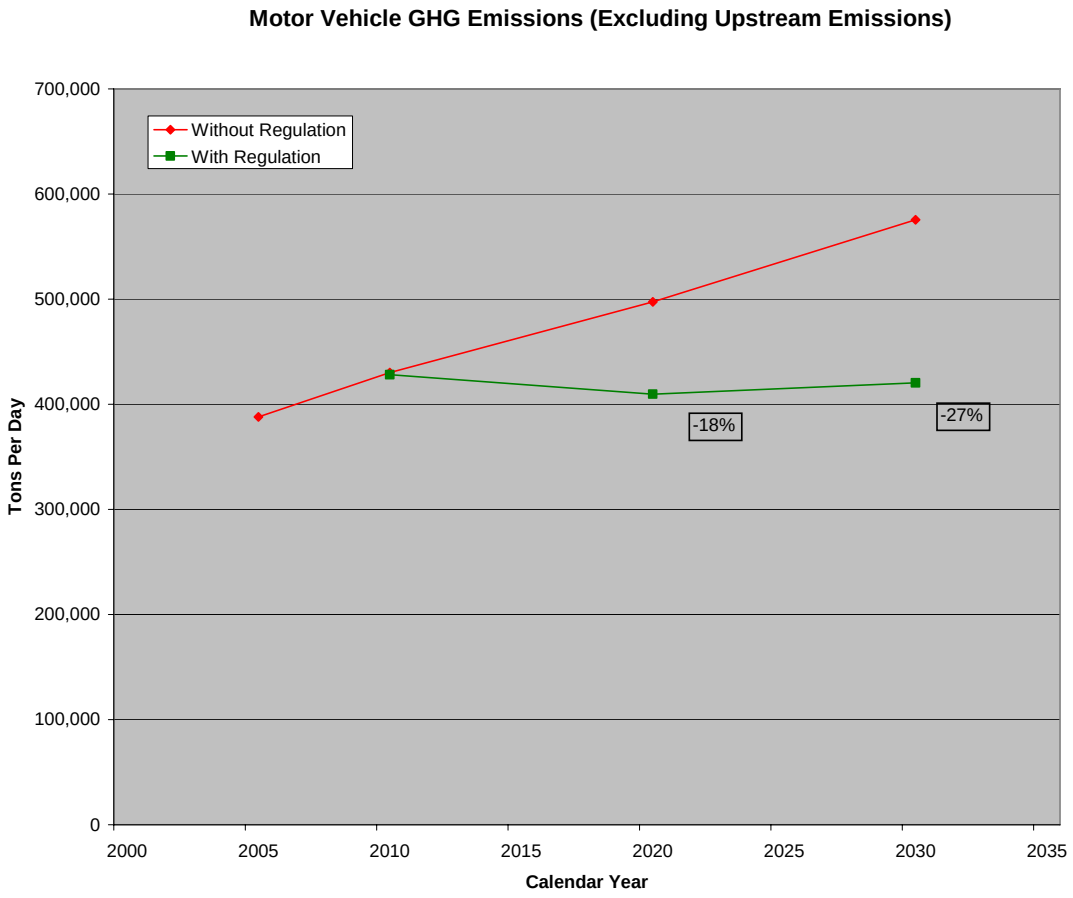
[20] The figures were based on the following assumptions:
2020 Average Annual Daily Vehicle Miles Traveled = 127.9 million miles
2030 Average Annual Daily Vehicle Miles Traveled = 152.9 million miles
Average baseline fuel efficiency = 25 mpg
CO_2E emissions = 19.4 lbs/gallon
Average fleet CO_2 reduction in 2020 = 18%
Average fleet CO_2 reduction in 2030 = 27%

Example - For 2020: [[[127.9 million miles / 25 mpg] * (19.4 lbs/gallon)] / (2,000 lbs/1 ton)] / 0.18 = ~9,000 tons/day of CO_2 reductions

Figure 1: Motor Vehicle GHG Emissions (in California)[21]



3. Criteria Pollutants (LEV)

To understand how the adoption of California's emissions standards would impact emissions levels in Oregon, the Oregon Department of Environmental Quality worked with Washington's Department of Ecology (ECY) in 2005 to model the emission reduction benefits. Four different types of pollutants were investigated:

- Carbon Monoxide (CO)
- Volatile Organic Compounds (VOC)
- Oxides of Nitrogen (NOx)
- Air Toxics

4. Modeling Results[22]

DEQ and ECY evaluated several modeling scenarios to develop a better understanding of the emission reduction benefits expected in Oregon from California's vehicle standards. The

[21] CARB, Report to the Legislature and the Governor on Regulations to Control Greenhouse Gas Emissions from Motor Vehicles, p. 16, www.arb.ca.gov/cc/reports/ab1493_legreport.pdf

[22] Washington Department of Ecology, "Adoption of the California Low-Emission Vehicle Program in Oregon Expected Emissions Reductions", August 5, 2005. www.deq.state.or.us/aq/aqplanning/CalLev/Index.htm (**Reference 12**)

evaluation addressed three groups of vehicles: brand new vehicles only, the light duty fleet only, and the entire fleet registered in the state.

The results show the additional emission reduction expected beyond what would be achieved by the federal program. For example, in **Table 2** below, the expected VOC benefit from California standards in 2020 is in the range of 12% to 21%. In other words, new vehicles subject to the California standards in that year are expected to have 12% to 21% lower VOC emissions than federal vehicles. The years 2020 and 2030 were chosen to be consistent with the Washington and CARB analyses.

In general, California's LEV II vehicles are significantly cleaner than federal Tier 2 vehicles. There are three reasons for this:

- California's NMOG fleet average emissions requirement produces a cleaner fleet overall than the federal NOx fleet average emission standard;
- California's ZEV provisions require additional numbers of very clean vehicles; and
- California's evaporative emission standards are more stringent than federal standards.

Table 2: LEV II Reductions Compared to Federal Tier 2: *New Vehicles Only (Oregon Fleet)*

Year	Pollutant	Reduction
2020	CO	15%
2020	VOC	12% - 21%
2020	NOx	30% - 33%
2020	Toxics	22% - 38%

Table 3: LEV II Reductions Compared to the Federal Tier 2: *Oregon Light Duty Fleet*

Pollutant	Without I/M *	With I/M**
Year 2020 Evaluation		
CO	7%	8%
VOC	3% - 6%	4% - 7%
NOx	5% - 6%	8% - 9%
Toxics	5% - 10%	7% - 14%
Year 2030 Evaluation		
CO	11% - 12%	13% - 14%
VOC	7% - 11%	8% - 14%
NOx	9% - 11%	15% - 18%
Toxics	9% - 17%	13% - 25%

Table 4: LEV II Reductions Compared to the Federal Tier 2: *Entire Oregon Fleet*

Pollutant	Without I/M*	With I/M**
Year 2020 Evaluation		
CO	6% - 7%	8%
VOC	3% - 5%	3% - 6%
NOx	3% - 4%	4% - 5%
Toxics	4% - 9%	6% - 11%
Year 2030 Evaluation		
CO	11%	12% - 13%
VOC	6% - 10%	7% - 12%
NOx	7% - 9%	11% - 13%
Toxics	7% - 14%	10% - 19%

* Represents the effects in areas not subject to a vehicle emissions testing (Inspection/Maintenance) program.
** Represents the effects in areas with vehicle emissions testing (Inspection/Maintenance): Clackamas, Jackson, Multnomah and Washington Counties.

In summary:

- **Table 2** shows the range of additional benefit when looking at just new passenger cars and light duty trucks. Because new vehicles reflect the latest technology, **Table 2** shows the greatest amount of emission reduction benefit. The fleet mix in this analysis does not represent the vehicle fleet as a whole.
- **Table 3** shows the range of additional benefit looking at the fleet of passenger cars and light duty trucks of all ages. Because this fleet includes a fraction of older vehicles, the average emission benefit is less than is the case from new vehicles.
- **Table 4** shows the range of additional benefit looking at all vehicles in a typical urban fleet (passenger cars though heavy duty trucks). Because this fleet includes vehicles of all ages as well as all vehicle types (such as heavy duty trucks not regulated by California standards), the average emission benefit is less than is the case in **Tables 2 and 3**.

5. Methodology/Range of Results

To compare the emissions benefit of California's LEV II standards with the federal Tier 2 standards, Washington's ECY used the latest EPA modeling program MOBILE6.2. To describe the future distribution of vehicles, ECY used the sales mix predicted by CARB in January 2005. That vehicle mix assumed the full use of PZEVs and ATPZEVs to meet the ZEV requirement. It is not clear what mix of vehicles manufacturers will produce to meet the Tier 2 standards, so ECY investigated two different scenarios. This approach produced a range of emission reductions. The analysis is consistent with EPA's Guidelines for estimating the benefits of switching from the federal Tier 2 program to the California LEV II standards. By conforming to those guidelines, this analysis avoids criticisms that were raised with an earlier study conducted by the Northeast States for Coordinated Air Use Management. That investigation--dated October 2003--was conducted before EPA released its guidance.

The result representing the lower emissions in the range was calculated using the MOBILE6.2 default fleet mix (developed before the beginning of the Tier 2 program). This assumed that a mixture of high, medium and low emitting vehicles would be produced. Excess emissions from the higher emitting vehicles were offset by the emissions savings produced by lower emitting vehicles. Because the emission limits specified for individual vehicle categories are not completely proportionate to the emissions of vehicles certified in those categories, different mixes of vehicles can produce different overall emissions. In this case, the broad vehicle distribution produced low emissions.

The result representing the higher emissions range was developed by Christopher Porter of Cambridge Systematics, Inc. as part of his review of the Washington State evaluation.[23] This approach assumed a normal bell-shaped distribution of vehicles with most vehicles clustered near the middle of the emission categories ("bin" 5 in the Tier 2 framework). Emissions from this clustered scenario resulted in higher emissions than the default fleet mix. Cambridge suggested that this scenario might be closer to actual vehicle fleet sales than the older default mix.

The analysis also assumed the ZEV requirement will be met using PZEV substitution and applied reasonable assumptions about the future fleet. For a detailed discussion of the assumptions behind the model, please see the August 5, 2005 report from Washington Department of Ecology, which is slated for posting on Oregon DEQ's website at www.deq.state.or.us/aq/.

6. Effects of Inspection/Maintenance Program

In Oregon, vehicles owned in the Portland and Medford areas are subject to emissions testing (I/M) every two years as a precondition of owners' re-registering their automobiles. Vehicles registered in those areas constitute 44% of the total number of vehicles registered in the state. The other 56% of vehicles in the state are not subject to I/M and were modeled separately.

The I/M program helps ensure that a vehicle's engine and emission control system will not significantly degrade over time (increasing air pollution). Because these cars are maintained to a high level over the life of the car, their lifetime emissions are less. The analysis results in **Tables 3 and 4** show this effect in that the range of expected benefits from California standards are higher in areas with an I/M program.

D. Discussion of Costs, Benefits and Impacts

In preparation for the workgroup discussion, Dave Nordberg (DEQ) briefed the workgroup about emission reductions anticipated under the California program.

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

[23] Email from Christopher Porter, Cambridge Systematics, Inc. to Sally Otterson, Washington Department of Ecology. Re: Revised Sales Mix (Phase-In). January 31, 2005.

2. Summary of Public Comments

During the public meetings, five members of the public [Jerry McIntyre (small business owner), Marylou Noble (Multnomah county resident), Bill Bugbee (Washington county resident), Margaret Noel (League of Women Voters), Laura Etherton (OSPIRG)] testified that the implementation of these rules would result in better air quality and fuel efficiency. Adopting the standards will help alleviate global warming and provide cleaner air for humans.

In addition, the following members presented individual testimony at the public meetings:

- Charles Kilo, Physicians for Social Responsibility, commented on the health effects caused by global warming. He discussed how cars are a primary contributor of particulates and that children, especially those who live in the city, suffer from asthma.
- John Charles, Cascade Policy Institute, commented that he does not think the California standards are necessary because air quality has improved dramatically since the 1970's and air emissions are going down. He commented that cars and trucks should not be targeted as the problem regarding air pollution. He stated that 97% of worldwide CO_2 emissions are natural and that the California standards will have very little effect on climate change.
- Laura Etherton, OSPIRG, commented that vehicle miles traveled are predicted to increase and by not adopting the California standards, global warming pollution from tailpipe emissions would increase 30+% in 2020.

3. Summary of Workgroup Comments

The group referred to a handout (Chart included as **Appendix H**) distributed by Steve Douglas, AAM. The chart showed a comparison of the expected emission reduction benefits (reductions in NOx and VOC) from the federal and California programs. The expected benefits differed somewhat from the information DEQ has provided (the AAM chart shows less difference between the federal and California programs in terms of vehicle emissions reduction).

The National Low Emission Vehicle, (NLEV), standards used as the base case in AAM's analysis, was a voluntary program that preceded the federal Tier 2 requirements. Auto manufacturers had the option of agreeing to comply with NLEV tailpipe standards prior to model year 2004. Additionally, it was a program Northeast states could adopt to meet State Implementation Plan requirements in their area. EPA would offer these states SIP credits for participating in the program.

The group acknowledged that there could be variation in the estimates of emission benefit depending on the underlying assumptions of the analysis. DEQ staff agreed to confer with Steve Douglas, AAM, to understand better the data and assumptions used in each analysis. At the request of workgroup members, DEQ created charts (**Tables 5 & 6**) with information supplied by Tom Darlington, Air Improvement Resource, (AAM contractor) to help illustrate the analysis. Data used to create these graphs was provided by Air Improvement Resource and is included as **Appendix I**.

Table 5: AAM's NOx Reductions – Base Case (NLEV), LEV II, and Federal Tier 2: *Entire Oregon Fleet* [24]

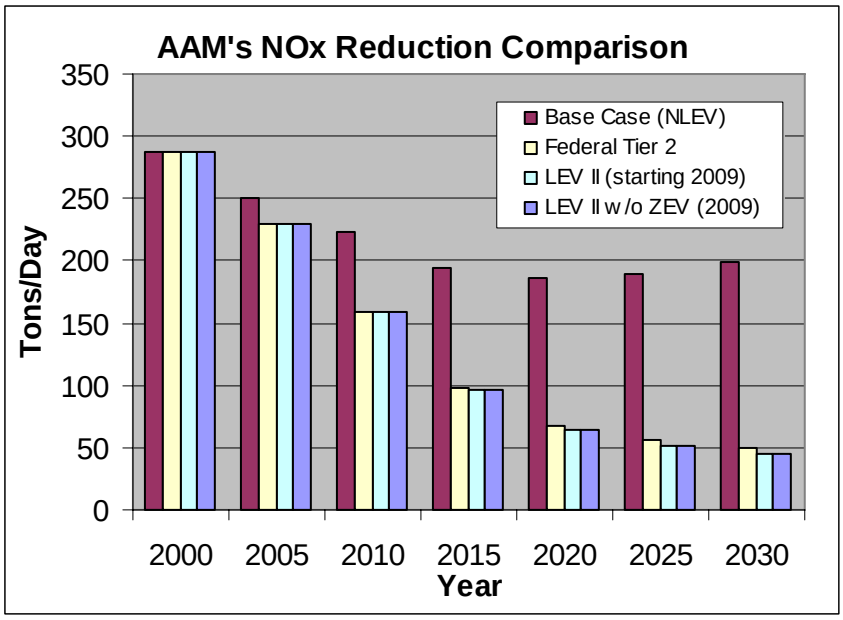
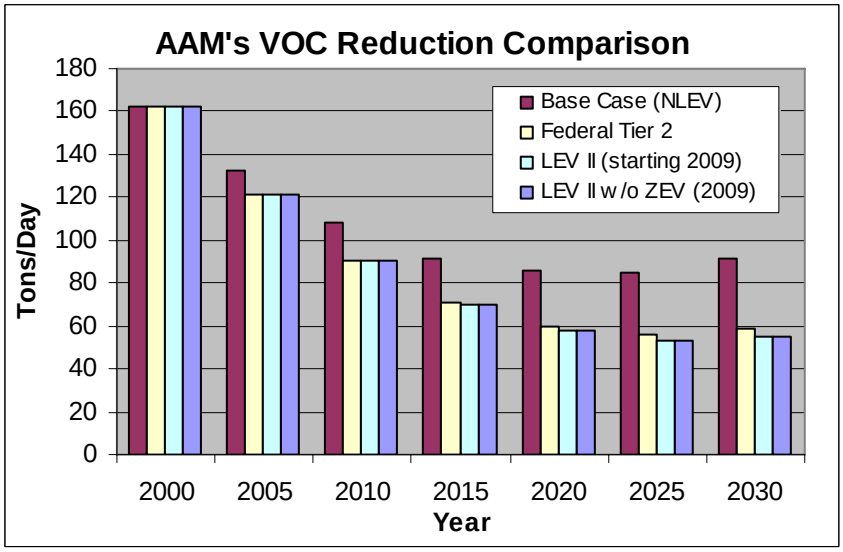


Table 6: AAM's VOC Reductions - Base Case (NLEV), LEV II, and Federal Tier 2: *Entire Oregon Fleet* [25]



[24] E-mail communication from Tom Darlington (AAM contractor) to Dave Nordberg (DEQ), October 11, 2005.
[25] E-mail communication from Tom Darlington (AAM contractor) to Dave Nordberg (DEQ), October 11, 2005.

Steve Douglas, AAM, pointed out in his handout that the federal vehicle standards would achieve a 70% reduction in NOx and VOC emissions by 2020 compared to 2000 levels. Restated, if Oregon does not adopt the California standards and stays with the federal standards, there will still be 70% emissions reductions for NOx and VOC from 2000 or a 50 percent reduction from 2005 levels.

Oregon's analysis did not look at historic emission reductions but compared expected emissions from the federal and California program today and in the future. Steve Douglas, AAM, was concerned with the way information was portrayed in the report, and wanted to clarify and recognize that substantial emission reduction benefits have been and can be achieved under either the federal or California standards. The workgroup agreed to include the handout in the report and asked DEQ to include graphs with information on CO_2 and air toxics reductions. The AAM handout, however, only addressed VOC and NOx and did not characterize GHG reductions.

Additionally, Steve Douglas, AAM, stated he believed the emission reductions between the federal and California standards are 1%-2% (for NOx and VOC) and questioned whether the cost of the program was worth the small emission reduction benefit. Again, it was recognized that there is variation in the expected benefit depending on the underlying assumptions, and that California, Oregon, and Washington's analysis shows a somewhat larger expected benefit.

DEQ and AAM's emission reduction data are not inconsistent. They simply present a different perspective of the same results. AAM's data focuses on large reductions that both Tier 2 and LEV II are expected to achieve during the next two decades. From that perspective, the difference between Tier 2 and Cal LEV II seems relatively small. DEQ's analysis does not address past emission reductions, but rather focuses on the differences between Tier 2 and LEV II going forward from today. This difference will continue to increase after 2020 because the ZEV standards are not fully phased in until 2018 and that the additional time is needed to allow for fleet turnover before the regulation's full effects are realized. Periodically, the federal and California programs take additional steps with California's program often in the lead. As a result, the gaps ebb and flow as programs come on line. However, the history of the program suggests that the gap could become smaller in the future as EPA adopts the air toxic regulation.

Regarding Oregon's analysis, Mark Reeve, the chair, asked if Oregon's fleet turnover was the same as that in California. Dave Nordberg, DEQ, replied the Oregon vehicles were a little older but that it was not enough of a difference to influence substantially Oregon's estimated benefits. Alan DeBoer, OADA, asked if the modeling was representative of existing cars, including those cars already in Oregon that are California compliant. DEQ's modeling assumes the existing fleet meets the federal cars requirements that currently apply to this state. DEQ believes this modeling assumption is appropriate for several reasons. First, the existence of a California-compliant sticker only means that vehicle falls within the standards of one of several emission categories. There is no indication that new vehicles sold in Oregon meet California's fleet average emission limit, which is the controlling feature of the program. Second, the NMOG fleet average limit will be substantially lower in 2009 when Oregon's rules go in effect. Third, the percentage of California certified vehicles in Oregon could well decline when the Pavley standard goes into effect unless Oregon adopts the California standards. Fourth, the approach used is the one that would be required by EPA, should Oregon ever claim emission reduction credit for the vehicle emission standards as part of the State Implementation Plan (SIP) under the Clean Air Act.

Bob Saunders, WA Ecology, stated that Washington's modeling numbers were similar to those produced by Steve Douglas, AAM. However, Bob Saunders disagreed with the way the information was presented, particularly because the graphs made it seem as though there is no emissions benefit. Washington calculated a 7-8% benefit for NOx and VOC in their state, taking into consideration EPA's guidance and other uncertainties. Washington's analysis (for both Washington and Oregon) applied California's emission standards to the mix of vehicles that California predicted will be used to meet those standards. That scenario was then compared two different fleet-mix scenarios where the Federal Tier 2 requirements would be in effect. One of those scenarios used a fleet mix described by Mobile 6.2 and the other scenario represented a compliance approach where manufacturers cluster most vehicles in the middle of the available emission categories. The clustering option was used because it is a less restrictive allowable compliance scenario. AAM's analysis used only the Mobile 6 default fleet mix[26].

Chris Hagerbaumer, OEC, submitted information showing the difference in smog-forming emissions between a California-certified vehicle and a federal vehicle. This information is included as **Appendix J**.

Some workgroup representatives expressed concern that the focus of the discussion was on criteria pollutants and not GHG. The primary benefit of the California standards is the GHG emissions reductions. Ashley Henry, OBA, asked to include information about CO_2 reductions if Steve Douglas's handout is included; that information is included as **Figure 1** on page 24. The workgroup concurred. Additionally, Steve Douglas, AAM, asked to remove **Table 4** from the report because it includes heavy-duty vehicles, which are not regulated as part of the California standards. DEQ believes **Table 4** provides useful information and has kept it in the report.

Alan DeBoer, OADA, asked about non opt-in states and their GHG levels. Chuck Shulock, CARB, replied studies were conducted regarding criteria pollutant levels but not for GHG because the standards were not yet enforced. However, it was difficult to compare the various states because each state has its own specific air quality issues due to its geographical location (Northeast states vs. Pacific Northwest) or legal criteria (EPA State Implementation Plan requirements).

Oregon's inspection and maintenance (I/M) program was also discussed because the Washington Legislature eliminated its I/M program. David Collier, DEQ, clarified the difference between I/M, which identifies cars that are not operating properly after they are four years old, and the California program, which requires new cars to be cleaner at the point of sale. Dave Collier indicated that the I/M program complements the California standards by ensuring that these highly controlled vehicles are maintained as they age. DEQ intends to retain the I/M program in the Portland and Medford areas because it is necessary to maintain air quality standards even with the California new car standards.

[26] Air Improvement Resource, Inc., Comparison of the Federal Tier 2 and California LEV Program in Oregon, October 4, 2005. www.deq.state.or.us/aq/aqplanning/CalLev/Index.htm (**Reference 13**)

IV. Cost of Vehicles

A. Overview

The initial purchase price of a new vehicle likely would increase if Oregon adopts California's vehicle emissions standards. At the same time, these advanced vehicles are likely to be more fuel efficient, producing savings to the consumer in fuel costs. The anticipated costs have been studied or estimated by several organizations including California's Air Resources Board (CARB), Northeast States Center for a Clean Air Future (NESCCAF), and Sierra Research. These cost ranges are summarized below.

B. California Air Resources Board (CARB)

1. LEV

Estimates derived from CARB data indicate that the Low Emissions Vehicle II program would increase average vehicle cost $115 to $271. Estimates are based on incremental costs of ZEV, PZEVs, ATPZEV in 2012, and CARB's predicted fleet mix.[27]

2. Pavley Costs

California greenhouse gas reduction regulations are phased in between model years 2009 and 2016. CARB estimates the average vehicle cost in constant dollars will increase over the phase-in period to a little more than $1,000 per vehicle as shown in **Table 7**. California's Pavley emission standards are required by law to achieve maximum feasible and cost effective greenhouse gas emissions reductions without reducing vehicle weight or banning the sale of any vehicle category such as sport utility vehicles or light duty trucks. Therefore, the estimated costs listed represent the cost of applying additional technology to the kinds of vehicles known today to achieve emission reductions.

Table 7: Average Vehicle Cost Increase under Pavley

	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

[27] Estimates derived from CARB Staff Report: Initial Statement of Reasons, 2003 Proposed Amendments to the California Zero Emission Vehicle Program Regulations dated Jan.10, 2003, **Table 5.1**. Pg. 39. http://www.arb.ca.gov/regact/zev2003/isor.pdf.

3. Pavley Savings

CARB also found that the increased initial purchase price of vehicles would be more than offset by reduced operating costs. For example, staff evaluated the potential increase in monthly loan payments over a typical 5-year car loan versus the monthly decrease in operating cost resulting from lower fuel consumption. Using the average increase in vehicle prices associated with the fully phased-in regulation (2016) and an assumed fuel price of $1.74 per gallon, staff calculated that the increased vehicle payment minus the lower operating cost would result in a monthly savings to the consumer of $3.38 to $6.74.[28] This savings will produce a net financial benefit that begins with the first month of vehicle ownership. At a fuel price of $3 per gallon, CARB estimated a net monthly savings of $20.37 to $25.68.[29]

The savings of individual vehicle owners may be magnified within the state's economy. That is because money spent on petroleum quickly leaves the state, whereas petroleum savings are more likely to be spent on local goods and services. The extent to which that occurs, the state's economy will recoup even more money from the consumers' savings.

C. Northeast States Center for a Clean Air Future

The Northeast States Center for a Clean Air Future (NESCCAF) studied the cost of dozens of technologies applied in various combinations to reduce greenhouse gas emissions. The analysis considered the emission reduction effects that the most promising technologies will have on five categories of motor vehicles ranging from small cars to large trucks. The study concluded that existing and emerging technologies "can achieve substantial and cost-effective reductions." Using a gasoline price of $2.00 per gallon, NESCCAF estimated that greenhouse gas reductions would save vehicle owners from $300 to $2,200 during the life of a vehicle while yielding CO_2 reductions up to approximately 45%.[30] CARB relied heavily on the information provided in this study to derive the costs and savings under Pavley. This study is available online at: http://bronze.nescaum.org/committees/mobile/rpt040923ghglightduty.pdf

D. Auto Industry Estimates

During California's rulemaking process, the auto industry argued that the greenhouse gas standards would produce lower savings than CARB estimated. The industry's position was based on an analysis by Sierra Research[31], which found that meeting the final (2016) Pavley standard would cost an average $3,000 per vehicle and save approximate 1000 gallons of fuel over that vehicle's life. The auto industry concluded the Pavley requirements would not be economical to the consumer.

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[28] CARB, Regulations to Control Greenhouse Gas Emissions From Motor Vehicles, Final Statement of Reasons, August 4, 2005, Revised **Table 10.5-1** of the ISOR Addendum, pg. 252. http://www.arb.ca.gov/regact/grnhsgas/fsor.pdf

[29] E-mail communication from Bill Dean (CARB) to Rachel Sakata (Oregon DEQ), September 22, 2005.

[30] Northeast States for a Clean Air Future, Reducing Greenhouse Gas Emissions from Light-Duty Motor Vehicles, pg. 3-23; September 2004. http://bronze.nescaum.org/committees/mobile/rpt040923ghglightduty.pdf **(Reference 5)**

[31] Sierra Research, Inc., Report No. SR2004-09-04, Review of the August 2004 Proposed CARB Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Cost Effectiveness for the Vehicle Owner or Operator, Appendix C to the Comments of The Alliance of Automobile Manufacturers, September 22, 2004. **(Reference 6)**

CARB responded to the industry's claims in the Final Statement of Reasons dated Aug. 4, 2005. In that document, CARB indicated the auto industry's analysis did not consider promising and cost-effective engine technologies such as homogeneous charge compression ignition engines or camless valve actuation systems. The industry analysis also assumed the use of expensive aluminum body structures and assigned higher estimated costs for vehicles components than CARB thought appropriate. Finally, CARB indicated that the industry assigned a higher than reasonable discount rate to their net present value analysis, (8% rather than 5%) and applied lower lifetime vehicle travel and different driving cycles to assess consumer savings.

E. Reliability of Past Cost Estimates

The NESCCAF study noted that cost projections include a degree of uncertainty because not all the technologies expected to be used are commercially available at this time. The study reviewed the cost estimates of meeting earlier California emission standards that CARB and the auto industry groups had made. After comparing those estimates with the actual implementation costs, NESCCAF found that both CARB and the auto industry overestimated the cost of meeting the earlier standards. The National Resources Defense Council, an environmental advocacy organization, found a similar pattern of overestimating the actual cost of controlling vehicle emissions.[32] Results of the NESCCAF review of past CARB and auto industry cost projections are shown in **Table 8**.

Table 8[33]: Estimated Costs of California's Low Emission Vehicle Program

Vehicle	CARB '94	CARB '96	ACG '93	AAMA '94	Actual
TLEV	$66	$72	$273	$298-487	$35
LEV	$122	$120	$788	$911-1,343	$83
ULEV	$227	$145	$679-1,326	$1,666-4,005	$251

TLEV: Transitional Low Emission Vehicle program that preceded California's LEV requirements.
CARB: California Air Resources Board
ACG: Automotive Consulting Group
AAMA: American Automobile Manufacturers Association

In 1990, CARB estimated that improved battery electric vehicles technology over time would result in an incremental cost of only $1,300 for pure electric vehicles. However, recent estimates show the cost of a mid-size full function battery electric vehicle with a range of 70-100 miles is still about $17,000 more than an equivalent conventional vehicle (or $16,900 more than a PZEV). [34]

F. Costs of No Action under the California Standards

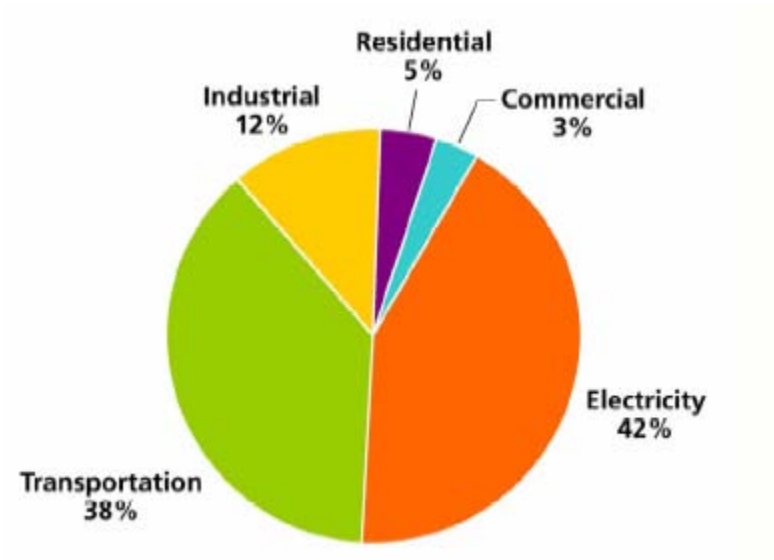
Under the Pavley standards, new cars must be cost-effective to the consumer. Therefore, the consumer should not see a net cost increase from the Pavley standards if Oregon opts in to the program. For example, many of the technologies manufacturers choose to comply with the

[32] Natural Resources Defense Council, Comments on the Proposed Adoption of Regulations by the California Air Resources Board (CARB) to Control Greenhouse Gas Emissions from Motor Vehicles, September 23, 2004, section 3.
[33] Northeast States for a Clean Air Future, Reducing Greenhouse Gas Emissions from Light-Duty Motor Vehicles, **Table 3-3**, pg. 3-4, September 2004. http://bronze.nescaum.org/committees/mobile/rpt040923ghglightduty.pdf **(Reference 5)**
[34] CARB, Final Statement of Reasons on the 2003 Amendments to the California Zero Emission Vehicle Program Regulations, January 2004, p. 17. http://www.arb.ca.gov/regact/zev2003/fsor.pdf

regulation are also expected to reduce operating costs. California believes that these will more than offset the higher initial purchase price and result in a net dollar savings to consumers.

Significantly, without the California standards there is the loss of GHG emission reductions. According to the Oregon Department of Energy, 84% of greenhouse gas pollution in Oregon is from carbon dioxide emissions. **Figure 2** shows the breakdown of Oregon's CO_2 emissions from fossil fuels by sector. Transportation emissions, such as those from cars and trucks are the second largest source. [35] By not adopting the California standards, Oregon would fail to address the second largest source of GHG emissions in the state.

Figure 2: Oregon's CO_2 Emissions from Fossil Fuels by Sector (Source: Oregon Department of Energy)



Adopting the standards is one important way for the state to reduce costs associated with both air pollution and global warming. More than 50 economists from across the Northwest and most of Oregon's major colleges and universities say that global warming poses an imminent threat to Oregon's $121 billion economy[36]. Temperature increases, rising sea levels, and altered precipitation patterns will directly influence human health and Oregon's agricultural, forestry, tourism and hydroelectric industries. These industries account for at least 25% of Oregon's economy.

- **Health Care**: Health-care costs are expected to rise in a warming world. Oregon could see an increase in unhealthy air days as hotter summertime temperatures lead to more frequent smog episodes. In extreme cases, these higher temperatures could lead to deaths, as evidenced by the abnormally high temperatures in Europe claiming more than

[35] Governor's Advisory Group on Global Warming, Oregon Strategy for Greenhouse Gas Reductions, State of Oregon, December 2004, p. 4-5. http://egov.oregon.gov/ENERGY/GBLWRM/docs/GWReport-FInal.pdf

[36] Resource Innovations Institute for a Sustainable Environment, The Economic Impacts of Climate Change in Oregon, A Preliminary Assessment, University of Oregon, 2005 http://ri.uoregon.edu/publicationspress/Consensus_report.pdf

20,000 lives in August 2003.[37] Drier summers could elevate pollen counts, making life more uncomfortable for people with asthma and allergies. Cases of certain insect-carried diseases are expected to rise, including Lyme disease and malaria.

- **Agriculture**: The sector contributes $11.5 billion to Oregon's economy each year, including $4.1 billion in crop production. Drought and streamflow declines will push irrigation demands beyond the capacity of reservoirs in some river basins, and altered temperatures are likely to displace temperature-sensitive high-value crops like Pinot Noir wine grapes from their current growing areas and diminish other sectors of the farm economy.
- **Forestry and Forest Products**: The sector contributes $10 billion to the state annually, and public and private forests occupy nearly half of Oregon's land area. Reduced snowpack and an increase in the frequency of droughts are likely to increase insect infestations and exacerbate wildfires, especially on the eastside. These changes will affect the forest products industry, rural communities, and the urban-wildland interface around communities, and the public agencies charged with fire response and disaster management.
- **Tourism**: Travel spending contributes more than $6 billion to Oregon each year and employs almost 100,000 Oregonians. Snowpack declines put Oregon's $200 million snow sports industry at risk, while coastal erosion and higher wave action caused by rising sea levels will diminish the state's multi-billion-dollar beach economy.
- **Hydroelectricity**: Dams in the Columbia River Basin generate over $7 billion in wholesale power each year, including surplus power exported out-of-state to meet demand elsewhere. Altered streamflows could reduce power exports by at least $230 million by 2020, according to the Northwest Power and Conservation Council.

There are other costs incurred by not acting under the California standards. These include lost economic opportunities for the state. By not implementing policies that address global warming, Oregon could lose a competitive advantage because it is not focusing on the technologies and practices needed to reduce greenhouse gases.

By adopting the clean car standards, Oregon will reduce carbon dioxide from passenger cars and light trucks by 12.3% below projected levels by 2020. Oregon's actions alone will not curb global warming, but additive efforts taken by states and countries will together reduce the threat.
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G. Discussion of Costs, Benefits and Impacts

In preparation for the workgroup discussion, Dave Nordberg (DEQ) briefed the workgroup about the estimated costs of the California program.

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

[37] Governor's Advisory Group on Global Warming, Oregon Strategy for Greenhouse Gas Reductions, State of Oregon, December 2004, p. 4-5. http://egov.oregon.gov/ENERGY/GBLWRM/docs/GWReport-FInal.pdf

2. Summary of Public Comments

At the public meetings, the following commentors provided oral testimony:

- Jerry Magee, citizen, commented that claims by the auto manufacturer regarding increased car prices are disingenuous because the costs of associated with health care and higher fuel demand costs more overall. Additionally, the costs of paying gas taxes and maintaining domestic oil production hurts consumer's pockets.
- Paul Fox, citizen, commented that the initial car price increase would be offset by reduced health care and gasoline costs.

3. Summary of Workgroup Comments

Chuck Shulock, CARB, explained some of the differences in the cost estimates from the auto industry and California. For example, CARB used different markup factors than the auto industry (1.4 vs. 2.25) when estimating the cost of component parts. The auto industry assumed lower GHG benefits would be achieved and assumed that all possible technologies would be needed to meet greenhouse gas standards. This included using expensive aluminum in the construction of a vehicle to bring the weight down. The auto industry also believed CARB did not properly account for high mileage vehicles, specifically those vehicles with very high mileage over a few years. Another point of disagreement involved expectations for fuel economy. The auto industry believes the technology is not as fuel efficient in real world applications.

V. Independent Auto Repair Industry

A. Overview

California Air Resources Board Rules require 15 year/150,000 mile emission control system warranties on a substantial number of new vehicles. The warranties apply to PZEV vehicles to ensure that they will be well maintained and produce few emissions long into the future. These warranties may have an effect on the independent auto repair industry.

Extended warranties are a consequence of the requirement that a percentage of each manufacturer's yearly fleet be Zero Emissions Vehicles (ZEV) -- battery-electric or fuel cell vehicles). The ZEV requirement increases from 10% of new vehicles in 2005 to 16% in 2018, and was originally based on the concept of introducing battery-electric vehicles into widespread use. When the ZEV mandate was adopted in 1990, California Air Resources Board (CARB) acknowledged that the ZEV targets may be difficult or impractical to meet and provided that the agency periodically review the development of ZEV technology to determine the feasibility of the ZEV targets. During the review process, battery-electric technology was found to be advancing more slowly than the agency had hoped. As a result, CARB modified the ZEV rules to create two new vehicle categories that can be used to meet the ZEV requirement. Those are Partial Zero Emission Vehicles (PZEVs) and Advanced Technology Partial Zero Emission Vehicles (ATPZEVs).

PZEVs are conventional vehicles with very low tailpipe emissions and near-zero evaporative emissions, and can be used to offset true ZEVs at a ratio of five to one. (Five PZEVs = one ZEV.) Most ATPZEVs are hybrid vehicles and can be used to offset true ZEVs at a better ratio than PZEVs depending on the characteristics of a given model. (Approximately one and one-half to four and one-half ATPZEVs = one ZEV). To ensure that the reduced emissions of PZEVs and ATPZEVs remain low over a long period, CARB's rules require both groups to be provided with comprehensive warranties on emission control equipment that last 15 years or 150,000 miles. These warranties are far more substantial than warranties required for other California or federal vehicles.

Emission system warranties are required by both California and federal vehicle standards and have the features shown in **Table 9**. These warranties are in addition to the normal bumper-to-bumper or powertrain warranties normally offered by vehicle manufacturers. The emission system warranties generally apply when a faulty component activates the Malfunction Indicator Light (MIL) or "check engine" light. Other warranty requirements may apply if the vehicle fails a required emissions test even when the check engine light does not indicate a problem.

Table 9: Emissions Warranty for Federal vs. California-compliant vehicles

Type of Vehicle	Emissions Warranty (Defects Warranty)
Federal	8 years/80,000 miles*
California-compliant	3 years/50,000 miles** 7 years/70,000 miles***
PZEV	15 years/150,000 miles

* Applies only to high cost emission control components such as catalytic converters and electronic control modules (based on a list of emission control components, not a specific $ amount)

** Applies to all emissions-related parts

*** Applies to high-cost emissions-related parts (based on price of >$460, indexed to inflation)

Both federal and California warranties apply to California vehicles. If a catalytic converter of a California-compliant vehicle failed at 70,001 miles, it would be covered as part of the federal warranty (8 years/80,000 miles).

Oregon DEQ anticipates that the extended emission system warranties will provide some benefit to consumers through reduced repair costs or improved equipment durability. However, there are no data on which to base any projections, so any effects in this area are speculative and cannot be quantified.

CARB recognized that while substituting PZEVs for true ZEVs was beneficial overall, the extended PZEV warranties could have negative effects on the independent auto repair industry. That is because most warranty work is done free of charge only when performed at new-car dealerships. Concerned by this issue, CARB commissioned the RAND Corporation to research how the independent repair industry will be affected by the extended warranties and to assess alternatives for reducing any adverse effects.

The RAND study[38] evaluated a scenario in which the auto industry produces the maximum number of PZEVs allowed to meet the ZEV standard to determine the impact of the extended warranty. The dominant finding was that independent repair shop revenue will continue to grow with extended warranties, but at a slower rate (30% growth as compared to 36% growth by 2020), and will likely reduce profits for independent shop owners. RAND estimated an approximate 4.1% reduction in total revenue.

The RAND study concluded that extended warranties should not cause layoffs in the repair industry as a whole, although there may be some layoffs at some independent repair shops. RAND could not quantify whether, or how many, independent repair shops might have to lay off employees. However, the study states that because the impacts of extended warranties are felt only gradually over time, workforce reductions could possibly be handled through normal attrition. Additionally, slower growth in revenue may translate into slower growth in the number of repair shops statewide. These effects and any regional differences between urban and rural areas were beyond the scope of the study.

Methods that might be used to mitigate unwanted impacts include: a) educating consumers about when auto repairs may be done by those who are not new-car dealers, and b) the possibility of independent repair shops gaining the ability to perform future warranty work through service contract agreements.

B. Discussion of Costs, Benefits and Impacts

In preparation for the workgroup discussion, Dave Nordberg (DEQ) briefed the workgroup about the basics concerning PZEV vehicles and its extended 15-year/150,000 mile warranty.

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

[38] RAND Corporation, The Impact of Extended Vehicle Emission Warranties on California's Independent Repair Shops. DEQ understands the RAND study to be the most authoritative study to date evaluating the effect of the California's vehicle emissions regulation on the independent auto industry. The RAND study can be found on line at http://www.rand.org/publications/TR/TR235/ **(Reference 7)**

2. Summary of Public Comments

At the public meetings, the following people provided oral comment:

- Jim Houser, Hawthorne Auto Clinic, stated he believes vehicles will become more reliable and encourage the auto industry to make better emission components. This is because the industry will not want to see vehicles returned for warranty work. Secondly, under the PZEV warranty, consumers will have to adhere to the manufacturer's maintenance schedule in order to be eligible for the extended warranty consideration. Car owners will have an incentive to maintain their cars better and longer, thereby leading to cleaner vehicles. Jim claims the maintenance work can be performed by anyone competent, not just the manufacturer's franchisees. While the repair companies may not have as much business, he still supports the rules.
- Barbara Crest, NW Automotive Trades Association, noted their concern about the PZEV warranty and the impact it would have on their industry. Under the warranty, vehicle owners would take their vehicles to dealerships instead of the repair shops. She cited a CARB-commissioned study that found the PZEV warranty would result in lower profits, job losses, and a $500 million decline in business over a 5-year period for independent repair shops in California. In Oregon, this will particularly affect repair shops in rural areas. She commented that the independent auto repair business offers competitive pricing and services, which results in a benefit for Oregon vehicle owners. Additionally, the PZEV warranty would force owners to rely on dealerships and drive business away from the independent shops.

3. Summary of Workgroup Comments

Workgroup members discussed the details of the PZEV warranty, such as (1) the cost of the warranty because manufacturers may not be around for the full 15 year length of the warranty; (2) dealing with the warranty in the aftermarket since the aftermarket part must be California certified; and (3) the effects on auto repair shops as they move from doing repair work to maintenance work.

Bob Anderson, NATA, also discussed a number of items that are covered under the warranty, including the engine, transmission, and other emission control components. Because so many things can trigger the warranty, the industry is concerned about the potential loss of business. He suggested that two lights be installed in the car – one to notify if it is a warranty covered failure and one to indicate that it is not. Therefore, the customer will know what is covered under the warranty. Additionally, he commented that the manufacturer is only responsible to warranty the original emission related parts, therefore, replacement engines, transmissions, and brake components are not covered under the PZEV warranty if they are installed by an independent repair shop.

Dennis McLerran, PSCAA, expressed his disappointment with Washington's decision to eliminate the ZEV requirement and its associated PZEV warranty provisions. Because the warranty covers high-cost components having the warranty keeps the responsibility for emission control performance on the manufacturer and not the consumer. Without the warranty, the cost to fix the components is high enough that owners might not repair their vehicles, potentially causing greater emissions. As the vehicle ages and equipment starts to fail, emissions increase, and the warranty serves as a way to control these emissions.

According to Bob Anderson, NATA, there is concern about lost business to the independent auto repair industry because a large percentage of their work is related to malfunctions that are identified by the MIL, whether emission related or not. This can cause consumer confusion as to where the repair should be made for warranty or non-warranty purposes. Bob commented that consumers could be more inclined to go to the dealership and not the independent repair shop when the MIL is illuminated, because the vehicle owner could think it is an item covered under warranty. The dealer usually performs warranty work, even though compensation for warranty work may be less than the rate for non-warranty work. Bob Anderson, NATA, also commented that because manufacturers reimburse dealership shops at about 60 percent on warranty work, the extended PZEV warranty could be financially burdensome for them.

The workgroup discussed the reduction in expected repair shop growth rate was not only caused by the PZEV warranty, but also because manufacturers are building the cars for more durability to satisfy consumer desires and score higher on ratings like JDPowers.

The workgroup also discussed the effect on consumers, particularly if they live in a rural area where no warranty work can be easily performed. Alan DeBoer, OADA, expressed doubts about the durability of parts under a 15-year warranty. The group discussed how the auto industry and the dealers could work together to design a warranty system that is cost effective for manufacturers and allows dealers to provide a high level of customer service. Because of the many uncertainties surrounding the warranty (such as costs) Steve Douglas, AAM, suggested leaving out the ZEV mandate provisions in the current rules

CARB did not estimate an additional cost for the 150,000-mile warranty because, according to CARB, the manufacturers currently design emissions control system for PZEVs to operate for 150,000 miles with no failures. Discussions with other manufacturers indicate that they are also designing emissions control systems for at least 150,000 miles without failures. This is needed to improve quality results in surveys such as Consumer Union, JD Power's long-term dependability study.

Bob Anderson, NATA, was mostly concerned about how the actual application of the California standards would effect the eventual environmental outcome and the negative effects those standards will likely have on the independent auto repair industry in the state.

VI. Vehicle Model Availability (including diesel vehicles) and the Biodiesel Market

A. Model Availability for Gasoline Vehicles

When other states initially opted in, there was some concern that the clean car standards would prevent farmers and recreational vehicle owners from purchasing the vehicles they need or want. Under the California standards, generally, the ½-ton pickups (F150, GMC Sierra 1500, Toyota Tundra, and Dodge Ram 1500) are subject to the standards and the ¾-ton (F250, F350, GMC Sierra 2500, 3500, Dodge Ram 2500, and 3500) and heavier vehicles are not. These vehicles, however, do not break out cleanly according to model groups. Vehicle weight changes with engine size, body style, plus the type and number of options. Dealers have expressed concern that they would be unable to provide customers with the vehicles they want. However, all opt-in states have indicated to DEQ that the California standards have not affected gasoline vehicle availability.

There have also been concerns that in the future popular models will be unavailable for sale after the Pavley standards take effect in 2009. The legislation prohibited CARB from banning the sale of any vehicle category [39]. For example, under the Pavley standards:

1. Compliance is determined by a manufacturer's average, so higher greenhouse gas emitting vehicles can be averaged with lower greenhouse gas emitting vehicles.
2. A less stringent fleet average emission limit was established for trucks, making it easier for these vehicles to meet California standards;
3. The standards allow the manufacturer with the heaviest vehicle model mix (GM) to comply by using available technologies without altering their current mix of vehicles;
4. The standards are phased-in gradually (through 2016), so changes that will reduce greenhouse gas emissions can be made as new models are normally introduced; and
5. Medium duty trucks are specifically exempted. The Pavley standards do not apply to vehicles with GVW greater than 8500 lbs., such as the Ford 250s or 350s (3/4 ton and heavier pick-up trucks).

In short, CARB does not expect the GHG emission standards to affect the availability of the 2009 and later model year vehicle types and models. CARB expects vehicles to be the same size, have the same carrying capacity as today's cars and trucks and to perform better. They are also expected to cost less to operate. For additional information on the cost of vehicles, please refer to Section IV. Cost of Vehicles.

B. Potential Effect for Gasoline Vehicle Availability in Oregon

It is also expected that model availability will be enhanced in three ways:

1. Purchasers would have more than one choice for a variety of specific vehicles. For example, a 2005 Nissan Altima could have two versions of the car – one as a regular version of the car and the other as a PZEV version (which comes with a 15-year warranty on emissions related components);

[39] California Assembly Bill 1493, Section 43018.5 (d)(2). www.arb.ca.gov/cc/ab1493.pdf **(Reference 8)**

2. Oregon would be more likely to receive shipments of hybrid vehicles because manufacturers will give opt-in states priority because they need to meet the tighter emission standards. As a result, more vehicles would be available, considering Oregon has the second highest percentage of hybrid sales, based on total 2004 figures. In 2004, Oregon sold 2,300 hybrids, California sold 25,000 hybrids and Washington sold 3,500 hybrids; and
3. Dealer trades to match customer demand would be easier because the entire West Coast would be subject to the same standards.

The availability of diesel vehicles in Oregon is discussed in Section C. below and the workgroup discussion is captured in Section E. 3, "Summary of Workgroup Discussion."

C. Model Availability for Diesels

1. Overview

No light duty diesel cars currently meet the California LEV II standards and they are unavailable in California. These cars are the VW diesel Jetta and Passat, Mercedes E320 CDI, and the diesel Jeep Liberty. This is because under the California LEV II standards, vehicles certify to different types of emission categories with different levels of stringency in comparison to the federal standards. Additionally, the California regulations have different on-board diagnostic regulations, different supplemental federal test procedure requirements, and different optional 150,000-mile certification requirements. While all manufacturers are working toward the California standards, AAM indicates there is no certainty that light-duty diesel vehicles will ever meet all of the different California requirements. CARB has an expectation that manufacturers will be able to meet those standards based on its conversations with manufacturers due to advancing technology and the new federal diesel standards.

2. Federal Tier 2 Diesel Standards

When the California LEV II standards went into effect in 2004, the NOx, PM, Supplemental Federal Test Procedure (SFTP), and on-board diagnostic emission requirements were more stringent than the current Federal Tier 2 standards. However, for new passenger cars and light duty trucks, the Federal Tier 2 standards phase-in will be completed by 2007; for heavy light duty trucks and medium duty passenger vehicles, the Federal Tier 2 standards will be phased in beginning in 2008, with full compliance in 2009. Tier 2 standards require manufacturers to reduce significantly emissions from traditional levels. The result will be that the two standards will be closer than they have been in the past. However, even when fully phased-in, Federal Tier 2 standards will offer more flexible NOx requirements for diesel engines than the California LEV program. The automobile industry believes that diesel manufacturers will use the additional flexibility to provide more diesel engine options under the federal program than under California's rules. CARB anticipates that many or most manufacturers interested in serving the automotive diesel market will offer equipment that meets both California and federal standards.

Table 10 shows the differences between the 2009 California and federal standards as they affect diesel passenger vehicles below 8,500 lbs. These categories reflect the expected certification standards for diesel vehicles.

Table 10: California LEV II & Tier 2 Emission Standards for NOx: Light Duty Vehicles <8,500 lbs

California LEV II Emission Standards, Passenger Cars and Light Duty Vehicles < 8500 lbs, g/mi		
Category	**50,000 miles/5 years**	**120,000 miles/11 years**
	NOx	**NOx**
LEV	0.05	0.07
ULEV	0.05	0.07

Tier 2 Emission Standards, Federal Test Protocol (FTP) 75, g/mi		
Bin#	**50,000 miles**	**120,000 miles**
	NOx	**NOx**
8	0.14	0.20
7	0.11	0.15
6	0.08	0.10

For the California standards, the NOx standard is 0.05 g/mi for 50,000-mile standards. The federal standards are less restrictive, specifically for bins 6-8 allowing diesel engines more certification flexibility. Because the federal and California program classify vehicle groups differently, the emission limits for the two programs **are not directly comparable**. As mentioned in **Appendix E**, federal vehicles can be certified to any of eight emissions categories, which are called certification "bins". Manufacturers can choose which bins they use to certify vehicles as long as the average NOx emissions of new vehicles meet the *fleet average emission requirement* of 0.07 g/mi.

There is one vehicle weight class, however, that will still have less restrictive requirements under the Federal Tier 2 standards than under the California standards. This applies to vehicles between 6,000 and 8,499 lbs GVW, such as half-ton pickups (e.g., Ford F150). Currently, all of the trucks made in this weight class use gasoline, not diesel; therefore, vehicle availability should not be a problem.

3. History of Diesel Vehicles in California

In 1998, CARB adopted the LEV II program and eliminated the Transitional Low-Emission Vehicle (TLEV) category beginning in 2004 (which effectively precluded diesels in vehicles below 8500 lbs gross vehicle weight given the then-current status of technology).[40] At that time, there was a significant difference between the technically feasible emission levels of gasoline and diesel vehicles. The TLEV NOx standards for 2004-2006 vehicles would have been 10 times higher than the next less stringent standard (0.5 grams per mile vs. 0.05). The particulate matter (PM) standards would have been four times higher (0.04 vs. 0.01). Taking into account the fact that gasoline PM emissions actually are below the 0.01 standard (approximately 0.002),

[40] Alliance of Automobile Manufacturers, "Barriers to Diesel Vehicles in California", E-mail memo to Oregon DEQ, October 4, 2005

the TLEV standard would have allowed diesel vehicles to emit 20 times more PM than gasoline. Because of those circumstances, CARB decided to eliminate the TLEV standard. At the time of the CARB action diesels had just been identified as a source of mobile toxic air contaminants and CARB was concerned about providing a significantly relaxed standard for diesels when vehicles operating on other fuels could clearly meet levels that are more stringent.[41]

4. The Future of Diesel Vehicles in California

The automobile industry believes the limited number of emission categories in the CARB regulation does not provide air quality improvement because fleet average emission requirements already cap overall fleet emissions. However, the California fleet average requirement only caps overall VOC emissions. The pollutants of concern with diesel vehicles are NOx and PM. Thus, less restrictive emission categories intended to accommodate diesel vehicles could lead to NOx and PM increases despite the VOC fleet average.

Additionally, the federal program temporarily provides greater flexibility because it allows the use of the full useful life Supplemental Federal Test Procedure (SFTP) standards rather than the 4,000-mile SFTP standards. The SFTP is an additional drive cycle developed by CARB and EPA. When adopted, CARB and EPA set the standards based on a vehicle with 4,000 miles. However, EPA provided manufacturers the option to temporarily instead meet the full useful life SFTP (120,000 miles). While the federal program provides greater flexibility, it is not relevant for Oregon because the temporary provision expires after the 2008 model year. In addition, CARB has received information suggesting that it is possible to meet the 4,000-mile SFTP standards without use of a selective catalyst reduction (SCR) system and suggesting that meeting the 4,000-mile SFTP standards is easily doable with SCR systems.

The automobile industry also believes the requirements to monitor diesel oxidation catalysts and diesel particulate filters (DPF) adopted by CARB in 2002 are not technically feasible at this time.[42] CARB has indicated to the Alliance of Automobile Manufacturers that they believe these technologies are, in fact, feasible.

5. Diesel Conclusion

CARB and AAM have different views regarding the feasibility of manufacturing diesel vehicles that satisfy the California vehicle emission standards. The manufacturers note they are likely to meet the federal diesel standards, but are unsure about the California standards.

D. Effect on Biodiesel Market

Adopting California's clean car standards will not block biodiesel growth in Oregon even if manufacturers are not able to certify diesel passenger vehicles. The vast majority of the market for biodiesel fuels will be heavy-duty, on-road vehicles above 14,000 pounds, and non-road applications (e.g., construction equipment, oil heat for homes). These diesel vehicles and non-road uses are not regulated under California's clean car program and would not be regulated in Oregon. Further diesel passenger vehicles that are regulated under California standards can

[41] California Air Resources Board, "Diesel Vehicles in California", E-mail memo to Oregon DEQ, October 12, 2005
[42] Alliance of Automobile Manufacturers, "Barriers to Diesel Vehicles in California", E-mail memo to Oregon DEQ, October 4, 2005

operate on either regular diesel fuel or biodiesel, and are expected to be available in 2009, the earliest year that the California standards would take effect in Oregon.

E. Discussion of Costs, Benefits and Impacts

In preparation for the workgroup discussion, Rachel Sakata (DEQ) briefed the workgroup on vehicle model availability, including the diesel and biodiesel markets.

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

2. Summary of Public Comments

At the public meetings, the following people provided oral testimony:

- Paul Fox, citizen, commented that by promoting and adopting the standards all of the West Coast would create a large market of California-compliant vehicles that the auto industry could not ignore.
- Jim Houser, Hawthorne Auto Clinic, commented that low sulfur fuel and the commitment from major auto diesel manufacturers to meet California's diesel standards by 2009 would provide Oregon with cleaner diesel autos and trucks. These vehicles would have lower emissions and provide a boost to the biodiesel industry.

3. Summary of Workgroup Comments

The workgroup raised questions about model availability and whether or not that will become a problem under the California standards. Dennis McLerran, PSCAA, said that the issues they dealt with concerned dealers thinking the only vehicles that would match the regulations would be the small vehicles and thereby limiting their selling ability. He indicated Washington's research shows all vehicles will be able to meet the standards. Chuck Shulock, CARB, indicated they did not want to limit vehicle choice for the consumer and ensured vehicles could be available using existing technology. Alan DeBoer, OADA, stated fuel prices would also dictate vehicle demand based on rising gas prices. They are seeing this in the current decrease in big vehicle sales and the long waiting list for Prius cars.

There was disagreement about whether or not the diesel vehicles would be able to meet the California standards in 2009, based on information about the technology and cost feasibility. Steve Douglas, AAM, explained that he did not believe the manufacturers would be able to meet the California standards, based on his discussions with auto industry engineers. Due to the technological advances required, such as modifying the catalytic converter, he expressed manufacturer concerns about the cost feasibility to develop such technology. Additionally, the federal and California have different test procedures and standards. Dennis McLerran, PSCAA, and Chuck Shulock, CARB, said the technology does exist based on their conversations with auto manufacturers and diesel vehicles would be available by model year 2009 under the California standards. In addition, medium-duty diesel trucks are available in California. The workgroup also discussed diesel vehicles and why European cars are mostly diesel (lower taxes on diesel fuel, less stringent NOx standards, and consumer preference for diesel performance).

Alan DeBoer, auto dealer, and Steve Douglas, AAM, felt dealer trading under the California standards will make auto trading more difficult, not easier. This is due to the border state

allowance where a state bordering an opt-in state can sell both federal and California-compliant cars. They felt it was easier now because they can sell both kinds of cars, however, if the state adopts California standards only California cars would be available in Oregon. Dave Collier, DEQ, thought that adopting California standards in Oregon and Washington would help create a level playing field, allowing dealers to trade more easily cars among themselves up and down the West Coast.

Chris Hagerbaumer, OEC, noted that biodiesel growth would not be affected in Oregon by adopting California's vehicle requirements for the reasons noted above.

Steve Douglas, AAM, stated that none of the three statements in Section B "Potential Effect for Gasoline Vehicle Availability in Oregon" accurately portrays how model availability will be affected:

1. For item 1, manufacturers typically do not sell identical vehicles meeting different emission categories. The 2005 Nissan Altima would only be available meeting one emission category (not a "regular version and a PZEV version" as indicated. Thus, this would not enhance model availability.
2. Vehicle availability will be driven by consumer demand not by government mandates. Oregon does not have California regulations and yet they already receive more hybrid vehicles per capita than any other state in the U.S.
3. Dealer trades to match customer demand would be more difficult - not easier, because dealers would not be able to obtain vehicles from neighboring states unless those vehicles had been approved by California.
4. Model availability is already restricted in California where diesels are not available and could be even more restricted if the ZEV mandate or Pavley regulations are adopted.

VII. Zero Emissions Vehicle (ZEV) Requirements: Alternate Path Compliance, Early Banking, and Proportional Crediting

A. Zero Emission Vehicles

California vehicle emission standards include requirements for Zero Emission Vehicles (ZEVs). These requirements were adopted to stimulate advancement of clean vehicle technology and to lower the emission of pollutants from motor vehicles. ZEVs are on-road vehicles that produce none of the compounds that lead to traditional air quality problems such as smog or carbon monoxide.

Advantages of the ZEV program are that it lowers the emission of traditional pollutants (such as Non Methane Organic Gases (NMOG) and Oxides of Nitrogen) approximately 3% from what it would be without the ZEV program. It also promotes the development of technology forcing vehicles with no tailpipe emissions.[43] The disadvantage of the ZEV program is that it is responsible for the majority of the overall cost of meeting California's Low Emission Vehicle II standards. Not all states that adopted the LEV standards have adopted the ZEV sales requirement. As discussed in Section II, Legal Issues EPA has stated that the ZEV program is not required to ensure identicality with California's standards. Although this position has not yet been challenged in any court, EPA's argument is at least plausible and probably has a low practical risk of being challenged.

When ZEVs were originally conceived they were thought of as battery-electric vehicles, but today the category has broadened to include fuel-cell vehicles as well. In addition, the category has been modified to allow more flexible ways to meet the ZEV requirements using Partial Zero Emission Vehicles (PZEVs) and Advanced Technology Partial Zero Emission Vehicles (ATPZEVs).

The ZEV requirement was first adopted in 1990 and specifies that a percentage of vehicles sold by each manufacturer meet the zero-emission level. The basic ZEV rules are that a manufacturer's annual sales of light-duty vehicles must consist of a percentage of ZEVs that starts at 10% in 2008 and increases to 16% in 2018. The requirement first applied only as a percentage of passenger cars and light duty trucks 1 (PC/LDT1). It was expanded to apply to light duty trucks 2 (LDT2) phased in for the period beginning in 2007 and ending in 2012. CARB understood the ZEV requirement would be challenging and provided that the ZEV targets be reevaluated by a technical review panel every two years. During the last review process, CARB determined that ZEV technology was not developing as quickly as hoped, and they added flexible ways to meet the requirement. CARB could adjust the program in the future, as needed, to provide more flexibility.

B. ZEV Compliance Specifics

There are optional pathways for complying with the ZEV mandate. One is the base path and the other is the alternate path compliance. CARB expects that manufacturers will choose to comply under alternate path compliance.

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[43] CARB Initial Statement of Reasons, 2003 Amendments to California ZEV Program Regulations, Released January 10, 2003. **Table 6.2**, pg. 46.

1. Base Path

Knowing the cost and difficulty of meeting true ZEV technology, CARB allows a substitution approach where less expensive, alternative vehicles can be substituted for true ZEVs. The substitution system for ZEVs is not one-for-one. Five PZEVs can be substituted for one ZEV. ATPZEVs, however, can be substituted for true ZEVs at a more favorable rate. The actual substitution rate for ATPZEVs varies according to the characteristics of a given model. On average, approximately 2.5 ATPZEVs are expected to substitute for one ZEV. Finally, the five types of true ZEVs also meet the ZEV requirement at different rates. More credits are allowed for more capable vehicles. Vehicles with a range over 100 miles earn the highest amount of ZEV credits. Such vehicles (long-range battery-electrics and fuel-cell vehicles) can be counted as three ZEVs in complying with the ZEV requirement.

One added feature during the several revisions to the ZEV rules was that 5 Partial-Zero Emission Vehicles (PZEVs) could be substituted for one ZEV to comply with up to 6% of the 10% (2008) to 16% (2018) ZEV requirement. PZEVs are vehicles with very low (SULEV) tailpipe emissions, zero evaporative emissions and a 15-year warranty on the emission control system. PZEVS have only recently been introduced to the market, but many are now available. Examples of PZEVs currently approved by CARB are the Ford Focus and BMW 325i.

Half of the remaining ZEV target (i.e., 2% to 5% of a manufacturer's fleet) may be met with Advanced Technology PZEVs or ATPZEVs. ATPZEVs are vehicles that meet PZEV requirements, but also promote ZEVs through the use of electric drive, gaseous fuel storage, or other ZEV-enabling technology. Most vehicles in this group are gasoline-electric hybrids such as the Toyota Prius. The final amount of the total ZEV requirement must be met with true ZEVs, which are further divided into 5 groups ranging from Neighborhood Electric Vehicles (NEVs) through ZEV Types 0, I, II and III (**Table 11**).

Table 11: Types of "True" ZEVs

Zero Emission Vehicle		Electric & fuel cell vehicles
NEV	Neighborhood Electric Vehicle	(Slow, no min. range)
ZEV Type 0	Utility Electric Vehicle	< 50 mile range
ZEV Type I	City Electric Vehicle	50 to 100 mile range
ZEV Type II	Full Function Electric Vehicle	>100 mile range
ZEV Type III	Fuel Cell Electric Vehicle	> 100-mile range, fast refueling.

The California vehicle regulations describe how manufacturers must calculate compliance under the ZEV alternate methods. For more information on the ZEV program, see CARB's website at:

http://www.arb.ca.gov/msprog/zevprog/factsheets/tutorial/tutorial.htm

Heavy use of the substitution approach means that the future fleet will contain a high number of low-emitting technology vehicles (e.g., PZEVs, ATPZEVs). Because of the high substitution rates, CARB projects that in 2020, PZEVs and ATPZEVs will make up approximately 35% of the light duty fleet. Additionally, Oregon currently has a burgeoning car sharing industry and ATPZEVs used for car sharing may be used towards the accumulation of credits to help fulfill the ZEV requirement.

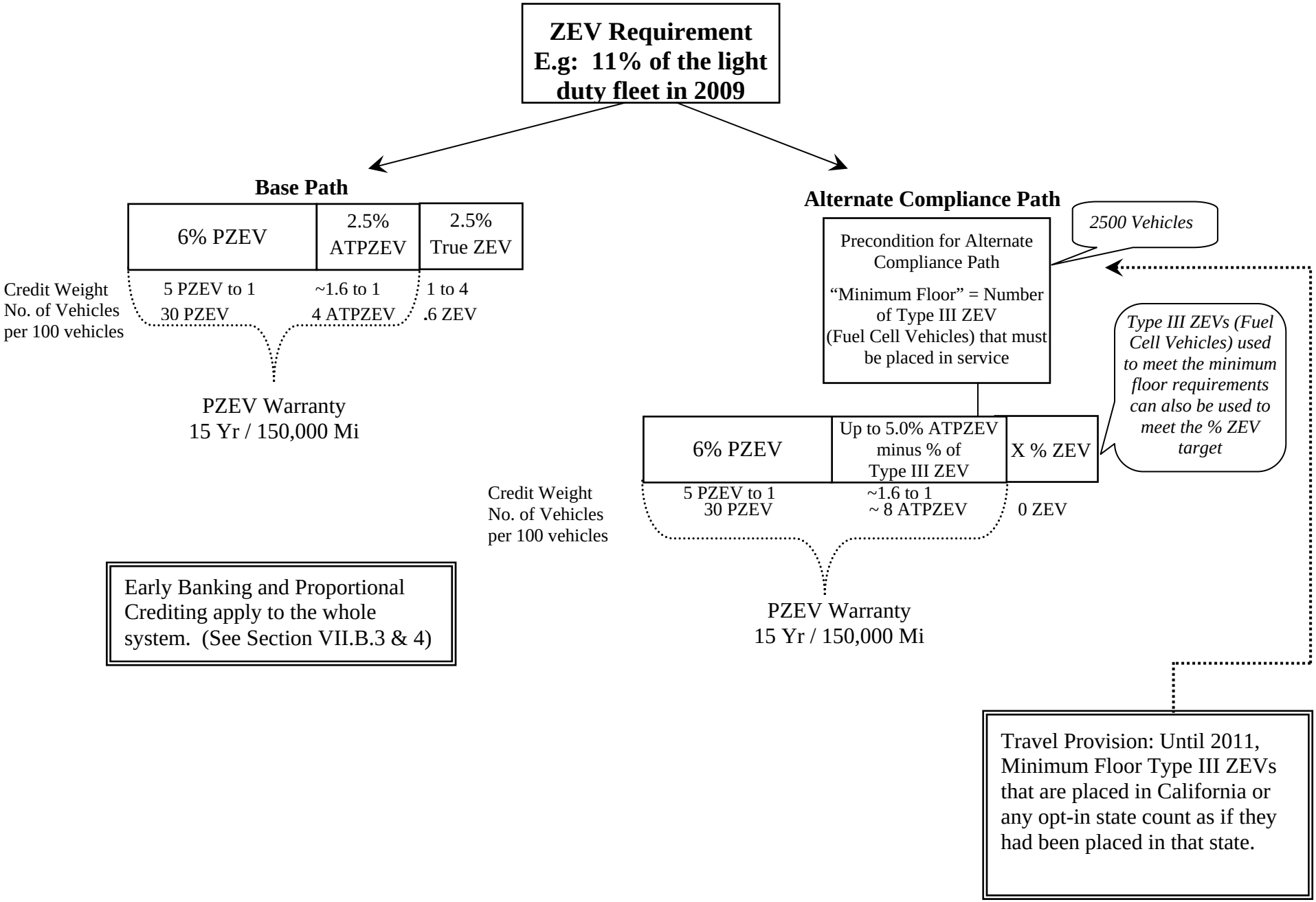
2. Alternate Compliance Path

All manufacturers will meet the requirements for true ZEVs using the Alternate Compliance Path. To qualify for the Alternate Path a manufacturer must meet a precondition by providing a "minimum floor" number of Type III ZEVs (fuel-cell vehicles) that must be placed in service. If all manufacturers use this approach, 2,500 Type III ZEVs will be placed in service during 2009 to 2011. Until 2012, the "travel provision" in the alternate path rules allows the required number of fuel cell vehicles to be placed in service in California or any opt-in state in the country. Credit will be given in each state even if there are no fuel cell cars sold in that state. Each manufacturer electing to follow the Alternate Path must provide a proportion of the required total that equals its market share of passenger vehicles and light duty trucks. Any shortage between the true ZEV credits required under the Base Path and the ZEV credits earned by the fuel cell vehicles placed in service must be made up using ATPZEVs.

The "minimum floor" or number of fuel cell vehicles required increases sharply under the Alternate Compliance Path. From 2012 to 2014, if all manufacturers follow the Alternate Path a total of 25,000 fuel cell vehicles will be placed in California with the number increasing to 50,000 during the years 2015 to 2017. In addition, beginning in 2012, fuel cell vehicles placed in opt-in states no longer count toward meeting the California requirement. For opt-in states, the California Alternate Path requirement would need to be met locally beginning in 2012, unless rule modifications were provided by California to scale the targets proportionally to each state's fleet size.

Figure 3 on the next page graphically depicts the two possible compliance pathways to meet the ZEV program fleet targets. CARB allows the substitution of near-zero emission vehicles (PZEVs and ATPZEVs) for true ZEVs, but not on a one-to-one basis.

Figure 3: Compliance Paths to Meet ZEV Program Requirements



3. Projected Oregon Fleet Mix

CARB estimates that manufacturers will meet the ZEV requirements by using the Alternate Compliance Path and will meet the ZEV-related requirements related to PZEV and ATPZEV production by over complying in the category of Passenger Cars (PC)/Light Duty Trucks (LDT1) <3750 lbs. and undercomplying in the Light Duty Truck 2 (LDT2) category between 3750 and 8500 lbs. California projected the mix of vehicles that would result from this approach as is shown in **Table 12** for the year 2020. Oregon applied that mix of vehicles to its own future fleet to determine vehicle emission reductions.

Table 12: Expected 2020 Oregon Fleet Mix to Meet ZEV Requirements

PC/LDT1 <3750 lbs		LDT2		Medium Duty Vehicles >8500 lbs	
True ZEVs	2%	Cal. LEV II	80%	LEV II	100%
PZEVs	57%	Fed. Tier 2 Bin 4*	20%		
ATPZEVs	14%				

*In cases where federal requirements are more restrictive than California's LEV II requirements, California's emission standards specify that the more restrictive standard applies.

4. Additional Cost of ZEV Vehicles

The same fleet mix projection is also used in conjunction with the expected incremental costs of PZEVs, ATPZEVs and true ZEVs shown in **Table 12** to estimate the average cost of complying with the ZEV program in Oregon. As mentioned earlier, one of the disadvantages of the ZEV program is that it is responsible for most of the cost of meeting the LEV II standards. **Table 13** lists the additional cost per vehicle under the program. While the cost of true ZEVs are substantially higher than for PZEVs and ATPZEVs, under the expected fleet mix in **Table 12**, only a small percentage of true ZEVs are expected in 2020 and potentially could be met through centralized fleets.

Table 13: Additional Cost of ZEV Vehicles[44]

Vehicle	Additional Cost in 2009	Additional Cost in 2012
PZEV	$100	$100
ATPZEV	$1,200	$700
Type II ZEV (battery EV)	$8,000 to $17,000	$8,000 to $17,000
Type III fast-refueling true ZEV (fuel-cell)	$120,000	$9,300

In the staff report, ARB staff noted that estimates for all ZEV vehicle types are subject to great uncertainty associated with projecting future costs for evolving technology.

C. Early Banking

To add regulatory flexibility and provide incentives for carmakers to introduce ZEV technology early, California's regulations allow manufacturers to exceed targets before the requirements take full effect and to bank that excess for future use. Several manufacturers accrued ZEV

[44] Estimates derived from CARB Staff Report: Initial Statement of Reasons, 2003 Proposed Amendments to the California Zero Emission Vehicle Program Regulations dated Jan.10, 2003, **Table 5.1**. Pg. 39. http://www.arb.ca.gov/regact/zev2003/isor.pdf.

credits by placing significant numbers of Neighborhood Electric Vehicles for use in California. Those manufacturers can document this early compliance and present it later to help satisfy the ZEV requirements.

D. Proportional Crediting

While early compliance and banking of credits is generally recognized as a reasonable regulatory feature, it raises problems for vehicle manufacturers when states opt into California's LEV program at a later date. In such instances, manufacturers may not have sufficient lead-time to accrue early credits, which may be critical to their compliance strategy. To address this situation, Rhode Island devised a proportional crediting provision, which acknowledges the early compliance credits that manufacturers earned in California before Rhode Island opted in to California's LEV program. Proportional crediting simply recognizes the percentage of a manufacturer's fleet that earned early credits in California and allows manufacturers to use the same percentage of credits in an opt-in state as if those credits had been earned locally. In addition to Rhode Island, New Jersey and Connecticut are adopting a proportional crediting feature to their programs.

E. ZEV Exclusion in Other States

A few states have omitted the ZEV requirement when opting in to California's LEV program. Massachusetts did not include ZEV requirements when they first opted-in, but added them later after court challenges to the legality of ZEV requirements were settled.

Maine excluded ZEV requirements from their rules in 2000, but adopted them in 2004 after California allowed an alternative path that did not require battery electric vehicles.

Washington State is opting in to California's standards without the ZEV requirement. Omitting the ZEV requirement eliminates the need for specific numbers of PZEVs (low emitting vehicles with zero evaporative emissions) ATPZEVs (hybrid electric vehicles) and true ZEVs (fuel cell and battery-electric vehicles). Not including the ZEV requirement makes the fleet average emission limits for NMOG the only controlling feature of the rules. California estimates that dropping the ZEV requirements allows criteria pollutants to increase approximately 3% from what it would be with ZEV requirements and does not affect the amount of greenhouse gas reductions that the regulations will achieve.

F. ZEV Infrastructure Requirements

As the CARB rules are currently written, the manufacturers have pursued the "alternative path" with the ZEV Type III requirement (> 100-mile range, fast refueling), which has a Fuel Cell Electric Vehicle. In 2012, these vehicles would require hydrogen-refueling infrastructure and repair facility remodeling in Oregon to support the then-existing numbers of Type III ZEVs. California budgeted $6.5 million in 2006 to co-fund up to three hydrogen-fueling stations ($500,000 per station), and incentives for vehicle purchase, etc. The ZEV mandate can also be accommodated by way of the "base path," which would require electrical vehicle recharging stations.

G. Discussion of Pros and Cons of Implementation Features

In preparation for the workgroup discussion, Dave Nordberg (DEQ) briefed the workgroup on zero emission vehicles, alternate compliance, early banking, and proportional crediting. Dave described the characteristics of PZEVs and ATPZEVs.

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

2. Summary of Public Comments

At the public meetings, oral testimony was provided on these specific topics:

- Gary Graunke, of the Oregon Electrical Vehicle Association, commented that he thought an electric vehicle was the best option and should be made available to the public. Additionally, he said electric vehicle technology has been in existence for a long time. While electric vehicles do not burn gasoline, the only constraint is the distance the vehicle can travel with a battery-powered motor. His concern regarding hydrogen fuel cell cars revolves around the conversion of electricity into hydrogen. He says the net effect provides only 20% efficiency, which is about the same as using oil.
- Rick Durst, citizen, commented that electric cars do not have as many parts and should cost less than combustion cars. The also require limited maintenance. He also mentioned that some of the first cars were electric and as people started to purchase gasoline cars, gas stations were installed everywhere. The same could happen with electric cars (with regards to installing plug-in stations) as more of them are brought into the market.
- Jenny Holmes, Ecumenical Ministries of Oregon, commented that the adoption of ZEV would encourage technology and help reduce emissions, subsequently providing clean air.
- Laura Etherton, OSPIRG, commented that without the full ZEV requirements, emissions would increase by 37% more than with the ZEV program. She also commented that ZEV is technology forcing and that in California the number of patents has risen dramatically because of the new technology.

Additionally, three members provided oral testimony expressing support for adopting the full ZEV program component in Oregon. [Jerry Magee (citizen), Gavin Clark (citizen), and Cyd Manro (citizen)].

3. Summary of Workgroup Comments

The workgroup had questions about the estimated additional cost for ZEVs. Chuck Shulock, CARB, clarified the estimate of $700 more for an ATPZEV was based on 2010 estimates for a mass produced hybrid electric vehicle. Additionally, he said GM expects to have, by 2010, a fully designed fuel cell vehicle that would be competitive with gasoline cars if produced in mass quantity. Steve Douglas, AAM, thought the figures should be much higher, especially if looking at the costs of a fuel cell car and expressed concern about having a fuel cell car available in 4 years. Alan DeBoer, OADA, stated he did not know of any hybrid (Prius) being only $700 more, but that they were several thousand dollars more. This raises the issue of whether this increase is due to supply and demand.

Dave Nordberg, DEQ, explained the current ZEV program in California is a demonstration program because manufacturers can place 250 true ZEVs anywhere in the country and meet the ZEV requirement. From 2009-2011, the requirement goes up to 2,500 cars and then to 25,000 cars from 2012 to 2014. This 25,000 requirement must be met by each state. Chuck Shulock, CARB, indicated he thought that having a fixed 25,000 vehicle requirement for each opt-in state was an oversight in the drafting of the regulation, as the other ZEV requirements are scaled proportionally according to vehicle sales in each state and that CARB would likely revise the requirement to correspond to fleet size in each state. In Oregon, if the requirements change, the true ZEV requirement would likely be 0.8% of new cars or approximately 1,000 new cars must be true ZEVs.

True ZEVs can be met by battery electric or fuel cell cars. However, Chuck Shulock, CARB, indicated all the major manufacturers affected by the regulations are choosing the fuel cell option because they did not think there was a future in battery electric vehicles. Bob Anderson, NATA, stated the battery technology is not there for true ZEVs and will not be available in the short term. CARB reevaluates its ZEV program every few years to determine what can realistically be achieved while also forcing technology. Chuck Shulock, CARB, indicated that his agency prefers to be aggressive rather than undershoot and leave potential reductions on the table.

The workgroup also discussed the concerns about developing true ZEV technology regarding fuel cell vehicles. David Van't Hof, Governor's Office, asked who would bear the cost if fuel cell cars were so costly that no one will buy them. Alan DeBoer, OADA, said the consumers would bear the cost, as the auto manufacturers will spread it out among the other cars. Another concern, voiced by Steve Douglas, AAM, and Bob Anderson, NATA, dealt with the lack of any infrastructure such as fuel cell stations in Oregon. Andy Ginsburg, DEQ, pointed out that an analogous problem exists with ultra low sulfur diesel, as it is not yet widely available, and getting the fueling structure developed generally starts with centrally fueled fleets. Andy Ginsburg also suggested that Oregon could consider adopting the ZEV requirement now and reviewing it later. This review could be done before implementation milestones based on the availability of the technology and fueling infrastructure.

Ashley Henry, OBA, and Ray Jubitz, (sitting in for Al Jubitz) raised the option of including cautionary language regarding the ZEV requirement in the report, noting there are caveats that raise concern because of possible lack of technology available at the time. This would make it clear to the Governor, that though they support the development of ZEV technology, it might not be feasible at this time.

David Van't Hof, Governor's Office, noted some states adopted the ZEV requirements, or initially left out ZEV, and then adopted it later. He asked if the rulemaking could adopt ZEV with modifications, such as dropping the true ZEV component. He asked whether that raises identicality issues. David then asked if the group, based on the concerns raised about the true ZEV portion and the potential emissions benefits and technology changes it could achieve, would list the pros and cons of ZEV and a modified ZEV option for consideration by the Governor.

The workgroup created a "brainstormed" list surrounding the adoption of the ZEV requirements, not adopting ZEV, and a modified ZEV program. **Table 14** on the next page summarizes their comments:

Table 14: Brainstormed Advantages of ZEV and Advantages of No ZEV (Disadvantages of ZEV)

FULL ZEV ADVANTAGES	NO ZEV ADVANTAGES
• Consistency • Consumer message • Larger AQ (criteria pollutants) benefits • Technology forcing • Marketing signal (interest) • More vehicle options • GHG benefits if Pavley overturned • Warranty benefits (PZEV): consumer • Economic development opportunity (technology) • Create hydrogen fueling stations • Car-sharing incentives • More durable systems for emissions control • Can repeal ZEV later • Prepares us for inevitable • Warranty makes repairs more likely • Spreads delivery and cost of infrastructure	• Buys time to see how ZEV plays out • Does not place undue burden on car owners compared to other polluters • Far less expensive • Avoids potential higher emissions because of fleet aging • Life cycle issue • Less market risk • Avoid forcing consumers to buy cars that they would not otherwise buy • Warranty increase cost of vehicles • Technology not there yet • Relying on California • Do not have to build infrastructure for warranty (statewide) • Can adopt ZEV later • Do not have to build hydrogen fueling structure • Decrease growth in aftermarket shops • Potential need for capital improvement to do work • Preserves consumer choice for repair • Reduces need for interest training

POTENTIAL OREGON MODIFIED ZEV FEATURES BRAINSTORM
What would it look like in Oregon?

- Explore goals (numbers) of ZEV program to ensure it is realistic for Oregon while also taking into account Oregon's high level of hybrid consumption
- Once a workable infrastructure is in place automatically implement true ZEV
- Proportional goals for true ZEV
- Determine if goals can be met without requiring a true ZEV
- Adopt full ZEV program with a biennial review of the infrastructure and changes in California to determine viability prior to 2012 with sufficient time for manufacturers to respond to any changes
- Adopt ZEV but modify criteria for true ZEV to allow other technology
- Ensure true ZEV technology is supportable by existing or future infrastructure
- Delay when ZEV (or true ZEV) goes into effect
- What version of modified ZEV would not create a 3rd vehicle?

Steve Douglas, AAM, thought the credits earned under early banking and proportional crediting vary by year and decreased over time. Steve Gutmann, Flexcar, asked what sort of car would earn 40 ZEV credits. A fuel cell vehicle put in place before 2009 would earn 40 ZEV credits. However, after 2009, the same vehicle would only earn four credits because the multiplier is reduced at the end of the 2008 model year.

The workgroup recommended that in regards to other options, to the extent California has committed itself to hydrogen fuel cell cars for true ZEVs, Oregon should explore other avenues for true ZEV that are more battery or electricity centric within the true ZEV world.

Chris Hagerbaumer, OEC, noted the growing car sharing industry in Oregon and wondered if any ATPZEVs used in the car-sharing program could be used as credits in meeting the ZEV requirement. Steve Douglas, AAM, indicated some manufacturers use the car-sharing program for credits, but thought Oregon would have to get credit approval by CARB's Executive Officer. Chuck Shulock, CARB, indicated he did not know the specifics but thought it could be approved by the state's Executive Officer.

The workgroup discussed if the proportional crediting and early banking can be adopted retroactively if Oregon adds ZEV later. According to Dave Nordberg, DEQ, the net credit bank in California will zero-out in 2008 or 2009. Chuck Shulock, CARB, said the early banking and proportional crediting were solutions tied to the true ZEV component. If Oregon considers excluding true ZEV, but adopting remaining ZEV requirements, he asked whether it was worth having the early banking/proportional crediting elements. Steve Douglas, AAM, suggested that adopting a modified ZEV program might violate Section 177 of the Clean Air Act.

Andy Ginsburg, DEQ, listed some of the pros and cons of proportional crediting and early banking. The con of proportional crediting is that the state would forgo some emissions reduction even though the effects are minimal. The pro is that it allows manufacturers to have a smoother implementation in states that opt in late.

Alan DeBoer, OADA, asked if there were any available ZEVs on the road right now. Currently, neighborhood electric vehicles are the only true ZEVs available, although there is active work on developing fuel cell cars. Ashley Henry, OBA, asked how close Oregon was to complying with the ZEV standards, looking at existing hybrids (ATPZEVs), PZEVs, and true ZEVs.

The workgroup also discussed the pros and cons of adopting ZEV without the PZEV warranty. Alan DeBoer, OADA, said the PZEV warranty not only adds costs to the vehicle but also exists to ensure people get their cars fixed. He also said the extended warranty should not be forced upon people because it is in the manufacturer's interest to ensure they make the best product available. Andy Ginsburg, DEQ, stated the PZEV warranty benefits the consumer as it provides a longer warranty for the car. Chuck Shulock, CARB, also said it ensures clean cars are on the roads, especially as they age.

Potential options for Oregon ZEV include:

a. Full ZEV program (with contingency provision to opt out of ZEV unless the 25,000 Fuel Cell requirement per state is reapportioned, per capita, by state).
b. ZEV program with Travel Provision extended to a future date contingent upon biennial review.
c. Customize the vehicle mix to achieve then existing "ZEV" program target.
d. Remove "True ZEV" requirement but retain PZEV & ATPZEV.

e. Remove requirement for PZEV Warranty.
f. No ZEV program.

VIII. Exemptions

Under the California standards, certain cars are exempt. These exemptions vary by state, but generally, the following exemptions apply in opt-in states.

A. List of Potential Exemptions

1) Military tactical vehicles,

2) Vehicles sold for registration and use outside of an opt-in state,

3) Previously registered vehicles where the mileage at the time of sale exceeds seven thousand five hundred miles, provided that for vehicle dealers, the mileage at the time of sales is determined by the odometer statement at the time the vehicle dealer acquired the vehicle,

4) Vehicles that are only available for rent to a final destination outside of the state,

5) Vehicles purchased by a nonresident prior to establishing residency in the state, regardless of the mileage on the vehicle,

6) Vehicles transferred by inheritance or as a result of divorce, dissolution or legal separation,

7) An emergency vehicle when a public safety agency has demonstrated to the department satisfaction that a vehicle that will meet said agency's needs is not otherwise reasonably available,

8) A vehicle acquired by a resident of this state for the purpose of replacing a vehicle registered to such resident that was damaged or became inoperative beyond reasonable repair or was stolen while out of this state, provided that such replacement vehicle is acquired out of state at the time the previously owned vehicle either was damaged or became inoperative or was stolen,

9) Vehicles owned by active duty military personnel who are stationed outside of Oregon and register their car in Oregon,

10) Vehicles designed exclusively for off-highway use,

11) Vehicles sold for the purpose of being wrecked or dismantled, and

12) Vehicles not requiring licensing or licensed with restricted highway use.

Washington included exemptions 1 through 7 in its rules.

B. Discussion of Pros and Cons of Implementation Features

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

2. Summary of Public Comments

No members of the public testified about exemptions.

3. Summary of Workgroup Discussion

Bob Saunders, WA Ecology, explained the rationale for Washington's decision in including or excluding various exemptions. For example, regarding #8 Washington advisory committee members questioned how one would verify if a vehicle was stolen or wrecked unless there was an accompanying police report. Washington decided to eliminate that option because they ultimately wanted to keep the number of exemptions to a minimum and limiting the possibility of potential loopholes. Steve Douglas, AAM, did not agree with Washington's decision to exclude #8.

The workgroup discussed adding #8 to the first seven exemptions noted above as proposed by Washington. Alan DeBoer, OADA, said at his dealerships they have sold vehicles to out of state residents that have had damaged, stolen, or inoperable vehicles while in Oregon. He said dealers fill out an affidavit for the out of state resident. The workgroup agreed to add it to the list of possible exemptions that Oregon should consider including in its rules.

The workgroup also discussed the California exemption that allows California residents on active military duty outside the state, to purchase and bring a non-compliant car into the state. The workgroup discussed whether military personnel could maintain a home of record and also be a resident of the state where they are stationed. If they choose to register in their state and then move to their home state, it would fall under a transfer exemption. Steve Douglas, AAM, asked whether the exemption provision applied if they are stationed somewhere else and they want to keep their registration in Oregon. This exemption would also be included. Alan DeBoer, OADA, said the benefit of registering a car in Oregon is the low registration fees. Monty King, Oregon Vehicle Dealer Association (OVDA) said active duty military personnel should not have to pay high out-of-state registrations costs because they cannot register their non-compliant car in Oregon. David Van't Hof, Governor's Office, said the Governor would probably agree with providing military personnel an exemption for their vehicles.

Andy Ginsburg, DEQ, asked how Oregon would verify if a previously registered vehicle qualifies for an exemption. Bob Saunders, WA Ecology, thought items 1-7 were easy to verify. Andy also raised concerns about the potential costs of verifying the exemptions. Sam Imperati, facilitator, suggested minimizing the verification costs by simply having people swear in an affidavit that an exemption applies, with a penalty for fraud.

Workgroup discussion indicated that some of the proposed exemptions might be unnecessary (10, 11, and 12) or not applicable to a state such as Oregon that cannot use registration denial as a component of its program. As a result, the workgroup favored including exemptions 1 through 9 in Oregon's rules.

IX. Compliance Verification and Enforcement

A. Overview

States specify in their regulations that car owners are responsible for owning a California compliant-car and that manufacturers and dealers are responsible for selling California compliant-cars. In implementing this requirement, states rely primarily on the dealer and manufacturer to ensure California-compliant cars are delivered and sold for purchase in an opt-in state.

B. Compliance Verification for Manufacturers

1. Manufacturer Car Certification

Before a car can be sold as California-compliant, manufacturers must have obtained certification from California. California issues an Executive Order to the manufacturer indicating that the specific engine family (a group of engines with similar emission characteristics), for which the manufacturer is seeking approval, is California-certified. Manufacturers then ship California-compliant cars to the dealer in any opt-in state for sale. Every year, manufacturers evaluate the fleet sales in the opt-in state and verify they have met the fleet average emission requirement.

2. Fleet Averaging

Under the California vehicle emission standards, a fleet average is the vehicle manufacturer's average vehicle emissions of all non-methane organic gases (NMOG) or greenhouse gases from all regulated vehicles in that state in a model year. For example, California LEV II regulations establish a fleet average emissions requirement of .053 g/mi NMOG for 2004 model year vehicles. Therefore, all 2004 model year vehicles offered for sale would have to have average fleet emissions that met or were below the standard.[45] This average emissions requirement becomes more stringent with each successive model year vehicles up until 2010. Beginning in 2009, the Pavley fleet average emission limits for greenhouse gas emissions are also applied and verified in similar fashion.

3. Phase In of NMOG Fleet Average Emission Requirements

There are two approaches to transitional allowances. The first is "deferred equalization". California, Connecticut, and Rhode Island defer the equalization year for three years. Debits can be earned in the first three years, but they do not have to be equalized until the fourth year. New Jersey essentially deferred the program for one year. California also allowed early credits before the fleet average first came into effect. The second is "deferred compliance". Massachusetts, Vermont and Maine allowed credits to be earned for three years without counting any debits. Essentially the assessment of debits was deferred for three years during which credits could be earned. Debits incurred in the fourth and subsequent years needed to be offset the following year. New York did not assess debits or credits until seven or eight years into the program. Washington's proposed rules defer the equalization for four years with the equalization year being the fifth. It has received comments from the manufacturers who

[45] California Code of Regulations, Title 13, Section 1961(b)(1)(A). http://www.arb.ca.gov/msprog/levprog/cleandoc/cleancompletelevregsasof8-14-04.pdf **(Reference 2)**

preferred the deferred compliance approach, which does not count debits. Washington's rule will be considered for final decision in December 2005. Oregon and Washington consistency has the benefit of easier implementation and leveling of the cross-border playing field.

4. Documentation

Manufacturers demonstrate compliance to each opt-in state by submitting documentation that their engines are certified to California's standards, annual reports of projected and actual sales, and their calculated fleet average emissions information. Each state's environmental department reviews the information and verifies that the manufacturer is in compliance. Manufacturers must also report on emission system warranty work performed and product recalls.

Additional reports must demonstrate how manufacturers meet the requirements for Zero Emission Vehicles (ZEVs) and any alternative compliance efforts (banking and trading). For information on these requirements, see the Section VII, Zero Emissions Vehicle (ZEV) Requirements, above.

C. Compliance Verification for Dealers

1. New Cars

Under the California vehicle emission standards, dealers only responsibility is to sell "new cars" that are California-certified. California's regulations define a "new car" as one having less than 7,500 miles.

Opt-in states vary in the procedures for dealer inspection and verification. At a minimum, states require that dealers keep the paperwork necessary to demonstrate that they sell only California-compliant cars for registration and use in the state. Documentation that can be subject to inspection includes the Manufacturer's Statement of Origin (MSO), delivery or sales records, and records of emission-related part repairs performed under warranty. Additionally, some states conduct under the hood inspections of the required California vehicle I.D. plate on dealer lots.

In most states, dealers can provide titling and registration of new vehicles as an agent of the state's Driver and Motor Vehicle (DMV) Division or Department of Motor Vehicles (DMV). If the state uses "registration denial" as a form of compliance, dealers who arrange for registration must provide proof to DMV that new vehicles meet California's emission standards as a condition of registration. A Manufacturer's Statement of Origin (MSO) states whether the car is compliant or not. Submission of an MSO with a vehicle registration application usually provides proof of compliance for brand new vehicles.

With the exception of Rhode Island and Maine, all states currently use or plan to use "registration denial." Maine relies on audits at the dealerships or a review of DMV registration information submitted by the dealer. California, New York, Connecticut, and Washington conduct dealer inspections as a supplemental way to verify compliance beyond registration denial. Washington's proposed regulations require manufacturers to report, upon request of the Department of Ecology, the vehicle identification numbers of all passenger cars, light duty trucks and medium duty passenger vehicles delivered to dealers that are not certified to California emission standards. By doing so, dealers receiving large numbers of non-California-certified cars are more likely to be inspected.

Massachusetts and Vermont conduct both registration denial and dealer inspections; however, these states rely only on registration denial to confirm compliance. Because Rhode Island and Maine do not have registration denial, they rely on dealer inspections to ensure compliance with the standards. Inspectors go onto the dealer lots to review the records or conduct an under-the-hood inspection. Each state conducts a dealer outreach program to ensure that dealers understand the requirements. Most states that are conducting dealer inspections have encountered fairly uniform compliance.

2. Used Cars

While most used cars have mileage over 7,500 miles, some "used" vehicles have mileage below 7,500 miles, in which case they are still subject to the California motor vehicle emission standards. Compliance verification methods for these cars vary by state.

As mentioned earlier, there are two ways to determine if a car is California-compliant: one is to look under the hood for the emissions label and the other is to look at the Manufacturer's Statement of Origin (MSO), which states whether the car is compliant or not. Most states use the MSO as proof of compliance.

Sometimes, however, there is no MSO accompanying a used car. This could happen if a used car is sold from person to person, from a dealer to a person, or if a vehicle is titled and registered from a non-LEV state and then sold to someone in a LEV state. In these instances, the original MSO is replaced with a titling document that does not say if the car is compliant with California's emission standards. Therefore, it is difficult to tell from the paperwork if the car is California-compliant.

When an MSO isn't available, states determine compliance in different ways. California confirms used car compliance by an under-the-hood inspection at time of registration. In Massachusetts, the owner can arrange to have a DMV inspector look under the hood to certify it is a California-certified car.

In New York, if the MSO does not indicate compliance or the person does not have an MSO, the registrant or dealer can certify compliance on a DMV form. The form must be signed by the registrant or dealer and attached to the registration documents. New Jersey and Washington are still working out compliance and verification details for their states.

D. Compliance Verification for Vehicle Owners

Most opt-in states rely on registration denial to ensure compliance for individual vehicle owners. Since non-compliant vehicles may not be registered in those states, individuals would generally return non-compliant vehicles to the dealer in exchange for a compliant vehicle. States without registration denial (Rhode Island and Maine) focus on compliance by dealers to minimize the potential for individuals to purchase noncompliant vehicles.

E. Compliance Options in Oregon

1. Overview

Based on a preliminary review of Oregon's statutes, Oregon's DMV does not have the authority to deny registration for non-compliant vehicles or to perform under the hood inspections.

Therefore, unless the statute is changed, compliance and enforcement of the California vehicle emission standards would primarily occur at the manufacturer and dealer level.

DEQ would review manufacturer's records to ensure that fleet average and other manufacturer requirements were met. DEQ would ensure dealer compliance for new vehicles by reviewing MSOs provided by Oregon's DMV. Any non-compliant vehicles identified would be flagged and the dealer could be contacted for outreach, technical assistance, or possible enforcement action. DEQ would use a combination of records review and under hood inspections to track compliance and trends for used vehicles below 7,500 miles that were previously registered in another state.

Figure 4 illustrates the basic system for the flow of motor vehicles entering Oregon and the points in that system where DEQ and DMV could engage to verify compliance. There are two main branches within this system, the path for new car sales and the path for used car sales. As **Figure 4** illustrates, the path for new car sales reflects the largest volume of vehicles entering the Oregon fleet.

2. New Car Pathway

For new cars, the main points of compliance verification are:

- Working directly with manufacturers to verify the annual sales mix and fleet average emissions.
- Working with DMV to review registration information and identify dealers selling non-compliance vehicles.

Approximately 140,000 new vehicles are registered for the first time each year in Oregon. As mentioned earlier, the original Manufacturer's Statement of Origin (MSO) accompanies a first-time registration. DEQ would review the MSO from DMV records to see if the cars are California compliant. As a supplement to the MSO, DEQ could request VIN information identifying all California and federal vehicles delivered for sale to any state[46] from the automobile manufacturers. This could come to DEQ in a database format to allow DEQ to sort and crosscheck information obtained from DMV to determine if there are high numbers of out of state or federal cars being registered in Oregon. If DEQ finds that some dealers are selling non-compliant cars, DEQ will work with the dealer through technical assistance or enforcement actions, if needed. If VIN records indicate a large number of federal cars entering the Oregon system, DEQ could investigate for possible compliance problems. Washington plans to request from the automobile manufacturers a list of federal VINs of vehicles delivered to Washington in order to search their Department of Licensing records and determine if any federal cars are registered in Washington.

There are also some cars (federal vehicles) bought in Oregon for use out of state. This may occur if a dealer has a contract with an Oregon company that is purchasing cars for its fleet outside of Oregon. DEQ would track the total number of cars (federal and California-compliant) from the manufacturer's report to look at trends. By doing so, DEQ could determine if dealers are receiving increased numbers of federal cars and potentially selling them for use in Oregon.

[46] AAM indicated that DEQ should only request information from Oregon.

3. Used Car Pathway

For used cars entering the Oregon system, the main points of compliance verification could include:

- Working with dealers to self-certify that used vehicles subject to California standards are indeed compliant.
- Working with DMV to review registration information and identify trends in cars registered from out of state, possibly leading to dealers selling non-compliance vehicles.
- For out-of-state vehicles to be initially registered within the vehicle inspection boundary, performing an under the hood check during vehicle inspection to determine if the cars are California compliant. If the car is non-compliant and does not qualify for an exemption, DEQ could deny them a vehicle inspection certificate.
- DEQ inspections of used vehicle dealers to verify compliance

A used car is subject to California standards if it has mileage less than 7,500 miles and is model year 2009 or later. According to DMV, there are approximately 5,500 used vehicles (with fewer than 7,500 miles) registered in Oregon each year.[47] Those that were originally sold as new in Oregon would already be compliant, but those that were imported from another state might not be California-certified. Used cars can enter the Oregon system through auto auctions, trade-ins, used car auto dealers, individuals, and by other means.

Either the dealer or the individual can register these used vehicles. DMV assumes that almost half of the registrations are completed by the dealer (approximately 2,200 vehicles out of 5,500). Dealers could check under the hood of vehicles, certify that the car is California-compliant, and submit an inspection form to DMV. DEQ could review DMV records for trends in the number of vehicles sold and track if there is a high influx of used vehicles with fewer than 7,500 miles with registrations from out of state.

Oregon's motor vehicle inspection programs (VIP) in Portland and Medford could be used to supplement the compliance verification system for used cars that are being registered in Oregon for the first time. (Vehicle inspection is not required for vehicles that are initially registered in Oregon until they are re-registered 4 years later, so this method of compliance verification would not be applicable to the 140,000 new vehicles sold each year.) When a vehicle is brought in for inspection, DEQ could scan the vehicle bar code located on the doorjamb or check under the hood to verify it is California compliant. If the vehicle is not California compliant, DEQ could deny them the vehicle inspection certificate. Without the inspection certificate, vehicle owners cannot register their car in Oregon. This would apply to approximately 2,500 used vehicles (of the 5,500) that fall within the inspection and maintenance boundary, or about half of the used vehicles under 7,500 miles that were previously registered in another state and are being registered for the first time in Oregon.

For those cars outside the inspection and maintenance boundary DEQ would review DMV records for trends in the number of vehicles (approximately 3,000 vehicles) sold. Because the MSO would not accompany the registration, DEQ would have to track if there were a high influx of vehicles with registrations from out of state. Additionally, DMV (or a dealer acting as a de facto DMV agent) is already performing a VIN inspection on the re-registered cars and could

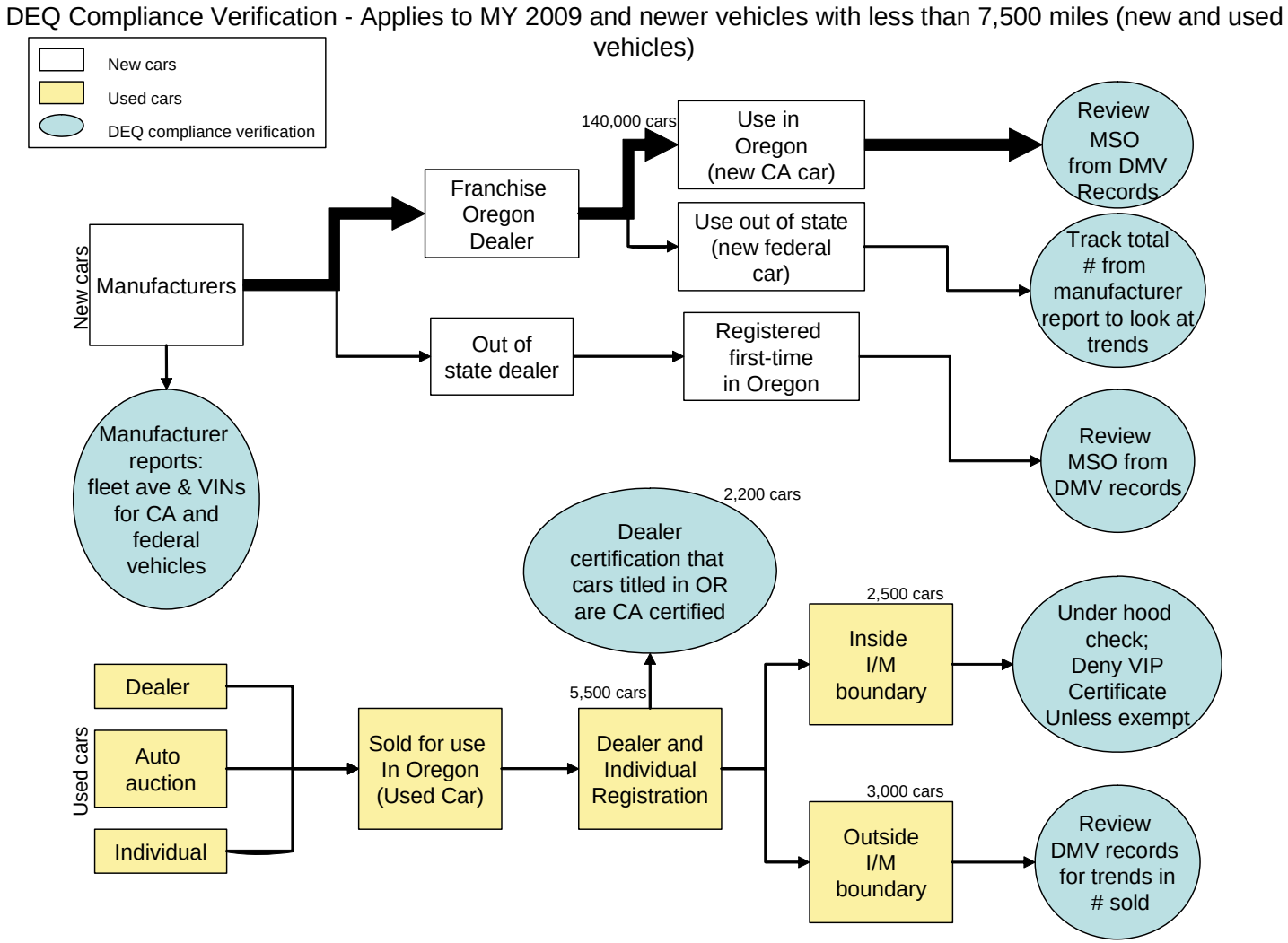
[47] E-mail communication from Lana Cully, Oregon Department of Motor Vehicles, to Rachel Sakata, Oregon DEQ, October 11, 2005.

also check to see if the vehicle is California compliant. While the DMV could not deny registration, it could note any relevant information and provide it to DEQ for tracking purposes.

4. Overall Compliance Approach

DEQ believes the majority of compliance verification can be accomplished by checking the MSOs from DMV records. Used car compliance can be addressed to a large degree though the vehicle inspection programs in Portland and Medford and by working with dealers to self-certify compliance when they register the vehicle with DMV. Any additional compliance issues can be evaluated and addressed as the program matures.

Figure 4: Compliance Verification Tracking in Oregon



F. Enforcement

Enforcement actions are rare in California and opt in states, but when they do take place, they are typically against the dealer and manufacturer for selling or providing a non-compliant car. The state environmental agencies verify compliance and enforcement by sending inspectors to dealer lots, having environmental agency staff review manufacturer's reporting records, and referring enforcement staff to pursue any necessary penalty and enforcement issues. In Oregon, when penalties are levied and paid, these monies go to the state's general fund.

California assesses a fine of up to $5,000 per vehicle against manufacturers. For dealers and car rental agencies, the fine can be reduced to $2,500. Most of the opt-in states (CT, ME, MA, RI, NJ) assign penalty amounts based on length of time and severity of the penalty. Penalty amounts can range from $100 to $25,000 per incident or vehicle. Some enforcement actions are referred to the Attorney General's office, although most cases are negotiated or settled through administrative actions.

New York establishes a suspended $500 fine for the first violation if there are no additional violations against the dealer or manufacturer. If there are no additional violations within a one-year period, the violation is simply noted and no fine is assessed. However, if there are multiple violations at once, the fine is $1,000 per additional violation (i.e., five violations = $4500 fine). Washington is considering up to a $5,000 fine per vehicle levied against dealers and manufacturers.

In Oregon, DEQ's enforcement procedures and civil penalty structure are described in Oregon Administrative Rules, Chapter 340, Division 12.[48] The Division 12 rules provide the framework to evaluate and determine the appropriate level of penalty levied against dealers and manufacturers based on a number of factors. Division 12 rules and enforcement guidance also allow DEQ flexibility to work with dealers and manufactures through education and other assistance measures to resolve compliance problems, with civil penalties as a secondary tool to ensure compliance.

California and opt-in states report that overall compliance is very high. However, New York, Massachusetts, and California have taken action against either dealers or manufacturers. Some cases are still pending court decisions. The states reported past problems with dealers who imported noncompliant Canadian cars. Some of those cases led to official enforcement action, but most compliance discrepancies are resolved informally, such as by persuading dealers to "unwind" an improper sale and provide the customer with a California-compliant car.

G. Discussion of Pros and Cons of Implementation Features

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

2. Summary of Public Comments

No members of the public testified about compliance and enforcement.

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[48] Oregon Administrative Rules, Chapter 340, Division 12. http://arcweb.sos.state.or.us/rules/OARs_300/OAR_340/340_012.html **(Reference 9)**

3. Summary of Workgroup Comments

Some members of the workgroup raised questions about the lack of “registration denial” and how to deal with compliance issues in Oregon. Dave Kircher, Puget Sound Clean Air Agency, asked how Oregon planned to “unregister” a car if it was found to be non-compliant. Andy Ginsburg, DEQ, replied that unregistering an individual car is not as important as having a system in place to identify any major offenders. A registration denial and under the hood inspections for used cars registered for the first time in Oregon would be an extremely expensive program; tracking trends to see if there are problems is fiscally more sound. Alan DeBoer, OADA, said registration denial is important because the vehicle owner should be responsible for compliance. Registration denial prevents noncompliant cars from being sold for use in Oregon, but it does not let dealers or individuals off the hook for selling noncompliant car in Oregon. Without registration denial, Alan also wanted to ensure Oregon does not create an incentive to bring in cars from out of state that would hurt Oregon dealers.

Chris Hagerbaumer, OEC, asked how much out-of-state buying occurred. Alan DeBoer, OADA, replied that when the Canadian dollar was weaker, he saw many Canadian cars coming from across the border. Washington also found this to be an area of concern to them and according to Bob Saunders, WA Ecology; this is why they required reports from the Department of Licensing to track numbers.

Steve Douglas, AAM, asked if Oregon could penalize out-of-state dealers for selling a non-compliant car. Shelley McIntyre, DOJ, indicated that Oregon could pursue action against an out-of-state dealer as a legal matter, but that collecting on penalties could be difficult as a practical matter.

Alan DeBoer, OADA, also said the consumer is ultimately the one who is harmed without registration denial. If the consumer buys a car from out of state and brings it into Oregon, the consumer may not be aware that they have a noncompliant vehicle. With registration denial, a person would go back to the dealer. This situation, however, would only work with cars that were registered for the first time in Oregon.

Alan DeBoer, OADA, suggested DMV be given the authority to deny registration. Bob Anderson, NATA, asked if there had been any legislative action to bring on registration denial. While it has not been brought before the Legislature, DEQ believes that reviewing MSOs and tracking the cars that are not California certified, Oregon would be able to adequately monitor and verify compliance. If there is a pattern where numbers of non-certified cars or out-of-state cars goes up significantly, then DEQ and DMV could look at options to address the situation, including new legislation to allow for registration denial.

The workgroup believes registration denial is a useful tool to verify compliance with the California standards. Additionally, the workgroup, with Steve and Alan dissenting, recommended pursuing registration denial without making it a condition of adopting these regulations. In combination with registration denial, the workgroup recommends a set of tools such as voluntary dealer inspection, DMV inspection, and a DEQ emissions inspection certificate could be additional ways to track compliance.

Monty King, OVDA (guest participant), said dealers and not DMV inspect many used cars. He indicated that dealers are regulated by DMV. He suggested adding a box on the inspection form to indicate whether or not a vehicle is California certified. If dealers falsified that information, DMV would have licensing jurisdiction. His only concern was not to hold any dealer

liable if the sticker is a fake. Andy Ginsburg, DEQ, said the form makes it clear that sticker inspections by dealers are “to the best of their knowledge”. DEQ would not hold a dealer liable for a fraudulent sticker installed by someone else. Dave Kircher, PSCAA also suggested putting a warning box on registration forms indicating that registering a non-compliant car in Oregon is a violation of the law. This puts people on notice that they’re subject to other penalties if they continue with registration.

The workgroup also discussed the applicability of the Unlawful Trade Practices Act (UTPA) and whether it could apply in Oregon. The UTPA provides some protection for Oregon’s consumers that purchase goods or services for use from a seller or business. A consumer may register a complaint about an unlawful trade practice with the Oregon Attorney General’s office. In this instance, a purchaser could register a complaint against an auto dealer if they are sold a non-compliant car.

Steve Douglas, AAM, expressed concern over Oregon’s potential requirement for manufacturers to send reports of California and federal vehicles VINs shipped to the state. The added requirement would be burdensome for them, especially if other states had their own special reporting requirements. Andy Ginsburg, DEQ, asked if VINs could be decoded to indicate whether the car is California certified. Steve Douglas, AAM, said the information is not coded in the VIN, but that manufacturers do have a database that identifies California and federal vehicles by VIN. However, Steve indicated that providing that information would be costly.

Washington requests a list of federal VINs that are delivered for their state. This allows Washington to search Department of Licensing records to determine if any of the federal cars are registered in Washington. Andy asked if it was possible for the auto manufacturers to send their entire database of vehicles delivered to any state, but Steve said it would be at least 15 million records. If Oregon requires VIN reporting, Steve suggested following Washington’s approach, which was to send a special request letter to the manufacturers each year for them to submit information. This frees manufacturers from the burden of remembering to submit the report on time.

Andy Ginsburg also asked if DMV, while inspecting the VIN of out of state cars being re-registered in Oregon, could check to see if it was California certified. DMV would not deny the registration, but would record the information for later follow-up by DEQ. Lana Cully, DMV, said while not required nor prohibited to do so, DMV would have to change its procedures to gather this information.

IX. Administrative Costs and Fees

A. Overview

The opt-in states currently use or estimate the following resources to write the regulations and implement the California program:

Table 15: Estimated State Resources to Implement California Standards

CA	WA	NY	MA	NJ	ME	CT	VT	RI
~200 FTE	1.5 FTE	2-3 FTE	1 FTE	2 FTE	1 FTE	1 FTE	0.5-1 FTE	0.5 FTE

FTE = Full time equivalent

Oregon DEQ estimates that it would take two full-time equivalents, at a total cost of $500,000 per biennium, for the agency to implement California's vehicle emissions program. Those positions would keep Oregon's rules current with California's program, review manufacturers compliance reports, work with the state DMV to verify vehicle compliance, conduct outreach and technical assistance to the public, car dealers, and manufacturers, conduct dealer inspections, and lead enforcement actions, as needed. In addition, DEQ will need to develop and set up a database tracking system.

B. Fee vs. General Program Funding

In a survey of states that have opted in, some charge fees to help fund the program, whereas others rely on general funds to implement California's vehicle emissions rules.

For example, in Connecticut and Vermont, the DMV collects fees from vehicle owners at the time of registration. Connecticut registrants pay a "Federal Clean Air Act" fee in addition to the regular registration fee each time they register or renew their car. A portion of this CAA fee ($4.25) is allocated to the Department of Environmental Protection and is used to pay for a variety of air quality programs, including the California vehicle emissions rules. Vermont has a similar program where the DMV assesses a Clean Air Fee at the point of registration/renewal. Vermont's fee (~$1 of the general registration fee) funds air quality programs, including the California vehicle emissions rules.

In New York, all registered cars must get an annual safety inspection, and part of this vehicle inspection fee ($4) is used to fund the California vehicle emissions program and the mobile source section of the Department of Environmental Conservation.

Some state environmental agencies assess fees on the auto manufacturer rather than the individual registrant. New Jersey plans to charge large and intermediate sized auto manufacturers $1 per vehicle sold in the state. The fee is imposed on potential users of the ZEV credit bank. California, however, tallies the cost of the on-road vehicle program and divides by the number of new vehicles sold in the state. Auto manufacturers are charged a proportion based on the number of vehicles sold in California.

Other states do not charge a fee, and instead, rely on general fund money. Massachusetts and Maine use general funds to staff its California vehicle emissions rules program. Washington anticipates it will not collect fees, and instead, will use its general fund to staff its program. Rhode Island is not contemplating fees, but is still working out the logistics of its program.

C. Options in Oregon

Under current statutory authority[49], Oregon DEQ likely would take the lead role in compliance verification through car dealer inspections. Oregon's DMV could support this work without additional resources by making registration records available to DEQ. If Oregon wished to pursue a change in statute allowing DMV to deny registration to non-compliant vehicles, the DMV could request a fee to support that additional work.

Oregon's options to administer the California program could include administering a fee-based program. Alternatively, Oregon would pursue a program similar to New Jersey by imposing a fee on auto manufacturers. Once a fee is adopted, it would still have to be ratified by the 2007 Legislature as part of DEQ's budget.

D. Discussion of Pros and Cons of Implementation Features

1. Summary of Guest Speaker Comments

There were no guest speaker comments.

2. Summary of Public Comments

No members of the public testified about administrative costs and fees.

3. Summary of Workgroup Comments

The workgroup discussed various fee options to help fund the program. Ashley Henry, OBA, asked about charging consumers at the time of licensing. Andy Ginsburg, DEQ, explained statutory limitations prevent DEQ from doing so. Ashley also recommended pursuing a licensing fee and not use general fund to pay for the program. Chris Hagerbaumer, OEC, asked if title fees could be used. Shelley McIntyre, DOJ, noted that the Oregon Constitution requires vehicle licensing and title fees to be placed in the highway trust fund. Specifically, all revenue from any fee administered on the registration and use of motor vehicles must be used exclusively for the construction, repair, maintenance, operation and use of public highways, and roads in Oregon. Lana Cully, DMV, said DMV has the ability to keep its administrative costs from the title fee, but the rest of it is used for highway fund purposes.

Ray Jubitz (sitting in for Al Jubitz) did not think charging the manufacturers a fee would be too onerous, because they would likely pass the cost to the consumer, and ultimately, it would add $1-$2 more per cost of the car. Chris Hagerbaumer, OEC, supported the idea of a manufacturer fee because it is a relatively small amount of money for the benefit achieved. Alan DeBoer, auto dealer, and Steve Douglas, AAM, did not support the idea of a manufacturer fee. Additionally, Alan stated he did not think it was fair to make the manufacturers pay for a program they do not want in the first place. He also questioned how to deal with small manufacturers (e.g., Ferrari) that sell very few cars in Oregon.

Andy Ginsburg, DEQ, pointed out that a fee on manufacturers would be much more efficient to collect because there are only 10-15 manufacturers versus 400 to 3,000 dealers.

[49] Oregon Revised Statute, 468.095. http://landru.leg.state.or.us/ors/468.html **(Reference 10)**

Monty King, OVDA, suggested including an invoice on every title to charge the purchaser a $5 fee. Elliott Eki, AAA, thought AAA's position would be for everyone to pay a fair share for clean air. He suggested adding this provision to tax returns and allow people to make a contribution.

Mark Reeve, chair, said a downside of using general fund is that it spreads the cost across all citizens, whether they have new cars or a car at all. People who do not have a car would not be happy about paying for the program, so from a fairness standpoint a fee based on those who sell, buy, or register new cars seems fairer. In response, Steve Douglas, AAM, pointed out that new vehicle purchasers are paying a significant amount to provide the supposed benefit for everyone else. In turn, people driving older, higher polluting vehicles are not improving air quality. Consequently, from "a fairness standpoint" using general fund money seems fairer. Regulations should encourage new vehicle purchases rather than discourage them through higher taxes and fees.

Chris Rich, OBA, (filling in for Ashley Henry) believes the cost of the program should be spread over as many people as possible because the program reduces CO_2, which benefits everyone.

X. Conclusion:

The Workgroup appreciates the opportunity to explore issues in a collaborative environment. This report contains an accurate summary of our discussions and it includes the advantages and disadvantages surrounding the various implementation issues. We thank the Governor and note our availability to assist in the future if he so desires.

Appendix A: LEV II Emissions Standards (all)[50]

Table A-1: LEV II Emissions Standards

LEV II Exhaust Mass Emission Standards for New 2004 and Subsequent Model LEVs, ULEVs, and SULEVs in the Passenger Car, Light-Duty Truck and Medium-Duty Vehicle Classes							
Vehicle Type	*Durability Vehicle Basis (mi)*	*Vehicle Emission Category*	*NMOG (g/mi)*	*Carbon Monoxide (g/mi)*	*Oxides of Nitrogen (g/mi)*	*Formaldehyde (mg/mi)*	*Particulates (g/mi)*
All PCs; LDTs 8500 lbs. GVW or less Vehicles in this category are tested at their loaded vehicle weight	50,000	LEV	0.075	3.4	0.05	15	n/a
		LEV, Option 1	0.075	3.4	0.07	15	n/a
		ULEV	0.040	1.7	0.05	8	n/a
	120,000	LEV	0.090	4.2	0.07	18	0.01
		LEV, Option 1	0.090	4.2	0.10	18	0.01
		ULEV	0.055	2.1	0.07	11	0.01
		SULEV	0.010	1.0	0.02	4	0.01
	150,000 (Optional)	LEV	0.090	4.2	0.07	18	0.01
		LEV, Option 1	0.090	4.2	0.10	18	0.01
		ULEV	0.055	2.1	0.07	11	0.01
		SULEV	0.010	1.0	0.02	4	0.01
MDVs 8501 - 10,000 lbs. GVW Vehicles in this category are tested at their adjusted loaded vehicle weight	120,000	LEV	0.195	6.4	0.2	32	0.12
		ULEV	0.143	6.4	0.2	16	0.06
		SULEV	0.100	3.2	0.1	8	0.06
	150,000 (Optional)	LEV	0.195	6.4	0.2	32	0.12
		ULEV	0.143	6.4	0.2	16	0.06
		SULEV	0.100	3.2	0.1	8	0.06
MDVs 10,001-14,000 lbs. GVW Vehicles in this category are tested at their adjusted loaded vehicle weight	120,000	LEV	0.230	7.3	0.4	40	0.12
		ULEV	0.167	7.3	0.4	21	0.06
		SULEV	0.117	3.7	0.2	10	0.06
	150,000 (Optional)	LEV	0.230	7.3	0.4	40	0.12
		ULEV	0.167	7.3	0.4	21	0.06
		SULEV	0.117	3.7	0.2	10	0.06

[50] California Code of Regulations, Title 13, Section 1961. http://www.arb.ca.gov/msprog/levprog/cleandoc/cleancompletelevregsasof8-14-04.pdf (**Reference 2**)

Appendix B: LEV II Vehicle Classifications

Table B-1: LEV II Vehicle Classifications

Abbreviation	Vehicle Category	Example of Emission Standards for non-methane organic gases (ozone precursor)	Examples of Vehicle Type meeting these standards
LEV II	Low Emission Vehicle (II)	0.075 g/mi. NMOG	2005 Ford: Crown Victoria, Chevrolet Impala, Mercedes S350
ULEV	Ultra Low Emission Vehicle	0.040 g/mi. NMOG	2005 Honda Accord, Subaru Legacy, Toyota Camry
SULEV	Super Ultra Low Emission Vehicle	0.010 g/mi. NMOG	2006 Pontiac Grand Prix, Buick LaCrosse, Mitsubishi Gallant, Saturn Ion
PZEV	Partial Zero Emission Vehicle SULEV with zero evaporative emissions due to sealed engine. 15 year, 150,000 mile warranty:	0.010 g/mi. NMOG	2005 Chrysler Sebring, Volvo S40, Nissan Altima, Volkswagen Jetta
ATPZEV	Advanced Technology Partial Zero Emission Vehicle: PZEVs with components that will advance true-ZEV technology. (Typically hybrids)	0.010 g/mi. NMOG	2005 Ford Escape, Honda Civic, Toyota Prius
ZEV	Zero Emission Vehicles The alternative technologies PZEV and ATPZEV vehicles can be used to satisfy most of the ZEV requirement.	Zero emissions	Electric Cars Future fuel cell powered vehicles

Please note that the examples of available vehicle models above are not inclusive. They merely offer a sampling of vehicles that meet the above categories.

Appendix C: Understanding the Pavley Emission Standards for CO2 Equivalents

Each greenhouse gas has its own global warming potency. Carbon Dioxide (CO_2) is the least potent greenhouse gas in terms of its global warming effect, but it is by far the most abundant global warming pollutant. The scientific community has developed a method for comparing all greenhouse gases, such as carbon dioxide, nitrous oxide, methane, and halogenated hydrofluorocarbons (HFC's) on a uniform scale, called **Carbon Dioxide Equivalents (CO_2E).**

This uniform scale uses CO_2 as the standard measure. For the more potent greenhouse gases like methane, nitrous oxide, or HFC's, the actual amount of emissions are adjusted (increased) to reflect an equivalent amount of CO_2 (i.e. how much CO_2 would be needed to have the same global warming potential).

The Pavley emission standards are based on grams per mile of CO_2 equivalent. For example, a 1-gram per mile reduction in nitrous oxide would be the same as reducing 296 grams per mile of CO_2.

Table C-1 lists the CO_2 equivalents of the four greenhouse gases regulated by the Pavley rules:

Table C-1: Carbon Dioxide Equivalencies

Mobile Source Greenhouse Gases	CO_2 Equivalent
Carbon Dioxide (CO_2)	1
Nitrous Oxide (N_2O)	296
Methane (CH_4)	23
HFC 134a	1300

Table C-2 shows the Pavley emission standards for CO_2E:

Table C-2: California Motor Vehicle Greenhouse Gas (Pavley) Emission Standards CO_2E

Fleet Average Greenhouse Gas Exhaust Mass Emissions Requirements for Passenger Car, Light Duty Truck, and Medium-Duty Passenger Vehicle Weight Classes[51]		
Model Year	**Fleet Average Greenhouse Gas Emissions (Grams per mile CO_2 equivalent)**	
	All Passenger Cars, Light Duty Trucks 0-3750 lbs. Loaded vehicle weight (LVW)	**Light Duty Trucks 3751 lbs. LVW – 8500 lbs. gross vehicle weight (GVW); and Medium Duty Passenger Vehicles (MDPV's)**
2009	323	439
2010	301	420
2011	267	390
2012	233	361
2013	227	355
2014	222	350
2015	213	341
2016+	205	332

It is up to manufacturers to determine their GHG emissions levels using equations provided in the regulations. Requirements for the smaller volume manufacturers ("intermediate", "small" and "independent low volume manufacturers" such as Ferrari, Saleen and Panoz) were waived until 2016 and were replaced by other requirements. Manufacturers are allowed to exceed emission limits in one year if they make up the difference the following year.

[51] Final Regulation Order, Amendments to Sections 1900 and 1961, and Adoption of new Section 1961.1,Title 13, California Code of Regulations http://www.arb.ca.gov/regact/grnhsgas/fro.pdf **(Reference 3)**

Appendix D: Examples of technologies that can be used to meet Pavley Emissions Regulations[52]

Low Rolling Resistance Tires: 3% GHG reductions

Rolling resistance is a measure of the force required to move the tires of a vehicle forward. When multiplied by the radius of the tire, this force gives the resistive torque that must be overcome by the engine when the vehicle is in motion. The rolling resistance of a tire can be reduced through improved tread and shoulder designs and the use of improved materials for tire belt and traction surfaces.

Variable Valve Timing and Lift: 3-8% GHG reductions

Currently used by BMW, Honda and Toyota

Valve lift is a measure of the height and duration of the valve opening. Most spark gasoline engines use fixed valve lift, where the valve lift does not change with the speed and load of an engine. Variable lift allows the period of valve opening to vary, which reduces pumping losses, reduces valve train frictional loss, increases compression ratio, and reduces idle speed— all of which reduce CO_2 emissions.

Cylinder Deactivation: 3-6% GHG reductions

Currently used by GM, Honda, Chrysler

Cylinder deactivation technology allows engines to operate on half their cylinders during certain operating modes. Generally, such systems "shut down" cylinders during light load operation so that the engine operates with efficiency similar to that of a lower-displacement engine. From an engineering standpoint, the major CO_2 reductions accrue due to a reduction in pumping losses associated with halving the number of cylinders in operation. The more frequently the deactivation mode occurs, the greater the CO_2 reduction impacts. Therefore, in some cases, the base engine may be upsized to allow more frequent operation in deactivation mode, which results in both reduced CO_2 and greater maximum power.

Smaller Engine with Turbocharger: 5-7% GHG reductions

Currently used by various auto manufacturers

Internal combustion engines eject 25 to 50 percent of energy into the exhaust. A turbocharged engine uses a turbine in the exhaust stream to drive a compressor in the intake manifold, which compresses incoming air to the engine. The higher-pressure air in the intake manifold forces more air into the engine than would otherwise be the case, and the resulting benefit is an increase in engine power. While the technology does not reduce CO_2 emissions directly, the fact that the engine produces greater power allows engines to be downsized without sacrificing performance, and this downsizing can produce significant CO_2 reductions.

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[52] Information on technology provided by NESCAUM study. http://bronze.nescaum.org/committees/mobile/rpt040923ghglightduty.pdf GHG reductions found on Union of Concerned Scientists website 10-27-04. Data also extracted from a 2001NAS report on GHG reductions.

Hybrid Electric Drive: 15-30% GHG reductions
Currently used by Toyota, Honda and Ford

Hybridization involves the interaction, in varying degrees depending on the design, of a conventional gasoline or diesel-powered power engine, in conjunction with an electric motor. Parallel hybrids use the conventional engine coupled directly to the vehicle' s drivetrain as the prime motive power with varying degrees of electric motor assist. Series hybrids also employ a conventional engine, but it is physically de-coupled from the drivetrain, making the electric motor the only motive source. The conventional engine provides power to operate a generator providing power to a battery pack, which in turn provides electric power to operate the electric motor. Reduced CO_2 emissions are achieved through a number of mechanisms, including utilization of smaller engines that operate in a more efficient power band, energy recovery through regenerative braking, engine shutdown at what would normally be idling conditions, and other strategies.

5 or 6 Speed Automatic Transmission (Increased Step Gear Ratio Transmission)
2-3% GHG reduction
Currently used in the Ford Explorer

In both automatic and manual transmissions, increasing the number of gears can provide a wider spread between the lowest (first gear) and highest gear ratios. This allows the engine to operate closer to its optimum efficiency at a wider variety of speeds, which results in a corresponding decrease in CO_2 emissions. Five and six speed automatic transmissions are now available, both of which provide benefits relative to the more traditional four-speed transmission.

Continuously variable transmission: 4-8% GHG reduction
Currently used by Nissan, Toyota, Saturn, or Honda

Conventional transmissions feature a discrete number of gear ratios (generally four to six) that determine the relationship between engine speed and vehicle speed. This results in some compromise in matching engine speed and load-to-vehicle requirements. A continuously variable transmission (CVT) offers an infinite range of gear ratios between fixed limits, which allows for the optimization of engine operating conditions and maximum power transmission efficiency.

Camless Valve Actuation: 15% GHG reduction
Emerging technology

Camless valve actuation expands upon the concept of variable valve timing and lift, described above, by completely eliminating the camshaft and mechanical valve actuation mechanism from the cylinder head. In place of the camshaft mechanism, valve motion is actuated and controlled through either electrical energy or hydraulic energy, and this can occur over a wide range of engine operating conditions. This yields greater CO_2 reductions than variable valve lift/timing systems.

Variable Compression Ratio: GHG Reduction 2-6%
Emerging Technology

Engine efficiency increases with cylinder compression ratio. The greater the compression, the more work performed for a given air-fuel mixture. In standard technology engines, the compression ratio is fixed across all operating conditions based on cylinder geometry. However,

the tendency of engines to experience knock varies with operating conditions. For example, at light loads, higher compression ratios can be tolerated without knock. However, since the geometry of a standard engine cannot be varied it is not possible to optimize compression ratios for specific operating conditions. New engine designs can mechanically vary cylinder geometry. This allows for engines that operate at a high-compression ratio under part-load conditions and at a lower compression ratio under high-load conditions. CO_2 reductions are achieved through the use of a smaller engine to achieve identical performance.

Appendix E: Understanding vehicle emission classifications

Both the California and federal standards use the Federal Test Protocol to simulate vehicle degradation over time as mileage accumulates. Under both the California and federal program, emission limits are set for the 50,000 mile and 120,000 mile thresholds for vehicle life. Emission limits become more lenient as vehicles age from 50,000 miles to 120,000 miles. Because the federal and California program classify vehicle groups differently, it is not practical to show a side-by-side comparison of emission limits for the two programs.

A. Federal Tier 2

The federal Tier 2 standards require vehicles to be certified to any of eight emissions categories. In the federal program, the vehicle emission categories are called certification "bins." Manufacturers are allowed to choose which bins they use to certify vehicles as long as the average NOx emissions of their new vehicles meet the fleet average emission requirement of 0.07 grams/mile (g/mi). **Table E-1** outlines the emissions standards for the federal bins.

Table E-1: Tier 2 Emission Standards

Tier 2 Emission Standards, Federal Test Protocol (FTP) 75, g/mi[53]										
Bin#	**50,000 miles**					**120,000 miles**				
	NMOG	**CO**	**NOx**	**PM**	**HCHO**	**NMOG**	**CO**	**NOx**	**PM**	**HCHO**
8	0.100 (0.125)	3.4	0.14	-	0.015	0.125 (0.156)	4.2	0.20	0.02	0.018
7	0.075	3.4	0.11	-	0.015	0.090	4.2	0.15	0.02	0.018
6	0.075	3.4	0.08	-	0.015	0.090	4.2	0.10	0.01	0.018
5	0.075	3.4	0.05	-	0.015	0.090	4.2	0.07	0.01	0.018
4	-	-	-	-	-	0.070	2.1	0.04	0.01	0.011
3	-	-	-	-	-	0.055	2.1	0.03	0.01	0.011
2	-	-	-	-	-	0.010	2.1	0.02	0.01	0.004
1	-	-	-	-	-	0.000	0.0	0.00	0.00	0.000

NMOG= non methane organic gases
CO= carbon monoxide
NOx= oxides of nitrogen
PM = particulate matter
HCHO= formaldehyde

B. California LEV-II Program

California's LEV-II program also classifies vehicles into certification levels of increasing stringency. In California's program, these categories define emission limits for individual vehicle groups. Manufacturers have flexibility in certifying vehicles to these groups as long as the fleet average is with allowable limit. **Table E-2** shows a summary of the emissions standards for light

[53] Table courtesy of dieselnet.com, http://www.dieselnet.com/standards/us/light.html

duty vehicles under the LEV II standard. Please see **Appendix A** for a more complete listing of these standards including medium duty vehicles to 14,000 lbs. GVW.

Table E-2: California LEV II Emission Standards: Light Duty Vehicles <8,500 lbs

California LEV II Emission Standards, Passenger Cars and Light Duty Vehicles < 8500 lbs, g/mi										
Category	**50,000 miles/5 years**					**120,000 miles/11 years**				
	NMOG	**CO**	**NOx**	**PM**	**HCHO**	**NMOG**	**CO**	**NOx**	**PM**	**HCHO**
LEV	0.075	3.4	0.05	-	0.015	0.090	4.2	0.07	0.01	0.018
ULEV	0.040	1.7	0.05	-	0.008	0.055	2.1	0.07	0.01	0.011
SULEV	-	-	-	-	-	0.010	1.0	0.02	0.01	0.004

Each category in both the federal and California programs sets limits for Non Methane Organic Gases (NMOG), Carbon Monoxide (CO), Oxides of Nitrogen (NOx) and formaldehyde. Emission limits within individual vehicle categories are similar in both the federal and California programs, but the proportions of NMOG to NOx vary among the groups.

Each program also sets overall fleet average emissions limits. The California fleet average limit applies to NMOG and the federal fleet average limit applies to NOx. To compare the stringency of the two programs, one must allocate vehicles to individual categories, which provide limits for both NMOG and NOx. Because the proportions of NMOG to NOx are not constant among the categories, different distributions of vehicles among the categories can produce different total emissions of the pollutant that is not limited by the fleet average requirement. For example, California's LEV II program limits the fleet average of NMOG, but not NOx. NOx limits apply only when a vehicle is classified in a given category. Depending on how vehicles are distributed to those categories, total NOx emissions can vary. The same is true for the Tier 2 program. Overall NOx emissions are constrained by the NOx fleet average, but NMOG is capped only by the vehicle categories allowing some variation in total NMOG emissions for different vehicle distributions.

Appendix F: Glossary

ATPZEV: Advanced Technology Partial Zero Emission Vehicle
ATPZEVs are a subcategory of PZEVs. They meet PZEV emission requirements and include vehicles such as dedicated compressed natural gas or hybrid electric vehicles.

CARB: California Air Resources Board
CARB is the state agency that develops and implements the California Motor Vehicle Standards.

CAA: Clean Air Act
The Clean Air Act establishes federal requirements for the regulation of air pollution.

CAFE: Corporate Average Fuel Economy
CAFE standards are federal fuel efficiency requirements for light duty motor vehicles established by the Energy Policy and Conservation Act.

CO_2: Carbon Dioxide
Carbon dioxide is the primary greenhouse gas that causes global warming.

CO: Carbon Monoxide
Carbon monoxide is an air pollutant that causes respiratory distress and can result in death when humans directly inhale excessive amounts.

En Banc: With all judges or a quorum of judges present

GHGs: Greenhouse Gases
Greenhouse gases (GHGs) trap heat in the atmosphere, causing global warming. The greenhouse gases covered under California's motor vehicle emissions standards are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and hydrofluorocarbons (HFCs).

In Toto: **In total**

LDV: **Light Duty Vehicle**
A passenger car or truck with a gross vehicle weight less than 8,500 lbs.

LEV: Low Emission Vehicle
A vehicle that complies with California's least restrictive vehicle emission category.

LEV II: **Low Emission Vehicle program, Phase 2**
California's current motor vehicle emissions program.

MOBILE6.2: **Emissions Factor Model**
EPA's computer modeling program that estimates the quantity of emissions of CO, VOC, NOx, PM2.5, and air toxics from motor vehicles.

NMOG: **Non Methane Organic Gases**

A group of photochemically reactive compounds that are regulated to reduce the formation of ground-level ozone or smog. NMOG includes most hydrocarbons (except methane) and some nonhydrocarbons that are chemical precursors of ozone.

NOx: **Oxides of Nitrogen**

NOx refers to several compounds that include nitrogen and oxygen atoms (e.g., NO_2 and NO_3). NOx is associated with respiratory irritation and is also one of the chemicals that can lead to formation of ozone, or photochemical smog. It comes primarily from motor vehicle emissions, but also is generated by other combustion processes.

PM: **Particulate Matter**

Particles found in the air, which include dust, dirt, soot, smoke, and liquid droplets. Particulate matter is formed by the incomplete combustion of fuel and comes from a variety of sources such as motor vehicles, tilled fields, unpaved roads, stone crushing, and burning of wood.

Pavley: AB 1493 or the Pavley Bill

The Pavley bill, or AB 1493, is the California bill that was enacted to require the California Air Resources Board (CARB) to regulate greenhouse gases from light duty motor vehicles. Named after California Assemblywoman Fran Pavley, it became law in 2002, and takes effect in model year 2009.

PZEV: Partial Zero Emission Vehicle

PZEVs are vehicles meeting the second most stringent set of emission standards under the California Motor Vehicle standards. These cars meet SULEV tailpipe emission standards, have zero evaporative emissions, and have a 15-year / 150,000-mile warranty. Zero evaporative emissions means no gases are allowed to evaporate from a vehicle's engine or fuel system.

SULEV: Super Ultra Low Emission Vehicle

SULEVs are the third most stringent category of emissions under the California program.

Tier 2: **The Federal Tier 2 Motor Vehicle Emissions Standards**

The Tier 2 program sets the current motor vehicle standards that apply nationwide (except areas that are subject to California's standards. Tier 2 regulates emissions from passenger cars, light trucks and SUVs.

TLEV: Transitional Low Emission Vehicle

Program that preceded California's LEV requirements.

ULEV: Ultra Low Emission Vehicles

ULEVs are the fourth most stringent emission category under the California standards.

ULSD: **Ultra-low Sulfur Diesel**

ULSD is diesel fuel with very low levels of sulfur (<15 parts per million) that comply with new federal diesel fuel standards that take effect in 2006. ULSD

directly reduces pollution from diesel exhaust and is a necessary precondition for diesel exhaust emission control equipment.

VOC: Volatile Organic Compound

A group of hydrocarbons that are regulated as precursors of ground level ozone. VOCs are compounds containing carbon except ethane, methane and specific other compounds that do not contribute to photochemical reactions.

ZEV: Zero Emission Vehicle

ZEVs are the most stringent emission category in the California program. They have zero tailpipe and evaporative emissions. These include battery electric vehicles and hydrogen fuel cell vehicles.

Appendix G: Additional Information on the Web

The following web links offer additional information on the federal and California motor vehicle emission standards.

California Air Resources Board, LEV-II Program

- http://www.arb.ca.gov/msprog/levprog/levprog.htm

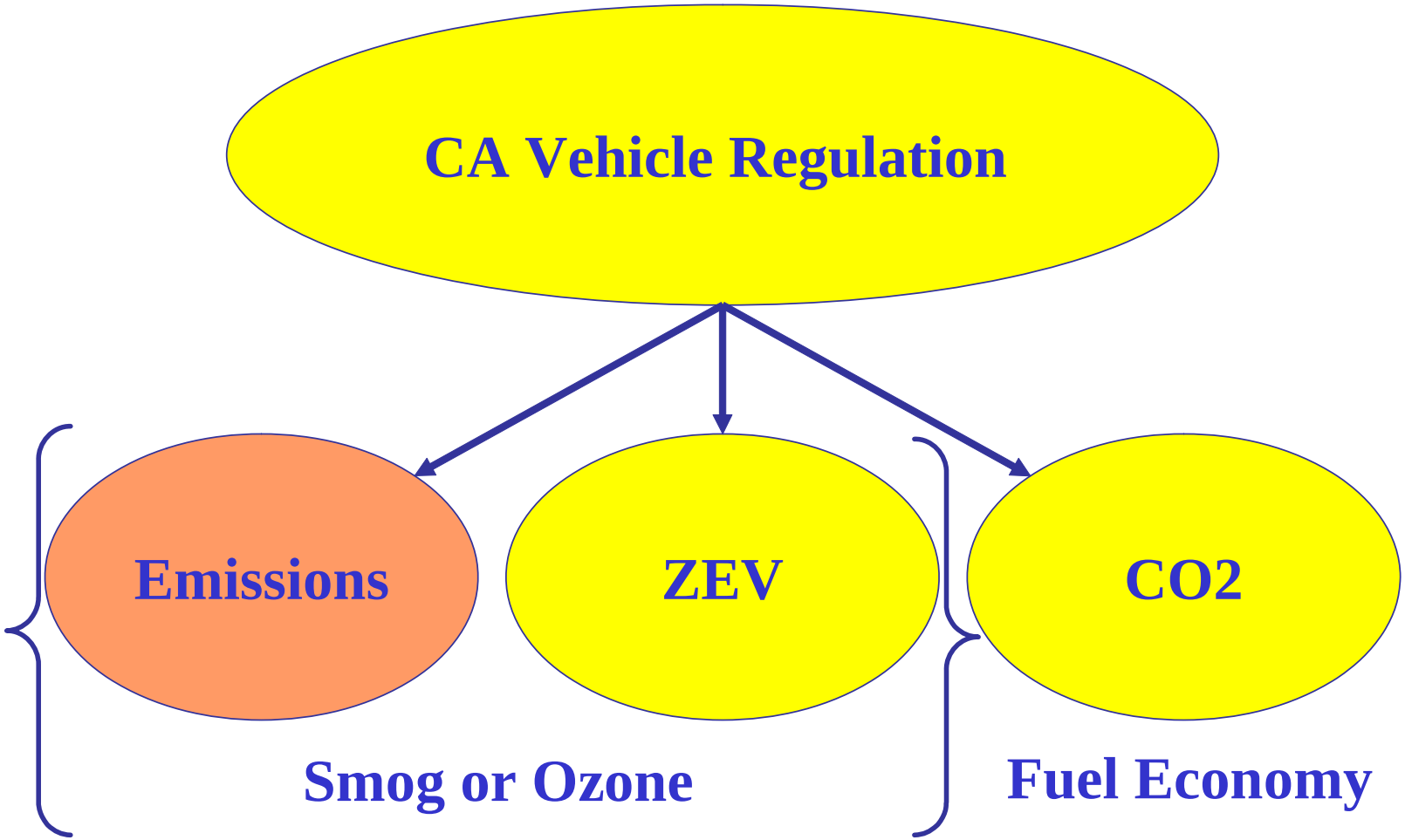
California Air Resources Board, Pavley Program

- http://www.arb.ca.gov/homepage.htm (search Pavley)
- http://www.arb.ca.gov/cc/cc.htm

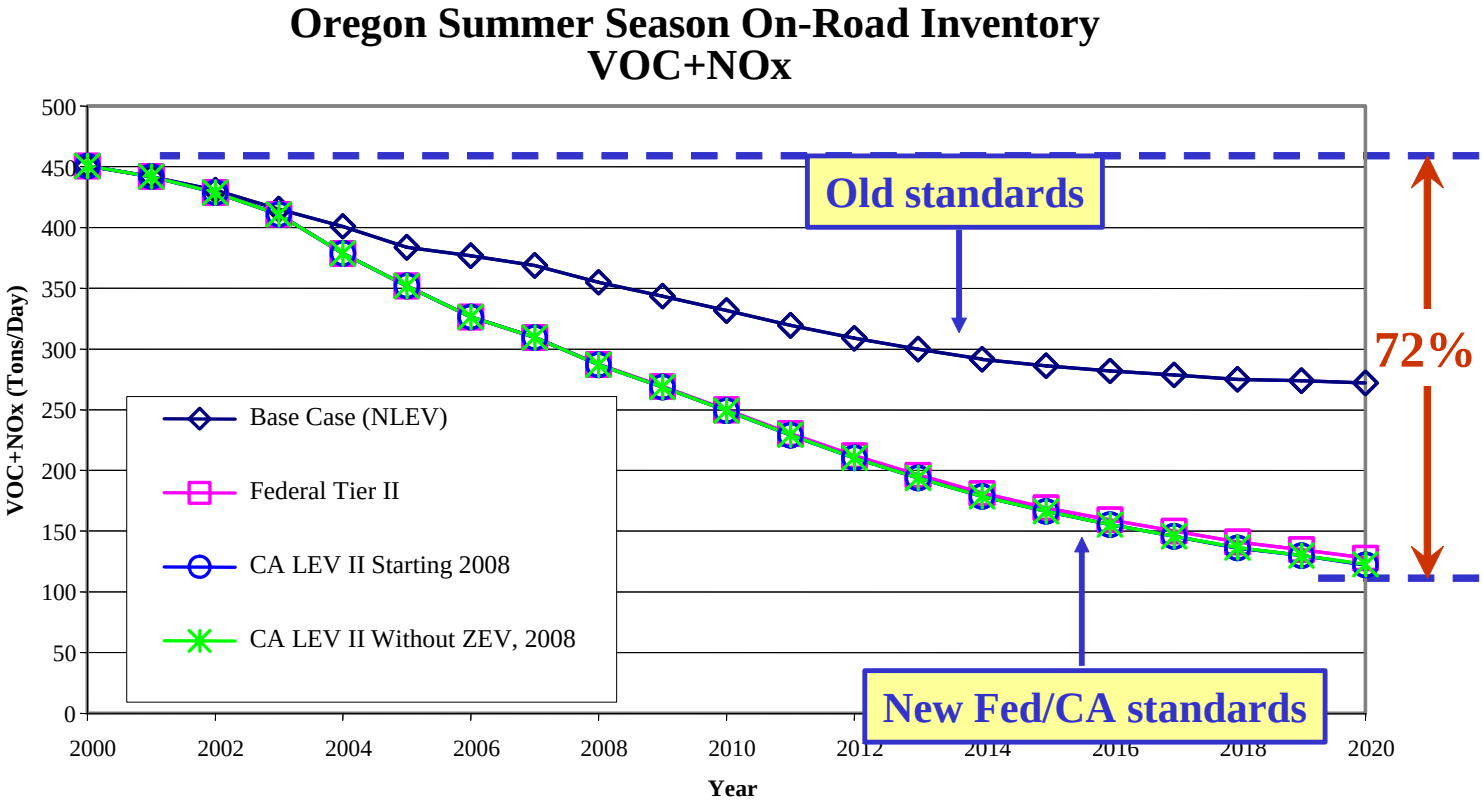
Federal Motor Vehicle (Tier-2) Program

- http://www.epa.gov/tier2

Appendix H: Information from Alliance of Automobile Manufacturers (submitted September 12, 2005)



Impact of New Regulations



Appendix I: Expected Emissions (Tons/Day) of NOx and VOC from 2000 to 2030 (Information submitted by Air Improvement Resource, AAM contractor, October 11, 2005)

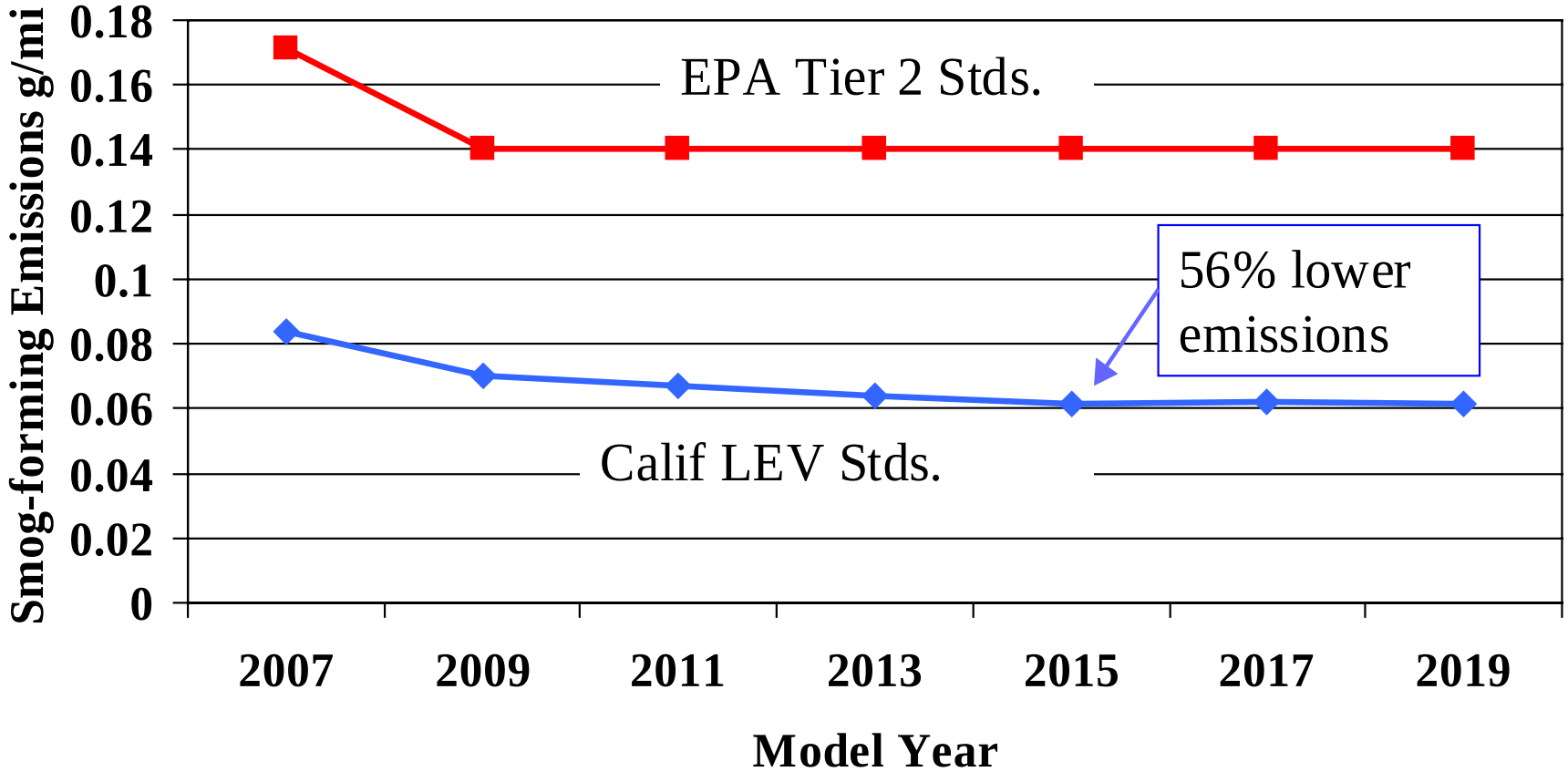
Pollutant	Year	Oregon On-Road Inventory, Summer Season (Tons/Day)				Program Benefit Relative to Base Case (Tons/Day)		
		Base Case (NLEV)	Federal Tier II	CA LEV II Starting 2009	CA LEV II Without ZEV Mandate, Starting 2009	Federal Tier II	CA LEV II Starting 2009	CA LEV II Without ZEV Mandate, Starting 2009
NOx	2000	287.93	287.93	287.93	287.93	0.00	0.00	0.00
	2001	282.83	282.78	282.78	282.78	0.05	0.05	0.05
	2002	277.08	276.08	276.08	276.08	1.01	1.01	1.01
	2003	267.12	264.84	264.84	264.84	2.29	2.29	2.29
	2004	258.15	244.97	244.97	244.97	13.18	13.18	13.18
	2005	251.03	230.32	230.32	230.32	20.71	20.71	20.71
	2006	248.08	212.69	212.69	212.69	35.38	35.38	35.38
	2007	244.34	200.58	200.58	200.58	43.77	43.77	43.77
	2008	237.91	186.19	186.19	186.19	51.72	51.72	51.72
	2009	231.40	173.37	173.06	173.06	58.03	58.34	58.34
	2010	223.89	159.14	158.62	158.62	64.75	65.26	65.26
	2011	215.80	144.29	143.57	143.57	71.51	72.22	72.22
	2012	209.52	131.30	130.31	130.31	78.22	79.21	79.21
	2013	203.70	119.04	117.82	117.82	84.66	85.88	85.88
	2014	198.19	107.59	105.99	106.06	90.60	92.19	92.12
	2015	194.71	98.49	96.59	96.59	96.21	98.12	98.12

	2016	192.03	90.64	88.41	88.41	101.40	103.62	103.62
	2017	189.79	83.60	81.04	81.04	106.19	108.75	108.75
	2018	187.18	76.54	73.78	73.78	110.65	113.40	113.40
	2019	186.71	71.98	68.95	68.95	114.73	117.77	117.77
	2020	186.58	68.06	64.75	64.90	118.51	121.83	121.68
	2021	187.08	64.91	61.37	61.53	122.17	125.71	125.55
	2022	187.14	61.78	58.10	58.18	125.37	129.04	128.96
	2023	187.67	59.31	55.41	55.50	128.36	132.26	132.18
	2024	188.70	57.40	53.44	53.60	131.30	135.26	135.10
	2025	189.99	55.48	51.28	51.45	134.51	138.71	138.54
	2026	190.88	53.80	49.45	49.71	137.08	141.43	141.17
	2027	192.23	52.57	48.15	48.32	139.67	144.08	143.91
	2028	193.79	51.00	46.43	46.69	142.79	147.36	147.10
	2029	196.20	50.35	45.71	45.98	145.85	150.50	150.23
	2030	198.60	50.11	45.40	45.67	148.49	153.20	152.93
VOC	2000	162.70	162.70	162.70	162.70	0.00	0.00	0.00
	2001	159.22	159.17	159.17	159.17	0.05	0.05	0.05
	2002	153.67	152.61	152.61	152.61	1.06	1.06	1.06
	2003	148.16	145.98	145.98	145.98	2.18	2.18	2.18
	2004	142.84	133.85	133.85	133.85	8.99	8.99	8.99
	2005	132.62	121.57	121.57	121.57	11.05	11.05	11.05
	2006	128.53	113.59	113.59	113.59	14.95	14.95	14.95
	2007	124.34	108.93	108.93	108.93	15.42	15.42	15.42
	2008	117.11	101.05	101.05	101.05	16.06	16.06	16.06
	2009	112.25	95.84	95.59	95.59	16.41	16.66	16.66

	2010	107.79	90.78	90.39	90.39	17.01	17.39	17.39
	2011	103.69	86.13	85.55	85.61	17.56	18.15	18.08
	2012	99.14	80.83	80.10	80.16	18.31	19.05	18.98
	2013	96.09	77.07	76.12	76.12	19.02	19.97	19.97
	2014	93.53	73.80	72.62	72.69	19.73	20.91	20.84
	2015	91.65	70.98	69.64	69.71	20.67	22.01	21.94
	2016	90.07	68.57	66.99	67.06	21.49	23.07	23.00
	2017	88.95	66.54	64.71	64.71	22.40	24.23	24.23
	2018	87.87	64.47	62.46	62.61	23.40	25.41	25.27
	2019	87.38	62.96	60.84	60.91	24.43	26.55	26.47
	2020	85.36	59.96	57.65	57.73	25.39	27.71	27.63
	2021	84.24	58.07	55.56	55.72	26.17	28.68	28.53
	2022	82.96	56.02	53.31	53.47	26.93	29.65	29.49
	2023	83.37	55.74	52.90	53.15	27.63	30.47	30.23
	2024	84.50	56.08	53.11	53.28	28.41	31.39	31.22
	2025	84.86	55.82	52.80	52.97	29.04	32.06	31.89
	2026	86.13	56.37	53.21	53.47	29.76	32.91	32.66
	2027	87.30	56.99	53.70	53.96	30.31	33.60	33.34
	2028	88.57	57.26	53.74	54.18	31.31	34.82	34.39
	2029	89.91	57.95	54.38	54.74	31.96	35.53	35.18
	2030	91.17	58.64	55.01	55.38	32.53	36.15	35.79
VOC + NOx	2000	450.63	450.63	450.63	450.63	0.00	0.00	0.00
	2001	442.05	441.95	441.95	441.95	0.10	0.10	0.10
	2002	430.75	428.68	428.68	428.68	2.07	2.07	2.07
	2003	415.28	410.82	410.82	410.82	4.47	4.47	4.47
	2004	400.99	378.82	378.82	378.82	22.17	22.17	22.17

2005	383.65	351.89	351.89	351.89	31.76	31.76	31.76
2006	376.61	326.28	326.28	326.28	50.33	50.33	50.33
2007	368.69	309.51	309.51	309.51	59.18	59.18	59.18
2008	355.01	287.24	287.24	287.24	67.78	67.77	67.77
2009	343.65	269.22	268.65	268.65	74.44	75.00	75.00
2010	331.68	249.91	249.02	249.02	81.76	82.66	82.66
2011	319.49	230.42	229.12	229.18	89.07	90.37	90.30
2012	308.66	212.13	210.40	210.47	96.53	98.26	98.19
2013	299.79	196.12	193.94	193.94	103.68	105.85	105.85
2014	291.72	181.39	178.62	178.76	110.33	113.10	112.97
2015	286.36	169.47	166.23	166.30	116.89	120.13	120.06
2016	282.10	159.21	155.40	155.48	122.89	126.70	126.63
2017	278.73	150.14	145.75	145.75	128.59	132.98	132.98
2018	275.05	141.01	136.24	136.39	134.05	138.82	138.67
2019	274.10	134.94	129.78	129.86	139.16	144.32	144.24
2020	271.93	128.03	122.40	122.63	143.90	149.54	149.30
2021	271.32	122.98	116.93	117.24	148.34	154.39	154.07
2022	270.10	117.80	111.41	111.65	152.30	158.69	158.45
2023	271.05	115.06	108.32	108.64	155.99	162.73	162.41
2024	273.19	113.48	106.55	106.88	159.71	166.65	166.32
2025	274.85	111.29	104.08	104.41	163.55	170.77	170.43
2026	277.01	110.17	102.67	103.18	166.84	174.34	173.83
2027	279.54	109.56	101.85	102.28	169.98	177.68	177.25
2028	282.36	108.26	100.17	100.87	174.10	182.19	181.48
2029	286.12	108.30	100.09	100.71	177.82	186.03	185.40
2030	289.77	108.74	100.41	101.04	181.02	189.36	188.72

Appendix J: Information on Smog-Forming Emissions for California-Certified <u>Vehicles vs. Federal Vehicles,</u> Information from Chris Hagerbaumer, OEC, (submitted October 13, 2005)



Source: Tom Cackette, Deputy Executive Officer, California Air Resources Board