

**Bureau of Waste Prevention
Division of Consumer and Transportation Programs**

**310 CMR 7.40:
THE MASSACHUSETTS
LOW EMISSION VEHICLE PROGRAM**

**Background Document and Technical Support for Public
Hearing on
The Proposed Amendments to Adopt the California Zero
Emission Vehicle Program Regulations**

**Regulatory Authority: Massachusetts General Law, Chapter 111,
Section 142A through 142M**

November 2009

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APPENDIX A: Proposed Amendments to the California Zero Emission Vehicle
Regulation

List of Acronyms

AER	All Electric Range
ARB	California Air Resources Board
AT PZEV	Advanced Technology Partial Zero Emission Vehicle
CAA	Clean Air Act
CNG	Compressed Natural Gas
EAER	Equivalent All Electric Range
EPA	U.S. Environmental Protection Agency
EV	Electric Vehicle
HEV	Hybrid-Electric Vehicle
ISOR	Initial Statement of Reasons
IVM	Intermediate Volume Manufacturers
LDT ₁	Light Duty Truck with a loaded vehicle weight of 0-3750 pounds
LDT ₂	Light Duty Truck with a loaded vehicle weight of 3750 to 8500 pounds
LEV	Low Emission Vehicle
LFCE	Low Fuel Cycle Emissions
LVM	Large Volume Manufacturers
MY	Model Year
NAAQS	National Ambient Air Quality Standards
NEV	Neighborhood Electric Vehicle
NO _x	Oxides of Nitrogen
PCs	Passenger Cars
PHEV	Plug-in Hybrid Electric Vehicle or Enhanced AT PZEV in Silver+ class
PZEV	Partial Zero Emission Vehicle
ROG	Reactive organic gases
Type C Hybrids	>10kW power capability where sub-systems operate at lower-voltage levels that are not suitable for full function ZEVs
Type F Hybrids	100 kW capability to propel an HEV through the driving test cycle on electric power alone
Type G Hybrids	Drive and energy storage system that is sufficient to propel a vehicle on the more aggressive driving cycle
Type I	City Electric Vehicle, range of 50 to less than 75 miles
Type I.5	City Electric Vehicle, range of 75 to less than 100 miles
Type II	Full Function Electric Vehicle, range of 100 or more miles
Type III	Zero Emission Vehicle, range of 100 or more miles plus fast refueling
Type IV	Zero Emission Vehicle, range of 200 or more miles plus fast refueling
Type V	Zero Emission Vehicle, range of 300 or more miles plus fast refueling
ZEV	Zero Emission Vehicle

Background Document and Technical Support for Public Hearing on the Proposed Amendments to Adopt the California Zero Emission Vehicle Program Regulations

310 CMR 7.40: The Massachusetts Low Emission Vehicle Program November 2009

I. EXECUTIVE SUMMARY

The Massachusetts Department of Environmental Protection (MassDEP) is proposing to adopt the 2009 revisions to the California Zero Emission Vehicle (ZEV) program requirements under the Low Emission Vehicle Program regulations, 310 CMR 7.40. The California Air Resources Board (ARB) first adopted the ZEV requirement in 1990 and has modified it four times to reflect the current status of zero emission vehicle technologies (e.g., battery, fuel cell, and hydrogen technologies) in achieving its ultimate goal of near zero emissions from the passenger car and light-duty truck fleet. The 2009 ZEV revisions reflect the findings of an independent panel convened by ARB in 2007 to report on the state of vehicle technologies. After reviewing panel's findings, ARB concluded that the ZEV program should again be updated to reflect the state of technology.

In summary, the revisions to the ZEV requirements that ARB has adopted and that MassDEP now proposes to adopt continue to require that automobile manufacturers develop and introduce advanced and zero emission vehicle technologies. However, they provide additional flexibility to the automobile manufacturers by allowing a portion of the ZEV mandate to be met with a new class of vehicle, referred to as plug-in hybrid electric vehicles (PHEVs), by creating new categories of ZEVs, and by adjusting ZEV credit values. The overall number of advanced technology vehicles should increase as automobile manufacturers take advantage of the 2009 revisions.

MassDEP is proposing to adopt the eight key elements of the ARB ZEV revisions that:

- 1) Create the "New Path" for MY 2012 vehicles and subsequent MY vehicles;
- 2) Establish carry forward and carry back provisions for ZEV credits;
- 3) Provide more favorable treatment of battery EVs;
- 4) Adjust the credit for AT PZEVs;
- 5) Increase the credit for Neighborhood Electric Vehicles (NEVs);
- 6) Extend the Travel Provision;
- 7) Modify transition requirements for Intermediate Volume Manufacturers (IVMs);
and
- 8) Make ZEV credit data available to the public.

II. INTRODUCTION

Massachusetts General Law (M.G.L.) c.111, Section 142K mandates that MassDEP adopt and implement ARB standards for new motor vehicle emissions if such standards are more stringent than the federal standards. In 1990, ARB adopted the California ZEV program that

introduces zero emission technologies to reduce and/or eliminate tailpipe emissions from motor vehicles. Since 1990, the California ZEV program has been modified four times. Most recently, ARB adopted Resolution 07-18 to address the state of technologies needed to meet the ZEV requirements. As a result, ARB proposed to amend the existing ZEV standards to continue its strong commitment for the commercialization of zero emission passenger cars (PCs) and light-duty trucks (LDTs). ARB adopted final revisions to the ZEV requirements on April 17, 2009.¹

MassDEP is proposing to adopt the ARB ZEV revisions under the Low Emission Vehicle (LEV) Program regulations, 310 CMR 7.40. The requirements will apply to 2009 and subsequent model year (MY) PCs and LDTs. MassDEP anticipates that the ZEV revisions will provide the automobile manufacturers with the framework to advance the commercialization of pure ZEV technologies that will ultimately reduce air pollution and greenhouse gas (GHG) emissions from vehicles. The proposed Massachusetts ZEV standards directly cite and/or incorporate by reference the revised applicable sections within Title 13 of the California Code of Regulations (CCR).

The ARB amendments to the ZEV program clarified and simplified the requirements applicable to all PCs and LDTs for 2009 and subsequent MYs. These requirements apply to four phases from MY 2005 through MY 2017. Significant changes were made to Phase III (MY 2012-2014) and Phase IV (MY 2015-2017) requirements for the ZEV program. Phase II (MY 2009-2011) requirements remain unchanged, whereas Phase I requirements are no longer needed as vehicles for MY 2005-2008 are no longer in production. The ZEV program is structured to establish an appropriate volume of ZEVs by including additional ZEV categories, such as longer range fuel cell vehicles and battery electric vehicles (EVs). In addition, it provides automobile manufacturers the incentive to produce certain Enhanced Advanced Technology Partial Zero Emission Vehicle (AT PZEV) technologies that would facilitate the commercialization of pure ZEVs. The amendments reflect the current state of technology and create opportunities for new vehicles to count towards the pure ZEV requirements.

III. BACKGROUND

In 1967, the federal Clean Air Act (CAA) established the framework for controlling mobile source emissions in the United States. Although state emissions standards were preempted by the federal emissions standards under CAA Section 209, California was granted a special exemption to the federal preemption because of the state's unique air quality problems. This exemption gave California the authority to set its own standards as long as those standards are at least as protective as the federal standards.² In 1990, California adopted the ZEV regulation as part of their LEV Program. It has been subsequently modified several times.

¹ The April 17, 2009 ZEV rulemaking does not include the most recent announcement by President Obama of an agreement between California, the federal government, and automobile manufacturers that establishes a new nationwide program of standards to regulate motor vehicle greenhouse gas (GHG) emissions and fuel economy (CAFE standards). Once California amends its regulations, Massachusetts will adopt the California revisions as required under Massachusetts law, MGL c.111, Sections 142B and 142K.

² U.S.EPA, Title II – Emission Standards for Moving Sources, Part A – Section 209, 42 U.S.C. §7543

The 1977 amendments to the CAA added Section 177 that allows other states to adopt the California standards if the standards are identical to California's and are adopted at least two years prior to the commencement of the model year to which the standards will apply.³ In 1991, Massachusetts promulgated 310 CMR 7.40, the LEV Program regulation as required under Massachusetts law, MGL c.111, Sections 142B and 142K. This law mandates that MassDEP adopt and implement California motor vehicle emission standards unless MassDEP finds, after a public hearing and based on substantial evidence, that emission standards and a compliance program will not achieve greater vehicle pollution reductions than the applicable federal standards for any model year.⁴

Massachusetts was one of the first states to adopt California's LEV standards. Massachusetts has also revised its ZEV requirements several times to be consistent with California's regulations. In order to maintain consistency with California ZEV regulations, MassDEP is now proposing to adopt the revisions to the ZEV program finalized by ARB on April 17, 2009 for MY 2009 and subsequent MY vehicles.

In general, the ZEV program has required that automobile manufacturers produce and deliver for sale a certain number of ZEVs that represent 10% of their total vehicle sales. The percentage requirement increases starting in MY 2009 through MY 2018 and subsequent model years as indicated Table I.

Table I – ZEV Percentage Requirement MY 2009-2018+

Model Years	Minimum ZEV Requirement
2009 through 2011	11 percent
2012 through 2014	12 percent
2015 through 2017	14 percent
2018 and subsequent years	16 percent

The actual percentage of ZEVs produced and delivered for sale is not a straight percentage calculation of total sales because the vehicle types that are eligible for ZEV credits are assigned differing credit values based on a number of vehicle attributes and factors⁵, as discussed below. Large volume manufacturers (see section III. 7. for a list and definition of large volume manufacturers) have been required to meet a portion of the ZEV requirement with pure ZEVs (i.e., vehicles that have zero tailpipe emissions, including fuel cells and battery EVs), while intermediate volume manufacturers (see section III. 7. for a list and definition of intermediate volume manufacturers) have had the option of meeting the entire ZEV requirement with other types of advanced technologies. Table II illustrates the current

³ U.S.EPA, Title I – Air Pollution Prevention and Control, Part D – Section 177, 42 U.S.C. §7507

⁴ Massachusetts General Laws, Chapter 111: Section 142K. Motor vehicle emissions standards

⁵ For example, NEV earns 0.30 credits in MY 2009 and a ZEV with a range of 300 or more miles earns 7.0 credits if placed in MY 2009-2017 and 3.0 credits if placed in 2018 or subsequent model years.

aggregate ZEV credit balances by vehicle type for all automobile manufacturers subject to the ZEV requirements in Massachusetts.⁶

Table II – MA’s ZEV Credit Balance

Vehicle Type	Technical Description of Vehicle Type	Vehicle Credits Accrued
ZEV	Zero tailpipe emissions (e.g., fuel cells and battery EVs)	338
ZEV from NEVs	Low speed vehicles that have a maximum speed of 25 miles per hour	1839
AT PZEV	Certified to PZEV standards and employing ZEV-enabling technologies (e.g., hybrids or compressed natural gas vehicles)	1039
PZEV	Conventional vehicles certified to the most stringent tailpipe emission standards, zero evaporative emissions, and extended warranty (e.g., advanced internal combustion engines)	1254

The ZEV credits that the automobile manufacturers have accrued result from the placement of ZEVs, NEVs, AT PZEVs, and PZEVs from MY 1998 through MY 2009. Although all automobile manufacturers are accruing enough credits to meet the ZEV requirements, they are committed to increase the production and placement of ZEV fuel cells, HEVs, and PHEVs. For example, automobile manufacturers have placed approximately 8,000 MY 2007 HEVs in Massachusetts⁷ and another 10,000 HEVs in MY 2008.⁸ According to California’s Initial Statement of Reasons (ISOR), the flexibility of meeting portions of the regulation with hybrid technologies has accelerated ZEV development through deployment of advanced technology vehicles with ZEV enabling technology and addressed the continuing need to balance the pressure on automobile manufacturers to develop ZEVs as technology advances.⁹

IV. PROPOSED REGULATORY AMENDMENTS TO 310 CMR 7.40

Massachusetts’ ZEV regulation will be identical to California’s amended ZEV regulation and will apply to MY 2009 and subsequent model year PCs and LDTs. It should be noted that the amendments to the LEV regulation are being proposed and will be effective after the end of MY 2009. However, it is necessary to include the revisions to the California ZEV regulation for MY 2009 to allow the automobile manufacturers retroactive flexibility allowed under the amendments, such as credit modifications for battery MY 2009 EVs.

The ZEV requirements consist of four phases for MY 2005-2017 vehicles. Phases I (MY 2005-2008) and II (MY 2009-2011) will remain unchanged because many automobile manufacturers still retain sufficient banked credits for compliance in these Phases. For

⁶ MassDEP ZEV data, MassDEP, September 2008

⁷ MassDEP NMOG data, MassDEP, March 2008

⁸ MassDEP NMOG data, MassDEP, March 2009

⁹ ARB Staff Report: Initial Statement of Reasons, 2008 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, ARB, February 8, 2008. p.10.

Phases III (MY 2012-2014) and IV (MY 2015-2017), the number of pure ZEVs (fuel cells and battery EVs) that will be placed in California and other LEV states is expected to decrease compared to the existing program (Table III illustrates the credits available in six defined types of pure ZEVs).

Table III – ZEV Types and Credits

ZEV Type	Description	ZEV Credit
Type I	Electric Vehicle with 50-75 mile range Limited Range Battery EV	2
Type I.5	Electric Vehicle with 75-100 mile range City Electric Vehicle	2.5
Type II	Electric with 100-200 mile range Full function Battery EV	3
Type III	100+ mile electric vehicle with fast refueling or 200 mile battery EV Fuel Cell or Battery EV	4
Type IV	200+ mile electric vehicle with fast refueling Fuel Cell	5
Type V	300+ mile electric vehicle with fast refueling Fuel Cell	7

While the number of pure ZEVs may decrease, the overall number of advanced technology vehicles (AT PZEVs and Enhanced AT PZEVs) should increase because the proposed regulations will allow automobile manufacturers to meet part of the ZEV requirements with vehicles in a new category of “Enhanced” AT PZEVs or PHEVs. PHEVs are hybrids with larger batteries that can be recharged by connecting to a standard electric power source outlet. For reference, ARB categorizes vehicles eligible for ZEV credits in three categories:

1. “Gold” vehicles are ZEVs with zero tailpipe emissions (battery electric vehicles or hydrogen fuel cells);
2. “Silver” vehicles are certified to PZEV standards and employ ZEV enabling technologies (hybrids or compressed natural gas vehicles); and
3. “Bronze” vehicles are conventional vehicles certified to the most stringent PZEV tailpipe emission standards with zero evaporative emissions and an extended warranty.

The information below identifies the eight most significant changes to the ZEV requirements as included in the final regulations adopted by ARB on April 17, 2009.

1) Creation of the New Path for compliance with ZEV requirements

The New Path is a combination of the existing Base Path compliance (based on percentage ZEV requirements where 2.5% of total sales must be ZEVs in the “Gold” category, 2.5% must be AT PZEVs in the “Silver” category, and 6% must be PZEVs in the “Bronze” category) and the existing Alternative Compliance Path (allows mostly AT PZEVs to fulfill the “Gold” and “Silver” obligations and requires fuel cell vehicles to be placed in California or section 177 states to advance fuel cell technology). The New Path begins in MY 2012 and will include a new category of vehicles referred as Silver+ PHEVs. The New Path is calculated using an annual percentage requirement for ZEVs with options to comply with percentages of PZEVs, AT PZEVs, and Enhanced AT PZEVs. The total annual percentage requirement for Phase III is 12% of total sales and increases to 14% in Phase IV. Both

Phases III and IV provide an option to comply with the ZEV requirement by including varying percentages of Enhanced AT PZEVs, AT PZEVs, and PZEVs.

Under Phase III, the pure ZEVs percentage requirement is 3% of the total requirement, but up to 90% of this pure ZEV requirement can be met with Enhanced AT PZEVs. Under Phase IV, the pure ZEV requirement is 6%, but up to 50% can be met with Enhanced AT PZEV. Consistent with the existing Alternative Path, the New Path allows 3% of AT PZEVs to meet the ZEV requirements for Phase III and 2% for Phase IV. The PZEV option remains unchanged and is consistent with the existing plan of 6% for the six year period. Table IV illustrates the New Path percentages for Phases III and IV.¹⁰

Table IV – New Path

	Phase III 2012-2014 (12% ZEV requirement)	Phase IV 2015-2017 (14% ZEV requirement)
ZEV	0.3% - 3%	3% - 6%
Enhanced AT PZEV	up to 2.7%	up to 3%
AT PZEV	3%	2%
PZEV	6%	6%

2) Establish carry forward and carry back provisions for ZEV credits

With the early production and placement of NEVs (as shown in Table II), most automobile manufacturers accrued substantial amounts of ZEV credits by producing AT PZEVs and PZEVs at a rate greater than required. As a result of these banked and/or traded ZEV credits, manufacturers have had the ability to delay the introduction and placement of pure ZEVs in the marketplace. The changes to the carry forward/backward provision will limit the long-term applicability of these banked credits by requiring the placement of additional ZEVs.

The carry forward provision in the new ZEV regulation allows all ZEV credits earned through MY 2008 to retain full value through MY 2011. Starting in MY 2012, these credits will no longer be allowed to offset the ZEV requirement but will only be allowed to meet the PZEV, AT PZEV, or Enhanced AT PZEV requirements of the regulation. ZEV credits earned in MY 2009 and later will be allowed to be carried forward for two years to the gold category requirement. For example, automobile manufacturers producing vehicles in 2009 can use these ZEV credits to meet requirements in 2009, 2010, and 2011, but in 2012 those ZEV credits can only be used to meet manufacturers' PZEV, ATPZEV or Enhanced ATPZEV requirements.

The carry back provision allows automobile manufacturers a two-year carry back for gold category vehicles to meet their compliance obligation. The current obligation allows for a two year carry back for silver and bronze vehicles which would also cover the Enhanced

¹⁰ ARB Staff Report: Initial Statement of Reasons, 2008 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, ARB, February 8, 2008. p.10

AT PZEVs. For example, manufacturers producing vehicles in 2014 can use those gold credits in 2012 and 2013 after fulfilling their full obligation for the 2014 model year.¹¹

3) Provide more favorable treatment of battery EVs

Battery EVs are receiving renewed interest from the public and automobile manufacturers due to improvements in battery technology. Lithium ion and nickel based battery technologies are expected to meet the performance demands of customers. With great interest from consumers and the possibility of automobile manufacturers coming back into the electric vehicle market, the amendments provide for a more favorable treatment of Type I and II battery EVs when compared to Type IV fuel cell vehicles.

The ZEV amendments eliminate the percent cap on battery EVs to meet the gold requirement and modified the ratios for substitution. Table V illustrates the credit substitution ratios for each ZEV Type compared to a Type III (100+ mile range electric vehicle with fast refueling or 200 mile battery EV Fuel Cell or Battery EV). A larger ratio indicates that a greater number has to be produced to meet the Type III technology. For example, two Type I vehicles are equivalent to one Type III vehicle.¹²

Table V – Credit Substitution Ratio

ZEV Types	Credit Substitution Ratio Compared to a Type III ZEV
Type I	2.00
Type I.5	1.60
Type II	1.33
Type III	1.00
Type IV	0.80
Type V	0.57

(See Table III for definitions of all ZEV Types)

4) Adjust credits for AT PZEVs

AT PZEVs are intended to accelerate the development of pure ZEV technologies by advancing battery technologies. The amendments include PHEV credit adjustments to promote the expansion of such technologies and are expected to lead to performance improvements and cost reductions that are necessary for ZEV commercialization. Modifications to the treatment of credits for PHEVs include:

¹¹ ARB Staff Report: Initial Statement of Reasons, 2008 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, ARB, February 8, 2008. p.12

¹² ARB Staff Report: Final Statement of Reasons for Rulemaking, 2008 Amendments to the Zero Emission Vehicle Regulations, ARB, March 27, 2008

- a. Changing the “all electric range” (AER) calculation used in vehicle miles traveled to an “equivalent all electric range” (EAER) calculation that will enable “blended”¹³ PHEVs to be appropriately treated when compared to those of non-blended PHEVs;
- b. Extending an advanced componentry allowance for Type C hybrids (>10kW power capability where sub-systems operate at lower-voltage levels that are not suitable for full function ZEVs, but make use of advanced energy storage systems that are expected to be used on ZEVs) indefinitely and adding new higher battery capacity Types F & G HEVs. Adding new higher power Types, such as F hybrid vehicles (100 kW capability to propel an HEV through the driving test cycle on electric power alone) and G hybrid vehicles (drive and energy storage system that is sufficient to propel a vehicle on the more aggressive driving cycle), encourages the operation of higher battery capacity HEV drive systems that are interchangeable with those used in ZEVs; and
- c. Eliminating the low fuel-cycle emissions (LFCE) allowance for PHEVs that do not exclusively use LFCE fuels and increase the credit for AER PHEVs by at least 1.5 credits to compensate for the loss of LFCE allowance. Examples of vehicles eligible for AT PZEV LFCE are compressed natural gas (CNG) and hydrogen internal combustion vehicles.¹⁴

5) Increase credit for NEVs

NEVs are low speed battery electric vehicles with a maximum speed of 25 miles per hour. Although NEVs travel mostly on roads with a maximum posted speed limit of 35 miles per hour, tailpipe emissions are eliminated with these types of vehicles. Therefore, the ZEV amendments increase the NEV credit value from 0.15 to 0.3 to encourage automobile manufacturers to continue mass production of NEVs.

6) Extend The Travel Provision

The travel provision was added to the ZEV regulation in 2003 to encourage the initial development of Type III vehicles. The travel provision allows low volume production of these vehicles until the technology is commercially viable. California’s 2003 amendments to the ZEV regulation allowed Type III vehicles that are placed in Section 177 states to be counted towards compliance with California’s percentage ZEV requirements (as if they are placed in service in California). Similarly, vehicles placed in California can be counted toward a Section 177 state’s ZEV requirements. ARB’s April 17, 2009 modifications to the ZEV program extend the travel provision for Type III, IV, and V ZEV vehicles through MY 2017 and Types I, I.5, and II through MY 2014. The extension of the travel provision will reduce the number of Types III, IV, and V ZEVs in states that have adopted the California LEV program. Although the production and introduction of pure ZEVs would be reduced by half nationwide, the introduction of new and innovative PHEVs would potentially allow

¹³ “Blended” PHEVs fall between conventional hybrids and PHEVs with the addition of extra battery capacity and an on-vehicle charger. These do not earn the zero emission allowance.

¹⁴ Final Statement of Reasons for Rulemaking – Including Summary of Comments and Agency Responses, 2008 Amendments to the Zero Emission Vehicle regulations, March 27, 2008

automobile manufacturers the time and ability to slowly introduce more pure ZEVs into the market.

Because California's vehicle sales are significantly greater than each of the Section 177 states, a concern was raised by these states that allowing one for one credit for Type III and IV ZEVs under the travel provision could erase or greatly diminish the number of these vehicles placed outside of California. Therefore, the travel requirement under California's regulation provides for proportionality of California's credits to the Section 177 states' credits. In other words, the required credits are multiplied by the ratio of the manufacturer's total sales volume in the state receiving credit to the manufacturer's total sales volume in California. Automobile manufacturers have introduced AT PZEV hybrid vehicles in low volumes in Massachusetts and these vehicles represent a small percentage of the overall market. Since 2000, automobile manufacturers have introduced and placed approximately 30,000 hybrid vehicles in Massachusetts.¹⁵ Although the overall volume of AT PZEVs is low, automobile manufacturers are continuously increasing AT PZEV productions to meet consumer demand. Therefore, it is expected that the introduction of ZEVs will also start with low production volumes until the vehicles are commercially viable for mass production.

7) Modify Transition Requirements for Intermediate Volume Manufacturers (IVMs)

IVMs are defined as having annual vehicle (PCs, LDTs, and MDVs) sales in California between 3,001 and 60,000 units. There are eleven IVMs (BMW, Hyundai, Kia, Mazda, Mercedes, Mitsubishi, Volkswagen, Volvo, Jaguar, Suzuki, and Land Rover). LVMs are defined as having annual vehicle sales in California in excess of 60,000 units. There are six LVMs (Chrysler LLC, Ford, General Motors, Honda, Nissan, and Toyota). Once an IVM exceeds the threshold for three consecutive years, it is considered an LVM.

The amendments are intended to ease the transition for IVMs that become LVMs by allowing them six years to meet the LVM requirements. In the first three years of the transition period, a new LVM has the option to meet the ZEV requirements with a combination of PZEVs and AT PZEVs (at least 25% would have to be AT PZEVs). In years four through six, the LVM would continue to meet the ZEV requirements with PZEVs and AT PZEVs where at least 33% of the vehicles would have to be AT PZEVs. This transition would provide IVMs enough time to develop and deploy ZEV technologies into the market.

8) Public availability of ZEV credit data

All production data submitted by automobile manufacturers shall be made available to the public for MY 2009. The ZEV bank credit balance shall be available to the public for MY 2010. This would allow the public a better understanding of the automobile manufacturers' compliance rate.

¹⁵ Hybrids Placed in Massachusetts data, MassDEP, January 2009

V. AIR QUALITY IMPACTS

Ground level ozone or "smog" is a pollutant that has a significant health risk, especially for children with asthma. In addition, it is damaging to crops, trees and other vegetation. Ozone (O₃), at ground-level is created by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of sunlight. Sunlight and hot weather cause ground-level ozone to form in harmful concentrations. Motor vehicle exhaust and industrial emissions are major contributing sources of NO_x and VOCs. Many urban areas tend to have high levels of ground level ozone. In addition, rural areas are also subject to increased ozone levels from atmospheric dispersion by wind several hundred miles from their original sources.

Under the federal CAA, the U.S. Environmental Protection Agency (EPA) has established health-based National Ambient Air Quality Standards (NAAQS) for air pollutants. In September 1997, the EPA revised the NAAQS from a one hour to an eight-hour standard to provide increased health protection against longer exposure periods. Massachusetts has two ozone non-attainment areas. The Western Massachusetts non-attainment area is comprised of Hampden, Hampshire, Franklin and Berkshire counties. The Eastern Massachusetts non-attainment area encompasses the remainder of the state. Both areas are classified as moderate non-attainment areas under the 1997 eight-hour ozone standard. Therefore, MassDEP needs additional reductions to attain the ozone standard in Massachusetts and other Ozone Transport Commission (OTC) states. A State Implementation Plan (SIP)¹⁶ was submitted to EPA outlining ways to attain the 1997 eight-hour ozone standard statewide by 2010 through modeling demonstrations. The emission reductions, combined with the adoption of ZEV requirements, will aid Massachusetts in attaining and maintaining the NAAQS for ozone by bringing the State into attainment with the eight-hour ozone standard.

Emissions of GHG, the pollutants that cause global warming, are a real and documented environmental threat, according to United Nations Intergovernmental Panel on Climate Change (IPCC) and climate scientists around the world. The transportation sector contributes approximately 33% of all GHG pollutants in the U.S and over 60% of those emissions result from gasoline consumption for personal vehicle use, which makes it one of the nation's largest sources of global warming pollution.¹⁷ Massachusetts vehicles alone emit about 72 thousand tons of CO₂ global warming gas emissions per day.¹⁸ Therefore, it is essential to reduce and minimize GHG emissions from vehicles. ARB performed an analysis comparing emissions under the current ZEV program to emissions without a ZEV program. The result shows that there was a net decrease of direct emissions of reactive organic gases (ROG), including GHGs, and NO_x with the ZEV program in place.¹⁹

¹⁶ Final Massachusetts State Implementation Plan to Demonstrate Attainment of the National Ambient Air Quality Standard for Ozone, January 31, 2008

¹⁷ U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005, p. 29-31. (April 2007)

¹⁸ Background Document and Technical Support on Smog Index Vehicle Emissions Label, November 2008

¹⁹ ARB Staff Report: Initial Statement of Reasons, 2008 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, ARB, February 8, 2008. p.37

The ZEV requirements continue to push automobile manufacturers toward the development of new technologies to reduce emissions. In addition, the vehicle technologies used to comply with the ZEV requirements would reduce demand for petroleum fuels and help diversify the transportation fuel market. The increase in alternative fuels, such as electricity and hydrogen, will decrease our demand for fossil-fuels as well as reduce pollutants that harm public health, degrade environmental quality, and contribute to global warming.

VI. ECONOMIC IMPACTS

Initially, the ZEV program was designed to provide battery developers with the necessary production volumes to meet the cost and performance goals needed for commercial production. However, battery costs have remained high and automobile manufacturers have begun to look at other alternatives, such as hydrogen fuel cell vehicles.

The ZEV amendments have been projected by ARB to reduce the costs of compliance for automobile manufacturers because the regulations provide flexibility that could result in savings; however, these savings are difficult to accurately quantify. Factors that determine the cost of compliance with the ZEV requirements include vehicle type, number of vehicles, and the incremental cost for each vehicle. According to ARB, the fuel cell vehicle incremental costs are estimated to range from \$150,000 to \$250,000 per vehicle. Fuel cell vehicles are typically very expensive due to efficiency improvements required for greater range and greater fuel storage. Battery EVs costs are still uncertain due to the availability and price fluctuations of lithium-ion batteries. ARB estimated the battery EVs incremental costs from \$50,000 to \$100,000 per vehicle depending on the size of the battery and its range. For PHEVs, the incremental costs range from \$12,000 to \$25,000 per vehicle. Although there is great uncertainty with these estimates due to the evolving technology, costs are expected to decrease significantly when production quantities are high.²⁰

Determining the cost-effectiveness of the ZEV program has been more difficult and uncertain than other programs because of the longer lead times. In addition, it is extremely difficult to predict the future cost of technologies that are still in the demonstration stage. Cost-effectiveness is a measure of cost incurred to achieve the outcome. The amendments reduce the number of fuel cell and battery electric vehicles and increase the commercialization of larger numbers of Enhanced AT PZEVs. This translates to an overall decrease in costs due to the reduction in the number of vehicle using the more expensive technologies. Therefore, the amendments produce positive cost-effectiveness and the overall impact to the environment is improved at less cost due to the large numbers of AT PZEVs. This could produce an annual savings of millions of dollars to the industry compared to the current ZEV requirements.²¹

²⁰ ARB Staff Report: Initial Statement of Reasons, 2008 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, ARB, February 8, 2008. p.33

²¹ ARB Staff Report: Initial Statement of Reasons, 2008 Proposed Amendments to the California Zero Emission Vehicle Program Regulations, ARB, February 8, 2008. p.34

VII. OTHER PROGRAM IMPACTS AND PUBLIC PARTICIPATION

The change to the ZEV regulation does not have any negative impact on dealerships, vehicle operators, businesses, and agencies at the local, state or federal levels. Dealerships and vehicle operators are not expected to be impacted because the fuel cell and battery vehicles have not been sold commercially. Businesses are expected to benefit by starting up companies or providing services in advanced battery technology and ZEVs. The ZEV regulation has the potential positive impact on business creation, expansion, and employment.

VIII. REFERENCES

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U.S.EPA, Title II – Emission Standards for Moving Sources, Part A – Section 209, 42 U.S.C. §7543

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