

State of California
AIR RESOURCES BOARD

Updated Informative Digest

**PUBLIC HEARING TO CONSIDER ADOPTION OF THE 2003 AMENDMENTS
TO THE CALIFORNIA ZERO EMISSION VEHICLE REGULATION**

Sections Affected: Amendments to title 13, California Code of Regulations (CCR), section 1962 and the incorporated "California Exhaust Emission Standards and Test Procedures for 2005 and Subsequent Model Zero-Emission Vehicles, and 2001 and Subsequent Model Hybrid-Electric Vehicles, in the Passenger Car, Light-Duty Truck, and Medium-Duty Vehicle Classes," and section 1900(b)(19) and (21).

Background

The California ZEV regulation was originally adopted by the Air Resources Board (ARB or Board) in 1990, as part of the ARB's first Low-Emission Vehicle (LEV I) regulations. It established an ambitious program to dramatically reduce the environmental impact of light-duty vehicles through the gradual introduction of ZEVs into the California fleet. As originally adopted, the ZEV regulation required that specified percentages of the passenger cars and lightest light-duty trucks (called the LDT1 category) produced by each of the seven largest auto manufacturers be ZEVs, starting in 1998. The percentages were 2 percent for the 1998-2000 model years (MYs) and 5 percent for the 2001-2002 MYs. A requirement of 10 percent ZEVs applied to all but small-volume manufacturers starting in MY 2003. The regulation also included a marketable credits system. Although the regulation did not require a specific technology, the expectation at that time was that the requirements would be met by the introduction of battery electric vehicles (EVs).

In 1996 the ARB amended the ZEV regulation to allow additional time for the technology to develop. The requirement for 10 percent ZEVs in MYs 2003 and beyond was maintained, but the percentage ZEV requirements for MYs 1998 through 2002 were eliminated. At the same time, the ARB entered into Memoranda of Agreement (MOAs) with the seven largest auto manufacturers. Under the MOAs the manufacturers agreed to place more than 1,800 advanced-battery EVs in California in the years 1998 through 2000, and the ARB agreed to work with state and local governments to help develop ZEV infrastructure and remove barriers to ZEV introduction.

As part of the 1998 "LEV II" rulemaking, the Board adopted amendments that allowed manufacturers to use partial allowances of 0.2 or more generated from vehicles with extremely low emissions (referred to as partial ZEV allowance vehicles or PZEVs) to meet the 10 percent ZEV requirement. To be certified as a PZEV, a vehicle must meet the ARB's most stringent exhaust emission standards, have zero evaporative emissions, and be covered by an emissions warranty for 15 years or 150,000 miles, whichever occurs first. However, a large-volume manufacturer was required to have a minimum of 4 percent of its

California fleet of passenger cars and lightest trucks be vehicles classified as “full” or “gold” ZEVs.

The 2001 Amendments to the ZEV Regulation

Following a January 2001 hearing, the ARB adopted major amendments to the ZEV regulation that were designed to maintain progress towards commercialization of ZEVs while recognizing the market constraints created primarily by the cost of battery technology. The amendments maintained a core ZEV component, but significantly reduced the cost of the program – primarily through a reduction in the number of vehicles required in the near term and a further broadening in scope of the vehicle technologies allowed. The key elements of the 2001 amendments pertinent to this rulemaking are described below.

Reducing the number of ZEVs needed in the near term. Several amendments reduced the number of ZEVs required in the early years of the program. The amendments established multipliers that provided extra credits for ZEVs in the early years. ZEVs introduced before the 2006 MY received early introduction multipliers of 4.0 for the 2001 and 2002 MYs and 1.25 for the 2003-2005 MYs. A separate “NEV discount” multiplier reduced the credits earned by Neighborhood Electric Vehicles (NEVs) – which have a top speed of no more than 25 miles per hour – to 0.625 for the 2004 and 2005 MYs because of their limited functionality. For 2006 and subsequent years the credits earned by NEVs were further reduced to 0.15. The early introduction multipliers for ZEVs in a given model year and the extended range multiplier described below were only available to ZEVs that not only were “delivered for sale” but were also “placed in service.” The Initial Statement of Reasons for the rulemaking indicated that to earn multiple allowances, manufacturers would be required to certify to the Executive Officer the number of vehicles placed in service during the course of the model year.

Reducing the number of PZEVs needed in the near term. The amendments added PZEV early introduction multipliers that reduced the number of PZEVs needed to meet the maximum PZEV allowance amount to 25 percent of the preexisting requirement in MY 2003, 50 percent in MY 2004, and 75 percent in MY 2005. Manufacturers were also provided two years to make up a PZEV shortfall rather than the one year previously allowed.

Allowing advanced technology PZEVs to satisfy one-half of the “pure ZEV” requirement and increasing their allowances. Qualifying advanced technology vehicles that were not ZEVs were permitted to satisfy up to one half of the four percent “pure ZEV” portion of the ZEV requirement. These were known as Advanced Technology PZEVs (AT PZEVs), defined as any PZEVs earning a ZEV allowance of more than 0.2, not including the early introduction multiplier. One category of AT PZEVs consisted of PZEVs such as grid-connected hybrid electric vehicles with an all-electric range of 10 miles or more; the additional “zero emission vehicle miles traveled (VMT) allowance” for these vehicles varied from about 0.4 to 2 depending on the electric range. Another category of AT PZEVs – those using a fuel such as compressed natural gas with very

low fuel-cycle emissions – qualified for an additional allowance of up to 0.2, depending on the degree to which the vehicle uses that fuel.

A third category of AT PZEVs included vehicles that employed “advanced ZEV componentry” but did not qualify for a zero-emission VMT allowance – vehicles such as a non-grid connect gasoline hybrid electric vehicle. For this category, the amendments established three alternative performance-based paths that the manufacturer could use to calculate the allowance: (1) CO₂ savings, (2) vehicle efficiency, or (3) through MY 2007 only, the percent of peak power that comes from the battery. The calculations for the first two methods relied on the vehicle’s fuel economy as measured by the U.S. Environmental Protection Agency (U.S. EPA). The vehicle had to meet a threshold performance level to qualify for any allowance; for qualifying vehicles the amount of the allowance increased with the vehicle’s performance. The amendments also provided an additional allowance of 0.1 for vehicles that use gaseous or hydrogen fuel storage.

Expanding ZEV range credits and adding an efficiency multiplier for ZEVs and AT PZEVs. Modifying ZEV extended range credit provisions that had been added in 1996, the amendments reduced the minimum range needed for multiple credits to 50 miles, with credits increasing with range up to 10 credits for a range of 275 miles or more. Because a vehicle with a refueling time of less than 10 minutes earned the maximum credit regardless of range, a hydrogen fuel cell vehicle earned 10 credits, not including any phase-in multiplier.

A ZEV or AT PZEV having an efficiency at least 50 percent greater than the average for its size class qualified for a new efficiency multiplier. All vehicle efficiencies (gasoline, CNG, electric) were converted into the common units of California Miles per Equivalent Gallon (CMPEG). The multiplier earned was the larger of 1.0 or the vehicle CMPEG divided by the baseline. For ZEVs, the efficiency multiplier partially replaced the range multiplier on a phased-in basis beginning in MY 2005, and the combined value of the range and efficiency multipliers was gradually reduced, resulting in larger numbers of vehicles in later years. For AT PZEVs, the efficiency multiplier took effect beginning in MY 2002.

Increasing the percentage ZEV requirement in later years. The 10 percent ZEV requirement for large and medium-duty manufacturers was ramped up to 11 percent for the 2009-2011 MYs, 12 percent for the 2012-2014 MYs, 14 percent for the 2015-2017 MYs, and 16 percent for 2018 and subsequent MYs. During these ramp-ups, the portion of the ZEV requirement that could be satisfied by 0.2 allowance PZEVs was held at 6 percent. Thus the pure ZEV portion gradually increases from 4 percent in the 2003 through 2008 MYs to 10 percent by 2018. Up to one half of this pure ZEV portion could be satisfied with allowances from AT PZEVs.

Phased addition of LDT2 vehicles to the base for calculating a manufacturer’s ZEV obligation. At the January 2001 hearing the Board decided to modify the originally proposed amendments to phase in a new requirement that “LDT2” vehicles be included in the base for determining a manufacturer’s full percentage ZEV obligation, along with the passenger cars and LDT1 vehicles that had always been included. The LDT2

category includes most sport utility vehicles (SUVs), minivans, and larger pickup trucks. The addition of LDT2 vehicles was phased in beginning in the 2007 MY, when 17 percent of the manufacturer's California LDT2 production would be counted. The percentage increased by 17 percent increments through the 2011 MY, with a 100 percent requirement starting in the 2012 MY. Full inclusion of LDT2 vehicles increases the base across all manufacturers by an average of about 70 percent, although the impacts differ among individual manufacturers.

Restricting the future use of "banked" credits earned by NEVs. To avoid the possibility that manufacturers could place large numbers of NEVs in these early years and thereby amass enough credits from NEVs alone to avoid producing ZEV program vehicles for a number of years, the amendments capped the use of such credits in future years. NEV credits earned in prior years could only be used to satisfy 75 percent of a manufacturer's ZEV obligation in MY 2006 and 50 percent in MY 2007 and beyond.

Miscellaneous other changes. Various other changes made by the 2001 amendments included permitting additional ZEV credits for ZEVs, AT PZEVs and PZEVs placed as part of a transportation system in MYs 2001-2007. Additional credits were also authorized for a vehicle in California service for more than three years with an extended battery or fuel cell stack warranty.

Litigation and Other Recent Developments

In 2002, General Motors and DaimlerChrysler filed three lawsuits challenging the 2001 ZEV Amendments and their implementation; the first two also named some Fresno-area auto dealers as additional plaintiffs.

The federal preemption lawsuit. One of the cases was filed in January 2002 in federal district court in Fresno, asserting that the provisions pertaining to AT PZEVs that are gasoline hybrids are related to fuel economy standards and accordingly are preempted by the Energy Policy and Conservation Act of 1975 – the law that directed the National Highway Traffic Safety Administration to establish corporate average fuel economy (CAFE) standards. On June 11, 2002, a federal district judge issued a preliminary injunction that prohibits the ARB's Executive Officer from enforcing the 2001 ZEV Amendments with respect to the sale of new motor vehicles in the 2003 or 2004 MYs, pending final resolution of the case. The judge issuing the preliminary injunction found that the plaintiffs were likely to succeed in their preemption claim. He rejected arguments that the optional nature of the AT PZEV provisions eliminated preemption concerns, because he found that disparities in costs among the various compliance options in effect required manufacturers to produce gasoline hybrids. He enjoined enforcement of all of the 2001 ZEV Amendments based on the conclusion that the challenged AT PZEV provisions likely were not severable from the rest of the ZEV program. The ARB appealed issuance of the preliminary injunction to the U.S. Court of Appeals for the Ninth Circuit, which heard oral argument on February 13, 2003. In the interim, the preliminary injunction remained in effect.

The first state court lawsuit. The second case was filed in January 2002 in the Fresno County Superior Court with Isuzu Motors as an additional plaintiff. As amended, the complaint identifies seven theories under which the 2001 ZEV amendments are claimed to be partially or wholly invalid. One allegation is that the amendments adding LDT2s to the base for the percentage ZEV requirements was beyond the scope of the original hearing notice and could not be adopted without a new notice. There are also claims that the ARB did not comply with the California Environmental Quality Act (CEQA), that the ZEV regulation is inconsistent with the ARB's authorizing statutes, and that the Board failed to make a rational cost-effectiveness determination. On December 19, 2002 the trial court denied the automakers' motion for summary judgment and a trial court hearing on the merits is expected after January 2003.

The second state court lawsuit. On December 11, 2002, DaimlerChrysler and General Motors filed a second lawsuit in Fresno County Superior Court, this time challenging a November 21, 2002 guidance letter transmitted by the ARB's Executive Officer to vehicle manufacturers. The letter responded to inquiries on when 2002 MY NEVs would need to be placed in service in order to qualify for the 2002 MY early introduction multiplier – in case the preliminary injunction was lifted or the issue became relevant in the context of subsequent amendments to the ZEV regulation. The Executive Officer interpreted the regulation as allowing a MY 2002 ZEV to receive the 4.0 multiplier only if it is placed in service by the end of March 2003. Following a December 17 hearing, a temporary restraining order was issued temporarily prohibiting enforcement of the March 31, 2003 deadline as established in the guidance letter.

Technology developments. When the Board amended the regulation in 2001, it did so with the understanding that near-term compliance with the pure ZEV portion of the regulation would be expensive for automakers, but that continued vehicle and technology development would lead to less costly approaches. Since that time, there have been no significant reductions in the cost of battery EVs. Meanwhile, the marketing of battery EVs has been met with only modest success, with only NEVs emerging as a commercial although limited usage product. These factors, along with the federal lawsuit, have slowed or even halted automaker plans regarding battery EV development.

In addition, projections regarding the pace of commercialization of fuel cells, which were expected to provide a second ZEV technology late in this decade, have become less certain although automakers remain fully committed and continue to invest heavily in the technology. As a result, it appears that under the preexisting regulation manufacturers would need to develop additional battery EV products to bridge the interim years until fuel cells are available in larger quantities in the next decade.

The 2003 ZEV Amendments

Although the ARB believes that the challenged AT PZEV provisions are not preempted by federal law and that the federal preliminary injunction could be reversed on appeal, there is no doubt that the injunction has introduced considerable uncertainty regarding the ZEV regulation that would not necessarily be ended by a reversal by the Ninth

Circuit Court of Appeal. Removal of this uncertainty is essential for the ZEV program to move ahead. While there are advantages to the scoring provisions for gasoline hybrid AT PZEVs and the efficiency multiplier in the 2001 amendments, the ARB has developed what it considers to be a satisfactory alternative approach that removes all references in the regulation to fuel economy and addresses the preemption concerns.

Major additional amendments are designed to take full advantage of the near-term possibilities afforded by PZEVs and AT PZEVs and to establish a stepwise approach towards “gold” ZEV commercialization that takes into account progress over time. These amendments reflect the current state of ZEV technologies and the associated cost implications. The 2003 ZEV amendments include the following elements:

Delaying start of the percentage ZEV requirements until the 2005 MY. The start of the percentage ZEV requirements has been delayed two years, until the 2005 MY. Qualifying MY 2004 and earlier ZEVs, AT PZEVs and PZEVs will generate credits or allowances that could be used in future MYs.

Deleting the efficiency multiplier for AT PZEVs and ZEVs, and changing the methods for awarding allowances for AT PZEVs. The efficiency multiplier for AT PZEVs and ZEVs has been deleted. The amendments also eliminate the three current methods – the CO₂ reduction method, the efficiency method and the peak power method – that establish sliding scales for awarding allowances to PZEVs with other advanced ZEV componentry, including hybrid electric vehicles (HEVs). In their place is a mechanism based on five categories of HEVs that qualify for credits:

- Type A: Low voltage, low power HEV (< 60 volts, minimum 4 kW motor power)
- Type B: High voltage, low power HEV (\geq 60 volts, \geq 4 kW - <10kW motor power)
- Type C: Low voltage, medium power, advanced energy storage HEV (< 60 volts, \geq 10 kW motor power)
- Type D: High voltage, medium power HEV (\geq 60 volts, minimum 10 kW motor power)
- Type E: High voltage, high power HEV (\geq 60 volts, minimum 50 kW motor power)

Type A HEVs will not receive an additional advanced componentry credit, but the base 0.2 PZEV credit earned by such vehicles will be available for use in the AT PZEV category through MY 2008. Type B HEVs will earn an additional AT PZEV allowance of 0.2 in MYs 2008 and earlier. Type C HEVs will earn an additional AT PZEV allowance of 0.2 through MY 2011. Type D HEVs will qualify for an advanced ZEV componentry credit of 0.4 for MYs 2003 through 2011. And Type E HEVs will qualify for an advanced componentry credit of 0.5 with no sunset.

The amendments also change the way other AT PZEV allowances are determined. The maximum overall cap for PZEVs with low fuel-cycle emissions is increased from 0.2 to 0.3 and the applicable equation is revised to increase the allowance by 50 percent. The allowance for zero emission VMT for hybrid electric vehicles and the phase-in multiplier for AT PZEVs with any zero emission vehicle miles traveled have also been increased.

The amendments add a cap on total AT PZEV allowances for any technology type of 3.0 starting in the MY 2012.

An AT PZEV qualifying for both the zero emission vehicle miles traveled (VMT) credit and the advanced ZEV componentry credit will be allowed to make use of both credits. The limits on maximum zero-emission VMT credit under an alternative procedure have been changed. The early introduction multiplier and the zero emission range multiplier are not to be combined. The combined credit for any AT PZEV – including plug-in hybrids that earn a zero emission VMT allowance – is limited to no more than that earned by a Type III ZEV in the same model year.

Changing the way credits from ZEVs are calculated and applied. Along with removing the efficiency multiplier for ZEVs, the amendments make a series of changes to simplify the calculation and encourage sustainable commercialization of ZEVs. They identify five ZEV “types” that will be the basis for awarding ZEV credits: NEVs, Type 0 (utility low-range ZEVs), Type I (mid-range ZEVs like City electric vehicles), Type II (longer-range ZEVs like full-function battery electric vehicles) and Type III (long range, fast-refueling ZEVs like fuel cell vehicles). A 2003 and subsequent MY ZEV, other than a NEV, will earn 1 ZEV credit when it is produced and delivered for sale in California. A 2003 and subsequent MY ZEV will earn additional credits based on the earliest model year in which it is placed in service (not earlier than the ZEV’s model year). The following table shows the total number of credits the ZEV will earn, including the credit not contingent on placement in service, if it is placed in service in the specified model year or by June 30 after the end of the model year.

Tier	Model Year in Which ZEV is Placed in Service									
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012+
NEV	1.25	0.625	0.625	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Type 0 (Utility)	1.5	1.5	1.5	1.5	1.5	1.5	1	1	1	1
Type 1 (City)	8	8	8	7	7	5	2	2	2	2
Type II	12	12	12	10	10	7	3	3	3	3
Type III	40	40	40	40	40	40	4	4	4	3

Choice of an alternative compliance path or compliance with the percentage ZEV requirements of the 2001 amendments. The ARB ultimately adopted a two-path compliance approach under which manufacturers have the option of either complying with the pre-existing percentage ZEV requirements, or following an alternative compliance path. Under the alternative path, a manufacturer is allowed to meet an increasing “floor” requirement for production of Type III ZEVs – expected to be fuel cell

vehicles – during four multi-year stages running from MYs 2005-2017. Once the floor requirement for a stage is met, the manufacturer may meet the rest of its gold ZEV requirement with credits from AT PZEVs. If all large-volume manufacturers were to participate in the alternative path, it is expected that the following numbers of Type III ZEVs would be produced in the various stages: 250 in MYs 2005-2008, 2,500 in MYs 2009-2011, 25,000 in MYs 2012-2014, and 50,000 in MYs 2015-2017. The specified volumes are based on the principle that early production for new types of vehicles proceeds in stages in which volumes typically grow from tens to hundreds and then to thousands.

A large volume manufacturer is allowed to meet up to one-half of the minimum floor requirements with credits from Type I and Type II ZEVs. In the MY 2005-2008 and 2009-2011 periods, 20 Type I ZEVs, or 10 Type II ZEVs, would equal one Type III ZEV. For 2012 and later, that 10 Type I ZEVs, or 5 Type II ZEVs equal one Type III ZEV. The ratios for the 2009 and subsequent model years are based on limited cost data, and those ratios may need to be amended in the future. In addition, credits earned by extended in-use Type I and Type II ZEVs in MYs 2003-2011 may be used at a credit ration of 33 lease-years to 1 fuel cell vehicle towards satisfaction of the one-half of the minimum floor requirement that could be met by Type I and Type II ZEVs.

A large volume manufacturer is permitted to carry over excess credits from Type III ZEVs in a given period and use the credits towards meeting the minimum floor level in a subsequent period. The value of the carry over credits will be based on the model year in which the credits are used. Any manufacturer who elects to be subject to the alternative path for any model year and then fails to meet the minimum floor level requirements for Type III ZEVs by the end of the three or four year period in which the model year falls will be treated as subject to the primary requirements for that three or four year period.

The ARB intends to establish an Independent Expert Review Panel to report to the Board on the status of ZEV technology development in time for the Board to consider it and other information in determining the appropriate regulatory approach on the commercialization of pure ZEVs in MYs 2009 and subsequent.

A large volume manufacturer is permitted to carry over excess credits from Type III ZEVs in a given period and use the credits towards meeting the minimum floor level in a subsequent period. The value of the carry over credits will be based on the model year in which the credits are used. Any manufacturer who elects to be subject to the alternative path for any model year and then fails to meet the minimum floor level requirements for Type III ZEVs by the end of the three or four year period in which the model year falls will be treated as subject to the primary requirements for that three or four year period.

Credits earned by “excess” PZEVs in MY 2003 and 2004 available for use in the AT PZEV category in MYs 2005 and 2006. Credits from MY 2003 and 2004 PZEVs will be “excess” to the extent they exceed the number of credits from PZEVs that would be

required to take full advantage of the PZEV option in each year, had the percentage ZEV requirements been applicable.

Additional amendments affecting the ZEV credit calculations reflect the above changes to the structure of the calculation and experience with the program to date. These include modification of the fast refueling definition.

In the final amendments the cap on the use of credits from NEVs to meet “silver” AT PZEV obligations has been delayed from MY 2006 to MY 2008. In addition, ZEVs have been removed from the sales volume used to calculate the ZEV requirement.

The manufacturer of a MY1997-2003 ZEV, other than a NEV, may generate ZEV credits by leasing them for a period beyond three years. The credit is 0.2 times each additional year covered by the re-lease for additional years of service starting April 24, 2003 or later, and 0.1 times each additional year starting before that time.

“Travel” provisions. New York, Massachusetts and Vermont currently require compliance with the California ZEV requirements pursuant to section 177 of the federal Clean Air Act. The amendments provide that Type III ZEVs placed in any state that has adopted California’s ZEV program be allowed to count towards California’s ZEV requirement, including the requirements for a minimum floor for production of Type III ZEVs under the alternative compliance path through MY 2011. Similarly, under identical programs adopted by Section 177 states, Type III ZEVs placed in California would have to count towards the ZEV requirement in those other states. The effect of this provision is that during the MY 2005-2008 and MY 2009-2011 periods in which the target numbers of alternative path Type III ZEVs are 250 and 2500 respectively, those numbers would essentially apply on a combined basis in California and all Section 177 states administering a California ZEV program.

Refining the “placed in service” requirements. The amendments provide that a 2001-2002 MY ZEV qualifies for the early introduction multiplier of 4.0 only if it is placed in service in California by September 30, 2003. If it is placed in service after that time, it would be subject to the credit provisions applicable to 2003 and subsequent MY ZEVs as described above.

Miscellaneous changes. The energy storage device on a hybrid electric PZEV has been required to be warranted for 15 years or 150,000 miles, whichever occurs first. The amendments revise the warranty requirement for the energy storage device to 10 years or 150,000 miles. The sunset date on the award of transportation system credits is extended from MY 2007 to MY 2011, and credits earned by vehicles will not be subject to the cap on the use of transportation system credits.

Reaffirmation of the phased addition of LDT2s. After hearing comment on whether it should reaffirm the changes in the 2001 ZEV amendments that phase in a requirement that LDT2 vehicles be included in the base for calculating a manufacturer’s ZEV obligation, the ARB reaffirmed the inclusion of these provisions in the ZEV regulation.