

## **DRAFT AGENDA**

### **WORKSHOP TO DISCUSS POSSIBLE AMENDMENTS TO THE ZERO EMISSION VEHICLE (ZEV) PROGRAM**

**DECEMBER 5-6, 2002**

- I. Objectives
  
- II. Background And Context
  - A. Preliminary Injunction
  - B. Status Of ZEV Technology Development
  - C. Banked Credits
  
- III. Discussion of Specific Possible Changes
  - A. Strawman Proposal
  - B. Specific Changes
    - 1. Program Restart
    - 2. Calculation of AT PZEV Credits
    - 3. Calculation of ZEV Credits
    - 4. Compliance Categories
    - 5. Other Miscellaneous Changes
  - C. Discussion Questions
  
- IV. Next Steps

## **BACKGROUND INFORMATION**

### **WORKSHOP TO DISCUSS POSSIBLE AMENDMENTS TO THE ZERO EMISSION VEHICLE (ZEV) PROGRAM**

**DECEMBER 5-6, 2003**

#### **I. OBJECTIVES**

The staff of the Air Resources Board (ARB or Board) is developing amendments to the Zero Emission Vehicle (ZEV) program to be considered by the Board at its February 2003 meeting. The possible amendments are intended to address issues raised by industry litigation and take into account current conditions and trends in zero and near-zero emissions technology development. In developing possible amendments in light of the current situation, staff has identified several objectives to be achieved:

- The pure ZEV requirement and the goal of zero emissions must be maintained in order to achieve our long term public health goals
- The amendments should resolve issues raised by the federal preliminary injunction
- The regulation should maintain pressure that will accelerate ZEV technology development
- The regulation should provide support for future ZEV commercialization
- The regulation should take full advantage of technology options that are available today, to achieve air quality improvement and provide a bridge to ZEV commercialization
- The regulation should provide manufacturers the option to pursue their preferred path towards ZEV commercialization
- The regulation should provide flexibility with respect to fuels, technologies, and compliance pathways.

#### **II. BACKGROUND AND CONTEXT**

The staff will hold a public workshop on December 5 and 6, 2002 to discuss possible amendments to the regulation. This working paper first provides background information relevant to the staff's evaluation of possible changes, including discussion of the preliminary injunction, the status of ZEV technology development, and the number of banked credits that have been accrued by manufacturers. The paper then outlines various specific changes and issues under consideration, including a "strawman" proposal that assembles several possible changes into an integrated package. The staff seeks public comment on the identified issues and the various possible amendments.

The staff has not completed its evaluation of possible amendments, and the final staff proposal to be released in January 2003 may vary from the concepts discussed here.

#### **A. Preliminary Injunction**

In January 2001 the Air Resources Board (ARB) approved amendments to the ZEV regulation. The “2001 ZEV Amendments” ultimately were adopted in final form on April 12, 2002, and were approved by the Office of Administrative Law on May 24, 2002.

The 2001 ZEV Amendments maintained the underlying requirement that at least 10 percent of all passenger cars and the lightest light trucks produced by large and intermediate volume manufacturers be ZEVs, starting in the 2003 model year. A large volume manufacturer continued to be allowed to meet up to 60 percent of its ZEV requirements with partial ZEV credits from vehicles called “PZEVs” having very low – but more than zero – emissions. The 2001 Amendments allowed another 20 percent of the manufacturer’s ZEV obligation to be met by partial credits from advanced technology vehicles in the “AT PZEV” category, which includes gasoline hybrid-electric vehicles meeting specified criteria. PZEVs and AT PZEVs have become known respectively as “bronze” and “silver” vehicles, with the ZEVs making up the remaining 20 percent representing the “gold” standard. An intermediate volume manufacturer may meet its entire 10 percent obligation with credits from PZEVs or AT PZEVs. The 2001 Amendments also added a variety of mechanisms such as early introduction multipliers that a manufacturer may use to reduce the total number of vehicles required in the near to mid term.

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 model years, pending final resolution of the case. The lawsuit was brought by General Motors, DaimlerChrysler and various Fresno-area auto dealers. The ARB has appealed issuance of the preliminary injunction to the U.S. Court of Appeals for the Ninth Circuit. The appeal has been fully briefed, and we are hopeful for a decision before the end of February 2003. In the interim, the preliminary injunction remains in effect.

The preliminary injunction grew out of the parts of the AT PZEV provisions that pertained to vehicles with advanced ZEV componentry such as that used in gasoline hybrid-electric vehicles. There are three options for qualifying gasoline hybrids as AT PZEVs and measuring the amount of ZEV allowances they earn. One option is based on the extent to which carbon dioxide (CO<sub>2</sub>) emissions are reduced and one is based on the vehicle’s efficiency as measured by fuel economy. The judge issuing the preliminary injunction found that the plaintiffs

were likely to succeed in their claim that the AT PZEV provisions are related to fuel economy standards and accordingly are preempted by the Energy Policy and Conservation Act of 1975, which directed the National Highway Traffic Safety Administration to establish corporate average fuel economy (CAFE) standards. The judge 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.

In response to the preliminary injunction, the staff's current plans are to propose amendments that would remove all references to fuel economy in the ZEV regulation and address the preemption concerns raised in the district court's decision. While there are advantages to the scoring provisions for gasoline hybrid AT PZEVs in the 2001 Amendments, the staff believes that the strawman approach is a satisfactory alternative that would avoid the prospect of continuing uncertainty pending final resolution of the federal lawsuit.

Due to the preliminary injunction and the status of technology development discussed below, the staff is proposing that the amended percentage ZEV requirements apply starting in model year 2005.

## **B. Status Of Technology Development**

When the Board adopted the 2001 amendments, it did so with an understanding that near-term compliance with the "pure ZEV" portion of the regulation would be expensive for manufacturers, but that continued development work would lead to more economical approaches that could be employed in modest quantities as the required vehicle volumes increased.

Since that time, there have been no significant reductions in the cost of battery electric vehicles, with only NEVs emerging as a commercial although limited usage product. In addition, projections regarding the pace of commercialization of fuel cells, which were projected to provide a second ZEV technology late in this decade, have become less optimistic. As a result, it appears that under the current regulation manufacturers will need to develop additional battery EV products to bridge the interim years until fuel cells are available in larger quantities in the next decade.

Supporters of battery EV technology argue that the additional battery EV products needed under the current regulation will help build the market for ZEV products. They also maintain that continued development of battery products provides a "safety net" in the event that fuel cell technology encounters impenetrable barriers. The auto manufacturers, on the other hand, have argued that the need to devote engineering staff and resources to mid-term battery EVs

will actually detract from the pace of fuel cell commercialization. Moreover, many manufacturers have stated that they would prefer to target their investment towards fuel cell technology rather than battery EV technology, because they believe that fuel cells show promise of future marketability while battery EVs do not. Although the ARB was aware of the potential mid-term compliance challenge at the time of the 2001 amendments, it was anticipated that any such challenge would be short-lived.

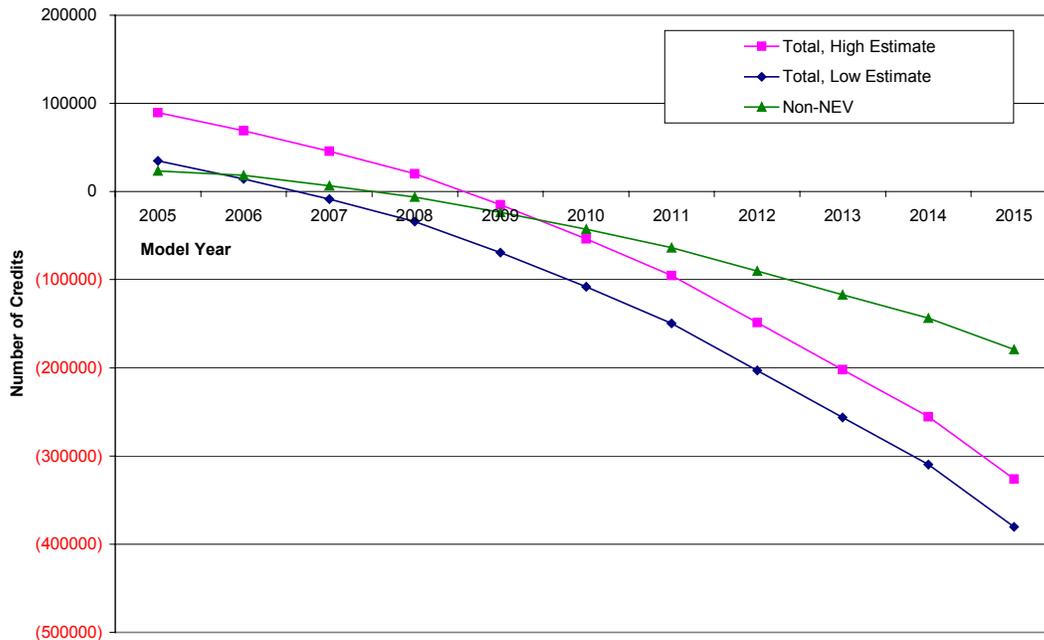
Meanwhile, technical progress in the AT PZEV and PZEV categories continues at a rapid pace, with a number of models in each category either already introduced or under active development.

### **C. Banked Credits**

One key factor that affects staff's response to the technology trends noted above is the availability of banked credits. Such credits, earned prior to the effective date of the regulation, can be used to offset manufacturers' compliance obligation in subsequent years. Thus the number of banked credits available will determine the timeframe in which new product will be needed to ensure compliance.

The following chart provides rough estimates of the number of banked credits that may be available and how long they could sustain manufacturer compliance. A negative value indicates that the number of available credits falls short of the number needed to comply with the regulation. Staff notes that these estimates are highly uncertain due to lack of complete information on current manufacturer ZEV placements and the number of placements that will be accomplished by the end of the 2002 model year.

ZEV Credit Balances



The above estimates are based on the following assumptions:

- The ZEV regulation is amended to make the percentage ZEV requirements applicable starting in the 2005 model year, and the Board decides that all credits earned from earlier model year vehicles will be retained.
- Manufacturers freely buy and sell credits such that compliance is sustained as long as possible for all manufacturers. (Thus the dates given above represent the average for all manufacturers. The status of individual manufacturers varies greatly – staff anticipates that some manufacturers will have only small amounts of banked credits while others will have credits sufficient to meet the portion of their gold obligation that can be satisfied using NEV credits for a number of years.)
- All manufacturers take full advantage of the 6 percent PZEV and 2 percent AT PZEV options, such that banked ZEV credits are only used to satisfy the 2 percent ZEV requirement. (Staff notes that based on current information from manufacturers, not all manufacturers will have products in all categories by the 2005 model year. They thus may be required to use banked or purchased credits in the AT PZEV and PZEV categories. This will reduce the number of banked credits from the numbers assumed above. On the other hand, if the gold obligation is temporarily reduced to 1 percent as discussed below, and manufacturers choose and are able to limit their use of banked credits to the gold category, then the number of banked credits needed each year would be reduced.)
- Total non-NEV ZEV credits are roughly 14,000 earned through 2001, and 9,200 earned in 2002-2003. The 2002-2003 credits are due to assumed

placement of 250 RAV4 EVs in model year 2002 and 200 in model year 2003, and placement of 200 Nissan Altra EVs in model year 2002.

- The “Total, Low Estimate” assumes placement of 7,500 NEVs. The “Total, High Estimate” represents a more aggressive view of manufacturer NEV placements, under which more than 16,000 NEVs earning 4 phase-in multiplier credits each are placed in service prior to April 2003.
- The “Non-NEV” line represents the available balance of non-NEV credits. This is an important consideration due to the requirement that beginning in 2006 at least 25 percent of the manufacturers’ ZEV obligation must be met using non-NEV credits. This percentage increases to 50 percent in 2007 and beyond.

Taking all of the above into account, under the “Low” estimate the available banked credits can sustain compliance for all manufacturers through the 2006 model year. Under the “High” estimate the banked credits can sustain compliance through the 2007 model year. After that point, although NEV credits are still available, the supply of non-NEV credits has been exhausted. Thus even if additional NEV placements are made beyond the levels assumed here, manufacturers would be out of compliance in 2008 unless additional non-NEV credits are generated. If the gold category is temporarily reduced to 1 percent, and manufacturers restrict their use of banked credits to this category, then the compliance date could be further extended.

As noted above, these estimates represent the average across all manufacturers. On an individual manufacturer basis, some would face compliance problems (in the absence of new vehicle placements) before these dates and some could extend the use of banked credits beyond these dates.

### **III. POSSIBLE PROGRAM AMENDMENTS**

#### **A. Strawman Proposal**

This section summarizes a strawman staff proposal that incorporates a number of regulatory amendments. The individual changes are discussed separately under Section B below.

The major features of the strawman proposal are:

- Delay the start of the percentage ZEV requirements until model year 2005, allowing the full use of credits earned prior to that model year.
- Remove references to fuel economy from the calculation of ZEV and AT PZEV credit values, and substitute a flat credit for ZEVs and for AT PZEV advanced componentry
- Define three “stages” of fuel cell development (model years 2003-2005, 2006-2008, 2009-2011) and award greater amounts of credit for demonstration

quantities of vehicles produced during those periods. At the conclusion of this demonstration period, in model year 2012, the fuel cell credit levels would revert to the level needed to meet the “red line” under the 2001 ZEV amendments.

- Allow the installation of hydrogen infrastructure to earn credit that can be used within the gold category and the transitional gold category, defined below. Staff has not arrived at a proposed quantification of hydrogen infrastructure credits and welcomes comment at the workshop on this point.
- During the 2005-2011 time period reduce the gold requirement to one half of its current value (new value would be one percent in 2005-2008 and 1.25 percent in 2009-2011). Add a new category known as “transitional gold” for the remainder of the current gold requirement. This category can be satisfied with ZEVs or with other technologies that lay the groundwork for future ZEV commercialization. Possible eligible technologies are:
  - AT PZEVs
  - Hydrogen infrastructure

The resulting compliance options are illustrated graphically on the following chart.

	Stage I			Stage II			Stage III			Return to "Red Line"			
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1%													Gold
1%													
1%													
1%							Gold	Gold	Gold	Gold	Gold	Gold	Silver
1%							T. Gold	T. Gold	T. Gold				
1%							T. Gold	T. Gold	T. Gold				
2%							Silver	Silver	Silver	Silver	Silver	Silver	
6%							Bronze	Bronze	Bronze	Bronze	Bronze	Bronze	Bronze

Each manufacturer is in a unique situation with respect to the availability of banked NEV and non-NEV credits, the status of fuel cell development, the availability of PZEV or AT PZEV products in the near term, and the technologies to be emphasized in its corporate strategy. Therefore the compliance pathways to be pursued will vary. Looking at a hypothetical "industry average", staff anticipates that there are banked credits available sufficient to postpone the need for additional product in the gold category until roughly through the 2007 model year, or longer if manufacturers restrict the use of banked credits to the gold category alone.

The fuel cell “stages” referenced above are defined as follows:

Stage I (2003-2005):

Tens of vehicles per manufacturer total over 3 years

Stage II (2006-2009):

Hundreds of vehicles per manufacturer total over 3 years

Stage III (2010-2012):

Thousands of vehicles per manufacturer total over 3 years

These numbers represent the industry-wide average. Specific totals for an individual manufacturer would be based on the manufacturer’s California sales.

Staff preliminarily estimates that in order to generate, on average, roughly the “demonstration” number of vehicles shown above per manufacturer, the credit levels per vehicle would be approximately 40 in Stage I, 15 in Stage II, and 4 in Stage III.

As illustrated in the chart above, in the strawman proposal the gold obligation is 1 percent for model years 2005-2008, 1.25 percent for model years 2009-2011, 3 percent for model years 2012-2014, and 4 percent for model years 2015 and beyond. The following table shows the approximate number of fuel cell vehicles that would need to be produced in each stage, industry-wide, in order to meet one-half of the strawman proposal gold obligation in model years 2005-2008 and the entire strawman proposal gold obligation in model years 2009 and beyond. (The target levels of one-half of the gold percentage for 2005-2008 and the entire gold percentage for 2009 and beyond were chosen to take into account some use of banked credits. The supply of banked credits is assumed to be exhausted as of model year 2009.) These estimates assume credit levels of 40, 15 and 3.75 in Stages I, II and III respectively. For comparison purposes, the table also shows the number of fuel cell vehicles that would be needed industry-wide to satisfy one half of the “red line” obligation under the current regulation through 2008 and the entire red line obligation for 2009 and beyond. Please note that the model year 2005 level takes into account placements that would occur in 2003 and 2004, and thus represents an average level of 40 vehicles per year industry-wide.

Staff seeks comment on how best to define target vehicle and credit levels in light of the status of fuel cell development and the availability of banked credits.

	Stage I	Stage II			Stage III			Return to "Red Line"			
Model Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Needed under Strawman	120	400	400	400	3000	5000	7000	18240	18240	18240	24320
Red Line Requirement	405	637.5	815	1470	8980	11040	12020	18240	18240	18240	24320

The “transitional gold” portion of the ZEV obligation would result in additional vehicles being placed or technologies employed, above and beyond the levels needed to satisfy the gold, silver and bronze categories. For example, if all

manufacturers chose to use AT PZEV hybrid electric vehicles to fulfill this category, the number of additional vehicles would be roughly as shown in the table below. Again these totals assume maximum use of banked credits.

Model Year	2005	2006	2007	2008	2009	2010	2011	Cumulative Total
Number of vehicles	0	4000	9000	11000	30000	32000	35000	121000

This is equivalent to more than a 25 percent increase in the number of such vehicles over the level needed to fully satisfy the silver category.

## **B. Discussion Of Specific Possible Changes**

This section outlines in further detail the specific changes under consideration. Staff seeks comment on these possible changes and on suggested alternatives.

### **1. Program Restart**

Delay start of the percentage ZEV requirements until model year 2005. (The 2005 date would not be affected by the pending federal lawsuit, as it would apply to a substantially revised program that does not include elements referring to fuel economy).

All other timing factors remain the same as in the 2001 Amendments  
 Early introduction multipliers  
 LDT2 ramp up  
 Percentage obligation ramp up

Credits earned prior to model year 2005 are retained at full value

### **2. Calculation of AT PZEV Credits**

Eliminate efficiency multiplier

Revise method for calculating advanced componentry credit to remove all references to fuel economy and substitute a credit that does not vary with the performance characteristics of the vehicle

Flat credit (build on 1998 language). Minimum threshold of 13 percent peak power from electric storage device/motor. (This threshold ensures that vehicles earning the credit make significant use of components that support the development of electric drive capability. Electric drive is an essential feature of all current and anticipated ZEV technologies (battery EVs and fuel cell vehicles)). Credit value keyed to average credit assumed under 2001 amendments (roughly 0.4)

Revise method for calculating credit for vehicles with zero emission VMT (e.g. grid connect hybrid vehicles) to compensate for loss of efficiency multiplier. Staff's target for the resulting credit level is roughly twice the credit level that would have been earned under the 2001 amendments for model years 2005-2008, and equal to the level that would have been earned under the 2001 amendments for model years 2009 and beyond. The increase is intended to provide an incentive for manufacturers to pursue this technology relative to other options.

The resulting credit levels for an HEV 20 would be roughly as follows:

Model Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012+
HEV 20	19	10	13	10	10	5	3	2	2	1.8

### 3. Calculation of Pure ZEV Credits

Eliminate efficiency multiplier, and eliminate range multiplier starting in 2005

Base 2003-2004 credit values on 2001 amendments (under those amendments there was no efficiency multiplier until the 2005 model year)

Beginning in 2005 model year, replace with 4-tier "flat" credit that does not vary according to vehicle characteristics within each tier. The credit would be based on the type of vehicle and year of introduction. The tiers are defined as follows:

NEV

Type I ZEV (50+ mile test cycle range [City EV])

Type II ZEV (120+ mile test cycle range [Full function BEV])

Type III ZEV (100+ mile range test cycle range; full fueling in 10 minutes or less [fuel cell]).

As part of this change, eliminate additional credit for refueling that provides 60 miles additional range in less than 10 minutes.

Staff is preliminarily considering proposing credit levels as follows:

NEV: Same as 2001 regulation

Type I and Type II ZEV: Roughly 2 times the 2001 regulation level in model years 2005-2008, and equal to 2001 regulation level thereafter. The increase is intended to provide an incentive for manufacturers to continue to pursue these technologies relative to other options.

Type III ZEV (fuel cell): Award credits as described in the strawman proposal above (roughly 3.5 times the 2001 regulation level in Stage I, 2.5 times the 2001 regulation level in Stage II, and slightly higher than the 2001 regulation level in Stage III).

The resulting revised credit levels are shown in the following table.

Model Year	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 I (City EV)	1.8	1.8	4	4	4	3	1	1	1	1.4
Type II (FFEV)	5.9	5.9	12	10	10	7	3	3	3	2.9
Type III (fuel cell)	40	40	40	15	15	15	3.75	3.75	3.75	2.92

For comparison purposes, the credit levels under the 2001 regulation are as follows:

Model Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012+
NEV										
Type I (City EV)	1.75	1.75	1.96	2.01	2.33	1.38	1.4	1.42	1.42	1.4
Type II (FFEV)	5.87	5.87	5.94	5.17	5.21	3.44	3.34	3.2	3.2	2.9
Type III (fuel cell)	12.5	12.5	11.3	8.03	7.07	4.36	3.92	3.46	3.46	2.92

#### 4. Compliance Categories

During the 2005-2011 time period reduce the gold requirement to 1 percent and insert a new category known as “transitional gold” for the remainder of the current gold requirements. This category can be satisfied with ZEVs or with other technologies that lay the groundwork for future ZEV commercialization. Possible eligible technologies are:

- AT PZEVs
- Hydrogen infrastructure

Allow the installation of hydrogen infrastructure to earn credit that can be used within the gold category and the transitional gold category.

## **5. Other Miscellaneous Changes**

Revise the 15 year/150,000 mile warranty requirement for an HEV traction battery used in AT PZEVs by allowing pro-ration for the final 5 years

Reflect interpretation that a “placed-in-service” credit for a vehicle in a particular model year is dependent on placement by the end of 3 months into next calendar year

Provide greater specificity as to criteria that must be met by demonstration program vehicles in order to earn ZEV credit

Modify station car cap so that it only applies to station car credit (remove vehicle credit from cap)

Remove ZEVs (including NEVs) and AT PZEVs that exceed the manufacturer’s compliance obligation from the total of manufacturer sales used to calculate the manufacturer percentage requirements

## **C. Discussion Questions**

This section outlines several questions being investigated by staff. Staff does not yet have enough information to develop a specific proposal, and seeks comments on the identified issues.

1. Should the staff consider proposing additional measures governing the use of banked ZEV credits? If so, what measures should be considered and what would be their effects on manufacturer compliance strategies?
2. How should credits be scaled in the transitional gold category? For example, should vehicles that are used in the transitional gold category be awarded a lesser credit than those that are used in other categories (e.g. should an AT PZEV used in the transitional gold category receive fewer credits than ones used in the AT PZEV category?) If so, what would be an appropriate credit level and what is its rationale?
3. Are there other ways to address the cost to the consumer of replacement batteries for hybrid electric vehicles, other than through a battery warranty?
4. Should the existing ZEV credit for in-service warranty be modified or eliminated? If so, should other options be considered as a replacement?