# Proposed Amendments to the Zero Emission Vehicle Regulation

# March 27, 2003
# April 24, 2003

California Environmental Protection Agency
AIR RESOURCES BOARD

# Overview

- Recap of March Board meeting
  - Including testimony and proposed alternatives
- Additional staff analysis
- Summary of proposed regulation
- Staff recommendation

# Recap of March Meeting

- What brought us to today
- Basic structure of proposed regulation
- Testimony and discussion
- Outstanding issues
- Board directives to staff

# Amendments Needed

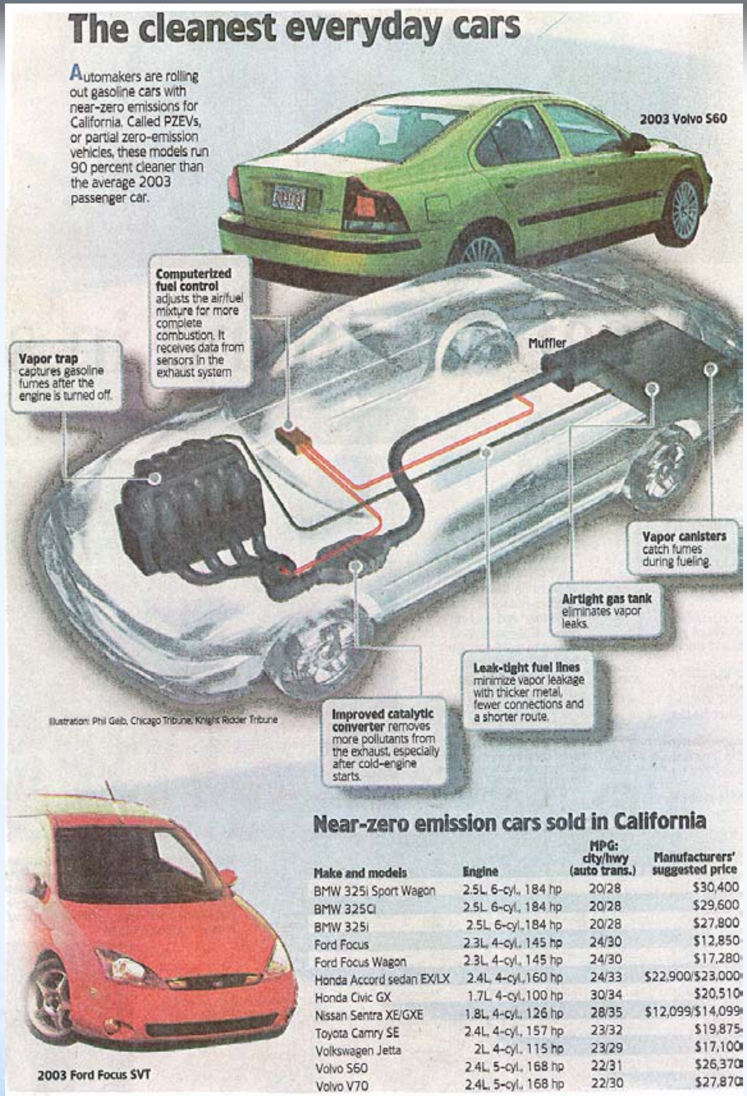
- To address legal challenges
  - ARB prohibited from enforcing regulation
  - 2005 earliest practical restart date

# Amendments Needed

- To align with technology status and market demand
  - No pure ZEV ready for mass deployment
  - Future ZEV development difficult to predict
  - Tremendous progress on PZEVs (bronze) and AT PZEVs (silver) providing new opportunities

# Technology Status

– 140,000 PZEV sales expected in MY 2003



## The cleanest everyday cars

Automakers are rolling out gasoline cars with near-zero emissions for California. Called PZEVs, or partial zero-emission vehicles, these models run 90 percent cleaner than the average 2003 passenger car.

2003 Volvo S60

**Computerized fuel control** adjusts the air/fuel mixture for more complete combustion. It receives data from sensors in the exhaust system

**Vapor trap** captures gasoline fumes after the engine is turned off.

Muffler

**Vapor canisters** catch fumes during fueling.

**Airtight gas tank** eliminates vapor leaks.

**Leak-tight fuel lines** minimize vapor leakage with thicker metal, fewer connections and a shorter route.

**Improved catalytic converter** removes more pollutants from the exhaust, especially after cold-engine starts.

Illustration: Phil Geib, Chicago Tribune, Knight Ridder Tribune

2003 Ford Focus SVT

### Near-zero emission cars sold in California

| Make and models | Engine | MPG: city/hwy (auto trans.) | Manufacturers' suggested price |
|---|---|---|---|
| BMW 325i Sport Wagon | 2.5L, 6-cyl., 184 hp | 20/28 | $30,400 |
| BMW 325Ci | 2.5L 6-cyl., 184 hp | 20/28 | $29,600 |
| BMW 325i | 2.5L, 6-cyl.,184 hp | 20/28 | $27,800 |
| Ford Focus | 2.3L, 4-cyl., 145 hp | 24/30 | $12,850 |
| Ford Focus Wagon | 2.3L, 4-cyl., 145 hp | 24/30 | $17,280 |
| Honda Accord sedan EX/LX | 2.4L, 4-cyl.,160 hp | 24/33 | $22,900/$23,000 |
| Honda Civic GX | 1.7L 4-cyl.,100 hp | 30/34 | $20,510 |
| Nissan Sentra XE/GXE | 1.8L, 4-cyl., 126 hp | 28/35 | $12,099/$14,099 |
| Toyota Camry SE | 2.4L, 4-cyl., 157 hp | 23/32 | $19,875 |
| Volkswagen Jetta | 2L 4-cyl., 115 hp | 23/29 | $17,100 |
| Volvo S60 | 2.4L, 5-cyl., 168 hp | 22/31 | $26,370 |
| Volvo V70 | 2.4L, 5-cyl., 168 hp | 22/30 | $27,870 |

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Sacramento Bee

# Preserving 2001 Compliance

- Some companies complied in good faith
- Built, marketed, placed ZEV products
- Earned legitimate credits
- Efforts should be recognized

# Two Path Concept

- "Base Path" - for OEMs that invested early and have banked credits
- "Alternative Path" - smaller, fresh gold (demonstration level), with higher silver option (4%), subject to review

# March Testimony

- Few strong objections to “Base Path”
  - Some concern about relaxation on changes related to later start date of 2005 vs. 2003
- Significant opposition to “Alternative Path”
  - Included initial target, out years, BEV role, and timing and role of review panel

# Staff's Sense of the Board

- Add future year targets for FCVs
- Explore all feasible means to bring BEVs back to the market place
- Fix plug-in hybrid definition *if* that technology is moved to "gold"

# Staff's Sense of the Board

- Draft resolution captures appropriate role of Independent Expert Review Panel - Board's discretion fully preserved

- 2011 sunset for travel provision addresses "leakage" concern for now

# Still Unresolved

- 250 vs. 500 for initial FCV demo?
- Rationale, numbers for future FCVs?
- Incentivize or mandate BEVs?
  - The latter by direct or indirect methods
- Call plug-in HEVs “silver” or “gold”?

# Directive to Staff

- Frame issues
- Discuss implications of alternatives
- Describe combined effects
- Clarify what Board is voting upon

# The Big Picture

- Aiming for long term, mass market penetration

- Zero emissions still the goal

- Biggest hurdles are performance, affordability, consumer acceptance, and (for some vehicles) infrastructure

# The Big Picture

- Bronze vehicles (zero evaporative emission, extremely durable) and silver vehicles (ZEV enabling) represent tremendous progress

- Pure ZEVs still elusive

# The Big Picture

- Existing mandate has resulted in "work-arounds," litigation, and intermittent product black-outs

- OEMs are voting with their R&D dollars for fuel cell vehicles

# The Big Picture

- Third party BEV manufacturers willing to enter, but only if price and/or subsidies are sufficient and sustained

# Issue-by-Issue Analysis

- 250 vs. 500 demonstration requirement
- Bringing BEVs back to market
- Future year FCV targets
- Plug-in hybrids

# Alternative Path - 250 vs. 500

- 250 based on stretch goal for FCVs

- 500 appears to be intended to indirectly leverage BEV production

# Impact of Choosing 250

- Manufacturers able to respond
- Base path OEMs may move to alternative path, increasing number of fresh ZEVs
- BEV substitution possible but unlikely

# Impact of Choosing 500

- Costs double from ~$250M to ~$500M
- Exceeds FCV developmental needs; could slow advancement as OEMs seek lowest cost options
- BEV substitution more economically attractive but still unlikely

# Impact of Choosing 500

- Worst case outcome
  - OEMs avoid alternative path entirely
  - Seek banked credits
  - Delay action until 2008 hoping for change
  - Bottom line risk--
    Fewer fresh ZEVs
    No additional AT PZEVs

# Alternative Path - 250 vs. 500

- Staff recommendation
  - Select 250 for 2001-2008 demonstration period
  - Allow BEV substitution
  - Retain 50% fresh FCV floor

# Future FCV Targets

- Staff proposed “TBD,” following input from Independent Expert Review Panel

- Several witnesses and Board Members sought specific targets now, even if revisions needed later

# Basis for Targets

- - Growth by Stages (10X)
  - Progression of early production for unique vehicles, where units grow from tens to hundreds to thousands
- CalETC
  - Annual doubling
- UCS
  - DOE national goals, OEM public statements
- South Coast AQMD
  - 2% gold <u>plus</u> 4% silver

# 2009 and Beyond

| | 10X | Cal ETC | UCS | SCAQMD |
|---|---|---|---|---|
| 2009-2011 | 2500 | 2800 | 5000 | 32000 |
| 2012-2014 | 25000 | 22400 | 30000 | 55000 |
| 2015-2017 | 50000 | 71000 | 71000 | 73000 |
| 2018-2020 | 89000 | 89000 | 89000 | 91000 |
| Cumulative Total | 166500 | 185200 | 195000 | 251000 |

# 2009 and Beyond

- Implications
  - All approaches are similar in long term
  - All numbers are subject to Board review
  - Key point today is rationale

# 2009 and Beyond

- Staff recommendation in light of Board direction
  - Follow 10X rationale
    - Consistent with DOE, scaled to CA
    - Consistent with manufacturer discussions
  - Align with “red line” in 2018
  - Allow BEV substitution to continue

# Concern About "Abandoning" BEVs

- Desire to keep existing BEVs rolling
- Desire to bring fresh BEVs to market by any feasible means

# Incentives for Existing BEVs

- Staff recommendation
  - Increase credit for BEVs in use beyond three years
  - Remove battery warranty requirement

# Incentives for New BEVs

- Staff recommendation
  - Provide 1.25 multiplier for City EVs (Type I) and Full Function EVs (Type II) sold or leased with consumer option to purchase or re-lease
  - Make effective in 2003 model year

# BEV Substitution on Alternative Path

- Staff Recommendation
  - Allow BEVs to meet 50% of alternative path fresh credit requirement
  - Applies to 2003 and later new vehicles
  - Use cost-based ratio, biased towards BEVs

    20:1 for Type 1 BEVs (city cars)

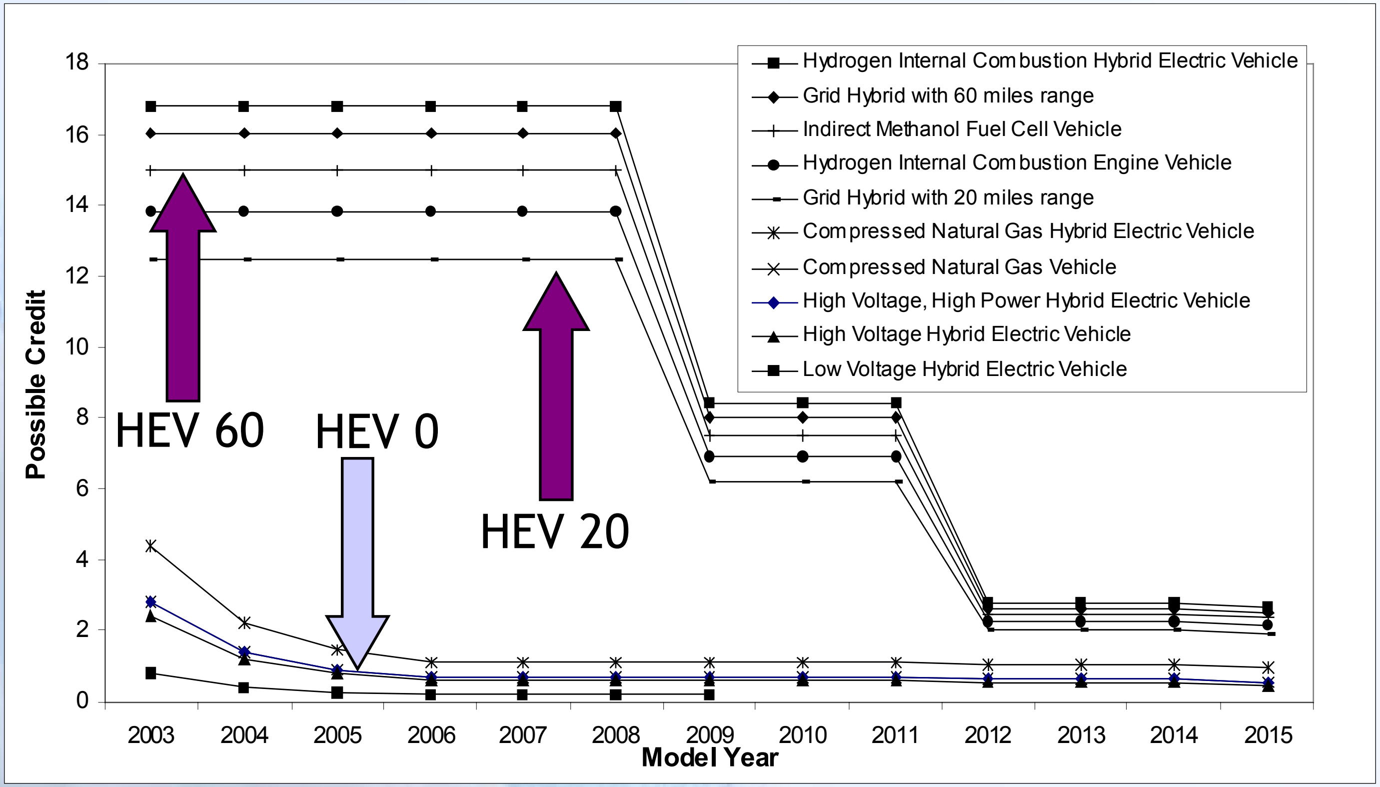
    10:1 for Type 2 (full function)

# Incentives for BEVs

- Summary of BEV incentive impacts
  - Encourage continued availability of used BEVs
  - Encourage sale and open-ended lease
  - Provide incentive for BEV production (cost per credit is less than FCVs)
  - No guarantee BEVs will be marketed; depends mostly on availability of financing for third party manufacturers
  - Higher BEV credits and BEV substitution would reduce total FCV numbers and reduce need for AT PZEVs

# Plug-in HEVs

- Current status
  - Plug-in HEVs receive large silver credit



# Plug-in HEVs

- Current status (continued)
  - OEMs have significant need for silver credits
  - Plug-in HEVs more attractive than regular hybrids on cost per credit basis

| Estimated Dollars Per ZEV Credit | | | | | |
|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 |
| Plug-in HEV | $ 2,381 | $ 2,381 | $ 2,381 | $ 2,381 | $ 3,175 |
| Level 2 HEV | $ 5,500 | $ 2,500 | $ 2,500 | $ 2,500 | $ 2,000 |

# Plug-in HEVs

- Staff recommendation
  - If plug-in HEVs become "gold," credit needs to be reduced to put plug-ins on appropriate scale
  - Also, minimum range should be increased
  - Will add cost, possibly negating the change
  - Staff recommends leaving in "silver" category

# Summary of Proposal with Board Direction

- Major elements
  - Base and alternative paths
  - Credit calculations
  - Independent Expert Review Panel
- Total vehicles (gold, silver, bronze)
- Air quality analysis

# Base Path

- Preserve 2001 regulation structure
- Percentage ZEV requirements
  - 2 % Gold
  - 2 % Silver
  - 6 % Bronze
- Allow use of banked credits

# Alternative Compliance Path

- Requires market share of FCV totals:

| | |
|---|---|
| 2005-2008 | 250 |
| 2009-2011 | 2500 |
| 2012-2014 | 25000 |
| 2015-2017 | 50000 |

- Allows:
  - 50% of FCV requirement to be met with BEVs
  - Rest of ZEV obligation to be met with AT PZEVs

# ZEV (Gold) Credits

- Remove efficiency multiplier
- Extend credit incentive for early FCVs
- Create and weight ZEV categories:
  - NEV, Type 0, Type I, Type II, Type III
- Adjust credits over time

# AT PZEV (Silver) Credits

- Remove efficiency multiplier and fuel economy references
- Modify credit calculations
  - Level 1, 2 and 3 HEVs
  - Zero emission range
  - Low fuel cycle emissions
  - CNG

# Other Modifications

- Incentives for early PZEV production
- Reaffirm addition of LDT 2 to baseline
- Transportation system credit
- Placed-in-service deadline
- Banked NEV credit cap
- Severability clauses

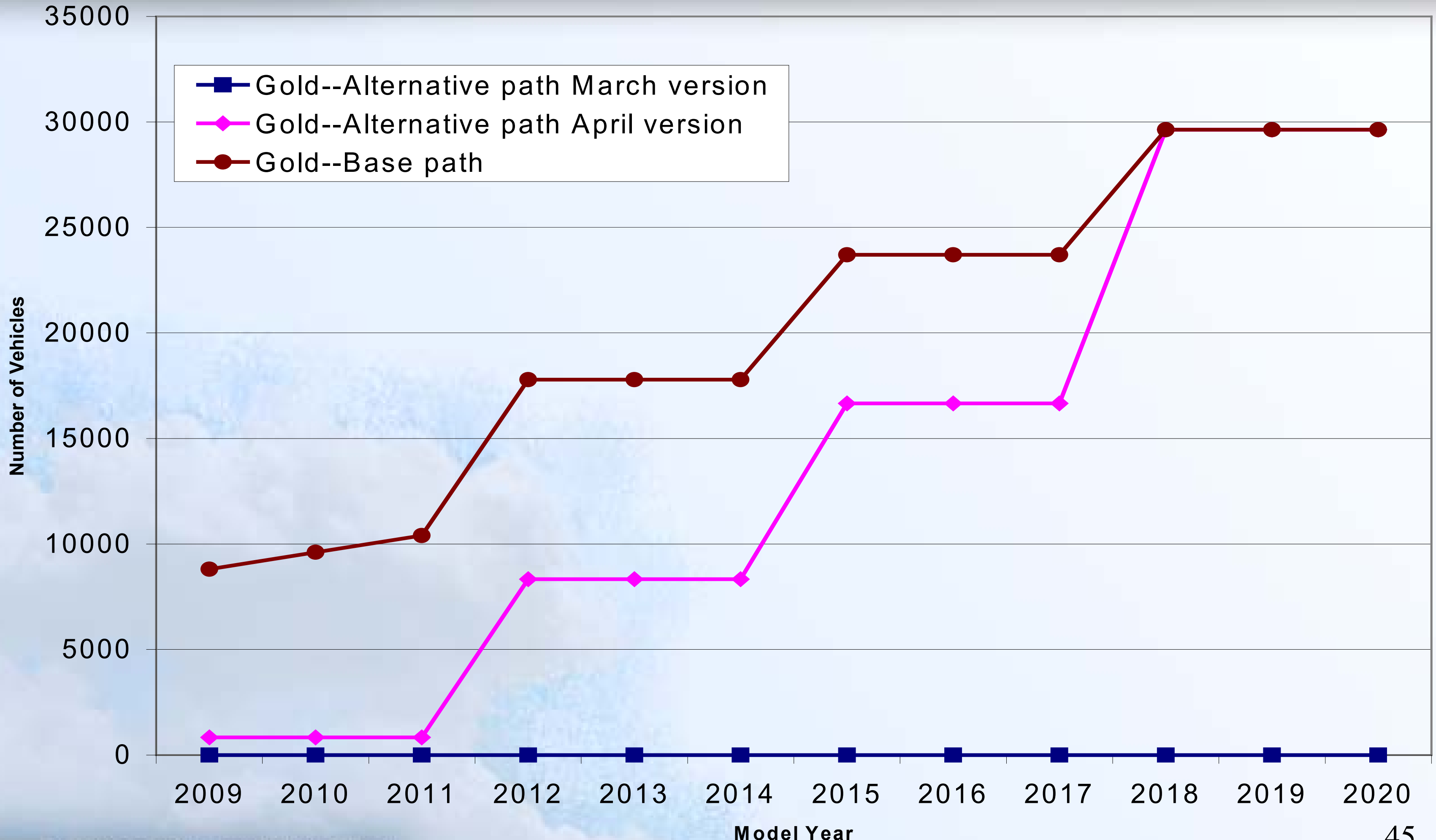
# Expert Review Panel

- Independent experts
- Assess ZEV and AT PZEV technologies
  - Fuel cell, battery, advanced componentry
  - Technology and market readiness
  - Provide Board with data to support review of future ZEV requirements

# Number of Vehicles

- General effect of today's changes
  - Increases number of fresh ZEVs on alternative path by adding later year targets
  - Decreases AT PZEVs on alternative path since fewer offsets needed
  - No change to base path, 2001-2008 demonstration period, or PZEV requirements

# Number of Vehicles-ZEVs

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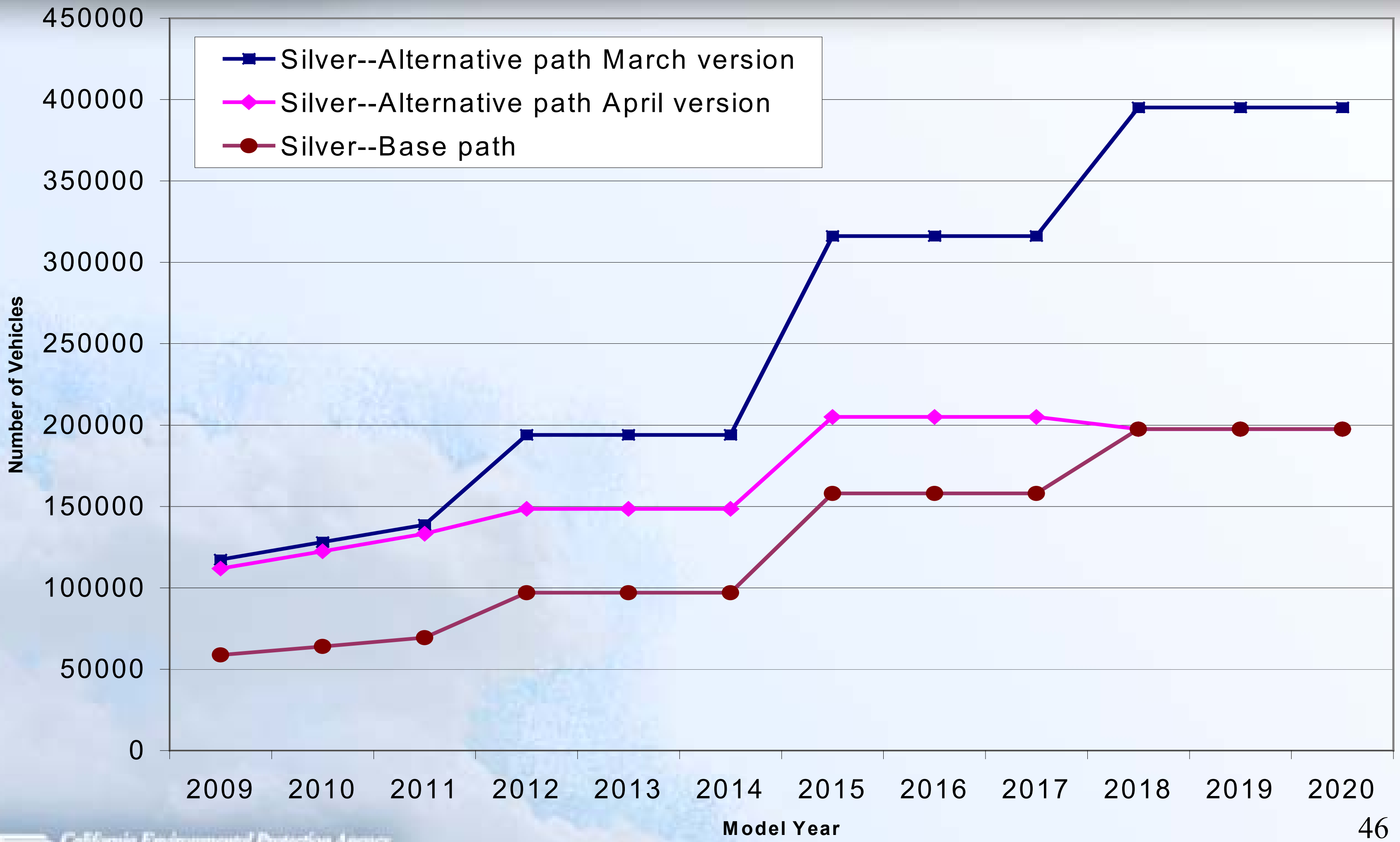
# Number of Vehicles--AT PZEVs



# Air Quality Analysis

- Emission reductions
- Response to environmental issues raised
  - Fleet turnover effect
  - Upstream emissions from hydrogen infrastructure

# Emission Reductions
## (Tons per day, South Coast Air Basin)

| | ROG | NOx |
|---|---|---|
| Net Change from March amendments | | |
| 2010 | 0.06 | 0.00 |
| 2020 | 0.12 | 0.21 |
| Net Change from 2001 amendments | | |
| 2010 | 0.03 | -0.06 |
| 2020 | 0.08 | 0.04 |
| Net Change from no ZEV program | | |
| 2010 | -0.32 | -1.02 |
| 2020 | -3.16 | -2.02 |

- Will also reduce CO and air toxics

# Response to Environmental Issues Raised (CEQA)

- Fleet turnover
  - Based on analysis to date, no reason to modify previous staff conclusion
- Emissions from hydrogen infrastructure
  - In near term, insignificant
  - Many options
  - Long term vision--sustainable and renewable production

# Staff Recommendation

- Approve the proposed amendments to the 2001 ZEV regulation
  - Maintains air quality benefit
  - Addresses litigation
  - Allows ZEV program to be implemented
  - Maintains progress towards transforming California’s vehicle fleet to zero emissions