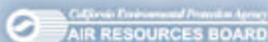


# California's Motor Vehicle Program

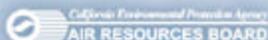
**ZEV Implementation Section  
California Air Resources Board**

June 2002



## Overview

- Air Quality in California
- Low Emission Vehicle Program
- Zero Emission Vehicle Program
- California Fuel Cell Partnership
- Zero Emission Buses
- Vision for the future



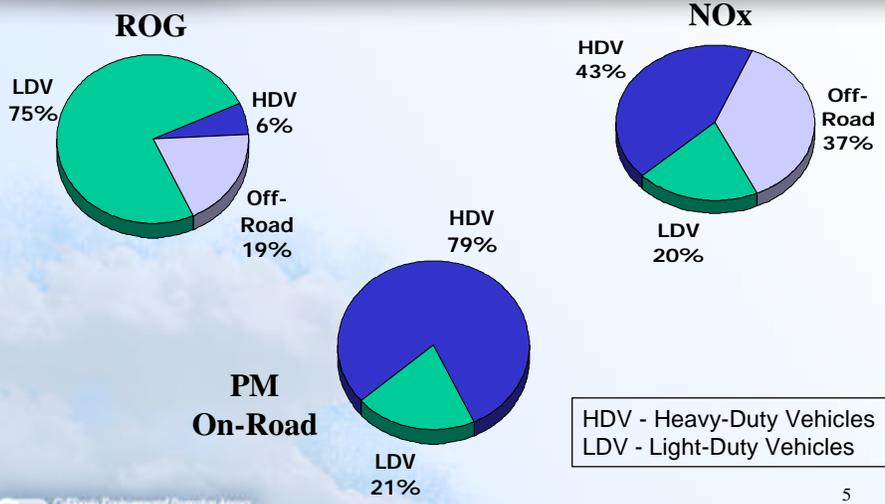
2

# Air Quality in California

## Most of California is Still Non-attainment for Ozone

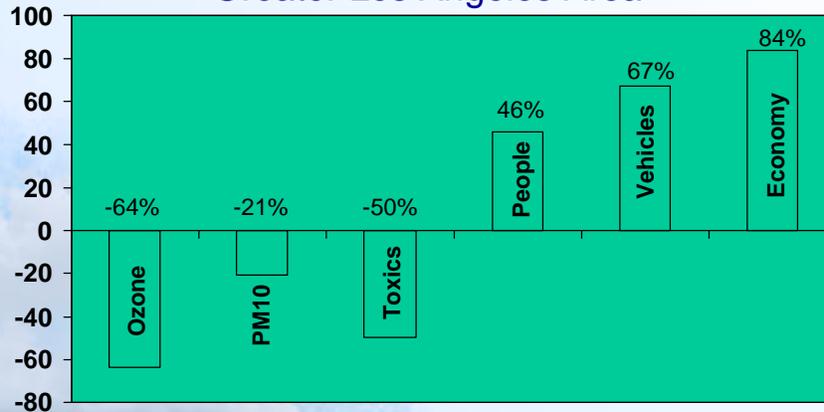


# Mobile Source Inventory (2010 - SCAB)

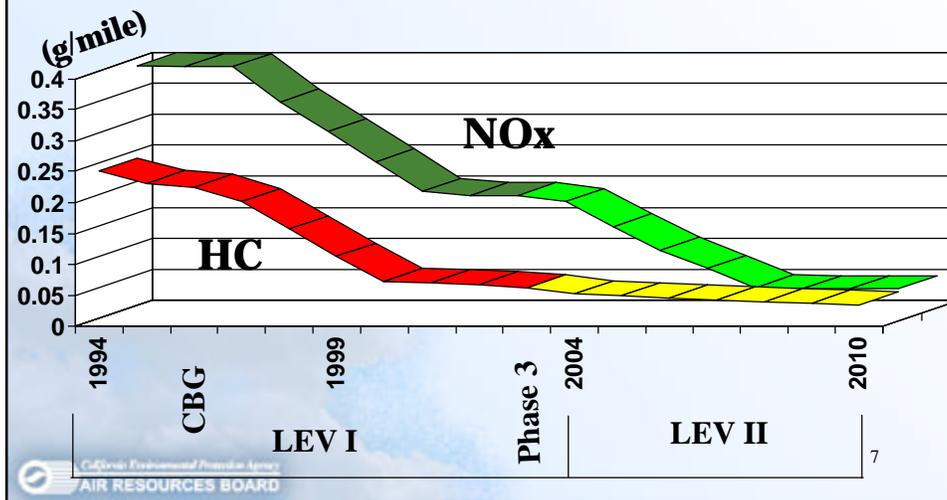


# California Air Quality vs. Growth

Percent Change 1980 to 1999  
Greater Los Angeles Area



## Goal is Near-Zero Emissions



## Low Emission Vehicle Program

## LEV I

- Adopted 1990
- Four emission categories
  - TLEV, LEV, ULEV and ZEV
- Fleet average requirement
- ZEV requirement
- Successful Implementation
- Full implementation by 2003

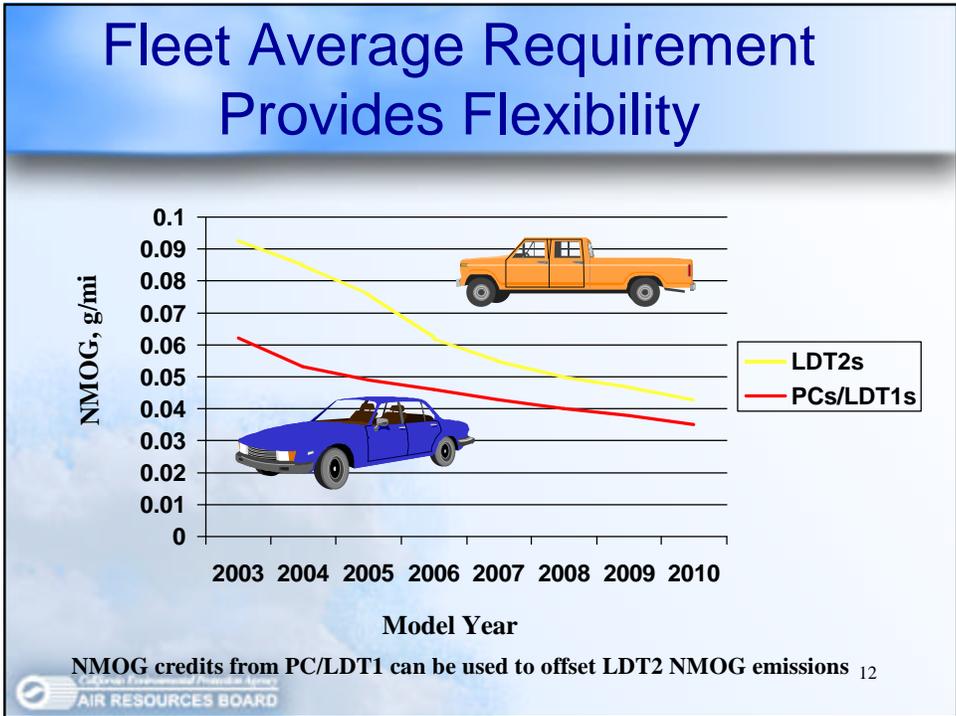
## LEV II

- Adopted 1998, implementation 2004-2010
- Sport Utility Vehicles (SUVs) and pick-up trucks meet passenger car standards
- Lower emission standards for all vehicle categories
  - NO<sub>x</sub>
  - NMOG fleet average
- SULEV emissions standard
- Partial ZEV allowance for SULEVs
- Elimination of TLEV category
- Near-zero and zero-evaporative requirements

## LEV II Exhaust Emission Standards (g/mi)

| Category | Durability Basis | NMOG  | CO   | NOx  |
|----------|------------------|-------|------|------|
| LEV      | 50,000 miles     | 0.075 | 1.7  | 0.05 |
| ULEV     | 50,000 miles     | 0.040 | 1.7  | 0.05 |
| SULEV    | 120,000 miles    | 0.010 | 1.0  | 0.02 |
| ZEV      |                  | zero  | zero | zero |

11

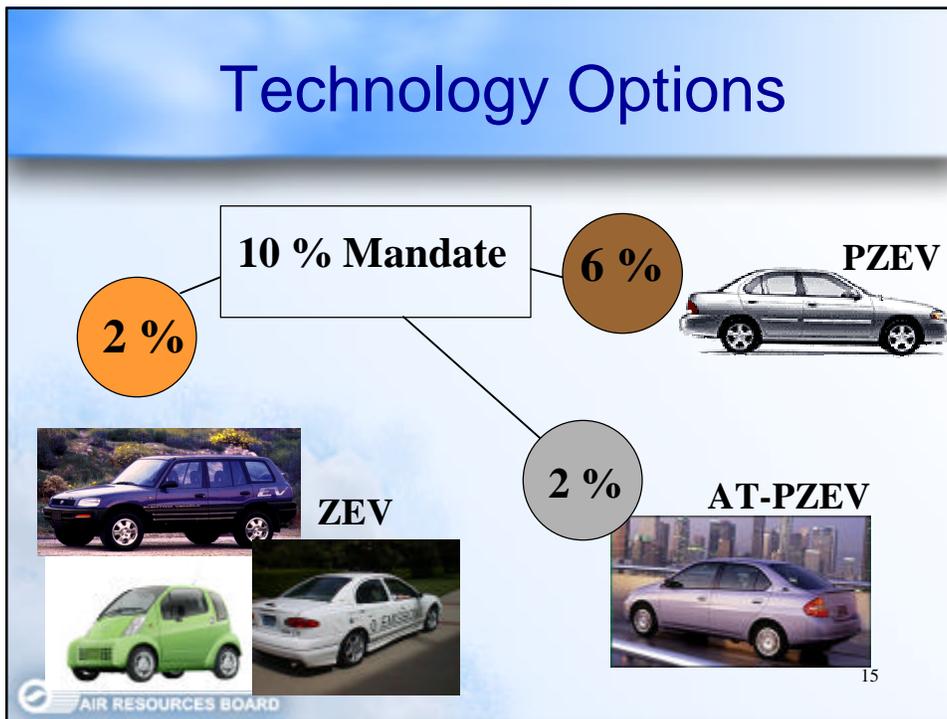


# ZEV Program

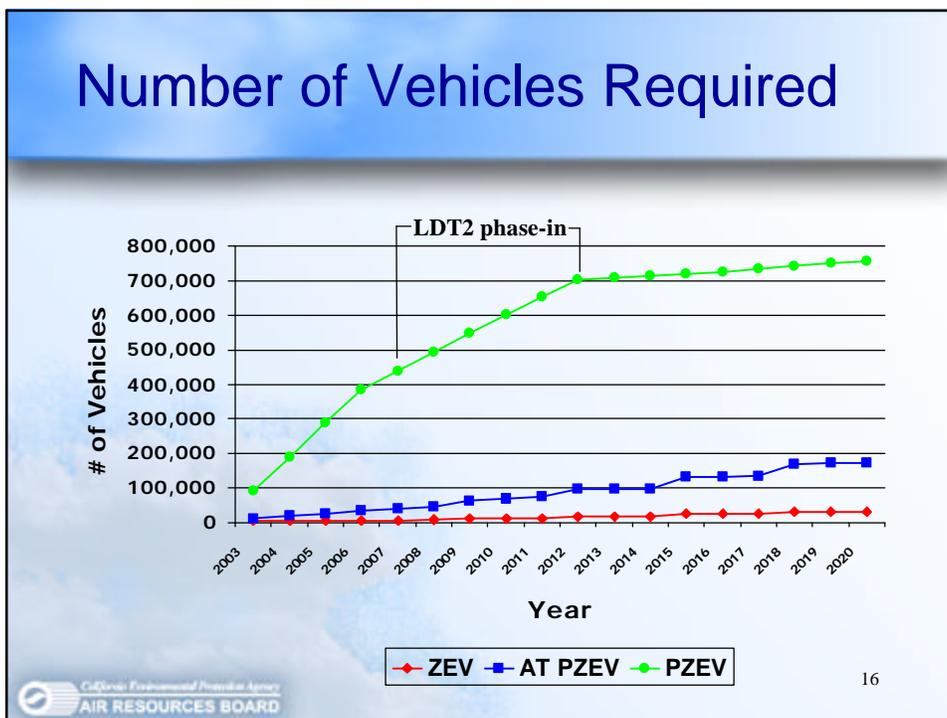
## ZEV Program History

- Adopted 1990 as part of the LEV I program
- 2% in 1998, 5% in 2001, 10% in 2003
- Requirements for 1998 and 2001 eliminated in 1996
  - 10% in 2003 retained
- MOA signed in 1996 requiring a specified number of ZEVs to be marketed in California beginning in 1998
- PZEV alternative adopted in 1998 as part of LEV II
- 2001 Board re-affirmed commitment to ZEV program and adopted modifications to 2003 requirement

# Technology Options



# Number of Vehicles Required



## Partial ZEV Allowance Vehicles

10 % Mandate

6 %

PZEV

- SULEV exhaust emissions
- Zero evaporative emissions
- OBD II requirements for SULEVs
- 15 year/150,000 mile performance and defects warranty
- 0.2 ZEV Credit



## PZEV Vehicles

- Due to large number of vehicles required PZEVs likely to be high volume models
- Will probably utilize conventional power systems (ICE) with advanced emission control systems
- Already being certified

## PZEV Status

Nissan Sentra CA  
First introduced in 2000  
0.2 PZEV credit



## Advanced Technology PZEVs

- All PZEV requirements, plus additional “ZEV-like” characteristics
  - Efficiency
  - Low fuel cycle emissions
  - Software to encourage maximum off-vehicle charging
  - Zero emission VMT
  - Advanced componentry

**10 % Mandate**

**2 %**

**AT-PZEV**



# Potential AT-PZEV Vehicle Types

## Hybrid Electric Vehicles



Toyota Prius

## Fuel Cell Vehicles w/reformer



GM Precept

## Natural Gas Vehicles



Honda Civic

# ZEVs

10 % Mandate



2 %



- **Battery electric vehicles**
  - “Full function” battery electric vehicles
  - “City” electric vehicles
  - “Neighborhood” electric vehicles
- **Hydrogen fuel cell vehicles**

## Full Function BEVs



- 7 models on road and in use today
- Many potential applications

## City EVs

Full FMVSS safety certification needed  
up to 60 mph top speed  
40-60 mile range  
2-4 passengers

Nissan HyperMini  
Th!nk City  
Honda City Pal  
DaimlerChrysler Smart



## Neighborhood Electric Vehicles

New DOT classification  
25 mph top speed  
Limited range  
2-4 passengers

GEM  
Th!nk Neighbor  
Lido



## Fuel Cell Vehicles

- Long-term promise
- Major development efforts underway
- Large volume production not expected until beyond 2003



## Manufacturer's ZEV Requirement

- Major manufacturers >60,000 vehicles/year
  - must meet full ZEV requirement
- Intermediate volume manufacturers - <60,001 vehicles/year
  - may meet 100% of requirement with PZEVs
- Independent low volume manufacturers - < 10,000 veh/year
  - no requirement
- Small volume manufacturers - <4,501 veh/year
  - no requirement



## California Fuel Cell Partnership

## California Fuel Cell Partnership



- Partnership announced April 20, 1999
- Office and public gallery opened November 1, 2000



## 2001 Accomplishments The Numbers...



- 16 vehicles
- 34,000 miles
- 754 refueling events
- 1,880 ride and drive participants
- 25 public outreach events

## 2001 Accomplishments (cont.)



- West Sacramento Headquarters Facility
- Technology Forum held at Headquarters
- Fuel Scenarios Study released
- Strong environmental and legislative community ties established
- Fuel cell bus testing

## California Fuel Cell Partnership Goals for 2002



- 20 Vehicles to accumulate 60,000 miles
- Methanol Fueling Station at Headquarters facility (completed April 2002)
- Build Satellite Hydrogen fueling stations
  - Richmond, California
  - 2 Additional Sites

## California Fuel Cell Partnership Goals for 2002 (cont.)



- Emergency Response Personnel Training
- New study - the design of safe and cost-effective facilities for the housing and servicing of hydrogen fuel cell vehicles
- Outreach to 250,000 people about fuel cell vehicles
- Distribute 1,000 teaching kits

## Zero-Emission Buses

## Requirements for Zero-Emission Buses (ZEBs)

- Large agencies (>200 transit buses) on diesel fuel path required to demonstrate at least 3 ZEBs beginning July 2003
- Large agencies required to make 15% of purchases ZEBs
  - Diesel path agencies, 2008-2015
  - Alternative fuel path agencies, 2011-2015

## Lead Transit Agencies



## ZEB Support

- Coordination and support from California Fuel Cell Partnership
- >\$25 million funding
  - local sources
  - state agencies (Air Resources Board, Energy Commission and Transportation Commission)
  - federal sources (Department of Energy and Congressional earmarks)

## Focus on Long Term



- Not just another control program
- Transforms transportation technology to provide cleaner choices

## Common Abbreviations Used by CARB

### Regulatory Vehicle Types:

- **ZEV** – Zero Emission Vehicle
- **PZEV** – Partial Zero Emission Vehicles
- **AT PZEV**- Advanced Technology Partial Zero Emission Vehicle
- **SULEV** – Super Ultra Low Emission Vehicle
- **ULEV** – Ultra Low Emission Vehicle
- **LEV** – Low Emission Vehicle or Low Emission Vehicle Regulations
- **TLEV** – Transition Low Emission Vehicle

### More Vehicle Terms:

- **LDV** – Light Duty Vehicle
- **HDV** – Heavy Duty Vehicle
- **PC** – Passenger Cars
- **LDT1** – Light Duty Truck 1 (less than 3,750 lbs)
- **LDT2** – Light Duty Truck 2 (less than 8,500 lbs)
- **SUV** – Sport Utility Vehicle
- **EV** – Electric Vehicle
- **HEV** – Hybrid Electric Vehicle
- **FCV** – Fuel Cell Vehicle
- **NGV** – Natural Gas Vehicle

## Common Abbreviations Used by CARB

### Pollutants:

- **NMOG** – Non Methane Organic Gas
- **ROG** – Reactive Organic Gas
- **HC** – Hydrocarbon
- **NOx** – Oxides of Nitrogen
- **Lbs. HC+NOx** – pounds of hydrocarbons and oxides of nitrogen
- **CO<sub>2</sub>** – Carbon Dioxide
- **CO** – Carbon Monoxide
- **PM** – Particulate Matter
- **G/mi** – gram per mile
- **PPM** – Parts Per Million

### Miscellaneous:

- **ICE** – Internal Combustion Engine
- **VMT** – Vehicle Miles Traveled
- **CBG** – Cleaner Burning Gasoline
- **LEV II** – 1998 amendments to LEV program
- **MOA** – Memorandum of Agreement
- **CNG** – Compressed Natural Gas
- **O<sub>2</sub>** – Oxygen
- **H<sub>2</sub>** – Hydrogen
- **CARB or ARB** – California Air Resources Board
- **EPA** – Environmental Protection Agency
- **Ca FCP** – California Fuel Cell Partnership