

# California's Experiences on Promoting Advanced Technology Vehicles

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California Environmental Protection Agency



**Air Resources Board**

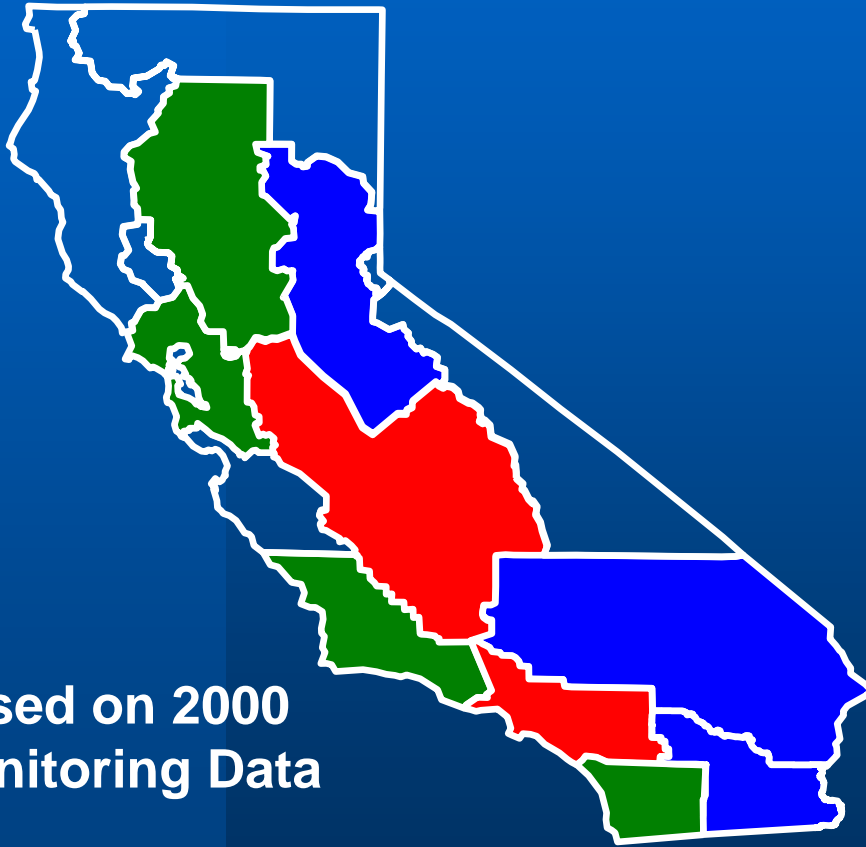
# Overview

- California's Air Quality
- The Zero Emission Vehicle (ZEV) Regulation
- The California Fuel Cell Partnership
- Climate Change Emissions
- Conclusions

# California Air Quality

Days Over State  
Ozone Standard

Days Over State  
PM10 Standard



Based on 2000  
Monitoring Data



# Key Motor Vehicle Regulations

ZEV Program Begins

On-Board Diagnostics II

Low Emission Vehicle I (LEV I)

+ Phase I Gasoline

Roadside Truck Inspections

Phase II Gasoline

Gasoline Trucks

Diesel Trucks

Low Emission Vehicle II (LEV II)

On-Road Motorcycles

Urban Transit Buses

Diesel Trucks

Diesel Trucks

1990

1995

2000

# ZEV Regulation Categories

10 % Mandate

2 %

ZEV

6 %

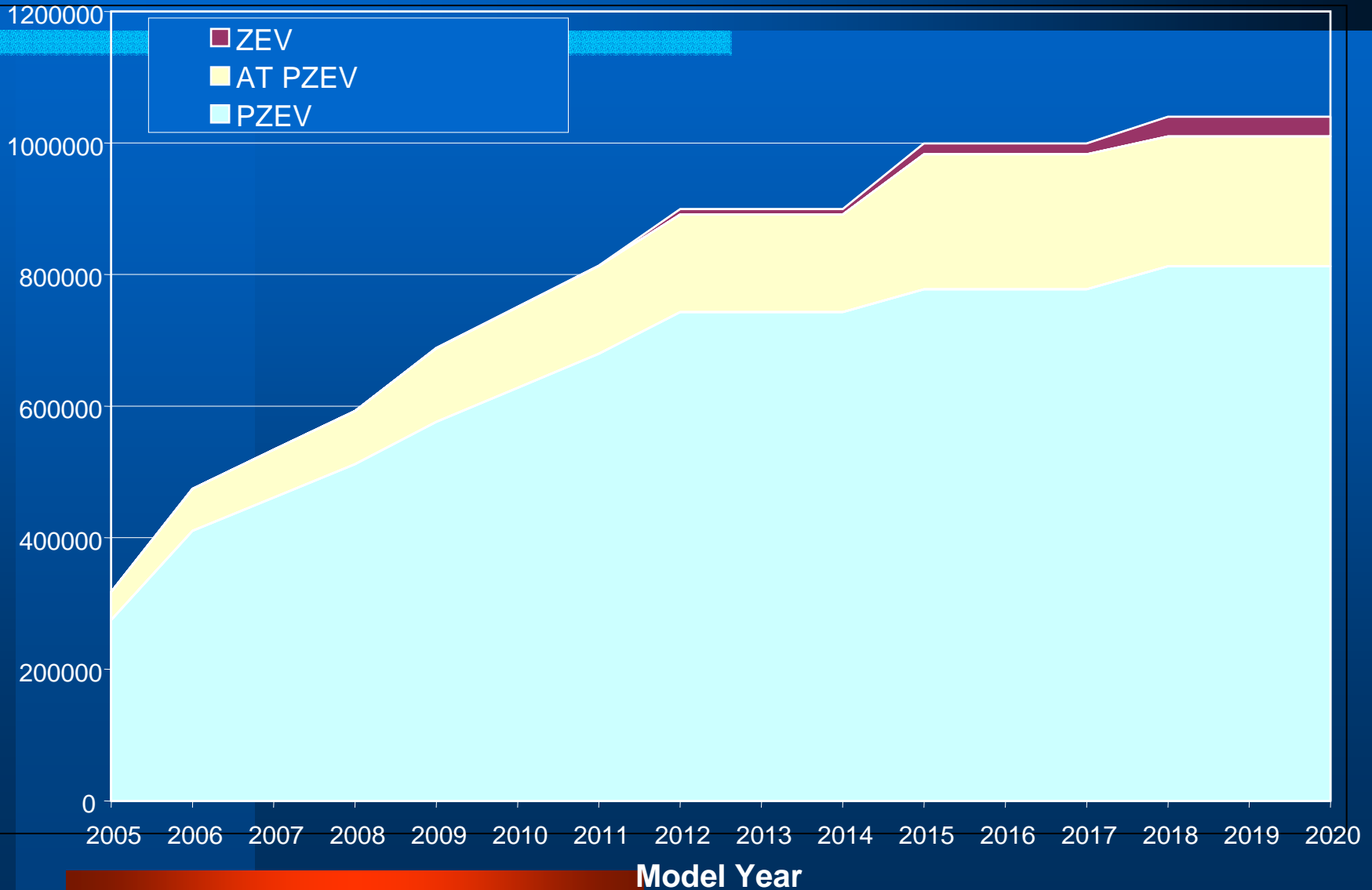
PZEV

2 %

AT PZEV



# Vehicle Production Scenario (example)



# PZEVs

## Near-Zero Conventional Vehicles

- Near zero exhaust emissions
- Zero evaporative emissions
- 15 year/150,000 mile warranty
- On-board diagnostics
- Sales: 195,000 in 2004 (California)
- 37 models available



# AT PZEVs

## Hybrids and Alternative Fuel Vehicles

- “ZEV enabling” technology
  - electric drive train
  - batteries
  - power management
- 3 models available, more coming in 2004
- ~ 20,000 expected sales in 2005



Toyota Prius Hybrid



Honda Civic GX

# Battery Electric Vehicles



- Over 2,500 full size EVs placed
- Cost and range issues shifts focus:
  - smaller vehicles
  - fuel cells
- NEVs
  - 25 mph top speed
  - limited range
  - 2-4 passengers



# Fuel Cell Vehicles

- Promising technology
  - emission benefits
  - higher fuel economy
  - greater efficiency
  - quiet and smooth operation
- Not ready for volume production
  - significant cost
  - manufacturing and performance challenges





# The Vehicles Progress Together

41 Fuel Cell Vehicles (FCVs)

Over 122,000 FCV miles to date

Over 2400 H<sub>2</sub> refueling events at the CaFCP

Zero or Near-0 Emissions



# Fuel Infrastructure



- Liquid H<sub>2</sub> storage
- Delivers gaseous hydrogen at two pressures:
  - 3600 psi & 5000 psi
- Fill time  $\leq$  4 minutes



# Fuel Cell Infrastructure



**UC Davis**  
Toyota Fleet  
Program



**Richmond**  
AC Transit



**LAX (Q4 2004)**  
SCAQMD



**Torrance**  
Toyota



**Torrance**  
Honda

**West Sacramento**  
CaFCP HQ

**Auburn (Fall 2003)**  
PG&E NGV Station

**Los Angeles**  
Honda Fleet Program

**Palm Springs**  
SunLine Transit Agency

**UC Irvine**  
Toyota Fleet  
Program

# Next Phase for the CaFCP

## Key Principles



- Vehicles in fleets
- Expanded fueling infrastructure
- Preparing communities
- Continued public outreach

# Climate Change: One Atmosphere

**Greenhouse  
Gases**

- CO<sub>2</sub>, methane

Haze

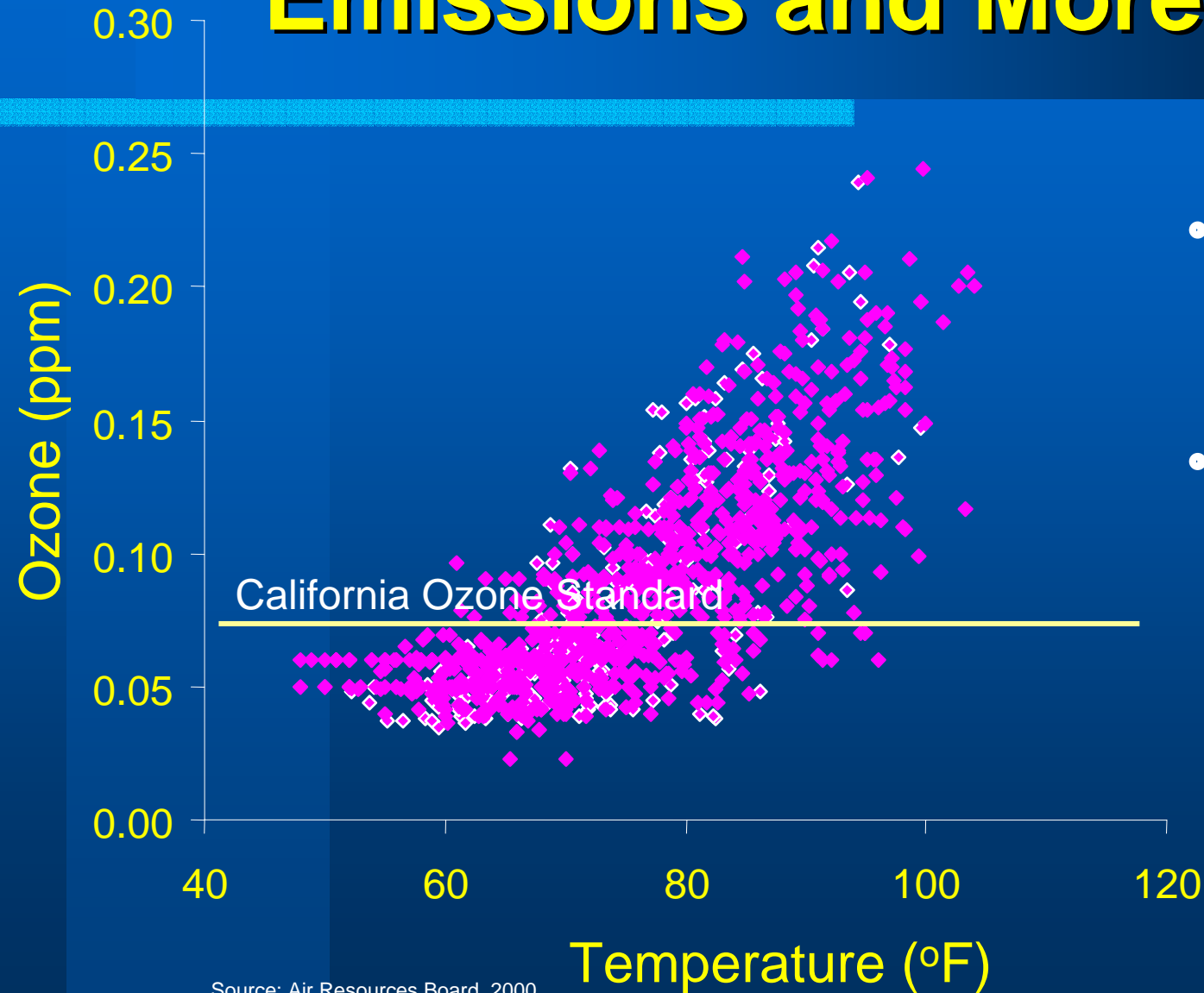
**Ozone**  
(ROG + NO<sub>x</sub>)

**Particles (PM<sub>10</sub>/PM<sub>2.5</sub>)**  
(NO<sub>x</sub>, SO<sub>x</sub>, ROG, ammonia)

**Toxics**

- Diesel particles
- Benzene
- Chromium
- Asbestos

# Hotter Days Lead to Higher Emissions and More Smog



- Los Angeles Ozone Levels (1995-1998)
- 10 warmest years of the last century all occurred within the last 15 years.

Source: Air Resources Board, 2000

# Climate Change Legislation (AB 1493)

- Global warming is a matter of increasing concern for public health and the environment in California
- AB 1493 General Requirements:
  - Maximum feasible & cost-effective reduction of greenhouse gas emissions from motor vehicles
  - Apply to 2009 and later model years
  - Performance based
  - Provide flexibility, not mandate specific technology

# Near Term Needs - Long Term Vision

- We must act today to protect human health and the environment
- Air quality and climate change point to need for H<sub>2</sub> future
- Focus on the ultimate solution -- zero-emission technology

