

Air Resources Board Symposium on California's Development  
of its Phase 2 Greenhouse Gas Emission Standards  
for  
On-Road Heavy-Duty Vehicles

April 22, 2015

# Truck Contribution and Market

# Topics

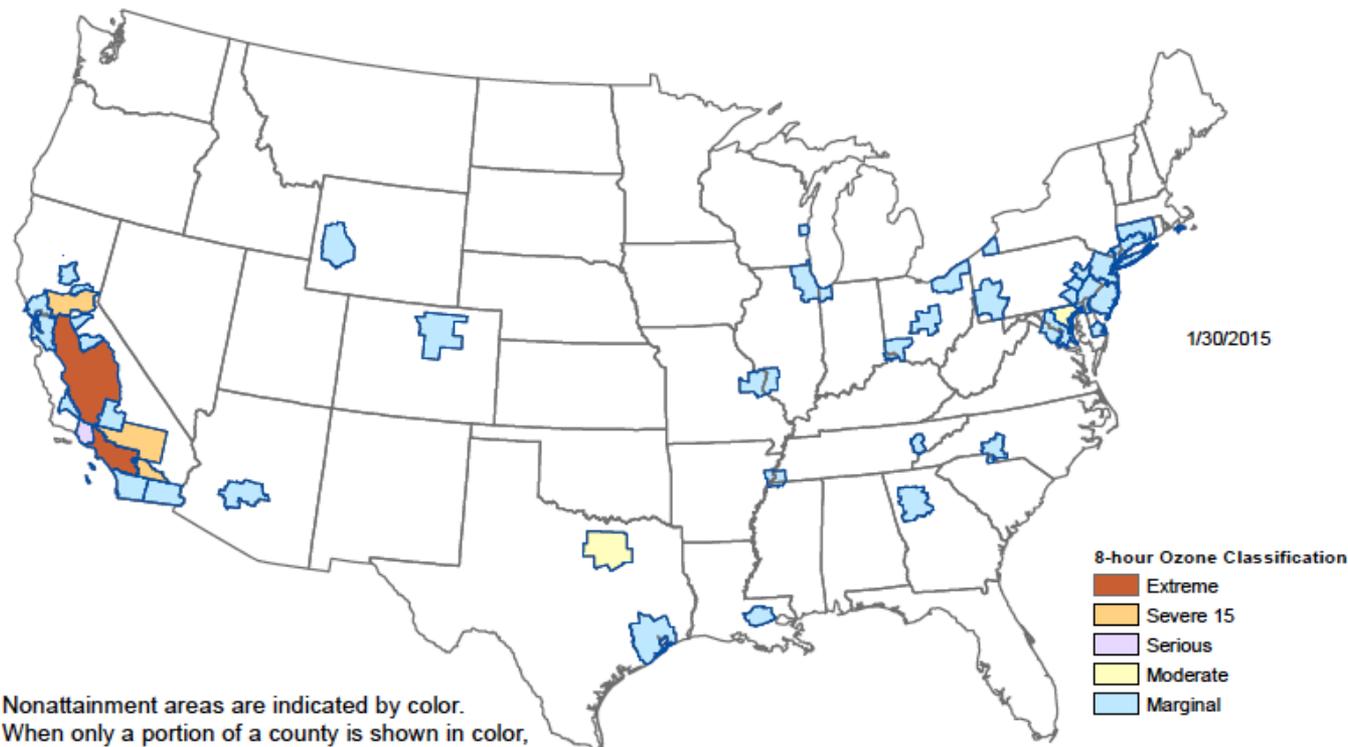
- ▶ California's Air Quality Challenges
- ▶ Heavy Duty Truck Emissions and Controls
- ▶ Heavy Duty Trucking in California

# California's Air Quality Challenges

»» Ozone, PM and Climate Change

# California is Unique in its Air Quality Challenges

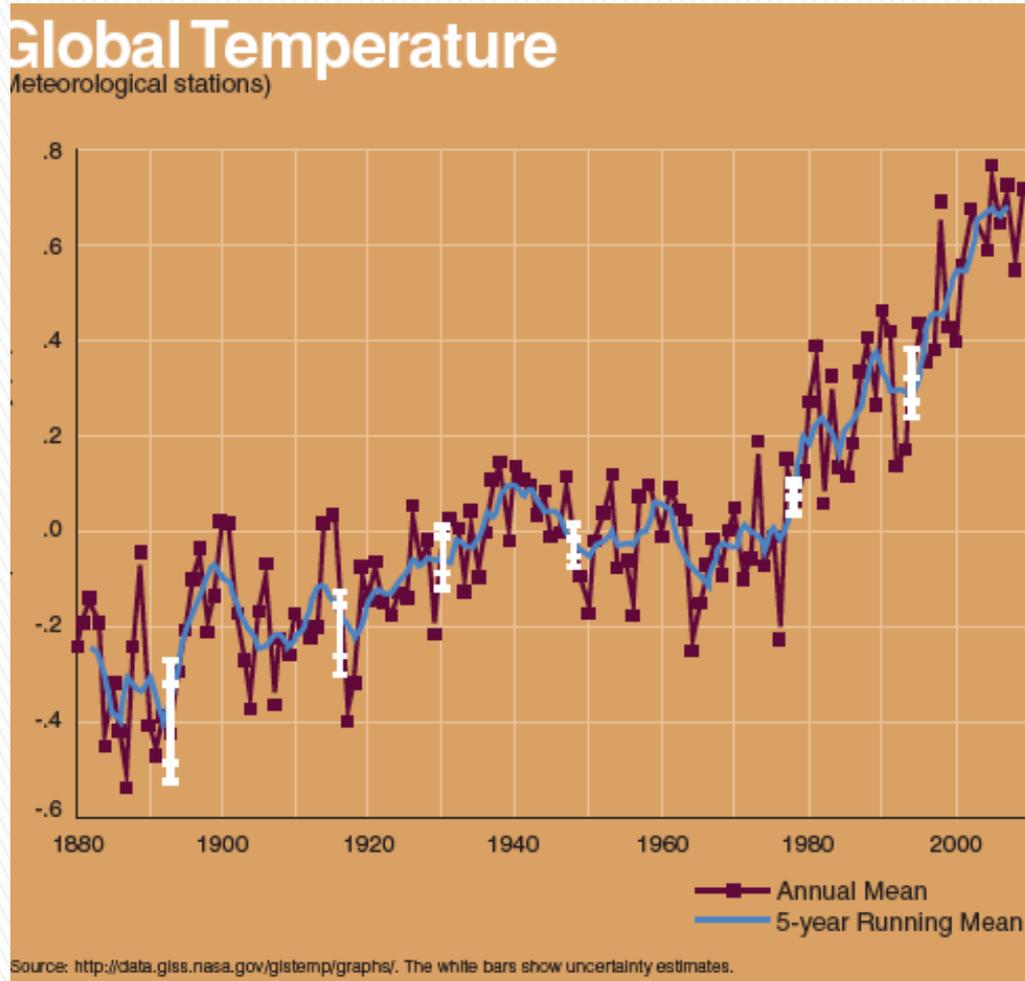
8-Hour Ozone Nonattainment Areas (2008 Standard)



Nonattainment areas are indicated by color. When only a portion of a county is shown in color, it indicates that only that part of the county is within a nonattainment area boundary.

90% of Californians live in Ozone or PM Nonattainment Areas

# Global Climate Change Impacts California



- ▶ Increased and harsher droughts
- ▶ Increased forest fires
- ▶ Sea level rises affecting coastal parts of the state

Source: <http://data.giss.nasa.gov/gistemp/graphs/>.

White bars show uncertainty estimates.

# California Has Taken Lead in Reducing GHG Emissions

- Achieve 1990 levels by 2020 (AB 32)
- 80% below 1990 levels by 2050 (Governors' Executive Orders)
- Reduce petroleum usage in California by 50% by 2030 (Governors' directive)

# ARB Climate Change Initiatives

- ▶ Low Carbon Fuel Standard (LCFS), Zero Emission Vehicle (ZEV) Program, Cap-and-Trade Regulation and Incentive Programs
- ▶ Heavy Duty Tractor-Trailer Greenhouse Gas Regulation
- ▶ Phase 1 Heavy-Duty Truck CO2 standards
- ▶ Under Inflated Vehicle Tires Regulation



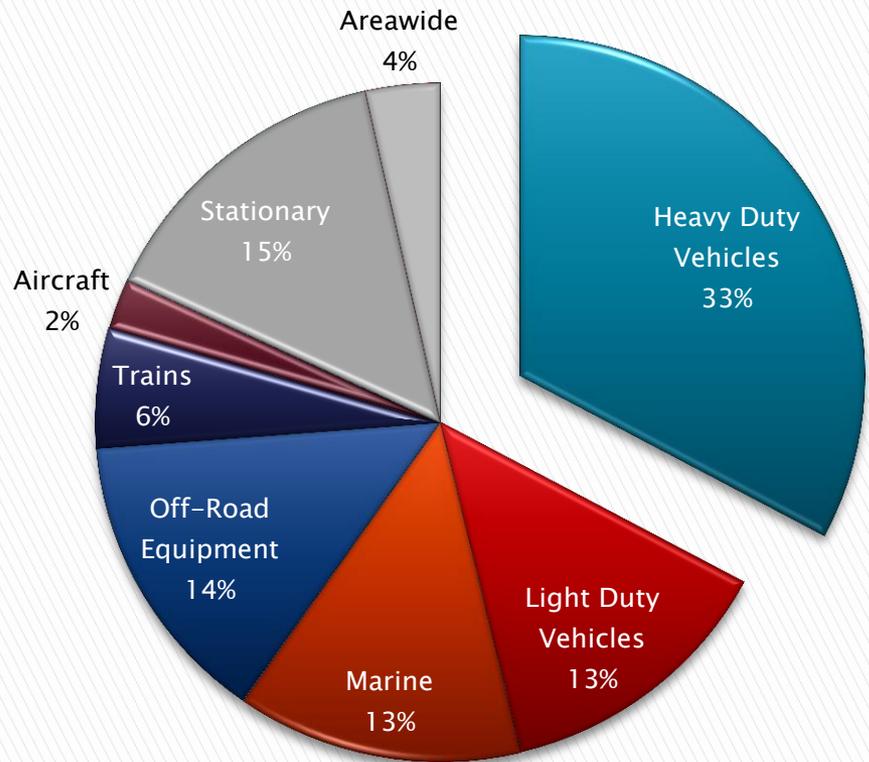
# Heavy-Duty Trucks

» Emissions and Control Programs

# Heavy Duty Trucks: Significant Source of Emissions

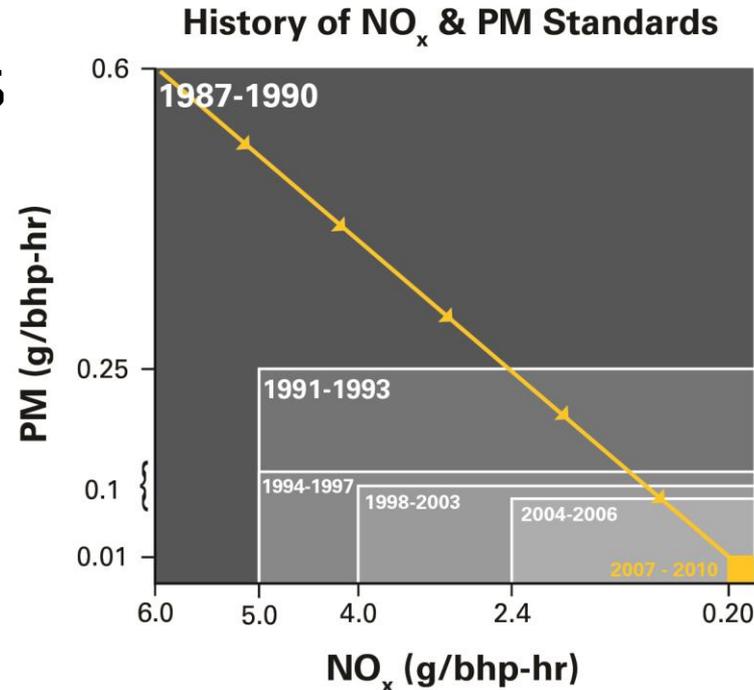
- 33% of statewide NOx emissions
- 26% of statewide diesel PM2.5 emissions
- 8% of statewide GHG emissions

2014 Statewide NOx Emissions



# NO<sub>x</sub> and PM Emissions Have Been Dramatically Reduced

- ▶ New engine standards
  - NO<sub>x</sub>/PM
  - GHG
- ▶ In-Use Requirements
  - Diesel fleet rules
  - Not-to-Exceed
  - Durability
  - Warranty
  - On Board Diagnostics

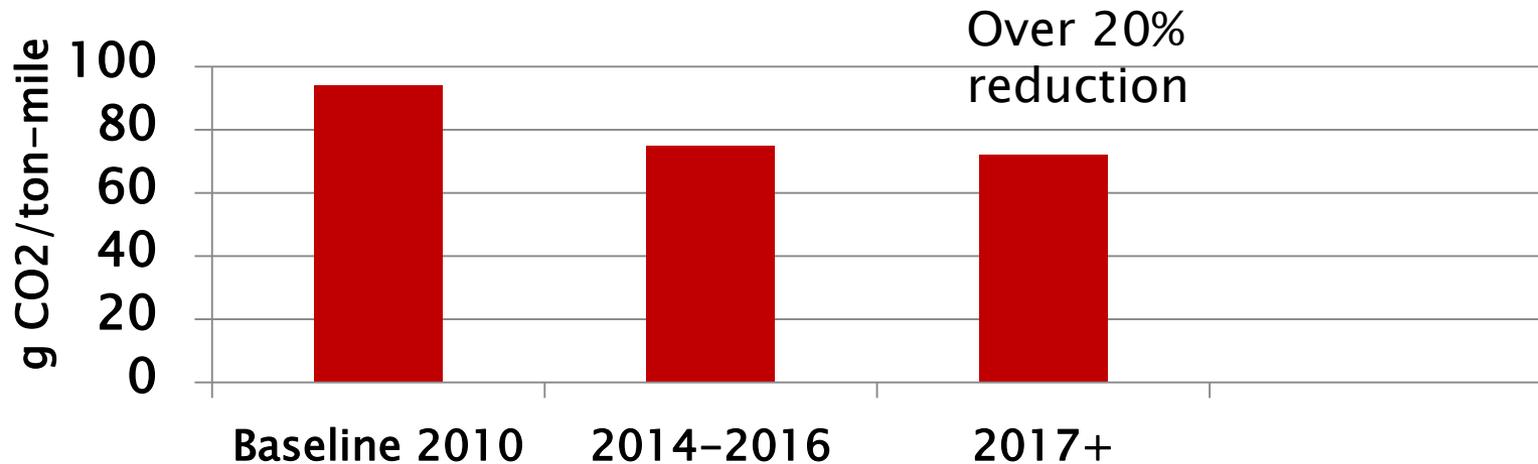


About 97%  
reduction  
in 20 years

History of NO<sub>x</sub> and PM Standards

# Standards Have Cut GHG > 20%

- ARB Tractor-Trailer GHG Regulation
- U.S. EPA Phase 1 Standards



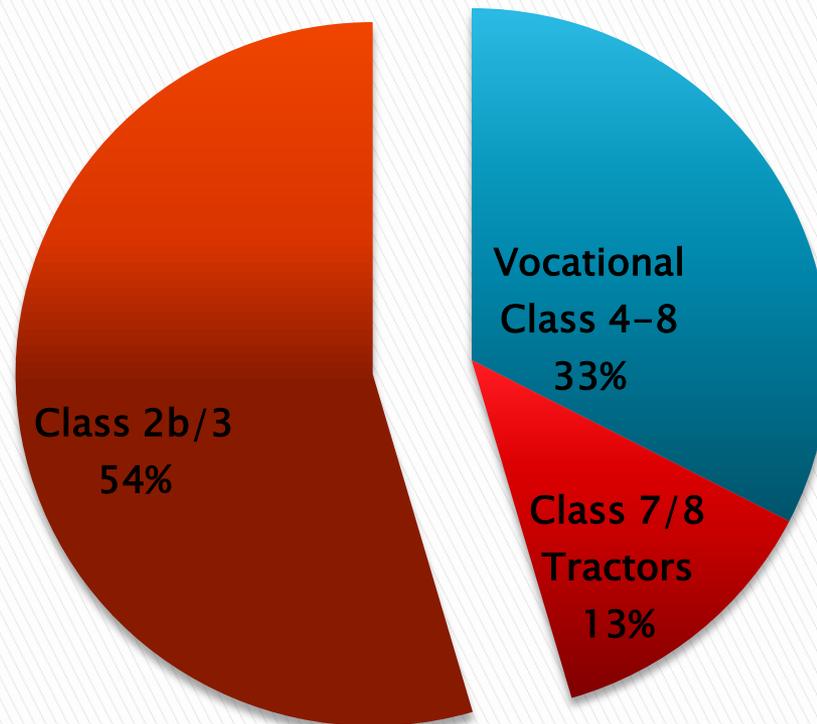
\* g CO2//ton-mile Phase 1 standards for Class 8 high-roof sleeper cabs

# Overview of Heavy-Duty Trucking in California

- » Types of Heavy-Duty Trucks, Sales Patterns and Opportunities for Reducing Emissions

# Class 2B/3 Dominate the Populations of Heavy Duty Trucks

## Population by Heavy Duty Truck Type

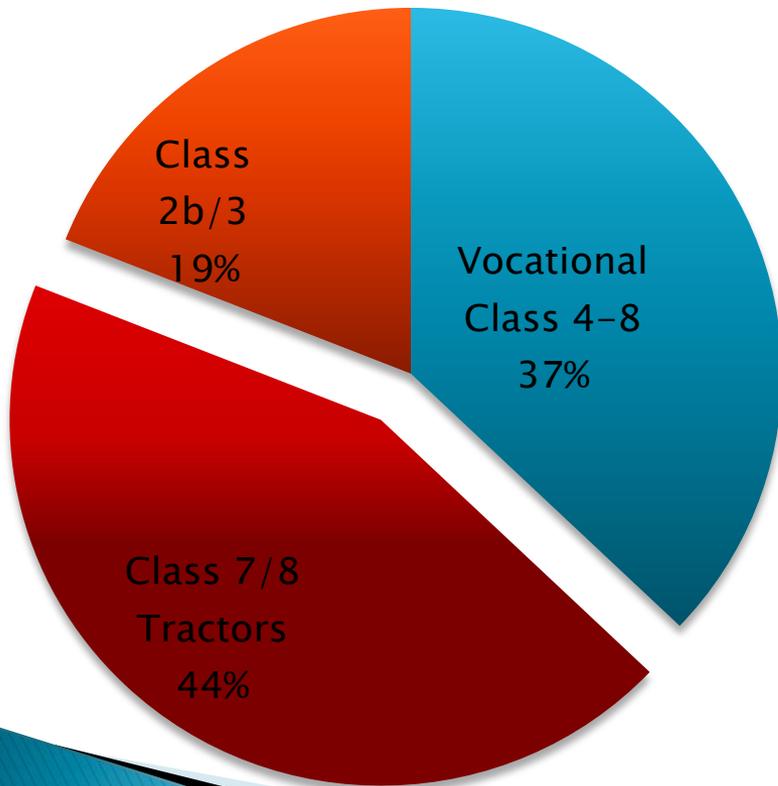


EMFAC 2014, CALENDAR YEAR 2014

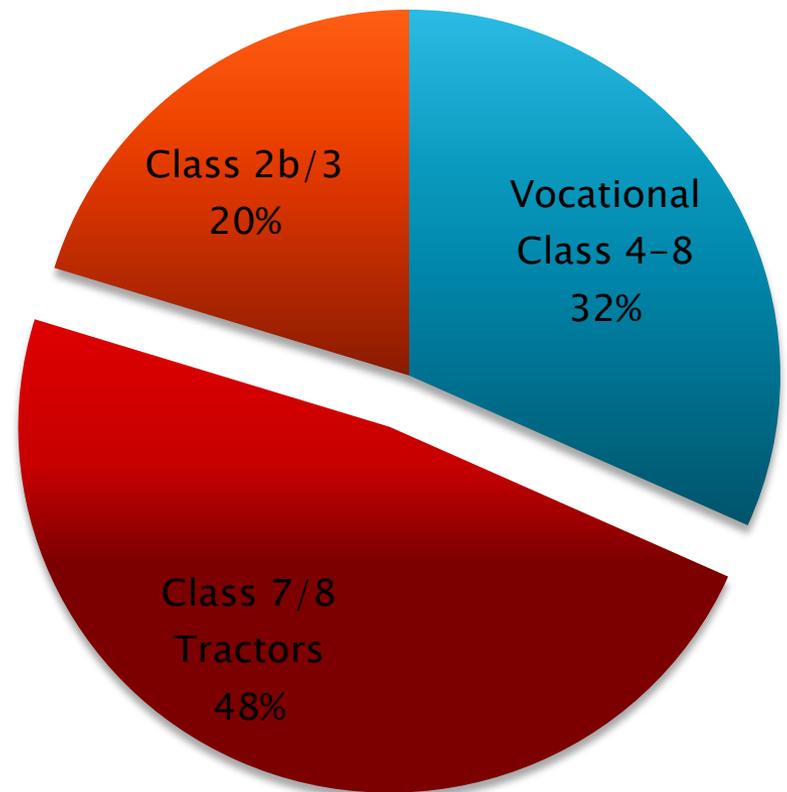
Nearly 2 million Heavy Duty Trucks (GVWR > 8500 lbs.) Operating in California

# Class 7/8 Trucks Dominate Emissions

## NOx Emissions



## CO2 Emissions



\*Emissions for Calendar Year 2014

# Many Heavy-duty Trucks Come from Out of State

- ▶ Nearly all Class 2b-6 trucks purchased in California
- ▶ Majority of Class 7-8s purchased outside California
  - Only 5-7% of national sales are from California
  - California is 13.2% of US GDP



# *Class 7-8 Long-Haul Trucks and Trailers*

- ▶ Majority of Class 7-8s operating in California are purchased outside of California
- ▶ Lifespans over 20 years and can travel more than a million miles
- ▶ Travel more than 80,000 miles a year
- ▶ 37% of total Heavy Duty Truck Vehicle Miles Traveled (VMT) in California
  - 13% of Heavy Duty Truck Population in California



# *Class 7-8 Long-Haul Trucks and Trailers Cont'd*

- ▶ Often start off life in a long-haul function, then move to regional transport use
- ▶ Long-Haul fleets tend to have younger trucks
  - Average age of <5 years
- ▶ Regional truck fleets tend to have older trucks
  - Average age of 12+ years
- ▶ Trailers have lifespans of 30+ years, dominated by dry vans
  - 1.2 to 2.2 trailers per tractor



# Class 4–8 Vocational Trucks

- ▶ Nearly all Class 4–7 and significant proportion of Class 8 operating in California were purchased in state
- ▶ Vast array of duty cycles and functions
- ▶ Fleets often own and use trucks for longer periods of time
  - Average age of 10+ years
  - Useful life of 10+ years
- ▶ Travel 10–40,000 miles a year
- ▶ 27% of total Heavy Duty Truck VMT in California
  - 33% of the total population of trucks



# Class 2b/3 Heavy Duty Pickup Trucks and Vans

- ▶ Vast majority operating in California were purchased in state
- ▶ Commercial use heavy duty pickup trucks and vans
- ▶ Large populations compared to other truck categories
- ▶ Average age of 10+ years
- ▶ Useful life of 10+ years
- ▶ Only operate ~20,000 miles a year
- ▶ 36% of VMT of all Heavy Duty Trucks
  - 54% of the total population of trucks

