

California Greenhouse Gas/Vehicle Pollution Challenge: How the State is Promoting Innovations



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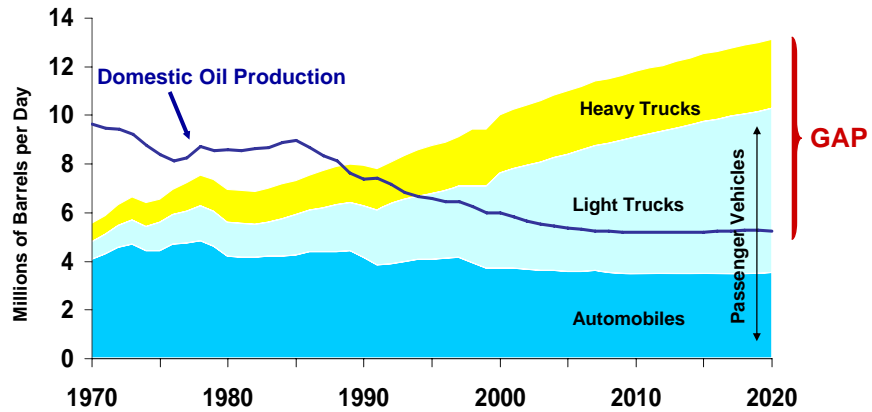
*Alternative Fuel Refuse and Recycling Trucks
Leading the Way to Energy Independence and a Cleaner Environment
Rutgers University – Busch Campus Center
Piscataway, NJ*

Key Air Quality Challenges

- “Easy” Reductions Achieved
- New 8-hour Ozone & PM 2.5 Air Quality Standards
- Local Cancer Risks
- Goods Movement Sources
 - Marine Vessels, Locomotives, Aircraft, On-Road Trucks . . .
- Climate Change

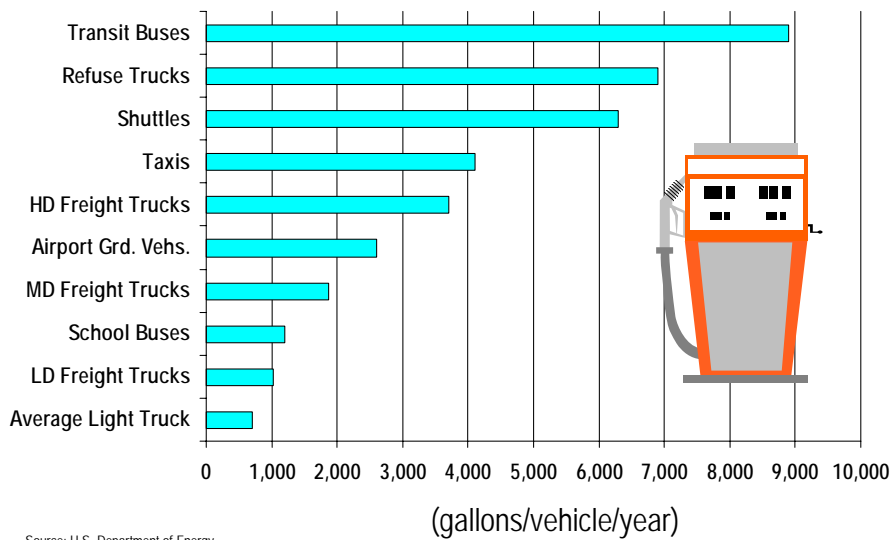


Energy Security Concerns – Key Driver



Source: [Transportation Energy Data Book: Edition 19](#), DOE/ORNL-6958, September 1999, and [EIA Annual Energy Outlook 2000](#), DOE/EIA-0383(2000), December 1999

Typical Fuel Use



Role of Natural Gas Vehicles in Petroleum Reduction

- Heavy Duty Vehicle Population – 884,000
- Heavy Duty Natural Gas Vehicles – 5,063
- Estimated Diesel Usage in Heavy Duty Vehicles – over 2 billion gallons per year



Source: California Energy Commission

Potential Petroleum Fuel Displacement



- ▶ Assuming 15% of Garbage Trucks, Buses, and Trucks are Natural Gas Vehicles
- ▶ 125 Million Gallons of Diesel Displaced per Year
- ▶ California Demand – 3 Billion Gallons of Diesel per Year

Source: California Energy Commission

Natural Gas Engine Availability

- One Light-Duty Vehicle – American Honda
- Currently Two U.S. Manufacturers – Cummins Westport (8.9L) and Westport (14.9L)
- Autocar, Kenworth, Freightliner – Offering Natural Gas Products
- Blue Bird, ThomasBuilt – Integration of Natural Gas Engines
- Several Upfitters Providing Conversions
 - BAF Technologies (Crown Victoria, E450)
 - Baytech (GM Engines)
 - Emission Solutions (International DT466)



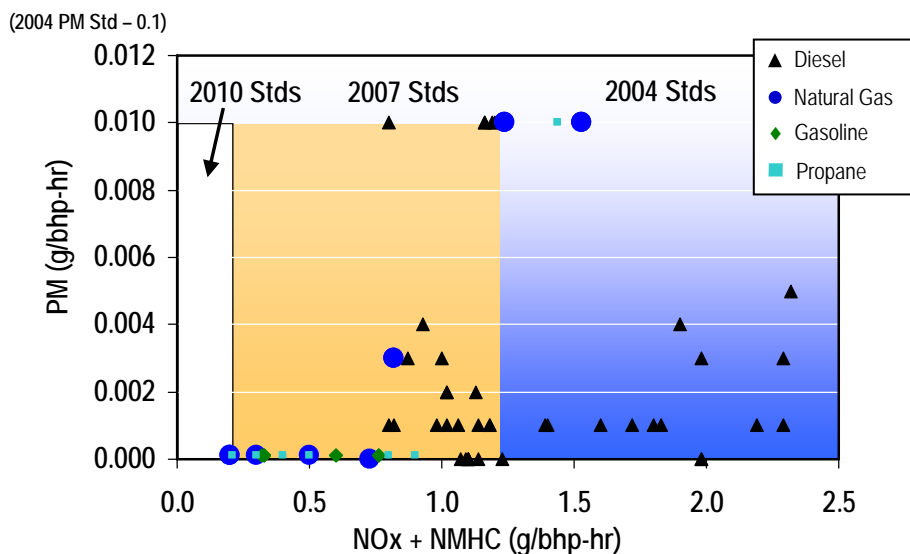
Source: American Honda



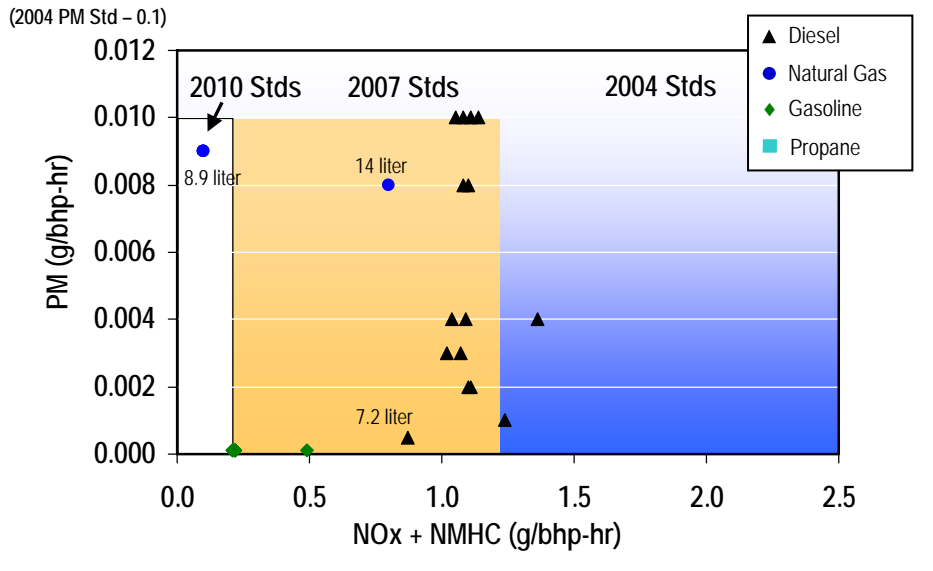
Source: Kenworth



2007 Heavy-Duty Engine Certifications



2008 Heavy-Duty Engine Certifications (as of January 11, 2008)



SCAQMD Fleet Vehicle Rules

- 1191 - Light- and Medium-Duty Public Fleets
- 1192 - Transit Buses
- 1193 - Refuse Collection Vehicles
- 1194 - Commercial Airport Ground Access
- 1195 - School Buses
- 1196 - Heavy-Duty Public Fleet Vehicles
- 1186.1 - Less-Polluting Sweepers



Natural Gas Vehicles Operating in Fleets in Southern California

- ~ 3,430 Light- and Medium-Duty Public Fleet Vehicles
- ~ 276 Heavy-Duty Public Fleet Vehicles
- ~ 3,691 Transit Buses
- ~ 697 School Buses
- ~ 1,390 Refuse Trucks
- ~ 222 Street Sweepers
- ~ 540 Taxicabs and Airport Shuttles



Countries With Over 100,000 NGVs

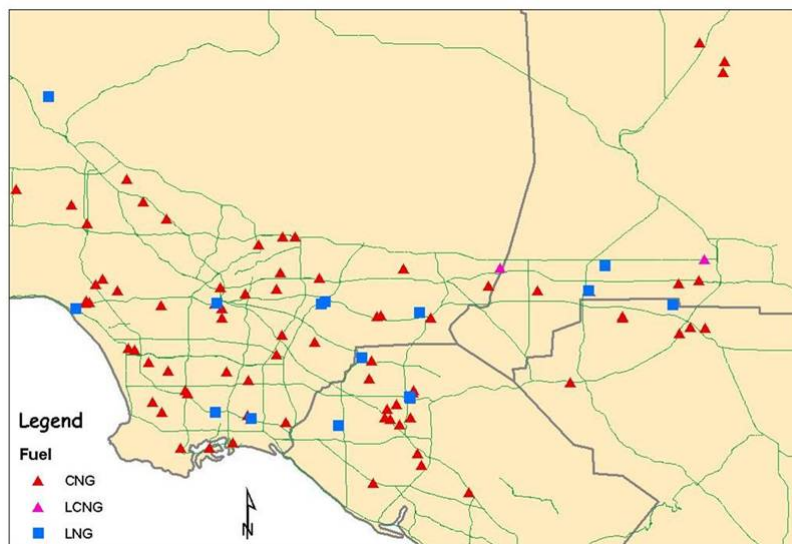
Pakistan	~1,600,000
Brazil	~1,420,000
Argentina	~1,350,000
Italy	410,000
India	334,658
Iran	263,662
USA	146,900
China	127,100
Colombia	100,000

Worldwide NGV Automobile Manufacturers

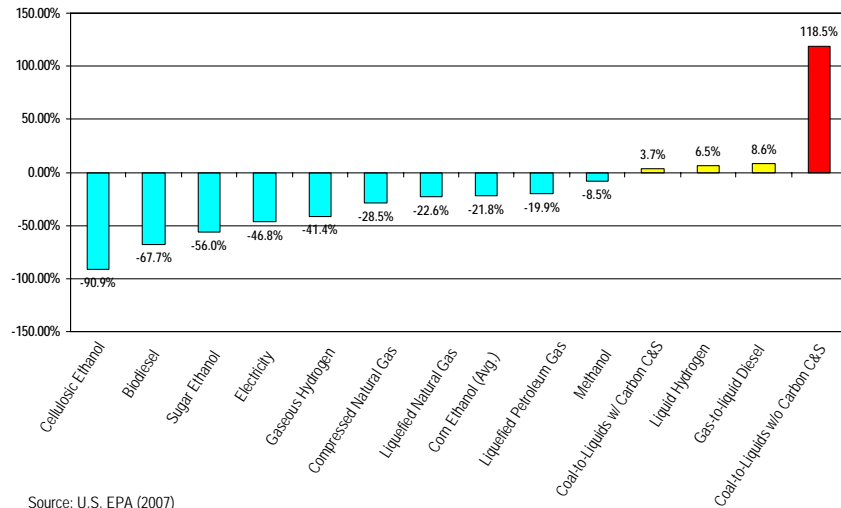
- Over 15 Passenger Vehicle Manufacturers
- Over 34 Different Models



Natural Gas Fueling Facilities

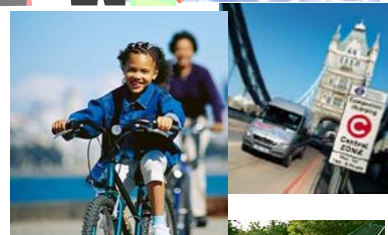


Greenhouse Gas Lifecycle Analysis (Percent Change in GHG Emissions)



Road to Success

- Need for Long-Term and Near-Term solutions
- Continue Investments Research/Demonstration Technologies
- Looking Beyond 2010 HD Engine Standards (i.e. Hydrogen Blends, Hybridization)
- Public-Private Partnerships



Road to Success (cont.)

- Continue Implementation of Fleet Rules
- Work with Engine Manufacturers to Expand Availability of Rule Compliant Engines
- Collaborative Efforts to Leverage and Accelerate Deployment of Clean Vehicles

