

# *Clean Diesel Technology 2007 to 2010 and beyond*



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Long Beach CA

[www.dieselforum.org](http://www.dieselforum.org)



## Discussion

- ▶ Challenge to truck and engine manufacturers
- ▶ Role of diesel power in goods movement
- ▶ Technology overview
  - Clean Diesel System
  - 2007 Technology
  - 2010 Technology Glimpse of the Future
- ▶ Future considerations



## The Challenge to Truck and Engine Manufacturers

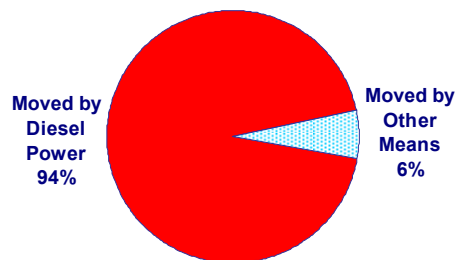
- ▶ Balance increasingly demanding customer expectations
  - High Efficiency, fuel economy
  - Greater reliability, durability
  - Minimal maintenance costs
  - Competitive price
  - High resale value – long useful life
- ▶ AND meet increasingly stringent emissions and safety standards



## Diesel Power and Goods Movement

- ▶ Diesel Technology the prime mover for highway goods: highway trucks, rail, marine work boats: why?

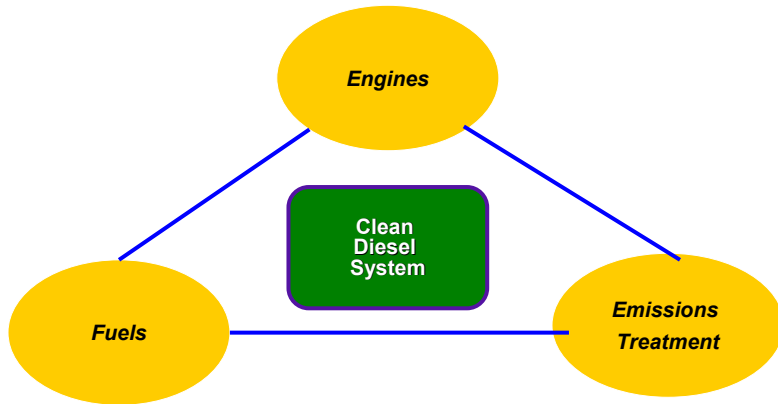
- Unique combination of power density, performance, fuel efficiency, reliability, fuel availability, maintenance infrastructure.



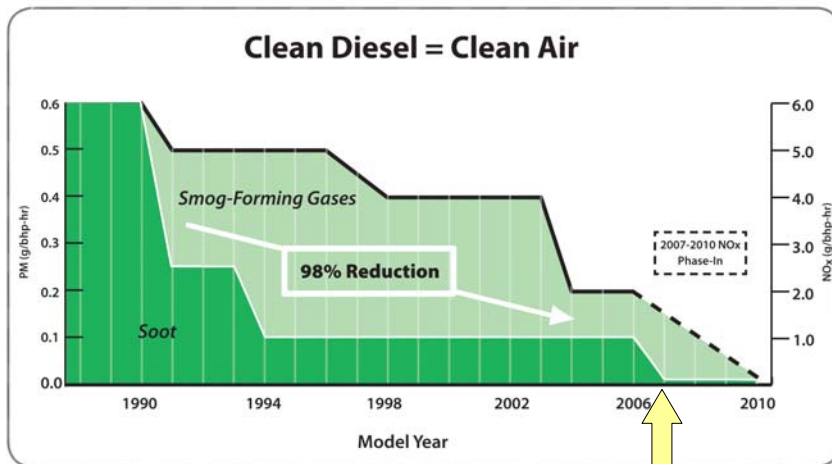
Total Ton-Miles



# Clean Diesel System



# Key Milestones



Source: U.S. Environmental Protection Agency, On-Highway Heavy Duty Diesel Emissions Reductions



## 2007: Clean Fuel and Clean Trucks

- ▶ Ultra-Low Sulfur Diesel
  - Implemented October 2006
  - About 90 percent ULSD nationwide (100% CA)
  - Significance equivalent with removing lead from gasoline
- ▶ 2007 Clean Diesel Trucks ... On Sale Now!
  - 90 percent lower in PM – about 50 percent lower in NOx
  - Particulate filters catalytic converters standard fare



## Factors influencing Acquisition of New Technology

- ▶ Acquisition of new 2007-2010 Clean Diesel trucks based on many factors
  - Economic Cycle
    - Trucking is a cyclical industry: Growing economy = more goods movement, more trucking services
  - Cost of new technology
    - 2007 generation trucks \$5,000 -\$10,000 increase
    - 2010 ?
  - Technology confidence
    - 2007 experiences
  - Competing alternatives
    - Other fuels, technologies
  - Financial incentives
    - Incentivize new technology and/or fund retrofitting existing trucks



## Evolution to new Clean Diesel Technology: Commercial Trucks

- ▶ All new highway diesels will have particulate filters starting 2007
- ▶ Heavy-duty diesels approaching the same level of emissions as natural gas engines in 2010
- ▶ Key concerns/opportunities
  - Successful introduction of 2007 technology and customer acquisition
  - 2010 Technology challenge and customer acceptance/acquisition
  - Incentives for 2010 technology adoption?

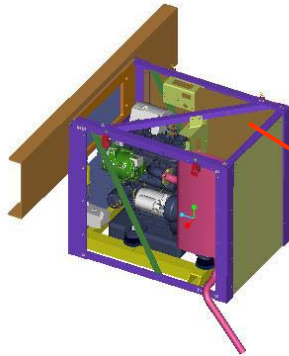


## What do Heavy-Duty Trucks Look Like in 2010?

- ▶ Greater emphasis on reducing energy consumption
- ▶ Aerodynamic design of truck/tractor and trailers, more single tires (instead of dual)
- ▶ Integration of idle reduction measures – auxiliary engines, plug-ins.



## Comfortguard Diesel Auxiliary Power Unit (APU) Prototype



## Aerodynamic Trailer Treatment



## SCR Fueling: Retail Station and Fleet



## Growth in Clean-Diesel Hybrid Electric Trucks

- ▶ Expect more clean diesel hybrid-electric vehicles – up to 26,000 lbs GVW
  - Short haul, box trucks
  - Tax incentives being developed
- ▶ Rapid growth in diesel electric hybrids in Transit bus applications
- ▶ Hydraulic hybrids in lighter applications



## Conclusions

- ▶ 2007 Generation Clean Diesel a Success
  - Manufacturers have met the challenge of 2007 – all certified and producing new 2007 engines
  - Early reports highly positive; uptake of new technology slow 1<sup>st</sup> & 2<sup>nd</sup> Q
- ▶ Cleaner diesel fuel introduction near seamless
- ▶ Advanced emissions control systems will allow diesels to meet the near-zero emissions levels of 2010 – competitive with alternative fuels



## Conclusions

- ▶ 2010 clean diesel technology under development
  - SCR not a new technology – European experience in trucks and likely experience in passenger cars 2009
  - SCR a leading technology for efficient NOx reduction

