

2007 AQMP Summit

Panel #4

On-Road Heavy Duty Vehicle Strategies

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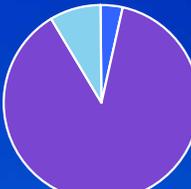
Objective

- Identify potential on-road heavy-duty vehicle control concepts focusing on technology availability and development, as well as accelerated implementation.

On-Road Heavy Duty PM2.5 Emissions



2002 – 8.5 tpd



2015 – 4.2 tpd



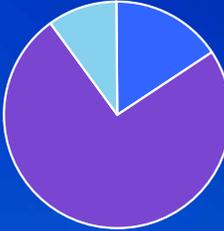
2020 – 2.2 tpd

Gasoline Trucks Diesel Trucks Buses

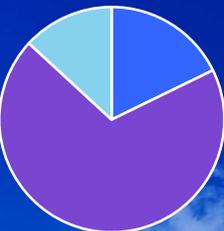
On-Road Heavy Duty NOx Emissions



2002 – 258.4 tpd



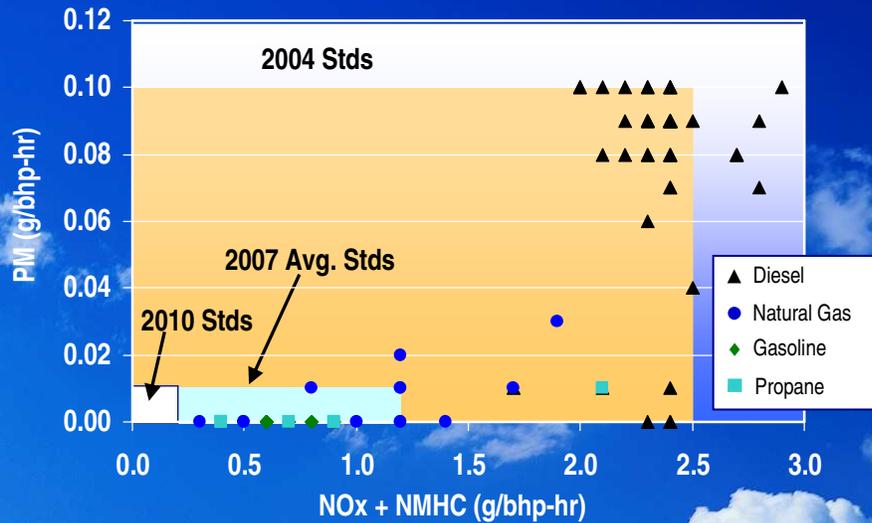
2015 – 162.4 tpd



2020 – 117.8 tpd

Gasoline Trucks Diesel Trucks Buses

2006 On-Road Heavy-Duty Engine Certifications (as of May 19, 2006)



Areas of Opportunities

- Advanced Power Train System
- Clean Fuels
- Engine Technology
- Fleet Modernization
- Fuel Cell and Hydrogen
- Hybrid/Plug-in Hybrid Technology
- Incentive Programs
- Retrofit Technology

Proven Commercially Available Diesel Alternative Technologies

Technology	NOx Reduction	PM Reduction
Natural Gas	50% or greater	70% (> with cat)
Diesel Emulsions	10-15%	50-65%
Biodiesel (B20)	-5% to 0%	15-20%
Ethanol Blends	2-6%	35-40%
Oxidation Catalysts	0-3%	~20%
NOx/PM Traps	0 to 25%	> 85%
Low-Sulfur Diesel	Minimal	~ 20%

Future Diesel Alternative Technologies

Technology	NOx Reduction	PM Reduction
<u>New Technologies</u>		
Hybrids (Gasoline)	~80%	90% + (oxidation catalyst)
Hybrids (Diesel)	~25%	90% + (diesel trap)
<u>Future Technologies Under Development</u>		
Natural Gas (Yr 2007)**	>85%	90% + (oxidation catalyst)
Gas-to-Liquids	0-14%	20-55%
EGR (Yr 2007)	50%	Needs Trap
SCR (Yr 2010)	> 85%	Needs Trap
NOx Adsorbers (Yr 2010)	> 85%	Needs Trap
Fuel Cells (compressed hydrogen)	100%	100%

Questions for Panelists

- Recommend three control strategies that in your view would provide a significant contribution to the emission targets in the time frame specified
- Describe the problems you see as a barrier to the introduction of clean air technologies
- Suggest the one research priority the air agencies should engage in for the next 5 to 10 years