



National Clean Diesel Campaign

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Office of Transportation and Air Quality
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National Clean Diesel Campaign

- Two components:
 - Regulatory: Clean Air Act requirements for new engines/fuels
 - Innovative Strategies: Existing engines in legacy fleet
- Goal: *Reduce emissions from the legacy fleet of over 11 million diesel engines by 2014*
 - About 500 projects nationwide (~130 EPA grants since 2003)
 - About 250,000 engines retrofitted or replaced
 - ~ 25 emissions control technologies verified, more on California's list
 - Partners have contributed significant resources
 - Over 2 external dollars for every 1 federal dollar invested
 - States have established programs with funding > \$400M

A Comprehensive and Collaborative Approach to Diesel Emissions Reduction

Common Aspects--

- Systems approach– ULSD enables clean technologies.
- Very large environmental and public health benefits.
- Current regulations: by 2030, PM reduced by ~250,000 tons/year, NOx by ~4 million tons/year. Annual benefits are expected to exceed \$175 billion versus costs of approximately \$11 billion.
- Responsive to needs of states to meet NAAQS.
- Collaborative process.

Locomotive/Marine

EPA's New Proposal for Locomotives, Inland Marine: 3-Part Program

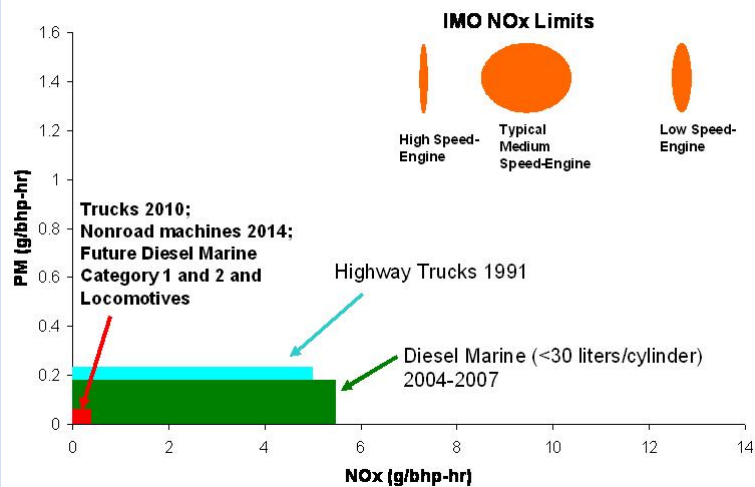
- Standards were facilitated by 15 ppm sulfur fuel, already required for locomotive and marine fuels beginning in 2012
- 1) Existing Engines
 - Engine-based reductions, apply at time of remanufacture
 - Proposed for locomotives; taking comment on similar marine program
 - Effective immediately - depending on rebuild kit availability
 - 2) Tier 3 Stds for newly-built locomotives and C1, C2 marine
 - Engine-based reductions
 - Effective 2009 -14 depending on engine size
 - 3) Tier 4 Stds for newly-built locomotives and marine diesels
 - Catalyzed PM filters + High-efficiency NOx aftertreatment (e.g., urea SCR)
 - Effective 2014 -17 depending on engine size

Reductions from Levels of Existing Standards

Sector	Proposed Standards Tier	PM	NOx
Locomotives	Remanufactured Tier 0	60%	15-20%
	Remanufactured Tier 1	50%	--
	Remanufactured Tier 2	50%	--
	Tier 3	50%	--
	Tier 4	90%	80%
Marine Diesel Engines *	Remanufactured Engines (asking for comment)	25-60%	up to 20%
	Tier 3	50%	20%
	Tier 4	90%	80%

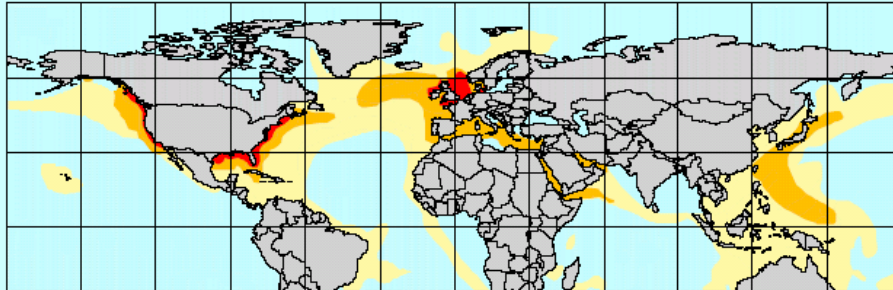
standards vary by engine size; reductions indicated are typical.

Ships Emission Rates More Than 50 Times Other Diesel Engines



Global ship traffic density

Low
Medium
High
Extra high



*85 percent in Northern Hemisphere
70 percent within 400 km of land*

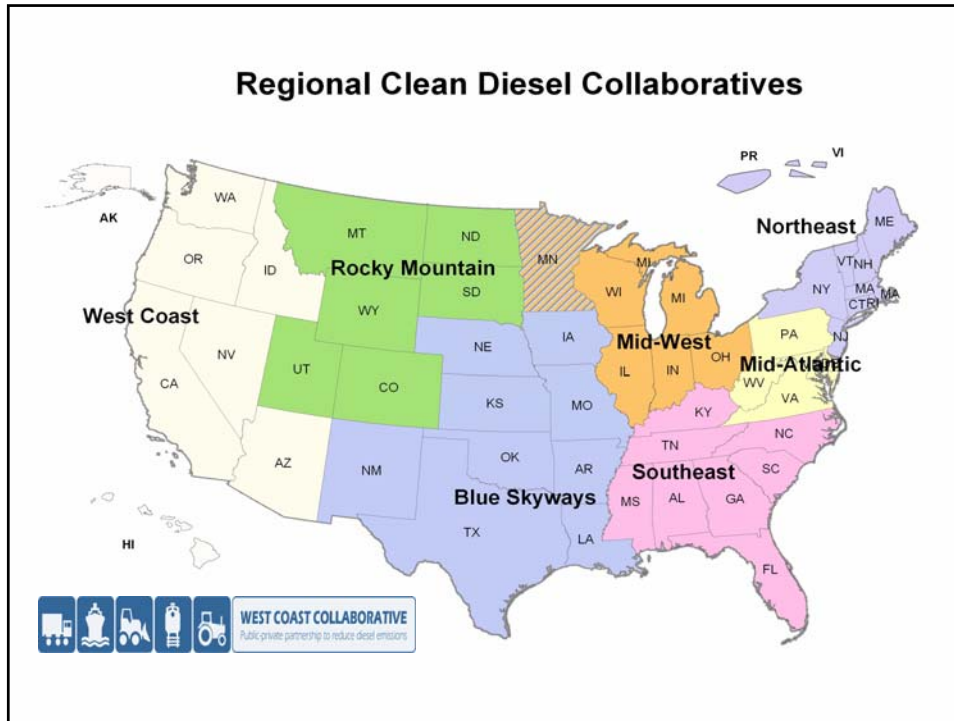
Source: IMO Study on Greenhouse Gas Emissions from Ships, MEPC 45(8), 2000.

Source: 'Sources of Transport of Air Pollution from Ships: Current Understanding, Implications, and Trends',
Dr. James J. Corbett & Dr. Paul Fischbeck.

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- **EPA's national program to encourage reductions in diesel emissions at ports**
 - Identifying incentives to overcome barriers to voluntary action to improve public health and reduce fuel consumption
 - Seeking cost-effective emission reductions from all diesel equipment in and around marine ports
- **Deep draft public ports on the coasts and in the Great Lakes**





Clean Ports USA Projects	
<ul style="list-style-type: none"> • To date EPA has funded 16 port-related projects <ul style="list-style-type: none"> – \$1.9 million EPA funds and \$2.5 million match – 25 case studies on Clean Ports USA web – 5 Clean Ports USA terminal operator workshops <ul style="list-style-type: none"> • Puget Sound, New York, Duluth, Philadelphia, Houston – Clean Ships: Advanced Technology for Cleaner Air, San Diego • Recent EPA Clean Port USA projects <ul style="list-style-type: none"> – Holland America Line Sea Scrubber Project – POLB Hybrid Yard Hostler Project Awarded – Indiana DEM to benefit Port of Indiana rail – PANY/NJ locomotive project – Massachusetts Port Authority (Boston) – 20 DOCs on RTG cranes, stackers, and tractors – Port of Houston Authority –DOCs, DPFs, ULSD, TxLED on yard tractors – Port of Tacoma (WA) –60 DCOs on Straddle Carriers with ULSD – 2 Community Air Toxics CARE grants (Oakland and S.Camden, NJ) 	

US EPA Funding

National Clean Diesel Campaign

- **FY 2003-2006**
 - \$25 million for Clean School Bus USA
 - \$6.1 million for non – Clean School Bus USA projects

- **FY 2007 budget**
 - President requested \$50 million to support clean diesel activity
 - Continuing Resolution - (same as 2006)
 - Cannot work on “DER” portion of Energy Bill

- **FY 2008 budget**
 - President requested \$35 million to support clean diesel activity (DER of Energy Bill) for nonattainment areas

- **NOTE: FY 2007 funding will be competed this spring/summer by EPA Regions. Links to RFPs: www.epa.gov/cleandiesel**

Federal Legislation Supporting Clean Diesel Activity

- **Energy Policy Act of 2005**
 - Total Authorization Over \$1 Billion
 - Authorized Funding levels (1st year)
 - **Diesel Emissions Reduction** \$200M
(Sometimes called DERA)
 - School buses \$55M
 - Fleet Modernization \$20M
 - Idle Reduction \$30M

- **SAFETEA-LU (CMAQ)**
 - \$1.7B authorized until 2009
 - Guidance issued in October, 2006 makes diesel retrofit projects a CMAQ priority

Clean Ports USA New Directions

- DERA implications: Verification
- Transportation Supply Chain
 - Developing tool to help freight owners measure emissions across supply chain
- International projects
 - Port of Los Angeles/Port of Shanghai
 - Pacific Ports Air Quality Collaborative
 - FY07 projects with Seattle/Tacoma, New York/New Jersey and Los Angeles
- Fleet modernization: 2010 truck standards



Clean Automotive Technology

EPA's Full Series Hydraulic Hybrid Urban Delivery Vehicle

*Hydraulic Hybrid
UPS Package Car
Demonstration Creates
"Real World" Experience*



- 60 70% mpg improvement in city driving
- 2 3year payback has attracts attention from fleets
- Potential for net Lifetime savings over \$50,000 with \$2.75/gal fuel costs
- Demonstration to accelerate technology transfer to industry & familiarity with technology
- Partners (UPS, Eaton, International Truck, US Army)

Strategies Which Increase Average Vehicle Efficiency

1. Capture and re-use energy lost to friction braking

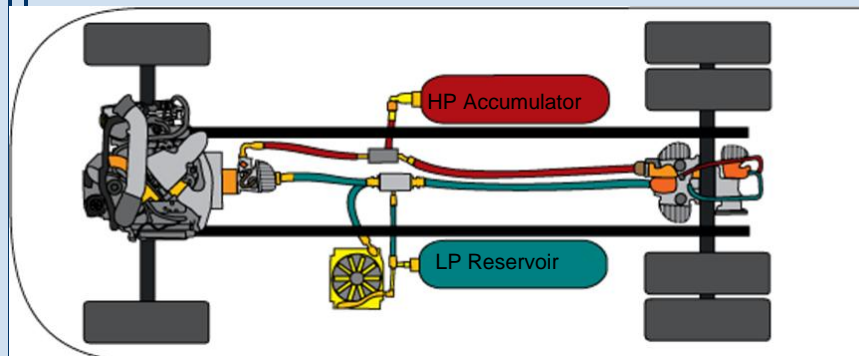
- ✓ Regenerative Braking

2. Improve average efficiency of engine / drivetrain

- ✓ Operate engine at best efficiency
- ✓ Shutoff engine at idle
- ✓ Shutoff engine at all times when not needed



Full Series Hydraulic Hybrid Configuration



Accumulators for Hydraulic Hybrid Demonstration UPS Truck



Rear Wheel

View looking at the driver's side of the vehicle

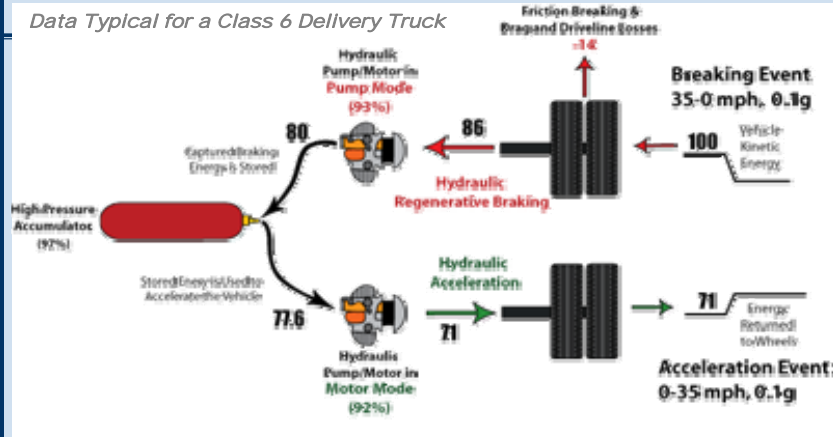
"Demonstration" UPS Truck Uses a "44-gallon" System

- ✓ Two 22-gallon high pressure accumulators
- ✓ Two 22 gallon low pressure reservoirs
- ✓ 20 gals of automatic transmission fluid
- ✓ High pressure operating between 2000 and 5000 psi

Clean Automotive Technology

Efficiencies While Braking/Accelerating

Data Typical for a Class 6 Delivery Truck



Analysis courtesy of **Automotive Research Center** – University of Michigan

Hydraulic Hybrids > 70%

Electric Hybrids < 25%

Summary

- Reducing emissions from diesel engines is one of the most important air quality challenges facing the country
- It's a shared responsibility – federal, state, private, local organizations all have to do their part
- Visit EPA's National Clean Diesel Campaign Website: www.epa.gov/cleandiesel/ports

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WEST COAST COLLABORATIVE
Public-private partnership to reduce diesel emissions