

Connecticut's Clean Air Initiatives

Diesel Retrofit Program

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What is in the exhaust from diesel engines?



- Diesel engines are significant contributors to air pollution.
- The exhaust contains hundreds of different chemical compounds that play a role in ozone formation, particulate matter, regional haze and acid rain.



Diesel Exhaust

- Diesel Exhaust is classified a probable human carcinogen by EPA
- Diesel PM has been labeled a toxic air contaminant by C.A.R.B.

Connecticut Diesel Exhaust Emissions

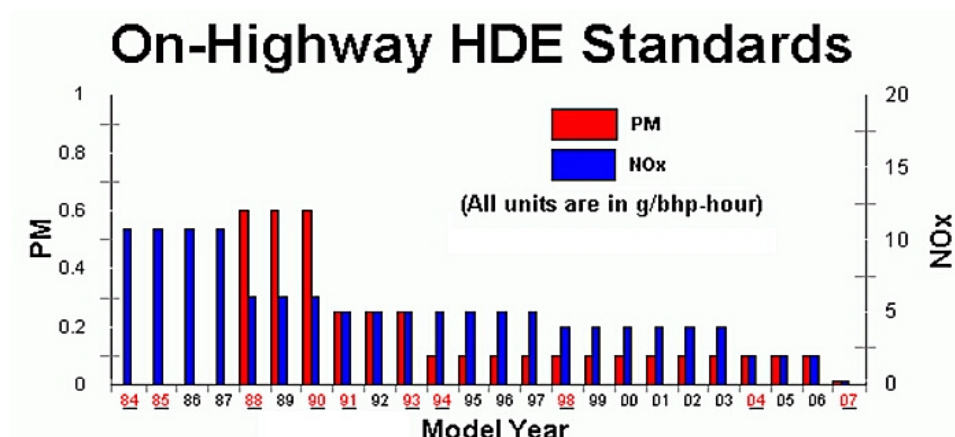
- 1999 On-Highway and Nonroad Diesel Emissions in Connecticut*
 - Nitrogen Oxides (NO_x): – 57,300 tons per year
 - 37% of all NO_x emissions in CT
 - Fine Particulate Matter (PM_{2.5}): 3,800 tons per year
 - 16% of all PM_{2.5} emissions in CT
 - Hydrocarbons (HC): 5,700 tons per year
 - 4% of all HC emissions in CT
 - Carbon Monoxide (CO): 34,300 tons per year
 - 4% of all CO emissions in CT

* Data is from EPA's National Emissions Trends (NET) database (www.epa.gov/air/data/nettier.html)

Strategies to Reduce Emissions from Diesel Engines

- Tighter standards for new diesel vehicles
- Encourage use of alternative fuels (e.g., CNG or electric)
- Retrofit existing engines with pollution control equipment
- Testing vehicles to ensure their not operating “dirty”
- Eliminate unnecessary idling

EPA’s Emission Standards for Trucks and Buses



EPA's Nonroad Diesel Engine Emission Standards

- Includes tractors, backhoes, bulldozers, forklifts, generators, pumps, etc.
- Tier I issued in 1994
 - Engine sizes > 50 hp
 - NOx standards phased in 1996-2000
- Tier II issued in 1998
 - All engine sizes
 - NOx, HC and CO standards phased in 2001-2006
- Tier III issued in 1998
 - Engine sizes 50 – 750 hp
 - NOx and PM standards phased in 2006-2008

Why Retrofits Are Necessary?

- Benefits of EPA's diesel regulations are long-term
 - Requirements are phased in between 1996 - 2008
 - Full benefits are years away
- Diesel Engines last a long time
 - Existing engines may last another 20-35 years
- The Voluntary Diesel Retrofit Program deals with existing engines today
 - Benefits from retrofits are immediate
 - Retrofit technology is available now

Retrofits Reductions

- Oxidation Catalysts -
20% PM, 40% CO and 50% HCs
- Particulate Filters -
60% PM, 60% CO and 60% HCs
- Fuel Additives, PuriNox -
60% PM, 25% HC and 10% NOx

The Q-Bridge Project

(Contract D)

Q-Bridge Project

- Highway Improvement and Bridge Replacement.
- Located along I-95 over the Quinnipiac River.
- Estimated construction schedule of 10-years.

Q-Bridge Workgroup

- Department of Transportation
- NESCAUM
- Mass Turnpike Authority
- DEP
- Connecticut Construction Industries Association (CCIA)

Retrofit Benefits

- Air Quality
- Public Relations

NTC – Diesel Vehicle Emissions Controls

“All diesel powered construction equipment with engine horsepower (HP) ratings of 60 HP and above, that are on the project or are assigned to the contract for a period in excess of 30 days shall be retrofitted with Emission Control Devices and/or use Clean Fuels in order to reduce diesel emissions.”

Retrofit Emission Control Devices

Oxidation catalysts, or similar retrofit equipment control technology that:

(1) is included on the Environmental Protection Agency (EPA) Verified Retrofit Technology List and

(2) is verified by EPA or certified by the manufacturer to provide a minimum emissions reduction of 20% PM₁₀, 40% CO, and 50% HC.

Clean Fuels

The Clean Fuels shall consist of PuriNOx, or other low NOx and PM₁₀ emission diesel fuel that:

(1) can be used without engine modification,

(2) is certified to provide a minimum emissions reduction of 30% PM₁₀ and 10% NOx when compared to No. 2 Diesel Fuel,

(3) is included on the California Air Research Board (CARB) Verification List.

Truck Staging Zones

- Establish truck-staging zones for diesel powered vehicles that are waiting to load or unload material at the contract area.
- Locate the zones where the diesel emissions from the trucks will have minimum impact on abutters and the general public.

Idling

Idling of delivery and/or dump trucks, or other diesel powered equipment shall not be permitted during periods of non-active use, and it should be limited to three minutes in accordance with the Regulations of Connecticut State Agencies Section 22a-174-18(a)(5).

Exceptions to the Idling Limits

- When a “mobile source” is forced to remain motionless because of traffic conditions or mechanical difficulties over which the “operator” has no control;
- When it is necessary to operate heating, cooling or auxiliary equipment installed on the “mobile source” when such equipment is necessary to accomplish the intended use of the “mobile source”;

Exceptions to the Idling Limits (Cont’d)

- To bring the “mobile source” to the manufacturer's recommended operating temperature;
- When the outdoor temperature is below twenty (20) degrees Fahrenheit; and/or
- When the “mobile source” is being repaired.

Expand Voluntary Diesel Retrofits

- Roadway and building construction
- School Buses
 - Advise school bus operators, superintendents etc. on health effects of diesel
 - Model contract language for no idling on school premises
 - Encourage the retrofit of school buses
- Public Transportation
- Municipal Vehicles

Diesel Retrofit Program For Construction Equipment Of The Central Artery/Tunnel Project

Boston, Massachusetts

by

Guido Schattaneck (*PBQD, Inc*)

and

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CA/T Once Completed in 2005

Within 7.5 Mile corridor

- 160 Lane-miles of New Highways
- Half of them in Tunnels
- 13 Million Cu-Yards of Excavated Material
- 4 Million Cu-Yards of Concrete Poured

Retrofit Program Criteria

- Only off-road equipment to be retrofitted.
- Equipment working close to sensitive receptors such as:
 - Residential communities.
 - Hospitals.
 - Building fresh air intakes.
 - Underground areas.



Oxidation Catalysts Instead of Diesel Particulate Filters

- Reduce CO, HC, Odors
- Ease of installation and maintenance
- Lower cost (2,000 versus 13,000)
- Proven technology (over 1 million in use)

Retrofit Program Costs

- Oxidation Catalysts cost \$1,000 to \$3,000 (\$2,500 average)
- Installation time < 2 hours.
- No adverse effects on equipment performance.
- Warranty concerns resolved in Phase 1

Future CA/T Retrofits

- Remaining CA/T contracts required to retrofit all off-road diesel equipment.
- Retrofitting part of project's odor control specification.
- Estimate additional 75 to 100 pieces to be retrofitted 2001-2004.





Clean Fuel Initiative Pilot Program

- Use PuriNOx on diesel powered construction equipment
- PuriNOx - emulsified diesel fuel
 - No. 2 Diesel + Additive + Water
- Reduces NOx and black smoke
- No Engine modification required

PuriNOx Test Results

- NOx reductions 24% - 30%
- Black Smoke reductions 93% - 97%
- No performance problems
- Required slightly more power in deep mud conditions
- Fuel consumption slightly increased

COSTS

Oxidation Catalysts Vs Clean Fuel

Current Assumptions

- Oxidation Catalysts @ \$8/HP
- PuriNOx @ \$0.15/Gallon above No2 Diesel

Oxidation Catalysts = 14 months of fuel

Questions?

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