What is the Diesel Technology Forum?

**Objective:**
A not-for-profit educational/trade organization dedicated exclusively to increasing awareness about clean diesel technology among policymakers, fleet managers and the media.

**Membership:**
Includes energy companies, engine and vehicle manufacturers, and emission control device manufacturers.

**Methods:**
Educational materials and outreach events.
Diesel Emissions Reduction Act

- Dedicated diesel retrofit funding created under the Energy Policy Act of 2005
- Authorized $200 million/yr for 5 years
- 70/30 funding split (federal/state)
- 50% of funding must go to public fleets
- Priority for non-attainment areas
- Defines retrofit to include the 5 R’s (repower, rebuild, refuel, replace, & retrofit)
- Promotes adoption of commercially available green technology, which provide manufacturing, marketing and maintenance jobs in all 50 states.
- Expires at end of FY2011
DERA to Date

- $464.7 million to date - $164.7 million in annual appropriations & $300 million through ARRA. President Obama requested $60 million in FY2011.

- More than 600 applications received for the $300 million under the ARRA. Approx $2 billion requested, more than $2 billion in matching funds offered.

- Nearly 400 applications received for the $84 million available in FY2009 and FY2010 (not including $36 million for state programs). Approx $570 million requested, more than $1 billion in matching funds offered.

- EPA estimates that more than $1 billion in qualified, unfunded project proposals have been received.
National Clean Diesel Program
Estimated $60M for FY2011

National
Estimated $42 Million (70%)

State
(30%)
Estimated $18 Million FY2011

National Clean Diesel Funding Assistance Program
Estimated $32M for FY2011

Clean Diesel Emerging Technologies Program
$4M for FY2011

SmartWay Clean Diesel Innovative Finance Program
Estimated $6M for FY2011

State Clean Diesel Grant Program 2011 $18M
State Base
Matching Bonus

Budget amounts for FY 2011 are estimated
National Clean Diesel Funding Assistance Program: Eligible Entities

- Regional, state, local, tribal or port agency with jurisdiction over transportation or air quality; and

- Nonprofit organization or institution which
  - Represents or provides pollution reduction or educational services to persons or organizations that operate diesel fleets; or
  - Has, as its principal purpose, the promotion of transportation or air quality
National Clean Diesel Funding Assistance Program: Eligible Fleets and Equipment

On and off road diesel engines/vehicles such as:

- Buses
- Medium or heavy duty trucks
- Marine engines
- Locomotives
- Construction vehicles
- Cargo handling (including at a port or airport)
- Agriculture
- Mining
- Power generation
National Clean Diesel Funding Assistance Program: Use of Funds

- Cannot fund the cost of emissions reductions mandated under Federal, State or Local law
  - Cannot fund after effective date of requirement
  - Can fund early compliance
- Grants are not for emissions testing
- Grants are not for fueling infrastructure
- Technologies and engines must be verified and/or certified by USEPA or CARB
National Clean Diesel Funding Assistance Program: Funding coverage

- 100% for verified exhaust controls
- 100% for certified engine upgrades
- 100% for incremental cost of cleaner fuels
- 75% for certified engine repowers
- 25% for all certified replacements
- 100% for verified idle reduction technologies
- 100% for verified aerodynamic technologies and low rolling resistance tires
National Clean Diesel Funding Assistance Program: Priority Projects

- Maximize public health benefits
- Most cost-effective
- In areas with high population and air quality issues
- Areas that receive a disproportionate quantity of air pollution
- Maximize the useful life of the engine
- Conserve diesel fuel and utilize ULSD (early introduction for nonroad projects)
Budget amounts for FY 2011 are estimated
State Clean Diesel Grant Program: Overview

- “States shall use funds to develop and implement grant and low-cost revolving loan programs as appropriate to meet state needs and goals relating to the reduction of diesel emissions”
- If state matches base allocation dollar for dollar, state receives additional 50% of base amount
- All 50 states and District of Columbia are eligible
- Matching funds not required
- Verified technologies not required
- Funding not utilized reverts to national program
DERA Reauthorization (FY2012-2016)

- Effort led by Senators Voinovich & Carper to reauthorize DERA for another 5 years (FY2012-2016)
- Program changes in reauthorization proposal
  - Expands eligible entities to include private fleets who contract to government agencies
  - Eliminates required 50% funding for public fleets
  - Calls for simplified application process
  - Reemphasizes priority for projects which demonstrate cost-effectiveness and health benefits
  - Removes restriction on using funds for programs mandated by state or local law
  - Allows EPA to implement rebate as well as grant or loan programs
Retrofitting Agricultural Equipment

- Very little done under DERA
  - CA, UT, FL, ID, WI
- Most common are irrigation pumps
- Greatest number in CA
- Less retrofit pressure than on-road diesel vehicles and construction industry
- Tremendous emissions reduction and efficiency gains are possible
# EPA Nonroad Emissions Regulations

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</table>

*In the 50 to 74 horsepower category there are two options. Option 1 requires a reduced PM limit (10 vs. 14) but allows Tier 4 to be delayed one year (2012). Option 2 requires the same PM limit as Tier 4 (14) but allows Tier 4 to be delayed one year (2012).*

**NOTE:** The vertical dashed lines separating the years show the seven-year life of the Tier 4D equipment flexibility provision ends and engines can no longer be placed in vehicle production.

## Fuel Sulfur Regulations

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<tr>
<td>On-road</td>
<td>500 ppm</td>
<td>15 ppm</td>
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</tbody>
</table>

**Legend:**

- **EPA Tier 1**
- **Tier 2**
- **Tier 3**
- **Interim Tier 4**
- **Final Tier 4**

*New emissions regulations take effect January 1 of the year indicated by color change unless otherwise noted.*

**Examples:**

- **NOx**
  - Tier 1: 0.05
  - Tier 2: 0.01
  - Tier 3: 0.002
  - Tier 4: 0.005
  - Final Tier 4: 0.0003

- **NMHC + NOx**
  - PM: Tier 1: 2.5
  - Tier 2: 0.19
  - Tier 3: 0.023
  - Tier 4: 0.075
  - Final Tier 4: 0.001

- **PM**
  - Tier 1: 2.5
  - Tier 2: 0.19
  - Tier 3: 0.023
  - Tier 4: 0.075
  - Final Tier 4: 0.001

- **NMHC**
  - Tier 1: 2.5
  - Tier 2: 0.19
  - Tier 3: 0.023
  - Tier 4: 0.075
  - Final Tier 4: 0.001
EPA Off-Road Emissions Regulations 174 to 750 Engine HP

Ultra-low sulfur diesel (15ppm) required since Jan 2007
### Sales by Size Class of Tractors in California

90% of tractors in CA Are less than 100hp

Source: Agriculture Equipment Manufacturers

<table>
<thead>
<tr>
<th>State</th>
<th>Product</th>
<th>Model Class</th>
<th>Size Class</th>
<th>1978-2010 Industry</th>
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<td>2-Wheel Drive Tractors</td>
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<td>&lt; 20</td>
<td>11%</td>
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<td></td>
<td>20 &lt; 30</td>
<td>26%</td>
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<td></td>
<td>30 &lt; 40</td>
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<td></td>
<td>40 &lt; 50</td>
<td>6%</td>
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<td></td>
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<td>50 &lt; 60</td>
<td>3%</td>
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<tr>
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<td></td>
<td></td>
<td>60 &lt; 70</td>
<td>4%</td>
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<td></td>
<td>70 &lt; 80</td>
<td>9%</td>
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<td>80 &lt; 90</td>
<td>12%</td>
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<td>180 &amp; Ove</td>
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<td>180 &lt; 200</td>
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<td>220 &amp; Ove</td>
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<td>220 &lt; 240</td>
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<td>240 &amp; Ove</td>
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USA Tractor Sales History

Source: Agriculture Equipment Manufacturers
2007 USDA Census

Tractors on Operations: 2007

United States Total
4,389,812
# Analysis of Ag Repower/Retrofit to Upgrade Emissions Compliance 1 Tier Level

<table>
<thead>
<tr>
<th>Year</th>
<th>Product</th>
<th>EST Tier Level</th>
<th>Model</th>
<th>Avg. 2010 Eng Hours</th>
<th>Per Hour Adjustment</th>
<th>2010 Adjusted Retail Cash Value</th>
<th>HP - Engine</th>
<th>Est Repower at Retail</th>
<th>Repower vs. Residual</th>
<th>Est. Retrofit to Tier 2/3</th>
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<td>4870</td>
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<td>$17,419</td>
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<td>$9,965</td>
<td>57%</td>
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<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2WD</td>
<td>3</td>
<td>6420</td>
<td>1620</td>
<td>1.90</td>
<td>$29,946</td>
<td>90</td>
<td>$14,970</td>
<td>50%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2WD</td>
<td>3</td>
<td>8230</td>
<td>1620</td>
<td>3.50</td>
<td>$112,840</td>
<td>200</td>
<td>$50,700</td>
<td>27%</td>
<td>N/A</td>
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</tr>
<tr>
<td></td>
<td>4WD</td>
<td>3</td>
<td>9320</td>
<td>1620</td>
<td>5.20</td>
<td>$141,385</td>
<td>375</td>
<td>$55,725</td>
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<tr>
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<td>Combine</td>
<td>3</td>
<td>9560</td>
<td>890</td>
<td>32.70</td>
<td>$134,790</td>
<td>275</td>
<td>$41,425</td>
<td>31%</td>
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</tbody>
</table>

Repower Cost - est $143/HP plus Labor at $75/Hour to R&R (25-35 Hours per machine)

Note: pre 1991 Vehicles have structural engines thus not viable for a repower.

Official Guide Values as of Fall 2010

Hours above Avg is Discounted per hour by Adjustment Factor (In $)
Exhaust Retrofit Concerns

- ARB and Cal/OSHA developed an interim policy to address off-road retrofit visibility concerns.
  - Specific criteria for impact on field of vision
  - Defined by interruption of sight of operator
  - Particularly problematic on smaller equipment
- Beyond visibility – additional concerns RE: exhaust heat temperatures
- Interim policy available at: www.arb.ca.gov/msprog/ordiesel/documents/retrofitvisguide.pdf
Examples of Small Tractors and Use
Agriculture Retrofit Considerations

- **Exhaust control devices**
  - Not available/suitable for all equipment (age, size)
  - Visibility/safety issues can be a factor
  - Warranty issues
  - No efficiency gains

- **Repowers**
  - Not available for pre-1991 structural engines
  - Can provide efficiency as well as emissions reduction benefits
  - May not be cost effective considering residual value of equipment
Agriculture Retrofit Considerations

- **Replacements**
  - Most expensive option
  - Offers greatest efficiencies and emission reduction benefits (esp. retiring Tier 0 and Tier 1)
  - Additional benefits (ie. safety - ROPS, operator comfort)

- **Idle Reduction**
  - Available for wide range of equipment
  - Relatively low cost
  - Provides emissions & efficiency benefits