U.S. EPA

Locomotive and Marine Diesel Proposal

Presentation to NRMM Working Group

Geneva, June 2007
Overview

- Background
- What the rule covers
- What we have proposed
- Benefits and Costs
- The Process for Completion
Reconciling Diesels with the Environment: EPA’s National Clean Diesel Campaign

Tier 2 Light-Duty
final rule 1999
fully phased in 2009
Diesels held to same stringent standards as gasoline vehicles

Heavy-Duty Highway
sales 800,000 / yr
40B gallons / yr
final rule 2000
fully phased in 2010

Nonroad Diesel
sales over 650,000 / yr
12B gallons / yr
final rule 2004
fully phased in 2015

Locomotive/Marine
sales 40,000 (1,000 locomotives) / yr
6B gallons / yr
proposal 2007
fully phased in 2017
Current Locomotive/Marine Diesel Standards Are Comparable to Early 1990’s Diesel Truck Standards

Trucks 2010; nonroad machines 2014

New locomotives today

New marine diesels today
What the Rule Covers-- Locomotives

Line-Haul
Sales ~700-1200 / year
Typically rebuilt every 5-7 years

Switch

Passenger
What the Rule Covers--

Marine Diesels

**Category 1 Commercial** (<5 liter/cylinder)
- ~15,000/year (about half are aux engines)
- Workboats
- Police boats
- Fishing vessels

**Category 2 (5 to 30 liter/cyl)** <300/year
- Gen sets
- Sailboats
- Gen sets sailboats
- Gen sets cruisers
- Gen sets yachts
- Tugboats
- Ferries

**Recreational** ~15,000/year
- Workboats
- Police boats
- Fishing vessels

**Category 3** (>30 liter/cyl)
- Covered in separate initiative
- Ocean-going ships

<75 hp
- <10,000/year
- Gen sets
- Sailboats
- Cruisers
- Yachts
- Tugboats
- Ferries

Ocean-going ships
- Great Lakes freighters
- Police boats
- Fishing vessels
## Proposed Locomotive Standards

<table>
<thead>
<tr>
<th>locomotive groups</th>
<th>date</th>
<th>PM</th>
<th>NOx</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>standard</td>
<td>standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(g/hp-hr)</td>
<td>(g/hp-hr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>reduction</td>
<td>reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td><strong>Remanufactured Locomotive Standards</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Remanufactured Tier 0 &amp; 1</td>
<td>2008 as available</td>
<td>0.22</td>
<td>7.4 - 8.0</td>
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<tr>
<td></td>
<td>2010 required</td>
<td>~60%</td>
<td>~20%</td>
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<tr>
<td>Remanufactured Tier 2</td>
<td>2008 as available</td>
<td>0.10</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>2013 required</td>
<td>50%</td>
<td>--</td>
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<tr>
<td><strong>Newly-built Locomotive Standards</strong></td>
<td></td>
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<td></td>
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<tr>
<td>New Interim (Tier 3) Standards</td>
<td>2012</td>
<td>0.10</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td></td>
<td>--</td>
</tr>
<tr>
<td>New Long-Term (Tier 4) Standards</td>
<td>PM 2015 NOx 2017</td>
<td>0.03</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>~90%</td>
<td></td>
<td>80%</td>
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</tbody>
</table>
# Proposed Marine Diesel Standards

<table>
<thead>
<tr>
<th>Category</th>
<th>Date</th>
<th>PM standard (g/hp-hr)</th>
<th>PM reduction %</th>
<th>NOx standard (g/hp-hr)</th>
<th>NOx reduction %</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Interim (Tier 3)</td>
<td>2009-2014</td>
<td>varies by engine size</td>
<td>~50%</td>
<td>varies by engine size</td>
<td>~20%</td>
</tr>
<tr>
<td>New Long-Term (Tier 4) Commercial &gt;600kW</td>
<td>2014-2017</td>
<td>0.03</td>
<td>~90%</td>
<td>1.3</td>
<td>~80%</td>
</tr>
<tr>
<td>Existing Marine Engines (requiring comment on remanufacturing stds)</td>
<td>2008</td>
<td>20-60% reduction</td>
<td></td>
<td>0-20% reduction</td>
<td></td>
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Nationwide PM Reductions From the Proposal

Particulate Matter (annual tons)

Calendar Year

PM

with current standards

with proposed standards

Base 50-State
Control 50-State
Nationwide NOx Reductions From the Proposal

Calendar Year

NOx (annual tons)

with current standards

with proposed standards

Base 50-State

Control 50-State
## Proposal Annual Costs and Benefits in 2030

<table>
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<tr>
<th></th>
<th>PM</th>
<th>NO\textsubscript{x}</th>
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<tbody>
<tr>
<td>Cost</td>
<td>$159M</td>
<td>$446M</td>
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<tr>
<td>Inventory reduction, tons</td>
<td>28,000</td>
<td>765,000</td>
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<tr>
<td>Cost per ton</td>
<td>$5560</td>
<td>$580</td>
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<tr>
<td>Unit cost as % of typical new locomotive price (similar for marine; varies vessel to vessel)</td>
<td>3%</td>
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<tr>
<td>Monetized benefits</td>
<td>$12B</td>
<td></td>
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<tr>
<td>Benefit to cost ratio</td>
<td>20:1</td>
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</table>
The Process Toward Completion

- Proposal signed March 1

- Available at EPA’s website
  - [http://www.epa.gov/otaq/marine.htm](http://www.epa.gov/otaq/marine.htm)

- Public hearings were held:
  - Seattle, 8th of May
  - Chicago, 10th of May

- Comment period will close 2nd of July

- Targeting final rule by the end of the year