Clean Diesel Moves the National Capitol Region

Metropolitan Washington Council of Governments
October 2, 2014

Ezra Finkin
Director of Policy

DIESEL TECHNOLOGY FORUM

Our Members are the Leaders in Clean Diesel Technology

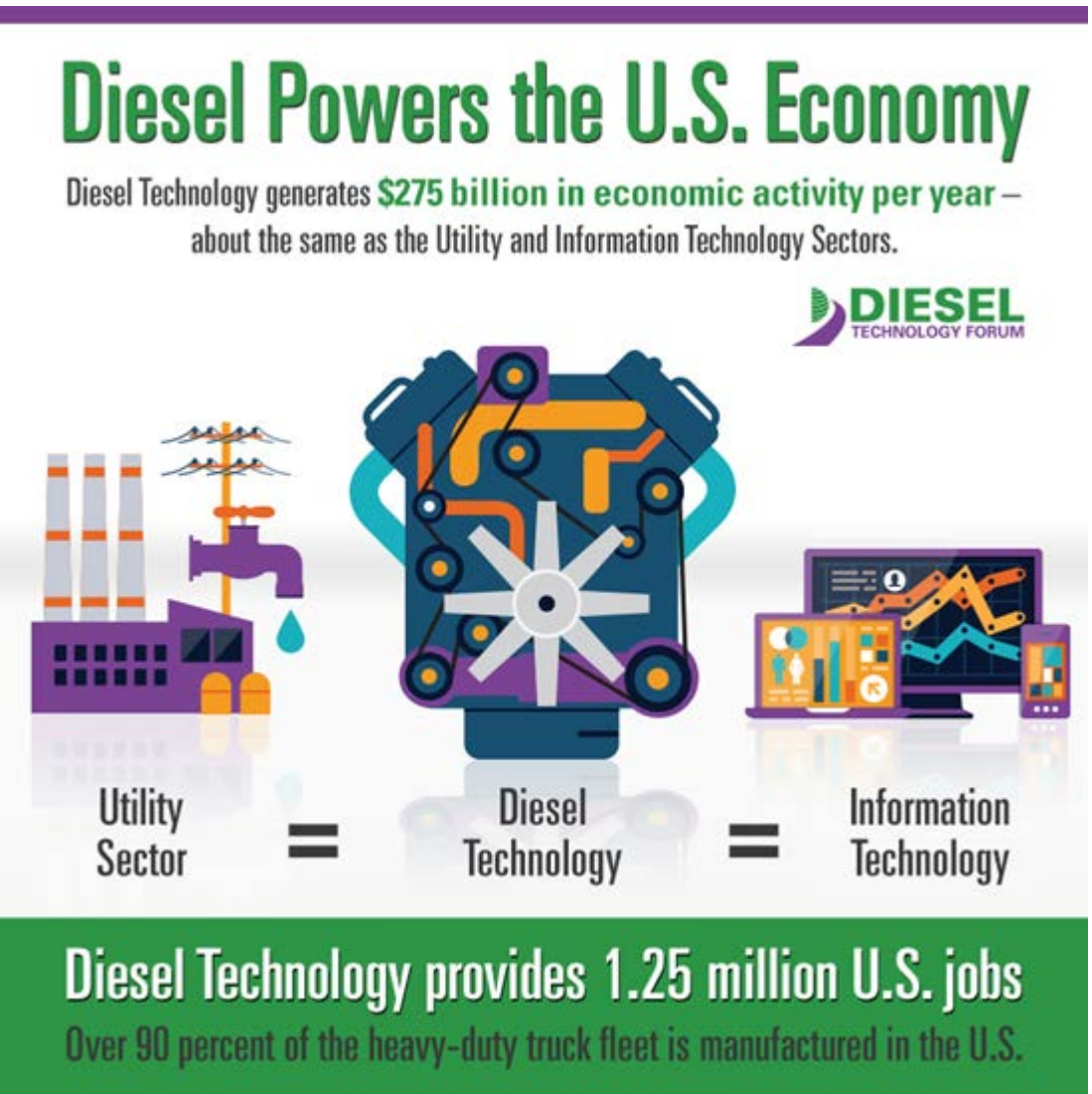
- AGCO
- BorgWarner
- Bosch
- Caterpillar Inc.
- Chrysler Group
- CNH Industrial
- Cummins Inc
- Daimler
- Deere & Company
- Delphi Automotive
- Ford Motor Company
- General Motors
- Honeywell
- Isuzu Manufacturing Services America
- Johnson Matthey
- Mazda North American Operations
- MTU America
- Umicore
- Volvo Group
- Volkswagen of America
- Yanmar America

Allied Members

- Association of Diesel Specialists
- National Biodiesel Board
- Western States Petroleum Association

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

WHY WE'RE TALKING ABOUT DIESEL



$46 billion in exports

1 in 4 engines destined for overseas markets

$24 billion in exports of trucks, equipment and engines

Net exporter of diesel fuel

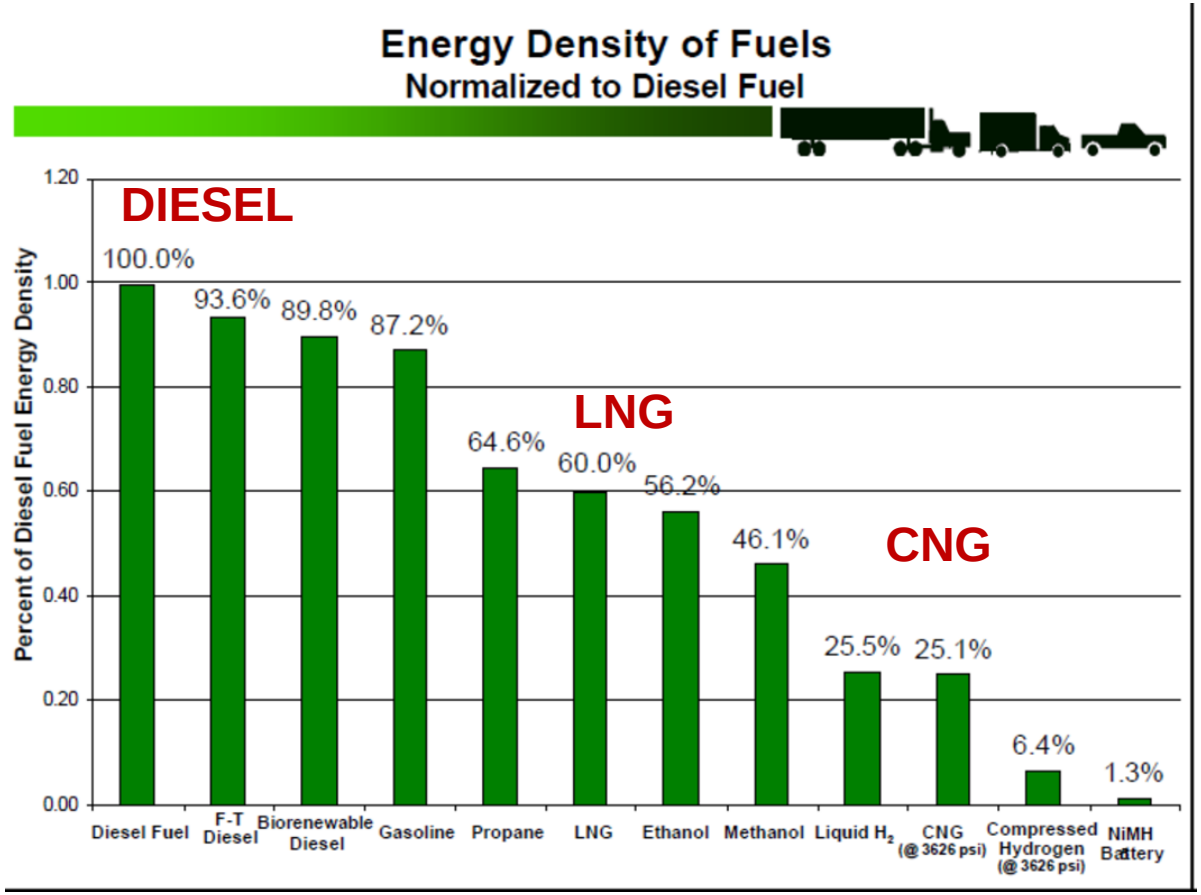
- **-262 million barrels (2012) generating roughly $10 billion in export revenue.**

#1 global transportation fuel

- **-National Petroleum Council**
- **-ExxonMobil**

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

NOTHING BEATS THE ENERGY CONTENT OF DIESEL



More freight and people can be moved on a gallon of diesel than any other transportation fuel.

Proven performance, reliability, durability, and fuel availability

Diesel plays predominant role in 16 key sectors of the economy

SOURCE: U.S. Department of Energy, EERA

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

DIESEL IS PART OF A SUSTAINABLE TRANSPORTATION FUTURE

6.7L POWER STROKE B20

POWERED BY BIODIESEL

Transformation to near-zero emissions
+
Renewable fuel and hybrid capabilities
=
Diesel technology as a sustainable energy strategy for the future

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

ADVANCE TECHNOLOGY DELIVERING EMISSIONS REDUCTION

Advanced Engine Technology

Advanced engine electronic combustion control , fuel injection systems, and turbochargers optimize performance and low-emissions

Clean Diesel System

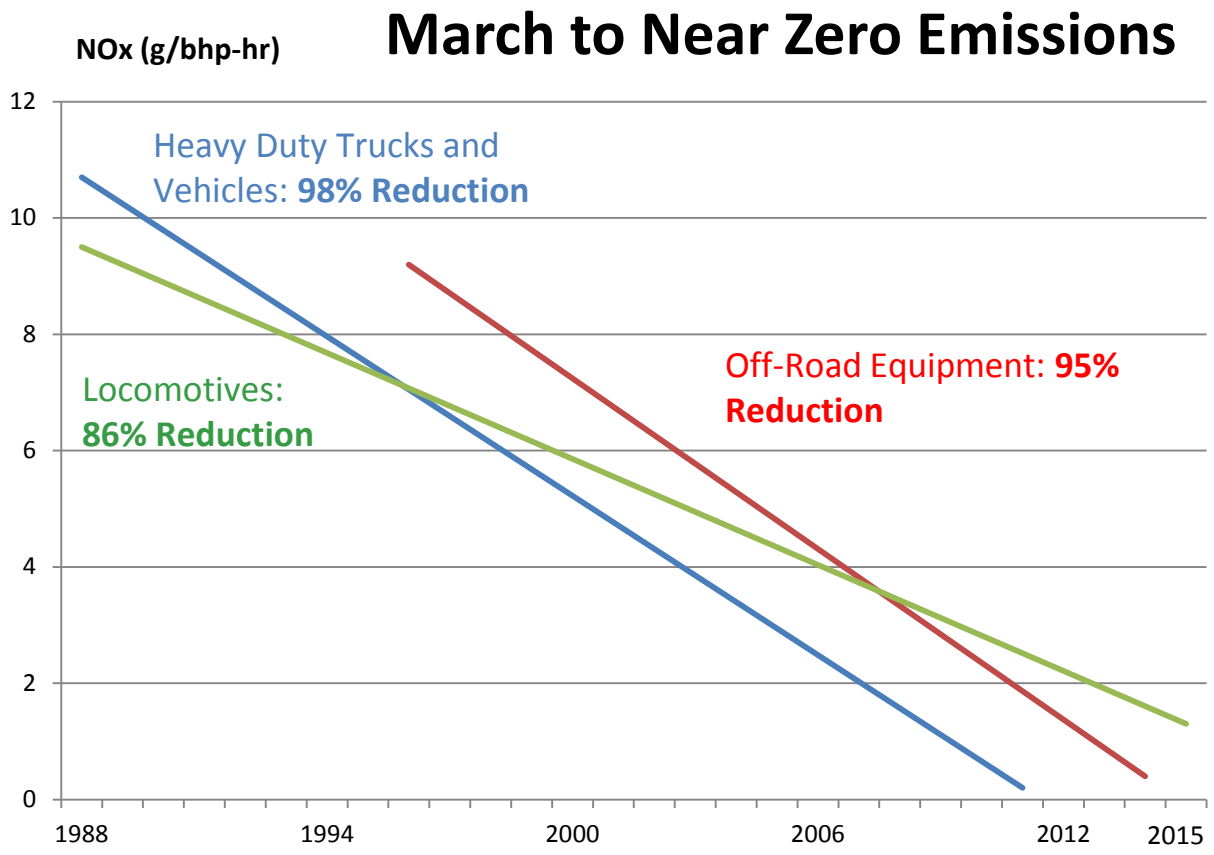
Cleaner Diesel Fuels

Ultra low Sulfur Diesel Fuel produces lower emissions and enable advanced emissions treatment systems (catalysts and filters)

Emissions Treatment

Particulate filters and catalysts reduce emissions of ozone-forming compounds (NOx and VOCs), trap and eliminate fine particles

Clean Diesel Delivers Real World Benefits



Regulatory Milestones

Fuel: ULSD 2006

Trucks: Clean Diesel Standards - 2007 & 2010

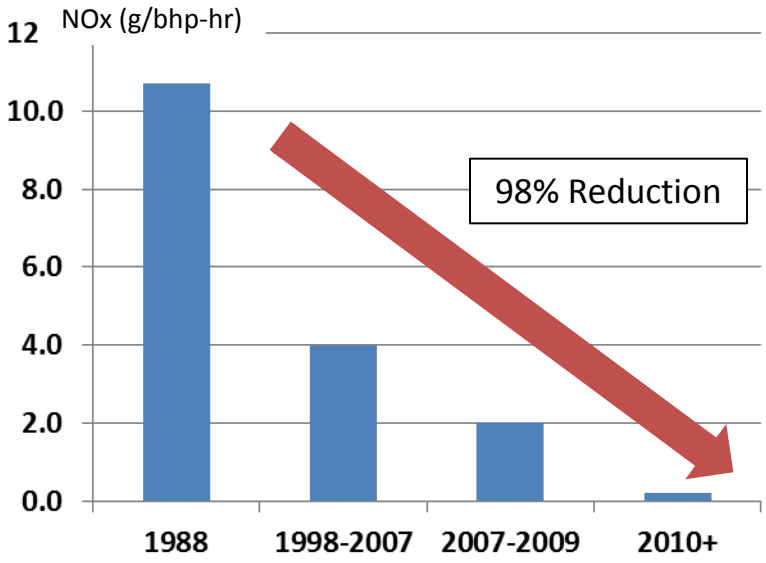
Off-road Equipment: Tier 4 Final – January 2014

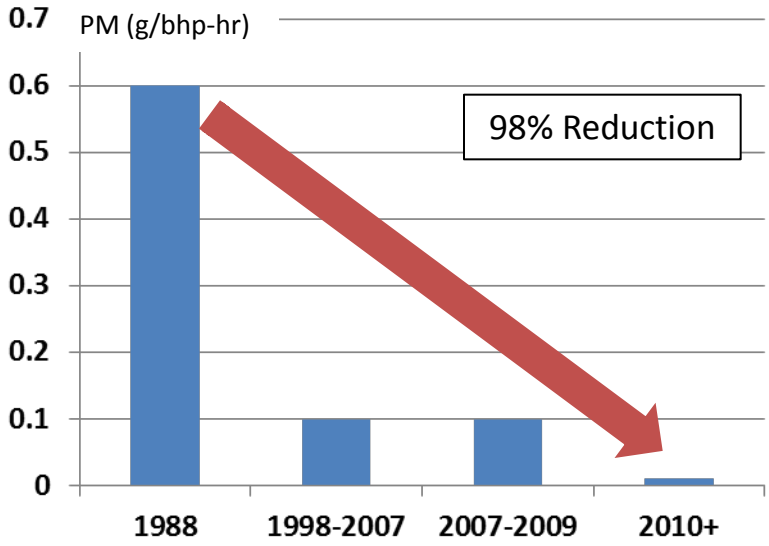
Locomotive & Marine: Tier 4 – January 2015

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

National Experience: Clean Diesel Trucks Support Emissions Reduction

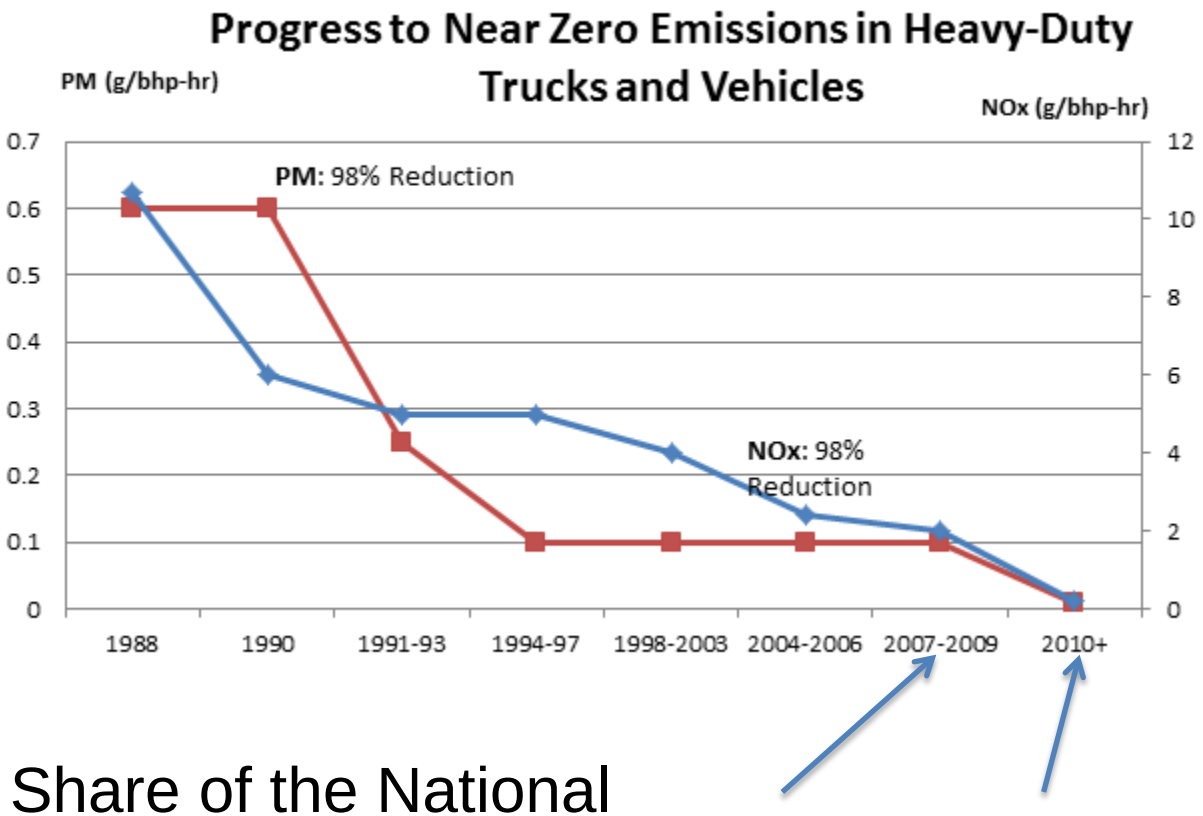
New clean diesel engines have reduced NOx and PM emissions by more than 95% over the last 25 years.





DIESEL TECHNOLOGY FORUM
www.dieselforum.org

One in Three Heavy Duty Vehicles Delivers Clean Air

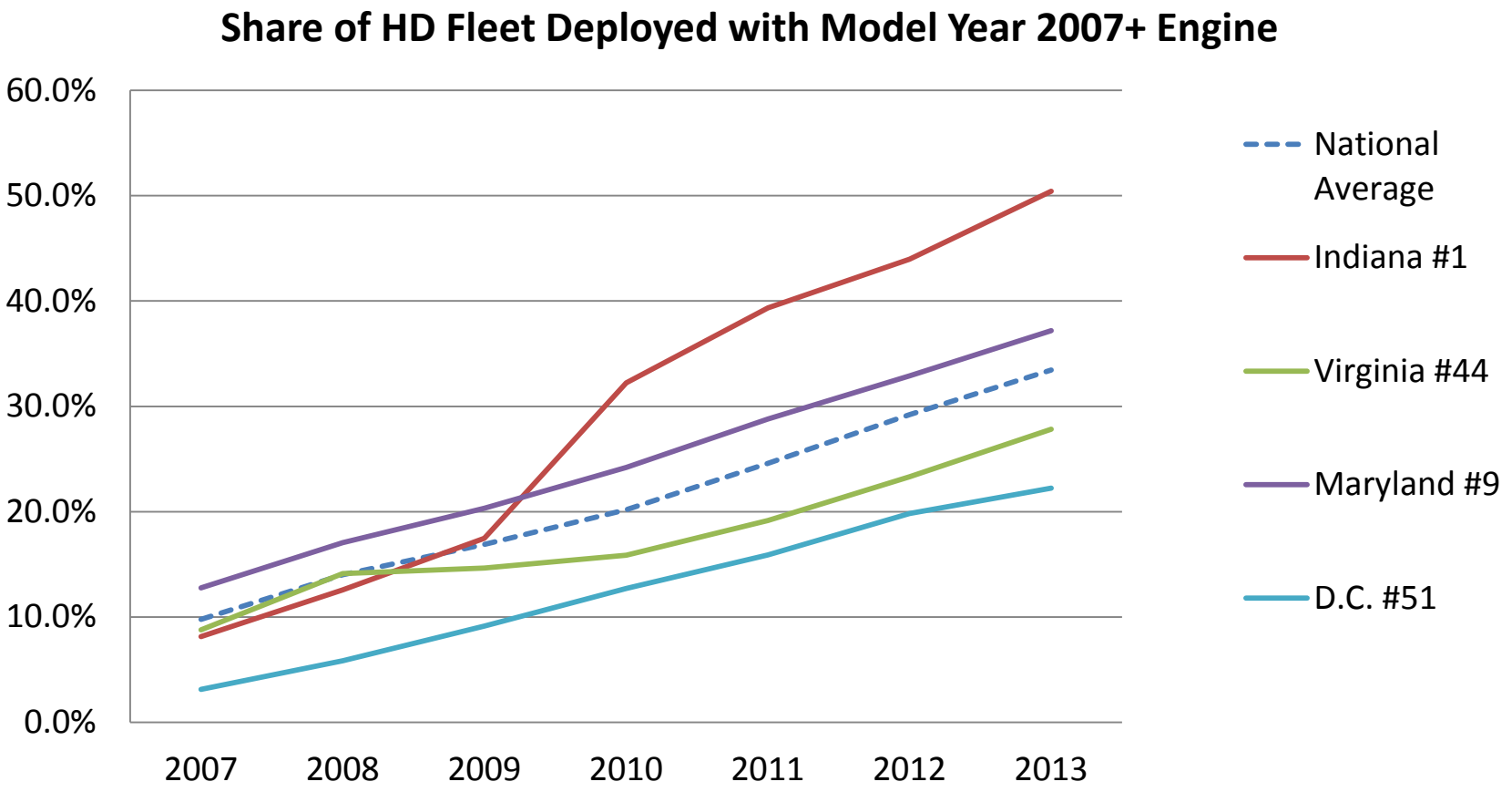


Share of the National Clean Diesel Fleet

33.5% **14.7%**

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

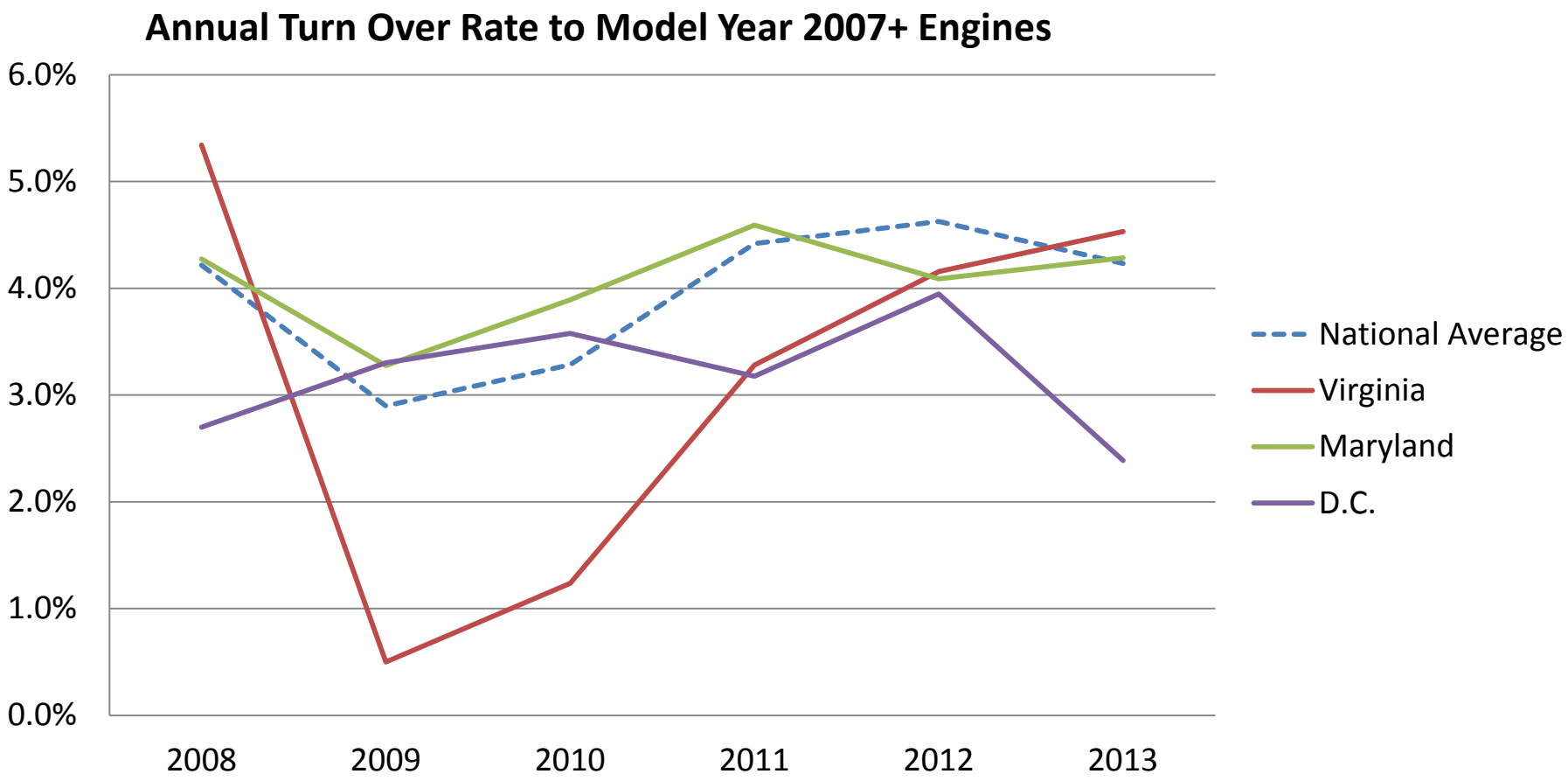
THE REGION IS A MIXED BAG FOR THE ADOPTION OF THE LATEST TECHNOLOGY



IHS Automotive
DRIVEN BY POLK

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

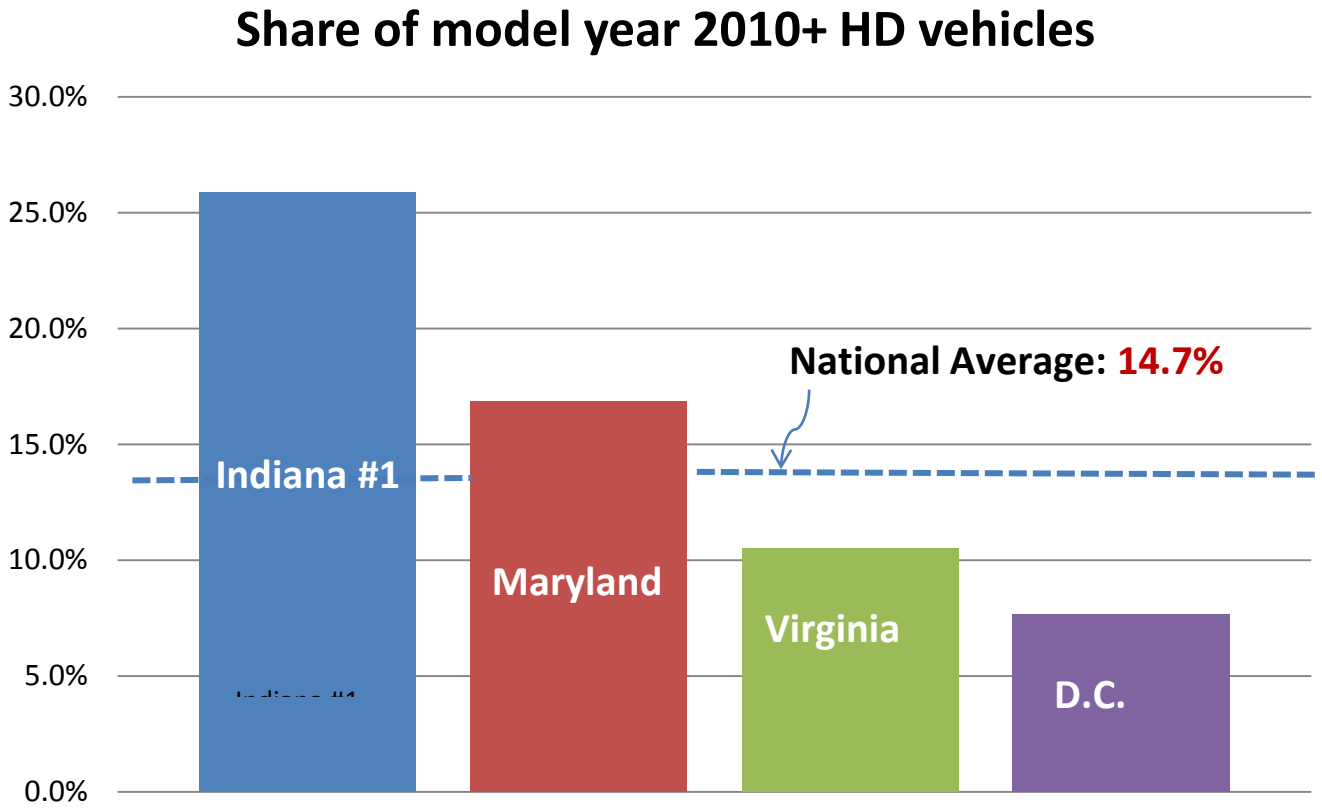
ROLL OUT OF NEW TECHNOLOGY VARIES GREATLY WITHIN THE REGION



IHS Automotive
DRIVEN BY POLK

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

DIFFERENCES STILL EXIST WITHIN THE REGION IN ADOPTION OF LATEST CLEAN TECHNOLOGY



IHS Automotive
DRIVEN BY POLK

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

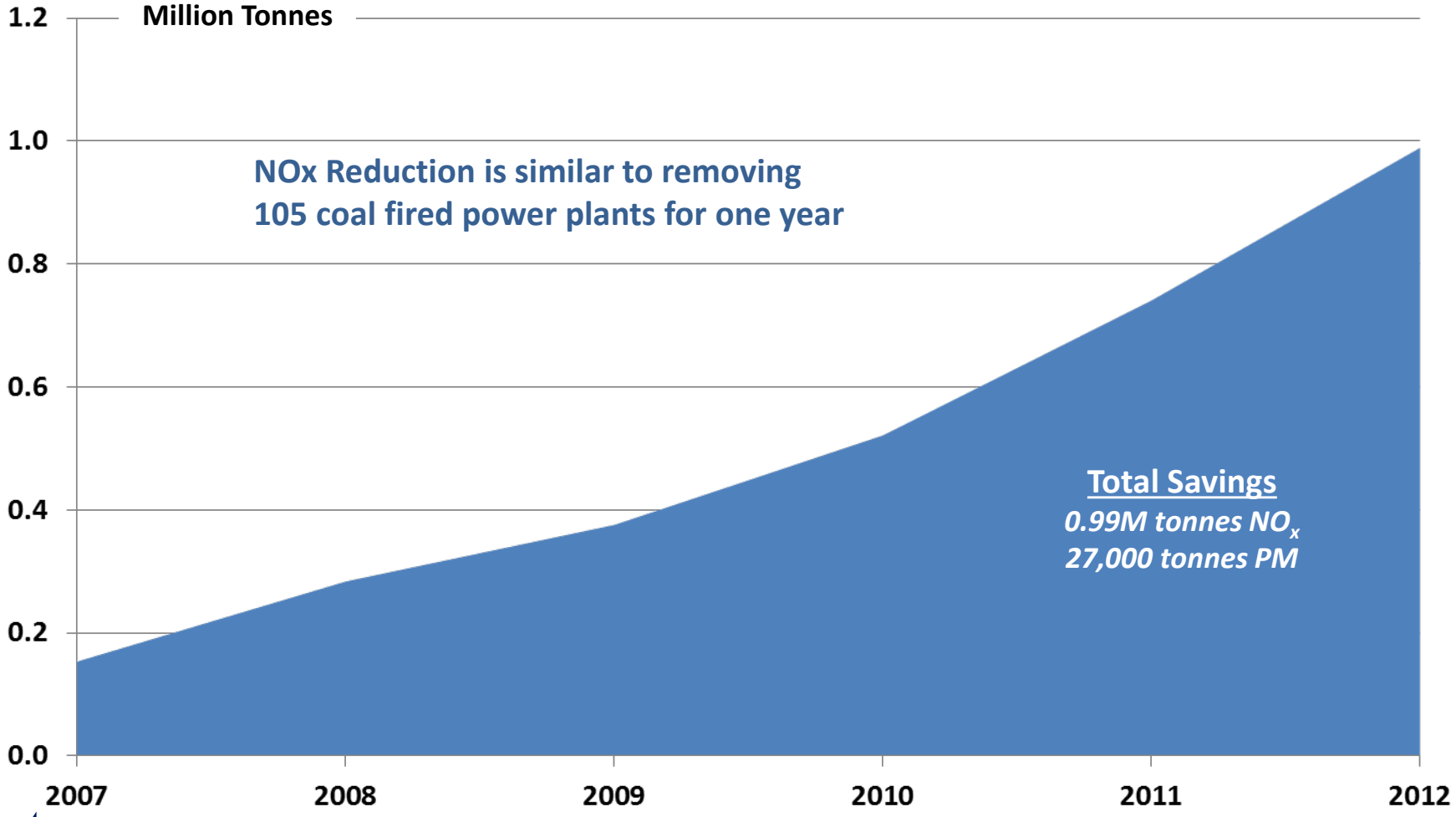
BENEFITS OF CLEAN DIESEL VEHICLES

- Criteria Pollutant Reduction: PM & NOx
- Fuel Economy Benefits & Greenhouse Gas Reduction
- Benefits to the Owner
- Clean Diesel vs Natural Gas
- Light Duty: DC Leads in Diesel Vans

2007-2012 new clean diesel engines have removed 1 million tonnes of NOx from the atmosphere.

U.S. Market

Cumulative Diesel Savings – Heavy Duty Trucks



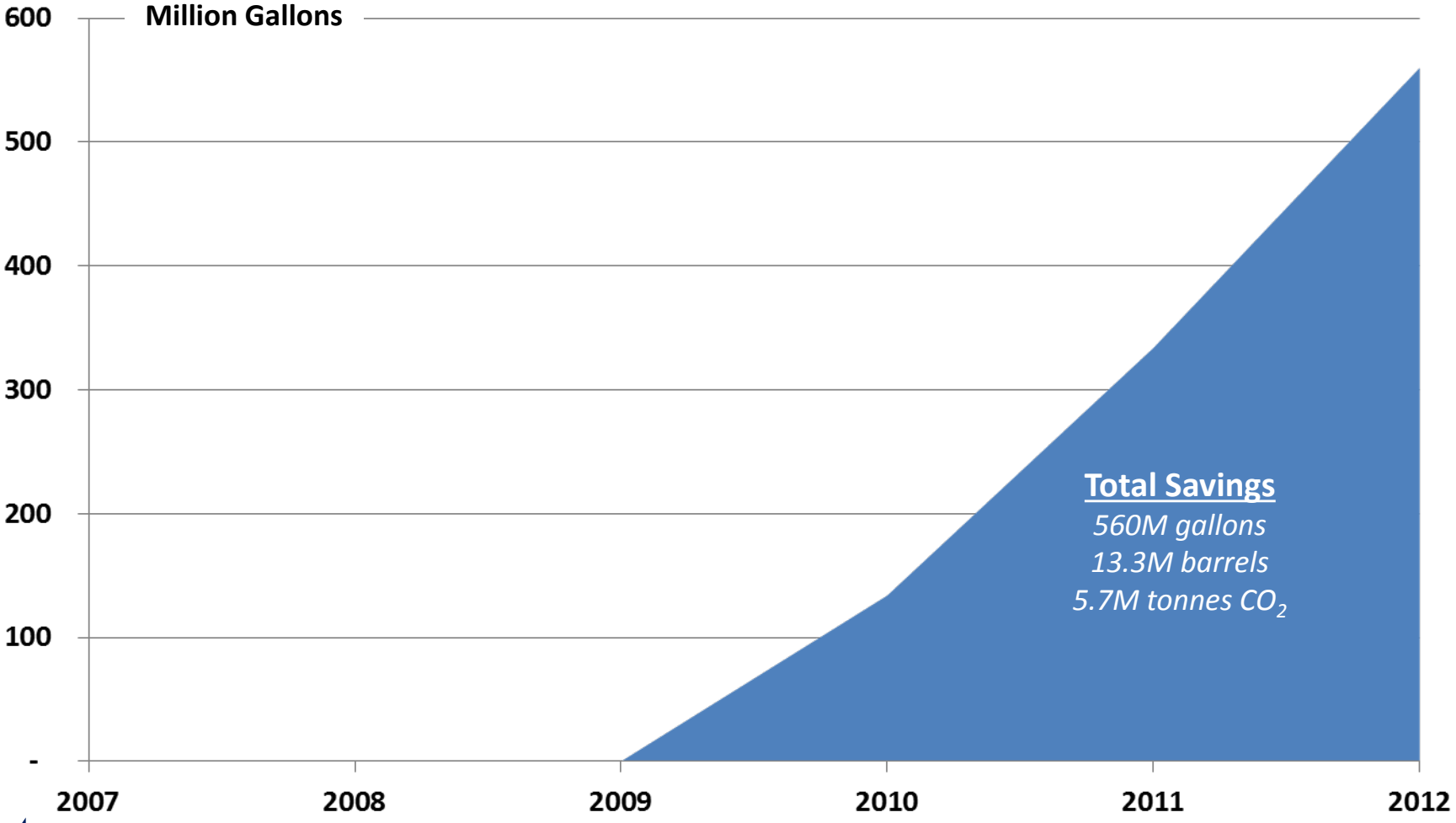
MARTEC

DIESEL TECHNOLOGY FORUM

2010-2012 new clean diesel engines in heavy duty trucks have saved 5 million tonnes of CO_2.

U.S. Market

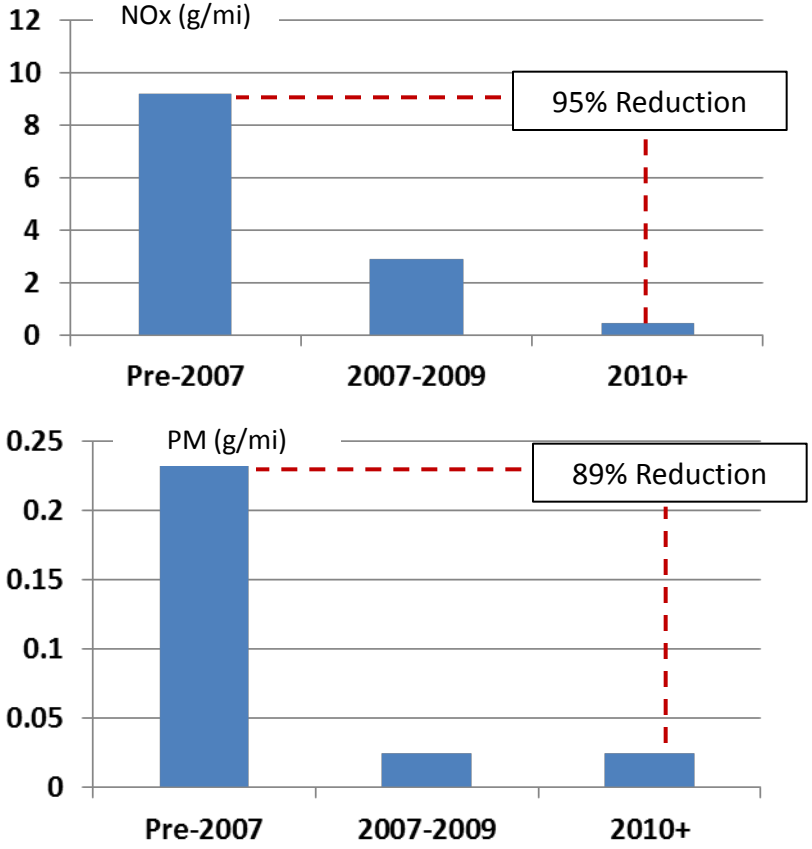
Cumulative Diesel Savings – Heavy Duty Trucks



New clean diesel engines in class 8 trucks save ~$3,500/year in fuel costs.

Class 8 Line Haul Savings from clean diesel

Savings to the new clean diesel buyer	Per Year
Average vehicle miles traveled	125,000
Fuel savings - gallons	875
Fuel savings - bbl	21
Fuel cost savings @ $4.00/gal	$3,500
CO_2 savings – metric tonnes	8.9
NO_x savings – metric tonnes	1.1
Particulate matter savings – kg	26



EPA estimates for in-use distance based output. Phase-in for 2004 and 2007 rulemaking is averaged across 2007-2009 and 2010 and beyond respectively. Pre-2007 estimates are based on an estimate of all vehicles in operation before 2007.

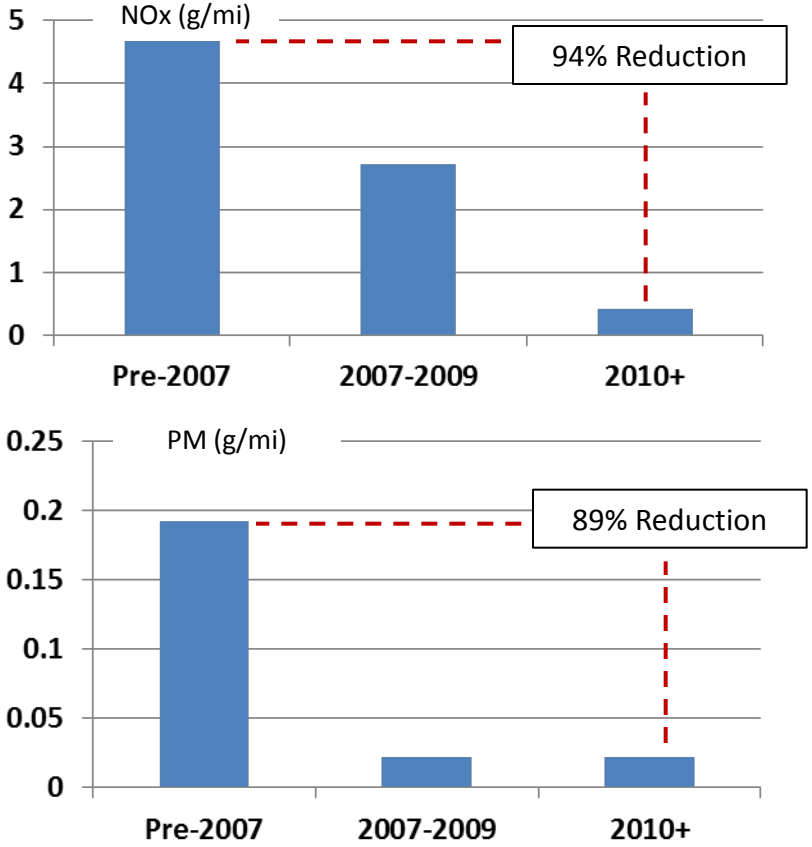
MARTEC®

DIESEL TECHNOLOGY FORUM

Class 7 vocational trucks with new clean diesel engines save 3.1 tonnes of CO2 per year.

Class 7 Vocational Savings from clean diesel

Savings to the new clean diesel buyer	Per Year
Average vehicle miles traveled	45,000
Fuel savings - gallons	310
Fuel savings - bbl	7
Fuel cost savings @ $4.00/gal	$1,240
CO_2 savings – metric tonnes	3.1
NO_x savings – metric tonnes	0.32
Particulate matter savings – kg	8



EPA estimates for in-use distance based output. Phase-in for 2004 and 2007 rulemaking is averaged across 2007-2009 and 2010 and beyond respectively. Pre-2007 estimates are based on an estimate of all vehicles in operation before 2007.

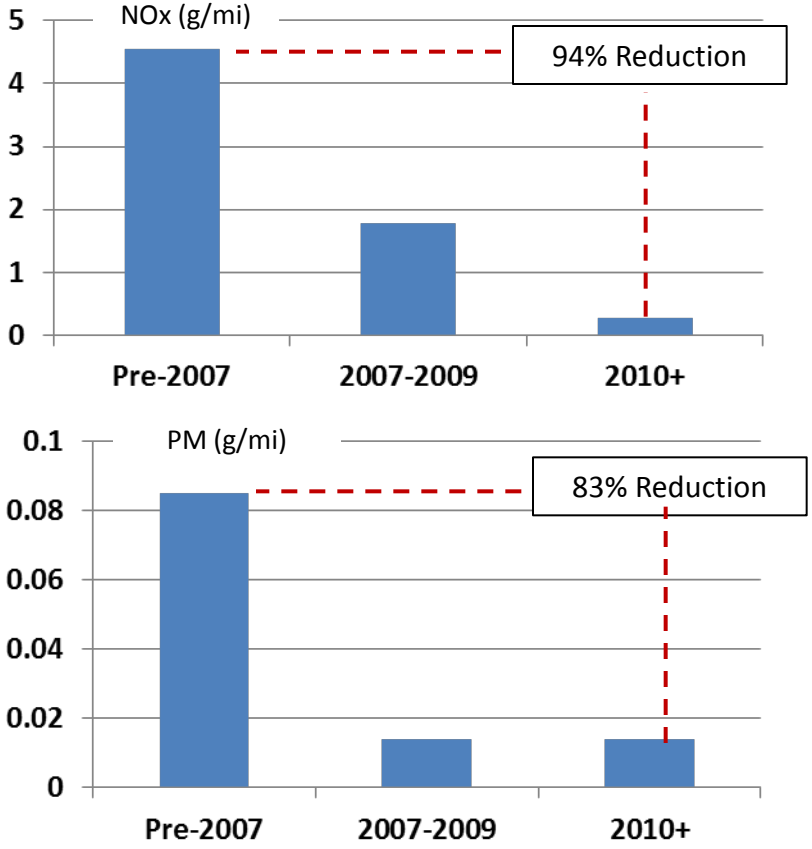
MARTEC®

DIESEL TECHNOLOGY FORUM

Pick up and delivery vehicles have achieved a 20X reduction in real world NOx emissions with new clean diesel engines.

Class 5 Pick Up & Delivery Savings from Clean Diesel

Savings to the new clean diesel buyer	Per Year
Average vehicle miles traveled	35,000
Fuel savings - gallons	160
Fuel savings - bbl	4
Fuel cost savings @ $4.00/gal	$640
CO_2 savings – metric tonnes	1.6
NO_x savings – metric tonnes	0.15
Particulate matter savings – kg	2



EPA estimates for in-use distance based output. Phase-in for 2004 and 2007 rulemaking is averaged across 2007-2009 and 2010 and beyond respectively. Pre-2007 estimates are based on an estimate of all vehicles in operation before 2007.

MARTEC

DIESEL TECHNOLOGY FORUM

ACTUAL EMISSIONS ARE CLEANER THAN WHAT IS REQUIRED

In Use Engine Emissions Relative to EPA Engine Standards
Source: Coordinating Research Council and Health Effects Institute

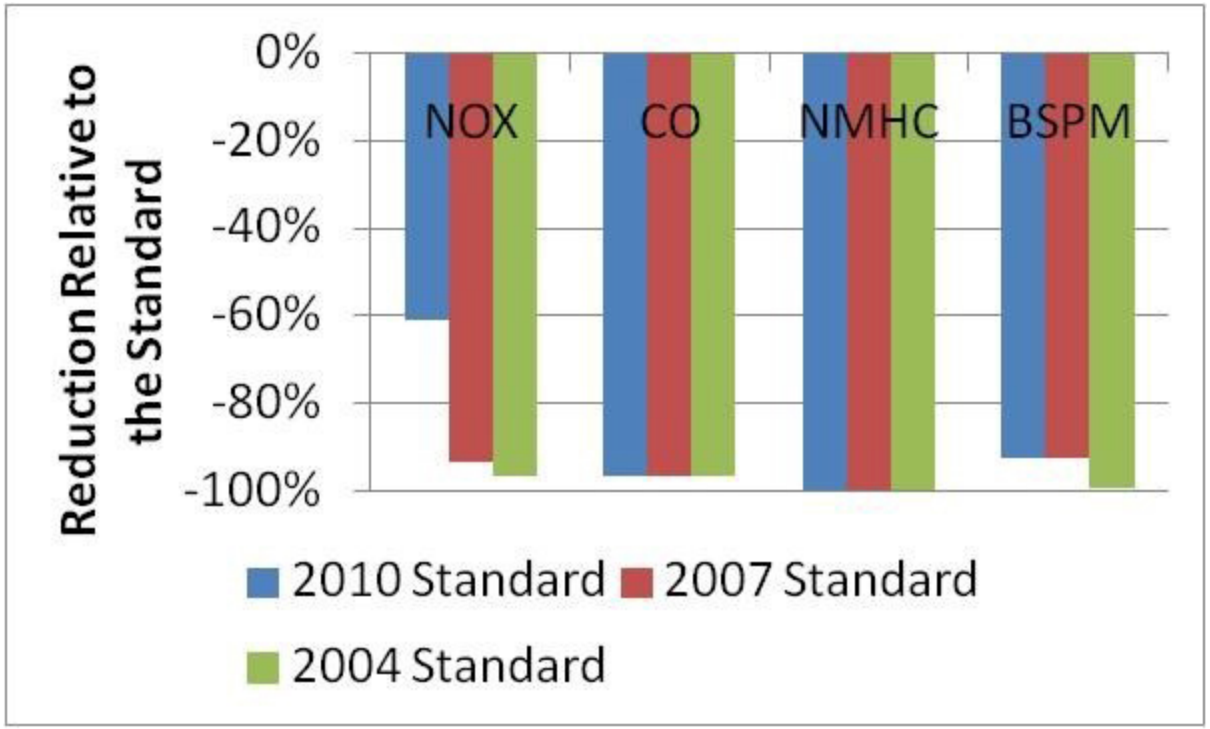


Figure 1. 2010 Engines Emissions Reduction Relative to 2010, 2007, and 2004 U.S. Emission Standards. Substantial reductions since 2004 were observed for Nitrogen Oxides (NOX: 97%), Carbon Monoxide (CO: 97%), Non-methane Hydrocarbons (NMHC >99.9%), and Brake-specific Particulate Matter (BSPM: 99%)

CLEAN DIESEL: JUST AS CLEAN AS NATURAL GAS

2012 Clean Diesel Bus & 2012 CNG Bus Emissions Comparison To 2000 Diesel Bus

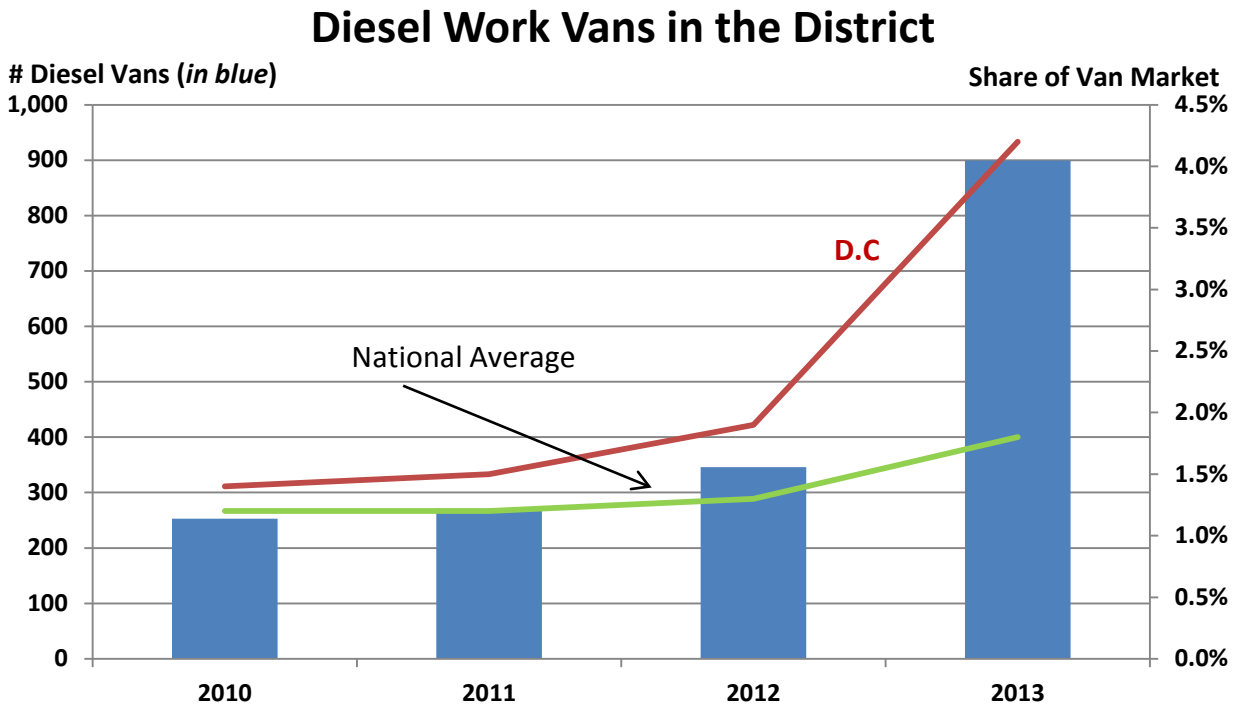
Vs. 2000 Diesel Bus	Nitrogen Oxide (NOx)	Particulate Matter (PM)	Hydrocarbon (HC)
2012 Diesel Bus	-94%	-98%	-89%
2012 CNG Bus	-80%	-99%	-100%

Emissions Reductions Per 10 Replacement Buses

Vs. 2000 Diesel Bus	Nitrogen Oxide (NOx)	Particulate Matter (PM)	Hydrocarbon (HC)
2012 Diesel	-4,953 kg	-275 kg	-429 kg
2012 CNG	-4,197 kg	-279 kg	-471 kg

SOURCE: Clean Air Task Force. "Clean Diesel versus CNG Buses: Cost, Air Quality, & Climate Impacts" (2012)

THE DISTRICT IS A LIGHT DUTY DIESEL SUCCESS STORY



More and More Diesel Offerings in the Work and Delivery Van Market

IHS Automotive
DRIVEN BY POLK

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

CASE STUDY: CLEAN DIESEL IN ACTION

What are the benefits to a region's air quality if all heavy duty vehicles are deployed with a clean diesel engine?

Ports of L.A. and Long Beach *Clean Air Action Plan:*

- *By 2010, **all** trucks calling the port complex must meet or exceed U.S. EPA 2007 model year emissions standards.*
- *16,000 trucks call the port complex every day*
- *90% of the fleet is deployed with a diesel engine (2012 emissions inventory)*

CLEAN PORT TRUCKS BENEFIT THE REGION

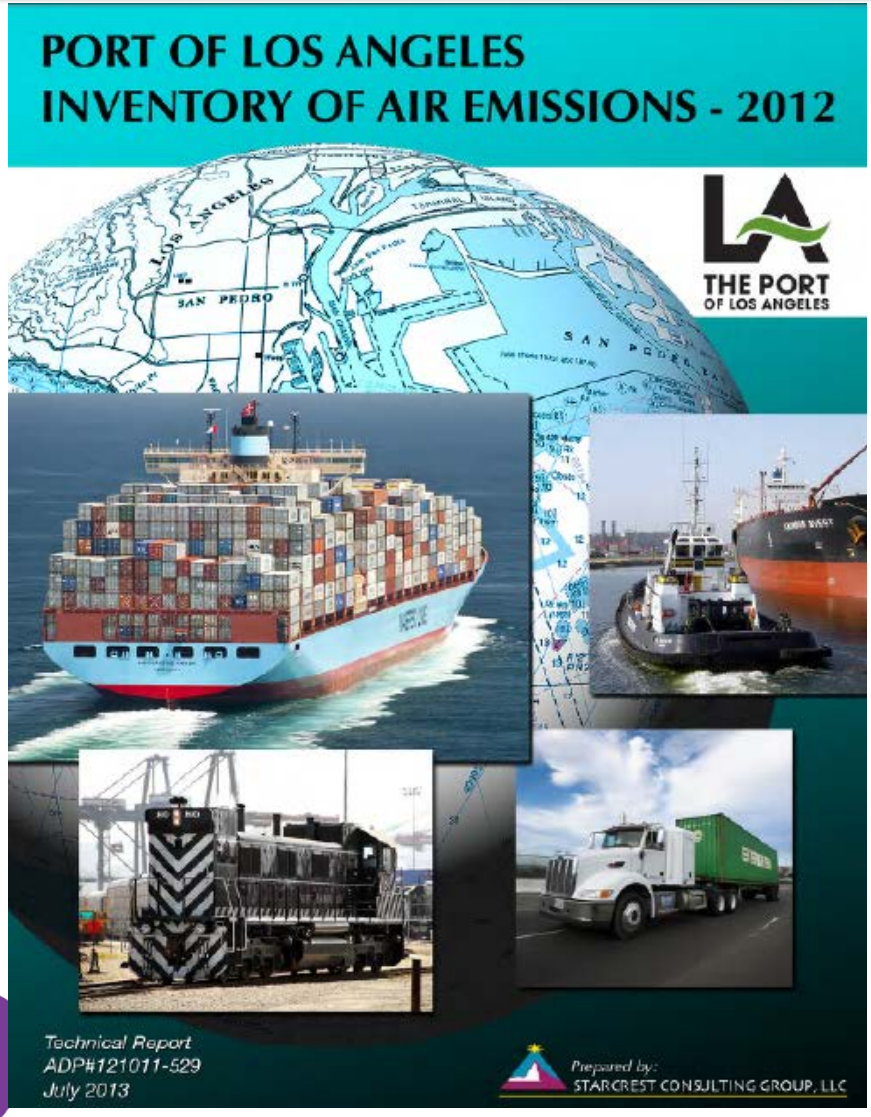
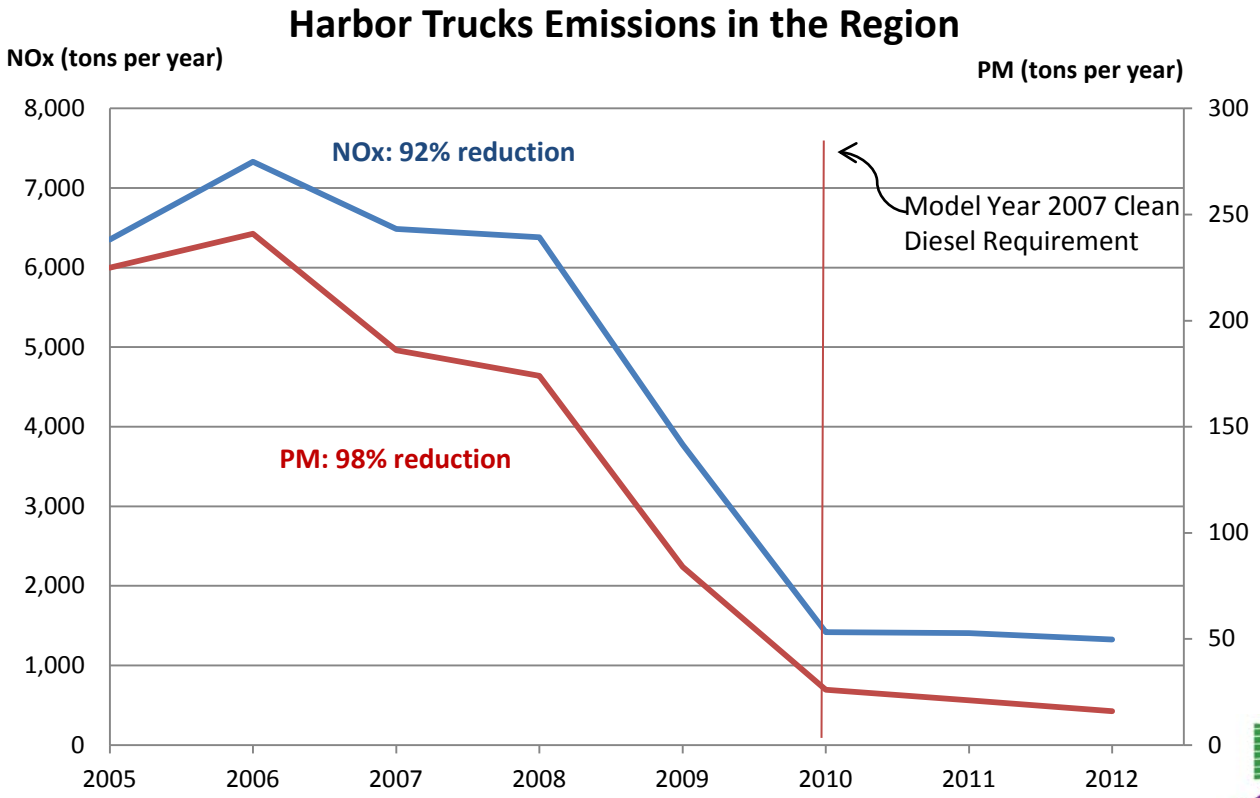


Figure ES.1: Emissions Inventory Geographical Extent

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

CLEAN TRUCKS IMPROVE AIR QUALITY IN L.A.

The Clean Air Action Plan requires clean equipment



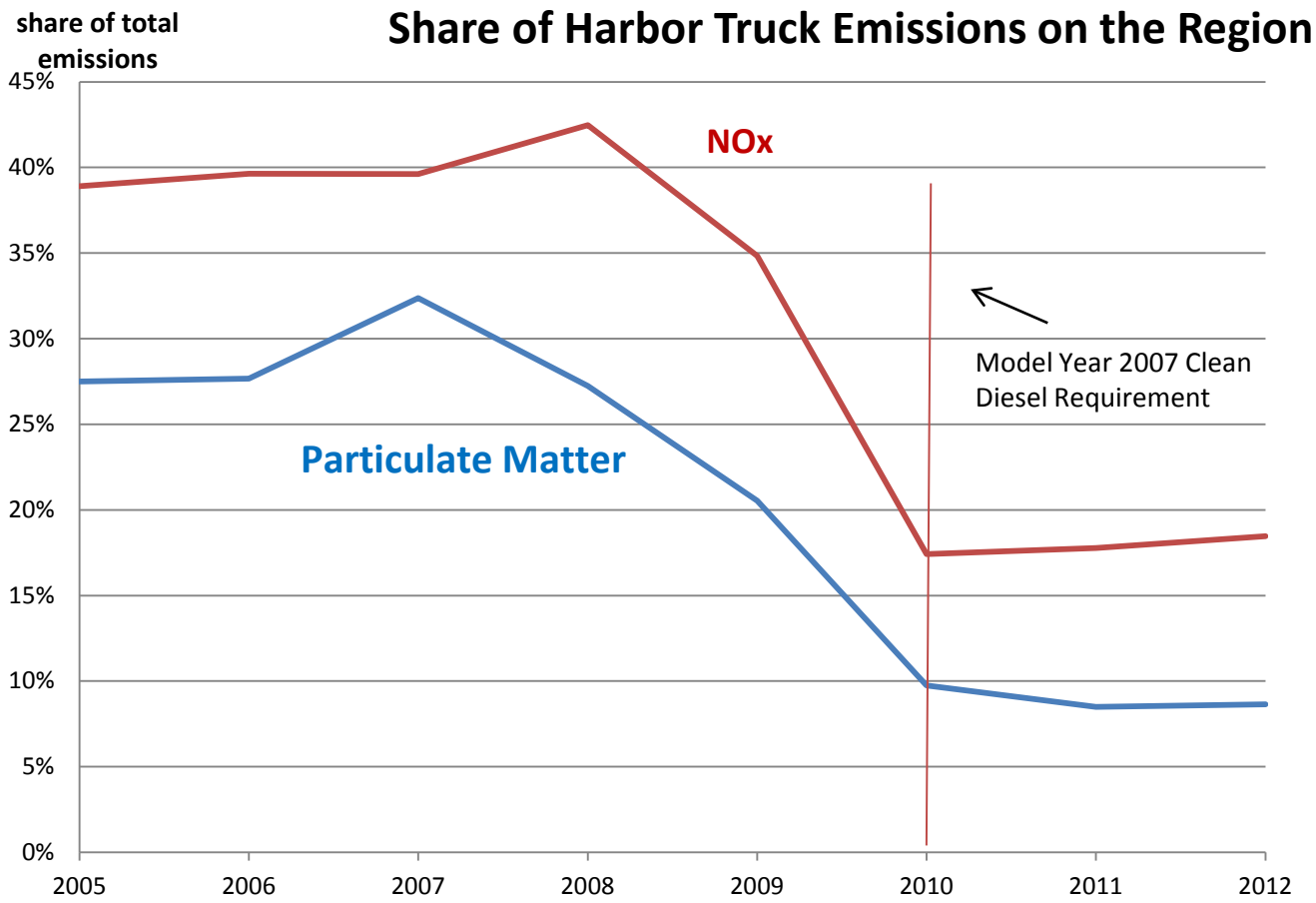
Over 90% of port trucks in service in So Cal are powered by diesel

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

CLEAN TRUCKS CONTRIBUTE TO CLEAN AIR

THE PORT OF LOS ANGELES

Port of LONG BEACH
The Green Port



DIESEL TECHNOLOGY FORUM
www.dieselforum.org

DIESEL'S FUTURE IS GREENER & CLEANER

Phase 1 Heavy Duty Fuel Economy & GHG Rules for Model Year 2014-2018 will Require Greater Fuel Savings

- EPA/NHTSA GHG rules require anywhere from **6 % to 23 % reductions in fuel consumption** by 2018 across 3 classes of vehicles:
  - pickup trucks and vans,
  - vocational vehicles
  - class 8 tractors.
- Requirements will save **530 million barrels of crude** and **$50 billion in fuel costs** for vehicle owner

Combinations of engine and vehicle technologies deployed during Phase 1

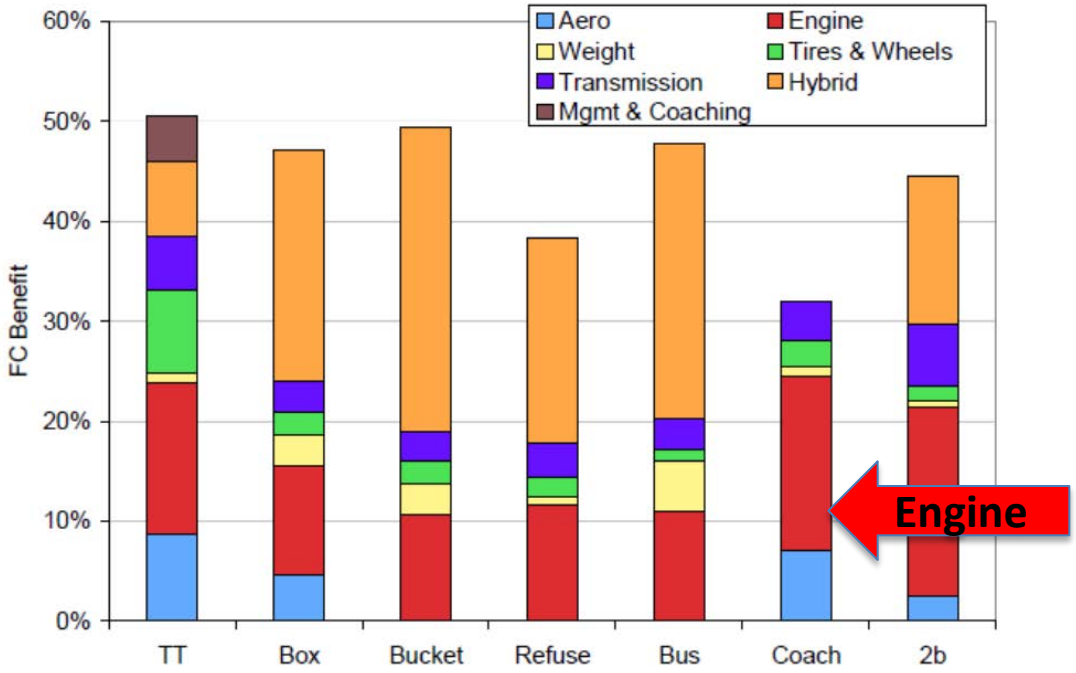


FIGURE S-1. Comparison of 2015-2020 new vehicle potential fuel-saving technologies for seven vehicle types: tractor trailer (TT), Class 3-6 box (box), Class 3-6 bucket (bucket), Class 8 refuse (refuse), transit bus (bus), motor coach (coach), and Class 2b pickups and vans (2b).

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

FUTURE CARBON EMISSION REDUCTION ADD UP!

Phase 1 Requirements:

270 million tons of carbon emissions reduced by 2018

<u>Putting this in perspective:</u>

20% of proposed carbon reduction from powerplants called for by 2030.

Phase 2 Rulemaking: Proposal by March 2015

- Further Reductions!

NHTSA
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

DIESEL TECHNOLOGY FORUM
www.dieselforum.org

SUMMING IT ALL UP

- Diesel's unmatched power and performance makes it the prime mover of freight and people.
- A quarter century of innovation results in near zero emissions for diesel vehicles today.
- Adoption of new technology illustrates that diesel is working for owners by saving fuel and cleaning the air for everyone.
- The region shows a varied rate of uptake in new technology.

The future is bright and green for diesel

- Advanced diesel engine technologies will be a vital pathway to meeting Phase 1 heavy duty fuel economy requirements
- Diesel engines alone can significantly contribute to carbon emission reduction while saving money for owners

Thank you

Contact information

www.dieselforum.org

www.facebook.com/dieseltechforum

Twitter: @DieselTechForum

#cleandiesel

Ezra Finkin

efinkin@dieselforum.org