

# EPA's Clean Diesel Efforts

Frank Acevedo  
Mobile Source Program Manager  
Air & Radiation Division  
U.S. EPA Region 5





## Why Clean Diesel?

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- ❑ **The Clean Air Act has been successful in dramatically reducing air pollution in the United States.**
- ❑ **As a result of EPA regulations, diesel engines manufactured today are cleaner than ever before.**
- ❑ **But because diesel engines can operate for 30 years or more, millions of older, dirtier engines are still in use.**
- ❑ **Reducing exposure to diesel exhaust from these engines is especially important for human health and the environment.**



# National Clean Diesel Campaign (NCDC)

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- ❑ Goal: *Reduce Emissions from the Legacy Fleet of over 11 Million Diesel Engines*
  
- ❑ Originally Focused on Five Sectors:
  - ❑ School Buses
  - ❑ Ports
  - ❑ Construction
  - ❑ Agriculture
  - ❑ Freight (SmartWay Transport Partnership)



National Clean Diesel Campaign

Working Together for Cleaner Air





# Diesel Emissions Reduction Act (DERA)

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- ❑ **DERA originally authorized under the Energy Policy Act of 2005**
- ❑ **Provide funding, on a competitive basis, to eligible entities, to achieve significant reductions in diesel emissions in terms of pollution produced and diesel emissions exposure, particularly from fleets operating in areas designated by the Administrator as poor air quality areas**
- ❑ **For projects using a certified engine configuration or a verified technology (aka retrofit)**



# Clean Diesel Efforts – Broad Range of Benefits

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- ❑ Improved air quality and public health
- ❑ Serves disproportionately impacted communities
- ❑ Reduces climate impacts and improved fuel savings
- ❑ Focuses on goods movement and the supply chain
- ❑ Generates economic and environmental activity
- ❑ Answers popular demand
- ❑ Meets local needs



# Investment of DERA Program Since 2009

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- ❑ Over \$728 million funds awarded by 2017 (\$75 million in 2018)
- ❑ 58,800 engines retrofitted or replaced
- ❑ Up to \$11 billion in monetized health benefits
- ❑ Up to 1,700 fewer premature deaths
- ❑ 81% of projects targeted to areas with air quality challenges
- ❑ 3:1 leveraging of funds from non-federal sources

Third Report to Congress: Highlights from the Diesel Emission Reduction Program, EPA, February 2016

( <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OHMK.pdf> )



## Emission and Fuel Reductions Since 2009

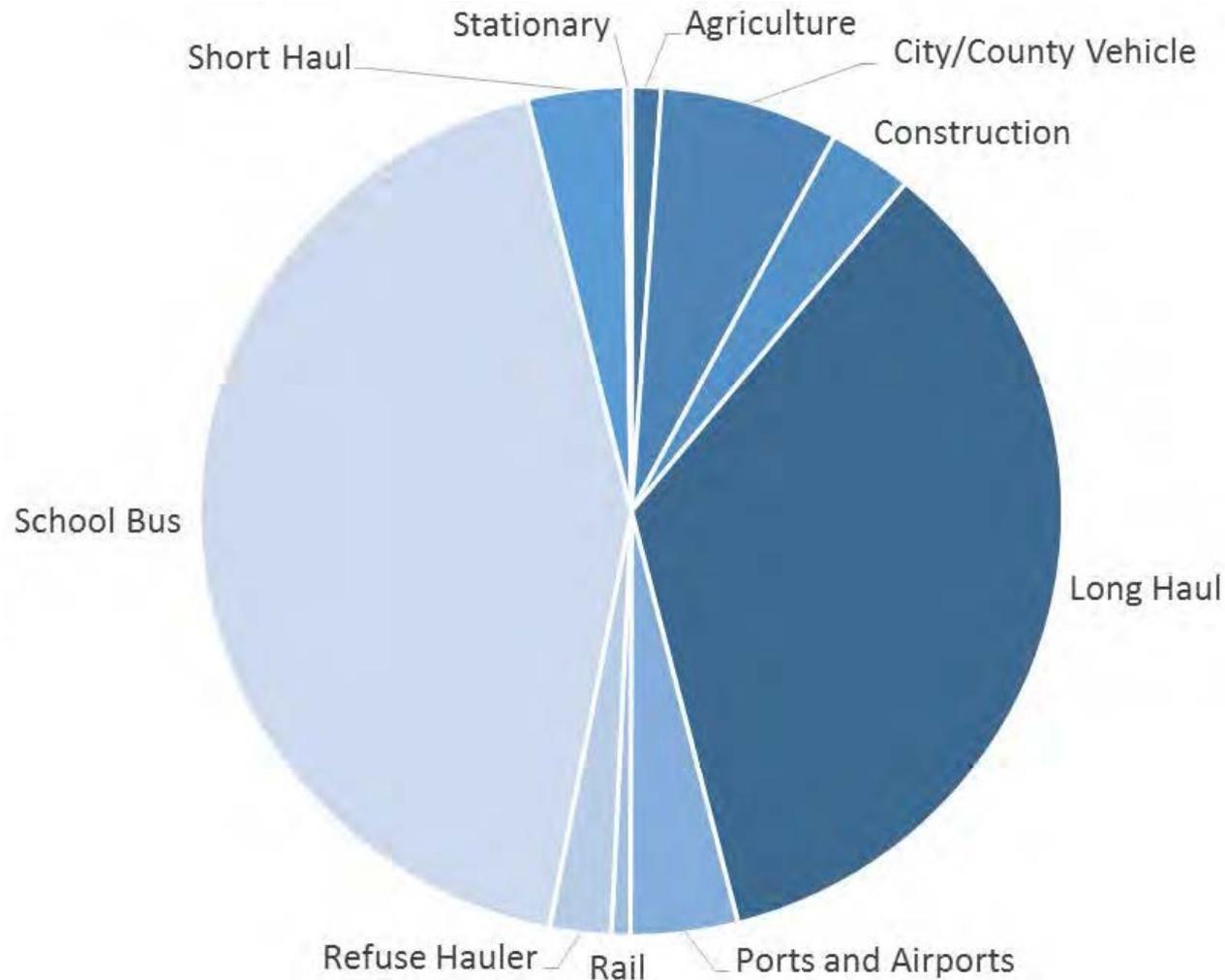
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- ❑ 312,500 tons of NOx
- ❑ 12,000 tons of PM2.5
- ❑ 18,900 tons of hydrocarbon
- ❑ 58,700 tons of carbon monoxide
- ❑ 4,836,100 tons of carbon dioxide
- ❑ 431 million gallons of fuel

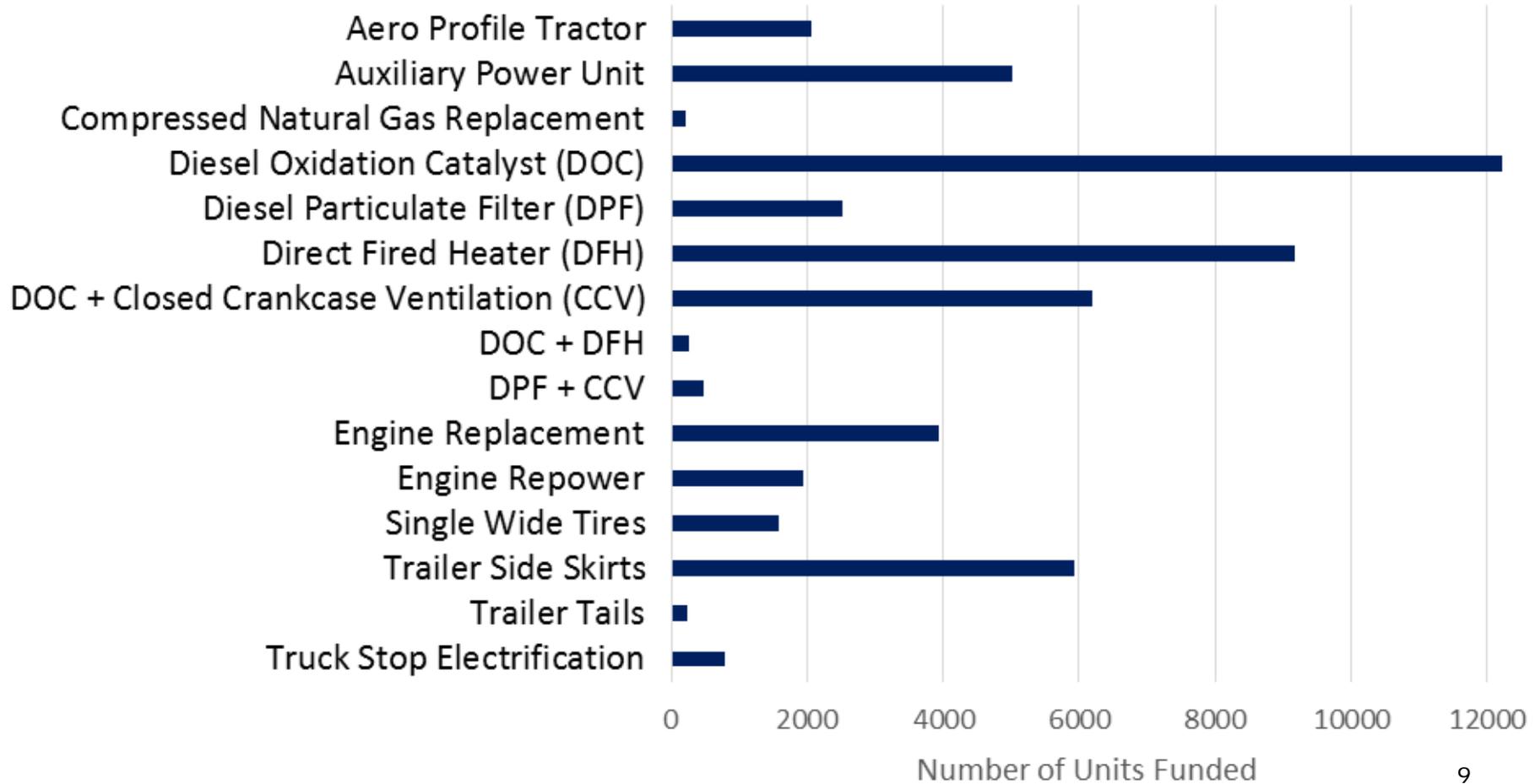
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# DERA Funded Sectors 2009-2013



# DERA Funding by Technology Type, 2009-2013



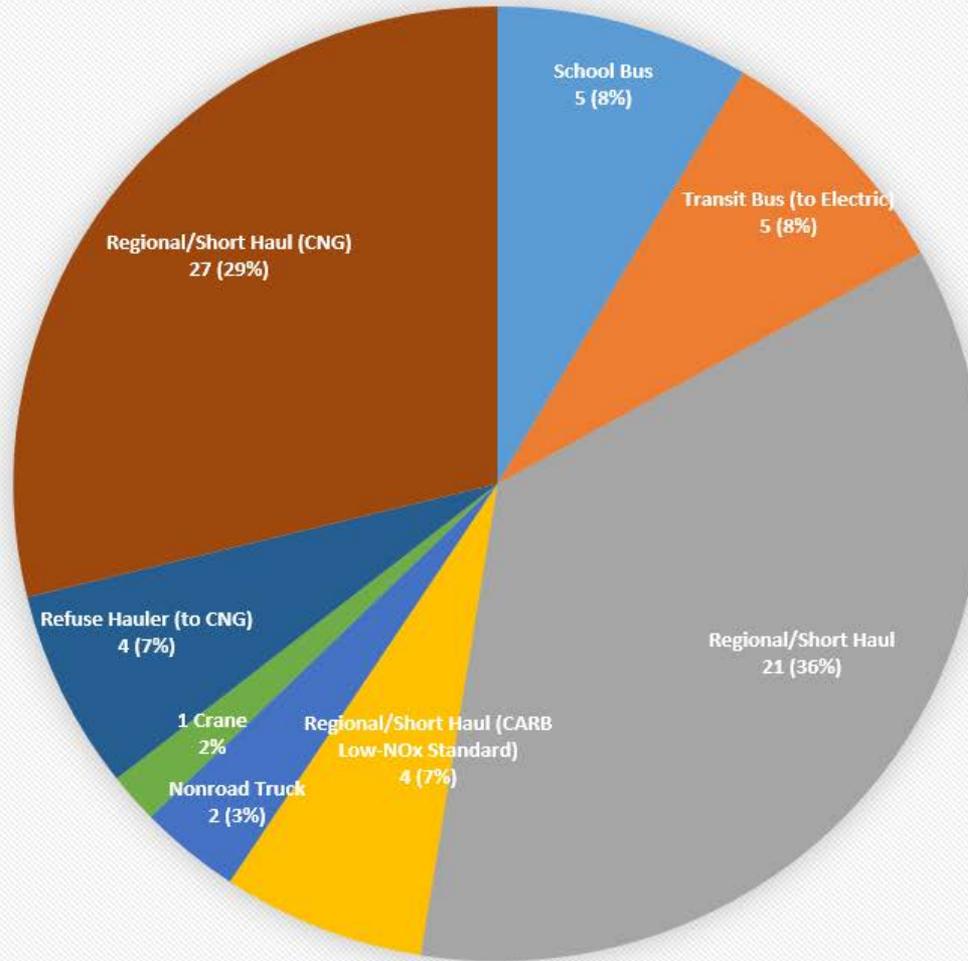
# DERA Funding since 2013



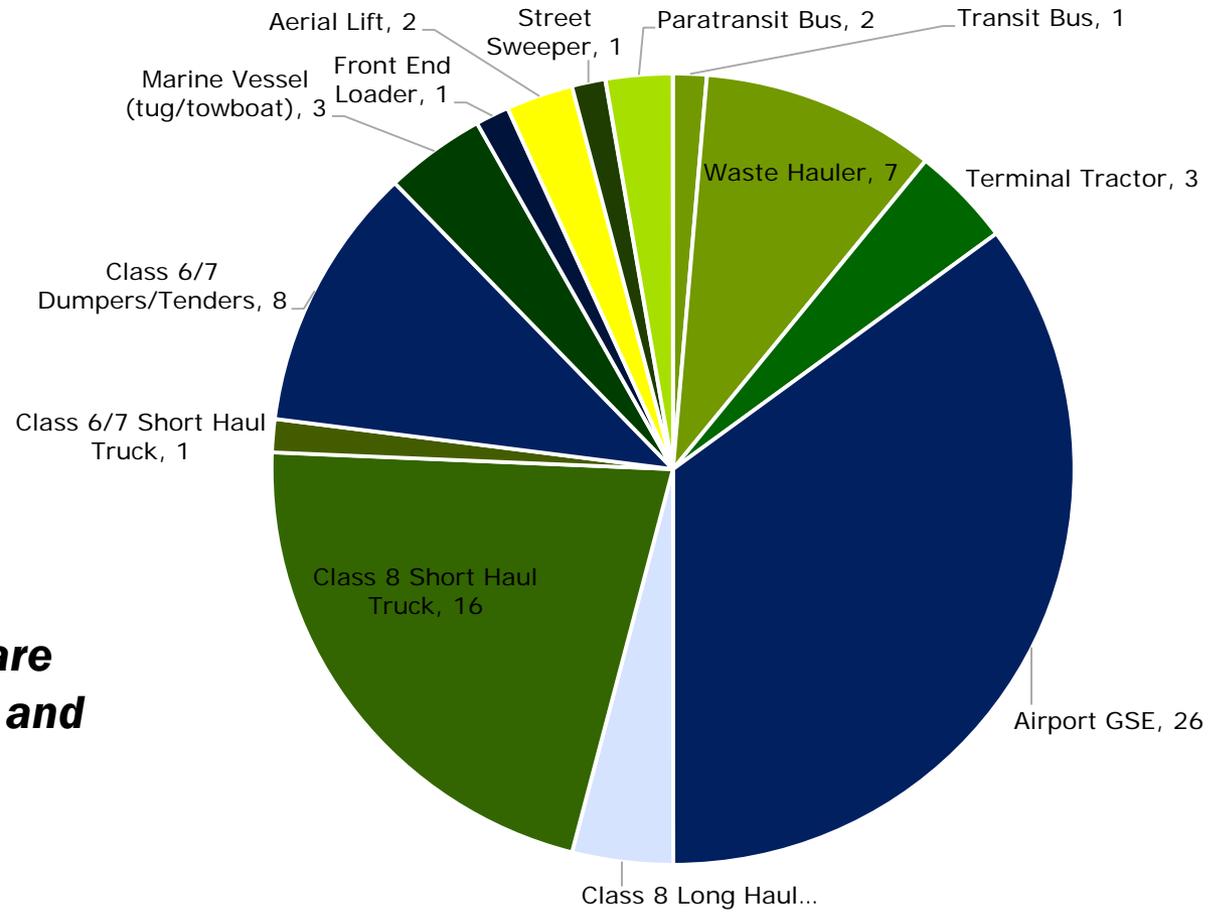
- ❑ Short-haul and Long-haul Truck Replacements
- ❑ Switcher and Short-haul Locomotive Repowers
- ❑ Electric Transit Bus Replacements
- ❑ Propane School Bus Replacements
- ❑ CNG Trash Haulers
- ❑ Tugboat Repowers
- ❑ Rail and Port yard Equipment Replacement
- ❑ Electric Airport Support Equipment



DERA 2016 Competition: Replacement Actions by Vehicle Type/Replacement Type (59 total)

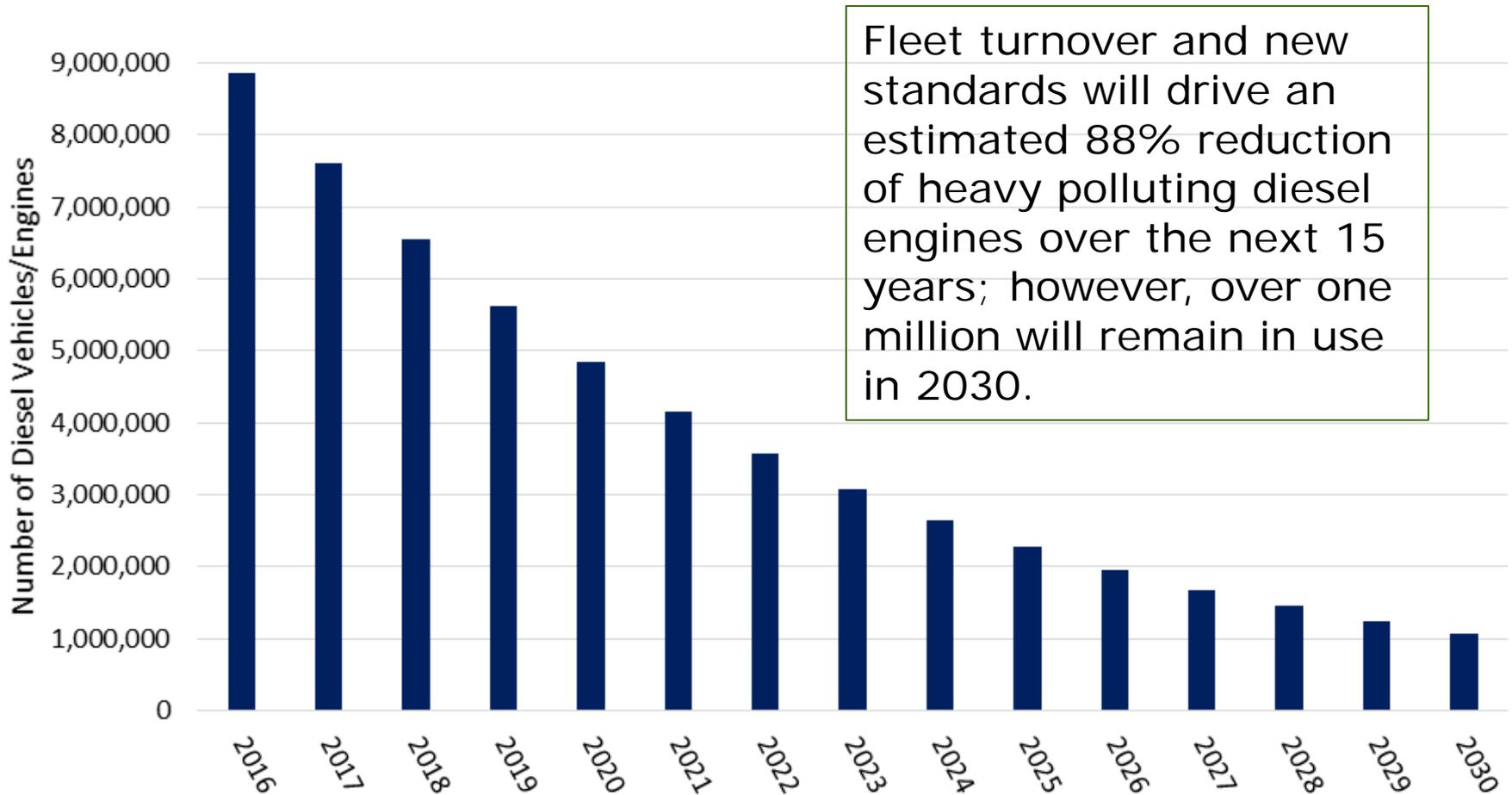


# 2017 DERA Competitive – Vehicles Addressed

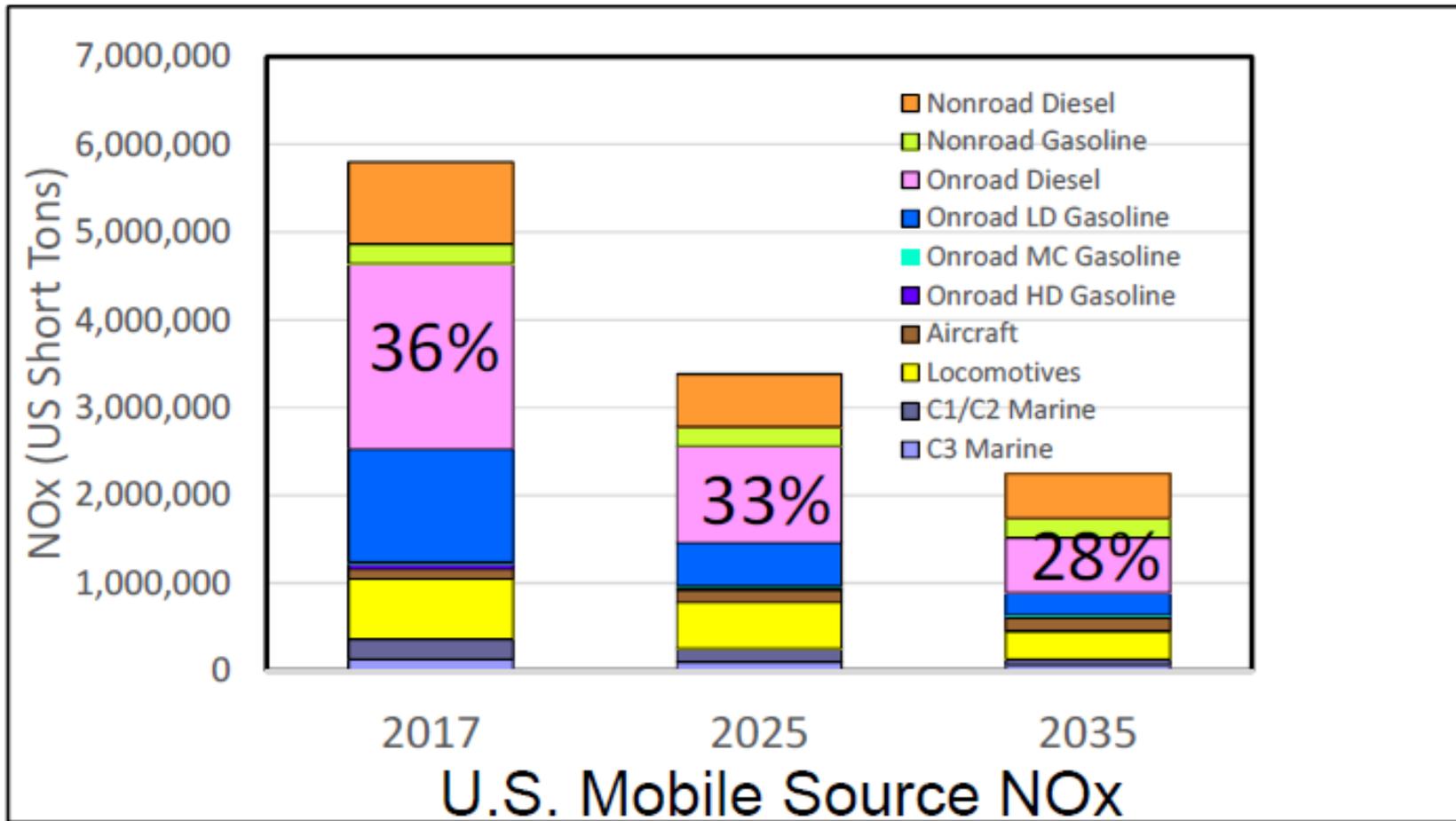


***While types of actions are narrowing, the vehicles and equipment addressed remain varied***

# Diesel Engine Turnover by Year



# NOx Emissions Currently Attributed to HD



Data source: EPA MOVES 2014b



# NCDC Moving Forward

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- ▣ Focus on Cost-Effective Projects
- ▣ Focus on Communities and Improving Areas of Poor Air Quality
- ▣ Streamline Funding Mechanism: National Clean Diesel Rebate Program
- ▣ Goods Movement and Ports Clean Diesel Projects

# Sample Emission Reductions – (Onroad Vehicle Replacements)\*



Vehicle Type	Baseline NOx (tons/yr)	Potential NOx Reductions (tons/yr)	Percent NOx Reduction (%)	Baseline PM2.5 (tons/yr)	Potential PM2.5 Reductions (tons/yr)	Percent PM2.5 Reduction (%)
Long Haul – Combination	12.873	9.178	71.3	0.824	0.797	96.8
Transit Bus	4.864	4.373	89.9	0.171	0.163	95.2
Short Haul – Combination	3.375	3.034	89.9	0.180	0.176	97.7
Refuse Hauler	2.417	2.143	88.7	0.184	0.179	97.0
Long Haul – Single Unit	1.336	1.183	88.6	0.137	0.133	97.6
Short Haul – Single Unit	1.033	0.926	89.6	0.079	0.078	98.0
School Bus	0.967	0.866	89.6	0.079	0.078	98.0

\*estimated emission reduction calculations are for comparisons only based on default activity factors by vehicle type

# Sample Potential Emission Reductions ( Nonroad Projects )\*



Vehicle Type	Baseline Nox (tons/yr)	Potential NOx Reductions (tons/yr)	Percent NOx Reduction (%)	Potential PM2.5 Reduction (tons/yr)	Reduced PM2.5 (tons/yr)	Percent PM2.5 Reduced (%)
Tugboat	54.188	30.29	55.9	1.330	1.000	75.3
Switcher Locomotive	19.355	14.342	74.1	0.478	0.389	81.4
Small Tugboat	15.803	8.597	54.4	0.301	0.204	67.8
Terminal Tractor	5.537	5.144	92.9	0.385	0.372	96.6
Forklift	3.797	3.568	94.0	0.521	0.514	98.5
Airport Support Equipment	3.200	2.970	92.8	0.169	0.162	95.5

\*estimated emission reduction calculations are for comparisons only based on default activity factors by vehicle type



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# CNG vs. Propane – Overview

## (PROs)

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### CNG

- ❑ Does not contaminate or dilute the crank case oil, increasing the oil's life
- ❑ Lower tailpipe emission than diesel
- ❑ Disperses easily in air (lighter than air)
- ❑ No chance of spills
- ❑ 98 percent of natural gas is domestic
- ❑ Lower price volatility than CNG or diesel

### Propane

- ❑ Non-toxic and non-corrosive.
- ❑ Lower tailpipe emission than diesel.
- ❑ Less space than CNG for storage.
- ❑ Fueling infrastructure is less expensive than for CNG

# CNG vs. Propane – Overview (CONs)

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## CNG

- ❑ Occupies more space than diesel or LPG. Mitigated in factory-built CNG vehicles by integrating the tanks into the vehicle body design.
- ❑ Fueling infrastructure can be expensive
- ❑ Vehicle cost differential higher than for LPG

## Propane

- ❑ Lower energy density than gasoline or diesel and hence the equivalent fuel consumption is more
- ❑ LPG provides less upper cylinder valve lubrication. If a LPG-fueled engine is not suitable modified, it will lead to valve wear
- ❑ Does not disperse easily and is readily inflammable