OVERVIEW OF 2007 HEAVY DUTY ON-HIGHWAY ENGINE STANDARDS

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FOREWORD:

The 2007 Heavy Duty On-Highway Engine Standards were finalized Jan 18, 2001.

Heavy duty engines contribute greatly to the serious air pollution problems, health, and welfare effects of ozone.

As a result, EPA set new standards under section 202 (a) (3) of the Clean Air Act.

CURRENT STANDARDS:

Compression Ignition (CI) - diesel
Spark Ignition (SI) - gasoline, propane, natural gas

	NOx+HC	PM	CO	HC	Idle CO
1998 CI	4.0 (NOx only)	0.1	15.5	1.3	--
2004 CI	**2.5**	0.1	15.5	--	--
1998 SI	4.0 (NOx only)	--	14.4/37.1	1.1/1.9	0.5%
2005 SI	**1.0**	--	14.4/37.1	1.1/1.9	0.5% exhaust gas flow

also, HDE Otto Cycle Federal Option 1 and 2 standards:

Option 1: NOx+HC = 1.5 for 2003 to 2007 HD vehicles $\leq$ 14k lbs
Option 2: NOx+HC = 1.5 for 2004 to 2007 HD engines w/o wgt categories
All standards are in grams per brakehorsepower hour

New Diesel Engine Standards

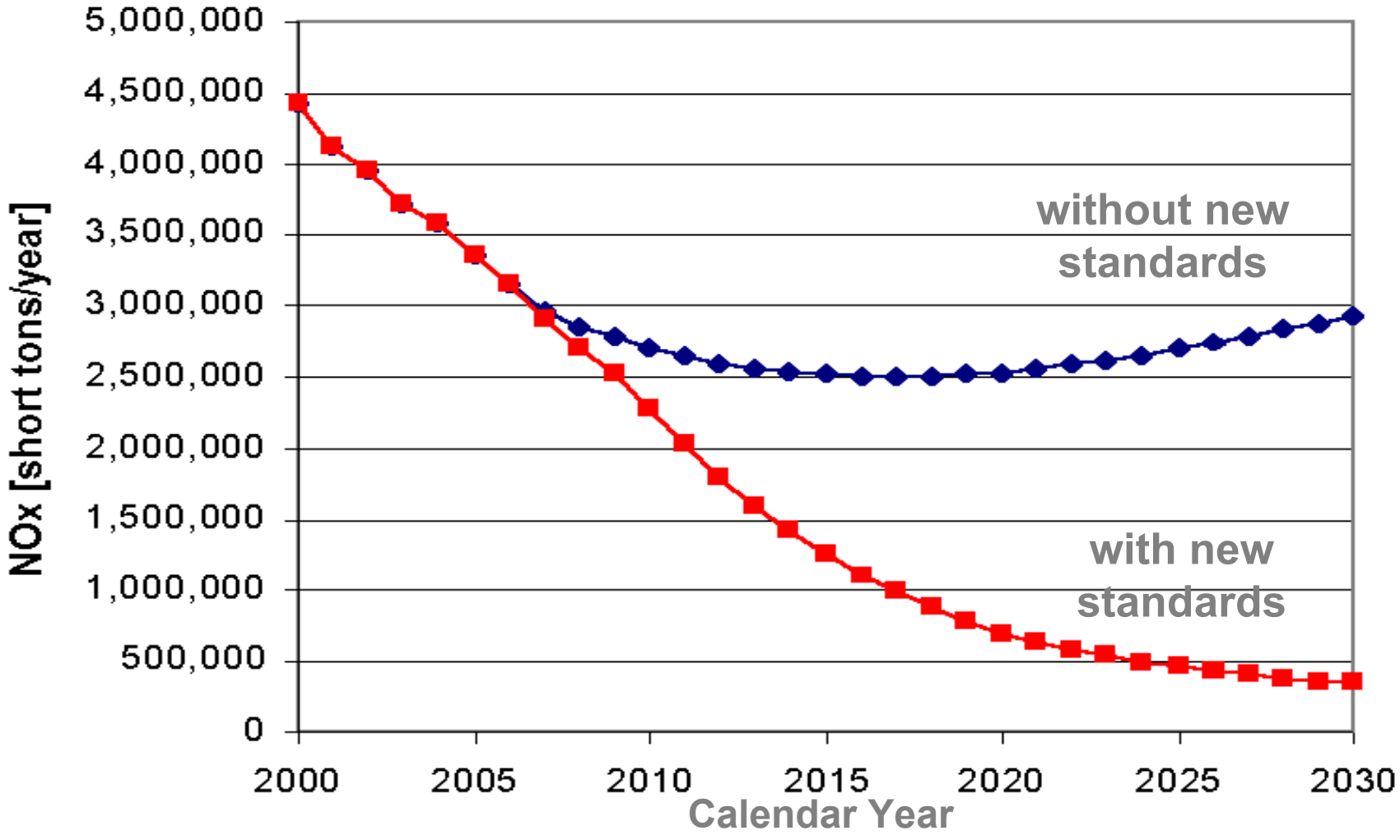
	2007	2008	2009	2010	2011	2012
PM (g/hp-hr)	**100%** at **0.01**					
NTE multiplier	1.5 x the PM FEL [a]					
in-use add-on (g/hp-hr)	0.01 (over full useful life)					none
ABT FEL cap (g/hp-hr)	0.02					
NOx (g/hp-hr)	**50%** [b] at **0.20**			**100%** at **0.20**		
NTE multiplier [c]	1.5 x the NOx FEL					
in-use add-on (g/hp-hr) [d]	0.10 (to 110k mi) 0.15 (110-185k mi) 0.20 (185-435k mi)					none
ABT FEL cap (g/hp-hr)	2.0			0.50		
NMHC (g/hp-hr)	**50%** [b] at **0.14**			**100%** at **0.14**		
NTE multiplier [c]	1.5 x the NMHC standard					
in-use add-on (g/hp-hr)	none					
ABT FEL cap (g/hp-hr)	no NMHC ABT program					

a But if PM FEL < 0.01 g/hp-hr, NTE PM standard level is 1.5 x 0.01 g/hp-hr (not 1.5 x the FEL).
b Deficit (25% maximum, "good-faith projection") in 2007 and/or 2008 may be made up in 2008/09.
c Applies if NOx FEL <1.5 g/hp-hr; otherwise, previous multiplier applies (1.25 x NMHC+NOx).
d Does not apply if NOx FEL >1.3 g/hp-hr.

New Gasoline Engine Standards

	2008	2009	2010	2011	2012
PM (g/hp-hr)	50% at 0.01	100% at 0.01			
in-use add-on (g/hp-hr)	none				
ABT FEL cap (g/hp-hr)	no PM ABT program				
NOx (g/hp-hr)	50% at 0.20	100% at 0.20			
in-use add-on (g/hp-hr) [a]	0.10 (over full useful life)				none
ABT FEL cap (g/hp-hr)	0.80 [c]			0.50	
NMHC (g/hp-hr)	50% at 0.14	100% at 0.14			
in-use add-on (g/hp-hr) [b]	0.10 (over full useful life)				none
ABT FEL cap (g/hp-hr)	0.40 [c]			0.30	
evaporative emissions	50% [d]	100% [d]			

a Does not apply if NOx FEL >0.50 g/hp-hr.
b Does not apply if NMHC FEL >0.30 g/hp-hr.
c These caps are 0.50 NOx / 0.30 NMHC if "phase-out" engines are not certified under the 1.5 g/hp-hr NOx+NMHC option in 2004 (i.e., if certified to 1.0 g/hp-hr NOx+NMHC).
d New standards (g/test) are: 1.4g/1.75g (3day/2day tests) for 8.5k-14k lbs & 1.9g/2.3g for >14k lbs.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NOx [short tons/year]
2000
2005
2010
2015
2020
2025
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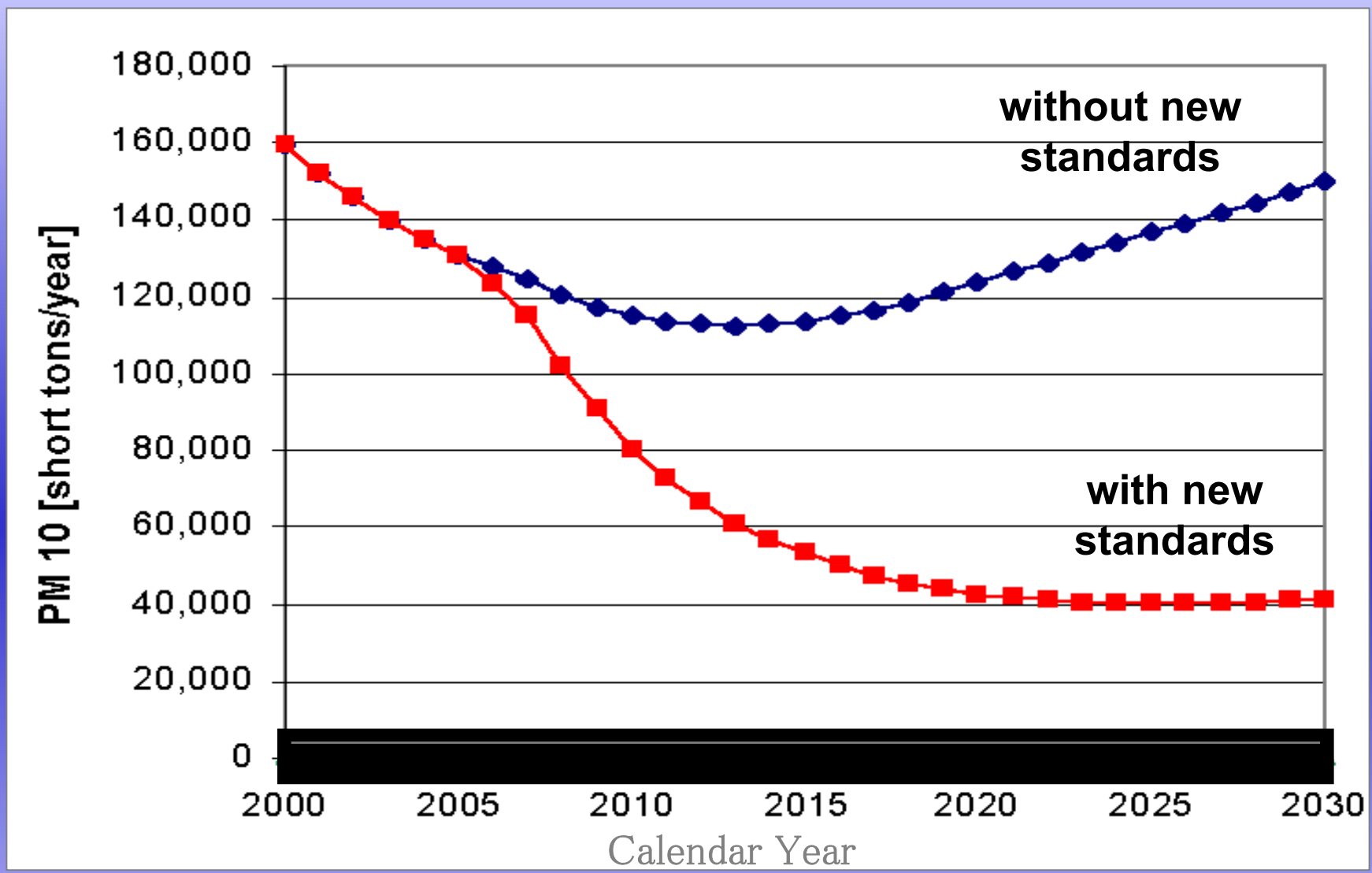
Calendar Year
without new standards
with new standards



EPA United States Environmental Protection Agency

Office of Transportation and Air Quality

- Clean (near zero sulfur) fuel by 2006
  - enables use of advanced emissions technology
  - maintenance savings for new and old trucks
- Particulate matter (PM) reductions of 90% or better through use of catalyzed PM filters by 2007
  - Large reductions in toxic hydrocarbons as well
- Oxides of nitrogen (NOx) reductions phase in: averaging 50% by 2007, 90% or better by 2010

Estimated annual health benefits

The program will prevent approximately

- Over 8,300 premature deaths
- Over 750,000 respiratory illnesses
- 1.5 million lost work days
- 2.6 million tons of NOx, 110,000 tons of PM
- 17,000 tons of toxic pollutants

Monetized benefits: $70.3 billion/year

Technological advances engine manufacturers may use to meet the new standards

a few examples:

- Low Sulfur diesel fuel
- PM traps
- NOx adsorbers
- EGR (exhaust gas recirculation)
- Advanced Combustion Technology (pilot + main)
- Oxidation Catalysts
- Alternative fuels: CNG, LNG, LPG, etc.

Natural gas and Propane powered HD engines are currently certified to low emission standards.

Seven engine manufacturers currently have certified their 2004 natural gas and propane engine families with emission levels ranging from 0.3 to 1.4 g/bhp-hr NOx and 0.01 to 0.03 g/bhp-hr PM

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