

2014-18 Medium & Heavy Duty Final Rule

Joint Briefing for Congressional Staff

9 August 2011



Highlights

- ✓ First ever **Medium- & Heavy-Duty** Standards
- ✓ Will reduce oil imports, fuel consumption, CO₂ emissions, and operating costs for thousands of businesses
- ✓ Allows manufacturers to produce a single fleet of vehicles to meet requirement
- ✓ 530 million barrels less oil
- ✓ 270 MMT lower GHGs
- ✓ \$50 billion in fuel savings
- ✓ \$49 billion in net benefits



Outline

- Background
- Unique Aspects
- Summary of Comments
- Key Elements
- Technical Assessment
- Key differences between EPA & NHTSA

Presidential Memorandum



May 21, 2010—Requests NHTSA and EPA to...

"begin work on a joint rulemaking under the Clean Air Act and the Energy Independence and Security Act of 2007 to establish fuel efficiency and greenhouse gas emissions standards for commercial medium- and heavy-duty vehicles beginning with model year 2014"

<http://www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards>



SmartWay Transport Partnership



- EPA program to improve freight transportation efficiency
- Encourages key technologies such as idle reduction, improved aerodynamics, & efficient tires

Unique Aspects

- More complex than light-duty
- Begins with Model Year 2014
- Gets existing technology off of the shelf and onto new trucks
- Enjoys broad support from major stakeholders

Comments Summary

Received over 41,000 comments

From U.S. Senators:

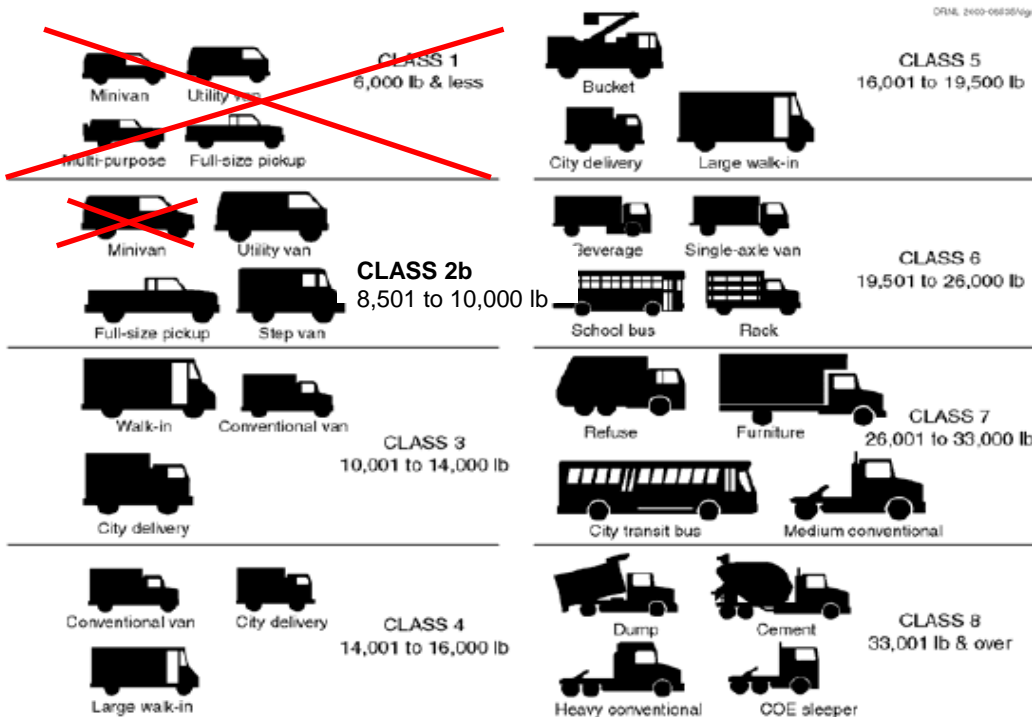
- ❑ Window sticker labels
- ❑ Develop online tool
- ❑ Increase stringency consistent with 2010 National Academies report
- ❑ Lay out path to expand range of vocational technologies
- ❑ Regulate trailers

Key Elements

- Breaks diverse truck sector into 3 distinct categories
 - Tractor “semis”
 - Heavy-duty pickups
 - Vocational trucks
- Incentives for advanced technology
- Separate standards for engines as well as vehicles
- Separate standards for fuel consumption, CO₂, N₂O, CH₄ and HFCs
- Provides manufacturer flexibilities

Vehicles Covered

- All on-highway vehicles that are not regulated by CAFE standards.
- Certain small businesses will not be covered in initial phase.










RVs X ✓



Class 7/8 Line Haul Tractors

- Final rule as proposed with improvements to test procedures raised through comments
- Regulate engines and tractors separately
- Engine standards met through same procedures as for criteria pollutants
- Tractor standards met through a compliance model

	Day Cab		Sleeper Cab
	Class 7	Class 8	Class 8
Low Roof			
Mid Roof	--	--	
High Roof			

Final 2017 Standards (% reductions)

	Day Cab		Sleeper Cab
	Class 7	Class 8	Class 8
Low Roof	(10%)	(10%)	(17%)
Mid Roof	(10%)	(10%)	(17%)
High Roof	(13%)	(13%)	(23%)

Semi-Trucks (Classes 7 & 8)

Heavy-Duty Manufacturers

- **Tractor manufacturers:** Volvo (Volvo & Mack), PACCAR (Peterbilt & Kenworth), Daimler (Freightliner & Western Star), and International
- **Engine manufacturers:** Volvo, PACCAR, Daimler (Detroit Diesel), International (Navistar), and Cummins
- In this segment, tractors and engines have separate standards that together ensure improvements in both vehicles and engines.

Which Technologies Enable Compliance?

Available today—

- ❑ Aerodynamic Profiles and Fairings
- ❑ Reduced rolling resistance tires
- ❑ Weight reduction
- ❑ Vehicle speed limiter
- ❑ Reduction in extended idle operation

Benefits—

- ❑ 10% to 23% reduction compared to 2010
- ❑ Tractors with sleeper cabs would achieve the greatest reductions by combining vehicle/engine improvements with reduced idling



Pickups & Vans

- Pickups & vans classified as a separate category of heavy-duty
- Largely derivatives of light-duty trucks
 - Light-duty = 1500 series pickups and vans
 - Heavy-duty = 2500 and 3500 series pickups and vans

Finalized as proposed

- HD Vehicles chassis certified since mid-1990s
- Same basic test procedure as for light-duty vehicles
- Same CO₂ gallons/mile metric
- Gallons/100 miles metric for fuel efficiency

Key differences from Light Duty

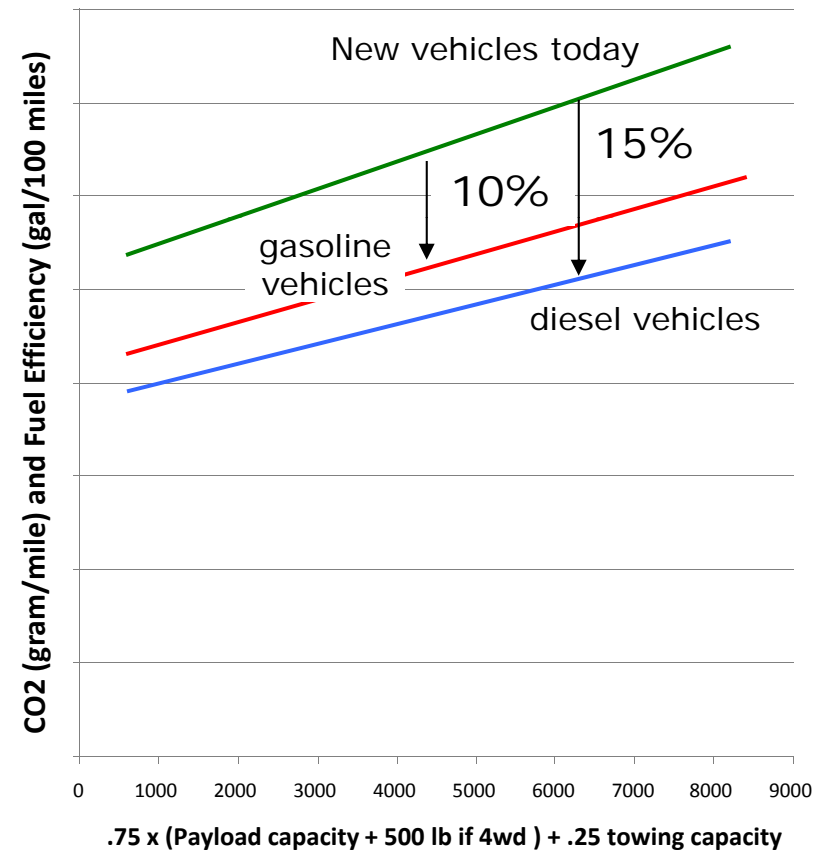
- No footprint curve—Attribute = payload + towing
- A/C leakage not counted as a credit
- Not all light-duty vehicle technologies are equally effective for heavier duty vehicles operating



Heavy-Duty Pickups & Vans

Reduction	
Diesel	15%
Gasoline	10%
AC HFC leakage	2%

- Phased in consistent with manufacturers' redesign cycles
- Alternative flat standards
- Compliance assessed on "corporate average" basis



What Technologies Do We Expect Manufacturers Would Use to Comply?

- Similar technologies to 2012-2016 light-duty program
 - But adapted for HD applications

- Four broad technology categories--
 - Engines: gasoline direct injection, internal friction reduction, diesel aftertreatment optimization, ...
 - Transmissions: 8-speed transmissions, ...
 - Vehicles: aerodynamic drag reduction, mass reduction, lower-rolling resistance tires, ...
 - Accessories: electric power steering, high-efficiency accessories, improved air conditioning systems, ...

Vocational Trucks (Classes 2b – 8)

- The vocational vehicle category includes the wide range of remaining trucks and buses of all sizes and functions.
- Some of the primary applications for vocational vehicles:
 - Delivery, refuse, utility, dump, and cement trucks
 - Transit, shuttle, and school buses
 - Emergency vehicles, motor homes, tow trucks



Vocational Vehicles (Classes 2b – 8)

Final standards apply to manufacturers of chassis & engines, not bodies

- **Chassis Manufacturers:** GM, Ford, Chrysler, Isuzu, Mitsubishi, Volvo, Daimler, International, PACCAR, Oshkosh, Nissan, Hino, Hyundai, Lodal, Unimog, Crane Carrier, American Lafrance, Advance Mixer, Collins Bus, North American Bus Industries, Forest River, Gillig, Motor Coach Industries, Plaxton Coach & Bus, Thor, Van Hool, New Flyer
- **Engine Manufacturer:** Cummins, GM, Ford, Navistar, Hino, Isuzu, Volvo, Caterpillar, Detroit Diesel, PACCAR, Mitsubishi FUSO
- **Hybrid Powertrain Companies:** Eaton, Arvin Meritor, Parker Hannafin, Bosch Rexroth, BAE, Odyne, Volvo, Azure Dynamics, Terex, Enova, Mitsubishi, ISE



Technologies We Expect OEMs to Use

□ **Challenges:**

- Wide range of vocational vehicle applications means that there are few common avenues for CO₂ and fuel consumption reductions
- Aerodynamic drag reduction technologies are of limited value

□ **Solution:**

- Focus on reduced tire rolling resistance and engine improvements
- Allows for hybrid powertrain as a means for compliance
- The final CO₂ and fuel consumption standards will achieve reductions from 6% to 9%, depending on the size of the truck

Incentivizing Technology



- Advanced Technology Credits
 - Final rule will provide 1.5x multiplier for credits generated on vehicles or engines using advanced technologies such as hybrids, plug-in hybrids, EVs, and Rankine waste heat recovery
- Certifying Innovative Technologies
 - Like the light-duty GHG rule, this rule will provide a compliance mechanism to certify innovative technologies that are not fully accounted for by the test procedures.
- Alternative Fuel Vehicles - Natural Gas & EVs
 - GHG and fuel consumption compliance are calculated based on a vehicle's CO₂ emissions.
 - Low carbon fuels like natural gas will perform 20-30% better than comparable gasoline or diesel engines under this approach.

Defer Action on Trailers

- ❑ EPA's SmartWay demonstrated that trailer designs and low rolling resistance tires can substantially reduce fuel consumptions from tractor trailers
- ❑ Trailer manufacturers are small businesses with limited technical expertise and resources
- ❑ The proposal provided broad notice of our intent to regulate trailers in the future
- ❑ Continue to rely on the SmartWay program to help drive trailer technology development and adoption



Key Differences

	Standard Metrics	Vehicles Covered	Other Pollutants	Lead Time
	gallons/mile gal/ton-mile gal/bhp-hr	No recreational vehicles	Only fuel consumption	Voluntary in 2014 & 2015
	gCO ₂ /mile gCO ₂ /ton-mile gCO ₂ /bhp-hr	All Heavy-Duty (non MDPVs)	A/C Leakage (HFC) N ₂ O & CH ₄	Effective 2014

Costs, Savings, & Payback

Vehicle	Cost	Lifetime CO ₂	Lifetime Fuel Savings	Payback Period
Diesel ¾ ton (e.g. F250)	\$1,050	24 MMT	\$7,200	2 years
Medium duty vocational	\$380	20 MMT	\$5,900	1 year
Class 8 high roof sleeper cab tractor (interstate freight)	\$6,220	270 MMT	\$79,100	1 year

* Based on 2018 standards and net present value 3% discount rate

Costs & Benefits

	Final Rule
Percent Reductions (2018)	Tractors: 10-23% Vocational Vehicles: 6-9% Pickup Trucks & Vans: 12-17%
Vehicle cost (2018)	Tractors: \$6,220 Vocational Vehicles: \$380 Pickup Trucks & Vans: \$1,050
Fuel Savings (2014-2018 lifetime)	530 million barrels oil
CO ₂ eq Reduction (2014-2018 lifetime, Upstream + Downstream)	270 MMT
Costs*	\$8.1 billion
Benefits*	\$57 billion
Net Benefits*	\$49 billion

Conclusion

- ❑ First ever MD/HD truck fuel efficiency & GHG emission standards
- ❑ Will reduce oil imports, fuel consumption, CO2 emissions and operating costs for thousands of businesses
- ❑ Constitutes a single coordinated national program that helps manufacturers to produce a single fleet of vehicles to meet related federal and state requirements
- ❑ Program design balances simplicity and flexibilities to reduce fuel consumption from an incredibly diverse segment of vehicles

National Academy's HDV Report

- 15 month study by a panel of experts finished April 1, 2010.
- Comprehensive look at technology & cost for fuel consumption technologies
 - Vehicle, trailer, infrastructure and operational
 - Applying all known future technologies and operational improvements, study showed reductions on the order of 50% are possible
 - 50% reductions are through 2020 timeframe and include some very expensive solutions totaling, for example, \$84,600 for tractors
 - For 2013-2015 truck only technologies <20% reductions possible
- Findings and recommendations primarily related to the nature of a regulation (some examples)
 - Metric: load specific fuel consumption (gallons/ton-mile)
 - Compliance Tool: component testing with a compliance model to calculate overall vehicle performance
- FRM is consistent with majority of findings and recommendations from the report
 - One significant deviation – report recommends NHTSA implement a pilot program before regulating the sector
 - NHTSA and EPA staffs are both recommending a regulatory approach built in large part on well established procedures and systems. NHTSA and EPA staff agree that this approach makes a pilot program unnecessary.