

EPA and NHTSA Propose First-Ever Program to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles: Regulatory Announcement

The U.S. Environmental Protection Agency (EPA) and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) are announcing a first-ever program to reduce greenhouse gas (GHG) emissions and improve fuel efficiency of medium- and heavy-duty vehicles, such as the largest pickup trucks and vans, semi trucks, and all types and sizes of work trucks and buses in between. These vehicles make up the transportation segment's second largest contributor to oil consumption and GHG emissions.

The proposed rules would create a strong and comprehensive heavy-duty national program (the "HD National Program"), designed to address the urgent and closely intertwined challenges of dependence on oil, energy security, and global climate change. At the same time, the proposed program would enhance American competitiveness and job creation, benefit consumers and businesses by reducing costs for transporting goods, and spur growth in the clean energy sector.

The agencies estimate that the combined proposed standards have the potential to reduce GHG emissions by nearly 250 million metric tons and save approximately 500 million barrels of oil over the life of vehicles sold during 2014 to 2018, while providing an estimated \$35 billion in net benefits to truckers, or \$41 billion in net benefits when societal benefits are included. The proposed HD National Program is

a key component of the agencies' response to a Presidential Memorandum issued last May, and has been developed with support from industry, the State of California, and environmental stakeholders.¹

Need to Reduce Fuel Consumption and Greenhouse Gases from Vehicles

Our country has two intertwined and critically important needs - to reduce oil consumption and to address global climate change. NHTSA and EPA are proposing the HD National Program to meet these needs by reducing fuel use and GHG emissions from on-highway transportation sources. The effect of these actions will be to improve energy security, increase fuel savings, reduce GHG emissions, and provide regulatory certainty for manufacturers.

Setting fuel consumption standards for the heavy-duty sector will improve our energy security by reducing our dependence on foreign oil, which has been a national objective since the first oil price shocks in the 1970s. Net petroleum imports now account for approximately 60 percent of U.S. petroleum consumption. Transportation accounts for about 72 percent of our domestic oil use, and heavy-duty vehicles account for about 17 percent of transportation oil use.²

Transportation sources emitted 29 percent of all U.S. GHG emissions in 2007 and have been the fastest-growing source of U.S. GHG emissions since 1990.³ The primary GHGs of concern from transportation sources are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and hydrofluorocarbons (HFC). The heavy-duty sector addressed in this joint proposal accounted for nearly six percent of all U.S. GHG emissions and 20 percent of transportation GHG emissions in 2007. Within the transportation sector, heavy-duty vehicles are the fastest-growing contributor to GHG emissions.

Benefits and Costs of the Proposed HD National Program

The agencies' analysis indicates that the combined proposed standards have the potential to reduce GHG emissions by nearly 250 million metric tons and save approximately 500 million barrels of oil over the life of vehicles sold during 2014 to 2018. In total, these combined standards would reduce CO₂ emissions from the U.S. heavy-duty fleet by approximately 72 million metric tons of CO₂-equivalent by 2030, below the level that would occur in the absence of the HD National Program.

Overall, EPA and NHTSA estimate that the HD National Program would cost the affected industry approximately \$7.7 billion, and generate total societal benefits of \$49 billion, providing

¹ Improving Energy Security, American Competitiveness and Job Creation, and Environmental Protection Through a Transformation of Our Nation's Fleet of Cars And Trucks" 75 FR 29399, May 26, 2010, www.whitehouse.gov/the-press-office/presidential-memorandum-regarding-fuel-efficiency-standards

² In 2009 Source: EIA Annual Energy Outlook 2010 released May 11, 2010

³ U.S. Environmental Protection Agency. 2009. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007. EPA 430-R-09-004. Available at: http://epa.gov/climatechange/emissions/downloads09/GHG2007entire_report-508.pdf

\$41 billion in net benefits as a result of the standards over the lifetimes of model year 2014-2018 vehicles, discounted at three percent.⁴ Using technologies commercially available today, the majority of vehicles would see a payback period of one to two years, while others, especially those with lower annual miles, would experience payback periods of four to five years. For example, an operator of a semi truck could pay for the technology upgrades in under a year, and have net savings up to \$74,000 over the truck's useful life.

There are also many potential benefits of the proposed program which the agencies have not yet quantified, including benefits from reductions in emissions of non-GHG pollutants. The benefits that are currently calculated into dollar amounts include benefits from GHG reductions, energy security, and other externalities such as reduced time spent refueling.

Scope of Standards for Heavy-Duty Engines and Vehicles

The agencies are each proposing complementary standards under their respective authorities covering model years 2014-2018, which together would form a comprehensive HD National Program. EPA and NHTSA are proposing emission standards for CO₂ and fuel consumption standards, respectively, tailored to each of three main regulatory categories: (1) combination tractors;⁵ (2) heavy-duty pickup trucks and vans; and (3) vocational vehicles. Each of these is described further below. EPA is additionally proposing standards for air conditioning related emissions of HFC from pickups, vans and tractors; as well as N₂O and CH₄ standards applicable to all heavy-duty engines, pickups and vans.

For purposes of this proposal, the heavy-duty fleet incorporates all on-road vehicles rated at a gross vehicle weight at or above 8,500 pounds, and the engines that power them, except those covered by the current GHG emissions and Corporate Average Fuel Economy standards for model years 2012-2016.⁶ Heavy-duty vehicles include both work trucks and commercial medium and heavy-duty on-highway vehicles as defined by the Energy Independence and Security Act (EISA). Heavy-duty engines affected by the proposed standards would generally be those that are installed in commercial medium- and heavy-duty trucks and buses. The agencies' scopes are the same except that EPA is proposing to include recreational on-highway vehicles (RV's, or motor homes) within its rulemaking, while NHTSA is not including these vehicles, due to EISA's requirement that standards be set for "commercial" medium- and heavy-duty on-highway vehicles and work trucks.

⁴ The monetized benefits presented are a summed value of many years worth of emissions reductions and fuel savings, discounting the value that future reductions have to society vs reductions in the present day. These benefit estimates use the Annual Energy Outlook 2010 reference case fuel prices, and apply a Social Cost of Carbon (SCC) value of \$22 per ton CO₂ reduced. Other SCC values are presented and discussed in the proposal.

⁵ Commonly known as semi trucks. The agencies are not proposing standards for trailers, thus this regulatory category denotes the main power unit portion of a tractor-trailer combined vehicle.

⁶ The final 2012-2016 standards cover some vehicles above 8,500 lbs. For example, this proposal excludes sport-utility vehicles, vans with less than a 13-person capacity, and ½-ton pickups.

Trailers are not covered under this proposal, due to the first-ever nature of this proposal and the agencies' limited experience working in a compliance context with the trailer manufacturing industry. However, because trailers do impact the fuel consumption and CO₂ emissions from combination tractors, and because of the opportunities for reductions, we are soliciting comments on controlling GHG emissions and fuel consumption from trailers, to prepare a foundation for a possible future rulemaking.

The agencies are developing these rules collaboratively under their respective authorities: the EPA is proposing GHG emissions standards under the Clean Air Act, and NHTSA is proposing fuel efficiency standards under EISA. The goal of the joint rulemakings is to produce coordinated federal standards that help manufacturers to build a single fleet of vehicles and engines that are able to comply with both.

Proposed Standards

It is important to note that the joint proposed standards cover not only engines but also the complete vehicle, allowing the agencies to achieve the greatest possible reductions in fuel consumption and GHG emissions, while avoiding unintended consequences. The majority of these vehicles carry payloads of goods or equipment, in addition to passengers. To account for this in the regulatory program, two types of standard metrics are proposed: payload-dependent gram per mile (and gallon per 100-mile) standards for pickups and vans; and gram per ton-mile (and gallon per 1,000 ton-mile) standards proposed for vocational vehicles and combination tractors. These proposed metrics account for the fact that the work to move heavier loads burns more fuel, and emits more CO₂ than in moving lighter loads.

The joint proposed standards are rooted in regulatory history, EPA's SmartWay Transport Partnership program, and extensive technical and engineering analyses. In developing this HD National Program, the agencies have drawn from the SmartWay Transport Partnership Program experience to identify technologies as well as operational approaches that fleet owners, drivers, and freight customers can incorporate. NHTSA and EPA believe that operational measures promoted by SmartWay can complement the proposed standards and provide benefits for the existing heavy-duty fleet.

The joint proposed standards are also heavily influenced by a study mandated by Congress in EISA and conducted for NHTSA by the National Research Council.⁷ This study examined many aspects of heavy-duty vehicle fuel consumption as well as considerations for establishing fuel consumption standards.

⁷ Committee to Assess Fuel Economy Technologies for Medium- and Heavy-Duty Vehicles; National Research Council; Transportation Research Board (2010). "Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles," Available electronically from the National Academies Press Website at <http://www.nap.edu/catalog>.

CO2 and Fuel Consumption Standards

Both EPA's and NHTSA's joint proposed standards for the three main heavy-duty regulatory categories are summarized below.

Combination Tractors

Heavy-duty combination tractors – the semi trucks that typically pull trailers - are built to move freight. Freight transportation customers choose tractors primarily based on two major characteristics: the gross vehicle weight rating (GVWR, which establishes the maximum carrying capacity of the tractor and trailer) and cab type (sleeper cabs provide overnight accommodations for drivers). Operators also consider the tractor roof height when mating with trailers for the most efficient configuration. The agencies are proposing differentiated standards for nine subcategories of combination tractors based on three attributes: weight class, cab type and roof height. The standards would phase in to the 2017 levels shown in Table 1. These proposed standards would achieve from seven to 20 percent reduction in emissions and fuel consumption from affected tractors over the 2010 baselines.

Table 1: Proposed MY 2017 Combination Tractor Standards

	EPA Emissions Standards (g CO ₂ /ton-mile)			NHTSA Fuel Consumption Standards (gal/1,000 ton-mile)		
	Low Roof	Mid Roof	High Roof	Low Roof	Mid Roof	High Roof
Day Cab Class 7	103	103	116	10.1	10.1	11.4
Day Cab Class 8	78	78	86	7.7	7.7	8.5
Sleeper Cab Class 8	64	69	71	6.3	6.8	7.0

Heavy-Duty Pickup Trucks and Vans

The agencies are proposing to set corporate average standards for heavy-duty pickup trucks and vans, similar to the approach taken for light-duty vehicles. Each manufacturer's standard for a model year would depend on its sales mix, with higher capacity vehicles (payload and towing) having numerically less stringent target levels, and with an added adjustment for 4-wheel drive vehicles. This approach recognizes both the inherently higher GHG emissions and fuel consumption of higher-capacity vehicles, and the importance of payload and towing capacity to the owners of these work trucks and vans.

EPA is proposing to establish standards for this segment in the form of a set of target standard curves, based on a "work factor" that combines a vehicle's payload, towing capabilities, and whether or not it has 4-wheel drive. The standards would phase in with increasing stringency in each model year from 2014 to 2018. The EPA standards proposed for 2018 (including a separate standard to control air conditioning system leakage) represent an average per-vehicle reduction in GHG emissions of 17 percent for diesel vehicles and 12 percent for gasoline vehicles, compared to a common baseline.

NHTSA is proposing to set corporate average standards for fuel consumption that are equivalent to EPA’s proposal (though not including EPA’s proposed air conditioning leakage standard). The proposed NHTSA standards represent an average per-vehicle improvement in fuel consumption of 15 percent for diesel vehicles and 10 percent for gasoline vehicles, compared to a common baseline. To satisfy lead time requirements under EISA, NHTSA standards would be voluntary in 2014 and 2015. Both agencies are proposing to provide manufacturers with two alternative phase-in approaches that get equivalent overall reductions. One alternative phases the final standards in at 15-20-40-60-100 percent in model years 2014-2015-2016-2017-2018. The other phases the final standards in at 15-20-67-67-67-100 percent in model years 2014-2015-2016-2017-2018-2019.

Vocational Vehicles

Vocational vehicles consist of a very wide variety of truck and bus types including delivery, refuse, utility, dump, cement, transit bus, shuttle bus, school bus, emergency vehicles, motor homes, tow trucks, and many more. Vocational vehicles undergo a complex build process, with an incomplete chassis often built with an engine and transmission purchased from other manufacturers, then sold to a body manufacturer. In these rules, the agencies are proposing to regulate chassis manufacturers for this segment. The agencies are proposing to divide this segment into three regulatory subcategories - Light Heavy (Class 2b through 5), Medium Heavy (Class 6 and 7), and Heavy Heavy (Class 8), which is consistent with the engine classification.

After engines, tires are the second largest contributor to energy losses of vocational vehicles. The proposed program for vocational vehicles for this phase of regulatory standards is limited to tire technologies and hybrid powertrains (along with the separate engine standards). The proposed standards depicted in Table 2 represent emission reductions from seven to 10 percent, from a 2010 baseline.

Table 2: Proposed MY 2017 Vocational Vehicle Standards

	EPA Full Useful Life Emissions Standards (g CO ₂ /ton-mile)	NHTSA Fuel Consumption Standards (gal/1,000 ton-mile)
Light Heavy Class 3-5	344	33.8
Medium Heavy Class 6-7	204	20
Heavy Heavy Class 8	107	10.5

EPA’s Proposed N₂O, CH₄ and HFC Standards

In addition to the CO₂ standards described above, EPA is proposing standards for N₂O and CH₄ emissions. N₂O and CH₄ are important GHGs that contribute to global warming, more so than CO₂ for the same amount of emissions. While today’s gasoline and diesel engines emit relatively low levels of N₂O and CH₄ emissions, EPA’s proposed standards would act to cap emissions to ensure that manufacturers do not allow the N₂O and CH₄ emissions of their future engines to increase significantly above the currently controlled low levels.

Air conditioning (A/C) systems contribute to GHG emissions in two ways – direct emissions through refrigerant leakage and indirect emissions due to the extra load on the vehicle’s engine to provide power to the air conditioning system. HFC refrigerants, which are powerful GHG pollutants, can leak from the A/C system. EPA is proposing a standard of 1.5 percent refrigerant leakage per year, to assure that high-quality, low-leakage components are used in each air conditioning system design for pickup trucks, vans, and tractors.

Program Flexibilities

EPA’s and NHTSA’s proposed HD National Program provides flexibilities to manufacturers in terms of how they could comply with the new standards. These flexibilities are expected to provide sufficient lead time for manufacturers to make necessary technological improvements and reduce the overall cost of the program, without compromising overall environmental and fuel consumption objectives.

The primary proposed flexibility provisions are an engine averaging, banking, and trading (ABT) program and a vehicle ABT program. These ABT programs would allow for emission and/or fuel consumption credits to be averaged, banked, or traded within each of the regulatory subcategories; however it is proposed that credits would not be allowed to be transferred across categories.

In addition to the general ABT programs, EPA is proposing to allow engine manufacturers the added option of using CO₂ credits to offset CH₄ or N₂O emissions that exceed the applicable emission standards based on the relative global warming potentials of these emissions.

The structure of the proposed ABT program for HD engines is based closely on earlier EPA ABT programs for HD engines; the proposed program for pickup trucks and vans is built on the existing light-duty fuel economy credit carry-forward, carry-back, trading and transferring provisions; and first-time ABT provisions are proposed for HD vehicle manufacturers that are as consistent as possible with the provisions for other categories.

The agencies are proposing three additional optional credit opportunities. The first is an early credit option intended for manufacturers who demonstrate improvements in excess of a proposed standard prior to the model year that it becomes effective. The second is a credit program intended to promote implementation of advanced technologies, such as hybrid powertrains, Rankine cycle engines, and electric or fuel cell vehicles. The last is a credit intended to apply to new and innovative technologies that reduce vehicle CO₂ emissions and fuel consumption, but for which the benefits are not captured over the test procedure used to determine compliance with the standards (i.e., “off-cycle”).

Public Participation Opportunities

We welcome your comments on this action. Written comments will be accepted for 60 days beginning when the proposal is published in the Federal Register. All comments should be identified by EPA Docket No. EPA-HQ-OAR-2010-0162 or NHTSA Docket No. NHTSA-2010-0079 and submitted by one of the methods listed in the following table.

You should consult the Federal Register notice for this joint proposal for more information about how to submit comments and when the comment period will close. A copy of the Federal Register notice can be found on the Web sites listed below. Two public hearings will be held, on November 15 in Chicago, IL and on November 18 in Boston, MA. Please consult the separately published hearing notice or the Web sites listed below for detailed information about the public hearings.

Methods To Provide Comments			
	Mail	Hand Delivery	Internet/Email
NHTSA	Docket Management Facility, M-30 U.S. Department of Transportation West Building, Rm. W12-140 1200 New Jersey Avenue, SE Washington, DC 20590	U.S. Department of Transportation West Building, Ground Floor, Rm. W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590, between 9 a.m. and 5 p.m. Eastern Time, Monday through Friday, except Federal Holidays	www.regulations.gov Docket No. NHTSA- 2010-0079
EPA	Environmental Protection Agency, Air and Radiation Docket and Information Center (6102T) 1200 Pennsylvania Avenue NW Washington DC 20460	EPA West building EPA Docket Center (Room 3340) 1301 Constitution Avenue NW Washington, DC	www.regulations.gov Docket No. EPA-HQ- OAR-2010-0162 Email: A-and-R- Docket@epa.gov
Or speak at a public hearing			

For More Information

You can access the proposed joint rules and related documents on EPA's Office of Transportation and Air Quality (OTAQ) Web site at:

www.epa.gov/otaq/climate/regulations.htm

You can access the proposed joint rules and related documents, including the draft Environmental Impact Statement, on NHTSA's Fuel Economy Web site at:

<http://www.nhtsa.gov/fuel-economy>

For more information on these rules, please contact EPA or NHTSA at:

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