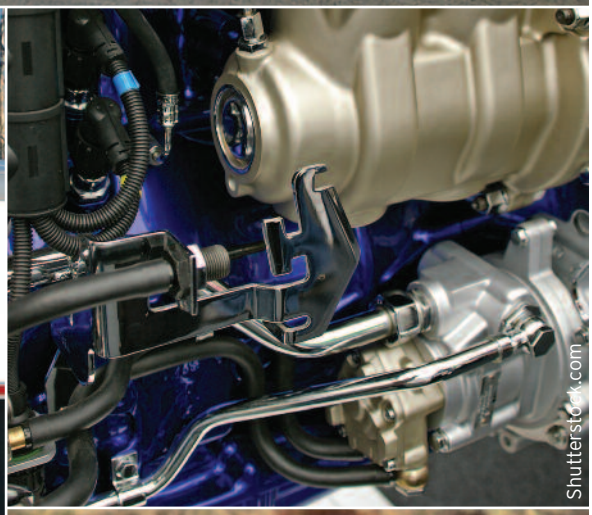
TRUCKS THAT WORK

How new fuel efficiency and greenhouse gas standards will deliver better, cleaner, cheaper-to-operate trucks — and why it matters for truck owners, wildlife and the U.S. economy

NATIONAL WILDLIFE FEDERATION 2011



NATIONAL WILDLIFE FEDERATION

CONFRONTING GLOBAL WARMING

Report

Executive Summary

Steve Hillebrand, USFWS

As the nation looks to cut oil use, enhance national security, reduce pollution and provide relief to consumers from high prices at the pump, the most effective near-term means we have to respond is to deliver more efficient cars and trucks.

At the end of July, US EPA and NHTSA will release the first-ever standards to increase the fuel efficiency of medium and heavy duty trucks. The Heavy Duty (HD) National Program will complement existing and proposed standards for cars and light trucks that are already on track to deliver big benefits to consumers. Up until now these improvements were only required for smaller vehicles, leaving savings on the table for those who need larger trucks.

This report reviews the proposed heavy duty truck standard, with a particular emphasis on the work pickup trucks used in outdoor and natural resource businesses and recreation. We find that new standards deliver.

New technology means trucks that cut pollution while maintaining or improving performance.

These new truck standards help ensure that, increasingly, truck owners do not have to choose between a vehicle that works in the outdoors and one that works for it.

ACKNOWLEDGEMENTS

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Specifically We Find:

The proposed National Heavy Duty (HD) Program delivers major benefits to the nation overall in energy security, cash savings and pollution reduction. **The standard will save** the nation **$35 billion** in fuel costs, **98 million barrels** of oil annually in 2030, and eliminate **246 million metric tons** of carbon pollution over the life of the vehicles covered by the standards.

The HD National Program covers trucks weighing more than 8500 pounds, including large pickups, vans, vocational vehicles (such as transit buses, utility trucks, delivery vans, cement mixers, and school buses) and large tractor-trailers. It requires fuel consumption and carbon pollution reductions of **7 to 20 percent by 2018**, depending on the type of truck.

These standards help individuals, large and small businesses, and government fleets save money and protect tight budgets from the impacts of rising gas prices. While new technology to save fuel does add modest additional cost, those costs are outweighed in all cases by fuel savings.

Owners of the largest trucks — long-haul tractor-trailers — save **$74,000 per truck** after accounting for additional technology cost. Net savings for vocational vehicles averages **$4000**, while work pickup's net savings range from **$3200 to $4950**.

Truck owners start saving on day one if they are paying monthly on vehicles that they've financed or leased. Moving to the more efficient trucks required by the standard protects individuals, businesses and local governments (and therefore the taxpayer) from thousands of dollars in budget overruns should gas prices rise.

These standards boost efficiency while safeguarding power and performance truck owners demand. Existing engine, transmission, body and tire technology delivers significant efficiency gains through innovation that often also provides power, acceleration or utility benefits. In fact, no efficiency technology considered by the agencies to meet the standard has a negative impact on performance.

While medium duty work pickups such as the Dodge Ram 2500 or F350 are covered by the Heavy Duty (HD) National Standard, similar, lighter pickups, such as the F150 or Dodge Ram 1500 are covered under the recently enacted 2012-2016 Fuel Economy and Greenhouse Gas Standards for cars and light trucks. The Light-duty Program requires somewhat more rapid fuel efficiency improvements for light-duty pickups. This translates into somewhat greater cost savings and quicker payback for those truck owners.

The technology being adopted to meet the light truck standards, as well as other innovation, suggest a roadmap for ongoing efficiency improvements and cost savings for larger trucks.

The new car and truck standards, and the innovation that goes with them, also provide a roadmap to safeguard and grow hundreds of thousands of jobs.

The new standards are a win-win for America. As we increase efficiency of all vehicles, we put money back to work in our homes and businesses, and reduce the need to make destructive energy choices. We build the next generation of technology and jobs in America, and help protect our natural resource heritage for our children.

MORE VEHICLES, MORE SAVINGS: NEW CLASSES OF TRUCKS TO BE COVERED BY EPA/NHTSA HEAVY DUTY (HD) NATIONAL PROGRAM

The EPA/NHTSA light-duty Vehicle Standard covers cars and trucks under 8,500 lbs
These vehicles have been covered by fuel efficiency standards since 1979. New standards are effective for 2012-2016 and being developed for 2017-2025

CLASS 1
6,000 lb & less

Multi-purpose

Utility Van

Mini Van

Full-size Pickup

CLASS 2a
6,001 to 8,500 lb

Mini Van

Full-size Pickup

The Heavy Duty National Program will cover trucks weighing more than 8,500 lbs.
These vehicles are being covered by fuel efficiency standards for the first time

CLASS 2b
8,500 to 10,000 lb

Step Van

Utility Van

Full-size Pickup

CLASS 3
10,000 to 14,000 lb

Walk-in Van

Conven-tional Van

City Delivery

Utility Van

Full-size Pickup

CLASS 4
14,001 to 16,000 lb

Conven-tional Van

City Delivery

Large Walk-in

CLASS 5
16,001 to 19,500 lb

Bucket

Large Walk-in

City Delivery

CLASS 6
19,501 to 26,000 lb

Beverage

Single-axle Van

School Bus

Rack

CLASS 7
26,001 to 33,000 lb

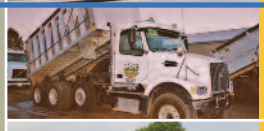
Refuse

Furniture

City Transit Bus

Medium Conventional

CLASS 8
33,001 lb & over


Dump

Cement

Heavy Con-ventional

COE Sleeper

1. FIRST- EVER HEAVY TRUCK STANDARDS

At the end of July, US EPA and NHTSA will release the first-ever standards to increase the fuel efficiency of medium and heavy duty trucks. The new standard will ensure fuel savings across these trucks of 7 to 20 percent by 2018.[1] Up until now such improvements were only required for smaller vehicles, leaving savings on the table for those who need larger trucks.

The Heavy Duty (HD) National Program will complement existing and proposed standards for cars and light trucks that are already on track to deliver big benefits to consumers and to energy security.

The new standards couldn't come at a better time.

Rising gas prices this year have been tough on all American households — and they have been particularly tough on those whose lifestyle or business requires a larger vehicle.

Trucking companies that move freight, commercial fleets, and small businesses with work trucks all face higher costs when fuel prices go up — costs which are passed on to other businesses and consumers.

As gasoline and diesel prices rise, the cost of traveling to hunt, fish, camp and hike also rises, impacting individuals who enjoy the outdoors and businesses that rely on tourism and outdoor recreation. The cost of protecting our natural resources also rises because the municipal, state and federal agencies which maintain our cities, parks and public lands also rely on fleets of light, medium and heavy-duty vehicles.

In a climate of ongoing concern over energy security and high costs, individual households, public agencies and private businesses will now have more opportunity to take control at the pump with new technologies that use less fuel.

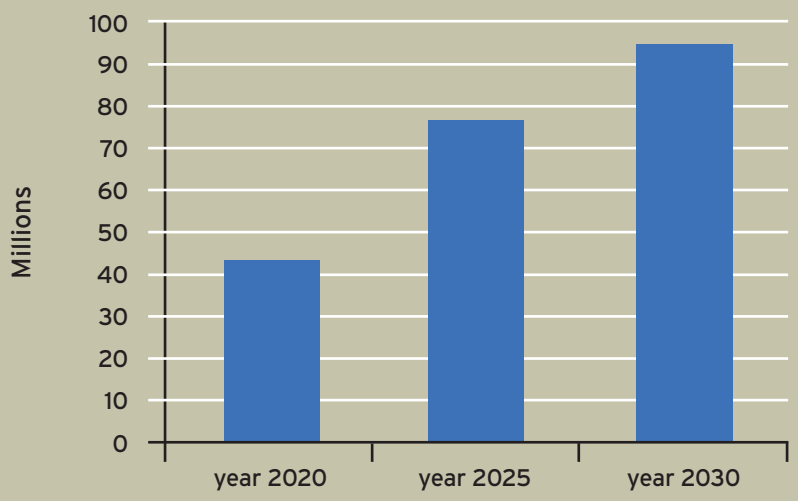
New standards deliver energy security, cash savings, and pollution reduction

The new HD standards will reduce U.S. oil consumption by 47 million barrels of oil annually by 2020, 80 million by 2025 and 98.5 million by 2030.[2] Cumulatively, the medium and heavy-duty trucks built under the 2014 and 2018 standard will save 500 million barrels of oil over their lifetime on the road.[3]

In addition to helping curb US oil dependence, these reductions in oil use mean big cash savings as well. The new standards save truck owners $35 billion on fuel, and deliver total net savings of $41 billion in economic and social benefits to Americans as a whole.[4] Owners and operators of the largest vehicles on the road — tractor-trailers or "semis" — are projected to save $74,000 net per truck over the life of these vehicles.[5]

Cost/benefits of EPA/NHTSA Medium and Heavy Duty Truck Standards	
Total social and economic benefits	$49 billion
Cost of implementation	$7.7 billion
Net benefits	**$41.3 billion**

BARRELS OF OIL SAVED ANNUALLY



Charts Source: Value of fuel savings, carbon pollution reduction: "Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicle," Environmental Protection Agency and National Highway Traffic Safety Administration, Federal Register, November 30, 2010. Annual oil savings estimated by ACEEE using Argonne National Labs Vision model.

The benefits of these fuel savings will cycle throughout the U.S. economy, in the form of lower transportation costs for consumer and industrial products.

Medium and heavy duty vehicle are far less numerous that passenger cars and trucks; they make up just 4 percent of the vehicles on the road, but account for 17 percent of transportation oil consumption.

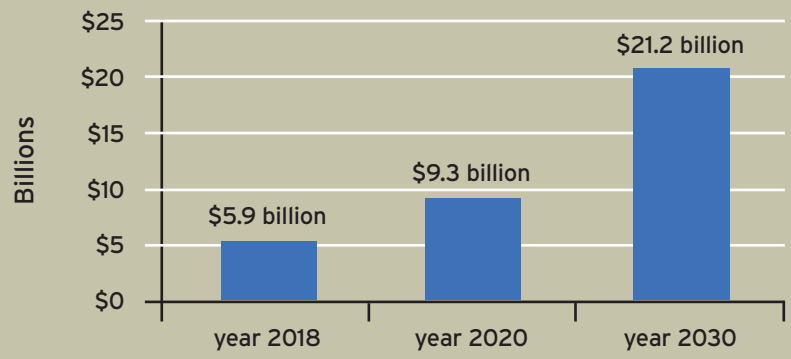
Medium and heavy duty vehicles are currently a growing contributor to U.S. carbon pollution, and these standards ensure both oil reduction and important action to address climate change. Heavy duty vehicles currently account for 20 percent of greenhouse gas pollution from the transportation sector and six percent of all U.S. carbon pollution.

The standard will cut carbon pollution more than 50 million metric tons (MMT) annually by 2030, and over their lifetime on the road vehicles produced under the standard will cut carbon pollution by 246 MMT.

While many other industries drag their feet, the trucking industry now follows the auto industry to show that effective carbon pollution reduction

HD NATIONAL PROGRAM: VALUE OF FUEL SAVINGS

(2008 dollars)

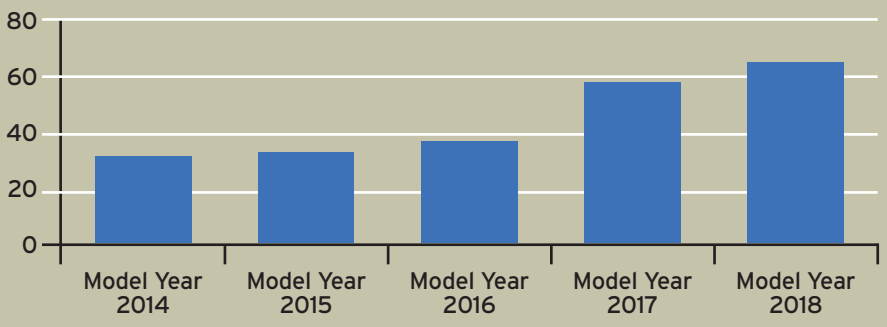


can be done. Compared to model year 2010 trucks:

- **Tractor-trailers** will cut their carbon pollution seven to 20 percent by 2017, depending on vehicle size and configuration.
- **Vocational vehicles** — including buses, bucket trucks, straight trucks and others will make carbon pollution cuts of 7-10 percent
- **Class 2B gasoline-fueled pickup trucks** will cut carbon pollution 12 percent and diesel-fueled pickup 17 percent by 2018

These targets include both the carbon pollution reductions that come from cutting petroleum use (mainly carbon dioxide,(CO_2), and reductions in nitrous oxide (N_2O) methane (CH_4) and refrigerant hydrofluorocarbon

REDUCTION IN CARBON POLLUTION FROM TRUCKS BUILT UNDER THE PROGRAM (Millions of Metric Tons)



(HFC) emissions — also potent greenhouse gases.

Current gas and diesel engines emit relatively low levels of nitrous oxide and methane, and the proposed standards cap emissions to prevent future increases. HFC refrigerants, which leak from motor vehicle air conditioning systems, are also a major contributor to climate change. The HD National Program also proposes a standard which reduces HFC leakage to 1.55 percent per year.

CLIMATE CHANGE

Climate change threatens the well being of people and wildlife worldwide. Taking prompt steps to implement win-win energy solutions like more efficient cars and trucks is essential to head off the worst future impacts.

In the US, events brought on by a changing climate, such as extreme weather, drought and floods threaten people's well being and public health. For wildlife, rising temperatures threaten:

- **Trout and salmon that face population decline in warmer waters.**
- **Prairie potholes and other transitory wetlands that are critical breeding grounds for ducks and other migratory waterfowl throughout North America.**
- **Moose, elk, polar bear, seals and other large fauna that depend on cold weather habitat ,and whose range is shrinking or disappearing.**

Petroleum is the largest source of carbon pollution in the US by fuel — even larger than coal. Fortunately we have solutions — like better and cleaner vehicles — that make big cuts in climate pollution while also making life better for families and businesses.

Background:

Fuel efficiency regulations for medium and heavy duty trucks were mandated by Congress as part of the bipartisan Energy Independence and Security Act of 2007, signed into law by President Bush. Around the same time, the Supreme Court ruled that the USA EPA should control greenhouse gases from sources such as cars and trucks along with other air pollution under the Clean Air Act.

To meet these legal obligations, and the needs for oil savings, public health and natural resource protection, U.S. EPA and NHTSA announced that they would set joint standards on fuel economy and carbon pollution emissions in May, 2010. They acted to implement a presidential memorandum on improving energy security, competitiveness, job creation, and environment through transformation of the nation's vehicle fleet.[6]

By working together, the two agencies ensure one streamlined national program for industry. They also ensure that fuel efficiency goals will not compromise pollution reduction goals and vice versa — and that new technology requirements for engines and vehicles meet technical, cost, pollution and public health objectives.

US EPA and NHTSA issued a proposed standard in November, 2010.[7] Following public comment, final standards will be issued at the end of July, 2011.

The medium and heavy-duty truck standards are a critical first step, bringing efficiency targets for the first time to a wide variety of previously unregulated vehicles. Similar to the car and light truck standards announced in May 2009, the HD National Program proposal was welcomed by a broad range of industry, government and public interest stakeholders.[8] The US is a leader in large vehicle manufacturing, and new standards can reward innovation by truck and engine manufacturers, while they contribute to real environmental progress and save billions for truck owners and operators.

The data and analysis we present in this report is based on the proposed standard. We anticipate some technical revisions, but no major changes in outcomes or direction in the final standard due out in July. Any adjustments as a result of the final rule will be provided in a subsequent update to this report.

What vehicles are covered?

Medium and heavy duty trucks are defined as those with a Gross Vehicle Weight Rating (GVWR) of greater than 8,500 pounds; GVWR measures the weight of vehicles when fully loaded with driver, passengers and cargo.

These proposed standards will cover all on-road vehicles larger than 8500 lbs.-except for certain large passenger SUVs and vans already covered under the light-duty standards) ; that includes large pickup trucks and vans; work and municipal vehicles like utility trucks, delivery vans, cement mixers and others; school buses; transit buses and the large tractor-trailers that move freight across our nation's highways. The standards outline fuel efficiency and carbon pollution improvements effective starting in 2014 through 2018.[9]

Smaller pickup trucks with a weight rating of less than 8,500 pounds — are not covered by the HD National Program.These vehicles (in class 1 and 2A) such as the Ford F-150 or the Dodge Ram 1500, are covered by new US EPA/NHTSA standards for cars and light trucks, which are in effect now for model year 2012 and are set to achieve fuel consumption improvements for this class of trucks of about 17 percent by 2016 and up to 20 percent by 2018.

Fuel consumption improves for all vehicles

The HD National Program includes a number of very different types of vehicles — and sets standards both for vehicles and/or engines in three basic classes: Combination tractors (or semis — that pull trailers), vocational vehicles, and heavy duty pick-ups and vans. Taken together, from a model year 2010 baseline, the new EPA/NHTSA HD Program will require an improvement in medium and heavy duty truck fuel consumption of between six percent and 20 percent by 2018.

Under the standard, the largest vehicles, Tractor-trailers will achieve fuel consumption improvements of 7-20 percent by 2017, depending on the weight class, cab type and roof height. The standard covers only the tractor portion of the tractor-trailer.

The vocational vehicle sector is extremely diverse. It includes transit and school buses, cement mixers, delivery trucks, beverage trucks, utility bucket trucks, walk-in vans and others. The HD program sets standards for the engines used by these vehicles in three weight classes (light heavy, medium heavy and heavy heavy), as well as for tires and hybrid powertrains. As a whole, vocational vehicles will be required to improve fuel consumption by 7 to 10 percent by 2017.

The HD Program sets a whole vehicle 'corporate average fuel efficiency' standard for HD pick-ups and vans — similar to that used in the LD Program for cars and smaller trucks. On average, gasoline-fueled work pickups will be required to reduce fuel consumption by 10 percent by 2018; diesel pickups will have a 14 percent requirement. For gasoline pickups this is equivalent to a 12 percent fuel economy improvement from approximately 14.9 mpg on

FIGURE 1. FUEL CONSUMPTION REDUCTION* TARGET FOR HEAVY-DUTY VEHICLES[11]
(Baseline = Model Year 2010)

	Model year	2010 fuel economy	2014	2015	2016	2017	2018	2019	2019 +	2018 fuel economy
	US EPA program		Mandatory							
	NHTSA program		Voluntary		Mandatory					
	Class 2B Gasoline pickup trucks and van	14.9 mpg	3%	3%	4%	7%	10%			16.7 mpg
	Class 2B Diesel pickup trucks and vans	14.5	1%	3%	6%	9%	14%			17
	Class 2B thru 8 Vocational vehicles		5-7%			7-10%				
	Class 7 and 8 Combination trucks		Class 7: 6-9%, Class 8: 6-18%			Class 7: 7-11%, Class 8: 7-20%				
		current standards							pending	
	Class 2A pickup trucks covered under the Light-duty standard	20.6	2012: 8%	2013: 10%	2014: 11%	2015: 14%	2016: 17%	24.7	2017: 18-20%	2018: 25-26

This chart shows cumulative fuel consumption targets for the classes of vehicles covered under the HD program. In the shaded columns it also shows the fuel economy levels that would be achieved by these fuel consumption reductions. The distinctions between fuel consumption and fuel economy are discussed in more detail in endnote 10. Additional information on sources can be found in endnote 11.

average in 2010 to 16.7 mpg in 2018.[10] For diesel pickups this is a 17 percent fuel efficiency improvement from an average of 14.5 mpg in 2010 to 17 mpg in 2018.[12] The fuel consumption target varies for different types of pickups based on a "work factor" that takes into account vehicle payload and towing capacity and 4 wheel drive capability. A more detailed description of how fuel economy targets are set for heavy duty pickups is included in appendix.

In Figure 1, we also include the fuel consumption and average mpg targets that will be achieved over the same time period by smaller pickup trucks such as the F150 or Chevy Silverado, that are covered under the Light-duty National Program. That program goes into effect two years earlier than the heavy duty program.[13] These pickups will reduce fuel consumption by 17 percent and reach a fuel economy of about 24.7 mpg by 2016. With modest continued improvements in the first years of the next phase of light-duty standards (which have just been outlined), by 2018 these pickups will likely achieve approximately 18-20 percent fuel consumption reductions relative to 2010 and an mpg of 25-26 mpg. Light duty pickups are tested differently from heavy duty pickups. When the mile per gallon targets for the 2A pickups are adjusted to take into account testing at closer to maximum payload they would likely reach around 23 mpg in 2018.

While the heavy duty diesel pickup's 2.5 mpg improvement from 14.5 to 17 mpg may sound small it represents a 14 percent improvement in fuel consumption in a class of vehicles that use comparatively large quantities of fuel. Accordingly, its absolute impact on fuel savings is significant, and underscores why standards for larger vehicles are so essential for meeting our national energy security goals.

At the same time, while true work trucks may be used differently from their smaller counterparts, the largest light-duty pickup trucks and the smallest heavy duty vehicles often use very similar engines, transmissions and vehicle technology. Technology used to meet the more stringent light-duty standard can aid truck manufacturers in meeting the 2014-18 HD standards and create opportunities to exceed it.

KEEPING THE CLEAN AIR ACT WORKING FOR SPORTSMEN AND ALL AMERICANS

For decades, hunters, anglers and other sportsmen and natural resource leaders have been at the forefront of ensuring we protect the nation's natural resources.

The conservation community was a leader in passing the Clean Water and Clean Air Acts in the 1970's and continues that leadership today on issues such as mercury air pollution from coal-fired power plants that ends up in rivers, lakes, fish and other wildlife. Mercury moves up the food chain to harm wildlife and public health and results in widespread fish consumption advisories including for some of our most popular sport fish.

The Clean Air Act provides the basis for the current proposal to cut greenhouse gas pollution from trucks. By ensuring that all vehicles cut their oil use and the pollution that causes climate change, these standards help sportsmen and others who enjoy the outdoors, and protect our natural resource heritage for our children, while driving the vehicle they use to enjoy it.

USFWS

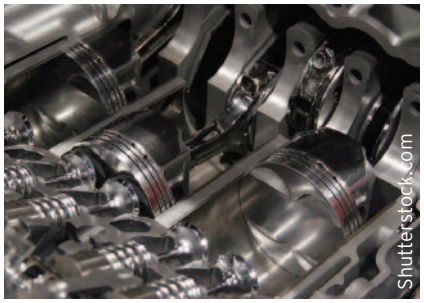
Not surprisingly, these new vehicle standards are broadly supported. Across the US, polls have repeatedly shown that large majorities of Americans support the strongest fuel efficiency standards. What's more, polls also show that the public believes they are a win-win on cost savings, national security, pollution reduction and the economy. A recent poll found that even in Michigan and Ohio — the heart of America's auto industry — the public supported strong standards for light vehicles by a four-to-one margin, and believed American innovation would create new jobs, not cut them.

The same win-wins exist for medium and heavy-duty trucks: whether we're a family, a small business, municipality, or major corporation, we all win with better, cleaner, more affordable transportation.

Driving forward

Developing the HD National Program required significant technical and engineering analyses, across an extremely diverse sector. The standard is a critical first step to ensure appropriate mechanisms are put in place across many different kinds of vehicles and vehicle use. The standards require comparatively modest efficiency improvements in some classes, however, leaving some oil, pollution, and cash savings on the table. As the agencies consider the next round of standards, a number of opportunities exist to increase fuel and consumer savings, including:

- **Help speed improvements to trailers, not just tractors.** The current standard only requires changes to tractors, but many relatively inexpensive aerodynamic and other changes to trailers can achieve significant additional fuel savings. Also, moving to a whole vehicle approach in vocational trucks could also help ensure that efficiency improvements are captured across a wider range of vehicle components and systems in this segment.
- **Draw on innovation in light duty vehicles to help achieve greater fuel savings in heavy duty pickups**. Smaller pickup trucks will improve fuel efficiency both earlier and faster than the heavier pickups, using technology often applicable to both. The agencies could consider mechanisms to incentivize adoption of additional efficiency in heavy duty pickups and vans, even before a next round of standard making.
- **Provide window labels for heavier vehicles.** The agencies can also address another missing piece for pickup truck consumers — no fuel economy window labels exist for the vehicles covered by the HD standard. A prospective Dodge Ram 1500 or Toyota Tacoma customer can refer to a standard label on the truck window in the dealers lot for the fuel economy, emissions performance, and annual fueling costs, no such labels exist for 250's or 3500's. While big fleet buyers are likely to research fuel consumption and emissions profiles, individuals and smaller businesses should not have to dig to find fuel savings. The HD National program and the Light-duty standards are already driving impressive improvements in truck technology — consumers should have all the information they need to reward that innovation with a purchase.



Feature

Comprehensive vehicle standards:

WORKING TOGETHER YIELDS IMPRESSIVE RESULTS

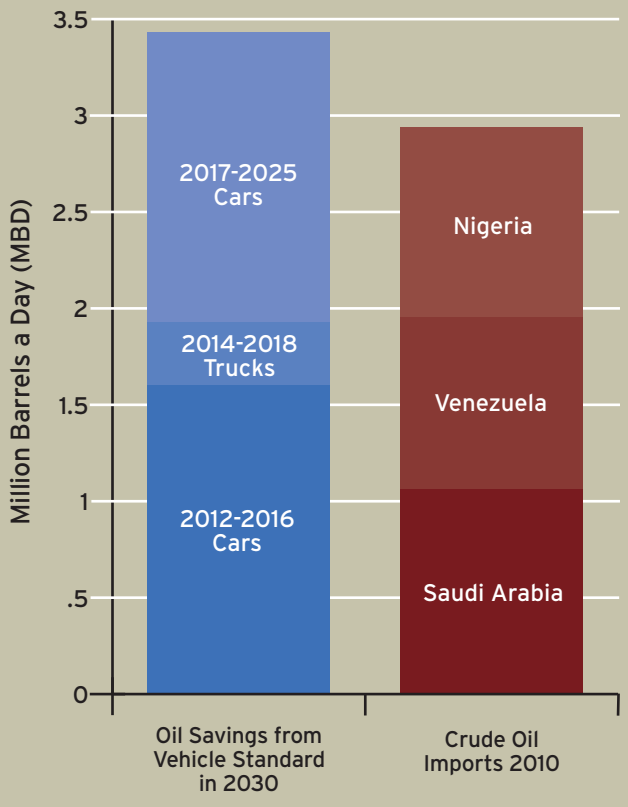
In December 2007 the bipartisan Energy Independence and Security Act set the stage to significantly raise the corporate average fuel economy (CAFE) standards for cars and light trucks vehicles for the first time in decades, and required new standards for larger trucks. Also in 2007, the Supreme Court ruled that under the Clean Air Act, the EPA should set standards for carbon pollution from cars and trucks, and other sources, as it does for other air pollutants.

Since 2009, the Administration has brought together government, public and industry stakeholders to develop and implement a national program which meets energy security, public health, environmental and economic obligations of these laws.

In May of 2009, the administration stood with the industry to announce standards for new cars and light trucks for model years 2012 to 2016. These standards brought together the regulatory approaches of EPA, NHTSA, and the state of California, providing a national program. Under the standard enacted in 2010, cars and trucks will reach an average of 34 miles per gallon by 2016, cut oil use by 1.6 million barrels a day, and cut carbon pollution deeply. In July 2011, the administration announced a similar agreement on a framework to extend these standards to 54.5 mpg by 2025. A timeline showing the steps in extending fuel efficiency for cars, and bringing enhanced fuel efficiency standards for the first time to heavy duty trucks, is shown on page 14.

Each of these steps has been publicly welcomed by a diverse range of stakeholders — including auto and component manufacturers, labor unions, national security voices and environmental organizations — because they would save billions of barrels of oil and create critical regulatory certainty for industry, while helping to put the US manufacturing sector on a path

FIGURE 2. OIL SAVINGS FROM VEHICLE STANDARDS VS FOREIGN OIL IMPORTS



toward growth, new jobs, and global competitiveness. When the development of a national program to improve fuel efficiency of medium and heavy duty trucks was announced in May 2010, it was also welcomed by manufacturers who also noted its important role in addressing carbon pollution, fuel efficiency and energy security.[14]

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The structure of the standards has also changed to make them more fair for industry and consumers. The standards now drive innovation and fuel savings for all sizes and types of vehicles consumers rely on — rather than pushing shifts between kinds of vehicles to meet, or evade, the standard.

These standards are not just supported by industry, but by the American public who in poll after poll overwhelmingly support strong standards that bring improved vehicles and fuel efficiency. That support makes sense because these standards deliver huge benefits to drivers and to America.

When both car and light truck, and medium- and heavy-duty standards are considered, the combined fuel savings and carbon emission reductions are impressive: By 2030, the three sets of standards would cut 639 million metric tons of greenhouse gases annually in 2030 or about 10% of total US carbon pollution today. The standards will also save 3.4 million barrels of oil per day — more than we get from Saudi Arabia, Nigeria, and Venezuela today combined.[15]

Taken together, these standards are by far the most effective, most certain and most rapid means to enhance American energy security and cut Americans' pain at the pump.

"Gas mileage is definitely important, and we're concerned about carbon footprint. I also worry with the supply of fuel, prices are going much higher. Our next vehicle has to be more fuel efficient – and I'm glad to see domestic companies getting out in front on the latest technology. There are a lot of auto and truck jobs in Ohio, so it's good for our economy when the newest, most advanced vehicles are built here."

JIM WENTZ
Angler and owner of Silvertip Productions, Winchester, Ohio.

He drives a 4X4 Chevy Silverado for business and recreation.

Fuel Efficiency Timeline

2007

APRIL:
Supreme Court rules that EPA should set standards for carbon pollution under the Clean Air Act, as it does for other air pollutants.

DECEMBER:
Bipartisan Energy Independence and Security Act (EISA) requires EPA and DOT to set new fuel economy standards for light-duty and heavy-duty vehicles.

2008

Financial crisis hits. Recovery Package includes Auto Recovery Loans.

2009

Obama Administration begins coordination between federal agencies and California to develop one national program for fuel efficiency and carbon pollution from cars and trucks.

Recovery Act includes public/private investments in retooling to manufacture next generation vehicles and components

CAR AND LIGHT TRUCK STANDARDS 2012-2016

MAY 2009:
Broad agreement announced on proposed standards for cars and light trucks for 2012-2016

MEDIUM AND HEAVY DUTY TRUCK STANDARDS 2014-2018

CAR AND LIGHT TRUCK STANDARDS 2017-2025

Cars and light trucks must reach 35.5 mpg by 2020

Average fuel economy today–25mpg

2010

NWF

APRIL 2010:
Final standards enacted. Requires cars and light trucks to reach 35.5 mpg by 2016.

MAY 2010:
Notice of intent to set medium and heavy-duty trucks for years 2014-2018 standards proposed in November 2010

MAY 2010:
US EPA and NHTSA also announce intent to develop standards for cars and light trucks for years 2017-2025

Cars and light trucks must reach 35.5 mpg by 2016

2011

New domestic fuel efficient vehicles sell strongly as gas prices rise. Auto recovery plays big role in economic recovery

Flickr: DiamondBackTruckCovers

JULY 2011:
Final truck standards expected

JULY 2011:
Agreement on framework for standards

SEPTEMBER 2011:
Proposed standards expected

As proposed, heavy-duty trucks must cut fuel consumption 7 - 20% by 2018

2012

NWF

JULY 2012:
Final standards expected

As proposed, cars and light trucks must reach 54.5 mpg by 2025

2. DELIVERING SAVINGS FOR TRUCK OWNERS

A sound return on investment:

FUEL SAVINGS QUICKLY OUTWEIGH COST OF NEW TECHNOLOGY

At a time of rising fuel costs and tight budgets, the new fuel economy and pollution standards for trucks will deliver welcome cost savings to households, businesses large and small, and to municipalities and public agencies — and through them to taxpayers.

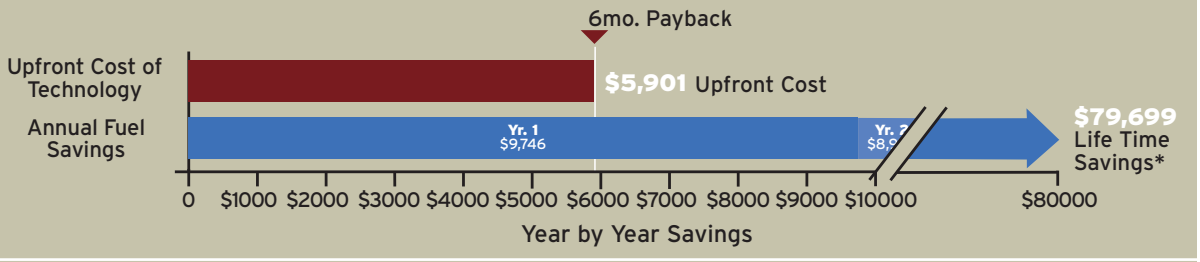
In order to meet the new standards, manufacturers will have to add new technology to their vehicles. This technology will add modest additional cost to the new trucks. These costs, however, will be outweighed by the fuel savings that truck owners will achieve as a result of the new technology.

The savings are largest for the largest vehicles, which use the most fuel, but paybacks are very positive for all truck classes.

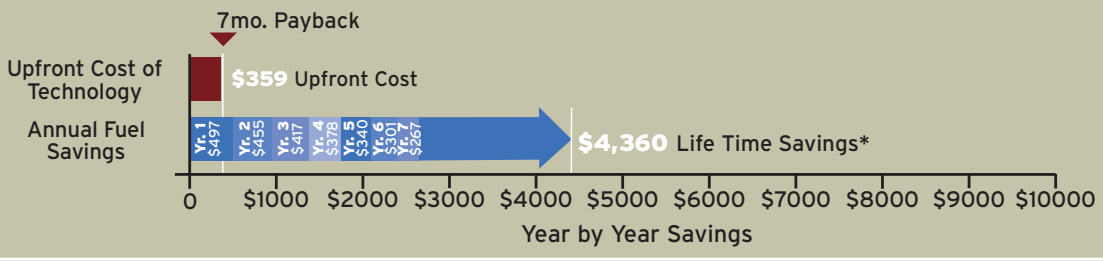
- **Owners and operators of tractor-trailers** will see net **savings of $74,000** over the life of their vehicles, with a payback period for new technology of less than one year.
- **Class 2B through Class 8 vocational vehicles**, such as delivery vans, cement mixers and garbage trucks, will realize an average of **$4,000 in savings**, also with a payback period of less than one year.
- **Class 2B and Class 3 large pickup trucks and van** see **savings of $3200 to $4950** over the life of the vehicle, with an estimated payback in 2-4 years.

FIGURE 3. UPFRONT COST, FUEL SAVINGS AND PAYBACK FOR HEAVY DUTY TRUCKS

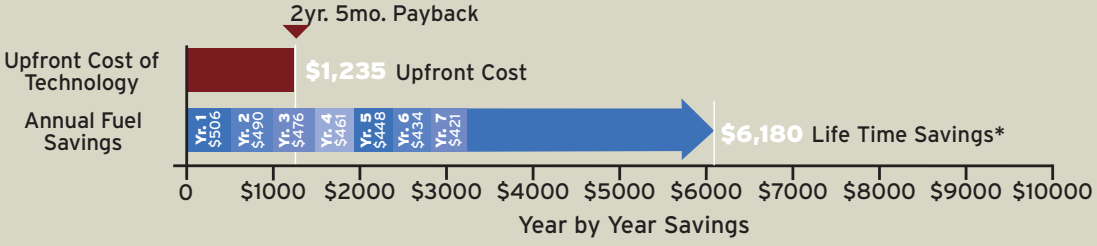
PAYBACK: Tractor Trailer



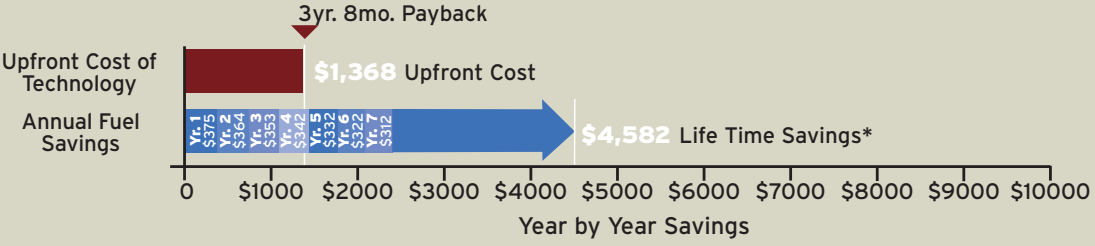
PAYBACK: Vocational Vehicles



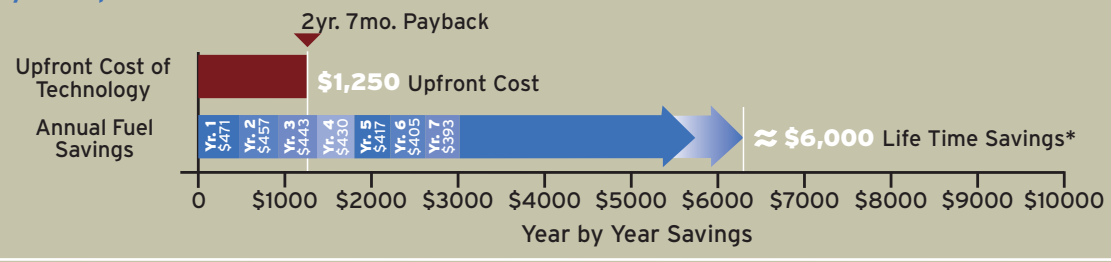
PAYBACK: Heavy Duty Pickup Diesel



PAYBACK: Heavy Duty Pickup Gas



PAYBACK: Light Duty Pickup 2018



Source: For Combination Tractors and Vocational Vehicles, upfront costs and fuel savings come from EPA/NHTSA/DOT Medium and Heavy-Duty Proposed Rule. Data for HD Pickups comes from ACEEE analysis of EPA data; Light duty analysis NWF and ACEEE based on EPA data from the LD 2012-2016 Final Rule and 2017-2025 Light-duty Supplemental Notice of Intent. All assume a 3% discount rate and AEO projected fuel prices. Only the combination tractors and vocational vehicles assume rebound driving effects.

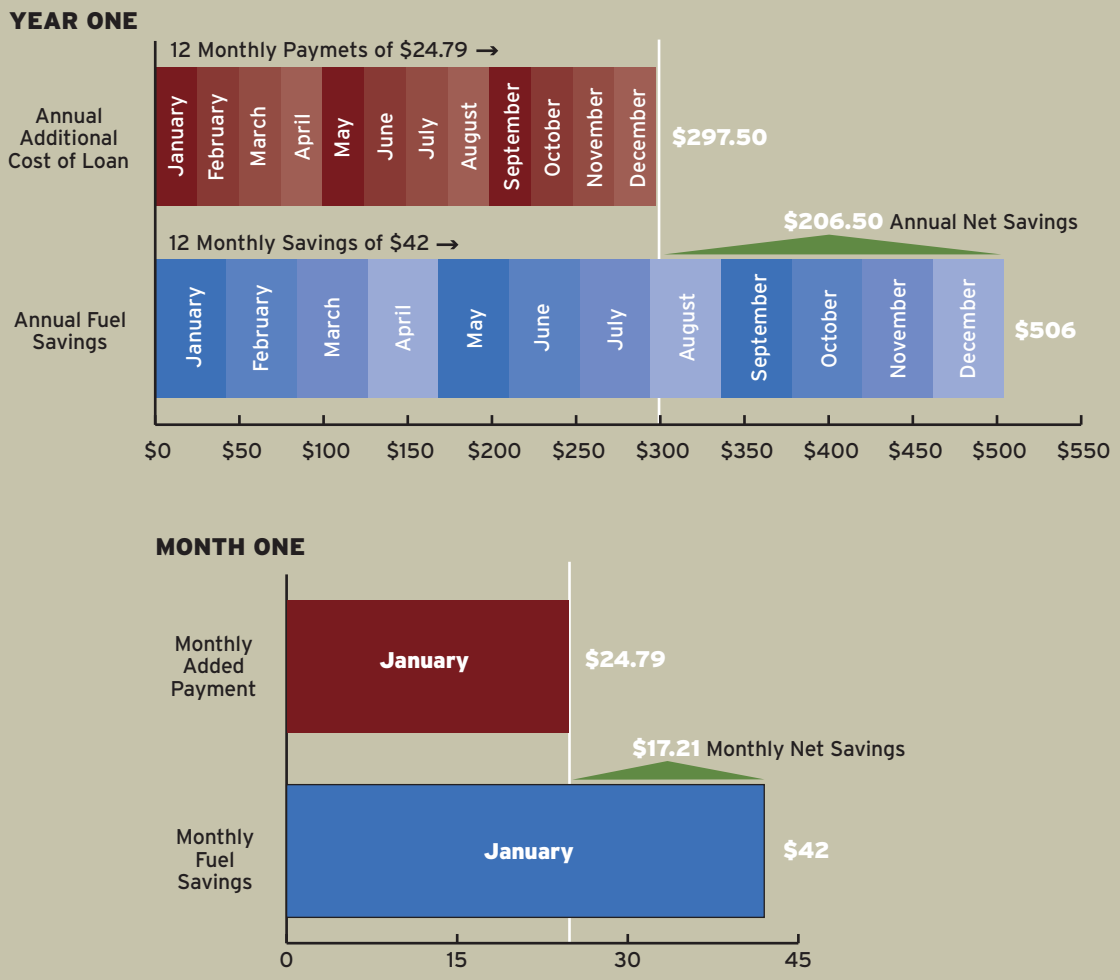
NWF

Savings right away

As the Figure 3 payback diagram shows, the money saved over the lifetime of all new trucks is significant. But most truck owners will not have to wait years or even months for a payback. Since many vehicles are not purchased in cash, but financed or leased with monthly payments, the added costs of the new technology are spread out over time, as are the fuel savings which begin the first day a truck owner drives his or her new vehicle.

The greater the fuel efficiency increases, the larger the savings on day one. But even where efficiency improvements are more modest — as in gasoline-powered heavy duty pickups — owners come out even or ahead immediately on a monthly operating cost basis while they are making payments on their vehicle — and clearly ahead thereafter. At the same time they gain other benefits in terms of new vehicle features, less exposure to gas price increases, and in contributing to environmental, energy and national security.

MONTHLY OPERATING COSTS



Assumptions: Based on additional upfront loan costs of $1,235 as shown in Figure 3 financed over 5 years at 6.54%

BRIAN PRESTON
Member Michigan United Conservation Clubs
Hunter, Angler
Colonel, National Guard

"I have to have a truck, because I hunt and fish – I've got to haul two kayaks, one canoe, four bicycles and all the required camping gear, and I pull a small-size boat. Here's what's really getting my attention: I can't fill up my truck any more without restarting the pump, because the pumps are set to shut off at $100. For the first time in my life, I've heard friends of mine talk about not going hunting because they can't afford that tank of gas. I would love to have – and I would pay extra for – a truck that got 35 miles per gallon. With the trucks they've got now that get 20-plus mpg, I'm doing the math whether it's worth trading in my 2-year old vehicle, because it only gets 15 miles per gallon."

Cutting gas prices & balancing budgets

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In addition to a short term payback, fuel efficiency improvements in heavy duty trucks put money back in truck owners, businesses, and taxpayers' pockets over the long term, and protect them from risks of volatile gas prices. As the chart on the next page shows, when we look at total fuel budgets, even relatively modest annual fuel savings add up, and they are one of the best measures families, businesses and governments have to protect their budgets against the risk of rising fuel prices.

With new, more efficient trucks and stable fuel prices, households, small and large businesses and governments (and through them the taxpayer) see significant savings that can be spent on other products, services, or on creating jobs. If fuel prices rise, more fuel efficient vehicles provide an insurance policy against a budget crunch.

At today's diesel prices of $3.95/gal, the approximate annual fuel cost for an individual diesel work pickup that gets 14.5 mpg and drives 15000 miles per year is $4086. If that truck owner moves from his current 14.6 mpg truck to a truck that gets 17mpg — as will be required by 2018 under the standard — –his annual fuel budget will drop to $3485. It cuts his or her annual spending on fuel by $601.

With the more efficient vehicle, if diesel prices rise, the truck owner's annual fuel budget doesn't reach what he's paying today until prices average $4.63. If prices rise further, to $5, he pays slightly more than today — $4412, but far less than the $5172 he would pay if the fuel efficiency of his vehicle hadn't increased. Put differently, with the more efficient truck he has achieved sure fuel savings under every price scenario, he has protected his absolute fuel budget against significant price rise, and he has protected his household spending against a major risk should gas prices rise even further.

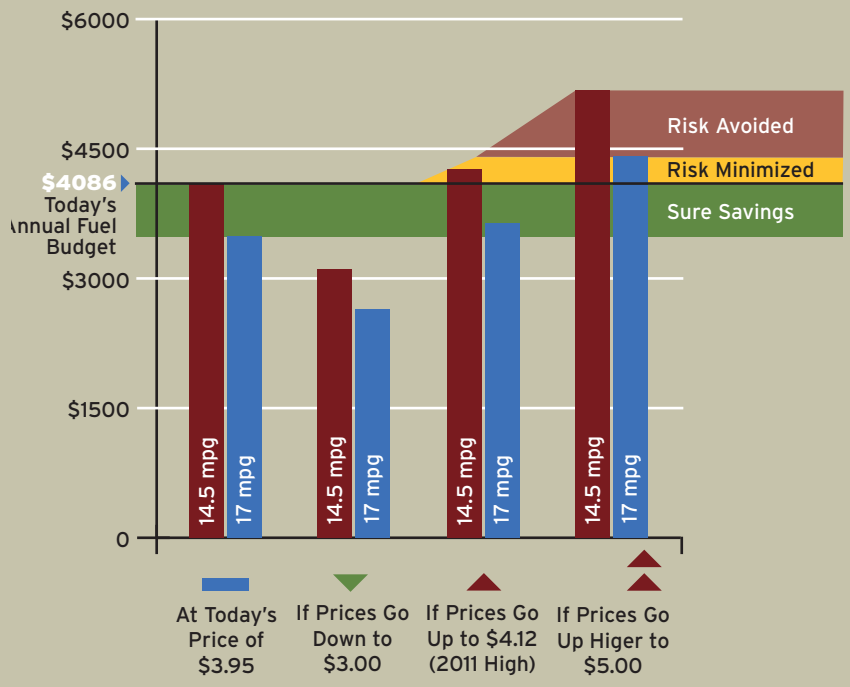
Commercial work pickups and vans drive between 15000 and 40000 miles per year on average according to the 2010 National Academy of Sciences (NAS) Study on Technologies and Approaches for Reducing Fuel Consumption of Medium- and Heavy-Duty Vehicles. For a small business person who owns three pickups, driving at the low end of this mileage range, his or her annual fuel budget is $12,259 today. The new standards would save him $1800/yr at today's gas prices and keep his budget from an annual $2300 overrun if prices rose to $5. If her fleet is made up of vans driving 40000 miles per year, those savings rise to $4800 per year and protect her from the risk of an annual $6000 overrun.

These standards also mean savings and budget security for municipalities and states, all of whom rely on fleets of trucks. For example, the State of Michigan Department of Natural Resources and Environment operates 275 class 2B and 3 work pickup trucks.[16] The fuel economy improvements under the new standards would save the department roughly $165000 per year at today's prices and protect taxpayers from a downside risk of budget overruns of $209,000 per year if prices rose to $5. These numbers reflect the savings from pickup trucks only in the one agency. If the whole state government were included, and also the straight trucks, buses, vans and other vehicles that are part of the state fleet, total savings for the state and taxpayers as a result of the new standard would be much greater.

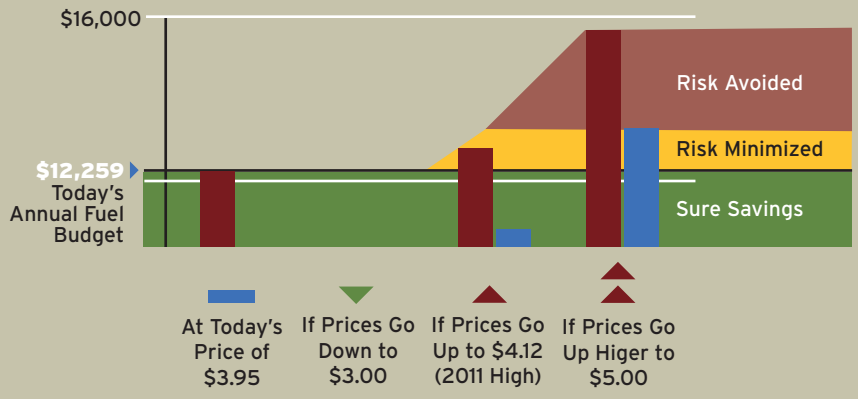
Flickr: mliu92

PROTECTING HOUSEHOLD, BUSINESS AND GOVERNMENT BUDGETS:

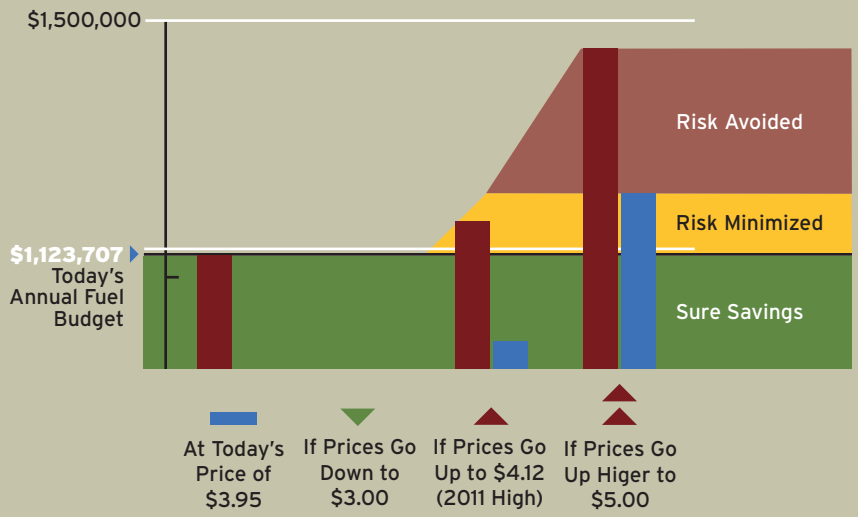
FUEL SAVINGS FROM MOVING TO THE MORE EFFICIENT HEAVY DUTY WORK TRUCKS UNDER VARIOUS GAS PRICE SCENARIOS



Individual Heavy Duty Diesel Pickup



Small Business with a Three Truck Fleet



State Natural Resource Agency: 275 Work Pickups

3. AMERICAN INNOVATION DELIVERS THE GOODS

New standards, new investment and consumer demand are currently driving a renaissance in vehicle technology innovation. Truck manufacturers have a range of options available — from advanced engines and transmissions to improved tires — to meet the requirements of the HD National Program.

Equally important, currently available technology can deliver significant improvements both in fuel efficiency and pollution reduction and in vehicle power and performance.

Technology to greatly increase fuel efficiency is available today

The technology available to improve fuel efficiency in medium and heavy duty trucks falls into four basic categories: engine improvements, transmission improvements, vehicle improvements such as aerodynamics and tires, and changes to accessories such as pumps and steering systems that are run off engine power. For vehicles like long haul tractor-trailers that often do more than 100,000 highway miles per year, aerodynamic improvements are unusually important and small improvements in engine efficiency can yield large paybacks. By contrast, a different technology mix will provide the biggest gains for transit buses or cement trucks.

The class 2B pickups — work trucks with a range of commercial and recreational uses — have an opportunity to take advantage of technologies across all these categories. The diagram on the next page shows the broad range of technologies available to increase pickup truck efficiency. The agencies only considered some of these technologies necessary to meet the near term standard, but all exist in vehicles today.

For gasoline-fueled trucks, some of the opportunities to improve fuel economy include reduction of frictional loss by using low-tension piston rings, improved crankshaft design and bearings, material coating and substitution, piston and cylinder surface treatment, and optimum thermal management and use of stoichiometric gasoline direct injection (S-GDI). S-GDI engines inject fuel at high pressure directly into the cylinders which improves cooling of the air-fuel mixture and allows for higher compression ratios and increased efficiency. Valve timing improvements, turbocharging, and cylinder deactivation can also improve engine efficiency and performance. Engine improvements are projected to improve fuel economy from three to five percent from baseline model engines.

For trucks powered by diesel engines, the new standard brings pollution reduction and fuel efficiency back together. Diesel engines are more efficient than gasoline engines , but have traditionally been dirtier, emitting higher levels of particulates (PM) and nitrogen oxides (NOx) that result in significant air quality and public health impacts.

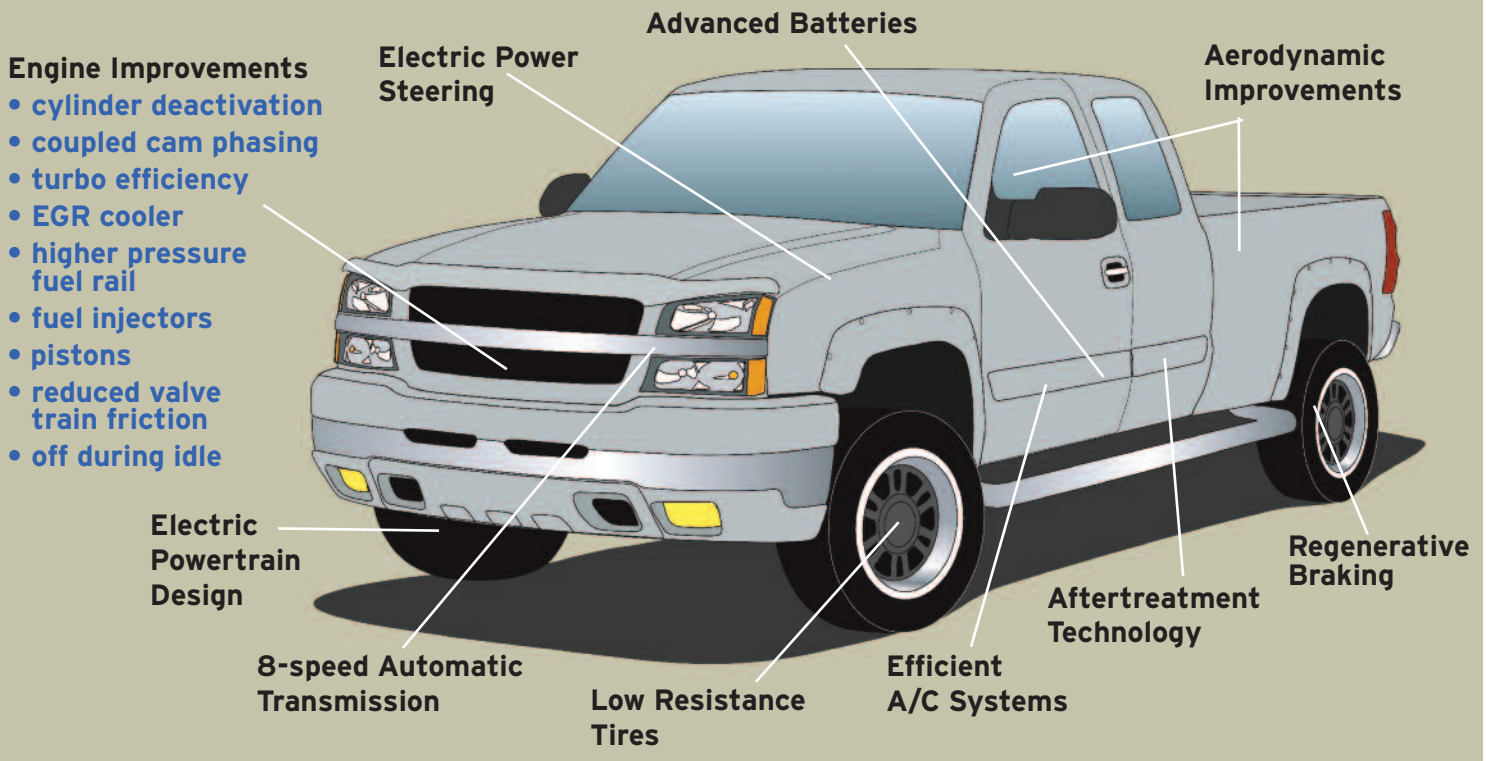
Both engine technology and exhaust gas after-treatment technology is used to limit NOx pollution from trucks. These systems, however, have an adverse effect on fuel economy, widely known as the NOx-fuel economy trade-off.

The new standards will encourage adoption of improved after-treatment technologies (such as improved selective catalytic reduction (SCR) systems). These in turn provide the flexibility to implement efficiency improving engine changes without increasing NOx emissions. Together, diesel engine and after treatment improvements can achieve fuel economy improvements of between eight and 12 percent.

Both gasoline and diesel-powered trucks can implement body improvements which can yield another five percent improvement in fuel economy, including reduction of aerodynamic drag, use of low rolling resistance tires, and weight reduction.

Finally, the use of electric power steering and six to eight speed transmissions can provide an additional three percent improvement in fuel economy for both diesel and gasoline trucks.

TECHNOLOGIES THAT DRIVE ENHANCED EFFICIENCY AND PERFORMANCE



"Over 600 employees at the BorgWarner plant in Asheville, North Carolina build turbochargers for all types of commercial trucks and off-highway vehicles for customers like Caterpillar, John Deere, Mack and Navistar. Our award-winning and innovative turbocharger technology boosts the performance of new engines while improving fuel economy and reducing emissions. That means drivers enjoy more miles per gallon as well as quick engine response, especially at low engine speeds and under heavy loads.

The benefits of powerful performance and improved fuel economy are driving demand for turbochargers in the US. In Asheville, North Carolina we produced over 400,000 turbochargers last year and expect strong growth in the future.

With 46 active patents and four Automotive News PACE Awards for turbocharger technology, BorgWarner has earned a reputation as a leader in turbocharger innovation. We trace our history to the Schwitzer Company of Indianapolis, IN which began producing turbochargers in 1928. In fact, Louis Schwitzer, an innovative engineer and founder of the business, won the very first auto race at Indianapolis Motor Speedway. Beginning next year, BorgWarner will become the exclusive turbocharger supplier for the Indianapolis 500, supplying race teams with EFR (Engineered for Racing) turbochargers built in Asheville, North Carolina."

PETE KOHLER
President and General Manager
BorgWarner Turbo Systems
Commercial Diesel Products

FIGURE 4: NEW TECHNOLOGY DELIVERS FUEL SAVINGS, IMPROVES TRUCK PERFORMANCE
Class 2B and Class 3 Pick-up Trucks, gasoline and diesel engines

Technology	Applicability	Fuel Consumption/ (CO_2) Reduction	2018	Performance Impacts*
Low friction lubricants	All	0 - 1%	$4	Reduced engine losses
8-speed automatic trans	All	0 - 6%	$218	Baseline is 4-speed automatic. Additional transmission gears can keep the engine at higher rpm for faster acceleration.
Low rolling resistance tires	All	1 - 2%	$6	Reduced vehicle friction load
Aerodynamics	All	1 - 2%	$51	Reduced vehicle drag
Electric power steering	All	1 - 2%	$101	Reduced parasitic loads
AC refrigerant leakage reduction	All	2% CO_2 reduction no impact on fuel consumption	$19	N/A AC efficiency improvements can reduce parasitic load
Engine friction reduction	Gasoline	1 - 3%	$108	Reducing engine losses
Coupled cam phasing	Gasoline	1 - 4%	$43	Valve timing improvements boost engine power.
Cylinder deactivation	Gasoline	3 - 4%	$182	Cylinder deactivation has no impact on performance. All 8-cylinders are utilized whenever needed, so there is no performance impact.
Stoichiometric GDI V8	Gasoline	1 - 2%	$372	GDI boosts engine power.
Mass reduction (5%)	Gasoline 2B	1.6%	$435	Ability to carry/tow more payload
Mass reduction (5%)	Gasoline 3	1.6%	$483	Ability to carry/tow more payload
Engine improvements	Diesel	4 - 6%	$152	Technologies: improved cylinder head, turbo efficiency improvements, EGR cooler improvements, higher pressure fuel rail, improved fuel injectors, improved pistons, reduced valve train friction.
After treatment improvements	Diesel	3 - 5%	$104	Enables improved engine function
Improved accessories	Diesel	1 - 2%	$82	Reduced parasitic loads
Mass reduction (5%)	Diesel 2B	1.6%	$511	Ability to carry/tow more payload
Mass reduction (5%)	Diesel 3	1.6%	$542	Ability to carry/tow more payload
TOTAL MY 2018 ADDED COST*	**GASOLINE**	**12 %**	**$1,539**	-
TOTAL MY 2018 ADDED COST*	**DIESEL**	**17 %**	**$1,248**	-

**These total added cost numbers are slightly higher than the numbers we use to calculate payback elsewhere in the report because this list includes more technologies than EPA ultimately judged were necessary to achieve the standard.*

Source: International Council on Clean Transportation, analysis of EPA/NHTSA data

New standards maintain the power and performance truck owners want

FIGURE 5. NEW TECHNOLOGY PULLOUT

Stoichiometric GDI V8

Delphi

Stoichiometric gasoline direct injection (GDI)[17]

Direct injection systems inject the fuel under pressure directly into the cylinder to increase combustion efficiency and power.

So where's the stoichiometry? Stoichiometric GDI includes controls which continuously adjust the mix of gases in the cylinder to optimize emissions and power — especially at midrange operating conditions.

While the agencies did not include turbocharging in the technologies considered for heavy duty gas trucks, GDI systems with new turbochargers are delivering impressive fuel consumption savings in light-duty vehicles.

Engine improvements

BorgWarner

Turbochargers compress the air entering the cylinders — also resulting in improved combustion and power. Once used mainly in high performance vehicles, turbochargers are now used in a wide variety of vehicles, delivering more power for each gallon of fuel used.

Most diesel engines are already direct injected and turbocharged, but more efficient and multiple turbochargers can further enhance efficiency. Similarly, higher pressure direct injection rails can enhance the effectiveness of that system.

Electric power steering

Nexteer

Electric power steering

Power steering pumps, water pumps, and other accessories are often run by belts off engine power — slightly decreasing total engine output. These "parasitic losses" can be deeply reduced by running these accessories on electric power drawn from the alternator.

Figure 4 on page 24 shows the technologies that the agencies specifically considered for HD pickups to meet the standard, the approximate cost of each technology and its impact on fuel consumption, engine, and/or vehicle performance.

None of the efficiency technologies considered has a negative impact on performance. Instead, many actually deliver enhanced performance as they reduce fuel use. In Figure 5 plus the feature that follows, we look in more detail at three of these technologies and also at the latest model Ford F150 which shows the impact of combining several of these new technologies into a new more efficient and more powerful package.

These technologies reflect sophisticated engineering and manufacturing innovation to enhance efficiency, not short cuts that get to fuel reductions by cutting vehicle functionality.

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Looking forward: Hybrid and electric powertrains

NTEA

Innovation in traditional internal combustion engines and powertrains were the primary tool the agency considered for meeting new emission and fuel efficiency standards for heavy duty pickups. Hybrid and electric powertrains, however, are also making inroads in the heavy duty sector, a development that will help manufacturers meet current and future fuel efficiency requirements.

The public usually associates electric and hybrid technology with passenger cars, but the US is a global leader in hybrid technology for the largest vehicles, with companies like Navistar, Eaton and Freightliner manufacturing hybrid buses and commercial vehicles now familiar in many cities. In addition to operating with enhanced fuel efficiency, these vehicles are also quieter and emit less localized air

"I want a vehicle that has no compromises. I've done a lot of offroading, all through the Everglades, through lots of swamp and mud and sugar sand. I've got hunting and fishing gear, my dog and all terrain vehicles. I want to be able tow a toy hauler up a high grade mountain, and not worry about not having power when I need it. And I want decent fuel economy.

ALEX MENENDEZ
IT Manager, Hunter and Angler, Floridian

He drives a 2003 Chevy Silverado, equipped with a 6.6 Duramax turbo diesel engine

That's becoming more and more possible. In the long run for the majority of working vehicles, it really doesn't feel like a compromise, because the numbers in power – horsepower, torque, payload – are going up.

There has been a perception that in order to gain fuel efficiency, you have to give up power. That's changing: Manufacturers have new technology which allows them to identify areas of inefficiency when designing engines, and make changes in software that runs the engine. With the new technology we have today, there doesn't have to be a trade-off. Power and efficiency can co-exist together."

pollution than the conventionally-powered vehicles they replace, yielding improvements in public health and quality of life in urban areas.

Certain types of commercial fleets — particularly those that do numerous low weight deliveries in congested urban areas and have centralized fueling — are candidates for cost-effective deployment of all-electric vehicles. Ford introduced its battery electric Transit Connect delivery van for commercial customers at the end of 2010, making it the company's first all-electric offering , beating its electric Focus to market. Smith Electric, with U.S. headquarters in Kansas City, Missouri, is also a leading provider of all-electric commercial trucks, in use by Frito Lay, AT&T, and others,[18] while Navistar builds its all electric eSTar truck in Indiana.[19]

Hybrid powertrains are already available in large light-duty vehicles such as the Silverado and the Escalade. As hybrid innovation continues in light and heavy duty sectors, it is reasonable to expect that these technologies will also reach heavy duty pickups, bringing a significant additional jump in fuel savings.

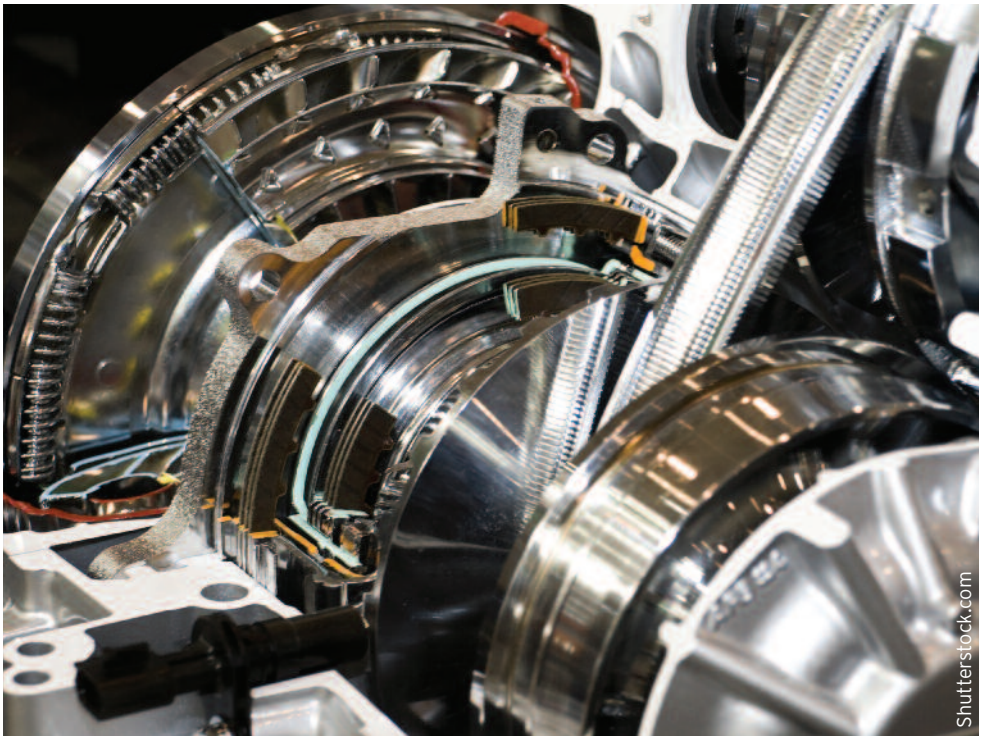
Truck technology innovation protects and grows jobs

In Figure 3 and Figure 4 we showed how fuel efficiency improvement will be met by combining numerous innovations that also improve vehicles in other ways. But these charts also show how cutting-edge engine and transmission technologies made by companies like Cummins, Eaton, BorgWarner, Honeywell, GM Powertrain, and many others in plants across the US, roll up into a new fuel efficient truck. They demonstrate how ongoing innovation to meet strong standards translates into protecting and growing jobs in the many companies that supply innovation, inside and outside the traditional auto industry.

A recent study by Natural Resources Defense Council, the UAW and NWF shows more than 300 companies in 43 states and more than 150,000 workers currently employed building the kinds of fuel efficiency enhancing components discussed in this section. These jobs clearly stand to grow as companies increase the fuel efficiency of cars and trucks. At the same time, introducing more efficient and innovative products helps ensure that domestically manufactured vehicles are more competitive in global markets — protecting US auto jobs broadly.

A study by CALSTART and the Union of Concerned Scientists similarly found that steadily increasing fuel efficiency of medium and heavy-duty trucks had the potential to add 124,000 new jobs throughout the economy by 2030.

Even after the deep job losses of the last decade, the now-recovering auto and automotive parts industries are the largest single employer in the manufacturing sector — supporting 700,000 direct and several million indirect jobs.[20] Over the past year, automotive growth has played a visible and outsize part in the economy's gradual recovery.[21] These standards and the innovation that comes with them are essential to keep this progress going.



"This thing has so much power it's pathetic… I always wanted to get the biggest and the best. This is the best."

JIM LEATH, *owner of Ford F-150 equipped with V6 EcoBoost Kansas City Star, June 12, 2011*

A case in point: THE F150 – AMERICA'S BEST-SELLING VEHICLE

Selling over 390,000 vehicles in 2010, the Ford F-150 pickup truck is America's best-selling vehicle.[22] Like other half-ton trucks, such as the Chevy Silverado 1500 the Toyota Tundra and others, it is popular in fishing holes and hunting camps nationwide.

These vehicles are covered by the Light Duty, not the HD National Program. Many of the technologies used in the new F150 and other light trucks, however, are also available for the larger trucks that will be covered by the heavy duty standard.

The environmental and commercial success of the F150 demonstrates how currently available technology can help larger vehicles meet and exceed the new medium and heavy-duty truck standards. It also provides a glimpse of the real world benefits consumers experience if they have the opportunity to move from an older less efficient vehicle to those that meet the new standards.

A truck owner who trades in a 2005 F150 for the 2011 model, for example, sees fuel consumption drop by 15 to 20 percent or more, depending on the vehicle configuration he or she chooses. A 20 percent reduction in fuel use has the same pocketbook effect as a 20 percent cut in the price of gas — it's like driving into the dealership paying $3.70 a gallon, and driving out paying $2.95.

The 2011 trucks also maintain great performance. In fact, one of the most fuel-efficient models, equipped with a 3.5 liter, six-cylinder EcoBoost engine — delivers 365 HP, 20 lbs-ft. of torque at 2500 rpm and has a towing capacity of 11300 lbs — outperforming the larger 5.0 liter V8.

And the combination of superior performance and efficiency is making sense to customers. Four out of ten F-150 customers are now opting to purchase the vehicle equipped with the EcoBoost V6, although it costs $1,000 more than the larger V-8.[23] But all of the new 150s outperform the comparable 2005 models, meaning innovation is providing customers with more and better choices across the board.

F 150 TRADE IN

= V6 = V8	Trade in a	For the	Increase in fuel economy	Decrease in fuel consumption and cost to drive	HP	Torque
Awesome Deal	2005 5.4 L V8	2011 3.5L V6 EcoBoost	26%	21%	more	serious
Base model trade in	2005 4.2L V6	2011 3.7L V6	25%	20%	more	more
V8 trade in	2005 5.4L V8	2011 5.0 L V8	20%	16%	more	same
Power trade in	2005 5.4L V8	2011 6.2L V8	3%	3%	serious	serious
Best fuel economy	2005 5.4L V8	2011 3.7L V6	33%	25%	close	less

Note: all automatic transmission

F 150 SIDE BY SIDE

	Engine	WD	Horsepower (SAE net@rpm)	Torque (lb.ft.@rpm)	MPG City	MPG HWY	MPG Combined
2005 FORD F150	4.2L V6	4x2	202 @ 4350	260 @ 3750	14	18	15.8
	4.6L TRITON V8	4x2	231 @ 4750	293 @ 3500	13	18	15.25
		4x4			12	16	13.8
	5.4L TRITON V8	4x2	300 @ 5000	365 @ 3750	13	17	14.8
		4x4			13	17	14.8
2011 FORD F150	3.7L V6	4x2	302 @ 6500	278 @ 4000	17	23	19.7
		4x4			16	21	18.25
	3.5L V6 EcoBoost	4x2	365 @ 5000	420 @ 2500	16	22	18.7
		4x4			15	21	17.7
	5.0L V8	4x2	360 @ 5500	380 @ 4250	15	21	17.7
		4x4			14	19	16.25
	6.2L V8	4x2	411 @5500	434 @ 4500	13	18	15.25
		4x4			12	16	13.8

sources: http://www.cars.com/ford/f150/2005/standard-equipment/, http://www.ford.com/trucks/f150/specifications/engine/, http://www.fueleconomy.gov/feg/findacar.htm

4. KEEPING AMERICA STRONG

Enacting and implementing effective light and heavy duty vehicle fuel efficiency and greenhouse gas standards is one of the best opportunities we have to work together to meet the economic, energy and national security challenges that we face as individuals and as a nation today.

American car and truck technology innovation can give us back control over our budgets and our energy security in an era in which demand for oil from established and rapidly growing economies is outstripping all potential supply. High and volatile gas prices are likely here to stay — but their stranglehold on our household budgets and our economy doesn't have to be.

Likewise, with strong action on efficiency and other advanced vehicle technologies like fueling with electricity, we need not remain dependent on unstable or hostile oil producing countries.

INCREASED FUEL EFFICIENCY FOR ALL VEHICLES:

Puts money back to work in communities across America:
In section three of this report, we discuss the billions in direct financial benefits that the standard brings to individuals, businesses and government. The heavy duty standard saves truck owners $21 billion a year in fuel costs, and those savings grow to hundreds of billions when light-duty standards are included.

But direct savings are only part of the equation. Today we spend about a third of a trillion dollars a year on foreign oil. By contrast fuel savings put this money back to work at home - making billions of dollars available for consumer spending and business investment to stimulate the U.S. economy. We've seen this work in reverse — when gas prices rise, they suck money out of spending throughout the economy — spurring economic downturns and recessions. With far more efficient cars and trucks we have the opportunity to break this cycle.

Builds the next generation of technology and jobs in America:

Transportation manufacturing is at the heart of domestic manufacturing, and consistent demand for innovative products at home is critical to keeping and building this high tech sector here in the US. While the public is most familiar with the big auto and truck companies, such as General Motors or Freightliner, these big assemblers are only the tip of the iceberg in an industry made up of thousands of large and small suppliers that build sophisticated vehicle, engine, and electronic components such as those highlighted in section 3. Automotive supply is the largest single manufacturing sector in the US, Despite the deep troubles of the last decade, manufacturing is on the rebound and growing faster than the pace of the economy as a whole. Strong standards in the light-duty sector are not only spurring R&D and investment in existing plants and workforce, they are providing rewarding, career-building jobs for the next generation of technical and engineering workers. Strong standards for all vehicles are an essential piece of maintaining this momentum.

The U.S. is also leading producer and exporter of medium and heavy-duty trucks. The National (HD) Program will help ensure both that we keep our technological edge in this sector, and create markets for these vehicles here, making it more likely that manufacturers will continue to produce these vehicles at home, and achieve success in this critical export industry.

Keeps our natural resource heritage off the chopping block: As gas prices rise and demand outstrips supply, nations worldwide are beginning to scrabble for oil in ever more expensive, risky and environmentally destructive locations. With strong ongoing fuel efficiency improvements our nation can avoid the extreme choices between our economy and the future of treasured lands waters and wildlife.

Even as the Gulf Coast is still recovering from the devastation of a deepwater oil disaster, politicians are weighing proposals that would clearcut arboreal forest to generate crude oil three times as pollution intensive as traditional petroleum, and promote drilling in public and private wilderness lands and in remote and risky ocean sites.

At the same time, climate change remains a profound threat to wildlife traditions, as habitats shift or disappear. Petroleum is the largest source of carbon pollution in the US, even larger than coal. But as the car and truck standards cut oil use, they also make a major contribution to cutting US greenhouse gas pollution.

As the Figure 2 on page 12 shows car and truck standards can deliver savings greater than the oil we import from Saudi Arabia, Venezuela and Nigeria. Those standards would also cut up to 10 percent of total US greenhouse gas pollution if fully implemented.

Big improvements in fuel efficiency go a long way towards giving us the freedom to make the energy choices that safeguard our natural resource heritage, our economy and our nation's future.

"We've got over 1,000 UAW members at the Volvo Powertrain facility in Hagerstown Maryland, and we're very proud to work on designing, manufacturing, and assembling heavy duty transmissions and diesel engines.

The innovative powertrains we build go into a lot of different vehicles – including Mack Trucks, a great American icon. These products are some of the cleanest and fuel-efficient on the market today, so we know we're helping protect scarce natural resources while at the same time reducing the cost of transportation. That means lower prices for consumers.

In our state of the art Engine Development Laboratory, we're not only refining the engine we use today, we're also developing and testing powertrains that will help us build the next generation of even more fuel-efficient engines.

We're proud to be part of Volvo's unwavering commitment to the environment – and we're even more proud that every Volvo and Mack Truck sold in North America is assembled in UAW facilities in the United States. Building the latest technology here helps keep jobs in the U.S.A."

DAVID PERKINS
President, UAW Local 171
Hagerstown Maryland

CONCLUSION: WHAT WE CAN DO.

We are seeing a renaissance in car and truck innovation that is improving the performance and usability of all kinds of vehicles, while bringing groundbreaking efficiency and real energy diversity to the transportation sector.

This transformation will deliver big savings to car and truck owners, families, businesses, and government. It will enhance our national security, spur technological innovation and job growth, and put our money back to work at home. We do not have to choose between energy security and safeguarding wildlife and natural resources.

For decades, hunters, anglers and the conservation community have stood up to improve land, water, natural resource and energy policies. We have worked with many partners at local, state and national level to ensure that our children and all Americans can enjoy wildlife and our natural resource heritage in peace and prosperity. Bringing clean efficient technology to the transportation and energy sectors is a central element in seeing this vision become a reality.

Over the past several years we have taken historic steps forward to put in place the laws and policies to bring the next generation of car, trucks, jobs and natural resource protection to America. But to be successful we need to finish the job. Key opportunities to make a difference include:

SUPPORT STRONG FUEL EFFICIENCY AND POLLUTION REDUCTION STANDARDS.

The first round of car and light truck standards are in place and the first-ever heavy truck standards will soon follow. Development of car standards that would stretch through 2025 are underway, and enhanced benefits are possible for heavy trucks as well. Voice your support locally and nationally. We don't have to give up power or performance to see oil and pollution savings, but we do have to continue to spur innovation over the long term.

PROTECT THE CLEAN AIR ACT AND OTHER LAWS THAT HELP PROTECT AIR WATER AND WILDLIFE.

Having EPA and DOT work together on the car and truck standards enables streamlined standards that are better and cheaper for manufacturers and consumers, and avoid competing regulatory objectives. Our fundamental environmental protections are under attack in Congress despite a forty year track record of successfully transforming our nation's air and water while saving America trillions of dollars.

PROMOTE ADVANCED MANUFACTURING IN THE US.

Strong standards that maintain demand for innovative products in the domestic market are critical to building and keeping cutting edge vehicle manufacturing jobs in the US. But a host of other R&D, training, tax, and investment policy can help build on current successes to ensure the US captures a major share of the high tech manufacturing that will build the next generation of advanced vehicles for the global market.

DEMAND EFFICIENCY FROM YOUR NEXT TRUCK:

Insist on fuel efficiency — and fuel savings — when you make your next purchase — whether you're buying now or later, a new truck or a used one, or simply new tires or equipment for the truck you have. Reward innovative suppliers and manufacturers, and the dealers who carry their products, with your investment. Get the word out to other consumers that cutting pollution isn't just for Priuses anymore. The right truck, and doing right for the future of wildlife and our nation's prized natural resources, can be one and the same. Let's make trucks work for the outdoors as well as they work in it.

Mack Trucks

Endnotes

[1] "Carbon pollution Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicle," US EPA and NHTSA , Federal Register, November 30, 2010. http://www.gpo.gov/fdsys/pkg/FR-2010-11-30/pdf/2010-28120.pdf

[2] American Council for an Energy-Efficient Economy (ACEEE) communication to NWF, June 2011

[3] "EPA and NHTSA to Propose Greenhouse Gas and Fuel Efficiency Standards for Heavy-Duty Trucks," Environmental Protection Agency, October 2010. http://www.epa.gov/otaq/climate/regulations/420f10901.pdf

[4] Ibid.

[5] Ibid.

[6] "EPA and NHTSA to Propose Greenhouse Gas and Fuel Efficiency Standards for Heavy-Duty Trucks," Environmental Protection Agency, May, 2010. http://www.epa.gov/oms/climate/regulations/420f10038.htm

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[8] Statements of support from the major manufacturers of medium and heavy-duty trucks and engines can be found online at: Cummins: http://newsblaze.com/story/20100521090219000003.bw/topstory.html
Fleetowner: http://fleetowner.com/fuel_economy/archive/trucking-support-fuel-economy-standards-1026/index1.html
Volvo Trucks: http://www.volvotrucks.com/trucks/na/en-us/news_and_events/news_releases/2010/_layouts/CWP.Internet.VolvoCom/NewsItem.aspx?News.ItemId=82865&News.Language=en-gb

[9] More information on the Light-Duty National Program is available at: http://www.epa.gov/oms/climate/420f11027.pdf

[10] A note on terminology: In this report, and others on this topic, readers will find both the terms fuel economy and fuel consumption.

Miles per gallon (mpg) measures how far we can go on a gallon of gas, and is our most familiar shorthand for vehicle efficiency

If we want a direct measure of gasoline use or fuel cost savings, however, we need to convert mpg/ fuel economy to *fuel consumption* – or gallons/mile. For heavy duty vehicles fuel efficiency is measured in gallons per ton mile. It is then possible to directly see the changes in fuel consumption (and fuel costs)

Because fuel consumption and fuel economy/mpg are mathematically related, but not the same – percentage changes are not identical and can be confusing.

For example, improving vehicle fuel economy from 10 to 20mpg is a 100% increase in fuel economy – the driver will go 100% further (twice as far) on a tank of gas. But the same shift is a 50% decrease in fuel consumption. The driver goes from using 10 gallons to go 100 miles, to using 5 gallons to go the same distance. He spends 50% less, and he emits roughly 50% less pollution. . In this report, where we are looking at impacts on cost and oil use, fuel consumption statistics give us a much clearer picture.

[11] Source: International Council on Clean Transportation, analysis of the EPA/NHTSA Proposed Rule (Federal Register/Vol. 75, No. 229/November 30, 2010. 20A data NWF analysis of data in 2012-2016 light dudy final rule and 2017-2025 Light Duty Program Supplemental Noi

[12] Recent analysis put out by the agencies as part of the FEIS, suggests that the final rule may slightly revise baseline fuel economy assumptions for this class of vehicles, and accordingly final mpg targets, but percentage improvements should remain roughly comparable.

[13] Vehicle standards are set for the vehicle "model year". For example 2012 model year vehicles start being available in the latter half of calendar year 2011.

[14] Daimler Trucks North America, Commitment Letter, May 18, 2010
http://www.epa.gov/oms/climate/regulations/daimler-commitment-ltr-05-18-10.pdf
And other similar letters from other truck manufacturers

[15] *High Gas Prices: Supply and Demand*. Natural Resources Defense Council, 2011.
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http://www.eia.gov/energy_in_brief/foreign_oil_dependence.cfm

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[21] Lahart, Justin, Wall Street Journal, "Car Makers Help Drive Economic Recovery," July 27, 2011.

[22] Clarke, Warren. "Top 10 Best-Selling Vehicles for 2010," January 7, 2011. <http://www.edmunds.com/car-reviews/top-10/top-10-best-selling-vehicles-for-2010.html

[23] "Ford Buyers go for EcoBoost V-6Engines," CNNMoney.com, June 13, 2011

APPENDIX

The attribute on which the target is based for work trucks is a "work factor" that combines vehicle payload capacity and vehicle towing capacity, with an additional fixed adjustment for four-wheel drive (4wd) vehicles. The work factor is calculated as follows:

Work Factor = [0.75 x (Payload Capacity + xwd)] + [0.25 x Towing Capacity]

where,

Payload capacity is the maximum weight the vehicle is designed to carry in lbs.
xwd is 500 lbs. if the vehicle is equipped with 4wd, otherwise 0 lbs.
and, Towing capacity is the maximum allowable weight that a vehicle can tow in lbs.

The emissions and fuel consumption targets are then defined as linear functions of work factor.

For example, a Ford F-250 two-wheel drive truck with a regular cab and a 6.2 liter V-8 gasoline engine is rated at 3,752 lbs. payload and 12,500 lbs. towing capacity. That translates to work factor of 5939 lbs., which corresponds to a fuel economy target of 13.5 mpg in 2014 and increasing to 14.8 mpg in 2018. The four-wheel drive version of the same truck is rated at 3,486 lbs. payload and 12,400 lbs. towing capacity, which translates to a work factor of 6215 lbs. and therefore a fuel economy target of 14.5 mpg in 2018.

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NATIONAL WILDLIFE FEDERATION

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ADDENDUM: THE FINAL HEAVY DUTY NATIONAL PROGRAM

The analysis in *Trucks that Work* is based on the proposed Medium -and Heavy- Duty Engine and Vehicle Standards. The Final Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles were released on August 9, 2011 and included only minor changes from the proposed standards. These changes do not impact any of the conclusions made in Trucks that Work. For those interested in the outcome of the final standards as regards the areas covered in Trucks that Work, key data is provided below.

OIL, POLLUTION AND ECONOMIC IMPACTS:

- Oil savings over the lifetime of vehicles built under the rule: **530 million barrels**

- Carbon pollution reductions over the lifetime of vehicles built under the rule: **270 MMT**

These compare to reductions of 500 million barrels and 250 MMT estimated in the proposed rule

- Net fuel savings to the public rise slightly from $41 B in the proposed rule to **$42B** in the final rule

REGULATORY STRINGENCY:

Combination tractors (semis) will be required to reduce fuel consumption 9-23% up from 7- 20% in the proposed rule. At the same time, however, the target reduction levels that semis must reach are very slightly higher (i.e. less stringent). **Vocational Vehicles:** will reduce emissions from 6 to 9 percent, down from 7 to 10 percent in the proposed rule.

Percentage cuts in fuel consumption and carbon pollution for **heavy duty pickups and vans** are slightly more stringent under the final standard, increasing by a few tenths of a percent to a 10% reduction for gasoline vehicles and a 15% reduction for diesel vehicles. The agencies have assumed a somewhat higher baseline fuel efficiency for gasoline pickups (up to 15.3 from 14.9mpg) , and a somewhat lower baseline fuel efficiency for diesel vehicles (down to 13.2 from 14.5mpg). This means that ending emissions levels for diesel vehicles are slightly higher, but also that total fuel savings are slightly greater. Target fuel economy in 2018 for diesel vehicles is 15.6 mpg under the final standard, and 17.2 mpg for gasoline vehicles.

PAYBACK:

For **combination tractors and vocational vehicles**, costs, fuel savings and payback periods remain very similar — both with payback periods of under a year and lifetime savings 10 or more times additional cost. For combination tractors (semis) the lifetime net savings drops slightly to $73,000 per vehicle from $74,000 in the proposed rule.

For **HD Pickups and vans**, upfront costs have dropped and payback is more rapid in the final rule than in the proposed rule, but final rule data remains very similar to the analysis done for this report. In the final rule, the agencies show technology costs of $1048, cumulative net fuel savings (fuel savings after payback of added costs) of $6138 and an estimated payback time of under two years — for a weighted average of diesel and gasoline trucks. The final rule suggests that the payback estimates in this report should be viewed as conservative, and that average savings may be somewhat greater and payback somewhat more rapid than projected in the report.