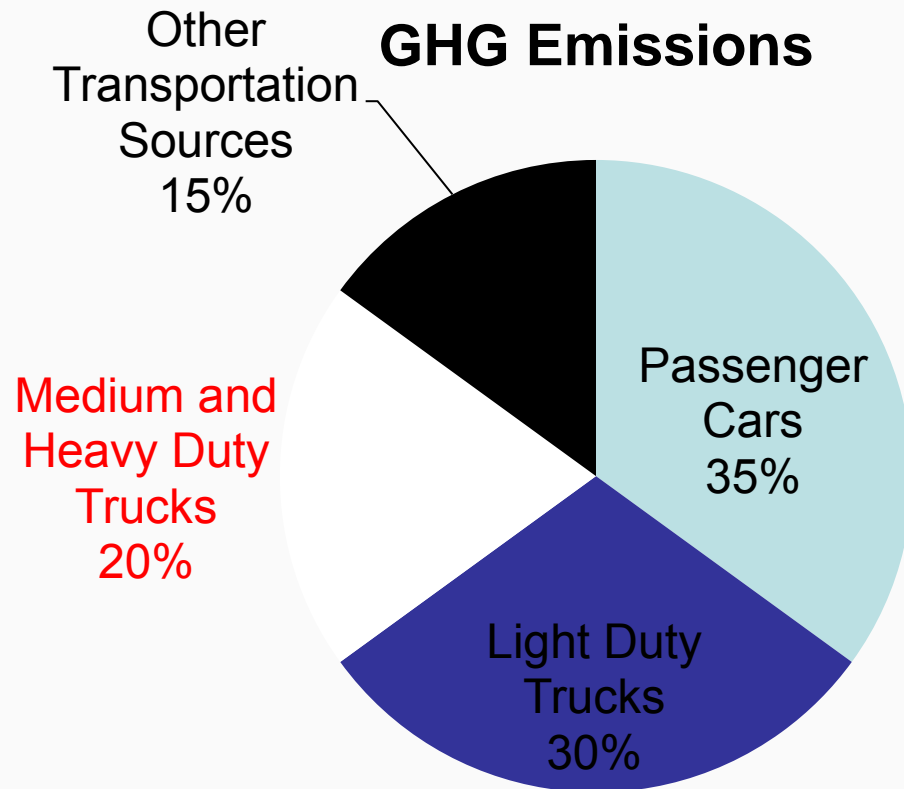


A large, faint watermark of the United States Environmental Protection Agency (EPA) logo is centered in the background. The logo features a stylized flower with three leaves and a scalloped top, surrounded by the text "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY".

Heavy-Duty GHG Rule

September 25, 2012

U.S. Transportation GHG Emissions



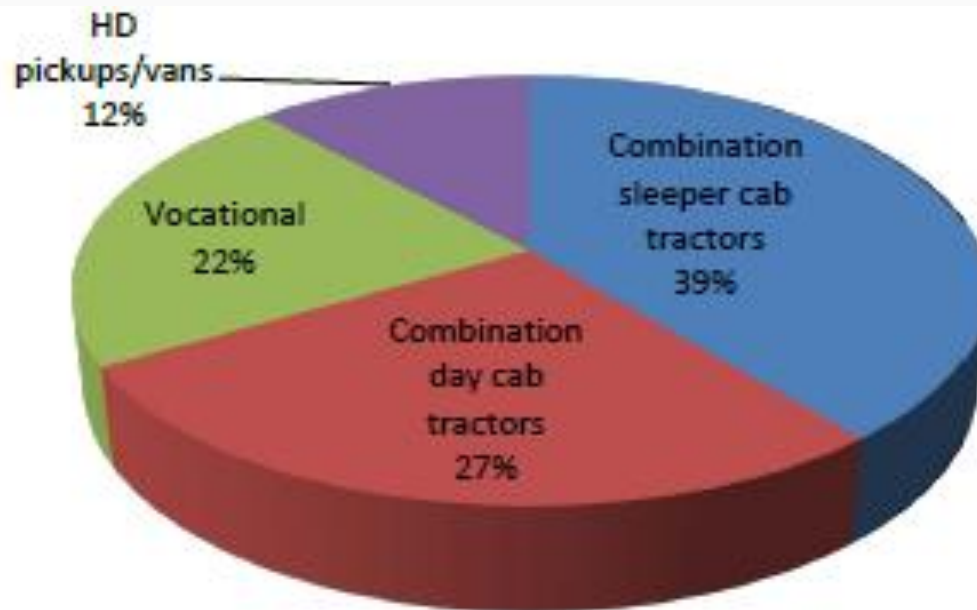


Key Elements of the HD Rule

- Joint EPA/NHTSA program
- Begins with 2014 model year and increases in stringency through 2018
- Breaks diverse truck sector into 3 distinct categories
 - Line haul tractors (largest heavy-duty tractors used to pull trailers, ie. semi trucks)
 - Heavy-duty pickups and vans (3/4 and 1 ton trucks and vans made primarily by Ford, GM and Chrysler)
 - Vocational trucks (everything else, buses, refuse trucks, concrete mixers, ambulances...)
- Sets separate standards for engines and vehicles, ensures improvements in both
- Sets separate standards for fuel consumption, CO₂, N₂O, CH₄ and HFCs. Fuel consumption and CO₂ standards are aligned.
- Provides incentives for advanced technologies (e.g. EVs and Hybrids)
- Manufacturer flexibilities, including averaging, banking and trading

GHG Contribution by Heavy-Duty Category








Represents ~20% of Mobile Source GHGs



CY 2005

Class 7/8 Line Haul Tractors

- Engines and tractors are regulated separately
 - Engine standards met through same procedures as for criteria pollutants
 - Tractor standards met through a compliance model (GEM)
- Each tractor's standard is based on the GVWR and roof height of the tractor.

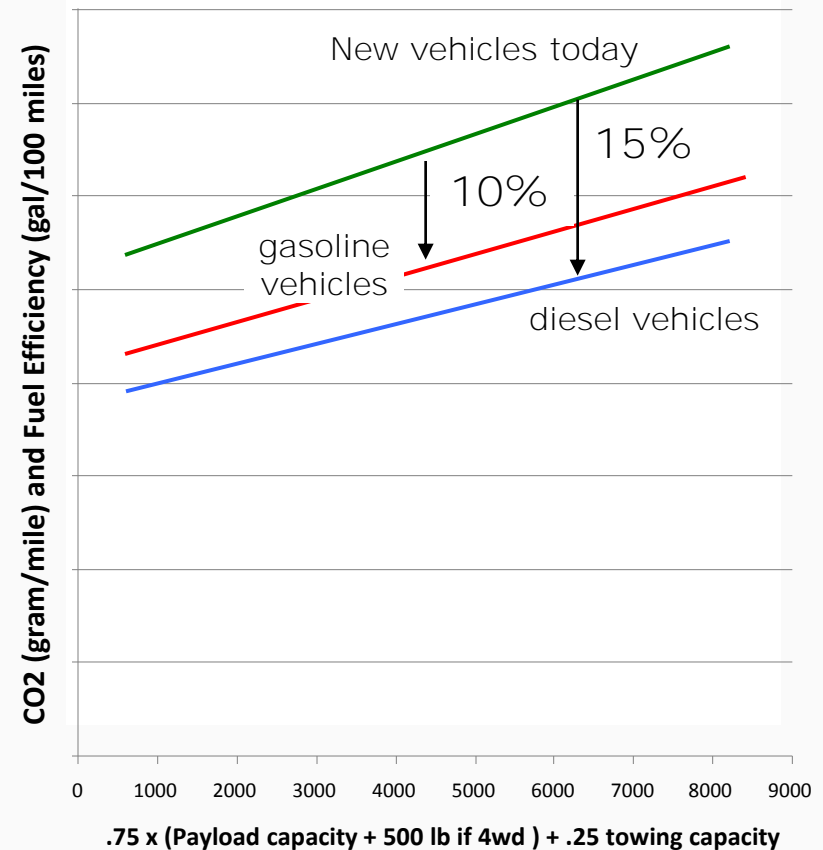
| | Day Cab | | Sleeper Cab |
|-----------|---|---|--|
| | Class 7 | Class 8 | Class 8 |
| Low Roof |  |  |  |
| Mid Roof | -- | -- |  |
| High Roof |  |  |  |

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

Heavy-Duty Pickups & Vans



- Pickups & vans classified as a separate category of heavy-duty
- Largely derivatives of light-duty trucks
- Compliance assessed on “corporate average” basis
- Work Factor Attribute = payload + towing capability



Vocational Vehicles (Classes 2b – 8)

- The vocational vehicle category includes the wide range of remaining trucks and buses of all sizes and functions.
 - Some of the primary applications for vocational vehicles include delivery, refuse, utility, dump, cement trucks, buses, emergency vehicles, motor homes, tow trucks
- The vehicle standards apply to manufacturers of chassis, not bodies. Each vehicle's standard is based on the GVWR of the complete vehicle.
- Like with Tractors, the vocational vehicles and engines are regulated separately.
- Vocational Vehicle compliance is determined using the simulation tool, GEM.



Heavy-Duty Engine GHG Standards

- The GHG emissions for HD engines are evaluated over the Heavy-Duty Engine FTP or SET cycle

Compression-Ignition Engines (g CO₂/hp-hr):

| Model Years | Light Heavy-Duty | Medium Heavy-Duty – Vocational | Heavy Heavy-Duty – Vocational | Medium Heavy-Duty – Tractor | Heavy Heavy-Duty – Tractor |
|----------------|------------------|--------------------------------|-------------------------------|-----------------------------|----------------------------|
| 2014-2016 | 600 | 600 | 567 | 502 | 475 |
| 2017 and later | 576 | 576 | 555 | 487 | 460 |

Spark-Ignition Engines (g/hp-hr):

| Model Year | CO ₂ Emissions | CH ₄ Emissions | N ₂ O Emissions |
|----------------|---------------------------|---------------------------|----------------------------|
| 2016 and Later | 627 | 0.10 | 0.10 |

Non-GHG pollutants

- The rule does not regulate non-GHG pollutants,
 - EPA expects reductions in emissions of most non-GHG pollutants, including NOX, SO₂, VOC, CO, and PM.
- The primary reasons for this are
 - Improvements in road load (aerodynamics and tire rolling resistance)
 - Anticipation of increased use of auxiliary power units (APUs) in combination tractors during extended idling.
 - APUs exhibit different non-GHG emissions characteristics compared to the on-road engines they would replace during extended idling.
 - Emissions from certain pollutants (e.g., SO₂) are proportional to fuel consumption.

Emission Impacts

TABLE VI-5—ANNUAL DOWNSTREAM GHG EMISSIONS REDUCTIONS AND FUEL SAVINGS IN 2018, 2030, AND 2050

| | Downstream GHG reductions (MMT CO ₂ eq) | Diesel Savings (million gallons) | Gasoline Savings (million gallons) |
|------------|---|-------------------------------------|---------------------------------------|
| 2018 | 22 | 2,123 | 59 |
| 2030 | 61 | 5,670 | 349 |
| 2050 | 89 | 8,158 | 522 |

TABLE VII-3—OVERALL ESTIMATED DOWNSTREAM IMPACTS ON CRITERIA POLLUTANTS
[Short tons]

| Calendar year | Downstream NO _x | Downstream VOC | Downstream SO ₂ | Downstream CO | Downstream PM _{2.5} ^a |
|---------------|----------------------------|----------------|----------------------------|---------------|---|
| 2018 | - 107,135 | - 12,951 | - 145 | - 25,614 | 803 |
| 2030 | - 235,046 | - 25,502 | - 423 | - 52,212 | 1,751 |
| 2050 | - 326,413 | - 35,126 | - 614 | - 72,049 | 2,441 |

Note:

^aPositive number means emissions would increase from baseline to control case. PM_{2.5} from tire wear and brake wear is included.



For More Information:

See Heavy-Duty GHG rulemaking documents at
<http://www.epa.gov/otaq/climate/regs-heavy-duty.htm>