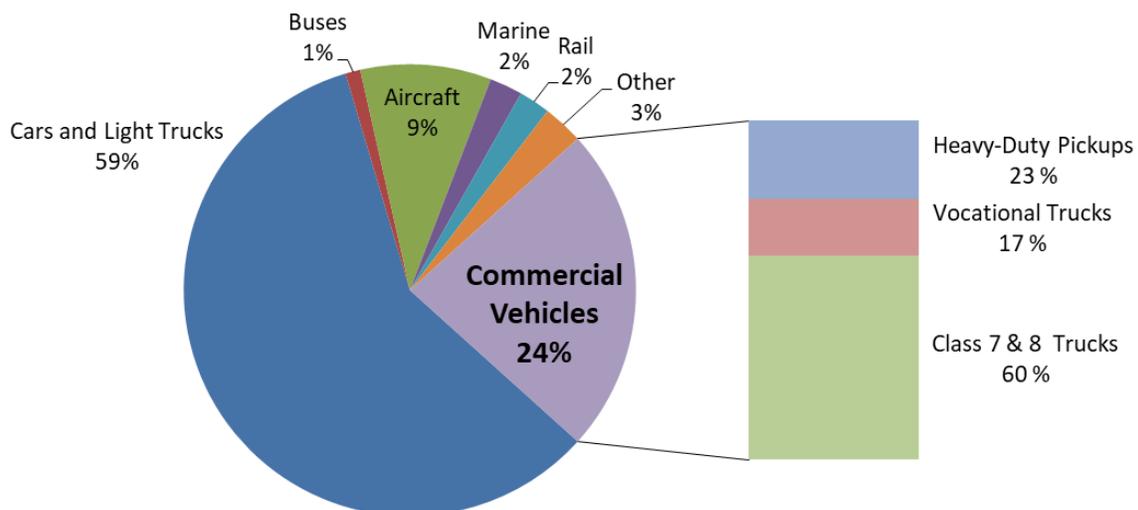


# ADVANCED DIESEL ENGINES AND CLIMATE CHANGE

Today, transportation sources of greenhouse gas emissions are now in the lead relative to other sources like power plants and industrial activity. Reducing transportation emissions to help cool a warming planet will rely on a variety of technologies for the many things that move. While cars are becoming more efficient, commercial vehicles are increasing efficiency too. These vehicles rely primarily on diesel engines and are anticipated to be diesel powered into the future. More fuel sipping diesel trucks are expected to reduce greenhouse gas emissions by over **1 billion tons** over the next dozen years and will play a significant role in meeting the climate challenge.

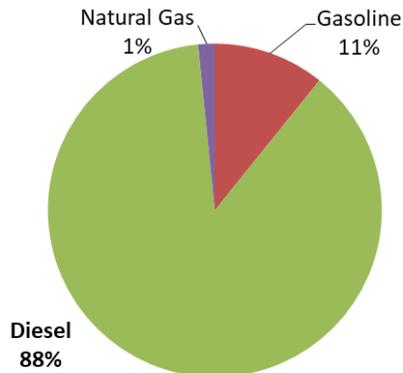
**What Are the Sources of Transportation Related Greenhouse Gas Emissions?** Cars, SUVs and pickups make up the majority of transportation related greenhouse gas emissions while commercial vehicles make up about 24 percent. Of the wide variety of commercial vehicles, the larger Class 7 and 8 trucks are responsible for 60 percent of all commercial vehicle greenhouse gas emissions, according to the U.S. Environmental Protection Agency.

**Transportation Sources of Greenhouse Gas Emissions in 2017**



In 2017, America's commercial trucks consumed 44 billion gallons of fuel. 38 billion gallons of this fuel was diesel fuel with the remainder made up primarily by gasoline. While truck owners have a number of alternative fuels from which to choose, diesel is the predominant fuel consumed. It takes a diesel engine to consume fuel. According to research commissioned by the Diesel Technology Forum, 75% of heavy-duty commercial vehicles are powered by a diesel engine. A diesel engine is found under the hood of 97 percent of the larger Class 8 tractors.

### Fuel Consumed by Commercial Vehicles in 2017



### Cars Are Getting More Efficient, Are Trucks?

Much like fuel economy rules for cars, commercial truck makers must also meet stringent fuel economy standards. These are known as the Phase 1 standard for trucks manufactured in 2014 and the Phase 2 rules for trucks that manufactured beginning in 2021. The diesel engine is one of the most efficient internal combustion engines and technologies developed to achieve fuel economy rules for trucks are designed to make the fuel sipping diesel engine consume even less fuel and reduce greenhouse gas emissions. These include improvements to the diesel engine along with non-engine technologies including the use of lightweight materials, more aerodynamic designs, low resistant tires, improvements to transmissions and lubricants, among others.

### What are the Benefits of More Efficient Diesel Trucks?

According to recent research published by the Diesel Technology Forum, more efficient trucks are expected to eliminate **1.3 billion tons** of greenhouse gas emissions while saving 130 billion gallons of fuel between 2011 and 2030. This is the same emission reductions as eliminating all passenger vehicles on U.S. roads or making them zero-emissions or the same energy used by 155 million homes.

### What Fuel Types Are Expected to Generate Benefits?

Today, diesel engines are the predominant fuel type that powers commercial vehicles. Research confirms that diesel will continue to dominate the commercial truck fleet through 2030 and diesel trucks will deliver these significant benefits.

There are alternatives to diesel today and other technologies are on the drawing board. One of the leading alternative fuels available today, natural gas trucks, comprise just under 2 percent of the

commercial truck fleet while battery-electric trucks are beginning to hit dealer lots. However, these alternatives are not expected to displace diesel's dominant position. Even under an aggressive forecast for the uptake of these alternatives, natural gas is expected to make up just under 3 percent of new truck sales while battery-electric options will capture under 1 percent of sales by 2025, according to the Fuels Institute. While all-electric trucks are available today in certain niche applications, like urban delivery vans and short haul trucks, the technology is not expected to fully mature across the wide variety of commercial trucks until 2030, according to the National Council on Freight Efficiency and the Association for the Work Truck Industry. While alternatives and emerging technologies will be with us, so will the diesel engine and refinements to diesel commercial vehicles will deliver significant benefits.

### **What Are the Diesel Technologies That Are Expected to Contribute to These Benefits**

Over the next decade, EPA estimates that the larger Class 7 and 8 commercial vehicles are expected to improve fuel economy by 25 percent while smaller commercial trucks, including heavy-duty pickups and vans, are expected to improve fuel economy by 16 percent. As noted earlier a variety of technologies are expected to play a role in reducing emissions including advancements in diesel engine designs.

The leaders in clean diesel technology are already hard at work refining diesel technology and integrating cutting edge technology. Detroit Diesel now integrates predictive cruise control into Class 8 trucks that anticipates changes in elevation, like hills, to determine when precisely to accelerate and when to cruise to maximize fuel efficiency. Volvo Trucks offers another technology to make the most of the diesel engine – turbocompounding – that can enhance fuel efficiency by up to 11 percent. By harnessing heat lost through the engine, this waste heat is channeled back through the engine to boost efficiency. Another strategy is to downsize the engine while boosting its performance, or downspeeding. A smaller engine is capable of doing the same work while saving fuel. Another fuel economy strategy is to make the engine smaller while allowing the engine to do more work without working hard. According to diesel engine technology leader Cummins, the latest downsized and downsped engines offered in the truck market can boost fuel economy by 5 percent.

One of the benefits of diesel technology is that has demonstrated capability of continual improvement over its century-long existence. These are just a few of the many technologies available today to boost the efficiency of the diesel engine. We can expect further refinements and improvements along with the integration of other emerging diesel technologies to make diesel a trusted partner to deliver sustainability goals and help cool a warming planet.

### **Meet the Leaders in Advanced Technology Diesel Trucks and Engines**

**Cummins:** <https://www.cummins.com/>

**Volvo Trucks:** <https://www.volvotrucks.us/>

**Daimler:** <https://daimler-trucksnorthamerica.com/>

**Detroit Diesel:** <https://demanddetroit.com/>

**Isuzu Commercial Vehicles:** <https://www.isuzucv.com/en/index>

**General Motors:** <https://www.gm.com/>

**Fiat Chrysler Automotive:** <https://www.fcagroup.com/en-US/group/regions/Pages/northamerica.aspx>

**RESOURCES:**

Inventory of U.S. Greenhouse Gas Emissions and Sinks. U.S. EPA.

<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>

Fast Facts: US Transportation Sector Greenhouse Gas Emissions, 2990-2017. U.S. EPA.

<https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100WUHR.pdf>

Greenhouse Gas Equivalency Calculator. U.S. EPA

<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Phase 2 Fuel Economy Standard. U.S. EPA, NHTSA

<https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-commercial-trucks>

<https://nepis.epa.gov/Exe/ZyPDF.cgi/P100P7NL.PDF?Dockey=P100P7NL.PDF>

“Tomorrow’s Vehicles - A Projection of the Medium and Heavy Duty Vehicle Fleet Through 2025”. Fuels Institute, 2017.

“Electric Trucks – Where They Make Sense”. North American Council on Freight Efficiency, 2018.

<https://nacfe.org/future-technology/electric-trucks/>

Volvo Trucks and Turbo Compounding: <https://www.volvotrucks.us/trucks/d13tc/>

Cummins and downsizing and downspeeding: <https://www.cummins.com/engines/x15-efficiency-series>

Detroit Diesel and Predictive Cruise Control: <https://demanddetroit.com/dt12transmission/ipm/>



**5291 Corporate Drive**

**Frederick, MD 21703**

**(301) 668-7230**

**www.dieselforum.org**