Diesel moves over 90 percent of the world's freight. Its power, efficiency and dependability make it the fuel and powertrain of choice for powering the global economy. More than two-thirds of all farm and construction equipment, over 90 percent of commercial trucks, over 70 percent of all transit buses and 100 percent of container ships, marine workboats and freight railroad locomotives rely on diesel due to the unique energy density of diesel fuel and the ability of the diesel engine to translate this fuel into power. The widespread availability ultra-low sulfur diesel fuel has enabled the use of new emission control and engine technologies that reduce diesel emissions to near zero levels. The inherent fuel economy and unique environmental attributes of the diesel powertrain is gaining the attention of many consumers and automakers are responding by introducing new diesel powered cars, trucks and SUVs.

This paper provides you with answers to key questions about diesel fuel that keeps America moving:

- What is diesel fuel?
- Why is diesel priced more than gasoline?
- Is natural gas replacing diesel fuel?
- Can diesel fuel be produced from non-petroleum sources?
- Are diesel cars gaining in popularity?

**What is diesel fuel?**

Diesel fuel is a refined petroleum product made from crude oil. Regulations in place since 2006 require the availability of ultra-low sulfur diesel fuel (ULSD) in the transportation sector. It is common to see references to ULSD or Number 2 diesel fuel in reference to motor fuels. Other types of diesel include residential heating oil, bunker fuel used to power ocean-going vessels and kerosene used in aviation fuels.

Diesel differs from gasoline in many ways. Diesel has the highest energy content of any transportation fuel which means vehicles can travel farther and equipment can produce more power with a gallon of diesel than any other fuel. A gallon of diesel fuel has 113 percent of the energy content of a gallon of gasoline and has almost 138,000 BTUs versus 124,000 BTUs for gasoline. Natural gas is recognized as an emerging transportation fuel yet liquefied natural gas has only 64 percent of the energy content of gasoline and only 74,000 BTUs for an equivalent gallon of the fuel, according to the Alternative Fuels Data Center [http://www.afdc.energy.gov/].
Gasoline is the largest consumed transportation fuel. According to the Energy Information Agency, in 2012, U.S. consumers purchased 3.2 billion barrels of gasoline and only 1.2 billion barrels of ULSD fuel. About 45 percent of the crude oil used to produce diesel and gasoline comes from U.S. sources. Yet, the U.S. is also an exporter of these finished transportation fuels. In 2012, U.S. refineries exported 154.3 million barrels of gasoline and 262.2 million barrels of ULSD fuel.

The primary factor in determining future fuels prices is the price of crude oil. About 60 percent of the price of a gallon of diesel fuel is contained in the raw crude oil. The remaining cost of producing diesel fuel is found in refining, marketing, taxes and other expenses.

The EIA’s Short-Term Energy Outlook forecasts a moderate decline in crude oil prices through 2015 with the exception of natural gas prices. As a result, gasoline and diesel prices are expected to decline although diesel will still be priced above gasoline. The moderate decline in crude oil prices – and gasoline and diesel – owes to expanded production of key on-shore basins including “tight” shale formations. The Department of Energy predicts that crude oil production will increase to 9.24 million barrels per day by 2015 up from 7.45 million barrels per day in 2013.
Additionally, increased biofuel production in accordance with the Renewable Fuel Standard (RFS) raises the overall supply of diesel fuel. Recently, the biodiesel industry surpassed one billion gallons of biodiesel produced in 2012 and more of the biofuel is expected to be produced through 2014. Light-duty vehicles and heavy-duty trucks and equipment are capable of operating on blends of biodiesel. The Energy Information Agency predicts the supply of quality biodiesel to continue to increase and is expected to contribute to easing price pressure on diesel fuel.

**Why is diesel priced above gasoline?**

You may have noticed that a gallon of diesel fuel costs more than a gallon of gasoline. For many years, diesel fuel prices tended to be lower than gasoline. Since September 2004, this trend has disappeared, with diesel fuel prices tracking or exceeding gasoline. According to the U.S. Energy Information Agency (EIA), the retail price of regular gasoline for the week of May 19, 2014 was $3.67 and a gallon of diesel was $3.93.

This price differential is due to a variety of factors both global and domestic. Both gasoline and diesel fuel prices will rise and fall with the price of crude oil. However, other influences are at work to accelerate diesel’s price relative to gasoline. For example, the excess supply of gasoline in Europe is contributable to a portion of the recent fall in domestic gasoline prices. Read more about economic factors that impact the price of fuels but visiting the U.S. Department of Energy’s short term energy forecast ([http://www.eia.gov/forecasts/steo/report/us_oil.cfm](http://www.eia.gov/forecasts/steo/report/us_oil.cfm)).

**Supply Costs**

Regulations in place since 2006 require the use of ultra-low sulfur diesel fuel (ULSD) with a sulfur content of at 15 parts per million. In order to meet this requirement, refiners incur additional costs that are passed along through higher retail price. These costs are not incurred when producing gasoline, although a proposed rule is expected to require refiners produce ultra-low sulfur gasoline beginning in 2017.

**Demand Factors**

In the domestic market, the demand for diesel fuel is different from gasoline. Diesel fuel is consumed by the large population of heavy-duty trucks, construction and agricultural equipment, locomotives, commercial marine vessels and some home heating furnaces while gasoline is consumed almost exclusively by light-duty cars and trucks. An increase in economic activity that results in additional freight transportation or construction contributes to an increase in demand for diesel fuel. Also, seasonal changes in the demand for diesel among these consumers can impact diesel fuel prices as well. In the autumn, demand for diesel and other distillate fuels such as home heating oil (a type of diesel fuel) picks up due to farm use and trucking of goods ahead of the holidays. By comparison, gasoline is usually more expensive in the spring and summer during the peak driving season.

The U.S. is also subject to international price pressures from many foreign markets. The U.S. is one of a few countries that supplies ULSD to the international market. In 2013, the U.S. exported over 300 million barrels of ultra-low sulfur diesel fuel up from 262.3 million barrels exported in 2012, according to the EIA. As a result, the U.S. has become a net exporter of diesel fuel to other countries that demand the clean fuel. Many Latin American countries recently increased consumption of U.S. ULSD. Europe is also a large consumer of U.S. ULSD to make up for its supply shortfalls to power its large fleet of light-duty diesel cars and trucks. Financial incentives in place in Europe since the fuel price shocks of the 1970s and 1980s encouraged the purchase of diesel-powered cars and trucks, though there are efforts to phase these out by the European Union.
Fuel Taxes

Another factor in diesel and gasoline prices are motor fuel taxes collected at the federal, state and sometimes the local level. Federal motor fuels taxes are deposited in the Highway Trust Fund to pay for repair and maintenance of the nation’s roads, highways, bridges, tunnels and mass transit infrastructure. State taxes are used for a variety of purposes.

Since October 1, 1997, the federal government has imposed a 24.4 cents-per-gallon tax on diesel fuel compared to an 18.4 cents-per-gallon tax on gasoline. Almost every state also levies a diesel tax the average of which is 19 cents per gallon. Some states levy the same tax rate on gasoline and diesel fuel, however 20 state currently tax diesel more than gasoline with only 13 states imposing higher gasoline taxes. More information on state fuel taxes can be found by visiting the following site: [http://www.api.org/oil-and-natural-gas-overview/industry-economics/~/media/Files/Statistics/StateMotorFuel_OnePagers.pdf](http://www.api.org/oil-and-natural-gas-overview/industry-economics/~/media/Files/Statistics/StateMotorFuel_OnePagers.pdf)

Will natural gas replace diesel and gasoline?

Recently, much attention has been raised concerning the rise of natural gas as a domestically sourced clean transportation fuel. Advocates for natural gas urge the transition of the heavy-duty on- and off-road vehicles and equipment to run on natural gas. However, currently the natural gas penetration in the heavy-duty truck sector is only about one percent. In 2012, about 220,000 heavy-duty trucks and vehicles were sold in the U.S. Roughly 2,000 of these conveyances were powered by natural gas. In 2012, 99.4% heavy duty vehicles registered in the U.S. were powered by diesel. Many energy experts, Presidential councils and international energy authorities all conclude that diesel will remain the predominant powertrain in North America and will remain the primary transportation fuel globally for the long term. This is attributable to the inherent energy density of diesel fuel and the ability of the diesel engine to translate the energy content into power. The Fuels Institute predicts that alternative fuels such as CNG and LNG, will make up only 3-5 percent of the total heavy-duty market by 2020. [http://www.fuelsinstitute.org/ResearchArticles/TomorrowsVehicles.pdf](http://www.fuelsinstitute.org/ResearchArticles/TomorrowsVehicles.pdf)

The National Petroleum Council in its 2012 report Advancing Technology for America’s Transportation Future for the U.S. Department of Energy stated: “Diesel engines will remain the power-train of choice for HD vehicles for decades to come because of their power and efficiency.” In fact, this trend is found globally as well. The Organization for the Petroleum Exporting Countries (OPEC) in its World Outlook on Oil 2012 forecasts growing global demand for distillate products, primarily diesel fuel, declining demand for finished gasoline, and highlights the need for global investments to meet the changing fuels needs of the market.

Can diesel fuel be produced from non-petroleum sources?

Yes. Much like ethanol, feedstocks based on a variety of non-petroleum and renewable sources can be refined into high quality bio-based diesel. Soybean oil, algae and even pond scum can be produced into biodiesel and blended into petroleum based diesel fuel much like ethanol is blended into gasoline. In the U.S., most heavy-duty trucks and equipment can operate on a blend up to 20 percent biodiesel, or B20, while most diesel cars, trucks and SUVs can operate on a blend of up to five percent biodiesel, or B5.

The expanded availability and use of biodiesel is an important component to reducing greenhouse gas emissions from diesel engines and achieving energy security. The Renewable Fuel Standard (RFS) mandates the use of certain biofuels blended into petroleum based diesel and gasoline in an effort to grow domestically sourced fuel with the capability of reducing greenhouse gas emissions. The U.S.
Department of Energy estimates that bio-based diesel fuel has a lifecycle greenhouse gas reduction potential of roughly 60 percent allowing these fuels to qualify as an advanced biofuel by the U.S. Environmental Protection Agency.

Biodiesel producers are well on their way to expanding their contribution of the fuel. In 2013, the biodiesel industry produced over 1.8 billion gallons of biodiesel and industry analysts predict that the biodiesel industry could contribute five percent of the total supply of diesel fuel sold in the U.S. by 2015. Biodiesel is also widely available. Most diesel fuel sold in filling stations that fuel light-duty cars and trucks contain a blend of 2-5 percent biodiesel. There are 324 fueling stations across the country that sell blends of biodiesel of 20 percent (B20) and above. (Source: [http://www.afdc.energy.gov/fuels/biodiesel_locations.html](http://www.afdc.energy.gov/fuels/biodiesel_locations.html))

**Are diesel cars trucks and SUVs growing in popularity?**

The diesel passenger car market that includes SUVs, vans and pickups, has nearly doubled in three years from 55,000 vehicles in 2010 to 100,000 in 2013 according to data compiled by R.L. Polk and Co. Consumers considering a diesel in their next vehicle purchase has grown year over year from 13 percent in 2006 to 28 percent in 2011 according to CNW Research. The number of diesel-powered cars, trucks, vans and SUVs is expected to double by the end of 2013 to 40 models offered and consumers will be able to choose from a predicted pool of 54 vehicles by 2015.

Consumers are also finding diesel fuel readily available. Today, roughly half of all gas stations around the country sell diesel fuel. According to the Fuels Institute, the number of gas stations offering diesel fuel will continue to increase to meet consumer demand.

Diesel vehicles also play an important part of vehicle manufacturer’s strategy to double fuel economy by 2025. The U.S. Environmental Protection Agency predicts that reliance on a greater number of diesel vehicles will help auto makers achieve their Corporate Average Fuel Economy (CAFE) standards owing to the unique energy efficiency of the diesel engine. Today, many light-duty vehicles exhibit a 20-40 percent increase in fuel economy compared to a gasoline powered counterpart. In fact, many light-duty diesel cars exhibit real world fuel economy statistics that are on par with a hybrid.

EIA has assessed whether there is adequate diesel fuel supply to serve a growing market of light-duty diesel vehicles in the U.S. and believes that there will easily be enough diesel fuel refining capacity in the U.S. to serve the doubling or tripling of the U.S. light-duty diesel car and truck market, particularly since the U.S. is currently a net exporter of diesel fuel.

*For more information, visit [www.dieselforum.org](http://www.dieselforum.org)*