



Gasoline

Gasoline is a petroleum-based **hydrocarbon** fuel that contain energy. It is used as a fuel in most U.S. passenger vehicles with **internal combustion engines**. Today, about 42 percent of the crude oil in the U.S. is refined into gasoline. To meet transportation needs, Americans use 13.5 million barrels of crude oil, or 256.6 million gallons of gasoline, every day. With the U.S. population over 309 million people, that is almost one gallon of gasoline every day for each man, woman, and child.

History of Gasoline

Edwin Drake dug the first oil well in 1859 and distilled the petroleum to produce kerosene for lighting. He had no use for the gasoline or other products, so he discarded them. It wasn't until 1892 with the invention of the automobile that gasoline was recognized as a valuable fuel. By 1920, there were nine million vehicles on the road powered by gasoline and service stations were popping up everywhere.

The early distillation process converted only a small percentage of crude oil into gasoline. As the demand for gasoline increased, processes were developed to increase the yield. Heavy hydrocarbon molecules were 'cracked' using heat and pressure. In the 1960s, catalytic cracking began being used to produce much higher yields. A typical U.S. refinery may produce twice as much gasoline from each barrel of crude oil as a European refinery.

During the 1950s, cars were becoming bigger and faster. **Octane ratings** increased and so did lead levels, as lead compounds were added to gasoline to reduce knocking and improve engine performance. Unleaded gasoline was introduced in the 1970s, when the health implications of lead became clear. Leaded gasoline was completely phased out in the 1980s with the introduction of catalytic converters to enhance fuel combustion.

Gasoline as a Transportation Fuel

Today, gasoline is the fuel used by a vast majority of passenger vehicles in the U.S. There are about 246 million vehicles that use gasoline to travel an average of 12,000 miles per year. There are 159,000 fueling stations that provide convenient accessibility for consumers. The production and distribution infrastructures are in place. Most Americans consider gasoline the most sensible transportation fuel for today, even if it is not an ideal fuel.

Consumers are concerned about price fluctuations. During World War I, the cost of gasoline was about \$0.25 a gallon. The price of gasoline has averaged about \$2.00 a gallon in inflation-adjusted dollars for the last 80 years, until the shortages caused by Hurricanes Katrina and Rita, and the unrest in many oil producing areas, such as Iraq, Iran, and Nigeria. In 2008, the highest ever average cost for a gallon of gasoline was \$3.27. However, in 2010, the average cost for a gallon of gasoline has only \$2.79.



More than 246 million passenger vehicles take to the roads every day in the United States. Gasoline fuels 99 percent of these vehicles.

Characteristics and Environmental Impacts of Gasoline

Gasoline has a high energy content of about 116,000 **Btu**/gallon and octane ratings of 84-93. It is highly flammable and toxic—gasoline vapors can cause dizziness, vomiting, and even death if inhaled in strong concentrations.

Gasoline is a nonrenewable fossil fuel that produces criteria air pollutants—carbon monoxide, lead, nitrogen dioxide, **ozone**, particulate matter, and sulfur dioxide—when it is burned. Since the 1960s, stricter environmental standards have led to gasoline formulations and vehicle designs that have reduced vehicle exhaust emissions by 95 percent.

The **Clean Air Act** Amendments of 1990 mandated that **reformulated gasoline** be used in areas of the country that do not meet air quality standards, as well as reductions in nitrogen compounds (**NO_x**) and **volatile organic compounds** (VOCs). More than a dozen different formulations of gasoline are now required by law in the U.S.

Even with reductions in toxic and non-toxic **emissions**, the impact of gasoline on the environment is immense because there are so many vehicles in the United States driving so many miles. It will take the concerted efforts of consumers, industry, and government to make significant changes to our transportation system.