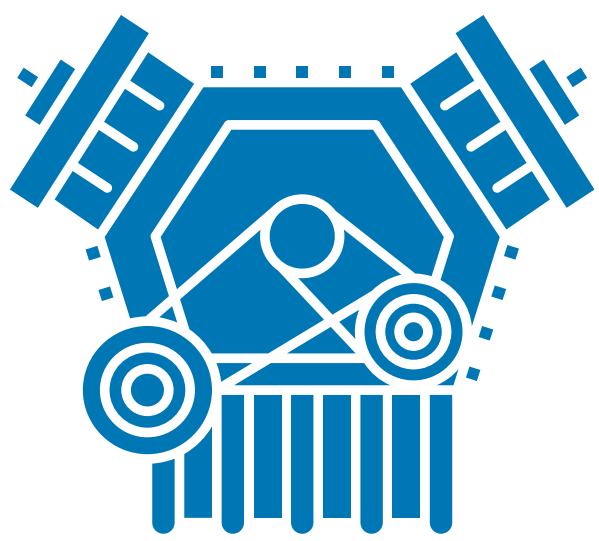


Internal Combustion Engine Vehicles

What Is It?

Internal Combustion Engine (ICE) vehicles operate by burning a mixture of fuel and air in engine cylinders that drive pistons, creating mechanical energy for the wheels. ICE vehicles commonly run on **Gasoline or Diesel** fuel.



How Clean is It?

ICE vehicles are equipped with emissions control systems such as catalytic converters exhaust gas recirculation that help reduce harmful exhaust but are still a significant contributor to greenhouse-gas emissions.



What Does It Cost?

As of March 2025, the average MSRP for a new ICE vehicle in the U.S. was around \$48,000, but prices vary significantly. Regular maintenance along with fuel costs can result in several thousand dollars in annual expenses.



Space



Typical gas ranges for ICE vehicles can vary between 200 miles and 500 miles, depending on several factors. Driving conditions, speed, elevation change, and traffic congestion can influence the range.

Point

- Gasoline and diesel fuel stations are readily available in most regions.
- ICE vehicles typically offer longer driving ranges compared to EV, and refueling takes only a few minutes.
- ICE vehicles come in a wide range of prices and styles, making them accessible to a broad spectrum of consumers.
- Increases in ICE fuel efficiency not only mean better performance but less fuel consumption.
- Most emergency vehicles, critical services, and military vehicles utilize internal combustion engines.



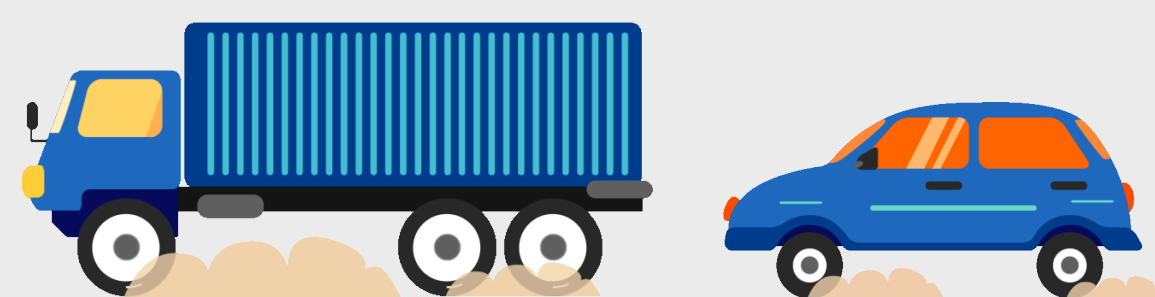
Counterpoint

- The price of gasoline and diesel fuel varies considerably and is influenced by geopolitical events.
- Most Americans drive fewer than 40 miles a day, making increased range unnecessary most of the time.
- Older ICE vehicles may be more affordable as used cars, but lack safety features, fuel efficiency, or may produce more emissions.
- ICE vehicles run entirely on hydrocarbons, which produce emissions and affect air quality.
- Public transit and many government vehicles are shifting away from ICE for cost or environmental reasons.



How Does It Work?

1. An ICE vehicle is filled with fuel at a gas station or fuel pump.
2. As the car is turned on, combustible fuel is pushed into the engine through the fuel line.
3. Fuel and air are delivered to the engine cylinders, where the fuel is compressed and then ignited by the engine spark plug.
4. The ignited fuel combusts, creating energy that pushes the cylinder piston downwards, creating mechanical energy that is used to rotate the wheels.
5. The exhaust valve opens, and the piston is pushed back upwards again, where it will receive more fuel and repeat the process. The gas from the combusted fuel is exhausted out of the vehicle.
6. This cycle can be repeated thousands of times per minute in an ICE engine. The engine also runs an alternator, which provides electricity for vehicle systems and charges its battery.



Did You Know?

Nikolaus Otto is credited with inventing the first practical four-stroke engine in 1876. His design, known as the Otto Cycle, laid the foundation for the development of modern gasoline engines used in cars today.

What's Next?

ICE vehicles are becoming more efficient thanks to advances in engine design, fuel systems, and emissions controls. Automakers are also exploring synthetic and biofuels to reduce environmental impact while retaining the core functionality of ICE vehicles. Hybrid models, which combine electric motors with ICE technology, are playing a key role by extending range and reducing emissions without sacrificing performance or convenience.