Natural gas cars: A look under the hood

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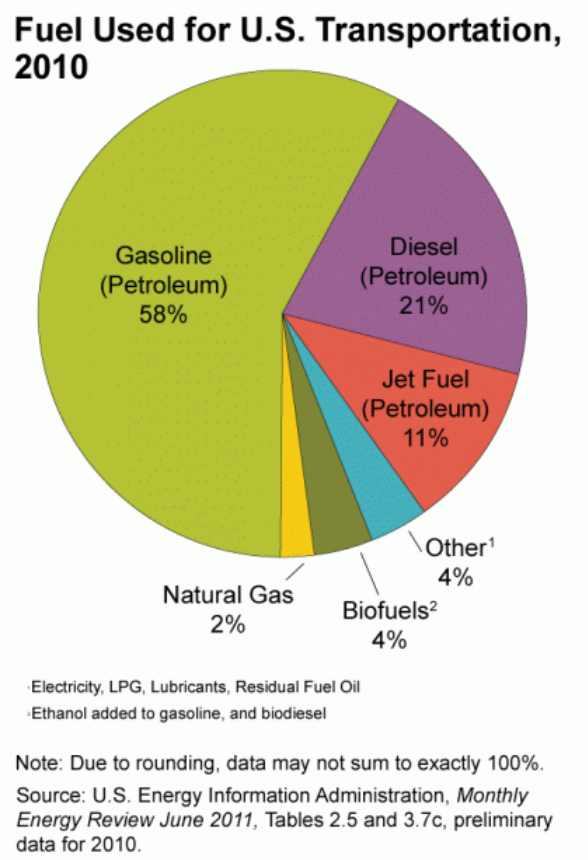

With U.S. natural gas production booming, and the price of natural gas right now lower than the price of gasoline or diesel fuel, some are asking: Why don't more of our cars run on natural gas?

Compressed natural gas (CNG) vehicles – the most common type of natural gas vehicle – have been around for decades. **Today, natural gas accounts for about 2 percent of U.S. demand for transportation fuel**, with most of that demand coming from fleet vehicles like buses and taxis.

Looking forward, we do see opportunities for natural gas to make an increasingly important contribution to U.S. transportation when it comes to certain fleet uses; I will talk more about this later. But for average consumers, there are a number of challenges that limit the widespread adoption of natural gas vehicles. These include:

- **Vehicle cost.** CNG vehicles are **nearly 25 percent more expensive** than conventional gasoline or diesel vehicles and **nearly 10 percent more expensive than hybrids**, based on equivalent models. For example, a CNG-powered passenger car available in the United States costs about $5,600 more than a similarly equipped conventional model, and a CNG-powered 18- wheeler costs an additional $60,000. Even with today's low natural gas prices, it would take years for motorists to recoup these extra costs.

- **Infrastructure cost.** For American motorists to fuel up on CNG as easily as they do today on gasoline and diesel, the U.S. would need to build an entirely new network of pipelines and service stations to accommodate high-pressure fueling. In a 2010 study, IHS-CERA estimated it would **cost between $8 and $12 billion** to have CNG facilities installed in **just 10 percent of existing U.S. fueling stations**. A single CNG station costs anywhere from $300,000 to $3 million more than a regular gas station.

Obviously, these two challenges are **economic**, and you've likely heard some supporters of CNG vehicles advocate for taxpayer subsidies and government support to overcome them. But other challenges to CNG as at transportation fuel are **performance-related**. For example:

- **Energy density.** Just as foods like nuts and granola bars are popular with hikers because they pack a lot of calories into a small, light package, gasoline and diesel are popular with drivers because they are the fuels with the highest energy density. **CNG has relatively low energy density; it contains nearly 70 percent less energy per gallon equivalent than gasoline or diesel.** As a result, CNG vehicles pack less horsepower.

- **Frequency and duration of fill-ups.** The lower energy density of CNG also means that drivers will have to fill their tanks more frequently to go the same distance. For example, you would have to fill a CNG-fueled passenger car about 1.7 times to go the same distance as its gasoline-powered equivalent. Refueling a CNG vehicle also takes longer – about twice as long as a standard passenger vehicle.

- **Cargo space.** Because of CNG's lower energy density – and its need to be kept under very high pressure – CNG vehicles are equipped with large, heavy fuel tanks (200 pounds versus 10 pounds for gasoline). These tanks **reduce a car's fuel economy and its cargo capacity**. CNG-powered passenger vehicles currently have about half the cargo space of their conventional equivalents.

Given all these factors, where might natural gas-powered vehicles play a role? One important application for CNG vehicles is for commercial and municipal fleets with limited driving distances. For these vehicles, CNG can make economic sense because they can benefit from shared refueling locations and infrastructure costs. According to the Natural Gas Vehicle Coalition, buses account for more than 60 percent of all natural gas vehicles in the world.

We also are beginning to see expanded interest in the use of liquefied natural gas (LNG) as a vehicle fuel for commercial trucks in the United States. LNG, which is natural gas super-cooled to its liquid form, has a much higher energy density than CNG.

Demand for fuel for trucks, buses and other heavy-duty vehicles exerts a strong influence on U.S. transportation trends. Today, these vehicles — which are generally tied to commercial activity — account for about 20 percent of total U.S. demand for transportation fuels; by 2040, they will account for about 30 percent.

ExxonMobil supports the market-driven use of natural gas as a vehicle fuel. But a government push to subsidize or mandate the expanded use of natural gas in the transportation sector is a wrong turn.

National energy goals in the transportation sector – such as reducing Americans' transportation costs and strengthening U.S. energy security – are better (and more economically) met through other methods, such as the expanded use of hybrid vehicles or improved fuel efficiency in conventional vehicles. This is, in fact, what we expect to happen. ExxonMobil's *Outlook for Energy* projects that the average new car on U.S. roads in 2040 in will get 45 miles per gallon, compared to 22 MPG today, with hybrids and efficiency accounting for most of that improvement.

Like any fuel or technology, natural gas should compete with other transportation fuels on a level playing field – not one distorted by governments trying to pick which fuels and technologies will ultimately be the most successful. In this way, the nation's energy needs are met at the lowest possible cost to consumers and taxpayers.