



ENERGY E-TIPS

Compressed Natural Gas is Fueling Various Vehicles

Natural gas is a highly combustible odorless and colorless fuel gas. Natural gas can be used to heat buildings and water, cook food, dry clothes and even to help generate electricity. More than 60 million households in the United States rely on natural gas for their heating and cooking purposes. Natural gas is a safe and reliable fuel, if used correctly. This edition of Energy E-Tips will explore important information related to natural gas and its potential of reducing our dependency on foreign oil.



Natural gas gives off a lot of heat and light when it burns, but doesn't produce smoke compared to fossil fuels like coal and oil. That makes it a good fuel for use in the home. Because natural gas pipes are buried safely underground, you aren't likely to lose service during stormy weather. Gas companies add a special chemical to natural gas to give it a rotten egg odor.

How is natural gas produced?

Natural gas is really a mixture of gases that formed from the fossil remains of ancient plants and animals buried deep in the earth and also occur naturally throughout the solar system and universe. It is largely composed of methane. Most scientists believe that the pressure, combined with the heat of the earth, changed this organic mixture into petroleum and natural gas. Eventually, concentrations of natural gas became trapped in the rock layers, like a wet sponge traps water. Most natural gas comes from three types of wells: natural gas-and-condensate wells, oil wells and coal bed methane wells.

What are the differences between natural gas and biogas?

Natural gas is obtained in natural form and consists primarily of methane, while biogas is a gas produced by the biological breakdown of organic matter in absence of oxygen, and consists of methane and carbon dioxide. Natural gas is available in large quantities, while biogas is available in limited quantities. Natural gas is used as a source of power, while biogas is used mostly in rural areas. Natural gas is also used as raw material in petrochemical industries. It is supplied for household use as Liquefied Petroleum Gas (LPG) and also used for running vehicles as Compressed Natural Gas (CNG).

How can natural gas fuel my vehicle?

According to statistics from Natural Gas Vehicles for America (NGV America), there were 130,000 light- and heavy-duty compressed natural gas (CNG) and liquefied natural gas (LNG) vehicles in the United States and 12 million vehicles worldwide.

There are two types of natural gas vehicles (NGVs): dedicated and bi-fuel. Dedicated NGVs are designed to run only on natural gas; bi-fuel NGVs have two separate fueling systems that enable the vehicle to use either natural gas or a conventional fuel (gasoline or diesel). In general, dedicated NGVs achieve better performance and have lower emissions than bi-fuel vehicles because their engines are optimized to run on natural gas. In addition, dedicated vehicles do not have to carry two types of fuels, thereby increasing cargo capacity and reducing weight.

In most cases, any existing gasoline vehicle can be converted to a bi-fuel (gasoline/CNG) vehicle. Authorized shops can do the retrofitting, which involves installing a CNG cylinder in the trunk, installing the plumbing, installing a CNG injection system and the electronics.

What are the pros and cons of using natural gas?

As a fuel, natural gas offers significant environmental and public health advantages through reduced vehicular greenhouse gases emissions including particulate emissions. The use of natural gas as a vehicle fuel offers independence from oil producing countries and oil market fluctuations resulting from international political and market influences. Natural gas offers a cheaper alternative to any other available vehicle fuel.

On the other hand, LNG is heavier than air and tends to collect below a vehicle or tank during leaks, which would allow it to ignite explosively upon ignition. Fueling takes longer, for example refueling small car require about 20 minutes, making refueling less convenient.

What about gas emission from burning natural gas?

Natural gas is the cleanest of all the fossil fuels. Having a higher percentage of methane, the main products of the combustion of natural gas are carbon dioxide and water vapor, the same compounds we breathe out. But combustion of natural gas, on the other hand, releases very small amounts of sulfur dioxide and nitrogen oxides, and virtually no ash or particulate matter.

Are there any natural gas stations in Arkansas?

According to the *Log Cabin Democrat*, Southwestern Energy Company opened its first CNG station by one of its subsidiaries in May 2011 located in Damascus, Ark. The primary focus of the station is to fuel Southwest Energy Companies' current fleet of 40 CNG-powered vehicles, and the company plans to increase that fleet to 100 by the end of the year.

Before the opening of this station, there was only one other public CNG station in the state, in Fort Smith. Two other CNG stations are for private use. The City of North Little Rock is expected to open its CNG station in the coming months. Crain Automotive in Conway has a fueling station, providing compressed natural gas to Conway Chamber of Commerce's signature van.

Some Arkansans view CNG as a positive alternative to traditional petroleum-based fuel. At a price per gallon equivalent of around \$1.60 GGE (Gasoline Gas Equivalent – It is the amount of alternative fuel it takes to equal the energy content of one liquid gallon of gasoline), they view it as an affordable alternative. Others appreciate the fact that the fuel comes directly from Arkansas, from the natural gas found in the Fayetteville shale. Still others tout its environmental benefits, including lower levels of emissions and pollutants compared to diesel and gasoline, and longer vehicle life expectancy of the vehicles (due to less carbon residue), according to some industry studies.

As with most things, there are also those who oppose the use of CNG. There are concerns about the increased number of earthquakes in the area.

References:

“CNG station opens in Damascus; Centerpoint is first customer” *Log Cabin Democrat*, May 14, 2011: <http://thecabin.net/news/local/2011-05-14/cng-station-opens-damascus-centerpoint-first-customer>

Samy Sadaka ssadaka@uaex.edu
Rachel Lipsey rlipsey@uaex.edu