**Natural Gas Basics**

**How was natural gas formed?**

The main ingredient in natural gas is methane, a gas (or compound) composed of one carbon atom and four hydrogen atoms. Millions of years ago, the remains of plants and animals in the ocean decayed and built up in thick layers.  This decayed matter from plants and animals is called organic material — it was once alive.  Over time, sand and silt covered the organic material, and trapped it in rock as the sediment lithified.  Pressure and heat changed some of this material into oil (petroleum), and some into natural gas — tiny bubbles of odorless gas.

**Most of the natural gas consumed in the United States is produced domestically**

In 2013, natural gas production was equal to about 93% of U.S. natural gas consumption. Five states accounted for approximately 67% of total U.S. natural gas production in 2013:

* Texas (28%)
* Pennsylvania (13%)
* Louisiana (10%)
* Oklahoma (8%)
* Wyoming (7%)

**Uses of Natural Gas**

The United States used 26.13 trillion cubic feet (Tcf) of natural gas in 2013, the equivalent of about 27% of total U.S. energy use. Natural gas is used as a fuel to produce steel, glass, paper, clothing, brick, and electricity. Natural gas is a major fuel used to heat buildings. About half of the homes in the United States use natural gas as their main heating fuel. Natural gas is also used in homes and businesses for cooking, for heating water, for drying clothes, and for outdoor lighting.

The top five consumers of natural gas in the United States in 2013 were:

* Electric power sector—31%
* Industrial sector—28%
* Residential sector—19%
* Commercial sector—13%
* Vehicle fuel—less than 1%

**Natural Gas & the Environment**

**Natural gas is a relatively clean burning fossil fuel**

Burning natural gas for energy results in fewer emissions of nearly all types of air pollutants and carbon dioxide (CO2) per unit of heat produced than coal or refined petroleum products. About 117 pounds of carbon dioxide are produced per million British thermal units (Btu) equivalent of natural gas compared to more than 200 pounds of CO2 per million Btu of coal and more than 160 pounds per million Btu of distillate fuel oil. These clean burning properties have contributed to increased use of natural gas for electricity generation and increased use of natural gas as a transportation fuel for fleet vehicles in the United States.

**Natural gas is mainly methane—a strong greenhouse gas**

Natural gas is made up mostly of methane, which is a potent greenhouse gas. Some natural gas leaks into the atmosphere from oil and gas wells, storage tanks, pipelines, and processing plants. These leaks were the source of about 23% of total U.S. methane emissions, but only about 2% of total U.S. greenhouse gas emissions in 20121. The oil and natural gas industry tries to prevent natural gas leaks. In areas where natural gas is produced but can't be transported economically, natural gas is flared or burned at well sites. This is considered to be safer than releasing methane into the atmosphere because CO2 is not as potent a greenhouse gas as methane.

**Natural gas exploration, drilling, and production has many environmental impacts**

When geologists explore for natural gas deposits on land, they may have to disturb vegetation and soils with their vehicles. A gas well on land may require an area to be cleared and leveled to host a pad where a natural gas well can be drilled. Well drilling activities produce air pollution and may disturb people and wildlife and water resources. Pipelines are needed to transport the gas from the wells, and this usually requires clearing land to bury the pipe. Natural gas production can also result in the production of large volumes of contaminated water. This water has to be properly handled, stored, and treated so that it does not pollute land and water.

While the natural gas that we use as a fuel is processed so that it is mainly methane, unprocessed gas from a well may contain many other compounds, including hydrogen sulfide, a very toxic gas. Natural gas with high concentrations of hydrogen sulfide is usually flared. Natural gas flaring produces CO2, carbon monoxide, sulfur dioxide, nitrogen oxides, and many other compounds depending on the chemical composition of the natural gas and depending on how well the gas burns in the flare. Natural gas wells and pipelines often have engines to run equipment and compressors which produce additional air pollutants and noise.

**Advances in drilling and production technologies have positive and negative impacts**

New drilling and natural gas recovery technologies have greatly reduced the area that has to be disturbed to produce natural gas. Horizontal and directional drilling techniques make it possible to produce more natural gas from a single well than in the past, so fewer wells are needed to develop a natural gas field. Hydraulic fracturing (commonly called *hydrofracking, or fracking*) is opening up large reserves of gas that were previously too expensive to develop. Fracking involves pumping liquids under high pressure into a well to fracture the rock which allows natural gas to escape from the rock. There are some potential environmental concerns associated with the production of natural gas using this technique:

* The fracturing of wells requires large amounts of water. In some areas of the country, significant use of water for shale gas production may affect the availability of water for other uses, and can affect aquatic habitats.
* If mismanaged, hydraulic fracturing fluid—which may contain potentially hazardous chemicals—can be released by spills, leaks, faulty well construction, or other exposure pathways. Any such releases can contaminate surrounding areas.
* Hydraulic fracturing also produces large amounts of wastewater, which may contain dissolved chemicals and other contaminants that require treatment before disposal or reuse. Because of the quantities of water used and the complexities inherent in treating some of the wastewater components, treatment and disposal are important.
* According to the United States Geological Survey, hydraulic fracturing "causes small earthquakes, but they are almost always too small to be a safety concern. In addition to natural gas, fracking fluids and formation waters are returned to the surface. These wastewaters are frequently disposed of by injection into deep wells. The injection of wastewater into the subsurface can cause earthquakes that are large enough to be felt and may cause damage."
* Natural gas may be released to the atmosphere during and after well drilling, the amounts of which are being investigated.

**Strict safety regulations and standards are required for natural gas production, transportation, distribution, and storage**

Because a natural gas leak can cause an explosion, there are strict government regulations and industry standards in place to ensure the safe transportation, storing, distribution, and use of natural gas. Because natural gas has no odor, natural gas companies add a strong-smelling substance called mercaptan to the natural gas so that people will know if there is a leak. If you have a stove that burns natural gas, you may smell the rotten egg scent of natural gas when the pilot light goes out.

http://www.eia.gov/kids/energy.cfm?page=natural\_gas\_home-basics