

GREENHOUSE GAS EMISSIONS AND REDUCTIONS



FACT SHEET

MAY 2012

Greenhouse Gases

Greenhouse gases such as water vapor, carbon dioxide, methane and nitrous oxide are gases that prevent heat from escaping into the atmosphere, somewhat like the glass panels of a greenhouse. Greenhouse gases are necessary to sustaining life because they keep the planet's surface temperature relatively stable. Many scientists believe that the burning of fossil fuels such as coal, oil and natural gas, along with deforestation have caused the concentrations of these heat trapping greenhouse gases (mostly carbon dioxide) to increase in our atmosphere. Some scientists also believe that the increased atmospheric concentrations are a primary cause of higher global temperatures.¹

Each greenhouse gas has been assigned a number that reflects its global warming potential (GWP). For instance, carbon dioxide has a GWP of 1, methane has a GWP of 23 and nitrous oxide (NO_x) has a GWP of 296.² This comparison allows emissions of greenhouse gases to be estimated and reported on an equal basis as carbon dioxide equivalents (CO₂e).

Fossil fuels are combusted in order to provide different types of energy (heat, electricity, etc.). Comparing the combustion of natural gas to the combustion of coal and oil, natural gas emits 44% less carbon dioxide than coal, and 25% to 30% less than oil.

Comparison of Carbon Dioxide Emissions from Combustion of Fossil Fuels

Fuel Source	Natural Gas	Oil	Coal
Carbon Dioxide Emitted	117,000*	164,000*	208,000*

*Pounds of emissions produced per billion British thermal units of energy

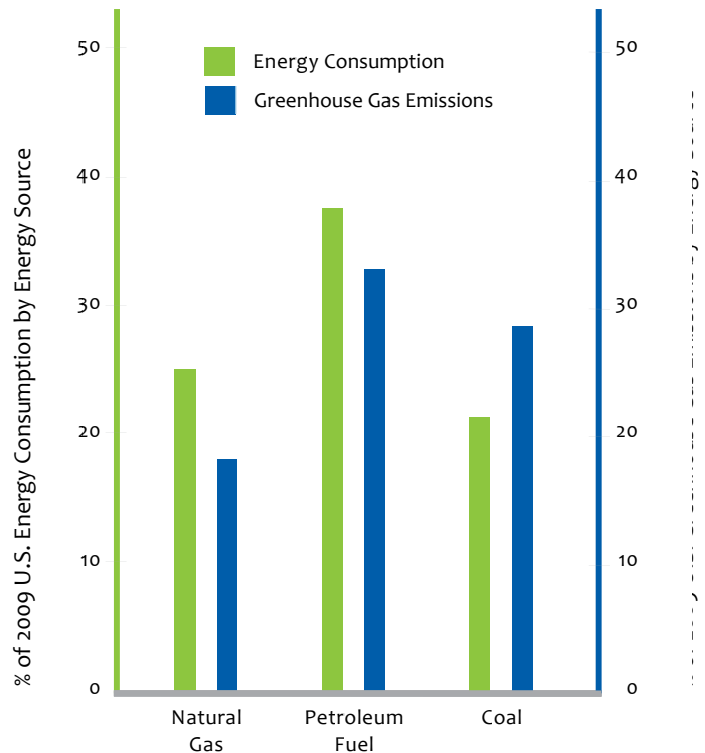
Source: Energy Information Administration

In 2006 the total U.S. greenhouse gas emissions were 7,050 million metric tons of CO₂e (MMTCO₂e).³ Only 16% of the 2006 U.S. greenhouse gas emissions came from the combustion of natural gas (mostly electrical power production, home heating and industrial use), which accounted for 22% of the 2006 U.S. energy consumption. The following graph compares the share of total U.S. energy consumption versus the share of total U.S. CO₂e emissions generated in 2006 from the combustion of coal, petroleum fuels and natural gas.³

KEY POINTS

- Combustion of natural gas provides 22% of the nation's energy, but only 16% of its greenhouse gas emissions.
- The U.S. natural gas industry accounts for only 3.2% of the total U.S. greenhouse gas emissions on a CO₂-equivalent basis.
- Chesapeake's greenhouse gas emissions come mainly from internal combustion engines that emit CO₂ and from fugitive emissions of methane.
- Chesapeake has partnered with the EPA in a voluntary program to reduce methane emissions.

Carbon Dioxide Emissions vs. Energy Consumption



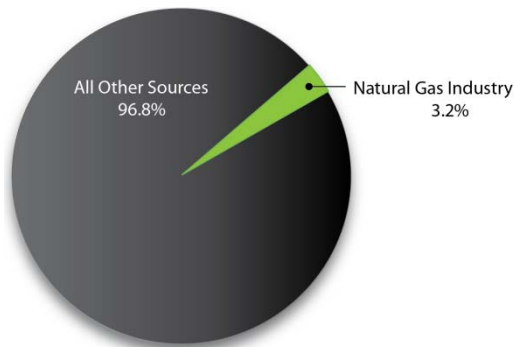
Chesapeake's Operations and Greenhouse Gases

As with almost all industries, greenhouse gases are emitted from Chesapeake Energy Corporation's operations. Our greenhouse gas emissions come mainly from the use of internal combustion engines that emit CO₂, from amine treater units and from fugitive emissions of methane. However, the entire U.S. natural gas industry only accounts for approximately 3.2% of the country's total greenhouse gas emissions on a CO₂e basis.⁴ This

industry consists of hundreds of companies in addition to Chesapeake providing services that include production, processing, transmission and storage and distribution to users.

Greenhouse Gas Regulations

The Environmental Protection Agency (EPA) has begun to regulate greenhouse gas emissions under new source review permitting regulations for very large sources and is writing new New Source Performance Standards (NSPS) regulations for refineries and power plants. However, their authority to regulate greenhouse gas emissions is being challenged in federal courts. The Regional Greenhouse Gas Initiative is a cap-and-trade program for CO₂ emissions from electric power plants located in a group of northeastern states. California has passed legislation and is also beginning to regulate greenhouse gas emissions from industrial and transportation sources in California.



Total U.S. Greenhouse Gas Emissions⁴

Chesapeake Reducing Greenhouse Gas Emissions

Chesapeake does not presently operate in jurisdictions that regulate greenhouse gas emissions. However, the company has joined with the EPA in a voluntary program to reduce methane emissions where feasible. Established in 1993, the EPA's Natural Gas STAR Program is focused on sharing technical ideas and methodologies for Best Management Practices (BMPs) with member companies that reduce methane emissions.⁵ The program promotes technology-sharing workshops between member companies, such as a May 2009 EPA Natural Gas STAR Workshop hosted by Chesapeake at its Oklahoma City headquarters. The program is also a means for member companies to record and report emissions reductions to the EPA. Many of the BMPs promoted by the STAR Program have historically been utilized by Chesapeake. However, becoming a member of the program has placed additional focus on our efforts to voluntarily reduce methane emissions. Some of the BMPs that Chesapeake has focused on since joining the program include:

- Reduced emission completions – often referred to as green completions

- Low-bleed pneumatic controllers
- Flash gas compression
- Enhanced compressor blow-down procedures
- Vapor recovery units
- Dehydrator flash tanks
- Fugitive leak detection and repair

Information on these and other BMPs can be found at epa.gov/gasstar/.

The EPA reported that 2007 was a very successful year for the world-wide **Natural Gas STAR Program**, with reported reductions of approximately 92.5 billion cubic feet (Bcf) of natural gas (methane). This amounts to an avoidance of greenhouse gas of 2.7 MMTCO₂e. Approximately 72% of those reductions were in the U.S.

Information Sources

1. US EPA Climate Change website:
<http://www.epa.gov/climatechange/basicinfo.html>
2. IPCC Third Assessment Report: Climate Change 2001.
3. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 (April 2008) USEPA #430-R-08-005.
4. Coverage of Natural Gas Emissions and Flows under a Greenhouse Gas Cap-and-Trade Program; ICF International, for the Pew Center on Global Climate Change.
5. US EPA Natural Gas STAR Program website:
<http://www.epa.gov/gasstar/>

About Chesapeake

Chesapeake Energy Corporation is the second-largest producer of natural gas, a Top 15 producer of oil and natural gas liquids and the most active driller of new wells in the U.S. Headquartered in Oklahoma City, the company's operations are focused on discovering and developing unconventional natural gas and oil fields onshore in the U.S. Chesapeake owns leading positions in the Barnett, Haynesville, Bossier and Marcellus natural gas shale plays and in the Granite Wash, Cleveland, Tonkawa, Mississippi Lime, Bone Spring, Avalon, Wolfcamp, Wolfberry, Eagle Ford, Niobrara, Three Forks/Bakken and Utica unconventional liquids plays. The company has also vertically integrated its operations and owns substantial midstream, compression, drilling, trucking, pressure pumping and other oilfield service assets. For more information on Chesapeake environment initiatives, visit the environment section of CHK.com, HydraulicFracturing.com, NaturalGasAirEmissions.com, NaturalGasWaterUsage.com, AskChesapeake.com or fracfocus.org.