United States Environmental Protection Agency

Greenhouse Gas Emissions

Overview of Greenhouse Gases

Methane Emissions

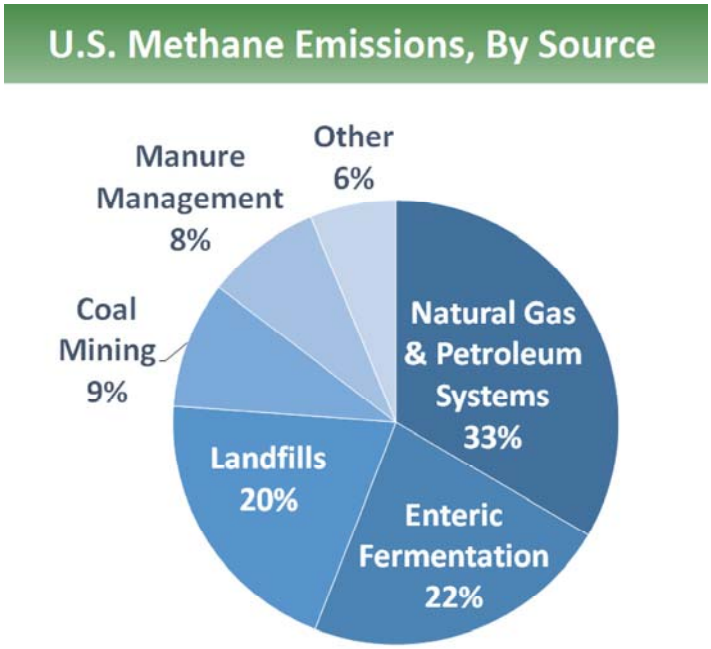
Properties of Methane

Chemical Formula: CH_4
Lifetime in Atmosphere: 12 years
Global Warming Potential (100-year): 25

Methane (CH_4) is the second most prevalent greenhouse gas emitted in the United States from human activities. In 2014, CH_4 accounted for about 11 percent of all U.S. greenhouse gas emissions from human activities. Methane is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock. Natural processes in soil and chemical reactions in the atmosphere help remove CH_4 from the atmosphere. Methane's lifetime in the atmosphere is much shorter than carbon dioxide (CO_2), but CH_4 is more efficient at trapping radiation than CO_2. Pound for pound, the comparative impact of CH_4 on climate change is more than 25 times greater than CO_2 over a 100-year period.

Globally, over 60 percent of total CH_4 emissions come from human activities.[1] Methane is emitted

from industry, agriculture, and waste management activities, described below.



Note: All emission estimates from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 –2014*.

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Industry. Natural gas and petroleum systems are the largest source of CH_4 emissions from industry in the United States. Methane is the primary component of natural gas. Some CH_4 is emitted to the atmosphere during the production, processing, storage, transmission, and distribution of natural gas. Because gas is often found alongside petroleum, the production, refinement, transportation, and storage of crude oil is also a source of CH_4 emissions. For more information, see the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* sections on Natural Gas Systems and Petroleum Systems.

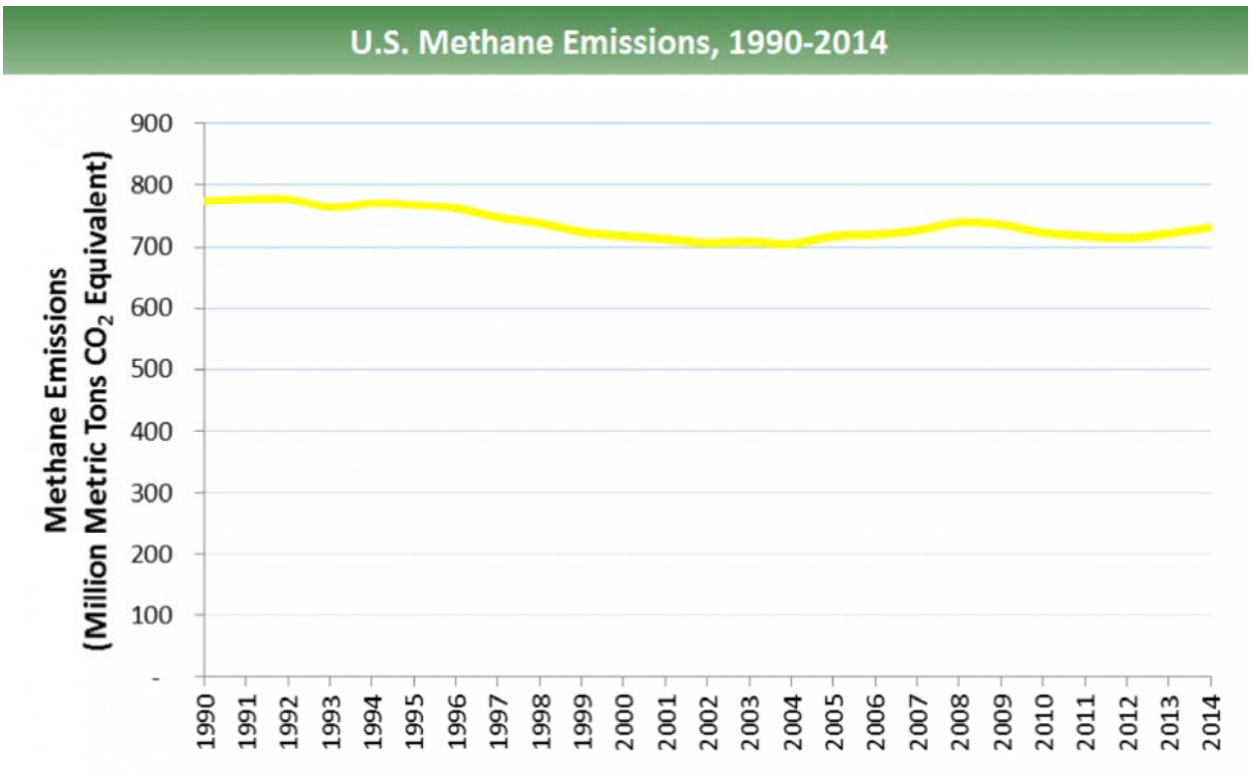
- **Agriculture.** Domestic livestock such as cattle, buffalo, sheep, goats, and camels produce large amounts of CH_4 as part of their normal digestive process. Also, when animals' manure is stored or managed in lagoons or holding tanks, CH_4 is produced. Because humans raise these animals for food, the emissions are considered human-related. Globally, the Agriculture sector is the primary source of CH_4 emissions. For more information, see the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* Agriculture chapter.
- **Waste from Homes and Businesses.** Methane is generated in landfills as waste decomposes and in the treatment of wastewater. Landfills are the third largest source of CH_4 emissions in the United States. For more information see the U.S. Inventory's Waste chapter.

Methane is also emitted from a number of natural sources. Wetlands are the largest source, emitting CH_4 from bacteria that decompose organic materials in the absence of oxygen. Smaller sources include termites, oceans, sediments, volcanoes, and wildfires.

To find out more about the role of CH_4 in warming the atmosphere, and its sources, visit the Causes of Climate Change page and the Climate Change Indicators page in the Science section.

Emissions and Trends

Methane (CH_4) emissions in the United States decreased by 6 percent between 1990 and 2014. During this time period, emissions increased from sources associated with agricultural activities, while emissions decreased from sources associated with the exploration and production of natural gas and petroleum products.



Note: All emission estimates from the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014*. These estimates use a global warming potential for methane of 25, based on reporting requirements under the United Nations Framework Convention on Climate Change.

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Reducing Methane Emissions

There are a number of ways to reduce methane (CH_4) emissions. Some examples are discussed below. EPA has a series of voluntary programs for reducing CH_4 emissions, and is supporting the president's Strategy to Reduce Methane Emissions (15 pp, 1.9 M, About PDF). EPA also supports the Global Methane Initiative Exit , an international partnership encouraging global methane reduction strategies.

Examples of Reduction Opportunities for Methane	
Emissions Source	**How Emissions Can be Reduced**
Industry	Upgrading the equipment used to produce, store, and transport oil and gas can reduce many of the leaks that contribute to CH_4 emissions. Methane from coal mines can also be captured and used for energy. Learn more about the EPA's Natural Gas STAR Program and Coalbed Methane Outreach Program.
Agriculture	Methane can be reduced and captured by altering manure management strategies at livestock operations or animal feeding practices. Learn more about these strategies and EPA's AgSTAR Program.
Waste from Homes and Businesses	Because CH_4 emissions from landfill gas are a major source of CH_4 emissions in the United States, emission controls that capture landfill CH_4 are an effective reduction strategy. Learn more about these opportunities and the EPA's Landfill Methane Outreach Program.

References

[1] EPA (2010). *Methane and Nitrous Oxide Emissions from Natural Sources*. U.S. Environmental Protection Agency, Washington, DC, USA.

Last updated on October 6, 2016