Los Alamos Study Group

Nuclear Disarmament • Environmental Protection • Social Justice • Economic Sustainability

The myth of methane: why we must end our reliance on natural gas
Natural gas is not a "bridge fuel!"

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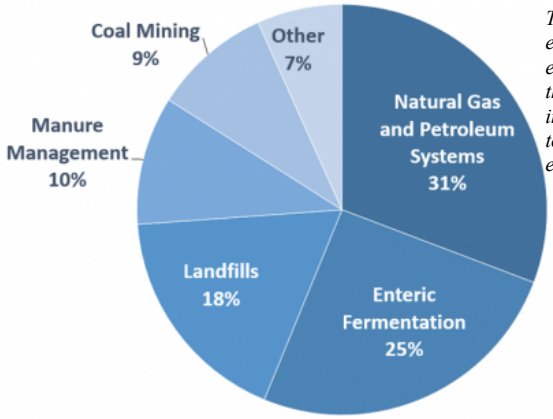
According to the World Bank CO_2 emissions in the US have fallen from 20.2 metric tons per capita in 2002 to 16.4 metric tones per capita in 2013. This has been widely attributed to an economic recession as well as the rising use of natural gas displacing coal. This dip in CO_2 emissions has contributed to the fallacy that natural gas is a "bridge fuel" that will allow us to continue using fossil fuels while lowering our greenhouse gas emissions.

In the 2012 State of the Union address President Obama cited this information and praised the natural gas industry as having the potential to create 600,000 jobs. He also claimed that the US had a 100,000-year supply of natural gas resources. This was and is more politically convenient than truthful. (8)

In Obama's Clean Power Plan the support for natural gas is apparent. However, the plan does not address the issue of the rising methane emissions, rather it stimulates them which more or less cancels the plan's climate benefits. (9)

This "bridge fuel" theory, and the political claims around it, massively fail to take into account the rising amount of methane emissions from natural gas, as well as the immense and immediate effect that methane has on global warming.

2015 U.S. Methane Emissions, By Source

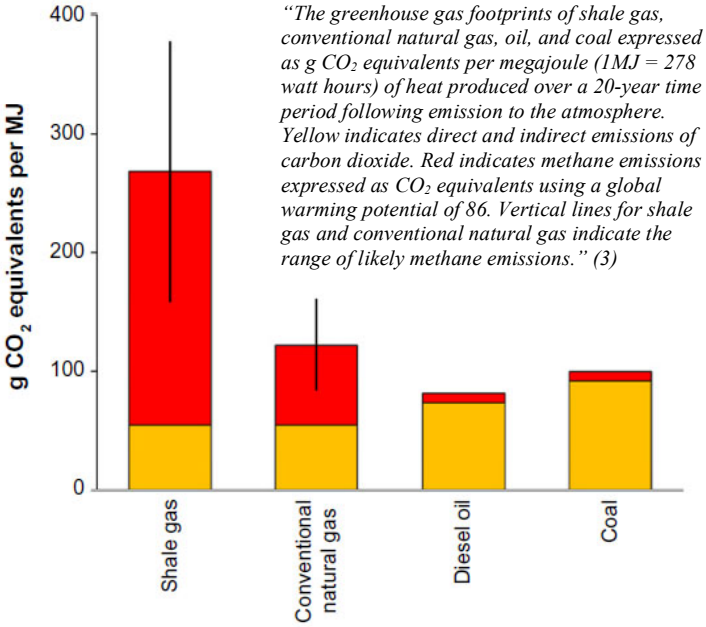


This EPA estimate of CH_4 emissions from the fossil fuel industry is likely too small an estimate.

U.S. Environmental Protection Agency (2017). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015.

Atmospheric Methane on the Rise

- In the last 10 to 15 years the concentration of atmospheric methane has risen dramatically, with the rise of natural gas production.
- Methane contributed about 28% of total fossil fuel greenhouse gas emissions for the USA in 1980 and 42% in 2013. (3)



"The greenhouse gas footprints of shale gas, conventional natural gas, oil, and coal expressed as g CO_2 equivalents per megajoule (1MJ = 278 watt hours) of heat produced over a 20-year time period following emission to the atmosphere. Yellow indicates direct and indirect emissions of carbon dioxide. Red indicates methane emissions expressed as CO_2 equivalents using a global warming potential of 86. Vertical lines for shale gas and conventional natural gas indicate the range of likely methane emissions." (3)

- Methane emissions are comprised of intended and unintended emissions that occur in all parts of the natural gas life cycle. Emissions sources include active wells, aging and dormant wells, refining processes, transportation, and distribution. Intentional venting practices also waste this dwindling natural resource. (6)

Methane as a Warming Accelerant

- The reduction of CO_2 emissions is important for global warming and for the protection of the oceans, but the reduction of methane emissions is also necessary now to immediately minimize warming through natural feedback loops.
- While carbon dioxide cycles through the atmosphere over hundreds of years, methane stays in the atmosphere only about 12 years. While both gasses are in the atmosphere the greenhouse warming effects of methane are more than 100 times those of carbon dioxide per unit mass. (3)
- Without a dramatic reduction in methane emissions over the next decade the global average temperatures will pass the dangerous threshold of 1.5°C-2°C above the preindustrial baseline. (3)
- Many methane impact estimates are based on a 100-year impact period. However, due to the immediacy of the effects of methane, a 20-year model best represents the actual warming issues that we face in the critical period ahead. (3)
- Phrases like "carbon footprint" are dangerously narrow and misleading.

Other Dangers of Methane

- Besides driving climate change, methane also contaminates ground water, kills vegetation, and creates harmful air pollution. (7)
- Methane is often accompanied by radon and a variety of toxic compounds including hydrogen sulfide, toluene, xylene, and benzene.
- Methane contributes to tropospheric ozone, or smog, which harms plants, reduces crop yields, and can lead to lung damage. (7)

Shortcomings of Industry Studies & Current Regulation

- "The oil and gas industry is the largest industrial source of methane pollution. The industry dumps or loses almost 8 million tons of methane into the air each year – equal to the amount of natural gas needed to heat [sic] 6.5 million US homes – through unrepaired leaks and intentional releases." (1)
- EPA leakage estimates have been based on industry supplied data, now superseded by independent studies.
- As the current guidelines stand, enforcement of venting operations is difficult because the process is left to the judgment of the operator.
- Satellite imagery shows a 2,500 square mile methane "hot spot" over the Four Corners region of Northwestern NM. It is the largest of its kind in the United States, and is widely attributed to the increase of hydraulic fracturing in this area. (5) Given the immediacy of the effects of methane on atmospheric temperatures it is possible that this hotspot is directly affecting local weather systems and temperatures.
- In 2016 the EPA and the Bureau of Land Management (BLM) issued proposed regulations to control methane emissions, over industry protests. These regulations require energy companies to provide data on methane leaks, but do not yet require action to curtail the leaks.
- According to the Vice President of the American Petroleum Institute these proposed regulations are "unreasonable and overly burdensome", and industry should be left to develop their own solutions. (4)
- The Trump administration has put a 2-year delay on this regulation trying to limit the methane and smog-forming pollutants from oil and gas wells. In May of 2017 Republicans sought to nullify the proposed regulatory rule, but failed by a narrow margin. (2) This delay of regulations curbing methane emissions from fossil fuels can only accelerate global warming and send the wrong signals to utilities and investors.

Solutions

- The immediate reduction of methane emissions is an essential step in the battle to slow global warming.
- Regulation is necessary but will be insufficient. We need to tax methane to internalize its many externalities. The cost of natural gas is so low that it is holding back solutions that we need now.
- Any carbon taxes need to address both carbon dioxide and methane. "Taxing methane emissions at 86 times the tax for carbon dioxide emissions…would accomplish this." (3)
- Insulating buildings and other efficiency investments should be at the forefront of reducing the use of and emissions from methane.
- This will create jobs, renew buildings and raise standards, as well as employ and develop labor skills.
- Electrification of heating systems by utilizing efficient technologies, as well as passive solar and related retrofits, will decrease the demand for natural gas.
- Underground Thermal Energy Systems and Passivhaus technologies show promise for the thermoregulation of buildings with very little external energy.
- Meanwhile, common sense regulations and existing technologies for fixing or harnessing methane leaks are already available but underused. (6)
- Conservation is key. Shale gas makes up about 67% of US natural gas supply, and is the largest offender in methane emissions. Limiting our reliance on this source is very important to curbing our methane emissions and greenhouse gas emissions overall.

Notes:

(1) Earthjustice."Reducing Methane Pollution." *Earthjustice.* 5 Dec. 2016. Web. 13 June 2017. http://earthjustice.org/cases/2015/reducing-methane-pollution.

(2) Eilperin, Juliet. "Trump Administration Delays Rules Limiting Methane Emissions." *The Washington Post.* WP Company, 14 June 2017. Web. 23 June 2017. https://www.washingtonpost.com/politics/trump-administration-delays-rules-limiting-methane-emissions/2017/06/14/0e7d50fa-512b-11e7-be25-3a519335381c_story.html?utm_term=.3f3a713e49ac.

(3) Howarth, Robert W. "Methane emissions and climatic warming risk from hydraulic fracturing and shale gas development: implications for policy." *Energy and Emission Control Technologies,* Dove Press, 8 Oct. 2015. Web. 14 June 2017. https://www.dovepress.com/methane-emissions-and-climatic-warming-risk-from-hydraulic-fracturing--peer-reviewed-fulltext-article-EECT.

(4) Magill, Bobby. "EPA Will Regulate Methane Emissions from Oil and Gas Wells." *Scientific American*. Climate Central, 13 May 2016. Web. 13 June 2017. https://www.scientificamerican.com/article/epa-will-regulate-methane-emissions-from-oil-and-gas-wells/.

(5) NASA. "US Methane 'Hot Spot' Bigger than Expected." *NASA*. 9 Oct. 2014. Web. 19 June 2017. https://science.nasa.gov/science-news/science-at-nasa/2014/09oct_methanehotspot/.

(6) Nikiforuk, Andrew. "Canada's Methane Leakage Massively Under-Reported, Studies Find." *Resilience*. The Tyee, 31 May 2017. Web. 14 June 2017. http://www.resilience.org/stories/2017-05-31/canadas-methane-leakage-massively-reported-studies-find/.

(7) Nikiforuk, Andrew. "Why Is Trudeau Blowing His Chance to Curb Dangerous, Climate Warming Methane?" *Resilience.* The Tyee, 14 June 2017. Web. 14 June 2017. http://www.resilience.org/stories/2017-06-14/trudeau-blowing-chance-curb-dangerous-climate-warming-methane/.

(8) Hughes, David. "2016 Shale Gas Reality Check." *Resilience*. Post Carbon Institute, 16 Dec. 2016. Web. 27 June 2017. http://www.resilience.org/stories/2016-12-16/2016-shale-gas-reality-check/.

(9) Mello, Greg. *Los Alamos Study Group*. Personal Communications. 27 June 2017.