Center for American Progress

# Reducing Methane Pollution from Fossil-Fuel Production on America's Public Lands

## A Needed Step to Combat Climate Change

By Claire Moser, Nidhi Thakar, and Matt Lee-Ashley October 6, 2014

Past proposals to address climate change have focused primarily on reducing carbon dioxide pollution, most recently with President Barack Obama's proposed standards for power plants. However, policymakers are beginning to address the threat of methane pollution—a much more potent greenhouse gas, or GHG.[1] To be effective, U.S. climate policies must aim to reduce methane emissions from all sources, particularly from the extraction and production of fossil fuels on America's public lands, one of the nation's largest sources of GHG emissions.

This issue brief provides new estimates of methane emissions from energy production on federal lands and waters. Based on an analysis of data from the U.S. Department of the Interior's Office of Natural Resources Revenue, or ONRR, methane emissions from venting and flaring activities on public lands have significantly increased over the past five years.[2] The analysis also indicates that well-site processing, production, and other upstream, midstream, and downstream activities are a significant source of indirect, fugitive methane emissions that surpass even the highest estimates of methane emitted from venting and flaring. The Obama administration is undertaking an important rulemaking to curtail methane pollution from venting and flaring activities on federal lands; however, policymakers have yet to seriously address the larger problem of fugitive methane emissions from energy production on public lands and waters.

### Methane emissions from public lands and waters

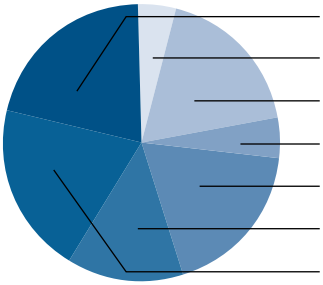
Methane is the second-largest GHG contributor to climate change after carbon dioxide, accounting for 9 percent of all GHG emissions in the United States.[3] Nevertheless, methane is a far more powerful pollutant than carbon dioxide, with a global warming potential more than 20 times greater per metric ton over a 100-year period.[4]

As fossil-fuel production on public lands has increased to record-high levels in recent years, methane released on federal lands has sparked serious concerns about the climate impacts of industry practices, which are already a major source of carbon pollution.[5]

Methane from fossil-fuel production is primarily emitted through: 1) the combustion of extracted fossil-fuels; 2) the industry practices of venting, or intentionally releasing excess gas, and flaring, or intentionally burning excess gas; and 3) fugitive emissions, which include unintentional leakage from the transportation, storage, and distribution of fossil fuels.

FIGURE 1

**Methane emitted from combustion of fossil-fuels extracted on federal lands and waters in 2012**



| Fossil fuel | Metric tons of methane | Percent |
|---|---|---|
| Coal | 13,080 | 21.09% |
| Coalbed methane | 2,656 | 4.28% |
| Natural gas liquids | 11,161 | 18.00% |
| Onshore oil | 2,999 | 4.84% |
| Offshore oil | 11,368 | 18.33% |
| Offshore natural gas | 8,390 | 13.53% |
| Onshore natural gas | 12,358 | 19.93% |
| **Total** | **62,012** | **100.00%** |

Source: Heidi Ries and Caroline Wagner, "Greenhouse Gas Emissions from Fossil Fuel Energy Extracted from Federal Lands and Waters: An Update" (Stratus Consulting 2014), available at http://cdn.americanprogress.org/wp-content/uploads/2014/10/WildernessSociety_GHGEmissions_September17Revisions.pdf.

Based on a new report by Stratus Consulting commissioned by the Center for American Progress and The Wilderness Society, the conversion to energy or combustion of fossil fuels mined, drilled, and otherwise extracted on federal lands and waters contributed approximately 62,000 metric tons of methane to the atmosphere in 2012 alone, or more than 1.5 million metric tons of carbon dioxide equivalent.[6] Natural gas extraction and production processes are the source of more than half of these emissions. (see Figure 1)

Although fossil-fuel extraction from federal lands and waters is a significant source of methane pollution, fugitive methane emissions from the production of natural gas are a much larger source of this pollution. Based on a review of recent literature by Stratus Consulting, it is estimated that fugitive methane emissions from conventional and unconventional natural gas production on federal lands and waters may have been as high as 8.1 million metric tons in 2012, which is the equivalent of annual emissions from 42 million cars.[7] (see Table 1)

TABLE 1

**Estimated range of fugitive methane emissions from fossil-fuel production on public lands in 2012**

| Low scenario, in metric tons CH4 | | High scenario, in metric tons CH4 |
|---|---|---|
| 130,011 (0.6% leakage) | Unconventional upstream (well site production) and midstream (processing) | 3,748,658 (17.3% leakage) |
| 55,415 (0.4% leakage) | Conventional upstream (well site production) and midstream (processing) | 227, 073 (2% leakage) |
| 29,473 (0.07% leakage) | Downstream (storage, transmission, and distribution) | 4,210,372 (10% leakage) |
| **214,899** | **Total** | **8,186,103** |

Note: Estimates are derived using a high and low range of methane leakage rates cited in independent literature reviews as provided in Table A.4, A.7, and A.10 of Ries and Wagner, "Greenhouse Gas Emissions from Fossil Fuel Energy Extracted from Federal Lands and Waters: An Update."

Source: Heidi Ries and Caroline Wagner, "Greenhouse Gas Emissions from Fossil Fuel Energy Extracted from Federal Lands and Waters: An Update" (Stratus Consulting 2014), Appendix, available at http://cdn.americanprogress.org/wp-content/uploads/2014/10/WildernessSociety_GHGEmissions_September17Revisions.pdf; Trevor Stephenson, Jose Eduardo Valle, and Xavier Riera-Palou, "Modeling the Relative GHG Emissions of Conventional and Shale Gas Production," *Environmental Science & Technology* 45 (24) (2011): 10757–10764; Dana R. Caulton and others, "Toward a better understanding and quantification of mehtane emissions from shale gas development," *Proceedings of the National Academy of Sciences of the United States of America* 111 (17) (2014): 6237–6242; Andrew Burnham and others, "Life-Cycle Greenhouse Gas Emissions of Shale Gas, Natural Gas, Coal, and Petrolum," *Environmental Science & Technology* 46 (2) (2012): 619–627; Katherine Hayhoe and others, "Substitution of Natural Gas for Coal: Climatic Effects of Utility Sector Emissions," Climatic Change 54 (1–2) (2002): 107–139.

As seen in Table 1, unconventional natural gas production and processing on federal lands and waters may have generated as much as 3.7 million metric tons of methane in 2012.[8] Conventional natural gas production and processing could have released more than 225,000 additional metric tons of methane into the atmosphere.[9] Downstream emissions resulting from the storage, transmission, and distribution of natural gas contributed up to 4.2 million metric tons of methane.[10]

Because fugitive methane emissions from natural gas production are difficult to measure, the extreme range of estimates for the low and high scenarios illustrated by Table 1 highlight the uncertainty present in existing scientific assessments of fugitive methane emissions on public lands. However, even the most conservative calculations estimate that fugitive methane emissions equaled almost 215,000 metric tons in 2012—close to 3.5 times the amount of methane emitted from fossil fuels extracted on public lands.[11]

## The rise of 'waste' methane from venting and flaring

Methane emissions from the venting and flaring of oil and natural gas should be of particular concern to policymakers because emissions from this practice can be avoided. Just as importantly, usable natural gas that is currently wasted through venting and flaring—due to inadequate infrastructure—can and should be captured for future use. A 2010 report from the Government Accountability Office, or GAO, found that roughly 5 percent of all federal onshore natural gas produced in the United States is wasted through venting and flaring. Furthermore, the report stated that a remarkable 40 percent of this gas could be "economically captured with currently available control technologies."[12] Unless policymakers enact reforms to reduce waste, taxpayers could conservatively lose almost $800 million over the next decade due to the venting and flaring of natural gas from public lands.[13]

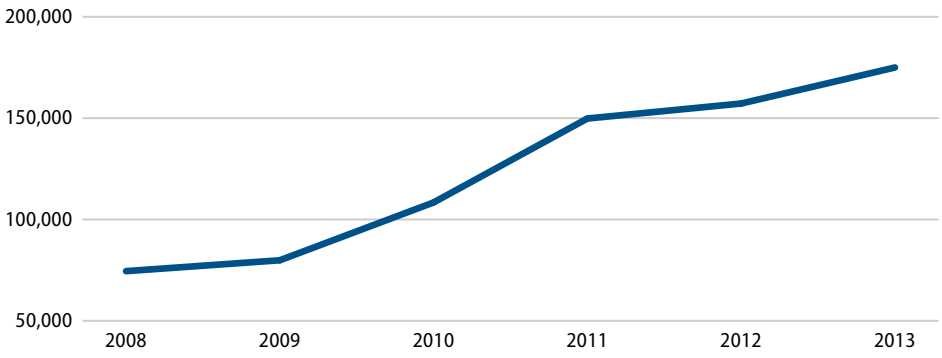
While venting and flaring are only two of the many root causes of GHG emissions from public lands, the amount of methane these practices emit remains significant and, according to new estimates, has steadily increased over the past five years. Additionally, the GAO has reported that federal agencies are also likely underestimating the actual amount of vented and flared gas by a magnitude of 30 times or more.[14]

Data compiled by the Office of Natural Resources Revenue for their Oil and Gas Operations Reports, or OGORs—in which federal leaseholders report production information to the agency—show that emissions from venting and flaring have increased significantly since 2008. (see Figure 2) However, because some federal leases are managed as part of communitization agreements, which are collections of leases for federal and some nonfederal production that draw from the same reservoir, OGOR data also includes some portion of production from state, tribal, and private lands.[15] As a result, there is some uncertainty regarding the exact amount of vented

and flared gas coming from federal lands. However, assuming that the ratio of federal and nonfederal production reflected in the OGOR data remained steady over time, it is estimated that methane emissions from venting and flaring on federal lands rose approximately 135 percent between 2008 and 2013. Significantly, it is also estimated that between 2010 and 2013, emissions from venting and flaring on federal lands rose approximately 61 percent.[16]

**FIGURE 2**

**Emissions from venting and flaring from the U.S. Department of the Interior's Office of Natural Resources and Revenue oil and gas operations reports, in metric tons**




Source: Heidi Ries and Caroline Wagner, "Greenhouse Gas Emissions from Fossil Fuel Energy Extracted from Federal Lands and Waters: An Update" (Stratus Consulting 2014), Appendix, available at http://cdn.americanprogress.org/wp-content/uploads/2014/10/WildernessSociety_GHGEmissions_September17Revisions.pdf.

The increases in venting and flaring levels are likely in part due to rising oil and natural gas production in New Mexico and the Bakken shale region—located in North Dakota and Montana—as well as the lack of adequate infrastructure to capture and process natural gas released during production.[17] New Mexico is quickly becoming one of the nation's top natural gas-producing states and is already the largest petroleum producer in the Mountain West.[18] The state has seen a sharp increase in the amount of gas vented and flared. As National Geographic reported in May, the Department of the Interior's Bureau of Land Management, or BLM, has found that increased venting of natural gas is due to the state's lack of "infrastructure to handle the gas associated with oil development" and "the gas itself [being of] poor quality that cannot go directly into a pipeline."[19]

In the Bakken shale region, the U.S. Energy Information Administration, or EIA, reported that "as a result of accelerated development activity, primarily combined with hydraulic fracturing," production of natural gas "more than doubled" from 2005 to 2011 and continues to increase.[20] Additionally, more than 35 percent of the natural gas produced in the region was flared or not marketed due to "insufficient natural gas pipeline capacity and processing facilities."[21]

Low natural gas prices may also be a contributing factor to the sharp increase in levels of venting and flaring on public lands. Low gas prices provide less of an incentive to operators to make the investments needed to capture marketable natural gas.[22] According to the EIA, the average wellhead price for natural gas dropped from $3.95 per thousand cubic feet in 2011 to $2.66 per thousand cubic feet in 2012.[23]

## Reducing methane emissions from oil and gas development on federal lands

As part of President Obama's Climate Action Plan, the White House earlier this year released its Strategy to Reduce Methane Emissions.[24] In addition to highlighting emissions from landfills, coal mines, and the agricultural sector, the strategy aims to reduce methane emissions from the oil and gas industry. Under the White House strategy, the BLM is currently developing a proposed rule to curb methane emissions from the venting and flaring of gas from oil and gas development on federal lands. The agency is expected to release a draft rule this fall.[25]

A reduction in methane emissions from venting and flaring, and the curtailment of wasted gas is not only in the best interest of the public but also economically advantageous to oil and gas producers. Data from the U.S. Environmental Protection Agency suggests that 40 percent––around 50 billion cubic feet––of the natural gas currently lost during the venting and flaring process could be captured by currently available, off-the-shelf technologies.[26] This is enough gas to meet the needs of approximately 500,000 to 550,000 American homes for one year and is valued at $133 million.[27] In many cases, companies could offset the costs of installing currently available technologies to capture wasted gas by selling this captured natural gas.

For example, BP has installed a number of technologies to capture vented and flared gas and reduce emissions, resulting in an increase in the capture of natural gas and condensate. It has also prevented more than 100,000 metric tons of carbon dioxide and 2,000 metric tons of methane from entering the atmosphere.[28] BP's economic benefit from these upgrades was considerable—$5.8 million. Other companies, such as Devon Energy, have had similar success. Since 1990, the company has saved more than $125 million by implementing these technologies.[29]

These strategies to reduce the amount of vented and flared natural gas have the added benefit to the federal government of increasing revenue from royalty payments on captured gas. The 2010 GAO report estimated that such reductions could increase federal royalty payments by close to $23 million annually, as well as reduce GHG emissions by an amount equivalent to almost 16.5 million metric tons of carbon dioxide—the annual emissions of 3.1 million cars.[30]

The BLM's efforts to curb venting and flaring are an important step that can yield both GHG reductions and benefits to taxpayers. The problem of fugitive emissions from energy production on federal lands, however, remains largely unaddressed. The U.S. Environmental Protection Agency, or EPA, and the Department of Energy, or DOE, are working to enact reforms to decrease fugitive methane emissions, particularly from natural gas pipelines. In response to a report issued by its Office of Inspector General on the need to address leaks from natural gas pipelines, the EPA has been working with the Pipeline and Hazardous Materials Safety Administration to develop a strategy to address methane leaks from distribution pipelines.[31] DOE's initiative includes incentives for natural gas producers to decrease methane leaks, establish new energy-efficiency standards for producers, and invest in new technologies for leak detection and measurement.[32] Nevertheless, neither of these efforts is focused on emissions from public lands.

Additionally, at the September U.N. Climate Summit in New York, six international oil and gas companies committed to reducing methane emissions from upstream oil and gas production.[33] However, no specific targets or commitments to reduce emissions have been set, and the companies represent only a small segment of the overall industry.

Considering that the most conservative estimates of fugitive methane emissions are well above the highest estimate of emissions from venting and flaring, a comprehensive methane-reduction strategy must include strong measures to curb fugitive emissions.[34] The Department of the Interior can begin to address fugitive emissions by requiring more thorough reporting from producers. Better accounting of fugitive methane emissions can provide a foundation for the BLM to establish and enforce standards to reduce these emissions from all stages of energy production on America's public lands, including upstream, midstream, and downstream operations.

By taking an all-inclusive approach to tackling methane pollution from public lands—including addressing fugitive emissions—the Obama administration can help meet the President's goals under his Climate Action Plan and continue to move the nation toward a cleaner and more secure energy future.

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## Endnotes

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8 Ries and Wagner, "Greenhouse Gas Emissions from Fossil Fuel Energy Extracted from Federal Lands and Waters: An Update," Appendix pp. 23–24. Based on the lowest and highest leakage rate of methane derived from a review of relevant literature, the range for methane emitted from upstream and midstream, unconventional natural gas production in 2012 is 130,011 metric tons to 3,748,658 metric tons.

9 Ries and Wagner, "Greenhouse Gas Emissions from Fossil Fuel Energy Extracted from Federal Lands and Waters: An Update," Appendix pp. 23–24. Based on the lowest and highest leakage rate of methane derived from a review of relevant literature, the range for methane emitted from upstream and midstream, conventional natural gas production in 2012 is 55,415 metric tons to 277,073 metric tons.

10 Ries and Wagner, "Greenhouse Gas Emissions from Fossil Fuel Energy Extracted from Federal Lands and Waters: An Update," Appendix pp. 23–24. Based on the lowest and highest leakage rate of methane derived from a review of relevant literature, the range for methane emitted from downstream natural gas production in 2012 is 29,473 metric tons to 4,210,372 metric tons.

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