

Comparing oil, natural gas methane emissions estimates

2015 CH₄ emissions (teragrams per year)

Industry segment	Study	EPA GHGI
Production	7.6 (+1.9/-1.6)	3.5
Gathering	2.6 (+0.59/-0.18)	2.3
Processing	0.72 (+0.20/-0.071)	0.44
Transmission and storage	1.8 (+0.35/-0.22)	1.4
Local distribution*	0.44 (+0.51/-0.22)	0.44
Oil refining and transportation*	0.034 (+0.050/-0.008)	0.034
U.S. O/NG total	13 (+2.1/-1.7)	8.1 (+2.1/-1.4)†a

As of June 21, 2018.

* This work's emission estimates for these sources are taken directly from the GHGI. The local distribution estimate is expected to be a lower bound on actual emissions and does not include losses downstream of customer meters due to leaks or incomplete combustion.

† The GHGI only reports industrywide uncertainties.

Source: Environmental Defense Fund

from a sample of facilities, which may have included a less-than-representative number of abnormal operating conditions compared to the researchers' sample, the study said.

"Such a large difference cannot be attributed to expected uncertainty in either estimate," the researchers wrote.

The EPA said June 22 that it is looking forward to reviewing the study in greater detail.

The researchers used both bottom-up measurements — those collected from close to the source — and top-down measurements — those collected aerially. For the bottom-up data, the study integrated the results of recent facility-scale studies to estimate methane emissions. The researchers then checked those results through top-down studies.

The two types of measurements produced similar estimates for oil and gas industry methane emissions for 2015, and both were "significantly higher than the corresponding estimate" in the EPA inventory, the report said.

"There is an urgent need to complete equipment-based measurement campaigns that capture these large-emission events so that their causes are better understood," the researchers wrote.

The study used aerial infrared camera surveys of about 8,000 production sites in multiple oil and gas basins, and it found that roughly 4% of the surveyed sites had at least one high-emission-rate plume. Liquid storage tank hatches and vents accounted for 90% of these sightings, the study said.

The American Petroleum Institute said June 21 that while it had not reviewed the specifics of the paper yet, previous studies have shown that there are "limitations of relying [on] airborne measurements alone to draw firm conclusions on methane emissions from the oil and natural gas industry."

The association questioned whether short-term measurements can accurately be extrapolated to annual loss rates, whether aerial data conflates fossil fuel methane and biogenic methane, whether background methane levels are adequately accounted for, and whether precise emissions rates can be computed from ambient methane data.

"We look forward to continuing our engagement with both private and governmental organizations, to identify ways to improve our operations and provide our operational and technical expertise to ensure that current and future data collection and analysis are robust and accurate," Erik Milito, the industry association's upstream group director, said in a statement.

Methane, the primary component of natural gas, is a potent greenhouse gas, and while it has a shorter atmospheric life than carbon dioxide, its global warming potential is 80 times that of CO₂ over a 20-year time frame.

The EDF researchers noted that the variability they found in emissions levels "reinforces the conclusion that significant emission reductions are feasible." They recommended using established technologies and best practices to deal with more "routine" emissions sources, along with other systems to more quickly find the root causes of high emissions that are caused by abnormal conditions.

The EPA in 2016 updated its emissions inventory procedures, revising at that point the estimates for 2013 emissions. The EPA increased its estimates for petroleum systems' production field operations by roughly 102% compared to the previous figure, while the agency's estimate for the natural gas production sector went up 125% compared to the 2015 inventory.

The EDF study estimated the leak rate from the U.S. oil and gas system is 2.3%, compared with the EPA inventory estimate of 1.4%.