



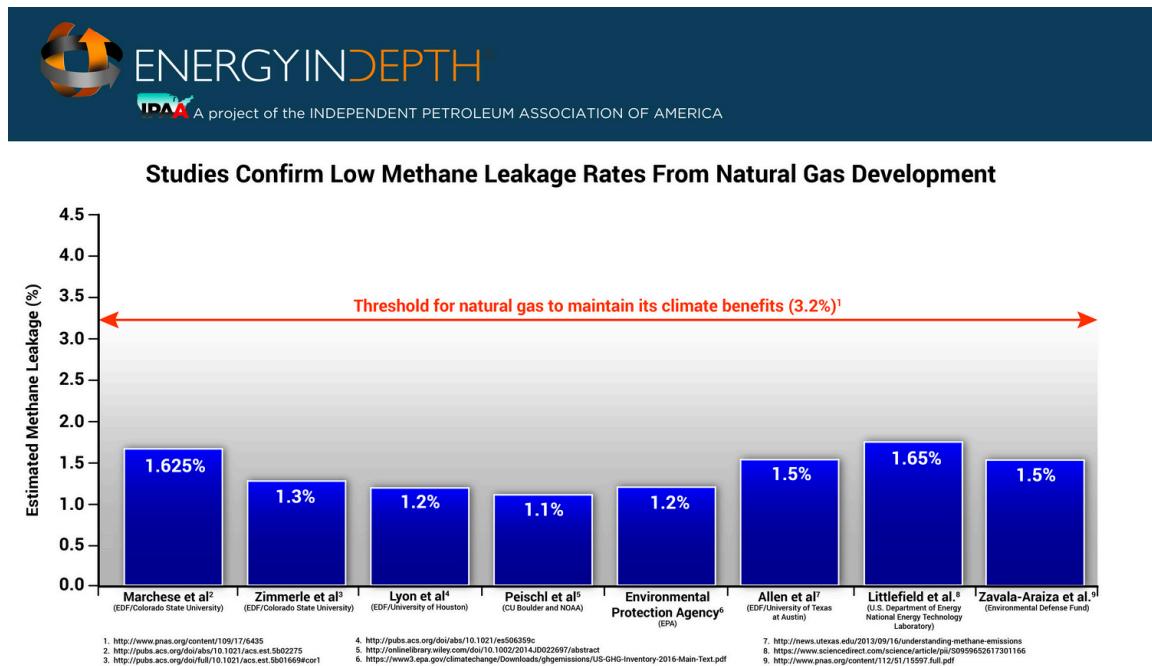
March 15, 2018

Katherine Bagley
Managing Editor
YaleEnvironment360
Yale School of Forestry & Environmental Studies
195 Prospect Street
New Haven, CT 06511

Dear Mrs. Bagley,

In a recent op-ed published by [Yale Environment 360](#), climate activist and 350.org founder Bill McKibben discusses the environmental movement's failure to turn public opinion against natural gas. And although McKibben acknowledges the switch to natural gas has lowered carbon emissions, he claims that this benefit is negated because "most studies show that the [methane] leakage rate is at least 3 percent and probably higher." This is completely false.

There's a reason McKibben doesn't link to any studies when he makes that assertion: it's not true. In fact, numerous peer-reviewed studies and federal government assessments confirm low leakage rates from natural gas development that are well below three percent. Scientists agree that 3.2 percent is the threshold for natural gas to maintain its climate benefits.



Here's some facts on what methane leakage rate studies have actually found:

- **Allen et al. (Leakage rate: 1.5 percent):** This [landmark 2013 EDF/University of Texas study](#) was the first to measure actual emissions, and it found emissions “nearly 50 times lower than previously estimated by the Environmental Protection Agency,” confirming beyond a shadow of a doubt natural gas’ climate benefits over coal. UT and EDF followed up with [two more studies](#), which also found very low methane leakage rates. These studies concluded that methane emissions from the upstream portion of the supply chain are only 0.38 percent of production. That’s about 10 percent lower than what they found in their 2013 study.
- **2017 EPA Greenhouse Gas Inventory (Leakage rate: 1.2 percent):** Despite numerous flaws —including [extrapolation](#) of emissions data from larger facilities onto smaller facilities, potentially [incorrect assumptions](#) about pneumatic controller emissions, and methodology based on [flawed](#) so-called “super-emitter” assumptions — EPA’s [latest methane emissions data](#) show very low methane leakage rates.
- **Littlefield et al. (Leakage rate: 1.65 percent):** This 2017 U.S. Department of Energy National Energy Technology Laboratory [study](#) used data from Zavala-Araiza et al. (see below) to synthesize emissions on a national scale. But even though the study finds low emissions, it is worth pointing out that it likely overestimates the leakage rate based to the fact that it extrapolates so-called “super-emitter” data from Zavala-Araiza et al. on a national scale. A recent NOAA [study](#) also reveals the “super-emitter” data Zavala-Araiza et al. relied on air measurements likely collected during episodic maintenance events, which skewed emissions higher than they typically would be.
- **Lyon et al. (Leakage rate: 1.2 percent):** Using “top down” measurements from aircraft over the Barnett Shale in Texas, this 2015 EDF/University of Houston [study](#) found very low leakage rates, despite the fact that a limitation of “top down” studies is the fact that methane detected can come from other sources such as agriculture and natural seeps.
- **Marchese et al. (Leakage rate: 1.6 percent):** This 2015 EDF/Colorado State University study took direct measurements from 114 gathering stations and 16 processing plants across 13 states. Using these measurements, along with EPA data from other segments of the natural gas supply chain, the study found an overall leakage rate that EDF’s Mark Brownstein noted is a “well below what most scientists say is advantageous for the climate.”
- **Peischl et al. (Leakage rate: 1.1 percent):** This 2015 Colorado University-Boulder/NOAA [study](#) used “top-down” measurements from five flights from a NOAA research aircraft over areas that collectively represent half of the U.S.’s total shale gas production (Haynesville, Fayetteville and portions of Marcellus shale). The report goes [notes](#): “[T]he regions investigated in this work represented over half of the U.S. shale gas production in 2013, and **we find generally lower loss rates than those reported in earlier studies of regions that made smaller contributions to total production**. Hence, the national average CH4 loss rate from shale gas production may be lower than values extrapolated from the earlier studies.”
- **Zavala-Araiza et al. (Leakage rate: 1.5 percent):** This 2015 EDF [study](#) analyzes data from 12 previous EDF Barnett Shale papers and finds low methane emissions despite being, as the report [puts it](#), “biased toward high-emitters.” Notably, a recent NOAA [study](#) reveals the “super-emitter” data Zavala-Araiza et al. relied on air measurements likely collected during episodic maintenance events, which skewed emissions higher than they typically would be. As a result, these “peak” emissions data were inappropriately used to calculate a normal emissions profile.

- **Zimmerle et al. (Leakage rate: 1.3 percent):** This 2015 EDF/Colorado State University [study](#) finds low overall natural gas system methane leakage rates based on 2,292 onsite measurements from transmission and storage facilities along with additional emissions data from 677 facilities and activity data from 922 facilities.

The International Energy Agency (IEA) has also [noted](#) that the climate benefits of natural gas are significant even at higher leakage rates and regardless of time-frame. As IEA explained in an analysis for its latest World Energy Outlook, "... [T]aking into account our estimates of methane emissions from both gas and coal, on average, gas generates far fewer greenhouse-gas emissions than coal when generating heat or electricity, regardless of the timeframe considered."

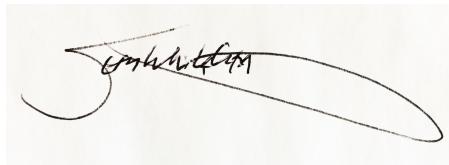
Natural Gas Has Bipartisan Support

In addition to the fact that the shale gas boom has [lowered energy costs](#), significantly [improved air quality](#), bolstered U.S. [energy security](#) and [created millions of jobs](#), these well-documented climate benefits illustrate why support for natural gas is "nearly as strong among Democrats as Republicans," to use McKibben's own words.

Indeed, U.S. Sen. [Tim Kaine](#) (D-Va.) has explained, "We've been improving our emissions in this country without agreeing to the Kyoto accords, without Congressional action because of innovation from the natural gas area." Another prominent Democrat, former Virginia Gov. Terry McAuliffe, recently said, "You're reducing carbon emissions by using natural gas. ... That's a move in the right direction. We can't go 100% renewable in Virginia. It's laughable to even discuss it." And even California Governor and noted environmentalist Jerry Brown has criticized the extreme "Keep It In the Ground" agenda, saying that anti-fracking activists "[don't know what the hell they're talking about.](#)"

Credible publications such as Yale Environment 360 are essential to contributing to the honest, fact-based discussion that energy issues — including natural gas — deserve. Such discussions become more and more difficult when false claims from political activists are amplified without scrutiny.

Sincerely,

A handwritten signature in black ink, appearing to read "Seth Whitehead".

Seth Whitehead
Team Lead
Energy In Depth