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Tom Zeller Jr. Contributor

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Natural Gas Leaks: A $30 Billion Opportunity and Global Warming Menace

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A new study released Tuesday suggests that the global oil and gas industries allow as much as 3.6 trillion cubic feet of natural gas — and almost certainly far more — to escape into the atmosphere annually. The leakage rate represents at least $30 billion in lost revenues, the analysis found, and it reinforces previous studies suggesting that the much-touted climate benefits of the expanding shale boom are unlikely to be realized unless these so-called fugitive emissions are brought under control.

While the chief component of natural gas, methane, breaks down in the atmosphere more quickly than carbon dioxide, it has far more planet-warming potential while it is present. The gas escapes from storage tanks and vents at oil production sites, and in even greater amounts all along the natural gas production and delivery chain — rising from wells, poorly constructed processing facilities, and leaky transmission and delivery pipelines. Over a 20-year time frame, the cumulative leakage in 2012, the new study suggested, would represent as much as 7 percent of total global greenhouse gas emissions — or the equivalent of about 40 percent of total carbon dioxide from coal-fired power production.

For all of this, governments have done little to date to monitor, measure or regulate methane emissions. And given the varying quality of country-to-country reporting of methane leaks in the oil and gas industry — most of which comes from somewhat crude, bottom-up measurements taken on the ground near production, processing and delivery infrastructure — the study suggests that its findings, which put the overall global leakage rate at 3.2 percent, are almost certainly on the low side.

"Even the best country data relies on bottom-up emissions inventories," said Drew Nelson, the senior manager for natural gas with the Environmental Defense Fund, an industry-friendly environmental group that commissioned the analysis, in an email message. "There have been studies in the U.S. that suggest our bottom-inventory is under-reporting emissions by 50 percent. This study relies on those bottom-up inventories and many places have far less capacity on their inventories than we do."

An employee passes machinery at a gas processing facility in Ukraine. The country is among the largest leakers of natural gas, according to a new study. (Photo: Vincent Mundy/Bloomberg via Getty Images)

Ethan Davis, an energy analyst and consultant with the Union of Concerned Scientists who looked over the new analysis, concurred, noting that even if the 3.2 percent leakage rate was accurate, it is above what some studies have shown would be necessary to realize any climate benefit from the coal-to-natural-gas switch. Even so, "Adding this all up," Davis said in an email message, "there is very good reason to think this is likely a low leakage rate —

especially for global sources."

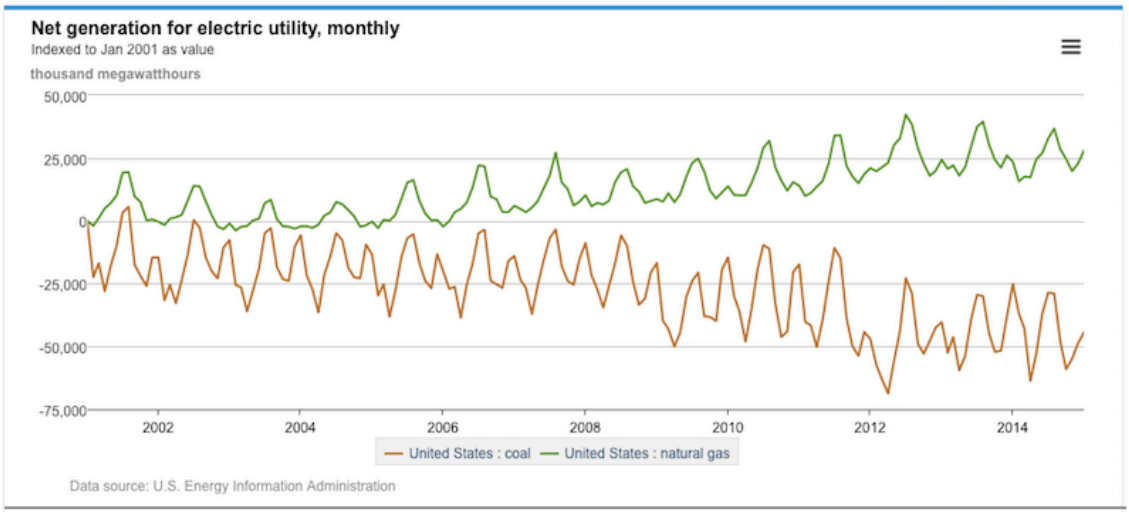
Some of the world's major natural gas producers are among the biggest methane leakers. Russia, the United States, Uzbekistan, Canada and Mexico top the list, according to the report, which was prepared by the Rhodium Group, a New York-based consultancy that specializes in energy market analysis. Should nothing be done and the oil and gas industries grow globally as predicted over the next 15 years, the study found, emissions would expand by as much as 23 percent. Climate scientists, meanwhile, suggest that global emissions must be cut roughly in half by mid-century in order to keep planetary average temperatures from rising to potentially dangerous levels.

The findings are the latest in a sobering series of analyses that raise particular questions about the virtues of the booming natural gas industry.

It was only a few years ago that the Obama administration confidently lined itself up alongside prestigious energy scientists, eager drilling companies, and even august environmental groups like the Sierra Club — to tout natural gas as the link to a clean-energy future.

To be sure, it was still a fossil fuel that emitted planet-warming carbon dioxide when burned, but those emissions came in far smaller doses relative to coal, the chief alternative. In the near term, the thinking went, making the switch from coal to natural gas as an electricity-generation fuel could ease greenhouse gas emissions while other, cleaner technologies like wind and solar power got a firmer foothold in the marketplace — all while preserving the nation's economic vitality.

That switch has came about, to be sure. Coal's share of power production has steadily fallen over the last decade, while the role of natural gas — which was being tapped in record volumes in the U.S., thanks to the advent of new and deeper drilling technologies — has climbed to record heights.



But policymakers and other stakeholders were so focused on comparing the carbon dioxide emissions of different fossil fuels when they are burned, they failed to pay much attention to leaking methane, which is roughly 28 times more effective as CO2 at trapping heat in the atmosphere over a 100-year period. Over a 20-year time frame, methane is over 80 times more potent than CO2 a greenhouse gas.

Critics have also noted that rock-bottom prices for natural gas mean that it isn't just coal that is being displaced, but also the same low- or no-carbon technologies and practices that natural gas was supposed to provide a bridge toward. These include nuclear power, various renewable energy technologies and even energy efficiency. "Increased natural gas use for electricity will not substantially reduce U.S. [greenhouse gas] emissions," the authors of a study published in Environmental Research Letters concluded last fall, "and by delaying deployment of renewable energy technologies, may actually exacerbate the climate change problem in the long term."

Researchers at Cornell University were among the first to begin signaling the lack of methane accounting and abatement as a potential problem — and their findings were initially dismissed by both the oil and gas industries and the White House, which were intent on portraying fracking technology and natural gas in particular as a boon to both the economy and the climate. But numerous subsequent studies have raised similar concerns, including an analysis last year, published in the Proceedings of the National Academies of Science, suggesting that the emissions associated with unconventional shale oil and gas development were likely to be significantly higher than estimates published by the Environmental Protection Agency.

In response to the growing concern, the White House announced in January that it would aim to cut methane emissions from the oil and gas sector by between 40 and 45 percent from 2012 levels over the next 10 years. The proposal would include new methane emissions requirements for any new or modified drilling equipment, along with tougher leak abatement regulations for all oil and gas facilities, new and existing, that operate on public lands. Under the new program, the EPA would also consider requiring "remote sensing technologies and other innovations in measurement and monitoring technology" to help detect methane leaks along the oil and gas production and supply chain.

According to the new EDF-commissioned study, capturing all of this fugitive methane ought to be considered relatively inexpensive, low-hanging fruit for combating climate change. "An analysis of these emissions in the U.S. found that emissions could be reduced by 40 percent for less than 1 cent per thousand cubic feet of gas," Nelson noted. He added that the report also concludes that of the over 70 technologies and practices identified in EPA's Natural Gas STAR Program — a voluntary undertaking that encourages oil and natural gas companies worldwide to adopt reduce emissions of methane — all but one pay back within three years, and over half pay back within one year.

Industry representatives quickly slammed the administration's methane abatement proposals, however, describing them as a solution in search of a problem. "EPA's proposed methane regulation is redundant, costly, and unnecessary," said Thomas Pyle, president of the Institute for Energy Research, in a statement issued at the time. "Energy producers are already reducing methane emissions because methane is a valuable commodity. It would be like issuing regulations forcing ice cream makers to spill less ice cream."

Even if that's true, researchers seem to suggest that the leakage reductions are not happening quickly enough — a fact that may be due in part to the huge amounts of natural gas unleashed by the advent of fracking technology, and the correspondingly low prices for the commodity. As things stand, "drilling the next well provides more of a return on investment than fixing leaks," said Nelson. "Even though the paybacks are high for fixing leaks, without a regulatory incentive to do so, many companies will not fix the leaks in order to make greater profits elsewhere."

This is true both in the U.S., and globally, according to the new report.

"Despite its climate significance, very few countries have taken steps to regulate methane emissions from the oil and gas sector or set specific goals to reduce leakage in the future," the analysis concluded. "This not only leaves a potentially cost-effective source of abatement on the table, but could also reduce the effectiveness of efforts to reduce [greenhouse gas] emissions across the energy sector, from power generation to transportation."

Tom Zeller Jr. has written on energy and environment for The New York Times, The Washington Post, National Geographic, HuffPost and Bloomberg View. You can follow him on Twitter @tomzellerjr.