

OIL AND GAS

Methane leaks offset natural gas' climate benefits — study

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An oil and gas site burning off methane, the second-largest contributor to global warming after carbon dioxide. Tim Hurst/Flickr

Current methods of controlling methane leaks must improve 30% to 90% over the next decade for natural gas to be an effective part of U.S. efforts to meet greenhouse gas reduction goals, according to new research from the Massachusetts Institute of Technology.

The study, published this week in *Environmental Research Letters*, considered multiple scenarios to look at the scale of methane mitigation needed if natural gas is relied on to cut carbon dioxide-equivalent emissions 32% by 2030 relative to 2005 levels. Natural gas — while less emissions-intensive than coal — is primarily made of methane, and leaks still occur across its supply chain at storage tanks, production wells and pipelines, noted the [paper](#), which also considered alternative scenarios to meet climate goals through an expansion of carbon-free energy sources.

In one scenario — where methane emissions from the power sector were reduced by up to 90% from today's levels — CO₂ emissions would need to fall roughly 20% by 2030. In scenarios where methane emissions do not drop to that degree, deeper CO₂ cuts are required to meet the target, as well as more rapid growth in carbon-free power.

Jessika Trancik, an associate professor of energy studies at MIT and a study co-author, said the uncertainties around natural gas and methane emissions come from two factors: the

amount of methane that is actually leaking and how those short-term, decadal-scale contributions to global warming are valued.

"If you are the kind of risk-averse agent that really wants to mitigate climate change and meet your targets and keep global warming within check," Trancik said, "then you would probably choose the path of accelerating a transition away from natural gas and doing that even more because of this uncertainty."

Magdalena Klemun, an MIT postdoctoral associate and paper co-author, said reducing CO2 emissions from the electricity sector through a reliance on natural gas can create what the researchers described as a "hidden commitment" to methane leakage mitigation. While natural gas use has lowered CO2 emissions in recent years, significant investments and effort to further address methane leaks would be needed over the next 10 years to meet goals set under the Paris climate accord, she said.

The alternative is to accelerate away from fossil fuels and toward carbon-free sources, thereby reducing the need to cut methane leakage from the natural gas supply chain. Klemun said there has been "little evidence" for rapid, widespread methane leakage mitigation in the past, referencing data from EPA.

"Of course, the past is always only one model for what may happen in the future, but it's worth considering and asking: Given the knowledge that we have, how feasible does it seem to achieve deep leakage reductions over the next decade, and what are other options to meet near-term climate policy goals?" Klemun said.

Different processes can require different mitigation approaches, Klemun said, who noted that there is still "significant uncertainty" about methane leakage rates. Researchers determined the overall range of leaks to be between 1.5% and 4.9% of the amount of gas produced and distributed. That uncertainty makes it more difficult to assess different mitigation pathways, Klemun said.

'Refreshingly honest'

Industry groups, including the Natural Gas Supply Association, Independent Petroleum Association of America and American Petroleum Institute, say they support more development of natural gas infrastructure.

Daphne Magnuson, NGSA's vice president of strategic communications, said that although the group had not yet reviewed the MIT study, natural gas is needed to achieve a clean energy future.

"The energy industry is in the midst of a transformation to a clean energy future and natural gas is an essential part of reaching that goal in a way that is affordable and accessible for everyone," Magnuson said via email, pointing to investments in new technologies to reduce emissions and a price on carbon as solutions.

Bethany Aronhalt, an API spokeswoman, said the natural gas and oil industry is addressing climate change "head-on" and investing billions in new technologies and efforts such as the Environmental Partnership, an initiative launched in 2017 to develop U.S. energy resources while reducing emissions.

"The idea that we cannot increase energy development while driving climate solutions is obsolete and contradicts the industry's continued progress in minimizing emissions," Aronhalt said over email.

Still, environmental groups said there is no room for the expansion of gas infrastructure, considering the harmful impact of methane and the difficulty monitoring and controlling it.

Matthew Gravatt, deputy legislative director at the Sierra Club, said a continued build-out of gas infrastructure and more extraction lock in decades of reliance on fossil fuels.

"The strategic choice is, are we going to make the investment that we need to in building out clean energy infrastructure?" Gravatt said, who also emphasized a need for energy efficiency measures.

Lorne Stockman, a senior research analyst at nonprofit Oil Change International, called the paper "refreshingly honest" about the difficulty of monitoring, measuring and looking at methane venting due to a high dispersal of emission points.

"This study was clear that the vast nature of the gas network makes accurate estimates of methane leakage unreliable," Stockman said in an email.

Stockman took issue, however, with what he called a "dichotomy" set up by the study between reducing methane leakage or reducing gas consumption — he said the climate crisis means both need to be done and that the window for gas as a so-called bridge fuel has closed.

The study was supported by the MIT Environmental Solutions Initiative, and received support from MIT's Policy Lab at the Center for International Studies.