

Study on methane emissions from natural gas systems indicates new priorities

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A new study published in the journal *Science* says that the total impact of switching to natural gas depends heavily on leakage of methane (CH₄) during the natural gas life cycle, and suggests that more can be done to reduce methane emissions and to improve measurement tools which help inform policy choices.

[Published in the February 14 issue](#) of *Science*, the study, "Methane Leaks from North American Natural Gas Systems," presents a first effort to systematically compare North American emissions estimates at scales ranging from device-level to continental atmospheric studies. Because [natural gas](#) emits less carbon dioxide during combustion than other fossil fuels, it has been looked to as a 'bridge' fuel to a lower carbon energy system.

"With this study and our larger body of work focusing on natural gas and our transforming energy economy, we offer policymakers and investors a solid analytical foundation for decision making," said Doug Arent, executive director of the Joint Institute for Strategic Energy Analysis (JISEA) and a co-author to the study. "While we found that official inventories tend to underestimate total methane leakage, leakage rates are unlikely to be high enough to undermine the climate benefits of gas versus coal."

The article was organized by Novim with funding from the Cynthia and George Mitchell Foundation and led by Stanford University's Adam Brandt. It was co-written by researchers from Stanford University, JISEA, Energy Department's National Renewable Energy Laboratory (NREL), University of Michigan, Massachusetts Institute of Technology, National Oceanic and Atmospheric Administration, University of Calgary, U.S. State Department, Harvard University, Lawrence Berkeley National Laboratory, University of California Santa Barbara, and the Environmental Defense Fund.

"Recent [life cycle](#) assessments generally agree that replacing coal with natural gas has climate benefits," said Garvin Heath, a senior scientist at the NREL and a lead author of the report. "Our findings show that natural gas can be a bridge to a sustainable energy future, but that bridge must be traversed carefully. Current evidence suggests leakages may be larger than official estimates, so diligence will be required to ensure that leakage rates are actually low enough to achieve sustainability goals."

Among other key findings of the research:

- Official inventories of methane leakage consistently underestimate actual leakage.
- Evidence at multiple scales suggests that the natural gas and oil sectors are important contributors.
- Independent experiments suggest that a small number of "super-emitters" could be responsible for a large fraction of leakage.
- Recent regional atmospheric studies with very high emissions rates are unlikely to be representative of typical natural gas system leakage rates.
- Hydraulic fracturing is not likely to be a substantial emissions source, relative to current national totals.
- Abandoned oil and gas wells appear to be a significant source of current emissions.
- Emissions inventories can be improved in ways that make them a more essential tool for policymaking.

Provided by National Renewable Energy Laboratory

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