

Editorial: Introducing the Special Report “Monitoring Methane Emissions from Oil and Gas Operations”

PRX Energy is pleased to publish the report “Monitoring Methane Emissions from Oil and Gas Operations” (Collins *et al.*) sponsored by the American Physical Society’s Panel on Public Affairs and by Optica (formerly the Optical Society of America) [1]. Both societies have long been committed to informing public debate on policy issues where the societies’ science communities have relevant expertise. This report identifies specific research directions and policy initiatives that would improve the detection of large methane leaks in the oil and gas sector.

As a venue for results and ideas that advance energy research and technology, *PRX Energy* is an appropriate home for the new report. The journal aims to create connections across the interdisciplinary energy research community to address big challenges. It supports this goal with its broad scope, open access format, and innovative content. Here, Collins *et al.* connect the efforts of both research scientists and policymakers to combat methane leaks from the energy sector. Their report is a useful guide for researchers, one that both evaluates state-of-the-art technology and gives direction for progress. It also highlights the necessary flow of ideas between policy and science. For instance, any effective methane policy will have to rely on rigorous data collection and analysis. Similarly, environmental and regulatory needs have revealed gaps in what scientists can measure or understand.


Methane is a much more potent greenhouse gas than carbon dioxide and is a practical target for emission reduction for several reasons. Its atmospheric lifetime is around ten years, so reductions in present-day emissions will have an impact over the next few decades, a timeframe that we know is vital for limiting global temperature rise to manageable proportions. Methane also has economic value, creating a commercial incentive to capture it. And as identified in the report, a small fraction of emission sources in the oil and gas sector contribute a substantial part of total methane emissions—so-called superleaks. While other environmental and agricultural emissions of methane are comparable to these superleaks in total size, their ubiquity will require a different approach to rein them in. Identifying and remedying point-source emissions offers one of the few “quick fixes” in an arsenal of tools that will be needed to reduce and mitigate climate change.

The report identifies both technology and policy gaps that, if addressed in tandem, could rapidly improve our ability to monitor and control methane emissions. The monitoring will not only identify sources but will also contribute to a pool of data that will support better local and global models. Advances in technology would ideally drive a virtuous cycle, avoiding policy failures that stem from gaps in scientific knowledge. One opportunity is to advance light detection and ranging (LIDAR) in the 1.65 μm waveband for fast and cheap monitoring of methane absorbance signals. Other opportunities include improvements in rapid, high-precision monitoring of carbon isotopes for identification of methane sources and the compilation of comprehensive databases of spectroscopic signatures to aid remote sensing. These new forms of information will help to raise societal awareness and drive policy change.

The *PRX Energy* editorial team hopes that this article stimulates discussion, debate, and research. Further, the editors welcome original research, Perspectives, Reviews, and Tutorials that report work at the intersection of science and policy with relevance to energy science and technology.

[1] W. Collins, Monitoring Methane Emissions from Oil and Gas Operations, [PRX Energy 1, 017001 \(2022\)](#).

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 Published 22 June 2022

DOI: [10.1103/PRXEnergy.1.010002](https://doi.org/10.1103/PRXEnergy.1.010002)