

Methane emission mitigation in the oil and gas sector

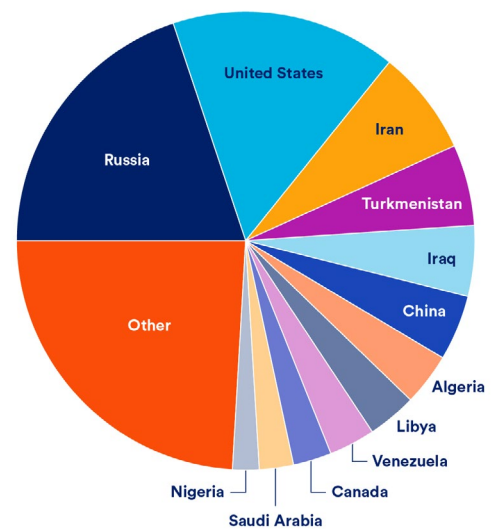
Background

Methane, a greenhouse gas with a warming potential more than 80 times higher than CO₂, is responsible for half a degree Celsius of warming to date.¹ Human activity in three sectors account for more than half of global methane emissions, with agriculture accounting for 40% of emissions, fossil fuels for 35%, and waste for 20%.² However, available measures could reduce methane emissions across these three sectors by as much as 45% by 2030.³ Given methane has an estimated atmospheric lifespan of around a decade, taking action to decrease emissions not only means we may substantially reduce atmospheric concentrations, but we may also be able to observe the impacts of these efforts within our own lifetimes.

Five nations—Russia, the United States, Iran, Turkmenistan, and Iraq—account for approximately 50% of the emissions from the oil and gas industry, as illustrated in Figure 1.⁴ We can reduce methane from the oil and gas sector using cost-effective and common-sense technologies and practices. As of 2021, estimates show that 80% of oil and gas mitigation measures can be implemented at negative or low cost.⁵ While mitigation potential varies between countries and regions, a vast majority of abatement potentials are expected to be realized for less than USD\$600 per ton of methane.

Figure 1: Top emitters of methane from oil and gas sector

Source: IEA Methane Tracker (2021)



¹ IPCC AR6 WGI Summary for Policymakers Fig. 2 Figure SPM.2 in IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, et. al. (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–32, doi:10.1017/9781009157896.001.

² UN Environment Programme. (2021, May 5). *Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions*. UNEP. <https://www.unep.org/resources/report/global-methane-assessment-benefits-and-costs-mitigating-methane-emissions>

³ UN Environment Programme. (2021, May 5).

⁴ International Energy Agency (2021) *Methane Tracker Database* - IEA; as modified by Clean Air Task Force.

⁵ UN Environment Programme. (2021, May 5).

Additionally, addressing methane emissions could result in economic and health co-benefits. A recent report found nearly 14 million people in the U.S. face an increased risk of cancer due to toxic air pollution emitted alongside methane at oil and gas sites in the U.S.⁶ These findings reiterate the importance of implementing available technologies and practices to support methane abatement and reduce hazardous air pollution for the benefit of communities around the world.

Technological potential

Technological advancement has opened the door to new possibilities for methane reduction. Methane detection technologies include spaceborne, airborne, and ground-based instruments, such as Optical Gas Imaging (OGI) cameras. By aiding the visualization and measurement of methane concentrations, satellites have demonstrated significant promise for methane monitoring. Spaceborne equipment can offer independent quantitative data on global methane concentrations, aid in the creation of appropriate target-setting goals and domestic policies, promote transparency of global emissions, and monitor the performance of methane abatement strategies. However, some regions may be rarely sampled due to weather conditions and topography – including areas like the Amazon, where oil and gas facilities are also located.

Airborne projects have also adopted advanced remote sensing. By attaching a sensor to a plane, teams have been able to survey large areas, up to nearly 258 square kilometers per plane per data.⁷ Aerial methane monitoring can drastically reduce inspection and operational costs while monitoring areas difficult to reach on the ground.

OGI cameras have also been used throughout the oil and gas industry as a part of Leak Detection and Repair (LDAR) programs. While spaceborne and airborne detection instruments can map methane emissions over wide areas, OGI cameras can visualize specific emission sources in the field, detect smaller leaks, and examine the equipment in hard-to-reach places. These cameras are critical tools as oil and gas companies, regulators, and third-party leak detection and repair service providers seek to observe, detect, and mitigate fugitive emissions. Gas imaging captured by OGI cameras is primarily qualitative, and quantitative estimates would require additional investment in equipment. Leaks, however, can be repaired even in the absence of quantification.

There is no perfect tool for detecting methane emissions; nonetheless, a combination of technologies can contribute to a comprehensive understanding of total methane emissions and ensure data leads to action.

Policy: A pathway to mitigation

Methane policies in the oil and gas sector are fundamental for addressing emissions.

International best practices include:

- **Quarterly LDAR** using optical gas imaging cameras or other approved technologies
- Use of **Vapor Recovery Systems (VRS)** for tanks holding oil or produced water to capture gas
- Compressor stations will be required to either **retrofit to reduce emission for compressor seals** or **route all emissions to VRS**
- Phasing out high bleed pneumatics to **low or zero bleed pneumatics**
- Requirements for **Reduced Emission Completions (RECs)**

⁶ Clean Air Task Force. (2022, September 15). Fossil Fumes: A Public Health Analysis of Toxic Air Pollution from the Oil and Gas Industry. Clean Air Task Force. <https://www.catf.us/resource/fossil-fumes-public-health-analysis/>

⁷ Kairos Aerospace. (2022). *Methane Detection*. Kairos Aerospace. <https://kairosaerospace.com/methane-detection/>

Countries that have published national and sub-national regulations on methane from oil and gas include:

- **Mexico** published its regulations in 2018 based on the latest science and technologies.⁸ The regulations far exceed initial commitments made at the North American Leaders Summit in 2016.
- **Canada** published comprehensive methane regulations targeting new and existing sources in 2018.⁹ With these regulations, Environment and Climate Change Canada (ECCC) estimates that between 2018 and 2035, methane emissions will be reduced by roughly 10 million metric tons.
- **Colombia**, the first South American country to regulate methane emissions from oil and gas, published methane regulations in 2022.¹⁰
- **The United States**, with the passage of the Inflation Reduction Act this year, will tackle the waste of natural gas through methane pollution pricing.¹¹ The US EPA will be required to impose a charge on oil and gas sources through the Methane Emissions Reduction Program (MERP).

In addition, at least three countries (e.g., Argentina, Nigeria, and Ecuador) and the European Union, are in the process of developing their regulations. Methane policies in the oil and gas sector will enable them to meet their international commitment and help reach the goals of the Global Methane Pledge.

Financing Mechanisms

Methane abatement is one of the most impactful ways of reducing global warming per dollar of capital invested.¹² Available funding options from the philanthropic, public (multilateral and bilateral), and private sectors can support emissions reductions in the oil and gas sector. This year, the Global Methane Hub dedicated \$10 million in funding to assist 30 countries with developing methane action roadmaps.¹³ To date, the World Bank, Interamerican Development Bank, and Asian Development Bank have provided the majority of funds targeted toward methane abatement.¹⁴ The United States is providing \$5 million to the African Development Bank (AfDB) to support methane abatement across the African continent.¹⁵

Numerous structural barriers must be addressed to successfully scale-up implementation of methane abatement projects, including a lack of accessibility for methane abatement within funding institutions and a lack of financial incentives and capacity within countries to spur the development of high-quality project proposals. However, the Global Methane Pledge's Energy Pathway, which will encourage countries to eliminate routine flaring by 2030, is anticipated to become a vital implementation step that will accelerate the adoption of cost-effective methane mitigation options.¹⁶ Furthermore, it is important to note the role of private companies in the oil and gas sector, as they, too, can fund methane mitigation strategies and fugitive emissions reductions can lead to increased profits.

⁸ Clean Air Task Force. (2018, November 13). *Mexico Takes a Giant Leap Forward in Regulating Methane Emissions*. Clean Air Task Force. <https://www.catf.us/2018/11/mexico-takes-leap-forward-regulating-methane-emissions/>

⁹ Clean Air Task Force. (2018, April 26). *Canada Issues Comprehensive Oil and Gas Methane Regulations*. Clean Air Task Force. <https://www.catf.us/2018/04/canada-issues-comprehensive-methane-regulations/#038>

¹⁰ Clean Air Task Force. (2022, February 16). *A Methane Champion: Colombia becomes first South American country to regulate methane from oil and gas*. Clean Air Task Force. <https://www.catf.us/2022/02/methane-champion-south-america-colombia-becomes-first-south-american-country-regulate-methane/>

¹¹ Clean Air Task Force. (2022b, August 25). *The Inflation Reduction Act of 2022: What it is, what it means, and how it came to pass*. Clean Air Task Force. <https://www.catf.us/2022/08/inflation-reduction-act-what-it-is-what-it-means-how-it-came-to-pass>

¹² UN Environment Programme. (2021, May 5).

¹³ Global Methane Hub. (2022, April 4). *The Global Methane Hub Donates \$10 Million to the Climate and Clean Air Coalition (CCAC) for Immediate Action to Reduce Methane Emissions*. Global Methane Hub. <https://globalmethanehub.org/2022/04/04/the-global-methane-hub-donates-10-million-to-the-climate-and-clean-air-coalition-ccac-for-immediate-action-to-reduce-methane-emissions/>

¹⁴ OECD DAC. (2019). <https://www.oecd.org/dac/financing-sustainable-development/development-finance-data/>

¹⁵ African Development Bank. (2022, September 15). *US government announces \$5 million grant to support African Development Bank in tackling methane emissions*. African Development Bank. <https://www.afdb.org/en/news-and-events/press-releases/us-government-announces-5-million-grant-support-african-development-bank-tackling-methane-emissions-54772>

¹⁶ The White House. (2022, June 18)

Building Capacities

Through collaboration and shared knowledge, the identification and implementation of methane pollution solutions becomes faster, scalable, and accessible. **The following organizations have the expertise and capacities to support nations in their methane pathways.**



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TASK FORCE



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