
We Need to Talk About Methane

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This decade will be decisive in the fight against climate change to avoid breaching the 1.5 degree Celsius temperature threshold agreed to at the 2015 United Nations Climate Change Conference in Paris. It will be impossible to safeguard the planet without controlling emissions from the oil and gas sectors. While public and private climate action has historically been focused on carbon dioxide, it is now time to reprioritize action on methane: a climate super-pollutant that is the main component of oil and gas. All eyes are on the United States to successfully implement its new methane regulations and methane fee to reduce emissions by 50 percent below 2005 levels in 2030. The world must follow the United States' lead. Global policymakers, financial investors, environmental advocates, and citizens must put methane front and center to spur sound climate decision-making. Immediate, practical steps are needed to prevent methane leakage in the critical oil and gas sectors while sustainable progress is made to transition to a carbon-free energy future.

Despite daily news of climate disasters, global actors are making progress on climate change. Fifty years ago, at the United Nation's first Conference on the Human Environment in Stockholm, the issue of global warming governance was put on the table. Countries were warned to "be mindful of activities in which there is an appreciable risk of effects on climate."¹ Hundreds of recommendations were formally declared, including that the UN collect, measure, and analyze data on the environmental effects of energy use and production. Carbon dioxide was expressly

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called out by name; methane went unmentioned—even though methane is the primary ingredient in fossil fuel energy supplies.

This glaring omission of a climate super pollutant took a half century to rectify. In 2021, at the UN Framework Convention on Climate Change (UNFCCC) 26th Conference of the Parties (COP26) in Glasgow, over 120 nations signed the Global Methane Pledge aimed at cutting methane emissions by 30 percent by 2030.² However, methane emissions remained unpriced, and polluters continued to release them into the atmosphere unpenalized.

Then, in 2022, the United States took a major legislative step to curb methane emissions. The Inflation Reduction Act (IRA) imposes a fee on oil and gas (O&G) methane emissions of USD 900 per ton in 2024, rising to USD 1,500 after 2026.³ Considering that the United States is the world's largest O&G producer and consumer⁴—and satellites detect significant, persistent methane leakage from American energy systems⁵—the move to price methane is groundbreaking. The IRA is expected to reduce U.S. O&G methane emissions by a “considerable percentage.”⁶ Without the IRA, the United States could forfeit the removal of as much as 660 million metric tons of carbon-equivalent emissions in 2030.⁷

The timing to price methane could not be more urgent. For the second year in a row, despite the COVID-19 pandemic, atmospheric methane levels increased at record rates.⁸ According to the International Energy Agency (IEA), however, at today's elevated natural gas prices, nearly all methane emissions from O&G operations worldwide could be avoided at no net cost because the gas sold pays for the equipment and operational upgrades to prevent methane leakage.⁹ In other words, operators can benefit from cutting methane to avoid paying the fee—a boon for the climate. This cost-effective lever is what economists like William Nordhaus have long been urgently calling for.¹⁰ Pricing methane (akin to a carbon tax) is “an alluringly simple policy hailed by environmentalists, scholars, and politicians as a cure-all for climate change.”¹¹

SOURCES OF METHANE

Human-made methane is primarily emitted from three sources: fossil fuels (oil, gas, and coal); waste (landfills and wastewater); and agriculture (livestock and rice cultivation). Together, fossil fuels are responsible for an estimated one-third of emissions.¹² However, analysts assert that official records may significantly undercount O&G methane emissions by some 70 percent.¹³

Given this marked discrepancy, it is critical to validate current methane inventories. Bottom-up analysis using open-source engineering models like the Oil Climate Index plus Gas (OCI+) estimates life-cycle emissions from O&G production, processing, shipping, and end uses.¹⁴ Studies using the OCI+ find that emission intensity ranges widely depending on the resource extracted and operations used.¹⁵ As such, one barrel of oil or cubic foot of gas can be as much as ten times more climate intensive than an equivalent volume of another resource, even before petroleum products reach end users.¹⁶

A constellation of aerial remote methane sensors and satellites are using top-down measurements to affirm bottom-up findings. Methane from oil and gas and other operations in the United States and worldwide are being spotted by an array of public, private, and non-profit observation platforms.¹⁷ Singular super-emitting leaks of 200 kilograms per hour are not unusual.¹⁸ Satellites are finding O&G systems around the globe that massively leak over 100 tons per hour.¹⁹ To put this in perspective, if a single gas system leaked at this elevated rate persistently for a year, its emissions would be equivalent to those of over 15 million cars.²⁰

STOPPING LEAKAGE

Methane leakage from O&G systems emanates from wellheads, flares, valves, flanges, pneumatic controls, storage tanks, compressors, pipelines, and other components.²¹ System-wide leakages can be small or large, intermittent or persistent. A combination of equipment and operational improvements, monitoring and detection regimes, regulatory standards, and market certification is needed to prevent methane leakage. As increasing volumes of gas are liquefied and shipped globally, it will be imperative for operators and regulators to assure that leak-free gas is traded and consumed through the entire supply chain.²²

Russia and the United States were reportedly tied at 14 million metric tons of methane emitted in 2021, with the largest share from the O&G sector.²³ The most methane-intensive operators (measured by emissions per barrel oil equivalent) are in Turkmenistan, Venezuela, and Algeria. The least intensive O&G operations are in Norway, where the industry and government aim to operate essentially leak-free in response to historic regulations.²⁴ According to the IEA, if all countries were to prevent leakage as well as Norway, “global methane emissions from O&G would fall by over 90 percent.”²⁵

WHAT LIES AHEAD

Recent studies highlight increased risks from climate tipping points: conditions beyond which climate change becomes self-perpetuating and leads to “abrupt, irreversible, and dangerous impacts with serious implications for humanity.”²⁶ The Earth is currently approximately 1.1 degrees Celsius pre-industrial levels. These current global warming levels already present the possibility of climate tipping points. Even staying within the Paris Agreement range of 1.5 to 2 degrees Celsius warming carries risks that numerous climate tipping points may be met, including significant sea level rise from collapsing ice sheets, dieback of biodiverse biomes such as the Amazon rainforest and warm-water corals, and carbon and methane release from thawing permafrost.²⁷

Nevertheless, the worst tipping points are still avoidable.²⁸ Preventing each tenth of a degree rise in the Earth’s temperature could forestall progressively worse disasters.

This decade is decisive in the fight against climate change. It will be impossible to safeguard the planet without controlling methane emissions from the O&G sector. Contrary to popular belief, the world will not run out of these resources anytime soon. Consumers will continue to demand these abundant resources to fuel their cars, heat their homes, and produce everyday goods like shampoo, pajamas, and paint. But, it is becoming more environmentally damaging to supply energy-using technologies like fracking oil and liquefying gas.

All eyes are on U.S. federal agencies to successfully promulgate new tighter methane regulations for oil and gas.²⁹ And the IRA’s methane fee is expected to bring emissions down by 50 percent below 2005 levels in 2030.³⁰ The U.S. is getting the world talking about methane and this will help lead the way to meet the Global Methane Pledge, which will be tracked by the UN’s new Methane Alert and Response System (MARS) using satellites to identify and attribute methane hotspots worldwide.³¹

Policymakers, financial investors, environmental advocates, and citizens need to remain abreast of methane emissions and their outsized climate risks to inform sound decision-making. Global climate stabilization cannot afford to wait for O&G spigots to turn off. Instead, immediate, practical steps must be taken to prevent methane leakage in the O&G sector while sustainable progress is made to transition to a carbon-free energy future. *f*

ENDNOTES

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