



10 THINGS YOU NEED TO KNOW ABOUT METHANE

WHAT IS METHANE, AND HOW IS IT DIFFERENT FROM CARBON DIOXIDE?

Methane (CH₄) is a powerful greenhouse gas, with a Global Warming Potential more than 80 times greater than that of carbon dioxide (CO₂) over 20 years after it is emitted. Methane doesn't stay in the atmosphere as long as carbon dioxide, but it is far more damaging to the climate because of how effectively it absorbs heat. Additionally, methane is responsible for around half of the growth in tropospheric ozone formation, which is a potent local air pollutant.

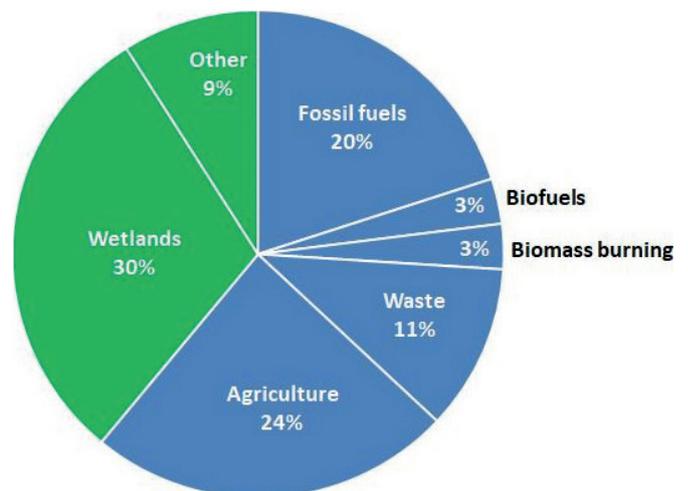
WHY DO METHANE EMISSIONS MATTER?

The amount of methane in the atmosphere has tripled in the last century. Methane pollution from human activity is responsible for at least a quarter of today's global warming. According to the IPCC, "deep reductions" in non-CO₂ emissions like methane are critical. If the world is to avoid the worst impacts of climate change, methane emissions must dramatically decline by 2030.

Reducing methane reduces global temperatures. According to the European Commission's Methane Strategy, reducing 50% of global methane emissions over the next 30 years could shave off 0.18°C by 2050. A 0.20°C temperature drop is nearly half of what's needed to get us from 2°C to 1.5°C and deep methane reductions can help close much of this gap.

WHERE ARE METHANE EMISSIONS COMING FROM?

Approximately 40% of methane emissions result from natural sources, while the remaining 60% is caused by human activity. Agriculture is the largest single source of global methane emissions, responsible for roughly 45% of manmade emissions, largely due to livestock and rice cultivation. Fossil fuels (oil, gas, coal) are the second largest source, responsible for approximately 30% of emissions, with waste, biofuels and biomass burning making up the rest.



Data source: Saunio, M., Bousquet, P., Poulter, B., Pregon, A., Ciais, P., & Canadell, J. et al. (2016). The global methane budget 2000–2012. *Earth System Science Data*, 8(2), 697-751. doi: 10.5194/essd-8-697-2016. Available at: <https://essd.copernicus.org/articles/8/697/2016/essd-8-697-2016.pdf>

WHY FOCUS ON FOSSIL FUEL METHANE IF IT ISN'T THE LARGEST EMISSIONS SOURCE?

The fossil fuel sector has the largest potential for rapid methane reductions. The Climate and Clean Air Coalition (CCAC) Scientific Advisory Panel estimates that almost 70% of fossil methane emissions can be abated using technology and solutions that are available today.

Oil and gas methane emissions present a particularly important opportunity, as it offers the most immediate and lowest cost options to reduce this potent greenhouse gas. There are many proven, commercially available technologies companies can use to control methane emissions.

The International Energy Agency estimates the industry could reduce its worldwide emissions by 75% and that up to 40% of those reductions can be realized at zero net cost.

WHY IS THERE A HIGHER COST EFFICIENCY OF OIL AND GAS METHANE REDUCTIONS?

Because natural gas is composed mostly of methane, emissions of methane from the oil and gas value chain represent a wasted product that could have otherwise been sold.

Data from the International Energy Agency shows that in 2019 alone the oil and gas industry emitted approximately 82 million metric tons of methane. This wasted gas translates into roughly \$19 billion of lost revenue at average 2019 delivered prices.

These emissions have a greater short-term climate impact than every single gas-powered passenger vehicle in the world combined. The IEA estimates that nearly half (40%) of these emissions could be eliminated at no cost.

WHAT ARE THE CAUSES OF METHANE EMISSIONS IN THE OIL AND GAS INDUSTRY?

Methane emissions occur intentionally and unintentionally across the oil and gas value chain during extraction, gathering and processing, transmission, and distribution. Typical sources include leaky wells, pipelines and storage facilities, inefficient flares and direct venting of gas.

A significant portion of emissions results from “super emitters”—a random assortment of facilities that, sometimes due to mechanical failure, sometimes due to operator error are responsible for significantly high emissions, according to a series of studies by Environmental Defense Fund. These super emitters are largely absent from emission inventories, and highlight the need for further measurement and frequent or continuous monitoring of methane emissions.

HOW DO WE REDUCE METHANE EMISSIONS FROM OIL AND GAS PRODUCTION?

There are many cost-effective and proven solutions for keeping methane in the system and out of the atmosphere. Fixes are often as easy as tightening loose valves and repairing leaky equipment. Leak detection and repair (LDAR) programmes that use infrared cameras, for example, to detect methane emissions are among the most effective strategies to consider.

Other times, sites may need changes to engineering design to prevent recurring, intermittent issues such as emergency venting. There are many options for companies to reduce vented emissions, such as electrifying sites or capturing vented gas for fuel use.

Critically, companies should not just address active leaks but also consider the root causes of emissions to identify and address potential sources of high emissions in the future.

HOW CAN NEW TECHNOLOGIES HELP MITIGATE METHANE EMISSIONS?

Advancements in remote-sensing technologies allow operators to pinpoint emissions faster and gather useful data to analyse root causes for implementing prevention measures. Continuous monitors that track methane emissions levels can also alert operators to leaks or super-emitter events instantly, reducing the time a source is emitting and improving operational efficiencies.

Satellite technology offers the potential of further characterizing emissions on a global scale, providing information for oil and gas producing regions with little to no data for countries, companies, and NGOs to verify progress on emissions reductions worldwide.

WHAT ARE THE HEALTH BENEFITS OF REDUCING METHANE EMISSIONS?

When methane leaks, it also does so with air toxics like benzene, hydrogen sulphide, toluene, and xylene, as well as smog producing volatile organic compounds. Flaring helps to combust most of these but spawns a host of other pollutants like particulate matter and sulphur dioxide.

The potential health impacts of these air pollutants range from irritation of eyes, nose, and throat to chronic or fatal illnesses such as cancer.

WHAT IS UNEP DOING TO COMBAT METHANE EMISSIONS?

Since 2014, UNEP has implemented the Climate and Clean Air Coalition’s Mineral Methane Initiative. This initiative aims to promote deep reductions of methane emissions from the oil and gas sector of 45% by 2025 and of 60%-75% by 2030, compared to 2015 levels. Through this initiative, UNEP works to improve methane policy, transparency and science around the world. This includes the management of the gold-standard methane transparency framework, the Oil and Gas Methane Partnership.

The work of this initiative has helped to raise awareness of methane emissions and contributed to the growing priority of mitigation activities. Today, many of the largest oil and gas companies have committed to methane reduction targets, and governments are beginning to develop methane reduction policies and strategies.

Going forward, a new independent international methane emissions observatory will aggregate and reconcile multiple methane emissions data streams, including scientific field measurements, satellite data as well as company reporting and national inventories, to provide the most accurate estimate of methane emissions levels globally. The observatory will help accelerate methane emissions reduction activities around the world.