



## **Improved understanding of global oil & gas related methane emissions through international measurements**

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Methane ( $\text{CH}_4$ ) is an important greenhouse gas as it contributes  $\sim 25\%$  of the direct radiative forcing impact of carbon dioxide ( $\text{CO}_2$ ), and atmospheric  $\text{CH}_4$  has grown over 3x as fast as  $\text{CO}_2$  since the industrial revolution. Among the diverse  $\text{CH}_4$  sources globally, mitigating  $\text{CH}_4$  from the oil and gas (O&G) sector is key for several reasons: (i) The O&G sector is one of the largest anthropogenic  $\text{CH}_4$  sources. (ii) There it can be cost-effectively captured and used as an energy source. (iii) Mitigating co-emitted non-methane hydrocarbons can reduce tropospheric ozone pollution and direct health risks.

Existing national emission inventories (based on engineering calculations, outdated emission factors, and sometimes incomplete activity data) are largely insufficient/inaccurate for guiding mitigation efforts as dozens of empirical peer-reviewed studies have demonstrated in the US & Canada over the past decade. Based on measurements using multiple techniques at different scales (component-, facility-, and basin-level), these studies illustrated the heterogeneity inherent in the  $\text{CH}_4$  emission patterns that is not well captured in emission inventories. Examples of this heterogeneity include: (i) The omnipresence of super-emitters (defined as the “fat tail” in skewed distributions of emission rates) across the O&G supply chain. (ii) Up to an order of magnitude variability in emission magnitudes (normalized by gas production) across basins. (iii) The specific emission sources contributing most to the total  $\text{CH}_4$  emissions in each basin vary widely. A recent synthesis of these studies in the US suggests that the national emission inventory underestimates O&G related  $\text{CH}_4$  emissions by 60%.

The Climate and Clean Air Coalition (CCAC) International Methane studies – a collaboration between UN Environment, Environmental Defense Fund (EDF), and the Oil and Gas Climate Initiative (OGCI) – intends to address the demonstrated need for empirical emissions data to lay the foundation for mitigation efforts. Given the lack of comparable data outside the US & Canada, several measurement campaigns have started measuring  $\text{CH}_4$  emissions across the O&G supply chain globally. This presentation summarizes the recent scientific advances and lessons learned from our ongoing international studies. This work builds on EDF’s experience in the US and Canada, underscoring the commitment to transparency of the collected data, external review, deployment of multiple methodologies, and publication of results in peer-reviewed journals.