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Challenges with Developing Comprehensive Oil and Natural Gas Operator-Level Measurement-Based Methane Emissions Inventories in the U.S.

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Measurement-based methane emissions inventories are essential for U.S. oil and natural gas operators to track their progress toward emissions targets and demonstrate the impact of improved operational and monitoring practices. However, translating raw emission measurement data, whether from continuous monitoring systems, aerial flyovers, or operational cause analyses, into emissions inventories is nontrivial. In this talk, we discuss findings from a United States Department of Energy funded project where we investigated how to combine a bottom-up inventory required by regulatory agencies, data from continuous monitoring systems, data from aerial flyovers, and follow-up operator cause analysis data to develop an operator-level emissions inventory. We introduce the concept of a comprehensive measurement-based emissions inventory, which represents all emissions across the entire time frame, across all spatial assets, and of all emissions sizes. We carefully characterize the extrapolation efforts necessary to create a comprehensive emissions inventory estimate with data from each type of technology. Understanding these methods is essential for operators preparing defensible emissions inventory reports that adhere to reporting frameworks such as Veritas and OGMP 2.0. In many cases, there are several possible extrapolation approaches of varying complexity and with various underlying assumptions. We provide simple examples to illustrate the sensitivity of annual emissions estimates to the various extrapolation approaches and highlight the challenges, strengths, and limitations when working with data from each of the technologies.