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Current Project Overview

Methane emissions from natural gas-fired compressor engines can be attributed to exhaust (combustion slip), rod-packing, and engine leaks. This study will focus on emissions from the unburned methane in the exhaust. Vaughn et al. estimated the national combustion slip as 24% of the 1391 Gg of methane emissions from gathering and boosting stations reported in the US EPA GHGI in 2020. Natural gas is comprised of both hydrocarbon and nonhydrocarbon species, with methane being present in large quantities. Methane is not fully combusted in compressor engines, especially lean-burn engines like ethane, propane, and butane. It is possible that these engines preferentially combust ethane and propane and leave out methane. A novel in-stack tracer gas method coupled with Fourier Transform Infrared species measurement is employed to quantify combustion slip from compressor engines. The objective of this work is to analyze fuel and exhaust gas stack test data from midstream oil and gas facilities to perform a comparative analysis of the combustion of other species of fuel gas to methane. This study will help in getting a better understanding of engine destruction efficiencies for different species of fuel gas, and better model methane emissions from compressors.

Research Progress

The project is in its early phases of collection and analysis of available published data from different studies and or partner midstream oil and gas partners. This helps to ascertain whether available stack test data would adequately address the subject of preferential combustion of natural gas-fired compressor engines.

Research Plans

1. Gathering and analyzing available stack test data
2. Work with midstream partner companies to gather data from stack tests data that will incorporate all natural gas species.

Publications

None

Literature cited

Photo –Vaughn, T. L., Luck, B., Williams, L., Marchese, A. J., & Zimmerle, D. (2021). Methane exhaust measurements at gathering compressor stations in the United States. *Environmental Science & Technology*, *55*(2), 1190-1196.