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Detection and quantification method intercomparison of methane emission from natural gas distribution network leaks in Hamburg, Germany

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On October 14, 2020 the European Commission adopted the EU methane strategy[1]. Measurement-based reporting of methane emissions will be crucial and may become legally binding. A variety of different methods are in use to quantify methane emissions from natural gas distribution networks, some attempting to quantify the pipeline leak under the ground, others attempting to quantify the emissions to the atmosphere. Comparisons between these methods are essential, as each method has its own advantages and limitations. In August and September 2020, we conducted an extensive campaign to compare three different methods, the mobile survey method, the tracer release method, and the suction techniques, to quantify emission rates of leaks from the natural gas distribution network in Hamburg, Germany. The mobile measurement technique employed two different cavity ringdown analyzers to identify and quantify methane, ethane and carbon dioxide using a moving vehicle. The tracer release technique measured methane and the tracer gas acetylene also with fast laser methods during driving or stationary deployment in a vehicle at an identified leak location. The suction method deployed soil sondes around an identified leak and measured methane in a stream of air pumped out of the soil until an equilibrium was reached. In total, we targeted 20 locations that had been identified by mobile measurements or by the routine leak detection of the local gas utility, GasNetz Hamburg. For numerous locations we detected several emission outlets from e.g., cavities, cracks or drains and we used measurements of the ethane to methane ratio to identify possible mixture of fossil and microbial sources. We will compare the different quantification methods, including their suitability for routine application and precision and accuracy in emission quantification.

[1] https://ec.europa.eu/energy/sites/ener/files/eu_methane_strategy.pdf