Mobile monitoring of fugitive methane emissions from natural gas consumer industries

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Natural gas is used as a feedstock for major industrial processes, such as ammonia and fertilizer production. However, fugitive methane emissions from many major end-use sectors of the natural gas supply chain have not been quantified yet. This presentation introduces new tools for estimating emission rates from mobile methane measurements, and examines results from recent field measurements conducted downwind of several industrial plants using a specialized vehicle equipped with fast response methane sensor. Using these data along with local meteorological data measured by a 3-D sonic anemometer, a Bayesian approach is applied to probabilistically infer methane emission rates based on a modified Gaussian dispersion model. Source rates are updated recursively with repeated traversals of the downwind methane plume when the vehicle was circling around the targeted facilities. Data from controlled tracer release experiments are presented and used to validate the approach. With access via public roads, this mobile monitoring method is able to quickly assess the emission strength of facilities along the sensor path. This work is developing the capacity for efficient regional coverage of potential methane emission rates in support of leak detection and mitigation efforts.