



Assessing fugitive emissions of CH₄ from high-pressure gas pipelines

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The impact of unconventional natural gas production using hydraulic fracturing methods from shale gas basins has been assessed using life-cycle emissions inventories, covering areas such as pre-production, production and transmission processes. The transmission of natural gas from well pad to processing plants and its transport to domestic sites is an important source of fugitive CH₄, yet emissions factors and fluxes from transmission processes are often based upon ver out of date measurements. It is important to determine accurate measurements of natural gas losses when compressed and transported between production and processing facilities so as to accurately determine life-cycle CH₄ emissions.

This study considers CH₄ emissions from the UK National Transmission System (NTS) of high pressure natural gas pipelines. Mobile surveys of CH₄ emissions using a Picarro Surveyor cavity-ring-down spectrometer were conducted across four areas in the UK, with routes bisecting high pressure pipelines and separate control routes away from the pipelines. A manual survey of soil gas measurements was also conducted along one of the high pressure pipelines using a tunable diode laser.

When wind adjusted 92 km of high pressure pipeline and 72 km of control route were drive over a 10 day period. When wind and distance adjusted CH₄ fluxes were significantly greater on routes with a pipeline than those without. The smallest leak detectable was 3% above ambient (1.03 relative concentration) with any leaks below 3% above ambient assumed ambient. The number of leaks detected along the pipelines correlate to the estimated length of pipe joints, inferring that there are constant fugitive CH₄ emissions from these joints. When scaled up to the UK's National Transmission System pipeline length of 7600 km gives a fugitive CH₄ flux of 4700 ± 2864 kt CH₄/yr – this fugitive emission from high pressure pipelines is 0.016% of the annual gas supply.