# Is the rate of fugitive methane gas migration around Alberta's energy wells adequately constrained?

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ABSTRACT
Methane emission reduction efforts make fugitive gas migration assessment important. Fugitive emissions around energy are classified as either Surface Casing Vent Flow (SCVF; where methane migration occurs at the wellhead within the outermost casing) or Gas Migration (GM; where methane migration occurs outside of the outermost casing and/or cement sheath). Both SCVF and GM have reporting procedures required by the Alberta Energy Regulator, with incident reports collated in a database.

We evaluated the degree to which fugitive emissions are understood around Alberta's energy wells by considering the fraction of all wells that have required GM testing by regulation either during their lifetime and/or at abandonment. This review considered 3,961 GM reports (for 3,574 unique wells) for an estimated 593,353 wells in January 2017.

An estimated 3.8% of Alberta's wells have required GM testing within 90 days of drilling - specifically the 22,547 wells that were drilled after 1995 in a defined 'Required Testing Area' (RTA) near Lloydminster. Gas migration was reported 6.6% of these wells (i.e. 1,488 unique wells in this category).

GM testing is not required around wells outside the RTA unless an environmental (groundwater or soil contamination) or public safety (fire, explosion, toxic effluent) hazard is identified. Gas migration was reported in 2,086 unique wells outside the RTA.

Approximately 4.4% of Alberta's energy wells have been abandoned without GM testing. Since 1991, SCVF has been required in all wells, and GM testing required in the RTA. Although 61% of wells have had SCVF reported, poor correlation between SCVF and GM occurrence suggests SCVF is not a good surrogate for GM.

We found no evidence that the recommended GM testing approach has been critically evaluated since established as 'practical and affordable' approach in the 1990s. We conclude fugitive GM rates around Alberta's energy wells are not currently well constrained.