

List of Methane Emissions Studies as provided by interested parties to NMED and EMNRD. We understand that these are all published, peer-reviewed studies.

**Citations provided by Dr. Manvendra Dubey, Los Alamos National Labs**

**Basin Wide Methane Emissions Estimate from Top Down**

<https://mjbradley.com/sites/default/files/MJBradleyWIEBNGMethaneEmissionsImplicationsforPolicymakersFinal.pdf>

Study Authors	Affiliation of Lead Author	Year Published	Estimated % Leakage (Source of Gas)
Petron et al.	NOAA	2012	2.3-7.7% (Denver Julesburg Basin)
Karion et al.	NOAA	2013	8.8±2.6% (Uinta Basin, UT)
Petron et al.	NOAA	2014	4.1±1.5% (Denver Julesburg Basin)
Caulton et al.	Purdue University	2014	2.8-17.3% (Marcellus Shale – Southwest Pennsylvania)
Peischl et al.	University of Colorado Boulder, NOAA	2015	0.18-2.8% (Fayetteville, Haynesville, and Marcellus Shale – Northeast Pennsylvania)

Range 0.2 to 17.3%, Top down sampling does not resolve all the activities in the basins.

Recent finer scale top down studies are beginning to address this issue.

- <http://onlinelibrary.wiley.com/doi/10.1029/2011JD016360/pdf>
- <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1002/grl.50811>
- <http://onlinelibrary.wiley.com/doi/10.1002/2013JD021272/abstract>
- <http://www.pnas.org/content/early/2014/04/10/1316546111>
- <http://onlinelibrary.wiley.com/doi/10.1002/2014JD022697/pdf>

**Citations provided by Karen Pratt, XTO Energy, Inc.**

[Synthesis of Recent Ground-level Methane Emission Measurements from the U.S. Natural Gas Supply Chain](#)

[Equipment leak detection and quantification at 67 oil and gas sites in the Western United States](#)

[Long-Term Measurements Show Little Evidence for Large Increases in Total US Methane Emissions over the Past Decade](#)

[Methane source attribution in a U.S. dry gas basin using spatial patterns of ground and airborne ethane and methane measurements](#)

[Methane emissions from natural gas production sites in the United States: Data synthesis and national estimate](#)

[Temporal Variability Largely Explains Difference in Top-down and Bottom-up Estimates of Methane Emissions from a Natural Gas Production Region](#)

[Measurements of Methane Emissions At Natural Gas Production Sites In The United States](#)