Natural Gas: Risk and Opportunity

FrackingSENSE
Center of the American West

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The Gas Boom Has Clear Advantages in the United States…

• Economic development;
• Increased energy security;
• Less air pollution; and
• Fewer greenhouse gases from combustion than coal.

…if done the “right way”.
...and Potential Risks

1. Ground and surface-water contamination and significant amount of water usage;
2. Air emissions can threaten public health (e.g., VOCs and ozone);
3. Increased greenhouse gas emissions; and
4. Cumulative impacts from truck traffic, noise, lights, etc.

...if not done correctly.

Lack of public trust due to risks could erode economic and social benefits of the gas boom. It is in everybody’s interest to get it right.
Oil and Gas Air Quality Impacts

Ozone

- Harmful air pollutant associated with health problems, including premature mortality, asthma attacks, and numerous respiratory conditions, especially for children, the elderly, Coloradoans with pre-existing respiratory disease and those who work and exercise outdoors.

- According to the American Lung Association, nearly 24% of the population of Weld and Larimer counties are particularly vulnerable to air pollution due to age, disease, or poverty. Over 50,000 people suffer from asthma in Weld and Larimer county, nearly a quarter of them children.

- A vast region of the Colorado Front Range – spanning from south Denver to Fort Collins, Weld County and Rocky Mountain National Park -- is out of compliance with EPA's Health-Based Ozone Standards and Wintertime Ozone Alerts are Being Issued in Rural Colorado with Rising Frequency.

- According to a recent NOAA/CU study, oil and natural gas development is a significant source of ozone-forming pollution:
  - Accounts for 55% of wintertime VOCs in 2011
  - Propane levels in Erie 10 times higher than Pasadena, CA, four times higher than Houston, Texas.

- Colorado has experienced unhealthy levels of ozone pollution in oil and gas development areas:
  - In Weld County, the location of increasing oil and gas development, monitor now registering nonattainment with rising 4th Max ozone values over the last 3 years.
  - RMNP monitor registering nonattainment.
Oil and Gas Air Quality Impacts

• Toxic Air Pollution
  – O&G sources emit toxics like benzene, a known carcinogen
  – NOAA study concludes oil and gas could be largest source of benzene in Weld County. Study estimates these sources account for 385–2056 tons/yr of benzene (compared to 3.9 tons/yr for all Colorado TRI sources).

• Methane
  – Methane is a potent climate forcer (20x>CO2 over 100 yrs)
  – Methane is a contributor to large scale ozone formation.
  – NOAA study finds that actual methane leakage from the oil and gas sector in Colorado is in the range of 2.3% to 7.7%, with a best guess of 4%. This is twice as high as the EPA’s estimate in its State Inventory Tool.
Power Plant CO₂ Emissions

2,200 lb CO₂/MWh

Coal

950 lb CO₂/MWh

Natural Gas
Power Plant Emissions Aren’t the Whole Story

- Coal Mining & Processing
- Transportation
- Coal Combustion
- Natural Gas Production
- Processing
- Transmission & Storage
- Natural Gas Combustion
- Local Distribution to Other End Users

**Source:** Adapted from Jaramillo et al., (2007) EST 41, 6290, Truck photo by Stephen Petit, SiefkesPetit Communications. Posted at: flickr.com/photos/truckpr/6771598239/. Used under Creative Commons license.
Methane Leak Rates Affect Climate Benefits of Natural Gas

• Overall leak estimates range between 1% - 7.9%, but much of it based on assumptions.
• 2010 EPA estimates leaks are about 2.5%, 2011 estimates at 1.4%.
• Whether leaks are 1.4% or 2.5%, a recent paper illustrates switching from diesel to natural gas may make things worse for the climate over some time periods.
What it Takes to Avoid Climate Damages

A recent paper in PNAS shows the point, given current data, for these three fuels at which it is better for the climate in all time frames to switch to natural gas:

- **Coal power plant** = 3.2% (or less) leakage
- **Gasoline** = 1.6% (or less) leakage
- **Heavy Duty Diesel** = 1.0% (or less)
Opportunities

By fixing leaks and reducing waste, significant reductions in emissions can be realized with cost effective controls. “Zero tolerance” for fugitive emissions.

• Green Completions
• Leak Detection and Repair
• Storage Vessels
• Venting and Flaring