Fracking leaks may make gas 'dirtier' than coal

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(PhysOrg.com) -- Extracting natural gas from the Marcellus Shale could do more to aggravate global warming than mining coal, according to a Cornell study published in the May issue of *Climatic Change Letters* (105:5).

While natural gas has been touted as a clean-burning fuel that produces less carbon dioxide than coal, ecologist Robert Howarth warns that we should be more concerned about methane leaking into the atmosphere during hydraulic fracturing.

Natural gas is mostly methane, which is a much more potent greenhouse gas, especially in the short term, with 105 times more warming impact, pound for pound, than carbon dioxide (CO_2), Howarth said, adding that even small leaks make a big difference. He estimated that as much as 8 percent of the methane in shale gas leaks into the air during the lifetime of a hydraulic shale gas well -- up to twice what escapes from conventional gas production.

"The take-home message of our study is that if you do an integration of 20 years following the development of the gas, shale gas is worse than conventional gas and is, in fact, worse than coal and worse than oil," Howarth said. "We are not advocating for more coal or oil, but rather to move to a truly green, renewable future as quickly as possible. We need to look at the true environmental consequences of shale gas."

Howarth, the David R. Atkinson Professor of Ecology and Environmental Biology, Tony Ingraffea, the Dwight C. Baum Professor of Engineering, and Renee Santoro, a research technician in ecology and evolutionary biology, analyzed data from published sources, industry reports and even Powerpoint presentations from the Environmental Protection Agency (EPA).

They compared estimated emissions for shale gas, conventional gas, coal (surface-mined and deep-mined) and diesel oil, taking into account direct emissions of CO_2 during combustion, indirect emissions of CO_2 necessary to develop and use the energy source and methane emissions, which were converted to equivalent value of CO_2 for global warming potential.

The study is the first peer-reviewed paper on methane emissions from shale gas, and one of the few exploring the greenhouse gas footprints of conventional gas drilling. Most studies have used EPA emission estimates from 1996, which were updated in November 2010 when it was determined that greenhouse gas emissions of various fuels are higher than previously believed.

"We are highlighting unconventional gas because it is a contemporary problem for us in upstate New York, and because there is a big difference between developing gas from an unconventional well and a conventional well, for the mere reason that unconventional wells are bigger," Ingraffea said.

He noted that the hydraulic fracturing process lends itself to more leakage because it takes more time to drill the well, requires more venting and produces more flowback waste, he said.

"A lot of the data we used are really low quality, but I'm confident they are the best available," Howarth said. "We want to go out into the Marcellus Shale and do micrometeorological fluxes of methane at the time of venting and get a real number on this, which has never been done. We're optimistic we can get funding and do that over the next year."

"We've tried to be conservative all along; we're not trying to be hyperbolic in our statements," Ingraffea said.

"We do not intend for you to accept what we've reported on today as the definitive scientific study in regards to this question. It's clearly not," he added.

"What we're hoping to do with this study is to stimulate the science that should have been done before. In my opinion, corporate business plans superseded national energy strategy."

More information: Howarth RW et al (2011). Methane and greenhouse-gas footprint of natural gas from shale formations. Climatic Change Letters. DOI 10.1007/s10584-011-0061-5

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