



Friday, May 20, 2011

**\*UPDATE VI\* Five Things to Know about the Cornell Shale Study**

*Almost year to the day after first attempt to smear shale gas fails, Howarth and crew back at it again in new report set for release this week*

Call it an annual rite of spring for the community of Ithaca, N.Y. – finals, farmer’s markets, and the release of bite-sized “studies” by Cornell professors targeting the discovery, development and use of natural gas. Last spring, Prof. Robert Howarth got the ball rolling, putting out a two-page abstract that earned a splashy [write-up in Reuters](#) mere minutes after it was released, but one that was withdrawn quickly thereafter owing to basic errors in the professor’s calculations. Turns out, [he didn’t know](#) that methane emissions occurred during the production of coal. Pretty big mistake in a paper that’s supposed to be comparing emissions from coal to those from natural gas, isn’t it?

Once bitten but still not shy, Howarth would release two additional abstracts over the next 10 months. The first one, [posted soon after](#) the April version was retracted, ratcheted down its rhetoric quite a bit, suggesting only that coal emissions were “probably quite similar” to those from shale gas. Later this week, Howarth and Prof. Anthony Ingraffea, a rock-mechanics specialist, are set to release their latest iteration of the report – but you’ll be hard pressed to find much circumspection [in this one](#). According to the professors: “Compared to coal, the footprint of shale gas is at least 20 percent greater and perhaps more than **twice as great** on the 20-year horizon.”

As for the paper itself, it hasn’t even been released yet (we expect a Wednesday publish date) but has still found a way to [generate plenty](#) of [attention](#) in the press – even nabbing a 27-graph [write-up](#) in *The New York Times*. Against that backdrop, here below: the first five things you need to know [about the Cornell report](#) (it probably won’t be the last five):

**Thing #1:** The study’s conclusions rely almost entirely on the application of a Global Warming Potential (GWP) factor that’s **45 percent higher for natural gas** than the one cited by the UN’s Intergovernmental Panel on Climate Change ([IPCC](#)) in 2007.

- Unable to reach their conclusions with the help of existing data or conventional assumptions, Howarth and Ingraffea manipulate the study parameters in two significant ways.
- First, they use a 20-year timeframe to study the GWP of methane in the atmosphere, rejecting the more common 100-year horizon considered by scientists to be more relevant in assessing the impacts of climate change. Second: They ratchet up methane’s GWP value to 105, far greater than IPCC’s recommendation of 72 over a 20-year period, and a staggering **320 percent**

**higher** than IPCC's 100-year benchmark of 25. (IPCC Fourth Assessment Report [AR4], table 2.14, [2007](#))

- Why the shorter timeframe? Well, even using the inflated GWP factors, the study's authors still can't make the score for natural gas come out worse than coal's over a 100-year time horizon. That's because methane is long gone from the atmosphere in a much shorter timeframe than carbon dioxide – [according to EPA](#), methane disperses after nine to 15 years, compared to a 100-years-or-longer stay for CO<sub>2</sub>.
- In defense of that decision, the authors offer the following explanation: "Though the 100-year horizon is commonly used, we agree with Nisbet et al (2000) that the 20-year horizon is critical, given the need to reduce global warming in coming decades." But [according to IPCC itself](#): "To assess the possible climate impacts of short-lived species [such as methane] and compare those with the impacts of [long-lived] GHGs, a metric is needed. However, **there are serious limitations** to the use of global mean GWPs for this purpose."
- Howarth's colleague Dr. Rick Allmendinger [frames the comparison](#) this way: "Take the overly simplistic example of a pot of cold water on the stove: if I turn the burner on high for a short period of time and then turn it off, the water will warm **but it will not boil**. On the other hand, if I turn the burner on low but keep it on low for a long period of time, the water will eventually boil. In the case of methane, soon after we stop using it, the warming effect will go away; CO<sub>2</sub> will continue to warm the atmosphere for decades or centuries after ..." (Allmendinger blog, accessed [Apr. 11, 2011](#))

**Thing #2:** Even the study's authors admit their data is "lousy."

- Howarth: "They are **limited data**. These are not published data. These are things **teased apart out of PowerPoint presentations here and there**. So rather than try to extrapolate based on any complicated formula, we've ended up simply taking the mean of those values." (Howarth presentation to colleagues, 22:30, [March 15, 2011](#))
- Howarth: "A lot of the data we used are **really low quality**, but I'm confident that they are the best available data." ([38:50](#))
- Howarth: "Let me just as an aside say that, again, the quality of the data behind that number [methane emissions during well completion] **are pretty lousy**. You know, they're these **weird PowerPoint sort of things**." ([44:15](#))
- Ingraffea: "We do not intend for you to accept what we have reported on today as the definitive scientific study in respect to this question, clearly it is not. We have pointed out as many times as we could that we are basing this study on in some cases **questionable data**." ([38:20](#))
- Ingraffea: "I hope you don't gather from this presentation that we think we're right." ([57:15](#))
- Howarth: "**We did not look as carefully at coal**. ... We didn't put anywhere near the amount of effort into them [coal numbers], but I'm sure they are lower than natural gas." ([39:10 – 40:08](#))

### Thing #3: Lost-at-sea on L.U.G.

- Howarth, et al. estimate that between 1.4 percent and 3.6 percent of all natural gas produced over the life of a well leaks off into the atmosphere during the transmission process, a hypothesis that relies heavily on “lost and unaccounted for gas” (LUG) figures reported in a non-peer-reviewed Texas trade magazine that, as December 2010, is no longer in circulation.
- **Howarth explains:** “The other way we looked at this is what’s called ‘missing and unaccounted for’ gas. And this is an accounting scheme. ... We use the state of Texas data **and extrapolate**. So this compares the measured production at a gas well with what is finally sold to consumers. And on average, over the last decade, 3.6 percent of the gas that’s produced in Texas never makes it to consumers. Well, where does that go? **Either vented into the atmosphere, or stolen**. Well, and **no one knows which.**” ([28:40](#))
- As mentioned, Howarth’s data for the entire state of Texas – and thus, owing to extrapolation, the entire U.S. – comes from an article published in the [July/August 2010 issue](#) of Fort Worth Basin Oil & Gas magazine. But while the authors are quick to jump on the figure cited for LUG in Texas, they ignore in its entirety the detailed explanation found further down in the article laying out the factors that go into calculating LUG.
- **From the article:** “LUG is frequently more of a measurement and reconciliation issue **than a loss issue**. It involves a complicated process of tracking volumes of gas as it moves from the wellhead and through a gathering system, which often includes several stages of compression, removal of inert gases and trash, extraction of liquids and, finally, measurement of the remaining gas at the tailgate of the plant on a heat content basis. ... **I think lost and unaccounted for is a poor name for it because it implies that we’re actually losing gas**. I believe ‘processing reconciliation’ is a much more accurate term.” (Pipeline attorney Phil Gamble, as quoted by Pamela Percival, Basin Oil & Gas, [July/Aug. 2010 issue](#))
- More on LUG: “The equipment used to process the gas also operates on natural gas, as well as the compressors that move the gas through the gathering system and the processing plant. The gas used to power that equipment comes from the gas going through the system and **is typically deducted from the producer’s total gas.**”
- In other words: **LUG gas is not necessarily leaked gas**. Unfortunately, Howarth, et al. base this entire section of their paper on the notion that natural gas that’s considered “lost and accounted for” in a pipeline accounting context is natural gas that’s simply leaked into the atmosphere in a practical one. The reality, as detailed in the very article they cite in their study (but ignored), is in fact quite different. It’s an accounting issue.

### Thing #4: The authors’ estimates on pipeline leakage are based on data and assumptions that are completely irrelevant to the Marcellus Shale.

- In calculating the percentage of methane leakage from pipelines, Howarth and crew rely on two data points: 1) long-range transmission losses reported in Russia (seriously), and 2) LUG data from a [trade magazine](#) in Texas (see above).

- But setting aside questions related to the credibility of pipeline data from Russia, Howarth doesn't dispute that this data is derived from "long-range" transmission reporting. As we know, in the Marcellus, the distance natural gas must travel to reach its markets is thousands of miles shorter than elsewhere in the United States, and certainly in Russia – thus providing fewer opportunities for methane to leak-off during the transport process.
- Interestingly, Prof. Howarth was asked precisely this question in a seminar he conducted last month. To wit: whether his study accounted for the fact that natural gas from the Marcellus had such a shorter distance to travel than natural gas produced elsewhere.
- **Howarth's response:** "No, I think that's a good point. **And the answer is no.** We developed the gas pipeline storage and local distribution numbers two ways. One, with these **long range transmission line data** from the Russian scene, German scientists. And the other is by the Texas missing and unaccounted for gas. And those don't allow you to tease that apart. So there has to be some aspect of what you're saying, but it's **not easy to put a number on it.**" ([55:40](#))

**Thing #5:** Could it be possible that – gulp! – **politics** played at least a small part in the process of assembling/directing this study?

- Although generally well-regarded as a researcher (notwithstanding last year's "[I blew it](#)" moment on the first iteration of his paper), Prof. Howarth is not exactly a dispassionate observer of the current debate over Marcellus development.
- Need proof? [Here he is](#) leading a protest against hydraulic fracturing in Binghamton, N.Y. at an EPA public information session last September (check out that great "no frack" pin he's wearing). And here he is [again](#), same place we think, doing much of the same.
- Believe it or not, activists have even shipped Prof. Howarth all the way up to Canada to lend assistance to anti-shale efforts in Quebec. [According to the professor:](#) "Quebec should go slow and wait until these problems are solved before choosing what is now a messy and dirty process that contaminates the air and the water." (as quoted in the Montreal Gazette, [Jan. 15, 2011](#))
- The study itself, as the authors acknowledge (37:55 of [this video](#)), was funded by the Park Foundation, an Ithaca, N.Y.-based organization that also funds some of the most active elements of the opposition. Among the groups supported by the group ([according to the Park Foundation itself](#)): Natural Resources Defense Council (NRDC), [Earthworks](#) (Oil & Gas Accountability Project), Riverkeeper, and American Rivers. (Park Foundation website, accessed [April 11, 2011](#)). The Park Foundation is also actively supporting [several other](#) Cornell professors in their ongoing advocacy in opposition to the Marcellus.
- Even former PA DEP secretary John Hanger -- formerly CEO of Penn Future, considered the state's leading environmental advocacy organization – panned the Howarth study in a departure note to his colleagues in January: "A paper that some of you may have seen authored by a professor professing to show carbon emissions are greater from gas **is riddled with errors.**" (Hanger message to colleagues, [Jan. 13, 2011](#))

- 2010: Worldwatch Institute weighs in with critique of first version of Howarth study: “In performing a lifecycle assessment, gas and coal must be held to the same standard, and it’s not clear that Howarth is doing this in his analysis.” (Worldwatch blog, [April 13, 2010](#))

**UPDATE:** (4/14/11, 10:34 a.m. EST)

Rare day indeed in which we find ourselves quoting NRDC, but specific to the question of Howarth’s use of that sneaky 20-year timeframe as part of his paper, interesting insights [from Dan Lashof](#):

- “Moreover, while I can see an argument for using a time horizon shorter than 100 years, I personally believe that the **20-year GWP is too short a period to be appropriate for policy analysis** because it discounts the future too heavily. I calculate that over a 50 year period, the GWP of methane would be in the range of 42-56, based on the IPCC and the Shindell et al. analyses.” ‘

Read the entire post [here](#).

**UPDATE II:** (4/15/11, 3:45 p.m. EST)

You’re probably not going to even believe this one, so we’re including a link to the video just to prove it’s legit. This clip comes from Wednesday’s evening news broadcast of [WICZ-TV](#) in Binghamton, N.Y. In it, Prof. Howarth does his best to explain why producers aren’t doing more to stop methane from leaking from their wells. His answer? **Let’s roll [the tape](#)**:

**Howarth:** “We’re estimating that almost **two percent of the lifetime production** of a well is leaked as methane in those first week [sic.] or two following the fracturing.”

**Reporter:** “Howarth says the gas industry hasn’t bothered to try to stop the gas loss because very little money is at stake.”

**Howarth:** “That’s right. I’ve calculated that, assuming \$4 per million cubic feet, at that price **it’s probably about \$75 worth of lost gas** at the wellhead. So it’s not a big economic loss; it’s a small loss. That’s why industry hasn’t worried about it.”

Read that again: Prof. Howarth just said that two percent of the production of a shale well -- over its entire lifetime, remember – apparently only amounts to **\$75** worth of natural gas. By those calculations, that would put the total lifetime production value of a shale well right around **\$3,750**. Jeez, that’s not a great ROI for a well that cost \$5 million to drill, is it?

All kidding aside: Is this guy insane?

**UPDATE III:** (5/5/11, 8:45 a.m. EST)

The hits just keep on coming against the ill-fated Howarth/Ingraffea paper -- that latest? A five minute take-down of the piece by former NY Times energy and environment reporter (but still recognized as an energy and climate mandarin) Andy Revkin, captured [here](#) in an online

exchange with Abraham Lustgarten of ProPublica (who, not for nuthin', isn't quite as sanguine on the Howarth paper as you might expect). Here below, some key excerpts:

Revkin: "One thing that disturbed me and some of the scientists I consulted was the big gap in the definitiveness of [Howarth's] abstract summary and the actual paper. ... **I find that they are more value judgments than scientific** judgments. As long as that's expressly clear in the way that something is stated, but sometimes it's not so clear. That bugs me a little bit."

More Revkin: "It's quite clear to me that if you have best practices for getting [natural gas] out of the ground, and I've seen them up close, that you can have a **very valuable fuel that has a lot of attributes that will be favorable to people** in the decades to come. "

Heck, even Lustgarten himself piles on: "And Howarth, he's alleging that gas might actually be dirtier than coal. He **throws a whole bunch of assumptions into that**. And while it's an interesting prospect, I don't know yet if it can be said with any certainty."

Full clip [here](#).

**UPDATE IV:** (5/5/11, 12:17 p.m. EST)

Not to pile on here – 'cuz we'd never think of doing such a thing! – but a new report released just this week by Wood Mackenzie identifies several other significant errors in the Howarth/Ingraffea paper, some of which we ourselves even missed on our first go-around. Below, we include a few key findings and excerpts from the study (we'll toss up a link too as soon as it migrates from behind its pay-wall):

***1) The paper overestimates the average volume of natural gas vented during the completion and flowback stages by 60-65 percent.***

- Key point here, and a basic mistake made by the authors of the report. Simply put, Howarth et al. assume that all methane emitted during the development process is leaked (vented), and none of it is burned off (flared). According to Wood Mackenzie: "By ignoring this distinction of venting versus flaring, the overall contribution of greenhouse gases can be greatly overestimated."

***2) The report does not take into consideration recent industry trends such as green completions.***

- Aside from ignoring the existence of flaring, the Howarth study also does not consider significant emission reductions occurring thanks to reduced emissions completions (RECs). Wood Mackenzie says "producers are increasingly moving to RECs," while **Howarth assumes only old techniques** are currently being employed in his study.

***3) The report uses "obsolete data" on emissions during well completions, may be off by up to 90 percent.***

- According to Wood Mackenzie, Howarth “used obsolete data and considerably overestimated Haynesville emissions that contributed to the overestimation of vented methane.” This leads to an assumption of much higher emissions levels across U.S. well sites.

#### UPDATE V (5/9/11, 5:26 p.m. EST)

“Is the report wrong? Yes.”

We could end Update V with that, but that would discount all of the other accurate (and entertaining) points Navigant Consulting made on the Howarth study in their May edition of *NGMarket notes*. Other gems from Navigant’s Rick Smead include:

- “If natural gas is indeed, as is claimed by Professor Robert Howarth and several colleagues in the paper released in April, a net contributor to greenhouse gases worse than coal, **‘Houston, we have a problem.’**”
- “The authors develop startling statistics for the methane that comes out of a well when a portion of the hydraulic fracturing fluid comes back up and is disposed of, deriving a truly impressive quantity of gas ... **I have to wonder whether the authors have ever seen a working drilling/fracturing operation.**”
- “[T]he report assumes gas leakage from transmission and distribution facilities that average 1.5 billion cubic feet per day, which would be about \$2.7 billion gas per year ... it is a lot of gas. That does not happen, and assuming it does is **a discredit to the operators of the nation’s gas grid.**”
- “The report essentially is using a **very questionable claim of leakage** from the urban distribution systems to condemn the transport of natural gas to a new combined-cycle power plant ... **There is no way this could possibly be relevant.**”
- “Overall, nothing about this report should be allowed to impair the development of our national energy resource.”

The Global Warming Policy Foundation jumped in on the facts too, releasing a report entitled *The Shale Gas Shock*. The author Matt Ridley writes this matter-of-factly:

“[Howarth’s conclusion] requires **unrealistic assumptions** about: the quantity of methane that leaks during fracking, production and transport; the lack of methane leaks from coal mines; the residence time of methane in the atmosphere; and the greenhouse warming potential of methane compared with carbon dioxide. ... And Howarth gets his numbers on high gas leakage from shale gas wells from **unreliable sources**, his numbers on gas leakage from pipelines from long Russian pipelines, and assumes that ‘lost and unaccounted for gas’ is actual leakage rather than partly an accounting measure. He also **fails to take into account** the greater generating efficiency of gas than coal.”

At this rate, Update VI, VII and VIII may arrive in the next hour or so ...

#### UPDATE VI (5/20/11; 12:45 p.m. EST)

Uh oh: The U.S. Department of Energy appears to have come out with its own detailed debunking of the Cornell paper -- released just this week in the form of a PPT. Take a look for yourself [here](#).

## READ MORE

- **EID fact check:** [Ithaca Is Gorges, But its Position on Hydraulic Fracturing is the Pits](#)
- **Council on Foreign Relations:** [Picking apart the Howarth study](#)
- **E&E News (subs. req'd):** [Howarth stands by data, two weeks after referring to it as “lousy”](#)
- **Fact-Check:** [Debunking GasLand \(Fact Sheet\)](#)