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Five Things to Know about the Cornell Shale Study

Almost year to the day after first attempt to smear shale gas fails, Howarth back at it again with 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 University 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a two-page abstract that earned a splashy [write-up in Reuters](#) mere minutes after it was released, but one that was withdrawn quickly thereafter owing to basic errors in the professor's calculations.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 The first one, [posted soon after](#) the April version was retracted, ratcheted down its rhetoric quite a bit, suggesting only that coal emissions were "probably quite similar" to those from shale gas.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* today. Against that backdrop, here below: the first five things you need to know [about the Cornell report](#) (our guess is 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 global 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 CO₂.
- 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; CO2 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: Howarth and friends 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 from [that same article](#): "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 hundreds and even 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 a much 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 snazzy "no frack" pin he's wearing). And here he is [again](#), same place, 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: 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](#))
- Worldwatch Institute weighs in with critique of its own: "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](#))

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