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Gangplank to a Warm Future

By ANTHONY R. INGRAFFEA

ITHACA, N.Y. — MANY concerned about climate change, including President Obama, have embraced hydraulic fracturing for natural gas. In his recent climate speech, the president went so far as to lump gas with renewables as “clean energy.”

As a longtime oil and gas engineer who helped develop shale fracking techniques for the Energy Department, I can assure you that this gas is not “clean.” Because of leaks of methane, the main component of natural gas, the gas extracted from shale deposits is not a “bridge” to a renewable energy future — it’s a gangplank to more warming and away from clean energy investments.

Methane is a far more powerful greenhouse gas than carbon dioxide, though it doesn’t last nearly as long in the atmosphere. Still, over a 20-year period, one pound of it traps as much heat as at least 72 pounds of carbon dioxide. Its potency declines, but even after a century, it is at least 25 times as powerful as carbon dioxide. When burned, natural gas emits half the carbon dioxide of coal, but methane leakage eviscerates this advantage because of its heat-trapping power.

And methane is leaking, though there is significant uncertainty over the rate. But recent measurements by the National Oceanic and Atmospheric Administration at gas and oil fields in California, Colorado and Utah found leakage rates of 2.3 percent to 17 percent of annual production, in the range my colleagues at Cornell and I predicted some years ago. This is the gas that is released into the atmosphere unburned as part of the hydraulic fracturing process, and also from pipelines, compressors and processing units. Those findings raise questions about what is happening elsewhere. The Environmental Protection Agency has issued new rules to reduce these emissions, but the rules don’t take effect until 2015, and apply only to new wells.

A 2011 study from the National Center for Atmospheric Research concluded that unless leaks can be kept below 2 percent, gas lacks any climate advantage over coal. And a study released this May by Climate Central, a group of scientists and journalists studying climate change, concluded that the 50 percent climate advantage of natural gas over coal is unlikely to be achieved over the next three to four decades. Unfortunately, we don’t have that long to address climate change — the next two decades are crucial.

To its credit, the president’s plan recognizes that “curbing emissions of methane is critical.” However, the release of unburned gas in the production process is not the only problem. Gas and oil wells that lose their structural integrity also leak methane and other contaminants outside their casings and into the atmosphere and water wells. Multiple industry studies show that about 5 percent of all oil and gas wells leak immediately because of integrity issues, with increasing rates of leakage over time. With hundreds of thousands of new wells expected, this problem is neither negligible nor preventable with current technology.

Why do so many wells leak this way? Pressures under the earth, temperature changes, ground movement from the drilling of nearby wells and shrinkage crack and damage the thin layer of brittle cement that is supposed to seal the wells. And getting the cement perfect as the drilling goes horizontally into shale is extremely challenging. Once the cement is damaged, repairing it thousands of feet underground is expensive and often unsuccessful. The gas and oil industries have been trying to solve this problem for decades.

The scientific community has been waiting for better data from the E.P.A. to assess the extent of the water contamination problem. That is why it is so discouraging that, in the face of industry complaints, the E.P.A. reportedly has closed or backed away from several investigations into the problem. Perhaps a full E.P.A. study of hydraulic fracturing and drinking water, due in 2014, will be more forthcoming. In addition, drafts of an Energy Department study suggest that there are huge problems finding enough water for fracturing future wells. The president should not include this technology in his energy policy until these studies are complete.

We have renewable wind, water, solar and energy-efficiency technology options now. We can scale these quickly and affordably, creating economic growth, jobs and a truly clean energy future to address climate change. Political will is the missing ingredient. Meaningful carbon reduction is impossible so long as the fossil fuel industry is allowed so much influence over our energy policies and regulatory agencies. Policy makers need to listen to the voices of independent scientists while there is still time.

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