



The Fracas about Fracking - Low risk, high reward -- but the EPA is against it

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A major boom in domestic oil and gas production is under way, brought about by breakthrough refinements of a 1940s technology known as hydraulic fracturing, or "fracking."

Hydraulic fracturing involves pumping water, sand, and some trace chemicals under high pressure into a completed wellbore to create fissures in relatively impermeable geologic formations such as shale. The fissures allow oil or natural gas to flow into the well. The sand props the fissures open, preventing the resealing of pathways. Combined with horizontal drilling at depths of one to more than two miles below the earth's surface, hydraulic fracturing has unlocked vast stores of natural gas.

Fracking is also now widely used in vertical and horizontal drilling in oil reservoirs with low permeability. Conventional oil reservoirs with permeable geologic formations allow oil to flow to the wellbore as a result of natural pressure. But in many wells, as much as 75 percent of the oil and gas may be left in place. Fracking is one of several new ways to get at the ample resources remaining after natural pressure subsides.

In these ways, human ingenuity, catalyzed by market dynamics, has foiled predictions of irreversible decline in domestic oil and natural-gas resources. Official estimates of the amount of recoverable oil and natural gas have soared. Last year, global natural-gas supplies rose 40 percent. From 2010 to 2011, the U.S. Energy Information Administration (EIA) doubled its estimate of recoverable natural gas in the U.S. The EIA increased its estimate of Texas's natural-gas reserves by 70 percent between 2005 and 2008, and Texas also is doing prolific fracking in oil: Producers now have access to 2 billion barrels in the Wolfberry formation in the Permian Basin. The Eagle Ford fields in South Texas increased oil production fourfold in the first ten months of 2010. And the Haynesville-Bossier fields, straddling Texas's border with Louisiana, increased reserves of natural gas by 9.4 trillion cubic feet while increasing production twelvefold.

The EIA also believes that natural gas in the Marcellus formation of New York, Pennsylvania, and West Virginia contains more BTUs of energy than do the oil reserves of Saudi Arabia. Drilling is well under way in Pennsylvania, where 141,000 new jobs in the "gas patch" have been created in the last few years. New York has declined to accept its energy wealth and instead imposed a de facto moratorium on fracking, pending the completion of an environmental-impact statement -- thus deferring the creation of hundreds of thousands of high-paying jobs.

Enormous new oil production is opening up in the Bakken fields of the Williston Basin, covering the Dakotas and Montana. In 2008, the U.S. Geological Survey estimated that the Bakken contained up to 4 billion barrels of technically recoverable oil. Current estimates range as high as 24 billion barrels.

Oil production made possible by fracking is not now as prodigious as that of natural gas, but this could change, especially if the federal government allows oil-shale development in the Rocky Mountain West, where 70 percent of recoverable oil shale lies beneath federal land. Most of the currently surging oil and gas production is on private land, where federal permission is not required and state governments are supportive.

A rapid increase of domestic supplies of oil and gas at a time of painful gas prices; high-paying new jobs; expansion of thousands of businesses; increased federal, state, and local tax revenues: What's not to like? And the lion's share of the fracking boom has been in natural gas -- the so-called bridge fuel to the green-energy economy that President Obama promotes at every turn.

A fierce anti-fracking movement is nonetheless growing. According to its most zealous critics, fracking may even kill you. They claim that the technology may transform the water from your faucet into fire, make your house explode, cause earthquakes, or poison you with toxic chemicals. Just watch the Oscar-nominated documentary film *Gasland*, shown on HBO and sure to join the canon of sensationalist environmental documentaries of which Al Gore's *An Inconvenient Truth* is the classic.

Gasland is packed with major errors, half-truths, distortions, and exaggerations. The narrator explains that the fracking process "blasts a mixture of water and chemicals 8,000 feet into the ground. The fracking is like a mini-earthquake . . . [with] a mix of over 596 chemicals." This is a serious mischaracterization. The hydraulic fracturing, in fact, creates small fissures with an average thickness of 1 millimeter -- as a result not of blasts, but of carefully engineered electric pulses.

As mentioned above, the fracking material is a mix of water, trace chemicals, and sand. Of the fracking fluid, over 99.5 percent is water and sand. Perhaps 0.5 percent is a mix, not of "596 chemicals" but of just a few, such as guar gum, an emulsifier commonly used in ice cream. And remember: These chemicals are diluted in millions of gallons of water.

The list of environmental perils attributed to hydraulic fracturing is long: contamination of drinking water, wastewater pollution of rivers, groundwater depletion, air emissions of toxic pollutants and greenhouse gases, radiation, and even earthquakes. But, with the exception of groundwater depletion, no causal connection between hydraulic fracturing itself and any of these environmental problems has been demonstrated. Faulty well construction, breaches in cemented and heavy-steel-encased wellbores, and accidents could, of course, lead to adverse environmental impacts. But there is no evidence that fracking itself is inherently damaging.

Highly audible critics of fracking have attributed all of the environmental risks noted above to natural-gas production in the Barnett shale area around Dallas-Fort Worth, now the most productive fracking effort in the country. Al Armendariz, the regional administrator of the EPA -- an Obama appointee and an environmental activist -- has amplified public alarm through his heavy-handed actions against a natural-gas company called Range Resources. Steven Lipsky, a Dallas landowner, complained of natural-gas (methane) contamination of his water wells to state authorities (who have primary regulatory jurisdiction on the matter) and to the nearby regional office of the EPA. State officials already were investigating, but the regional EPA opted to issue a rarely used emergency order of "imminent endangerment" against Range Resources, whose fracking wellbore was 4,000 feet below Lipsky's wells. Most well water comes from groundwater

no more than 1,000 feet below the surface. Migration of contaminants from an oil or gas well often over a mile deeper is practically impossible. The Society of Petroleum Engineers estimates that over the last 60 years, more than 1 million oil and gas wells in the U.S. have used hydraulic fracturing. During this time, it has never been connected to groundwater contamination.

At a televised press conference, Armendariz claimed he had to act fast because two houses could explode at any moment. In fact, Lipsky and the owner of the other house had disconnected their drinking-water well from their houses, eliminating any potential that methane in the water might, under pressure in the water pipes, cause explosions in the houses.

Extensive testing proved that the natural gas produced by Range Resources had a different chemical signature than that of the natural gas in Lipsky's wells, which came from a shallow formation immediately below them. Local water-well drillers and residents testified that there always had been noticeable natural gas in the wells. Texas authorities have fully exonerated Range Resources -- but the EPA hasn't. The company is challenging the EPA's action in federal court but remains subject to fines of \$16,500 per day.

Worries about some other dangers are equally unfounded. Air emissions from drilling sites have been the most persistent public concern in the Barnett shale area. Studies by the Texas Department of Health and the Texas Commission on Environmental Quality have confirmed that the emissions do not exceed levels protective of human health, but this conclusion has not allayed public fears because one of the pollutants involved is benzene -- a widely known carcinogen at certain levels and exposures. In fact, the monitored benzene levels attributed to natural-gas drilling in the Barnett shale are not harmful to human health, but, pressured by state legislators, the usually pragmatic state environmental regulators adopted a 1,000-page rule imposing onerous controls on the drilling sites that would be more appropriate for a large refinery.

The one credible concern is the extremely high volume of water used in the fracking process. Quantities vary, but 2 million gallons per day appears to be an average use. Drawdown of aquifers used for drinking water occurred in the Haynesville shale area in Louisiana, but the problem was resolved by shifting to water sources not used for drinking. Methods are now under development to reduce freshwater use by recycling wastewater after treatment.

The practice of fracking has also been put at risk by recent academic studies. Headlines claim that Duke University researchers "prove[d]" that hydraulic fracturing in Pennsylvania has contaminated domestic water wells with high levels of methane. Even the relatively cautious Wall Street Journal reported on May 10 that the study shows that fracking "appears to be allowing potentially explosive methane gas to seep into drinking-water wells." Closer review shows that the study did not reach this conclusion at all. It found a correlation between proximity to drilling activity and higher levels of methane in water wells, but did not attribute this to subsurface migration of natural gas from hydraulic fractures.

The study's primary author, Rob Jackson, concluded that the methane in the water wells tested in the study was far more likely to have come from faulty construction of the natural-gas well than from hydraulic fracturing. A major weakness in the study was its lack of baseline data. What was the level of methane in the wells before hydraulic fracturing? The authors also acknowledged that methane is naturally present in almost every private well used for drinking water, livestock water, and irrigation in the region. Geologists point out that comparatively higher levels of methane are usually found in the soil and groundwater of areas with oil and natural-gas resources.

In deciding on a policy on fracking, we should not wait for a congressionally mandated EPA report on the impacts of hydraulic fracturing on drinking water, due in 2012. A congressional hearing held in May revealed fatal flaws in what was supposed to be a definitive, vigorously peer-reviewed study. For one thing, it will be an inside job from the EPA; the study's review panel excludes anyone with professional expertise in current industry practices or the technology of hydraulic fracturing. Under the current administration, industry experts, like highly credentialed professors of petroleum engineering, are assumed to be skills for greedy enterprises.

The EPA study has some other serious defects. It will cherry-pick only four wells, out of hundreds of thousands, for full forensic analysis, and it has excluded representatives of state regulatory agencies -- which have six decades of experience in regulating this practice, which began in 1948 -- from its review panel. Nor do the researchers seem aware of the difference between, on one hand, models of the assumed effects of hydraulic fracturing and, on the other, physical measurements of the results of hundreds of actual fracking treatments. To learn the fundamentals of this issue, the EPA would have to bother to speak with experts on the technology.

The study seems designed to substantiate a predetermined conclusion: that hydraulic fracturing poses grave risks. Therefore the EPA must either assert regulatory control on all drilling using this technology, or issue a "temporary" moratorium -- as in the aftermath of the 2010 Gulf spill -- until further study is complete. If fracking is delayed or discontinued, massive resources will remain untapped, hundreds of thousands of jobs will not be created, and billions of dollars of potential federal, state, and local tax revenues will be lost.

Risk can be managed and reduced, but never eliminated. Over the last 30 years, the on-shore oil and gas industry has had a sound environmental record. The many risks -- more uncertainties than palpable dangers -- attributed to hydraulic fracturing have not occasioned serious environmental harms. But, in only a few years, fracking has allowed recovery of approximately 7 billion barrels of oil and 7 trillion cubic feet of natural gas. Vast stores remain, and almost all new wells will need hydraulic fracturing.

The U.S. has far more energy resources than any other country, yet no other country so limits and blocks access to its own energy supply. The opposition to fracking displays this unfortunate mentality.

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