International Research Journal of Applied Finance ISSN 2229 – 6891
Vol. VII Issue – 11 Novembre, 2016 www.irjaf.com
DOI: 10.0711/article-6

Evaluating the True Costs of Oil and Gas Fracking: Environmental Liability, Governmental Regulations, and Geological Realities

Kurt Stanberry

Introduction: What is Oil and Gas Fracking?

Over the past decade, in the hunt for more fossil fuels, directional drilling has been combined with hydraulic fracturing and the technology has been perfected for extracting dispersed oil and natural gas, primarily from shale formations. This rather unconventional extraction method, known as "fracking", has expanded recently into more densely populated areas of the United States and nations around the world. As fracking operations have increased in frequency and intensity, a significant level of concern has emerged around whether these activities are dangerous to people and their communities in ways that are difficult. Risks include earthquakes and adverse impacts on water, air, agriculture, public health and safety, property values, climate change, and economic vitality. These factors lead to more government regulation and increased litigation, all of which contribute to the indirect costs of fracking. When indirect costs are combined with the relatively expensive direct costs of fracking technology, one can see why this oil and gas industry process has been through a boom and bust cycle.

Basic Financial Direct Cost Structure of Fracking

In terms of the relative cost of production, oil and gas extraction from shale is a very cost-intensive activity compared to conventional drilling. Expensive equipment and technology is required to produce shale oil or gas, and it also requires more drilling than conventional oil and gas recovery. Between 2006 and 2010, an average 43,240 new wells were drilled annually, according to government and company data at an average cost per well of $2.5 million, (of which approximately 25% is directly related to the fracking process itself). Other more recent data indicates that the actual costs for shale oil and gas wells are even higher. This is supported by calculations specifically made for wells in the some shale basins indicating a well cost in the Bakken Shale in Montana, North Dakota, and Canada is somewhere between $8 million and $10 million over a four-year period, with $2.5 million as the direct cost of fracking a single well.

Another factor that is pushing up costs associated with shale oil and gas recovery is the continual need for rigs that can drill deeper wells. It is worth remembering that hydrocarbons are finite reserves and after exhausting the shallower parts of deposits, producers need to go deeper and must come up with new techniques to extract these reserves. Deeper deposits need stronger stimulation and heavier fracturing. These factors have had an upward pressure on industry costs; the change in the average price per well in the Woodford shale area in Oklahoma has increased from $2 million to $5 million-$6 million.

Furthermore, unlike conventional projects, shale wells enjoy an extremely short life. In the Bakken region straddling Montana and North Dakota, a well that starts out pumping 1,000 barrels a day will decline to just 280 barrels by the start of year two, a shrinkage of 72%. By the beginning of year three, more than half the reserves of that well will be depleted, and annual production will fall to a trickle. To generate constant or increasing revenue, producers need to constantly drill new wells, since their existing wells span a mere half-life by industry standards.

DOI: 10.0711/article-6

In fact, fracking is a lot more like mining than conventional oil production. Mining companies need to dig new holes, year after year, to extract reserves of copper or iron ore. In fracking, there is intense pressure to keep replacing the production you lost last year. The peak of production is in the first month after a well goes online. By the end of the first year of operation, output declines by 40% to 50%. By the end of the second year, the rate had declined another 30% to 40%, and in the third year by another 20-30%. Shale oil and gas wells do not have very long lives, especially when compared with conventional deposits, which can be exploited for decades.

On average, the "all-in," breakeven cost for U.S. hydraulic shale is about $65 per barrel, according to a study by Rystad Energy and Morgan Stanley Commodity Research. So, with the current price in the $40's, the industry is under siege. In all likelihood, the oil companies will continue to operate older wells so long as they generate revenues in excess of their variable costs. Fracking is in a way a bit like a legal Ponzi scheme because the older wells—unlike those in the Middle East or the North Sea—produce only tiny quantities. To keep the fracking boom going, the shale operators must continue to drill lots of new wells.

It's rather difficult to know where all-in costs will settle. There is no doubt that shale oil costs more than conventional oil to extract. Beyond that, there is a lot of variability in the cost of extracting shale oil, meaning that every well has a different level of cost-per-barrel of production from as low as $40 a barrel to over $90 a barrel. With these drilling and production costs paid upfront for a comparatively short production life compared to a conventional well, it makes economic sense for the shale oil industry to suspend new wells when world oil prices dip as they have during 2015, and operation will not ramp up until demand and prices are strong, which will be sometime in the indefinite future.

Environmental Risks: Assessing the Human Costs of Fracking

In the past five years, more than 75 tort-based cases have been filed by property owners claiming property and personal injury damage caused by fracking operations. Add to that the disputes over municipal bans, regulatory enforcement, imposition of governmental regulation, water use, fracking flow-back disposal, oil and gas lease rights, and opposition to natural gas drilling by environmental groups, and that number of cases exceeds 100.

About half of the tort cases to date have been settled, new cases, including putative class actions, continue to be filed. And that trend is likely to continue, fueled by continued public attention, media scrutiny, and contradictory medical evidence. To some extent these cases play on uncertain science coupled with fear of oil and gas operations as natural gas drilling activities encroach closer and closer to population centers. While a few scientific studies on various effects of hydraulic fracturing have been completed, and others are underway, there is as yet no clear consensus on whether fracking activities in themselves can cause methane gas migration, groundwater contamination, earthquake damage and similar harms alleged in civil tort lawsuits all questioning whether hydraulic fracturing leads to unintended consequences.
Although prior and pending lawsuits have focused on relatively straightforward causes of action related to various forms of contamination, plaintiffs' counsel may grow more creative in their claims. For example, given the unpredictable way in which contaminants can migrate through different geology, claims of contamination at sites farther and farther away from drilling operations may emerge.

Additionally, plaintiffs may decide to focus on improper management or disposal of fracking wastewater. The fracking process can generate millions of gallons of wastewater per well.

DOI: 10.0711/article-6

That wastewater contains many hazardous chemicals, salts, and radioactive materials, and disposal is becoming increasingly controversial. Leaks from storage and transport units are inevitable, and with the increase in drilling, will mount in numbers. Moreover, water treatment facilities may bring claims if they are impacted in some way by treating the fracking wastewater. In addition to expanding their roster of legal claims, plaintiffs' counsel may employ new procedural mechanisms to leverage their impact.

Environmental Litigation Costs Must be Factored In

As mentioned previously, prior and pending lawsuits associated with natural gas extraction typically focus on individual sites, usually where a particular driller suffered a mishap, or a small group of adjacent homeowners are claiming injury. It seems inevitable that creative counsel will shift to seeking aggregated recoveries from deep-pocket defendants with interests in many sites over a broad region to maximize their recovery. In many respects, the Marcellus Shale situation has all the hallmarks of a mass tort case waiting to happen. One way for plaintiffs' counsel to create a mass tort case is to file statewide class actions on behalf of all private citizens affected by drilling operations. Indeed, as discussed above, three such class actions have already been filed in Arkansas. Of course, these plaintiffs will need to clear class action hurdles such as commonality and typicality, which should be substantial because of disparity among sites, the different ways in which injury can occur, and the varying damages suffered by each plaintiff. However, to do so, plaintiffs will likely point to the common processes for extracting natural gas and the common geology of the area.

Another possible avenue that plaintiffs' mass tort counsel may take is to join forces with the states and prosecute claims on their behalf. Many states use contingency-fee arrangements with private lawyers to pursue complex environmental claims. When private mass torts lawyers represent a state's trustee interest in the environment, the result is often an aggregation of many claims in ways that avoid traditional limits in other contexts. In addition to combining several sites into one case, creative counsel can name several unaffiliated 8 defendants in a single lawsuit as a method of maximizing recovery.

For example, plaintiffs might name not only the driller as a defendant but also any subsidiary contractors that might handle various aspects of a fracking site, such as wastewater transport. For many plaintiffs' counsel, the ultimate deep pocket may be the large energy companies that hold natural gas leases or other rights over large regions. These companies often have the most resources and the most interest in resolving lawsuits so that exploration and production can continue. Plaintiffs' counsel may argue that these leaseholders maintain responsibility for all operations of affiliates and contractors working the land. Other less-obvious targets for litigation include chemical manufacturers who market specialized additives for fracking fluid. At most drilling sites, much of the fracking fluid is left underground. If evidence suggests the chemical additives may pose some risk, new legal claims certainly would follow.

While some of these approaches may sound extreme, many of them have been used in other well-known mass tort litigations. Many well-known mass tort plaintiffs' counsel are already investing in Marcellus Shale and hydraulic fracturing lawsuits. For example, one website recently proclaimed, "Fracking puts drinking water in peril!" and alleges that "[t]housands of homeowner's properties and water supplies in Pennsylvania and other states have become contaminated as a direct result of oil and gas exploration activities." Some law firms invite viewers who "believe [their] drinking water and property have been impacted by oil and gas exploration activities" to contact the firm. Other firms with active mass tort practices state on their websites that they are "investigating a controversial type of natural gas drilling called

DOI: 10.0711/article-6

'fracking' in Pennsylvania and other parts of the country" and invited viewers to determine "if this process has tainted your water supply." As evidence of its "success" in this field, one law firm cited the "landmark settlement" it secured "against some of the country's biggest oil companies for contaminating public drinking water supplies with … MTBE." Law firms are holding public meetings around the country, including in Marcellus Shale areas, warning attendees of the dangers of fracking and presenting the option of lawsuits as a remedy. There is a widespread perception in the Marcellus Shale region that hydraulic fracking often leads to water contamination. The Marcellus Shale region is a largely rural one, relatively unaccustomed to the sprawling industrial impact of natural gas drilling that many in other parts of the country take for granted. Plaintiffs' counsel are actively seeking to represent clients in the region.

Government Regulation as an Indirect Cost

Fracking has been under constant debate in multiple jurisdictions at the local and national levels. The environmental side argues that the environmental impacts of fracking are too damaging to be worth it whereas the oil company side points out the economic benefits of improved energy self-sufficiency. This debate has been a major factor behind the government regulations being put in place by various governments and regulatory authorities.

The fracking process gives rise to the numerous concerns expressed by voters to elected politicians including ground water contamination, residual pollutant extracts, geological issus such as earthquakes, and the potential impact on other businesses operating in the region like tourism. In response, new regulations are being implemented. How these regulations have impacted fracking business and investments? At present, the regulations in some states or nations go as far as banning fracking.

A Global Comparison

Europe

Germany is a manufacturing hub with high energy needs and has a strong network of state owned gas pipelines that stretch across Europe, but the pipelines are mostly filled with gas imports coming primarily from Russia. Germany does have significant identified shale gas reserves with high volume; yet Germany is reported to be further tightening the fracking regulations, instead of exploiting fracking. German domestic gas production declined by 10% in 2012 and again in 2013, due partly to the fracking ban, (according to Wintershall AG, Germany's largest gas and oil producer).

France is the country is generally thought to have the largest shale gas deposits in Western Europe. Yet local laws prevent exploration and production, putting a complete stop to even assess the potential.

Poland has been one of the most active European nations allowing fracking, and estimate show Poland may have the biggest reserves in Europe. Not only was it easy on fracking regulations from the start, it also allowed encouraging promotions like six-year tax breaks for shale gas fracking, auctioning the shale gas sites to foreign companies, etc. Although Poland continues to be a pro-fracking country with easy regulations, other recent developments (like the EC serving a notice on breach of EU laws for fracking) are also causing concerns for fracking business firms in Poland who may shift base elsewhere.

The UK is an interesting case example. The UK was a net exporter of gas in 2003, but a decade later in 2013 it has become a net importer due in part to increased government

DOI: 10.0711/article-6

regulations. By 2025, the UK expects to be importing over half of all the gas it consumes, assuming it does not develop shale. According to most studies, the UK holds enough shale gas to supply its entire gas demand for centuries, but government regulations on fracking are a limiting factor.

Africa

The third largest reserves in the world are identified to be in Algeria, which has embarked on taking full benefit of its potential. Opening up fracking business by easing out the regulations has not only helped the country to become somewhat more self-reliant for energy needs, but also enabled export potential, employment opportunities, foreign investments.

North America

The US and Canada are examples of countries which have only modest fracking regulations in parts of the nation, while enforcing bans in other parts. In the US, states such as Texas, use an approach that favors the energy companies. However, some states such as New York have banned fracking altogether.

In Canada, two provinces have put a temporary ban in place, while others allow fracking. The Newfoundland and Labrador Hydraulic Fracturing Review Panel, which examined socioeconomic and environmental implications of fracking in western Newfoundland, recommended the province extend its "pause" in the acceptance of applications.

The Bottom Line: Fracking Has a Limited Present but Unlimited Future

Along with the economic benefits, fracking bring serious environmental concerns. To be economically viable, fracking requires multiple wells, and in nations where the biggest shale oil and gas plays are in populated areas, it is likely to be regulated or banned. Only in rural areas of the country with a relatively low population density will the necessary drilling intensity be possible and sustainable.

In North America the industry developed gradually and with the support of most state regulators and politicians, whereas in Europe, it is a newer thing and it is gaining negative publicity through reports and research about the adverse effects of the technology. Environmentalists have been very active in making all the risks associated with fracking known to the public and there have been protests against companies planning to drill for shale oil and gas from Latin America to the Balkans. For many critics, issues such as very large water consumption that this industry requires, the danger of contaminating underground water with toxic substances, and the increased risk of earthquakes are important limiting factors that will lead to increasingly expensive regulations. Adding lawsuits and litigations costs to the environmental costs to the already high cost of exploration and production means that fracking will not be economically feasible until prices again approach close to $80-90/barrel, which is unlikely for years to come.

References

Beattie, A. (2015) The Cost of Shale Oil Versus Conventional Oil, Retrieved from Investopedia, http://www.investopedia.com/articles/active-trading/051215/cost-shale-oil-versus-conventional-oil.asp, accessed Sept. 12, 2016

Coman, Hanna (2012) Balancing the Need for Energy and Clean Water: The Case for Applying Strict Liability in Hydraulic fracturing Suits. *Boston College Environmental Affairs Law Review*, 39(1), 131-160

DOI: 10.0711/article-6

Davis, C., & Hoffer, K. (2012). Federalizing energy? Agenda change and the politics of fracking. *Policy Sciences*, 45(3), 221-241. doi: 10.1007/s11077-012-9156-8

Deutch, J., Holditch, S., Krupp, F., McGinty, K., Tierney, S., Yergin, D., & Zoback, M. US Department of Energy, (2011). Shale gas production subcommittee 90-day report, http://www.shalegas.energy.gov/resources/081811, accessed Sept. 12, 2016

Diamanti-Kandarakis E, Bourguignon JP, Giudice LC, et al. (2009) Endocrine-disrupting chemicals: an Endocrine Society scientific statement. *Endocrine Rev*. 2009:30(4):293–342

Dittrick, P. (2013). Focus: Unconventional Oil & Gas: EIA-ARI Issues Update of World Assessment of Shale Oil, Shale Gas. *Oil & Gas Journal*. 111 (7): 46-48.

Foley, J. A. (2013) Oil From Deepwater Horizon Spill Broken Down By Hungry Ocean Bacteria, Researcher Says. *Nature World News*, natureworldnews.com, accessed August 15, 2015

Goldstein BD. (2001) The precautionary principle also applies to public health actions. *American Journal of Public Health*. 2001; 91(9):1358–1361

Jaffe, A.M. (2010) Shale gas will rock the world. *Wall Street Journal*. May 10, 2010. Available at http://www.wsj.com. Accessed February 7, 2016

Jacquet J. (2013) Boomtowns and natural gas: implications for Marcellus Shale local governments and rural communities. *NERCRD Rural Development Paper* No. 43. Available at: http://www.nercrd.psu.edu. Accessed January 26, 2015

Magnuson ML, Allgeier SC, Koch B, De Leon R, Hunsinger *R.* (2005) *Environ Science Technology.* 2005 Apr 1; 39 (7):153A-159A.

Manuel, J. (2010). MINING: EPA Tackles Fracking. *Environmental Health Perspectives*, *118*(5), A199.

Marcellus Shale [New York State Department of Environmental Conservation Web site]. Available at: http://www.dec.ny.gov/energy/46288.html. Accessed January 26, 2012

Mitka, M. (2012) Rigorous Evidence Slim for Determining Health Risks From Natural Gas Fracking. *Journal of The American Medical Association*, 307(20), 2135-2136.

Mooney, C. (2011). The truth about fracking. Scientific American, 305(5), 80-85.

Nicot, J., & Scanlon, B. R. (2012). Water use for shale-gas production in Texas, U.S. *Environmental Science & Technology*, 46(6), 3580-3586. doi: 10.1021/es204602t

Sickle A. (2009) The Marcellus Shale: New York is the natural gas industry's new lab rat. Available at: http://www.dcbureau.org/20091204299/natural-resources-news-service. Accessed January 26, 2016

Tully, S. (2015) The shale oil revolution is in danger. *Fortune.* http://fortune.com/2015/01/09/oil-prices-shale-fracking/, accessed Feb. 2, 2016

Witter, R. Z., Newman, L. S., & Adgate, J. L. (2012). Human health risk assessment of air emissions from development of unconventional natural gas resources. *Science of the Total Environment*, 424, 79-87

Woodwell, G. M., et al. (1978) Biota and the World Carbon Budget. *Science*. 199 (4325): 141-146

Author

Kurt Stanberry, MBA, JD
Professor of Legal Studies, University of Houston Downtown, stanberryk@uhd.edu