Christiana Z. Peppard, Ph.D.

Fordham University

CTSA 2014: Natural Gas Comment

"The fading of the petroleum age disquiets the entire world," wrote the US Bishops in 1981, six years before the completion of the U.N.-commissioned Brundlandt report on sustainable development (Our Common Future), five years before the nuclear meltdown at Chernobyl, and a decade before the first Iraq war, the 1992 Rio conference and Earth Charter movement, and recognition of persistent anthropogenic global warming. At that time, the Bishops were prescient to consider issues of energy as moral and ethical charisms.

The framework upon which the industrialized world rests is seared from the burnt detritus of ancient fossil fuels. In 1981, the Bishops rightly pointed out that, "Cheap oil and natural gas not only powered the dramatic transformation of Western society in the 20th century, they underlie much of the material progress developing countries have made." The question in 1981—and even more prominently today—is what kind of energy framework will human societies deploy to build the future. Will it be a renewable, sustainable framework—that is, a secure scaffolding for future generations to climb? Or will it continue to be a framework built on the deep legacies of the past—a burnt and short-lived offering of fossil fuels, with massive profit margins and negative global consequences? The question is simultaneously practical, technological, political, economic, and ethical. Currently, as in 1981, it is reasonable to characterize U.S. reliance on fossil fuels with the strong language of "addiction," for fossil fuels are indeed "essential for life as we know it."

This short comment presupposes familiarity with the basic data pertaining to climate science, the varied social and environmental effects of climate change, and the role of fossil fuels in industrialized and industrializing nations. Upon that edifice, it offers a synopsis and further development of Catholic reflection on natural gas extraction using data available through May 2014. For the purposes of this comment, "fracking" is

used as an overall term to encompass vertical and horizontal drilling as well as the hydraulic fracturing process, even while technical discussions make additional distinctions.

Setting the Natural Gas Scene

In 1981, the U.S. polity was attuned to the limitations of fossil fuels in at least two ways. First, the fuel crises of the late 1970s had demonstrated the fragility of national reliance on non-domestic petroleum resources; second, the rise of ecological consciousness put the finitude of fossil fuel supply in stark relief (especially through public documents like the Club of Rome's *Limits To Growth* and the emergent notion of "peak oil"). Foreign policy strategists and environmentalists were, for different reasons, keen to articulate viable energy futures for the economically powerful, fossil-fuel-reliant United States. At that time, natural gas extraction was a relatively minor aspect of U.S. domestic fossil fuel production compared to foreign sources as well as to "conventional" domestic sources. But in the 1980s and 1990s, the decades-old technology of hydraulic fracturing was amplified through innovations in horizontal drilling as well as chemicals used in the process of hydraulic fracturing. Beginning in the Barnett Shale in Texas, those technological innovations allowed "unconventional" fuel sources of natural gas and oil shale to be more easily accessed. Meanwhile, geological imaging has indicated that the natural gas and oil shale resources (known as "shale plays") buried beneath the domestic U.S. are quantitatively dramatic, and commentators predict that the fuel sources could power the entire U.S. for at least another century. In 2012, according to the *Washington Post,* shale gas accounted for 37% of the U.S. energy supply (up from 2% in the year 2000).[i] Corporate development of the Bakken (oil) and Marcellus (natural gas) shale formations accounts for much of the increase.[ii]

The appeal of shale plays as an unconventional source of fossil fuels is several-fold. First, the abundant shale oil and natural gas within the landmass of the U.S. is viewed by many as a desirable step towards energy sovereignty and perhaps could even be exported worldwide as conventional fuels become increasingly scarce, thereby contributing in new ways to the U.S. economy. Second, in an era of diminished conventional fossil fuel sources, energy companies are keen to develop more robust

portfolios of fuels and fuel sources, especially in a permissive regulatory climate. Third, partly because of the advance technologies and partly because of permissive regulatory climate, fracking is widespread only in the U.S. and its northern neighbor, Canada. While there is much to be said about the admirable goal of energy sovereignty, for the purposes of updating the 1981 USCCB report and thinking ethically about natural gas extraction, it is essential to pause on the latter two points: the rapid pursuit of unconventional fuel sources in a permissive regulatory climate.

Hydraulic Fracturing 101

Hydraulic fracturing is a technique that was invented decades ago but that has experienced a renaissance in the past few years, since companies discovered a way to frack not just vertically but horizontally. Fracking is the injection of sand, chemicals and copious amounts of water at high pressure, deep into geological formations. As the pressurized fluid penetrates porous crevices of pebble and rock, shale oil or natural gas from tiny air pockets rises to the surface, followed by a regurgitation of water and fracking solution. Like other forms of mining, it is an invasive procedure. The desired fossil fuel product is shale oil or natural gas. (The Bakken formation in North Dakota produces shale oil; the Marcellus Shale on the east coast of the United States produces natural gas.) The fossil fuel is siphoned off at the source and piped or trucked to facilities for processing and distribution.

Each fracking endeavor injects three to five million gallons of fracking cocktail—mostly water—into the earth. Some of it is regurgitated immediately. Much more surfaces over time, and some remains below. The regurgitated wastewater byproduct is known as flowback, and once regurgitated it is held in artificial ponds, which are usually lined with (theoretically) non-permeable material, roped off from public use and peppered with warning signs. Flowback water cannot be reclaimed for public use (though in places like Pennsylvania it is being reused for fracking; I have written elsewhere in great detail about the issue of hydraulic fracturing through the lens of water).[iii]

At least two sets of issues must be at the forefront of any responsible conversation about fracking. The first has to do with **data**: What scientific data do we

have about fracking and its effects? What do we lack, why do we lack it, and what do we need to be sufficiently informed? At present, U.S. discourse on this extractive technology does not sufficiently meet the criteria of honest conversation. The second set of questions has to do with **value:** What frameworks of value are most appropriate for the formulation of public policy on invasive procedures like hydraulic fracturing? Is economic benefit sufficient, or are there other kinds of non-economic goods worth valuing? We will begin with the question of data and conclude with the question of values.

Hydraulic Fracturing: A Dearth of Data

The technological improvements that have facilitated the rise of unconventional fuel extraction via horizontal hydraulic fracturing are part of the reason that fracking is on the rise in the United States. The other reason has to do with permissive regulatory culture. Specifically, a 2005 amendment to the National Energy Act—known colloquially as the "Halliburton Loophole"—explictly excluded fracking solutions from regulation by the Environmental Protection Agency by rendering the chemical contents of those solutions as "trade" (or "proprietary") secrets. The result of this federal wrangling has been to limit profoundly the regulatory and even inquisitive powers of the EPA and other entities into the downstream, potential long-term effects of whatever chemicals are used in fracking solutions. Indeed, for environmental and public helath reasons, it would seem to be important to know what is in fracking solutions; but by and large this information is unavailable (the registry, FracFocus, is largely voluntary or mandated on a state-by-state basis and cannot be searched in terms of chemical components of the fracking solution). A sampling of our current toxicological ignorance includes: What compounds are being injected into the earth? With what effects on watersheds and life downstream, including human life? The disconcerting reality is that the lack of publicly available information is *entirely contrived*—as a result of the Halliburton Loophole—in ways that directly benefit oil and gas corporations. Many citizens and scientists worry that this non-disclosure could mean the infusion of toxic materials into watersheds or downstream bodies.

What does the public know about fracking chemicals? As noted above, some components are disclosed in accordance with state regulations on the registry, FracFocus. An op-ed in the *New York Times* in March 2013 acknowledged that:

> The fracking cocktail includes acids, detergents and poisons that are not regulated by federal laws but can be problematic if they seep into drinking water. Fracking since the 1990s has used greater volumes of cocktail-laden water, injected at higher pressures. … The fact that gas companies do not always disclose the composition of all fracking and drilling compounds makes it difficult to monitor for injected chemicals in streams and groundwater.[iv]

Similarly, an April 2011 report by the Minority Staff of the House of Representatives Committee on Energy and Commerce indicated that in the four years between 2005 and 2009—that is, the first four years in which fracking was lassoed into the Halliburton Loophole—gas companies actively used over 2500 different fracking solutions, 650 of which included "29 chemicals that are (1) known or possible human carcinogens, (2) regulated under Safe Drinking Water Act for their risks to human health, or (3) listed as hazardous pollutants under the Clean Air Act."

Values

Granted, it might eventually be the case that new technologies will minimize the risks of contamination, or that walls can indeed be built to sequester toxic chemicals, or that detoxification processes could be found to return above-ground fracking solution (flowback or produced water) to a useable state. However, disclosure and non-disclosure are ethical issues. It needs to be a matter of public knowledge as to what chemicals are being used, the exact sites of usage, short and long-term toxicological and environmental effects, and the current limitations of our knowledge; and this information needs to be available far enough in advance to engage in meaningful research and reflection, and thereby to make decisions that reflect standards of informed consent. Yet more data will not be readily forthcoming until state and federal

governments require full disclosure of fracking chemicals as proprietary secrets.[v] The most important policy development would be the repeal of the Halliburton Loophole and the reinstatement of the EPA's full regulatory powers. In the meantime, the chance—even a slim chance, even an as-yet scientifically unattested chance—that toxic chemicals may enter the watershed or the lives of people who depend upon those watersheds is a strong enough reason to desist until more data is available. In ecologist Sandra Steingraber's assessment: "Benefit of the doubt goes to public health, not the things that threaten it, especially in situations where catastrophic harm—[such as] aquifer contamination with carcinogens—is unremediable." When downstream effects are probable or likely, or even possible—particularly with regard to extractive technologies and their impacts on watersheds and public health—the course of wisdom is to exercise caution, for the consequences of our decisions will be borne on human bodies and within the lifetimes of future generations. And when toxins infuse water supply and fatty tissues, they are more often than not there to stay.

The precautionary principle enacts the public's concern about the integrity of water sources and human health. It puts the pursuit of profit and economic growth as a secondary consideration. Many risk assessment wonks, environmental activists and grandparents everywhere endorse the precautionary principle. In common speech, it's the "look before you leap" principle. Our slow-moving, ecclesial edifice known as the Catholic Church defends this principle, too. And while the Vatican has not issued a statement on hydraulic fracturing as such (despite their popularity, the oft-retweeted photos of Pope Francis posing with anti-fracking T-shirts do not, yet, enjoy the status of an encyclical!), Chapter 10 of the *Compendium of the Social Doctrine of the Church* is quite clear that: "In the realm of technological-scientific interventions that have forceful and widespread impact on living organisms, with the possibility of significant long-term repercussions, it is unacceptable to act lightly or irresponsibly."[vi] The document also adduces that "politicians, legislators and public administrators" must encourage—fairly and without special interest lobbying—"a correctly informed public opinion and make decisions that are best-suited to the common good," and not merely for the profit of corporations.[vii] Clearly, correctly informed opinion is impossible without full information.

This consideration takes on added significance in a Catholic register when we

consider the differential impacts on vulnerable populations. Environmental historians and contemporary demographers demonstrate that people living in poverty bear the biggest burden of environmental changes related to fossil fuel extraction, and negative externalities from fracking are unlikely to be shared evenly. Instead, the people and watersheds surrounding fracked areas will shoulder the biggest burdens; but fracking does not occur in the backyards of the CEOs of oil companies who live in Appalachia, upstate New York, and northern North Dakota. Circumstantial examples have happened on the property of people who have signed leases with gas companies and have seen fracking operations move onto their land and shake the earth below them. Concerned parishioners have prompted regional Bishops' groups and the National Catholic Rural Life Conference to reflect normatively, from Catholic perspectives, on the technology and impacts of hydraulic fracturing.[viii]

The fact that fracking occurs in places that desperately need infusion of economic activity means that these populations are more vulnerable than other regions to the allure of a technology that may have downstream consequences. Indeed, anecdotal examples in the Bakken formation, in Wyoming, and in Pennsylvania, are available of watersheds contaminated by flowback, produced water, or the like for which oil and gas companies have agreed to supply long-term deliveries of water from external sources (though often these arrangements come with a legal gag rule).

Natural Gas: The Dearth of Data and the Value of Prudence

Fossil fuels are central to the lifestyle and economy of the contemporary United States and most countries worldwide, and energy sovereignty is a worthy goal. But *there are energy alternatives to fossil fuels.* That is, we can produce energy by other means. To be sure, at the outset these alternatives may be expensive, cumbersome, slow, or inefficient. They will come with problems of their own. There will be blips and hurdles, including the challenge of scale. But the fact of the matter is that energy for contemporary lifestyles is not necessarily the purview of fossil fuels alone. Thus, while fossil fuels are currently inextricable from contemporary life, they need not always remain so. In principle and increasingly in practice, other kinds of energy sources—such

as wind or solar—could fill the energy-generating niche. In philosophical terms, fossil fuels are not *sui generis.* In economic terms, fossil fuels are *substitutable.* Essential goods like water and human health are the opposite, and it is these life-giving bases that must form the framework for discussing the "value" of extractive technologies from the perspective of Catholic theological ethics.

The Bishops remarked in 1981 that their energy statement "seeks to situate energy issues in a moral context, to arouse sensitivity to human considerations that are often ignored." In a similar way, this brief comment on natural gas extraction via horizontal hydraulic fracturing strives to bring moral values to light in thinking about the future of the U.S. energy economy. In particular, the clear values of the precautionary principle, of full and informed decision-making, and of the Church's advocacy about fresh water and human health are central considerations.[ix] Several practical implications are as follows. Insofar as the lack of scientific evidence is the result of the Halliburton Loophole, that loophole must be tightened until all proprietary secrets have been squeezed out. Ongoing disclosure and stringent regulation fracking chemicals at federal and state levels must follow. Until more is known definitively about the downstream effects of fracking, the precautionary principle would hold that operations should desist. Only by looking at the big picture of value—not just short-term, shareholder-focused economic value—are we likely to achieve the human and ecological wellbeing that undergird any meaningful, long-term economic growth and independent, sustainable, energy future.

[i] See the summary in Alex Prud'homme, *Hydrofracking* (New York: Oxford University Press, 2014), chapter 5. The data is from Steven Mufson, "The new boom: Shale gas fueling an American industrial revival," *Washington Post* (Nov. 14, 2012).

[ii] See the list of domestic shale plays in Prud'homme, *Hydrofracking,* 42-26.

[iii] Christiana Z. Peppard, "Water from Rock: Hydraulic Fracturing," chapter 8 in *Just Water: Theology, Ethics, and the Global Water Crisis* (Maryknoll, NY: Orbis Books, 2014).

[iv] Susan L. Brantley and Anna Meyendorff, “The Facts on Fracking,” *The New York Times* (March 14, 2013), http://www.nytimes.com/2013/03/14/opinion/global/the-facts-on-fracking.html

[v] An excellent legal overview is available from David Allen Himes (March 8, 2012), http://energy.wilkes.edu/PDFFiles/Laws%20and%20Regulations/Halliburton%20Loophole%20Essay%20Final.pdf

[vi] PCJP, *Compendium,* no. 473

[vii] PCJP, *Compendium,* no. 479.

[viii] Robert Gronski, National Catholic Rural Life Conference, “Fracking: Injecting Ethics into the Process,” http://www.ncrlc.com/news.aspx?ID=348. Bishop Paul D’Etienne of Wyoming has said that “the public needs more information than is currently being provided about the chemicals in this mix that is currently being injected into the earth.” See the series by Dennis Sadowski in the *National Catholic Reporter,* “Catholic Voices Raise Moral Concerns in the Country’s Fracking Debates,” http://ncronline.org/blogs/eco-catholic/catholic-voices-raise-moral-concerns-countrys-fracking-debates (January 2014). In his multi-part article, Sadowski chronicles the stories of some citizens whose land and water have been affected by fracking operations.

[ix] C.Z. Peppard, “Fresh Water and Catholic Social Teaching—A Vital Nexus,” *Journal of Catholic Social Thought* (2012); and *Just Water,* especially chapters 3 and 4.