**Pros and Cons of Hydraulic Fracking**

**Spring Economics Research Paper**

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The purpose of this paper is to weigh the economic gains of hydraulic fracking against the environmental damage this dynamic fuel source causes, and establish an objective view of the arguments presented by both sides. Unfortunately, hydraulic fracking is a multifaceted revolution with a dizzying array of unintended consequences calling its viability into question. Due to the nature of its extraction, shale requires more custom tailored environmental policy to safely address the specific operations of a shale gas well. As of late, the federal government has been trying to keep its hands clean of the whole shale fiasco, and instead leaves the responsibility of environmental protection to the state governments. The ultimate goal in U.S. policy decisions, regarding fracking, is to accurately weigh the pros and cons and determine whether or not the process will ultimately cost us more than it is worth. This dilemma is not to be taken lightly because our economic and geopolitical standing are being appraised against our air, water and land quality. Ultimately, we can’t really afford to forgo any of these resources without cascading ramifications on public health and or wellbeing.

In order to properly convey all of the considerations necessary for informed fracking decisions, we must first address some economic and fracking terminology necessary to describe the controversy.

Terms:(Compiled from multiple sources)

* Externalities- investments that impart a benefit or loss on parties that did not partake in their purchase or production.
* Shale- a sedimentary rock that can contain water, oil, or gas within its pores and is easily fractured by high-pressure water.
* Fossil fuels- Any fuel source resulting from fossilized organic material, they are often burned for energy, and produce among other greenhouse gases, Carbon Dioxide.
* Price elasticity- The Responsiveness of consumer demand or producer quantity supplied for a product in relation to a change in market price.
* Energy independence- The goal of producing all domestic energy and perhaps exporting energy to other countries.

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* (P)DEP- Pennsylvania Department of Environmental Protection
* Renewable energy- Energy sources that are not finite in supply, at least in the context of human consumption, and generally do not produce pollution on the scale of fossil fuels.
* Greenhouse gas emissions- Gases that are a product of fossil fuel burning that trap the sun’s energy on earth and contribute to climate destabilization.
* Surplus- When production of a product is greater than existing demand.
* Liberalism- The belief in minimal government intervention in industry as a means for optimal economic engagement and allocation.

In order to discuss hydraulic fracking intelligibly, we must first understand what it is, and how it differs from conventional natural gas collection. Before the fracking revolution, natural gas was collected by a vertical well that penetrated into a natural gas reservoir. Hydraulic fracking takes advantage of shale’s ability to store gas and oil in its pores, and the propensity for these resources to be trapped in massive shale deposits. Rather than a traditional vertical well, fracking employs a vertical well (usually about 7,700 ft or approximately six stacked empire state buildings) with horizontal offshoots of about 1000- 6000 feet to access the greatest surface area. Once the well is complete, a mixture of water, sand and chemical additives is pumped in at extremely high pressures. The high water pressure causes the rock to fracture, the sand aids in keeping the fractures open, and the chemical additives act to lubricate the fluid and to some extend dissolve the rock formations. If tapped correctly, a well should have metal casings to keep the deposit pressurized and prevent the fluid from escaping and contaminating nearby water and land. It takes about 10 days for any given fracking process to be complete, at which point the fracking solution should be either stored, treated, pumped into other injection wells, or recycled. Unlike conventional gas, fracking is a relatively hard-core mining operation and requires extensive drilling and maintenance infrastructure on site at all times. The

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compositions of the solutions used are usually kept as undisclosed trade secrets. They are generally known to be about 0.5%-2% chemicals; these include acids (to break up minerals) as well as disinfectants (to contain microbial growth) and detergents (for lubrication). Every year in the states, billions of gallons of waste fluid are created as a by-product of fracking (Kate Kurshner).

As apposed to traditional gas and oil, fracking rigs are relatively short lived. They usually experience a 60% to 80% decrease in production after the first few years and an average lifespan of 7 years (Smil Vacliv). Fracking is a stand-alone feat of engineering, but the near future of fracking promises to address some it’s current shortcomings. These goals include waterless fracking, which already dominates 25% of Canadian shale rigs (Mark Crawford). This approach substitutes water with a significantly reduced volume of robust carbon dioxide foam. Another future innovation on the way to realization is, re-fracking processes, that will allow a seemingly depleted well to output either initial or greater volumes of natural gas from the original well.

Fracking is a novel, albeit short-term solution, that happened to be appropriately timed with America’s economic struggles and ongoing recovery. Desperate times call for desperate measures, and consequently, a step away from sustainable energy solutions has become temporarily justifiable. Unfortunately, areas impacted by fracking are very obviously damaged, in some cases beyond habitation. While

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fracking might be the fuel source to our economic furnace, it is ultimately a crime against humanity and the entire ecosystem. In order to make true progress towards energy independence, we need to peruse sources of energy that do not run out, or inflict ugly consequences on our surroundings. Fracking should be allowed to run its course under far more stringent government regulation until renewable resources are competitively priced or the public has had enough of the associated negative externalities to demand an end.

In theory, hydraulic fracking seems like a no-brainer. In the real world, however, things don’t always work the way they are supposed to, and people don’t always make conscious decisions with a book of morals and ethics in hand. It makes sense therefore, to view the pros and cons of fracking as they are rather than how they could be hypothetically. In order to objectively represent facts, the pros and cons will be presented in a pro-con table format to eliminate the ambiguity of phrasing in paragraph format.

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| **Pros** | **Cons** |
| American Energy Independence- U.S. shale has increased it’s share of natural gas production from under 8% in 2007 to over 40% in 2015. Last year U.S. regulatory authorities received nearly 40 applications to export liquefied natural gas. (Smil Vaciliv) | Self Defeating Competition-Due to the supply surplus, the price of all energy sources has decreased to the point of pricing out many domestic oil operations as well as foreign natural gas wells. The price drop is so dramatic; even some fracking operations are becoming uneconomical for producers. If the surplus is not absorbed quickly enough, the price will drop to the point where no producer wants to supply natural gas. |
| U.S. Manufacturing Revival- Due to reduced prices of energy inputs many manufacturing companies are once again profitable in the states.(Fracking: Do the Economics Justify the Risks?) | Short Well Life Span- Due to the rate at which fracking wells run dry, continual reinvestment and maintenance are required for the industry to turn a profit. |
| Easy Access-The U.S. has some of the easiest access to shale basins in the world, and ample water resources. One deposit in PA is large enough to supply America’s energy demand for a decade. (Conventional Policy for Unconventional Drilling) Worldwide there are approximately 6 trillion barrels of oil “equivalence” whereas as a species, humans have only used about 700 billion barrels of equivalence to date. Currently 27 U.S. states have discovered shale deposits and the country has accumulated the largest surplus of crude oil in 84 years. (Jeff McMohen) | Direct Environmental Damage- Fracking requires 2-5 million gallons of water per well, and billions of gallons annually. This water could otherwise have gone towards agriculture (Mark Crawford). There have been recorded instances of minor pressure-triggered earthquakes from fracking operations. Flowback from wells often contain radium and barium, both of which are radioactive and threaten public health and decimate local agriculture. Contamination can and has occurred throughout every medium (land ,air ,water). |
| Lowest Greenhouse Gas Emissions- (when combusted) of any fossil fuel source. *(Applies to all sources of natural gas and does not accurately depict the atmospheric damage fracking is capable of)* | Not So Clean After All-natural gas is mostly methane, a gas with 20 times the greenhouse effect of carbon dioxide. Unless all wells are contained perfectly all the time fracking invariably takes an extra toll on the atmosphere. |
| General Economic Benefit- In Pennsylvania alone, shale fracking had generated 232,000 jobs and 2 billion in tax revenue by the first quarter of 2013.It has revitalized numerous industries that support fracking operations. (Wharton University of Pennsylvania) | Economic Myopia- In states like Pennsylvania, where politicians have been practicing liberalism, value is placed on the short term economic gains over long term environmental sustainability. |
|  | Traditional Regulation- is not equipped to handle all of fracking’s complications. The government needs to demand chemical composition transparency and keep more comprehensive measures of fracking’s consequences. A member of the (P)DEP went as far as to reveal “ We are concerned about our data quality, we have justifiably taken a few beatings in the press over our data quality”. |

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This data has been collected from a large range of sources, varying wildly in topicality, scope and biases. While people can subjectively decide for themselves whether

or not the ends justify the means, based on the information they are provided with, in reality, their conclusions are meaningless. Unfortunately, fracking has become the subject of aggressive lobbying by the industry it self, as well as acting as the hub of an over-hyped media frenzy. What this really means, is that very little data, if any, can be trusted. Chances are that their writers had an ulterior motive or strong preemptive biases. While a comprehensive plan of action for the future of fracking is undoubtedly in order, the scientific community must first conduct a more clear analysis. Until more time has passed, we will simply have to wait to see how the government’s “risk it to get the biscuit” mentality pans out.

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