The Fracking Front in North Carolina
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Abstract
This case study analyzes various debate topics of the hydraulic fracturing (fracking) process of drilling for natural gas in North Carolina. The debate relates to the United States domestically and internationally. Along with the subject and history, this study looks at policies and regulations on fracking. In this section, concepts such as landowner rights, regulation, actors, U.S. and international policy are assessed. Furthermore, this case examines the economics of the energy production process in regard to income tax, damage cost, and corporate social responsibility. Additionally, the non-governmental organizations involved in the debate are acknowledged, such as Frack Free NC and Clean Water NC. This study also includes a counter-argument, which highlights the potential return on investment the industry can bring to North Carolina. These variables are all tools for the reader to determine if hydraulic fracturing is a sustainable replacement for petroleum. Finally, this case study addresses the concern whether the precautionary principle should be invoked on the energy production for natural gas. In the analysis and conclusion section of this study, possible options to the debate are illustrated, such as using stricter regulation on injection wells, sharing information and having transparency within the energy industry.

The issue of hydraulic fracturing, otherwise known as fracking, has been debated in more recent years among nations and scientists in regard to the possible environmental impacts and health concerns. With the oil industry having peaked decades ago, the United States has embraced the practice of drilling for natural gas within its own borders. The adoption of fracking has made the United States the one of the top producers natural gas in the world. This change from relying on foreign countries for oil to domestic production has furthered the United States along the path of becoming more energy independent. Along with increased energy independence, the shift from depending on foreign oil to domestic natural gas reserves has aided the United States’ national security efforts.

While there are benefits of domestic production, the process of hydraulic fracturing leads to debate among scientific communities, government officials, and locals on the sustainability of fracturing and a community’s rights to govern what is below the surface, or its subsoil rights. Potential economic boom incentivizes North Carolina (NC) government officials to promote the practice of hydraulic fracturing. Given our market economy and the importance of the oil and natural gas sectors, it is not surprising that the U.S. Federal government has also promoted fracking. As President Obama declared in the 2014 State of the Union Address: “One of the reasons why [the United States has reduced our total carbon pollution more than any other nation on Earth] is natural gas—if extracted safely, it’s the bridge fuel that can power our economy with less of the carbon pollution that causes climate change.”
The goal of numerous non-governmental organizations in North Carolina such as Frack Free NC and Clean Water NC is to challenge fracking in their communities and to promote a different form of capitalism that includes protecting our natural environment, rather than makes the environment an external factor. This form of green economy with zero emissions counters the predominant system in which corporations only have to lower harmful emissions per standards. Rather than allowing for destruction, these movements ask that the US and NC move toward a system of community rights for living within a clean environment over corporate rights for increased profit at the expense of quality of life, health, and our natural world.

Within the debate among scientists and government officials, many question if the precautionary principle should be invoked. The precautionary principle is an environmental preemptive strike against a potentially harmful practice. In other practices, such as the coal industry, the main concern is with carbon dioxide emissions (CO\textsuperscript{2}) causing a greenhouse effect and warming the planet. To combat this, many scientists urge for the precautionary principle to be invoked, which upholds that the entire planet needs to take steps to lower CO\textsuperscript{2} emissions in case there is a causation between CO\textsuperscript{2} and global warming. While CO\textsuperscript{2} is a side effect of the coal and oil industry, methane emissions are a byproduct of the fracking industry. Considering that methane emissions are more insoluble in the atmosphere than CO\textsuperscript{2} emissions, one may argue that the precautionary principle should also be extended to the practice of fracking.

In this case study, the first section will address the history and negative impacts of hydraulic fracturing. The second section of the paper will analyze the policies that deal with fracking and the political actors involved in North Carolina. Next, the paper will address the economics of the process and potential impacts on North Carolina and the United States as a whole. Following the economics, the advocacy and involvement of non-governmental organizations (NGOs) on fracking in NC will be detailed, followed by local geographic information system (GIS) images. Finally, the contrasting benefits of hydraulic fracturing will be determined, leading to the analysis section of this paper which will consider all of the information provided. Finally, the conclusion will further analyze if the precautionary principle should be invoked and if more energy independence outweighs the potential health and environmental impacts.

The Issue & History

The first commercial use of hydraulic fracturing took place in Duncan, Oklahoma in 1949.\textsuperscript{ii} In its origins, fracking was highly primitive, using only up to 80,000 gallons of water per well.\textsuperscript{iii} Following the United States’ fracking boom in 2003, however, a single well has progressed to use up to 8 million gallons of water. Debates of fracking’s sustainability and safety began to arise, despite a 2004 EPA study determining that fracking did not pose a threat to underground drinking water supplies. A year later, fracking was exempted from the Safe Drinking Water Act.\textsuperscript{iv}
Being exempt from the Safe Water Drinking Act, many might question whether a single study conducted by the EPA can determine the safety of fracking and underground drinking water. A study conducted by the Nicholas School of Environment at North Carolina’s Duke University found a definitive correlation between methane concentrations and nearby hydraulic fracturing. While the study’s findings revealed only methane and no fracking fluids (which contents are broken down in Figure 1.1) in the wells, this poses a serious environmental and health hazard. Methane is roughly thirty times more potent as a heat trapping gas than CO₂ and can be released through production or accidental spills or leaks. While this is a monumental problem for the areas it affects, it is not the only point of concern. In addition to methane leakage, environmental or health hazards are possible during many of the stages of natural gas production. Spills or leaks that can occur while handling fluids pose an enormous threat to water sources and surface life health. Though methane may be more potent as a greenhouse gas, fracking’s advantage is that it burns substantially lower amounts of greenhouse gases than coal or oil, making it relatively greener than typical energy methods.

States with natural gas in their shale deposits are highly polarized on the decision to allow hydraulic fracturing or to forego the extraction of this underground resource. In December, 2014, Governor Cuomo of New York banned hydraulic fracturing statewide. Cuomo cited numerous health and environmental hazards that he believed outweighed the economic benefits that fracking brings, benefits including job creation, energy independence, and population increase. In contrast, the state of Texas extensively utilizes their shale deposits. Former Governor Rick Perry claims that widespread fracking will not only lower the cost of people’s/household’s electricity bills across the country, but also aid the United States’ national security efforts by securing energy independence. In response to controversial (?) debates taking place at a state-level, several local governments have taken the matter into their own hands. The town of Denton, Texas has voted to ban fracking inside their city limits, giving them a small degree of influence.
Unfortunately for those Texas residents, Governor Abbott responded by signing House Bill 40 into law, which effectively prohibits towns like Denton from banning fracking.\textsuperscript{xii}

In North Carolina, state law prevents county and city laws from banning fracking in their jurisdictions, enabled by the unique private property rights in the United States.\textsuperscript{xiii} Along with this, fracking interests heavily contribute to the campaigns of those who vote in favor of fracking.\textsuperscript{xiv} The state government has gradually made strides towards an emphasis on hydraulic fracturing efforts: In 2012, the Mining and Energy Commission was “charged with developing a modern regulatory program for economic prosperity and environmental protection including the use of hydraulic fracturing.”\textsuperscript{xv} To solidify the state’s policy on the matter, NC Governor McCrory signed the Energy Modernization Act in 2014 to spearhead fracking in North Carolina, hoping to bring fracking interests to the state along with the economic benefits they entail.\textsuperscript{xvi}

Despite increasing state legislation approving/enabling fracking, the question of the precautionary principle has reemerged. One of the primary questions emerging are as follows: should the precautionary principle be invoked throughout North Carolina and does the state have the right to prevent localities from instituting it on their own?

\textit{Fracking Policies: Landowner Rights, Regulation, Actors, U.S. and International Policy}

Just as sovereignty allows independent nations to control resources within their own borders, many scholars who study hydraulic fracturing note that the same principle ought to be applied to private property owners within the given state. Imagine a private landowner in North Carolina along the Marlboro River Basin where, due to hard economic circumstances, this landowner’s neighbors are selling the rights to their minerals to fracking corporations. Imagine that this landowner is a farmer who protests fracking due to the potential environmental and health concerns. This landowner now have no rights to his/her own private, subterranean land for the fracking corporation now has the rights to make the landowner sell it or to seize it. This right the corporations have to seize the owner’s land is referred to as forced pooling. The landowner’s neighbors agreed to allow fracking pipelines to be built on the surrounding land of the landowner’s estate, so corporations are able to force the landowner to sell his/her mineral rights. Now that the landowner’s mineral rights have been seized, more problems arise for landowner and his/her farm. The pipelines have been built and drilling for natural gas into the deep shale layer has begun. On top of the noise and air pollution that come along with drilling, the landowner’s once quiet piece of land is disturbed with trucks transporting natural gas to refineries and storage facilities and the landowner is now beginning to notice the environmental and health concerns the landowner was concerned about prior to the land being taken over. The landowner also notices that the livestock on his/her farm has been compromised with contaminated water from the wells due to hydraulic fluid along with methane leaks and fracking water solutions leaking into the shallow water tables.

The use of the above narrative illustrates why some groups argue that the private landowner should have the same rights to natural resources on their land as sovereign states have to their borders and the resources within them. If the private landowner could refuse to sell their land rights to corporations, perhaps that would give the individual more of a fighting chance against hydraulic fracturing corporations that infiltrate communities. Which for the most part do not have the capital to refuse them. However, without the proper amount of resources that he
industry demands, these corporations would not be able to survive. As will be discussed later, natural resource extraction through hydraulic fracturing requires a large amount of land, specifically when it concerns subterranean extraction. Without land or money, these companies would perish, and with it the whole economic sector related to it.

In addition to discussed negative consequences for local communities, the rights of oil and gas corporations to take private land because of forced pooling also calls into question their ability to disregard policies such as the Clean Air Act and the Clean Water Act. Some wonder why the state has the ability to consider economic benefits over environmental concerns. People who raise this question also wonder why North Carolina is able to ignore the potential environmental impacts and health concerns for the sake of energy independence and potential job opportunities. These questions have caused some discontent within many communities in North Carolina and have prompted a considerable public outcry against hydraulic fracturing. The problem now includes North Carolina State legislators such as Governor Pat McCrory, non-governmental organizations (NGOs) such as Frack Free NC and Clean Water NC, indigenous Native Americans who are directly affected along the Marlboro River Basin, and the individuals who are voicing discontent over the industry invading their hometowns. These questions that communities in North Carolina are asking translate into much larger concepts that have gained national attention, such as whether the ethical and environmental hazards of fracking is worth the potential energy independence or economic opportunities. Furthermore, the larger debate is if the precautionary principle should be invoked in regard to hydraulic fracturing to protect the injustices against the private landowner, the environment, and the overall health of the communities.

A common term used is “subterranean- subsoil rights”. This is a debated concept in North Carolina for most of its residents that are unaware that they are being infringed upon through clauses such as split estates. Split estates are documents/a clause in a document (?) that legally state that an actor other than the landowner owns the mineral rights below the soil of a given estate or property. This is a relatively new issue arising for many residents in North Carolina. As of May 19, 2014 in Lee County “where the natural gas is closest to the surface,” there was a reported, “3,349 acres currently leased to gas companies by landowners, 9,073 acres with split estates, meaning landowners do not own the mineral rights below ground, [and there was] a proposed 650 feet minimum buffer between gas wells and homes.” Along with the concept of split estates comes the concept of forced pooling, which was illustrated in the previous scenario. Forced pooling “known as ‘compulsory pooling’ in North Carolina, gives
states the right to compel a non-contesting landowner into a mineral rights lease.” In favor of this scheme, many industrial actors claim that compulsory pooling will prevent environmental damage by minimizing the amount of wells. Landowners contest this rationale by claiming that forced pooling allows corporations to remove the rights of each individual property, and that it removes incentives for industry to negotiate with small landowners in some circumstances. Thus, the above example illustrates a potential scenario where one’s neighbors may sell the rights to their subsoil containing minerals, which gives corporations the right to force the non-compliers to do the same. Many North Carolina residents find split estates and forced pooling to be a complete infringement upon their rights, which is why the authors of this case study question if private landowners should have the sovereign right to withhold their minerals from industrial actors. Considering that this is still a relatively new issue in North Carolina, many residents are struggling to formulate a coherent response to fracturing corporations. Often these corporations also target low income regions who do not have the resources to claim the rights to their minerals under the split estate, an example being Lee County with a per capita income of $21,079. Along with property rights, subsidies and incentives are also a pressing issue North Carolina residents are facing.

Fracking is (often) subsidized by the government and funding of the oil and gas industry, the former being indirectly funded through taxpayer money. The United States has long provided annual support for oil and gas corporations. The Oil Change International estimates that “the U.S. provides anywhere from $14 billion to $52 billion in annual support for oil, gas and coal companies [having pumped] more than $470 billion into the oil and gas industry all in the form of tax breaks” in the last century. At the state level, Governor Pat McCrory of North Carolina stated in 2014 that “We have watched and waited as other states moved forward with energy exploration, and it’s finally our turn. This legislation will spur economic development at all levels of our economy.” As a result of McCrory’s comments, many residents expected the political leadership in North Carolina to follow the ideological stance of the national government; namely to subsidize the highly profitable industries with “public dollars.” Being said, the speed at which legislation went forward with bringing fracking to North Carolina was more cause for public outcry.

The speed at which the Energy Modernization Act (Fracking Bill) (2014) moved through the NC house caused more public discontent within the past few years. The Bill the legislature passed contained wording with promises to minimize environmental harm and other negative consequences. The NC legislature made promises to the public before moving forward with fracking, such as establishing rules and regulations on the process prior to it beginning. Specifically, the bill prohibits local governments from restricting fracking and it bans injecting fracking wastewater underground. In a statement made by chairman of the Mining and Energy Commission, Vikram Rao, the banning of injection wells in North Carolina was not because the commission believes them to be unsafe. Rather, at the Natural Gas Symposium at Coastal Carolina University in April, Mr. Rao described the ban as being in place because the commission perceived North Carolina to be unsuited geographically to handle them.
Environmentalists verbally opposed the speed at which the bill passed through the House and state, saying: “It allows permits to be issued regardless of whether the rules are adequate or among the best in the country.” Many residents of NC feel as though the bill was unnecessarily rushed and broke a promise to their constituents. Under the Fracking Bill, drilling for natural gas is allowed to occur sixty-one days after the Mining and Energy Commission approves the industry. NGOs such as Frack Free NC claim the bill fails to address the environmental concerns of fracking, for the sake of “corporate welfare,” and “entitlement programs.” Corporate welfare is “government support of private business, such as tax incentives,” while “entitlement programs” are guaranteed incentives for a specific group. Again, subsidies are playing an influential role in regulating the natural gas industry. Another important factor in regulating the natural gas industry is the industry’s ability to work around the Clean Air and Clean Water Acts due to the Energy Policy Act of 2005, also known as “The Halliburton Loophole.”

According to the Environmental Protection Agency’s website, “Natural gas plays a key role in our nation’s clean energy future.” Many question this “clean energy future” due to the fracking process being exempt from governmental regulations such as the Clean Air Act and Clean Water Act. According to the Clean Water Action campaign, “The federal Energy Policy Act of 2005 contained a provision...known as ‘The Halliburton Loophole,’ [which is] an exemption for gas drilling and extraction from [the] requirements...of the Safe Drinking Water Act (SDWA)...the Clean Air Act and Clean Water Act.” In 1970 the Clean Air Act worked to limit emissions of toxic air pollutants, and in 1990 it was amended to strengthen limits on emissions for more than 180 hazardous pollutants. In 1972 the Clean Water Act limited discharges into rivers, lakes and streams, and was was amended in 1987 to allow the EPA to develop a program for storm runoff. The Act was again amended in 2005 to exempt the oil and gas industry from the act. This exemption from key governmental regulations makes residents in areas of fracking concerned about just how harmful the energy process is. Because of the Halliburton Loophole, the gas drilling industry remains privately regulated separate from the regulations other industries need to abide by. Additionally, some fracking corporations are able to keep the chemical contents of the fracking fluid confidential, claiming the liquid’s contents to be “trade secrets.” The crime for releasing the contents of the fracking fluid was previously a Class 1 felony, but has been reduced to a misdemeanor as the Fracking Bill became legislation in North Carolina. The Halliburton Loophole and the “trade secrets” of the fracking fluid contents secrets,” call into question the true impacts of fracking on local communities and human health.

The Cumberland-Marlboro Basin in North Carolina is home to thousands of indigenous people, including the Eastern Band of Cherokee Indians. This Native American group has been successful in outlawing fracking on tribal lands due to the fact that the opposition went against the legislative clause that keeps local governments from outlawing fracking in their Cherokee jurisdiction. The Cherokees recognized Governor McCrory’s platform for the potential economic opportunities the process could bring, but were not convinced that the practice would not harm
the land. The Eastern Band territory passed resolutions to remind people that they are in fact a sovereign nation and have control over the processes on their lands. However, not all tribes in North Carolina are federally recognized and do not have the sovereignty to oppose fracting on their lands, the potential depletion of water resources and well contamination. It is estimated that 70,000-75,000 indigenous peoples will be affected along the Cumberland Marlboro Basin. The Cumberland Marlboro Basin includes portions of Robinson, Scotland, Hoke, Cumberland, Sampson and Wayne counties. The counties are chosen by testing for total organic carbon in rock samples, which is an indicator of natural gas.

While North Carolina has seen much controversy over fracting, it is not the only state in the United States to encounter the debate, particularly from indigenous communities. Governor Andrew Cuomo of New York, which has Iroquois (Haudenosaunee) nations who oppose the process, has issued a complete ban on the harvesting practice for untapped natural gas in the state. After consulting with the report conducted by the NY State Department of Health, Governor Cuomo determined that the potential health and environmental risks were not worth the estimated return on investment. Methane was the primary concern listed in the report; being linked to respiratory issues and for contaminating drinking water through shallow methane migration that could contaminate wells. The report found that in the Appalachian Plateau, “methane was found in 82% of the drinking water samples in fracting communities.” Cuomo also had concerns about the more well-known negative consequences of energy production, such as climate change. Methane is on the list of greenhouse gases linked to global warming and the greenhouse effect; and seismic activity - a potential side-effect of injection wells - is linked to causing earthquakes. The NY ban is controversial because it counters the formally held assumptions by the other 30 states and the EPA on health impacts of fracting. In contrast to New York, Texas is said to be a model state for the fracting process, being responsible for 30% of all U.S. natural gas production. The Barnett shale rock layer in Texas expands over 23 counties, or 6 million acres, and is the second largest source of natural gas for
the U.S. With an estimated projection of 20,000 wells being built in Texas over the next few years, as of 2013, regulations on water use, contamination and fracking have been pursued. In the past few years, Texas passed a law that requires the contents of fracking fluid be disclosed. Even with this disclosure, scientists have still reported that air quality in heavy drilling communities has been compromised with smog, and a 25% incidence of child asthma has occurred in these areas with fracking suspected to be the causal factor. This statistic is more than three times the state rate. Whether the air quality is the reason for the heightened occurrence of asthma among children is debated among many scientists and within the legislature. In comparison to New York, Texas approached fracking in a very different manner, and still the debate shows pros and cons for each decision made. Controversy within the United States over hydraulic fracturing is mirrored by the international hesitation to adopt the practice.

The U.S. is currently the largest producer of natural gas in the world, being around 87% self-sufficient in gas in 2011. This paradigm shift of newfound energy independence puts the U.S. in a position of being highly influential in the international system with substantial national power. One definition of national power is a country's ability to control other countries through persuasion and coercion. Controversy from within the U.S. about fracking, land rights, and the environmental impacts between the states make numerous foreign countries hesitant to commit to fracking. France, for example, has banned the controversial practice due to potential environmental risks, which is the same reason for the slow adoption of fracking in the rest of Europe. In addition to the environmental concerns being the reason France banned fracking, reasoning is also accompanied by rumors that President François Hollande banned the practice to protect the support of the Green Party vote in the upcoming election at the time. The U.S. pushes for France to adopt fracking for the believed 137 trillion cubic feet of “technically recoverable” subterranean gas the country possesses. Along with France, Russia has also taken an anti-fracking stance on fracking.

Unlike France’s objection to hydraulic fracturing, Russia has taken steps to exploit the industry, but not in the manner in which the U.S. has. The Advanced Resources International (ARI) “analysis of global shale formations outside the United States revealed that more than half of the world's shale oil resources are located in Russia, China, Argentina, and Libya” in 2013. According to scholars, many countries such as Poland, Turkey and Ukraine see their presence of shale as a “geopolitical game changer.” Just as the U.S. uses the resource as a means to become energy independent, Poland Turkey and Ukraine are specifically trying to reduce their dependence on fossil fuels from Russia and Iran. Russia is currently a significant energy supplier for Europe, largely the Russian near abroad, dependent on their production of natural gas. Fifty percent of Russia’s national budget comes from natural gas production, giving Russia political leverage in Europe. NATO chief, Anders Fogh Rasmussen, has accused Russia of funding anti-fracking campaigns throughout Europe in order to keep its leverage of supplying natural gas over the continent. Reports of these accusations coming from Ukraine say the anti-fracking groups are “becoming more organized and better funded just as the government worked to finalize shale gas deals with Western energy firms. If these accusations are true, then
Russia is exploiting the natural gas industry to gain more national power in Europe, which can and has caused problems internationally between Russia, the U.S. and Europe. As this analysis illustrates, hydraulic fracturing and its controversies reach beyond North Carolina to national and international levels.

While the analysis of hydraulic fracturing policies began with private property rights, split estates and forced pooling, in this section regulations expand even further to include concepts such as subsidies and actors, including NC Governor Pat McCrory. Additionally, this section also analyzed the Energy Modernization Act (Fracking Bill), the Halliburton Loophole, and the exemptions the oil and natural gas industry receive from the Clean Air and Clear Water Act. From there, this section determined how the indigenous Native Americans along the Marlboro River Basin are affected by fracking and what efforts have been done by the sovereign Eastern Band of Cherokee Indians to ban fracking on their tribal lands. After the regulations and policies were determined in North Carolina, the analysis broadened even further to include the state of New York and Texas. Finally, the concept was translated internationally in regard to European Union’s hesitation to adopt the drilling for natural gas, and Russia’s process of using the fracking industry to maintain political leverage throughout Europe. The purpose of this analysis is to determine the larger question fracking poses, which debates if the precautionary principle should be invoked on the fracking process, and if the process is worth the estimated return on investment.

**Economics: Income Tax, Damage Cost, and Corporate Social Responsibility**

The economic advantages and disadvantages of fracking have been heavily debated in recent years. This issue in many ways represents a larger conversation on economic policies and capitalism. The issues range from corporate social responsibility to policies to better protect the environment and save these companies (and their stockholders and stakeholders) money as well. Fracking has been banned in multiple states such as New York and Pennsylvania, however it is a different story in North Carolina. The question becomes, is it economically beneficial for the local or even the national government invoke the precautionary principle?

One of the most important aspects of hydraulic fracturing and reasons for North Carolina’s continuous support is the fact that the state believes they could bring in large amounts of revenue. Some states such as North Carolina have made steps in pursuit of this prediction by putting lowering taxes on their citizens and putting it on the energy companies. In 2014, North Carolina legislatures reformed and revamped current state tax codes, which would significantly lower taxes for both corporate and personal entities. Many officials do not want to just lower the income tax but eventually bring it down to zero. Taxing the gas companies to help relieve and ease the struggle on the general public would do this. People in the areas of where these drill sites are located are not just concerned about getting a tax break because of these companies, they are also concerned with local air and water pollution along with the damaging of the roads and infrastructure in the area.

On a recent trip to North Carolina, one could see the concerns of community members. Even though taxes have been lowered, locals are concerned about an increase in traffic through
rural areas due to the spike in well pads. This would in time increase smog and noise pollution as well as damage roadways. There is no argument against the fact that an increase in traffic will cause the smog levels to rise, cause roads to be damaged, and lead to increased noise levels. A study done by Duke University looked at the taxes imposed on fracking and the uses of the revenue they generate. The study found that the majority of the revenue was given back to the community through public services like wastewater services, emergency services and road repair along with the lowered income tax already imposed to help relieve the communities.\textsuperscript{xiii} According to Duke’s findings, which are modeled after Texas policies, one can see a bright future if numbers are the only thing that matters with Texas’ gas industry, which earned $4.5 billion in 2012.\textsuperscript{xiv} If similar results can be made in North Carolina, then some concerns could be resolved to gain support for fracking to officially enter the state when the moratorium is lifted.

In addition to the revenues being given back to the local governments for the communities affected, there is the idea of corporate social responsibility. These companies want to extract gas, however, they have to take into consideration numerous factors – including but not limited to environmental and public impacts - before being able to extract the natural resource. These energy companies know that they will not be able to drill at the rate they would like to without being able to satisfy the needs of the local citizens. Still, there are opaque concepts that corporations strongly hold on to, such as their “trade secret” formulas of the injection liquids, also called fracking fluid. The concern is that the undisclosed fluids are leaking into the local shallow water tables.

An example would be in Pennsylvania where an area of local water has been contaminated due to the fracking process. Since the water is contaminated, the Cabot Oil & Gas companies have now spent $109,000 dollars to remove the contamination of methane in the water supply for 14 homes.\textsuperscript{xv} If it were a watershed such as the one that supplies New York City, the cost to build a filtration plant and clean the water would be roughly $6 billion dollars and some of these companies are not willing to pay for these issues.\textsuperscript{xvi} Unfortunately, much of the numbers are still up for debate because reports vary all over the country. For instance, Frack Free NC reports that in Texas the gas industry gave $3.6 billion in revenue back to the state but there was a reported $4 billion in damages to local properties.\textsuperscript{xvii} This leaves some to wonder whether the costs outweigh the benefits.

Another area of concern that has left most of the public infuriated is that the state government is offering subsidies to these fracking companies. Though funding through income tax may be on the way out, other taxes will be used by the state and federal governments to help fund these industries. Many supporters of this industry see it as beneficial in many ways by creating jobs and a stronger economy. According to Sue Sturgis, subsidies are just another way to help finance “corporate welfare” for the oil and gas companies. The state senate proposed a budget that was set at $1.2 million dollars for drilling, analysis and marketing relief to these companies that brought in a combined $93 billion in 2013.\textsuperscript{xviii} If these companies are making so much money, then the local and state governments should not be helping them and putting more
stress on the citizens. On top of the money being given by the state, the U.S. is estimated to have provided $470 billion in tax breaks to the oil and gas industry.\textsuperscript{lxvii}

In addition to corporate social responsibility, the cost of fracking goes beyond what the companies are paying to the local citizens and governments. As we have seen earlier, in most cases of hydraulic fracturing, health issues have been a negative consequence. In most areas of fracking, residents have expressed complaints such as headaches, eye irritation, nausea, and respiratory issues including the raised risk of Silicosis. Silicosis is closely related to occupations that have high levels of dust. In \textsuperscript{2007}, there were $50 million costs in the medical care field due to illnesses related to the inhalation of dust.\textsuperscript{lxviii} In the shale region where drilling is being done in Arkansas, the cost of public health care was $10 million in \textsuperscript{2008}.\textsuperscript{lxix} While this trend only shows a positive correlation rather than scientific evidence, it is still cause for concern.

Furthermore, in addition to various health issues in areas where fracking is conducted, there are also concerns involving the environment. Places such as Pennsylvania are highlighting issues in other states in relation to the free flowing rivers and other natural resources. For example, fracking done in Pennsylvania is affecting the Chesapeake Bay because of pollution traveling in different river channels. The Frontier Group reports, \textquote{The cost of reducing the same amount of pollution as could be generated by fracking would be approximately $1.5 million to $4 million per year.}\textsuperscript{lx}x Every new well site adds approximately $130,000 in damage costs to global warming. Then multiply that roughly by the 82,000 well sites that were created between 2005 and 2012 and we are looking at $10.66 million dollars in added cost to issues of global warming.\textsuperscript{lxii}

Fred Krupp, President of the Environmental Defense Fund, in Foreign Affairs, argued that regulations will not only help the surrounding environment and the local people, but will also help the oil and gas companies. Some of the biggest concerns revolve around well pads. Krupp suggested that companies make adjustments to pneumatic valves and that they repair and monitor equipment, which could reduce the number and the size of methane leaks.\textsuperscript{lxiii} If changes like these were made, not only would the companies save $164 million dollars annually and reduce methane leakage by 40 percent, it would also save the companies and communities millions over the next five to ten years.\textsuperscript{lxiv} These adjustments to machinery and techniques may not make it acceptable to start drilling and doing what the companies are doing now, but it helps find a middle ground between the communities and gas companies all over the United States.

More research and impact studies are needed to determine the actual affects on the communities, health, property, profits, economics, and energy security. Given such a lack of
causal analysis, the question of whether or not the precautionary principle should be invoked seems pertinent. Much of the policy in regard to fracking is outdated, because many existing legislations are similar to those in places like Lee and Chatham County, which refer to reports made about the process from the year 1907.\textsuperscript{lxiv}

\textit{Non-Governmental Organizations: A View from Frack Free NC and Clean Water NC}

Hope Taylor founded the Non-Governmental Organization (NGO) Frack Free NC on the basis of her own personal battle with hydraulic fracking in her residential area. Oil and gas companies were infringing upon her property rights. Frack Free NC is an organization in North Carolina that tries to prevent fracking within the state and educates individuals on the potential negative consequences of the fracking industry. Frack Free NC posits themselves as being an organization that, “Is a network of grassroots organizations that believe that shale gas development using ‘fracking’ and horizontal drilling cannot be done without bringing harm to our waters, land, air, communities and public health.”\textsuperscript{lxv} The organization acknowledges certain bills that are helping to promote with the safe practice and prevention of potential dangers of fracking within North Carolina. Acts such as Bill 820 have contributed to creating a relationship between opposition to fracking and those supportive, including industry. The bill, introduced into the Senate on May 17\textsuperscript{th}, 2012, assists in creating improvements towards the environment, and the practice of hydraulic fracturing within state lines,. Before being passed into the Senate, Bill 820 was proposed to Congress on July 2\textsuperscript{nd}, 2012. Former Senator Bob Rucho of North Carolina signed Bill 820, but overall there were mixed opinions on the bill: only 27 members of the House voted ‘yes’ for the bill while 47 members voted against it. The bill has restrictions on oil and gas exploration, the usage of horizontal drilling and general regards to hydraulic fracturing, as the law pertains to:

- Oil and gas resources present in the Triassic Basins and in any other areas of the state.
- Methods of exploration and extraction of oil and gas, including directional and horizontal drilling and hydraulic fracturing.
- Potential environmental, economic, and social impacts arising from exploration activities, as well as impacts on infrastructure.
- Appropriate regulatory requirements for the management of oil and exploration activities, with particular attention to the regulation of horizontal drilling and hydraulic fracturing for that purpose.

The bill establishes a regulatory regime that makes recommendations on topics such as air and groundwater quality and emissions. The proposed goals of the bill are:

- Protection of public health and safety
- Protection of public and private property.
- Protection and conservation of the State’s air, water, and other natural resources.
- Promotion of economic development and expanded employment opportunities.
- Productive and efficient development of the State’s oil and gas resources.\textsuperscript{lxvi}
Hope Taylor of Frack Free NC continued her mission towards sustainable development through founding and supporting numerous organizations, such as Clean Water NC and NC Save$ Energy. According to Vikram Rao, the chairman of the MEC, the MEC “does not take a stand on issues and just writes rules as instructed from legislation.” Rather they present the argument that the presence of oil-rigs and the oil industry will be greatly beneficial for the economy of North Carolina. The economy will not benefit from hydraulic fracturing as anticipated because the business of hydraulic fracking in the first year will provide the equivalent of one grocery store’s worth of jobs for North Carolina residents. Alternatively, North Carolina’s government and several other states are pursuing a profit through the industry by taxing any oil that is drilled, rather than taxing the businesses itself. The N.C. Department of Environmental and Natural Resources within the past five years has allocated a total of $655,000 dollars towards two different areas of research on hydraulic fracking. Of that, $100,000 went towards studying shale gas and oil exploration while $555,000 were allocated for test drilling.

Due to the numerous organizations related to Frack Free NC activists against fracking overwhelm those supportive of implementing hydraulic fracking in North Carolina. Clean Water NC differs from Frack Free NC in that it concentrates more on water quality focusing on urban community streams and the preservation of clean and ethical water resources. Clean Water NC is aware that in North Carolina more than 3 million people depend on well water as their water source. The non-profit organization has a vision of “clean, safe, accessible water for all North Carolinians, protected by empowered, educated citizens and a publicly accountable government and economy.” As for NC Save$ Energy, their focus goes towards protecting and conserving environmental energy sources that are biodegradable. The organization’s aspiration is towards emplacing and utilizing an independent energy efficiency program in North Carolina. Furthermore, the Water Justice Campaign focuses upon the effects that hydraulic fracking and the fracking fluid has on nearby water systems. The contaminants in fracking fluid are non-biodegradable resulting in the additives being absorbed into the soil and therefore potentially tainting the water tables and soil itself. The Water Justice Campaign is passionate about educating and protecting against the prospective dangerous effects to the public’s water. They provide workshops towards educating and acknowledging the legalities of water rights.

Water is a central concern for many of those opposing fracking, primarily due to concerns of the polluting of wells and rivers: it is the belief of many that the fracking process releases dangerous chemicals into the groundwater supply due to the suspicion of dangerous chemicals used upon injection (which are often allowed to remain undisclosed). This has become a focal point for relevant factions, shown with Well User Protection and a Clean Pigeon River. Well User Protection priority is towards safeguarding groundwater sources emphasizing on informing those in North Carolina who own private wells. Clean Pigeon River targets specifically the Pigeon River, which expands from Haywood County, North Carolina entering into Cocke County, Tennessee. The hopes of a Clean Pigeon River working with residents residing nearby the water are to cleanse the pollutants that overwhelm the Pigeon River. These
organizations are focusing upon enacting more environmental standards for hydraulic fracking in North Carolina and nationwide.

Counter Argument: Potential Return on Investment

While there are economic, environmental, and national security concerns about fracking, there are also strong reasons to believe that fracking can affect all of the aforementioned areas in a very positive way. North Carolina has significant reserves estimated at nearly 1.7 trillion cubic feet of technically recoverable gas in North Carolina.\textsuperscript{lxxxii} Given clear and strong regulations, these reserves could provide safe energy for North Carolina and the country.

Another potential benefit would be an increased income generation for the state. Some estimates show that “the additional tax revenue generated by increased energy production could relieve state legislators of pressure to pay for all further income tax reductions with spending cuts and tax base broadening alone.”\textsuperscript{lxxxiii} This revenue could enhance other areas of the NC economy and/or fix their roads and bridges, and other infrastructure needs.

The North Carolina Mining and Energy Commission, “has held monthly meetings to discuss the implications of fracking in North Carolina and to establish regulations and standards on which the General Assembly will vote.”\textsuperscript{lxxxiv} The meetings of the NC MEC could help foster a dialogue within the state to create best practices with community stakeholders on this issue. Fracking could also benefit our national security in which we would be able to reduce our dependence on foreign oil. It is discovered by the, “U.S. Chamber of Commerce's Institute for 21st Century Energy, the increase in oil and gas production last year from fracking has significantly reduced our national security risks by increasing our own energy security.”\textsuperscript{lxxxv} This could also help to spare the lives of men and women who go overseas to obtain these vital resources.

Despite that President Obama has not been strongly in favor of fracking, he has said that, “this is particularly relevant to all of you who are serving in uniform: For decades, we’ve talked about the risks to our security created by dependence on foreign oil, but that dependence has actually grown year after year after year.”\textsuperscript{lxxxvi} Whether it is drilling for more oil or producing more renewable energy, something needs to be done about current dependencies on nations hostile to U.S. interests.

Additionally, the concern of private landowners lacking the capital to refuse the encroachments of corporations on their land can be balanced out by the financial benefits they may receive for giving these lands up; in Pennsylvania, many resident farmers have experienced a shale boom, allowing some to collect royalties as high as $35,000 a month.\textsuperscript{lxxxvii}

In short, hydraulic fracturing could greatly benefit our economy, environment, and national security. American energy has full potential as well as being safe and efficient; if it is accepted that the government and industry assurances the safety of fracking are true. Then, the use of domestic natural gas can not only lower the price of energy in the country (due to avoiding the unstable global petroleum prices set by OPEC countries and other fossil fuel exporters) but it can also keep the United States independent with regard to energy. On the other hand, the safety
of those at home can be guaranteed, if the process of fracking sincerely does not have any negative side effects on groundwater supply or fault movement.

Analysis and Conclusion

Should the precautionary principle be applied to the hydraulic fracturing industry? The answer to this question in both U.S. and internationally is disputed among various stakeholders, ranging from industry to legislature to local communities affected by the process. The answer is not solely science based, but also influenced by the personal values individuals hold and their feelings toward the debate. The way one weighs the costs and the benefits may determine their overall stance on the issue. Hope Taylor with *Frack Free NC* is an example of an individual that took an oppositional stance against hydraulic fracturing in North Carolina due to her personal relationship with the environmental and health impacts of the process. The ultimate goal for Taylor, as well as numerous other NGOs, is a paradigm shift from reliance on oil and natural gas to renewable, green sources of energy. The industry does not always fully share and embrace this goal, believing that fracking is a beneficial source of natural gas the future for energy production, but it should be exploited to its fullest extent in a safe and regulated manner.

While there are documented cons to the fracking industry, the potential estimated return on investment could be beneficial. The driving force behind U.S. foreign relations is highly centered on the need for oil. In many instances, American military presence correlates with a presence of oil in the region. If the U.S. could lessen its reliance on foreign oil and become more energy independent through fracking, then the nation will gain more national power and security. Along with this logic, increased economic returns and consequently a strengthened domestic economy are likely outcomes from the U.S. fully exploiting the natural gas. Having a secure energy market would also contribute to the U.S. obtaining national power through fracking. The US debate on this issue is mirrored by North Carolina’s experience which has moved forward in the process for the same potential gains.
At the state level in North Carolina, there are debates on democratic processes, private property and commons rights, as well as economic and social opportunities and costs. One of our concerns revolves around the possible significant role of small companies getting in the fracking the best practices for their regulation. Suggestions, made by scholars, include disclosure of the contents of the fracking fluid. A concern posed by industry actors side is that many want the contents of the fluid to be considered trade secret and therefore confidential. To solve this, the names of the fluids could be disclosed to the public, but not the percentage of each chemical in the fluid. If this is the path fracking takes in North Carolina, compromise may be reached.
Geographic Information System Images (GIS)

NC Geologic Formations with Potential Natural Gas

Map

showing the expanse of all the shale deposits across the state of North Carolina.
Possible expanse of the Western Basin of North Carolina in respect to the Smoky Mountain National Park.\textsuperscript{xci}

Map of all Native American Tribes in the state of North Carolina with fully assessed basins (Durham Sub-basin, Sanford Sub-basin, Dan River basin, Davie Basin, and Wadesboro Sub-basin) as well as unassessed basins highlighted.\textsuperscript{xcii}

Map of shale gas extraction throughout the continental United States
USGS mapping showing urban populations in respect to the fully assessed shale deposits with focus on Chatham and Lee counties where the majority of fracking interest lies.\textsuperscript{xiii}


iv Ibid.


ix Ibid.


Barksdale, Andrew. (May 2014). Fracking: Many in NC don’t control rights to gas under their


Ibid.


Ibid.

Vikram Rao, Natural Gas Symposium at Coastal Carolina University, April 17, 2015, Conway, SC.


Ibid.


Ibid.


Ericka Faircloth, Conference with Coastal Carolina University, February 5, 2015, Chapel Hill, NC.


xlii Ibid.

xliii Ibid.

xliv Ibid.


xlvii Ibid.

xlviii Ibid.


lxii Ibid.

Ibid.


xxvii Ibid.


xxix Ibid.

xxx Ibid.

xxxi Ibid.


xxiii Ibid.


xxx Ibid.


Vikram Rao, Natural Gas Symposium at Coastal Carolina University, April 17, 2015, Conway, SC.

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