The Fracking Industry and Its Potential Impact on the Illinois Economy

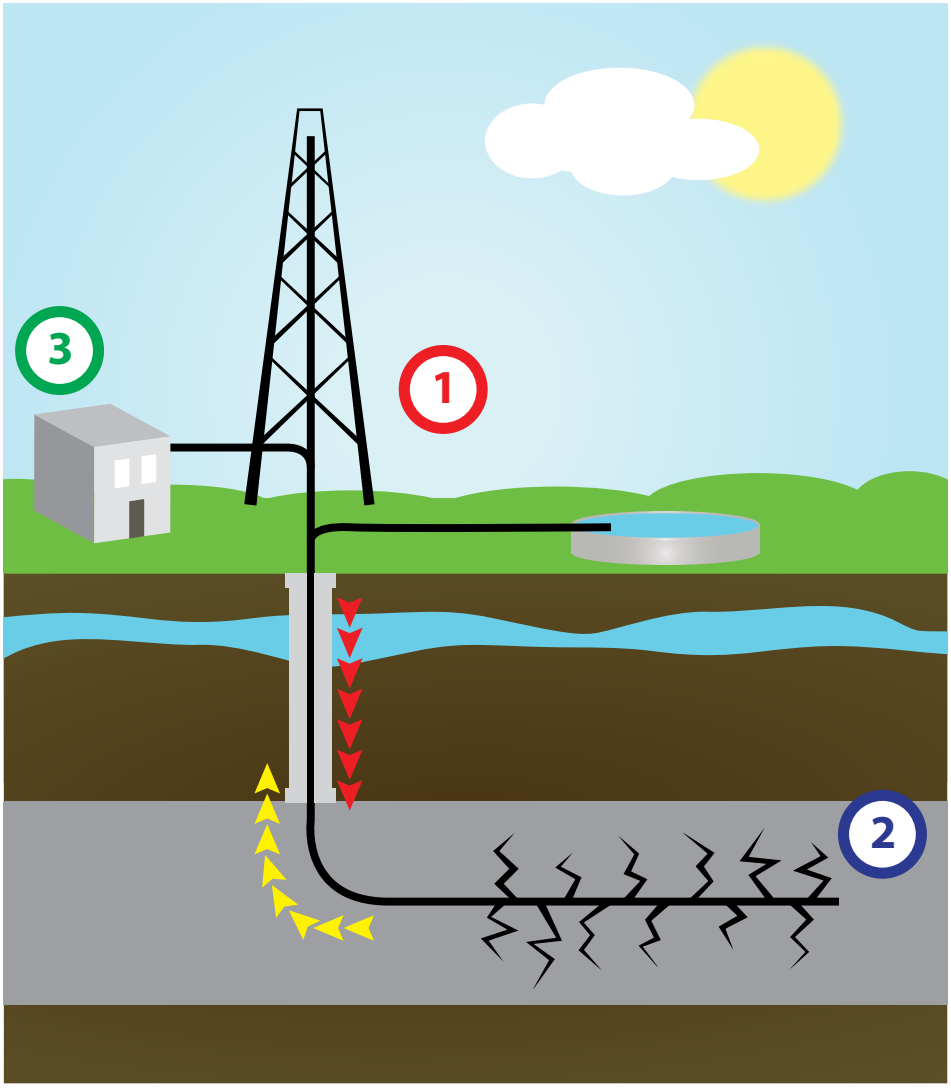
by Dave Bieneman, Ph.D.

Introduction

Technological advances have changed the future of the oil and gas industry in the United States. The utilization of high-volume, high-pressure hydraulic fracturing (what is commonly known today as fracking) over the last ten years on shale rock formations has dramatically increased the amount of oil and gas that are considered to be recoverable in the U.S. If the trend continues, it is expected that the U.S. will be able to eliminate its dependence on non-North American (all but U.S., Canada, and Mexico) oil sources within five to ten years.

The fracking process originated in the 1940s while horizontal drilling was first used in the 1930s. The current method of fracking combines the two techniques and injects a much larger amount of fluid into the well than did the previous method. The procedure is conducted

A Basic Overview of Hydraulic Fracturing:



1. A high pressure solution of water, sand and chemicals is sent through a well drilled horizontally through a shale deposit.
2. The solution creates cracks in the shale, allowing natural gas or oil to be released.
3. The mixture is reclaimed through the well, with the oil or natural gas flowing up the well and and the waste water stored for treatment.

by pumping water and sand (typically includes 99.5% water and sand) mixed with chemicals through a well into shale rock containing some form of oil or natural gas. The water creates pressure in the rock, creating fractures that allow the oil and/or gas to escape. This in combination with the horizontal drilling makes it possible to cover a much larger area from one drilling pad.[1]

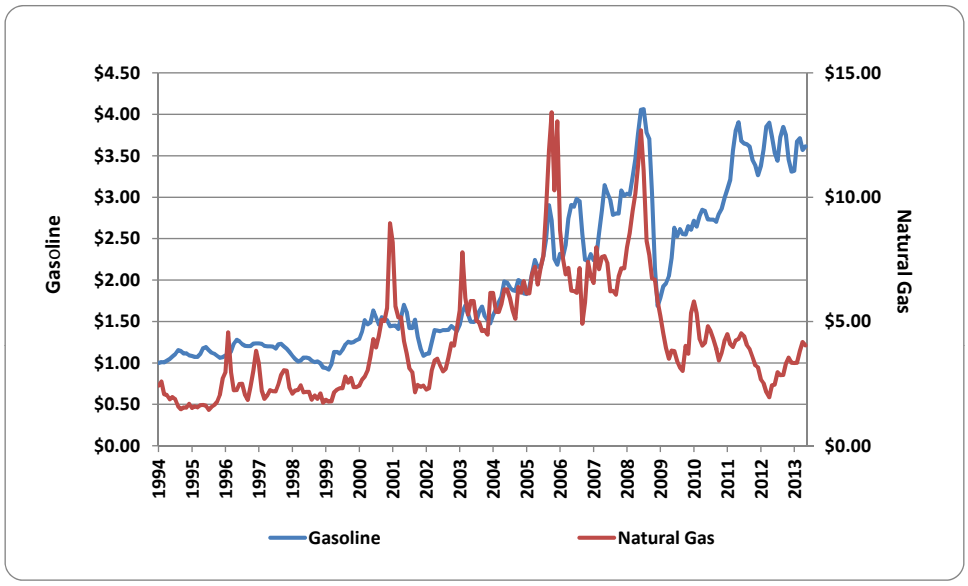
The industry has already proven that it can generate employment growth and increases in tax revenue while also contributing to the nation's move toward energy independence. The fracking industry hopes to expand rapidly in the U.S. but must address the main environmental concerns of water contamination, air pollution and gas leaks which can occur if operators do not follow proper procedures.[2] Large resources of oil have been found in shale rock in Texas and North Dakota, while shale has yielded primarily natural gas in Pennsylvania. Expectations are that southeastern Illinois also has extensive natural gas resources.

Natural Gas and Other Potential Power Sources

Investors in clean-technology industries have changed their focus over the past few years. It used to be that investments were made with the intent of one day making the fossil fuel industry obsolete. Now the concept seems to have changed to helping companies make fossil fuels less dirty. The reasoning behind this is twofold: 1) technological innovation has made domestic oil and gas deposits accessible that were previously not accessible; and 2) advances in the renewable energy field have come slower than anticipated so natural gas is seen by environmentalists as a much better alternative than coal.[3]

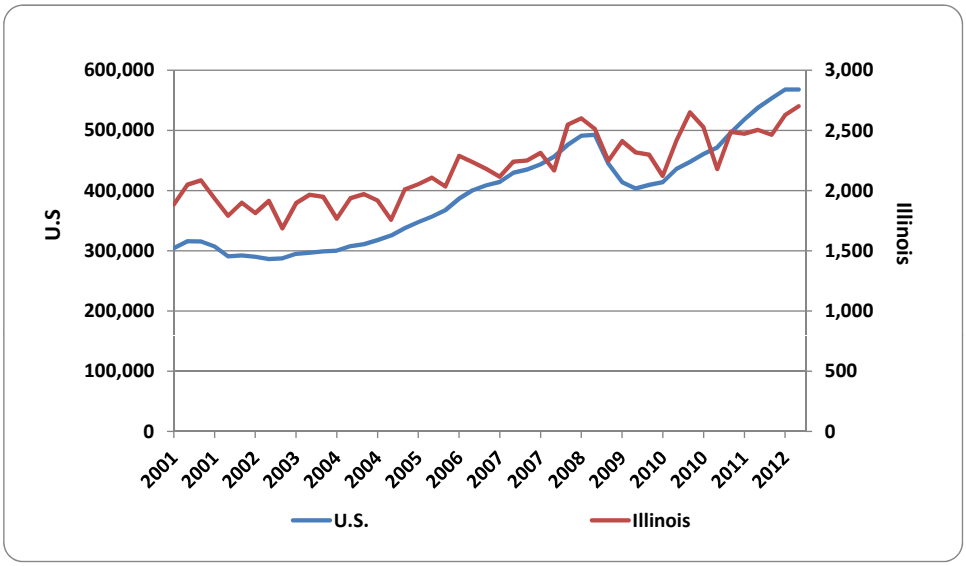
Exhibit 1, on the next page, shows that the price of natural gas spiked in 2008 at over $12 per thousand cubic feet and bottomed out at a price of about $2 in 2012 because of the warm winter. The price has been trending upward since then to just under $4 in 2013. Because natural gas is a relatively cheap source of energy now, demand for its use is increasing. It is expected to be used more often for electric power generation in place of coal and is likely to be used in other industries such as transportation. Gasoline prices are also plotted on the chart and are shown to have been over $3.50 a gallon for about 70% of the months since early 2011.

Exhibit 1. Prices of Gasoline and Natural Gas



Data Sources: Haver Analytics, Henry Hub (LA) [natural gas], Department of Energy spot prices [retail gasoline]

Exhibit 2. Employment for Combined Industries, NAICS 21111, 213111, and 213112



Data Sources: Quarterly Census of Employment and Wages (QCEW), Bureau of Labor Statistics (BLS), Illinois Department of Employment Security (IDES)

As technological innovation has increased the short-term and long-term supply of natural gas, new power plants being built are increasingly more likely to burn natural gas than to burn coal. One reason for this is that the new combined cycle gas turbine power plants have an overall fuel efficiency of 65 percent compared to the fuel efficiency of about 30 percent for coal power plants. Natural gas also burns cleaner than coal so power plants have an easier time of meeting air quality standards. This increased utilization of natural gas is expected to put upward pressure on natural gas prices in the future.[4]

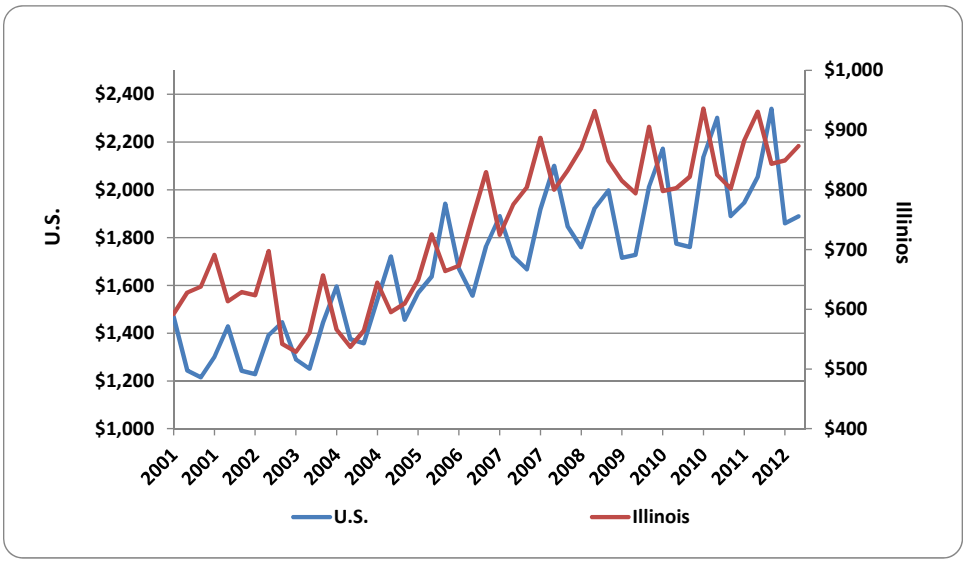
The lower price of natural gas caused the outlook for coal to decline and also had a negative short-term impact on the outlook for renewable energy. Now that natural gas prices have risen the outlook for coal is still in decline but the outlook for renewable energy has improved. Renewable energy sources such as solar and wind produce intermittent power, only when the environmental conditions are right. Backup power plants are needed for the times when solar and wind are unable to generate the required amount of power.

So when the price relationship between natural gas and renewable energy is just right then the public can take advantage of using renewable energy while still having access to reasonably-priced energy via natural gas-fired power plants when required. This relationship could lead to further investment in both renewable energy generation and natural gas power plants.[5]

Oil and Gas Employment and Wages Data

Fracking is having a large impact on the industrial economy as **Exhibit 2** shows the level of employment (for the U.S. and Illinois) for the sum of the three industries 1) Oil and Gas Extraction (NAICS 21111), 2) Drilling Oil and Gas Wells (NAICS 213111), and 3) Support Activities for Oil and Gas Operations (NAICS 213112). Even with a decline around the Great Recession, national employment for the combined industries has steadily risen since 2005 by 60-70 percent from 2005 to 2012. Illinois employment is

Exhibit 3. Average Weekly Wages for Combined Industries, NAICS 21111, 213111, and 213112



Data Sources: Quarterly Census of Employment and Wages (QCEW), Bureau of Labor Statistics (BLS), Illinois Department of Employment Security (IDES)

on a much smaller scale but has also been trending upwards, only between 30-40 percent over the period. It should be noted that some of the employment in this industry comes from self-employed contractors and the numbers employed within the industry are likely undercounted by the Quarterly Census of Employment and Wages (QCEW) program.

Exhibit 3 shows the corresponding average weekly wage data for both the U.S. and Illinois. Both series show a saw-toothed pattern that could be related to bonuses paid in one quarter of each year. The overall trends are similar with perhaps a slightly more positive trend for Illinois as compared to the U.S. However the average national wages in this industry are approximately two and a half times as large as those seen in Illinois. Part of this difference may have to do with the nature of offshore work more typical of oil and gas extraction in the rest of the U.S. than the onshore work typical of Illinois. Projects outside of Illinois could be bigger and more hours worked in an average week than those projects inside the state.

Potential Legislative and Environmental Barriers

Growth in employment and revenues may come slower than desired due to barriers set up by state governments. Some states have not allowed fracking within their borders as environmental concerns have weighed heavier than the need for new jobs.

It is known that Illinois has at least one working fracking well, which is located in White County in southeastern Illinois. Since regulations have not been in place in the state, companies were not required to specify the amount of fluids used in drilling so an exact number is unknown.[6] The Illinois legislation (SB1715) is said to be the strictest in the United States, giving oversight to the state's Department of Natural Resources (IDNR) and Environmental Protection Agency (IEPA).[7] The Illinois Hydraulic Fracturing Regulatory Act has been passed by the Illinois state legislature and has now been signed into law by the Governor. It will likely lead to large-scale fracking in the state.

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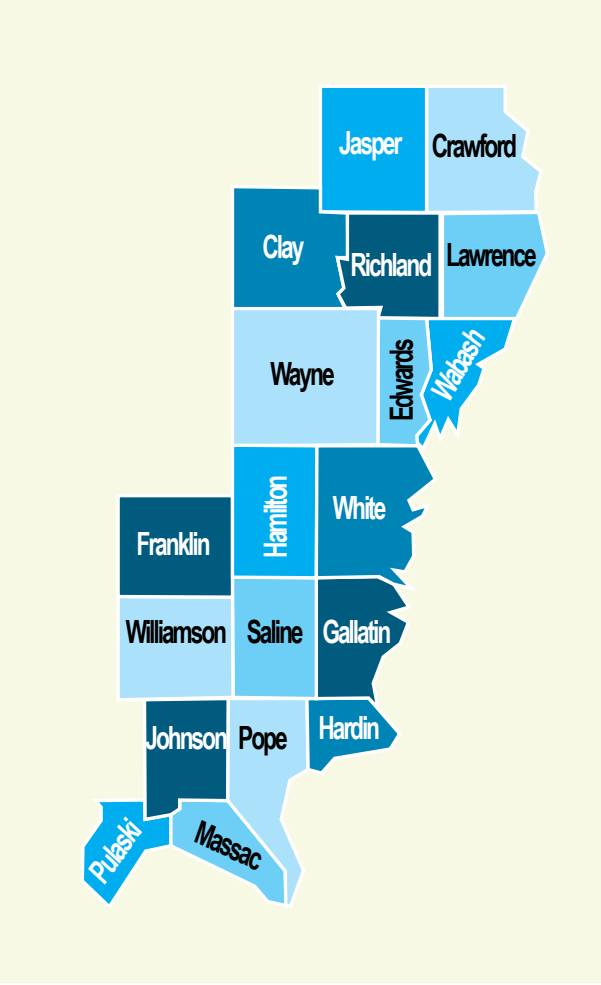
The legislation includes a requirement for companies to disclose the chemicals they use in hydraulic fracturing fluids.[8] The objective of supporters of the legislation was to have a bill in which the environment is protected and yet give certainty to the industry so that it can be successful. The industry is much more likely to make large investments in Illinois now than if no regulatory requirements were in place. Wayne



The 19-county area in southeastern Illinois is the most favorable area in Illinois for shale gas resources.

County has already collected about $200,000 in the last two years from the processing of records and collecting fees related to companies wanting to explore for oil and natural gas in the area so the industry appears to be on the verge of making a large economic impact.

In another example, the New York State Assembly recently extended a moratorium on fracking to 2015 after beginning it in 2008. This has caused some anguish among the state's citizens as unemployment is high in an area of the state (Southern Tier) that has suitable geological formations to take advantage of the technology. Right across the state border in Pennsylvania the fracking industry has generated economic growth. Estimates for the state of New York suggest that 15,000 to 18,000 jobs could be created in the Southern Tier and western New York with another 75,000 to 90,000 jobs possible if exploration and drilling were expanded to southeastern New York. Tax revenues to local and state government would be expected to go up by 1.4 billion dollars.[9]

Evaluation of the four major geologic criteria by the Illinois State Geological Survey indicates that the geology for the 19-county area in southeastern Illinois is the most favorable area in Illinois for shale gas resources.[10] The Illinois Basin in southeastern Illinois has significant reserves located at shallow depths, making long-term production a possibility. However people are worried about what issues the fracking industry might bring to the rural areas of southern Illinois. Thousands of workers could be transplanted into the area causing housing shortages and overwhelming businesses. Another possibility is that dramatic increases in revenues would override any inconveniences caused by a growing industry.[11]

Potential Illinois Economic Impact Compared to Impact at Bakken Formation

The Loomis study examines potential impacts that the fracking of shale gas in southeastern Illinois would have on the economy.[12] The study projected total annual employment impacts ranging from 1,034 full-time equivalent positions under the low-level investment scenario up to 47,312 under the high-level investment scenario. The highest scenario translates into $9.5 billion of economic impact for the state. In addition the largest employment impacts for secondary industries under the high-level investment scenario are in order of impact: 1) food services; 2) private hospitals; 3) real estate establishments; 4) wholesale trade businesses; 5) health practitioners; and 6) architects and engineers.

The Bakken formation is a shale rock formation that lies in northwestern North Dakota, northeastern Montana, and Canada. Both oil and gas have been found in the Bakken and harvesting the fuels was done using fracking technology. QCEW employment and wage annual data are now available for comparison for the year before oil production rapidly expanded in the region with the most recent available data.[13]

The region of study includes those counties in Montana and North Dakota that have wells producing oil from the Bakken formation. The data show that 27,954 jobs were added between 2007 and 2011, a 35.9 percent increase in jobs for the region. Average annual wages for all jobs in the region increased by 53.1 percent between 2007 and 2011. Total employment for

the nation decreased by 4.4 percent between 2007 and 2011 while average annual wages increased by 8.1 percent as a comparison.

The industry composition of the new jobs in the region shows that 38.1 percent were in mining, quarrying, and oil and gas extraction; 17.5 percent were in transportation and warehousing; and 12.9 percent were in construction. The largest percentage of employment growth for a particular industry sector was professional and technical services, which grew from 501 workers to 2,407 employed. The largest percentage increases in average annual wages were in real estate, rental and leasing; professional and technical services; and wholesale trade.

The impact of the oil and gas boom has not only helped the economies of the immediate area but effects have also spilled over into surrounding counties and states. As employment has increased because of the oil boom, wages have risen dramatically and the unemployment rate has decreased. These effects can be seen to a lesser degree as you move further away from the Bakken site.

Researchers for the Federal Reserve Bank of Minneapolis drew concentric circles on a map with the Bakken at the center of all of the circles. Using county employment and wage data the researchers showed that counties within the zero to 100 mile band were ranked a clear second in wage impact behind the zero mile band. Going out further to the 100 – 200 mile band the results showed not much more impact on wages than for other bands even further away from the center. However, the negative impact on unemployment rates continued all the way out to the biggest circle which represented 300 to 400 miles from the center.[14]

Conclusion

Oil and gas reserves accessible in shale rock in the United States are likely to change the global balance of power in energy production. The U.S. will account for a third of new oil supplies over the next five years according to the International Energy Agency (IEA). This change will make the U.S. a net exporter rather than its current status as the world's largest importer of oil. The IEA expects the U.S. to overtake Russia as the world's largest producer of natural gas by 2015 and to become "all but self-sufficient" in its energy needs by about 2035.[15] Estimates show that the lower 48 states have 20 shale plays (geographic areas where companies are actively looking for oil or natural gas in shale rock) that contain a total of 750 trillion cubic feet of recoverable natural gas and 23.9 billion barrels of recoverable shale oil.[16]

The fracking industry has already increased employment in various parts of the country including North Dakota, Montana, Texas and Pennsylvania. The passage and signing of strong regulatory legislation in Illinois should provide certainty to the industry allowing it to move forward. The southern region of the state has been in dire need of jobs for some time, especially since demand for Illinois' high-sulfur coal went into decline in the 1990's. The fracking industry could supply tens of thousands of jobs for that area and jobs that pay good wages. The state of Illinois would also benefit from increases in revenues.

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End Notes

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