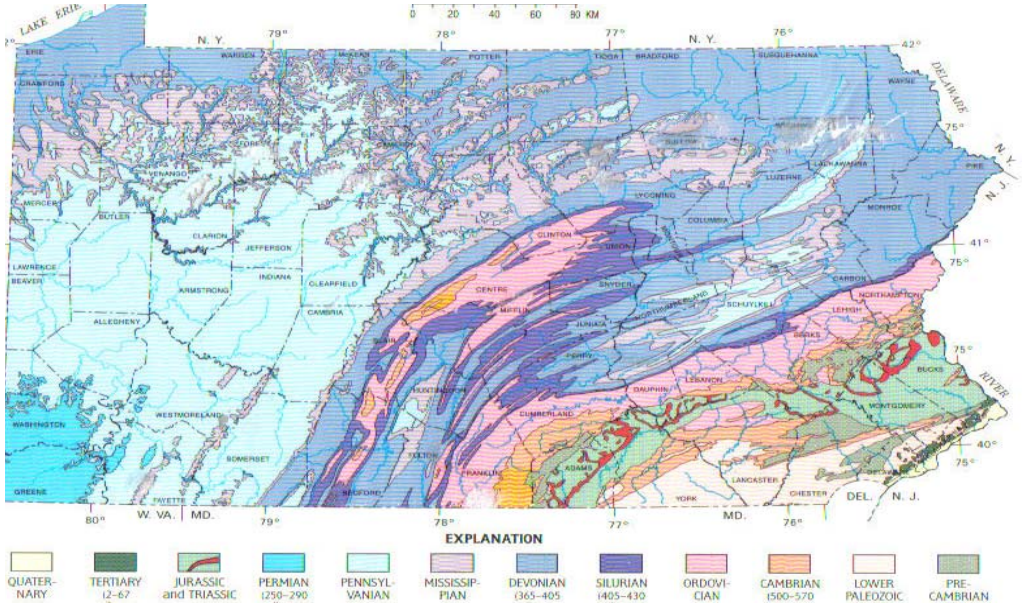
JOINT Urban Studies CENTER

7 South Main Street, Suite 201, Wilkes-Barre, PA 18701
e:info@urbanstudies.org p: 570.408.9850 w: www.urbanstudies.org

The Economic Impact of Marcellus Shale in Northeastern Pennsylvania



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7 South Main Street, Suite 201, Wilkes Barre, PA 18701
570.408.9850 * 570.408.9854 fax * www.urbanstudies.org
e:info@urbanstudies.org

Researchers: Sherry Murray and Teri Ooms

Note

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Executive Summary

Northeastern Pennsylvania is on the verge of a new era. Many emerging changes throughout the region, including increased business activity and population growth, are occurrences that the area has not experienced in more than 60 years. In the report, "The Rise of Luzerne County," the Joint Urban Studies Center (JUSC) examined the unexpected population increase and contributing factors. JUSC discovered that many people are moving here from more eastward locations due to soaring housing prices; this migration pattern is expected to continue.

Today, another possible reason to move to the region is natural gas industry employment. Any who have read a newspaper or watched the local news in recent months knows that there is much discussion about natural gas that may exist deep within the ground, in a rock formation known as Marcellus Shale. This discovery is new to the region and most are just beginning to grasp what this could mean. What exactly could it mean for northeastern Pennsylvania if a new industry moves into town – and particularly one directly affects residents and can potentially transform thousands of lives? This white paper addresses the potential that lies beneath that rock to see what it could uncover in the counties comprising Pennsylvania's 10th Congressional District.

In performing this study, JUSC sought to examine what other natural gas plays have done for other U.S. regions. We used case study methodology to compare our region in terms of wealth, employment, and housing. Case studies provide a systematic way of examining events, which allows sensible comparisons that help infer what may occur in similar scenarios.

First, JUSC looked at Barnett Shale in Texas, where the natural gas industry has helped the Dallas/Fort Worth economy stay virtually recession-proof. Referred to as the icing on the cake for that region, Barnett Shale generates a multi-billion-dollar direct impact on the economy, with multiplier effects rippling through virtually all regional industries. Texas production has resulted in $10.1 billion in annual output, and 55,000 permanent jobs. Specifically JUSC studied Denton County circa 1990 – before the Barnett Shale play. At the time, this Texas county was very similar to some the counties that comprise the 10th Congressional District. JUSC tracked Denton County's growth in terms of population, income and housing. In 1995, Denton County had a population of 317,850. At the time, 156 wells provided the county with mineral revenue of $88,786. By 2004, Denton County's population reached 528,950 and 1,460 wells provided the county with mineral revenue of more than $2.7 million. This represents a 66.4 percent population increase, an 835.9 percent increase in its number of wells, and a 2,976 percent mineral valuation increase.

Next, we examined Fayetteville Shale in the state of Arkansas. Newer than the Barnett Shale play, the Fayetteville Shale play has already increased

employment and significantly contributed to the state's local economies. Projections indicate major population increases and significant gains in employment through 2025. Specifically JUSC looked at Faulkner County and White County – areas that are also similar to some of those in Pennsylvania's 10th Congressional District. Here too, JUSC found ripple effects on businesses unrelated to the natural gas industry. Following is an excerpt from an interview with an Arkansas banker in which he discusses royalty payments in one Arkansas county:

> Arkansas Investment Banker Bill Paxton said that the money flowing into White County, Arkansas, from all the drilling and producing wells eventually flows into area restaurants, clothing stores and other businesses, like the sub-contractor who builds the gates to well properties. Paxton stated, "Because of the flow of money, anytime that you see any part of a segment doing well in an economy, you see the whole economy taking off and doing well. Now you're looking more at people who are looking to set up trusts. They're wanting to put funds into those trusts. So, we've had to change some of our investment practices and make sure we have all the products and services to serve the needs of the people."

Paxton's remarks demonstrate the rolling effects natural gas exploration can have on all aspects of the economy. Money eventually infiltrates many other industries can lead to a region's tremendous growth prospects.

Finally, JUSC examined the possible affects of northeastern Pennsylvania's Marcellus Shale play. After reviewing current activity throughout each Pennsylvania county studied, JUSC found that many residents indeed have leasing agreements with natural gas companies, that many of these companies have obtained state drilling permits, and that some companies have already begun drilling. Today, 93 drilling permits have been issued and 18 wells drilled in Bradford, Lycoming, Susquehanna and Wayne Counties. Currently, Lackawanna County neither has any drilling permits issued nor wells drilled; however, county records indicate that as of 2008, there are 85 leasing agreements in place. Likewise, Wyoming County does not have any permits issued or wells drilled; there are, however, 594 lease agreements in place with nine energy companies. At the time of this study's completion, there was no data available on how much natural gas the region was producing.

JUSC examined the potential cash flow of a typical Pennsylvania wells and calculated potential royalties a landowner may receive. The example below uses Barnett Shale production rates as a base for estimates:

- If you own 100 acres of gas-producing land, and
- You receive a royalty of 15%, and

- Natural gas is priced at $10 per unit , and
- The daily production rate is 2 million cubic feet (Mmcf) per day (a conservative estimate), then

---

- **Total royalty would be $1,095,000 per year.**

Few can predict a well's output at any point in time – especially so early in the Marcellus Shale play. This is only one possible scenario. It is also important to note that output declines quickly at first, but such decline slows towards the well's half life. A well's production typically lasts 20 – 30 years. The figure above does not include the lease value or sign on bonuses.

So what exactly does Marcellus Shale mean for northeastern Pennsylvania? It is very early in the Marcellus Shale play to make any predictions as to how much natural gas production may occur in the region. Many experts JUSC spoke to suggested that the play is only in its infancy, but they acknowledge that it has even more potential than either the Barnett or Fayetteville plays. If these predictions hold true, there is the possibility of unprecedented wealth, employment jumps, and significant population increases throughout the region. Time will tell.

Introduction

Throughout history, northeastern Pennsylvania has experienced many highs and lows – most notably, the coal mining industry and its regional impact. Once a booming and prosperous industry, it would ultimately be the source of the area's decline. For decades after coal mining left town, the region lost population, and maintained its traditionally low wages and suffering job market. Today, Northeastern Pennsylvania is on the rise – population is increasing and businesses are moving into the region. Further, we are faced with the possibility of a new natural resource phenomenon – natural gas found in Marcellus Shale deposits.

Given the area's history, people are naturally curious and concerned, while also excited. Increasing local and national media attention in recent months has focused on area land owners signing over leasing rights to energy companies and the high prices these companies are paying for such rights.

The goal of this study is to assess the potential economic impact of land leasing and drilling of Marcellus Shale deposits, with particular emphasis on banking. Other U.S. regions have demonstrated that when something of this nature occurs, a ripple effect causes money to flow into the surrounding communities. Drilling and production wells eventually impact area restaurants, clothing stores, and other businesses because of population increases that coincide with a lucrative natural gas industry. Beneficiary landowners often invest their new income, job growth results in population increases, and new businesses and industry sprout to support new clusters.

This document utilizes case study methodology to compare the area of study in northeastern Pennsylvania with other regions that have already experienced similar situations. Using publicly available data, interviews, and modeling JUSC examines the potential of Marcellus Shale deposits in the counties comprising Pennsylvania's 10th Congressional District. The Pennsylvania counties currently believed to have potential for future extraction of Marcellus Shale include: Bradford, Lackawanna, Luzerne, Lycoming, Susquehanna, Wayne, and Wyoming.

Marcellus Shale, also referred to as the Marcellus Formation, is a Devonian-age black, low-density, carbonaceous (organic rich) shale. Located in the Appalachian Basin, it stretches over 600 miles from southern New York into West Virginia and Ohio. Gas distributed throughout the rock, like Marcellus Shale, is known as an unconventional reservoir. The shale's natural fractures are key to recovering large amounts of natural gas. Largely, Marcellus Shale is exists a mile or more below the ground's surface. [1] Successful wells must yield large volumes of natural gas to pay for drilling costs, which may exceed $1 million for a

[1] Barnett Shale News

traditional vertical well, and much more than that for a horizontal well with hydraulic fracturing.

Natural gas occurs within Marcellus Shale in three ways: 1) within the shale's pore spaces; 2) within vertical fractures (joints) that break through the shale; and 3) adsorbed on mineral grains. Of these likely occurrences, most natural gas is contained in pore spaces. The natural gas, however, has difficulty escaping through such spaces, as they are very small and poorly connected. [2]

Historic Marcellus Shale wells produced gas at a very slow rate because of the low permeability mentioned above; this is typical for shale. However, the most successful historic Marcellus Shale wells share a common characteristic – they intersect numerous fractures. These fractures allow natural gas to flow through the rock unit and into the well bore. The fractures intersecting the well also intersect other fractures and those fractures intersect even more fractures. Thus, an extensive fracture network allows one well to drain natural gas from a very large shale volume.[3]

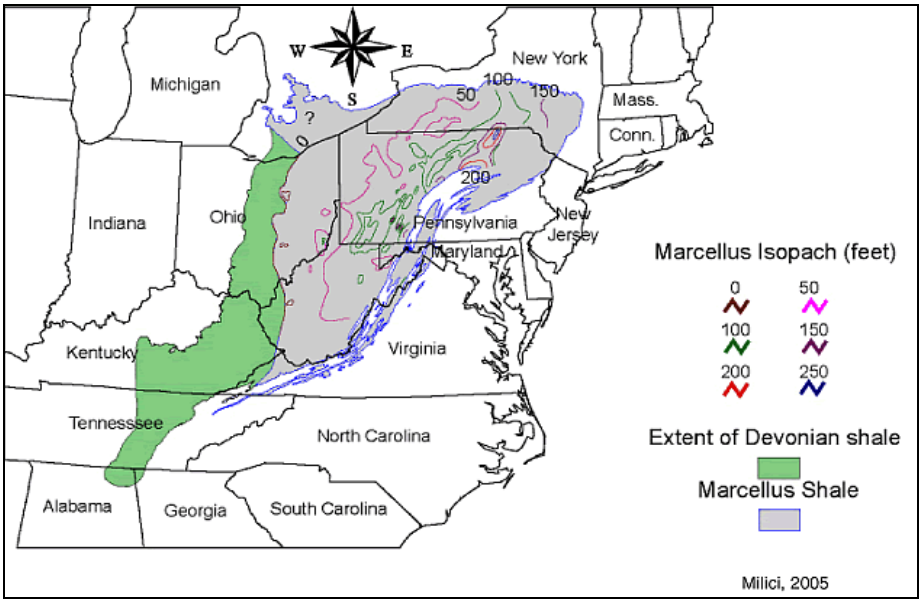
Marcellus Shale fractures are vertical, so a vertical borehole would be expected to intersect very few fractures. However, a horizontal well, drilled perpendicular to the most common fracture orientation, may intersect a maximum number of fractures. Some horizontal Marcellus Shale wells yield over a million cubic feet of natural gas per day. They are some of the most productive wells drilled in the eastern U.S. this decade.[4]

Past studies by the U.S. Geological Survey determined that Marcellus Shale contained an estimated undiscovered resource of about 1.9 trillion cubic feet (Tcf) of natural gas.[5] More recently, however; Terry Englander, a geosciences professor at the Pennsylvania State University, and Gary Lash, a geology professor at the State University of New York at Fredonia, estimated that Marcellus Shale could contain 516 Tcf of natural gas. Using new horizontal drilling methods and hydraulic fracturing of the productive rock unit, up to 10 percent of that natural gas may be recoverable. That volume would be enough to supply the entire U.S. for about two years, with a wellhead value of about $1 trillion. [6]

Figures 1 and 2 on the next page show the extent and depth of Marcellus Shale in New York, Pennsylvania, West Virginia, and Ohio. Clearly, there is a significant amount of Marcellus Shale at significant depths throughout northeastern Pennsylvania.

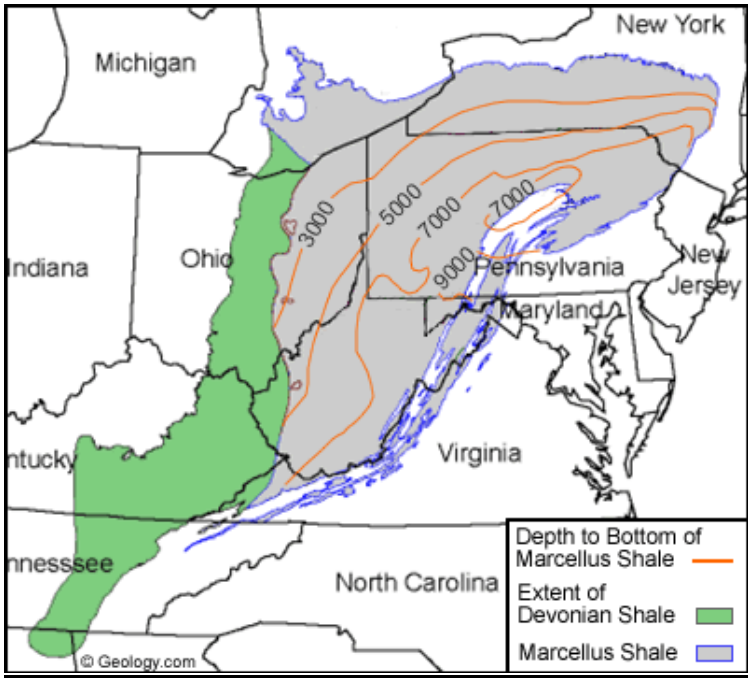
[2] http://geology.com/articles/marcellus-shale.shtml
[3] Ibid
[4] Ibid
[5] http://geology.com/articles/marcellus-shale.shtml
[6] Penn State Live

Figure 1: The Distribution of Shale in the Appalachian Basin [7]



Source: AAPG

Figure 2: The Depth of Shale in the Appalachian Basin



Source: AAPG

[7] http://www.geosc.psu.edu/~engelder/AFS/AFSindex.html

Companies Operating in Marcellus Shale in Northeastern Pennsylvania

Several energy companies are seizing upon the mainly untouched reservoir and are significantly investing in Marcellus Shale. Many of these companies have drilled for natural gas in Texas, Arkansas, Oklahoma, and West Virginia, and are just beginning to set their sites on Pennsylvania. Some estimates predict that more than 20 oil and gas companies will invest $700 million this year developing the Marcellus Shale. Up to 50 percent of that total is expected to be invested in Pennsylvania. The cost to companies for leasing mineral rights jumped from $300 per acre in early 2008 to nearly $2,500 per acre in May 2008. All companies are paying landowners royalty rights, which have jumped from 15 to 20 percent. Below are summaries of some of the major players in the region's natural gas rush:

- Chesapeake Energy Corporation, based in Oklahoma City, Oklahoma, is a Fortune 500 company and one of the nation's largest natural gas exploration firms. Its stock price opened the year at approximately $36 per share and has recently topped $50 per share. Chesapeake Energy is the country's second largest independent natural gas producer and its third largest overall natural gas producer. The company is the largest leasehold owner in the Marcellus Shale play that spans from West Virginia to southern New York. The company is currently using two operated rigs to further develop its one million net acres of Marcellus leasehold. Assuming 1,400 net wells are drilled in the years ahead, Chesapeake Energy's estimated risked unproved reserves are approximately 1.4 Tcf (5.7 Tcf of unrisked unproved reserves). The company's targeted results for vertical Marcellus Shale wells are $1.6 million to develop 1.25 billion cubic feet (Bcf) of natural gas on approximately 160 acres. The company has not yet developed a model for targeted results from horizontal wells in the play.

- North Coast Energy, Inc., based in Akron, Ohio, develops and explores new natural gas and oil properties in the Appalachian basin. In 2004, the company became the petroleum exploration division of Exco Resources, Inc. The company has 9,274 wells in Marcellus Shale and 360,000 acres under lease, most which are in Pennsylvania. This year, the company plans to drill 600 vertical and horizontal wells. Its parent company is traded on New York Stock Exchange (NYSE) under the ticker XTO.

- Range Resources Corp., based in Fort Worth, Texas, explores and develops oil and natural gas properties in the southwestern Appalachian, and Gulf Coast regions. Range Resources plans to allocate about $200 million this year, one-fifth of its capital spending, to Marcellus Shale. Range Resources is traded on the NYSE under the ticker RRC.

- Chief Oil & Gas, LLC, based in Dallas, Texas, was founded in 1993 and is one of the first companies to have drilled for natural gas in Texas' Barnett Shale, which is similar to Marcellus Shale. The privately-held company accumulated 200,000 leased acres of Barnett Shale and had 250 wells producing 100 million cubic feet (MMcf) per day. The company divested many of its assets in order to focus on exploring in the Rocky Mountains and Pennsylvania.

- East Resources, Inc., based in Vienna, West Virginia, leases more than 1.25 million acres and operates more than 2,400 wells in New York, Pennsylvania, West Virginia, and Colorado. In Bradford, Tioga, Sullivan and Wyoming Counties, the company has leased more than 300,000 acres. The company also owns a West Virginia gas utility.

- Fortuna Energy, Inc., based in Horseheads, New York, had 63 wells in the Southern Tier in 2006. Fortuna is a subsidiary of Talisman Energy, Inc., of Calgary, Alberta, Canada, which has operations worldwide.

- Equitable Production Co. is a subdivision of Pittsburgh-based Equitable Resources, which is traded on the NYSE under the symbol EQT. The company finds, delivers and deals natural gas in the Appalachian region.

- Cabot Oil & Gas Corp., of Houston, Texas, is an independent exploration and production company. This year, the company plans to spend 80 percent of its capital budget in East Texas and on Marcellus Shale. The company intends to drill 20 wells in Pennsylvania in 2008, which a company executive described as "scratching the surface of one of the hottest plays in the industry today." The company has an extensive leasing program targeting Marcellus Shale in six areas of Pennsylvania and West Virginia. According to the company, more than 100,000 acres have been leased. In addition, two vertical wells have been drilled in one area with limited tests from a thick Marcellus Shale section at rates between 800 thousand cubic feet (Mcf) and 1,000 Mcf per day. According to Cabot Oil; this rate exceeds most reported industry rates from vertical Marcellus Shale completions.

- Southwestern Energy Production Co., headquartered in Houston, Texas. expects to invest $26 million in various exploration and new ventures, including drilling up to three vertical wells targeting Pennsylvania's Marcellus Shale. The company is traded on NYSE under the ticker SWE. At the end of 2007, Southwestern Energy held 156,465 net undeveloped acres in areas of the country outside of its core operating areas in connection with its new ventures. This compares with 89,592 net undeveloped acres held at year-end 2006. Of its 156,465 net undeveloped acres held at year-end 2007, approximately 88,000 net undeveloped acres were located in Pennsylvania's Marcellus Shale play.

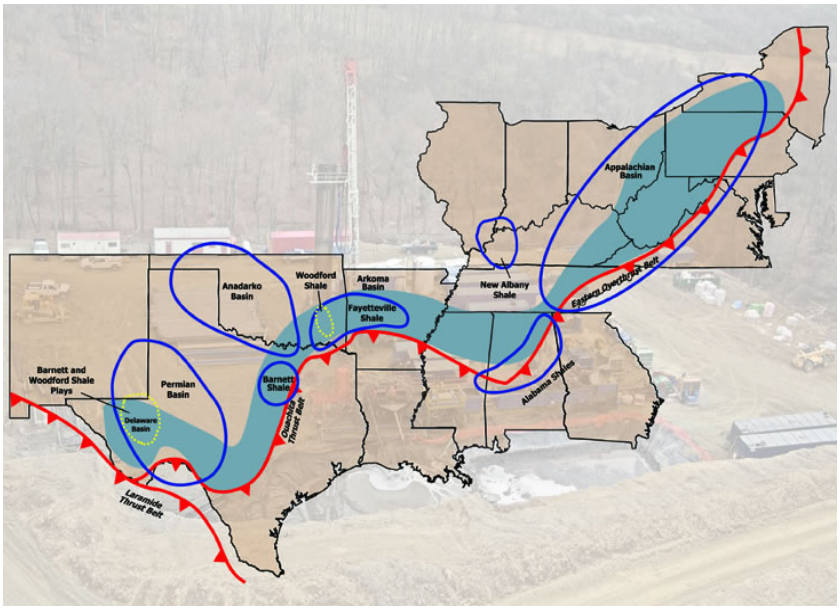
Case Studies

The Impact of Other Unconventional Shale Gas Basis throughout the U.S.

This section offers a detailed look at the impact that various types of natural gas producing shale have on local economies. The purpose of providing a case study in this analysis is to demonstrate what an industry, such as natural gas, can do for a region. Although case studies do not allow us to make a direct inference to what will occur in the Pennsylvania region studied, they offer a glimpse into possibilities and demonstrate lessons that may be learned.

This report examines three case studies. First, JUSC studies Barnett Shale located in Dallas/Fort Worth, Texas. The area's regional economy is booming and will likely maintain vitality through the country's current economic slowdown. Next, we examine Barnett Shale in Denton County, Texas – a county similar to the Pennsylvania counties studied. Denton County has experienced significant growth in the last fifteen years, mainly due to Barnett Shale. Finally, JUSC examines Fayetteville Shale in Arkansas. This type of natural gas producing shale is newer than Barnett Shale, but is tremendously impacting the state's economy and such growth is expected to continue over the next ten years.

Figure 3: Unconventional Shale Gas Basins



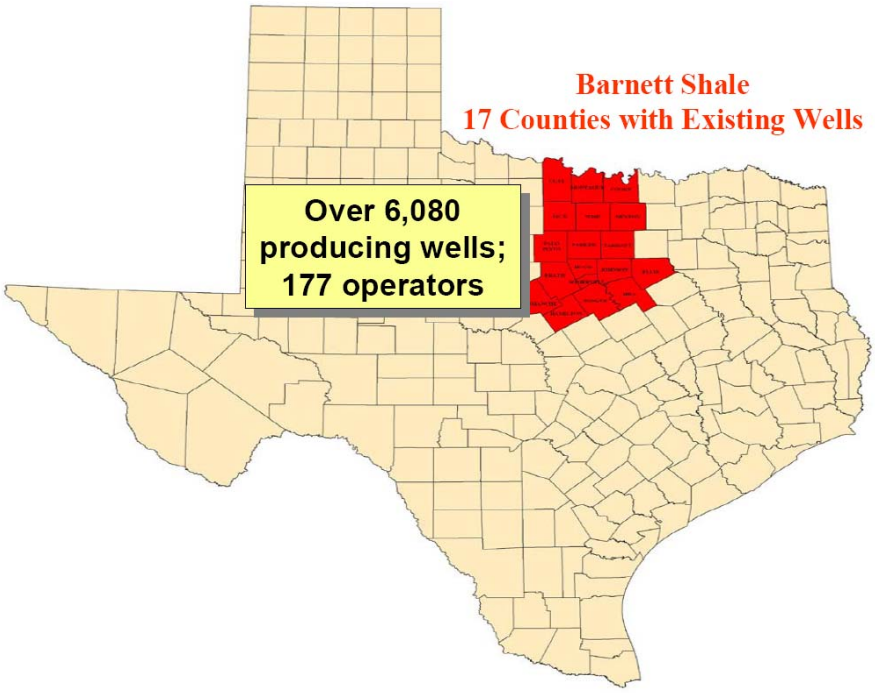
Source: AAPG

Barnett Shale

Barnett Shale is a hydrocarbon-producing geological formation of great economic significance to Texas. It consists of sedimentary rock and the productive part of the formation is estimated to stretch west and south from the City of Dallas, covering 5,000 square miles and at least eighteen counties.[8] It is the nation's second largest producing on-shore domestic natural gas field.

Texas' Barnett Shale field, located in the Dallas/Fort Worth area, was discovered in 1981 by Mitchell Energy. It was only after improvements in recovery methods during the late 1990s that significant production became possible. When price increases in natural gas made recovery economically feasible, production in Barnett Shale accelerated markedly.[9]

Figure 4: Counties with Existing Wells



Source: Texas Railroad Commission

[8] http://www.rrc.state.tx.us/barnettshale/index.html
[9] Bounty from Below

The Dallas/Fort Worth area is one of the nation's largest gas production regions. According to an economic impact analysis of Barnett Shale, total natural gas production has grown sharply in recent years and has accounted for 12 percent of the state's 2006 total production. The development has produced a substantial number of businesses, leading to the creation of jobs and economic opportunities for thousands of area residents and companies. Retail sales taxes, occupancy taxes, and other sources of fiscal revenue have increased, as the enhanced level of aggregate performance spans a broad spectrum of sectors.[10] These resources afford numerous opportunities for investments in overall community well-being. In addition, companies operating in the Barnett Shale have provided substantial time and monetary contributions to local charities.[11]

Prior to the emergence of Barnett Shale, Fort Worth had established itself as one of Texas' largest cities and a major contributor to the state's overall business prosperity. It is also a central part of a dynamic urban region, the population of which recently exceeded six million. Its Barnett Shale is like 'icing on the cake' for an area already performing quite well, and once the Barnett Shale play is exhausted, many of its impacts and economic benefits will remain.[12]

Economic Impact

Activity in Barnett Shale generates thousands of jobs and tens of billions in investment dollars. Royalty and bonus payments to area residents, cities, school districts, and others continue to rise, as do property tax receipts to local taxing authorities. Barnett Shale generates a multi-billion-dollar direct impact on the economy, with multiplier effects rippling through virtually all regional industries.[13] Texas production has resulted in $10.1 billion in annual output, and 55,000 permanent jobs.[14]

Activity has risen sharply over the past several years due to improvements in recovery techniques. Figure 4 demonstrates Barnett Shale's rapid production growth over a seven-year period.

The fiscal impact of Barnett Shale on local taxing entities stems from two primary sources: 1) taxes paid on oil and gas properties, and 2) enhanced retail sales and real estate development due to its economic impact. In addition to these major income sources, Texas' Barnett Shale leads to payments of royalties and bonuses directly to cities, school districts, and others, as well severance taxes of approximately $165.4 million to the State of Texas in 2006. There are various

[10] Bounty from Below
[11]. Ibid
[12] 06/22/2007: "The Icing on the Cake" Perryman Group Newsletter
[13] Drilling for Dollars
[14] Drilling for Dollars, p 8.

permits and fees payable to local governments and other state revenues stemming from various types of taxable activity.[15]

Exploration, drilling, and production in the field have transformed the economy with thousands of jobs and millions of dollars in investment; led to royalty and bonus payments to local residents, cities, school districts, and others totaling millions of dollars each year; increased property tax receipts to counties, schools, and other entities; and contributed to opportunities and prosperity for the entire region.[16]

When all major categories of stimulus from Barnett Shale activity are summed, the result includes $5.2 billion in annual output and some 55,385 permanent jobs. These impacts are notable even in the region's large and diverse economy. The overall effects of Barnett Shale activity are likely to account for an average of more than 108,000 jobs and $10.4 billion in output per year through 2015.

Table 1: Historical and Projected Values for Key Economic Indicators for the Barnett Shale Region

Date	Gross Area Product	Private Gross Area Product	Real Gross Area Product	Private Real Gross Area Product	Personal Income (by place of residence)	Real Personal Income (by place of residence)	Personal Income (by place of work)	Real Personal Income (by place of work)
2001	$73,082.660	$65,783.714	$85,048.633	$75,969.208	$74,941.131	$86,986.647	$49,533.454	$57,495.116
2002	$76,343.722	$68,499.154	$88,606.969	$79,262.763	$76,349.170	$88,554.889	$42,602.240	$49,412.936
2003	$80,082.608	$71,718.384	$89,927.581	$80,382.536	$78,841.470	$88,413.448	$43,850.862	$49,174.704
2004	$86,461.309	$77,540.460	$95,103.181	$85,290.687	$83,615.133	$91,972.528	$46,688.991	$51,355.590
2005	$96,878.852	$86,884.967	$100,357.220	$90,004.511	$90,121.190	$93,356.928	$50,278.803	$52,084.029
2006	$106,011.651	$95,077.629	$106,011.651	$95,077.629	$98,378.761	$98,378.761	$55,041.789	$55,041.789
2007	$113,257.264	$101,578.056	$110,563.640	$99,162.201	$105,635.625	$103,123.268	$59,098.496	$57,692.943
2008	$121,276.907	$108,772.981	$115,407.139	$103,508.400	$113,066.853	$107,594.450	$63,252.567	$60,191.161
2009	$129,734.453	$116,360.970	$120,380.673	$107,971.411	$120,879.692	$112,164.335	$67,619.343	$62,744.027
2010	$138,785.006	$124,481.165	$125,562.590	$112,621.514	$129,157.787	$116,852.582	$72,245.887	$65,362.830
2011	$148,384.419	$133,094.002	$130,923.817	$117,432.645	$137,911.498	$121,683.260	$77,137.942	$68,061.013
2012	$158,527.414	$142,194.778	$136,432.404	$122,376.155	$147,162.870	$126,651.811	$82,307.797	$70,836.017
2013	$169,251.068	$151,816.781	$142,104.799	$127,466.807	$156,930.842	$131,760.621	$87,766.000	$73,689.165
2014	$180,579.264	$161,981.467	$147,942.174	$132,705.659	$167,235.658	$137,010.231	$93,523.828	$76,620.749
2015	$192,536.093	$172,710.480	$153,945.429	$138,093.531	$178,097.652	$142,400.933	$99,592.603	$79,630.919

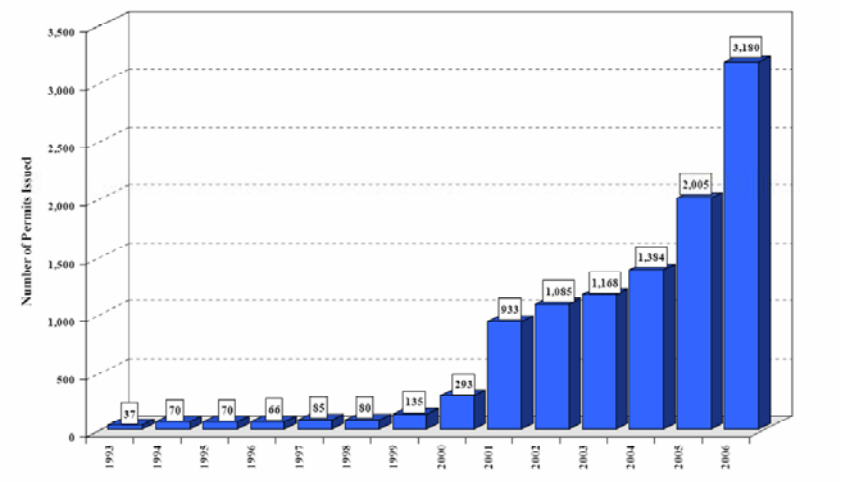
Source: Bounty from Below

[15] Bounty from Below
[16] Ibid

Drilling and Production

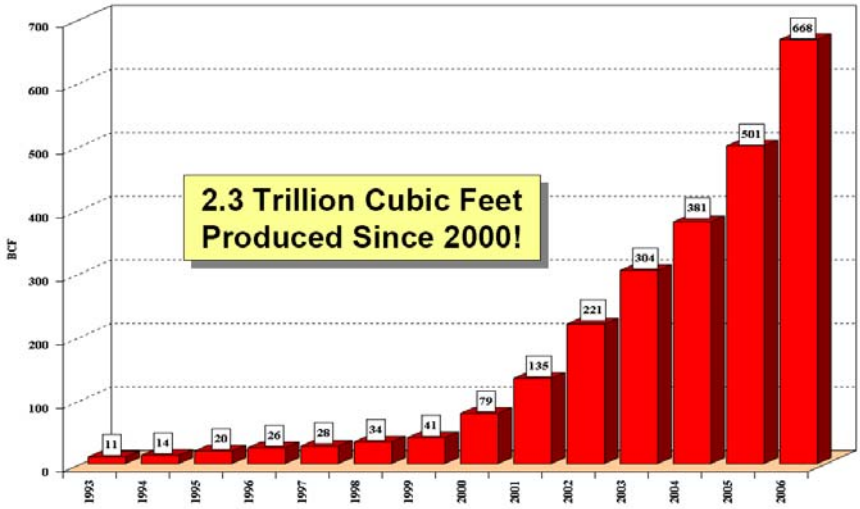
Drilling for and production of natural gas has skyrocketed over the last fifteen years. Currently, Texas has thousands of wells producing hundreds of billions of cubic feet of natural gas each year.[17] In 2007, Barnett Shale produced 1,165 Bcf of natural gas. Assuming an average sale price of $7 per Mcf and an average royalty rate of 20 percent, royalty owners split just more than $1.6 billion in royalty payments last year. The following charts demonstrate the incredible growth that has occurred in related permits, drilling and production.

Figure 5: Barnett Shale Drilling Permits
(1993 through 2006)



Source: Texas Railroad Commission

Figure 6: Natural Gas Production in Barnett Shale
(1993 through 2006)



Source: Texas Railroad Commission

[17] Drilling for Dollars

Case Study 1: Denton County, Texas

Denton County is part of the Dallas/Fort Worth, Texas, metropolitan area. It is a moderately sized county that has experienced tremendous growth since the mid-nineties when Barnett Shale came into play. It is important to look at the impact of Barnett Shale on its local economy in order to draw a comparison to our region. This county is used as a case study because of its similarities to some of the counties located within Pennsylvania's 10th Congressional District.

In 1995, Denton County had a population of 317,850. At the time, 156 wells provided the county with mineral revenue of $88,786. By 2004, Denton County's population reached 528,950 and 1,460 wells provided the county with mineral of more than $2.7 million. This represents a 66.4 percent increase in population, an 835.9 percent increase in wells, and a 2,976 percent increase in mineral valuation.[18]

A variety of factors have contributed to Denton County's growth, including the fact that state and local regulations have facilitated natural gas drilling and production. Each well can produce fuel for up to two decades. It is estimated that the Barnett Shale formation can produce natural gas for up to 30 years.

This case study examines Denton County's population, economic, and social data at three distinct time periods: 1990 – before energy companies were able to recover Barnett Shale; 2000 – a few years after the technology to drill for this type of shale became available; and 2005 or 2006 (depending on data source) – the most recent data available, which provides a current snapshot of the county's social and economic status.

Population Impact

Barnett Shale has resulted in Denton County's growing population, which has more than doubled since 1990 (See Table 2 on the next page). The county's largest population increase occurred in residents age 45-59. This may infer that the Barnett Shale industry is attracting older, more experienced workers.

[18] DENTON COUNTY OIL AND GAS TASK FORCE SUMMARY REPORT June 1, 2005

Table 2: Denton County Population 1990 – 2006

1990		2000		2006	
Total population	**273,525**	**Total population**	**432,976**	**Total population**	**584,238**

Economic Impact

Denton County residents also benefited directly from the Barnett Shale industry. The county experienced tremendous growth in median household income – from $36,914 in 1990 to $66,792 in 2006. The largest increase occurred in the $100,000 - $149,999 income range. In 1990, just 3 percent of the county's population fell into that income bracket; by 2006, more that 16 percent did so.

Table 3: Denton County Income 1990 – 2006

1990			2000			2006		
Total households	**102,025**	**100**	**Total households**	**159,062**	**100**	**Total households**	**198,774**	**100**
Less than $5,000	4,581	4.5%	Less than $10,000	8,313	5.2	Less than $10,000	8,734	4.4%
$5,000 to $9,999	5,528	5.4%	$10,000 to $14,999	5,574	3.5	$10,000 to $14,999	7,105	3.6%
$10,000 to $14,999	6,720	6.6%	$15,000 to $24,999	12,977	8.2	$15,000 to $24,999	13,918	7.0%
$15,000 to $24,999	14,947	14.7%	$25,000 to $34,999	16,206	10.2	$25,000 to $34,999	16,513	8.3%
$25,000 to $34,999	16,129	15.8%	$35,000 to $49,999	23,634	14.9	$35,000 to $49,999	27,114	13.6%
$35,000 to $49,999	20,903	20.5%	$50,000 to $74,999	34,457	21.7	$50,000 to $74,999	37,113	18.7%
$50,000 to $74,999	21,213	20.8%	$75,000 to $99,999	23,440	14.7	$75,000 to $99,999	31,260	15.7%
$75,000 to $99,999	7,548	7.4%	$100,000 to $149,999	22,397	14.1	$100,000 to $149,999	32,439	16.3%
$100,000 to $149,999	3,101	3.0%	$150,000 to $199,999	6,507	4.1	$150,000 to $199,999	14,274	7.2%
$150,000 or more	1,355	1.3%	$200,000 or more	5,557	3.5	$200,000 or more	10,304	5.2%
Median household income (dollars)	36,914	(X)	Median household income (dollars)	58,216	(X)	Median household income (dollars)	66,792	(X)

We also looked at income in terms of Individual Tax Return Data. Data obtained from the IRS (Internal Revenue Service). Denton County shows a 325% increase in dividends from 1990 – 2005 with adjust gross reflecting 312.8%.

Table 4: Denton County Tax Return Data 1900 - 2005

	Number of Returns	Number of Exemptions	Adjusted Income	Wages & Salaries	Dividends Before Exclusions	Interest Received	Gross Rents & Royalties
1990	92,235	219,385	3,432,829	3,005,711	29,004	151,178	89,091
2000	163,704	373,348	10,831,294	9,019,378	110,453	198,085	168,374
2005	209,681	488,001	14,171,829	12,072,937	123,211	182,459	N/A
Percentage Change	127.3%	122.4%	312.8%	301.7%	324.8%	20.7%	N/A

Source: IRS (numbers in thousands)

The table on the next page demonstrates the effects of Barnett Shale on business activity. Clearly, the Barnett Shale industry has had a ripple effect on many business activities. For example, the industry has increased the number of permanent maintenance, repair, and construction jobs by nearly 300. Jobs in the hospitality industry have increased by 365. Most notably, there have been more than 600 permanent jobs added in the retail trade category. The industry has also increased gross product and personal income.

Table 5: Current Annual Impact of the Barnett Shale on Business Activity in Denton County

Category	Total Expenditures	Gross Product	Personal Income	Employment (Permanent Jobs)
Agricultural Products & Services	$7,471,466	$2,079,176	$1,416,033	26
Forestry & Fishery Products	$9,294	$11,402	$4,221	0
Coal Mining	$11,287	$3,260	$3,464	0
Crude Petroleum & Natural Gas	$469,658,936	$102,933,330	$47,472,730	271
Miscellaneous Mining	$45,368	$19,307	$11,345	0
New Construction	$0	$0	$0	0
Maintenance & Repair Construction	$37,063,620	$20,031,460	$16,507,173	271
Food Products & Tobacco	$8,495,185	$2,185,723	$1,116,574	22
Textile Mill Products	$4,552	$1,541	$1,312	0
Apparel	$3,676,115	$2,019,994	$1,023,558	32
Paper & Allied Products	$2,413,115	$1,109,864	$501,763	9
Printing & Publishing	$3,355,360	$1,687,521	$1,101,484	22
Chemicals & Petroleum Refining	$17,583,842	$3,096,852	$1,454,148	12
Rubber & Leather Products	$1,813,009	$761,100	$444,932	10
Lumber Products & Furniture	$1,106,387	$355,033	$253,116	5
Stone, Clay, & Glass Products	$2,363,147	$1,201,889	$628,593	11
Primary Metal	$77,412	$23,265	$17,329	0
Fabricated Metal Products	$5,883,591	$2,192,617	$1,415,554	28
Machinery, Except Electrical	$3,363,235	$1,425,545	$1,018,412	12
Electric & Electronic Equipment	$2,596,597	$1,434,956	$857,855	8
Motor Vehicles & Equipment	$1,277,000	$304,162	$197,602	3
Transp. Equip., Except Motor Vehicles	$405,260	$170,060	$111,145	1
Instruments & Related Products	$567,808	$245,519	$186,620	2
Miscellaneous Manufacturing	$1,091,061	$404,629	$279,081	5
Transportation	$7,910,097	$5,192,149	$3,433,903	55
Communication	$9,673,043	$5,974,783	$2,550,831	26
Electric, Gas, Water, Sanitary Services	$22,575,780	$5,051,629	$2,204,482	11
Wholesale Trade	$19,040,534	$12,866,700	$7,419,052	97
Retail Trade	$41,095,996	$34,088,970	$20,384,111	621
Finance	$7,520,353	$4,185,659	$2,437,439	24
Insurance	$5,148,632	$3,097,012	$1,851,523	26
Real Estate	$84,159,982	$22,819,264	$3,676,681	37
Hotels, Lodging Places, Amusements	$3,858,521	$2,019,564	$1,324,905	38
Personal Services	$8,639,341	$5,332,693	$4,148,911	81
Business Services	$16,160,887	$9,429,208	$7,691,827	109
Eating & Drinking Places	$22,277,966	$13,070,464	$6,954,183	365
Health Services	$14,519,641	$10,137,786	$8,571,591	165
Miscellaneous Services	$13,737,290	$5,677,253	$4,921,704	137
Households	$329,914	$329,914	$322,942	26
Total	**$847,022,624**	**$282,971,729**	**$153,918,129**	**2,569**

NOTE: All monetary values are given in constant 2006 dollars.
SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

Source: Bounty from Below

The number of owner occupied housing units soared during the time period studied. In 1990 there were 48,766 units. By 2006 this number rose to 135,650 – an increase of 178 percent.

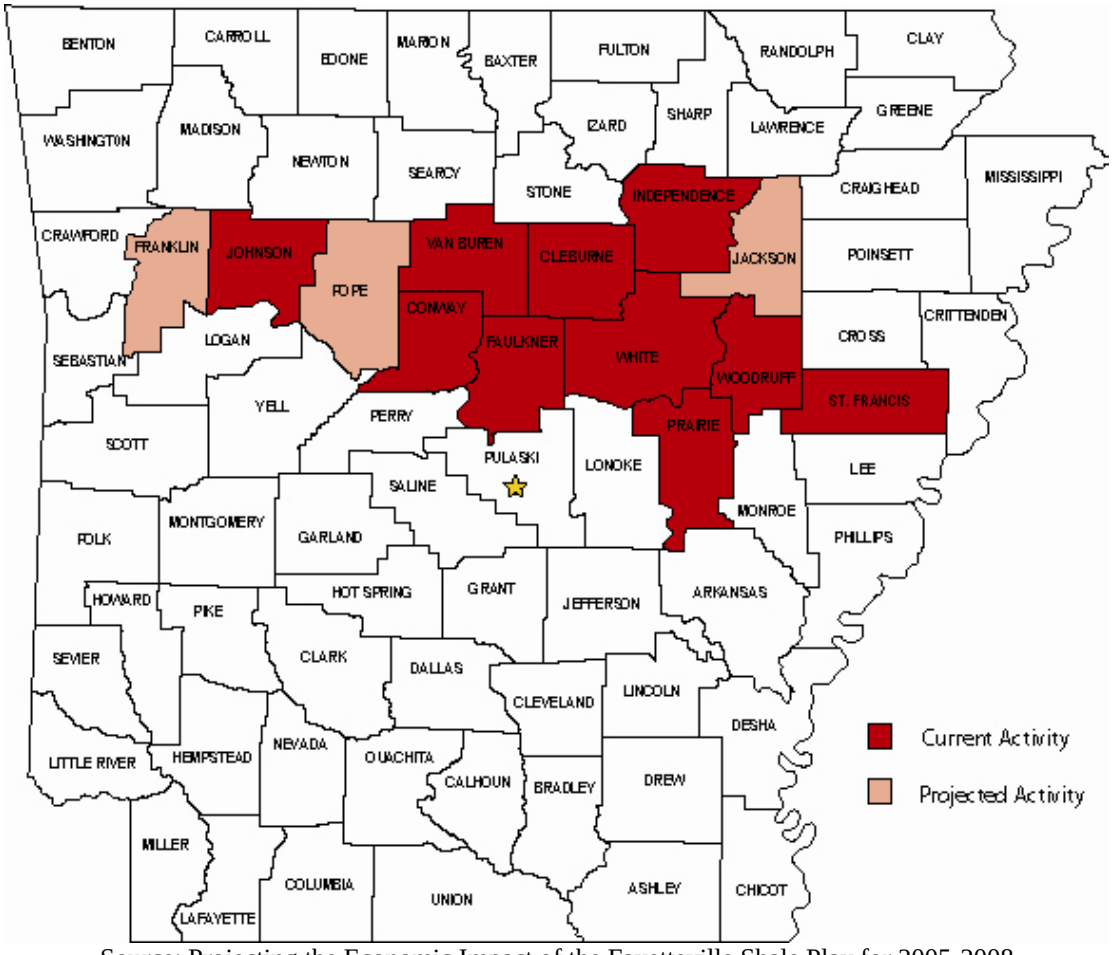
Table 6: Denton County Owner-Occupied Households 1990 – 2006

1990			2000			2006		
Total households	**48,766**	**100**	**Total households**	**88,484**	**100**	**Total households**	**135,650**	**+/-3,436**
Less than $50,000	4,001	8.2%	Less than $50,000	1,804	2	Less than $50,000	5,805	+/-1,363
$50,000 to $99,999	27,093	55.6%	$50,000 to $99,999	21,239	24	$50,000 to $99,999	10,121	+/-1,219
$100,000 to $149,999	12,058	24.7%	$100,000 to $149,999	31,157	35.2	$100,000 to $149,999	35,078	+/-2,240
$150,000 to $199,999	3,386	6.9%	$150,000 to $199,999	16,818	19	$150,000 to $199,999	33,208	+/-2,421
$200,000 to $299,999	1,600	3.3%	$200,000 to $299,999	11,855	13.4	$200,000 to $299,999	29,285	+/-1,867
			$300,000 to $499,999	4,238	4.8	$300,000 to $499,999	15,711	+/-1,511
			$500,000 to $999,999	1,111	1.3	$500,000 to $999,999	5,523	+/-1,241
$300,000 or more	628	1.3%	$1,000,000 or more	262	0.3	$1,000,000 or more	919	+/-354
Median (dollars)	89,100	(X)	Median (dollars)	133,200	(X)	Median (dollars)	171,700	+/-2,942

Fayetteville Shale

Fayetteville Shale is an unconventional natural gas reservoir located on the Arkansas side of the Arkoma Basin, ranging in thickness from 50 to 325 feet and ranging in depth from 1,500 to 6,500 feet. Fayetteville Shale is a Mississippian-age shale that is the geologic equivalent of Caney Shale found on the Oklahoma side of the Arkoma Basin, and Barnett Shale found in North Texas.[19] Fayetteville Shale is aerially extensive and may exist across numerous counties in central and eastern Arkansas, including the counties of Cleburne, Conway, Faulkner, Independence, Johnson, St. Francis, Prairie, Van Buren, White, and Woodruff. Direct economic activities associated with the development of Fayetteville Shale include: exploration, extraction, production, transportation, storage and distribution.[20]

Figure 7: Arkansas Counties Involved in the Fayetteville Shale Play



Source: Projecting the Economic Impact of the Fayetteville Shale Play for 2005-2008

[19] http://www.swn.com/operations/fayetteville.shale.asp
[20] Arkansas Oil and Gas Commission

Fayetteville Shale is a recently tapped unconventional source of natural gas. The tight, finely-grained rock formation, 300 million years old, ranges in thickness from 50 to 550 feet and in depth from 1,500 to 6,500 feet. The "sweet spot," where geologists believe the rock holds the greatest natural gas reserve, resides in five Central Arkansas counties: Cleburne, Conway, Faulkner, Van Buren, and White. [21]

In 2002, Houston-based Southwestern Energy began natural gas exploration in Arkansas. The company holds mineral rights on about 887,000 acres, and estimates that those properties could produce 11 Tcf of natural gas. Southwestern Energy predicts that it may drill as many as 8,000 wells.

Other companies involved in the shale play and their approximate acreage include:[22]

•Chesapeake Energy (1 million acres)

•Hallwood Energy (480,000 acres)

•Maverick Oil & Gas (125,000 acres)

•Shell Exploration & Production Co. (70,000 acres)

By the end of 2006, about 180 wells in Fayetteville Shale were completed.

U.S. natural gas production amounts to approximately 18-19 Tcf per year. Arkansas production, before the tapping of shale, amounted to about 1 percent of total production.

Table 7: Projected Economic Impact of the Fayetteville Shale Play in the State of Arkansas

Year	2005	2006	2007	2008	Total 2005-2008
Output Impact	$520.7 million	$1.1 billion	$1.6 billion	$2.3 billion	$5.52 billion
Employment Impact	2160	4394	6,661	9,683	9,683
State and Local Tax Impact	$28.1 million	$69.5 million	$105.9 million	$154.1 million	$357.7 million

[21] http://cleburnecountyarkansas.com.hosting.domaindirect.com/id10.html
[22] Ibid.

Case Study 2: Faulkner County, Arkansas

According to an economic impact study conducted by the University of Arkansas, Faulkner County's population is expected to increase to 133,170 by 2025.[23] The county's major industries include: manufacturing (19 percent), retail trade (14 percent), and accommodation and food services (10 percent). Leasing land and mineral rights, drilling, and other activities of energy companies within Faulkner County are expected to account for total economic activity of $308.6 million from 2005 to 2008. By 2008, 0.9 percent of Faulkner County employment or 484 jobs will be attributable to Fayetteville Shale play activities. A total of $21.5 million in local and state tax revenues will result from energy company investments made between 2005 and 2008.

Population Impact

Here too, there are population impacts. Faulkner County's population increased by nearly 40 percent between 1990 and 2006

Table 8: Faulkner County Population 1990 – 2006

1990		2000		2006	
Total population	**60,006**	**Total population**	**86,014**	**Total population**	**100,685**

Economic Impact

Like the previous case study, Faulkner County has experienced a tremendous increase in household income statistics. The county increased from 204 in the $100,000 to 149,999 income bracket in 1990 to 3604 in 2006.

[23] Projecting the Economic Impact of the Fayetteville Shale Play 2005-2008

Table 9: Faulkner County Income 1990 – 2006

1990			2000			2006		
Total households	**21,193**	**100%**	**Total households**	**31,853**	**100%**	**Total households**	**39,351**	**+/-735**
Less than $10,000	3934	18.6%	Less than $10,000	3,352	10.5	Less than $10,000	3,636	+/- 1,074
$10,000 to $14,999	2,355	11.1%	$10,000 to $14,999	2,283	7.2	$10,000 to $14,999	2,050	+/-752
$15,000 to $24,999	4,846	22.9%	$15,000 to $24,999	4,602	14.4	$15,000 to $24,999	5,459	+/- 1,288
$25,000 to $34,999	3,770	17.8%	$25,000 to $34,999	4,383	13.8	$25,000 to $34,999	5,389	+/- 1,254
$35,000 to $49,999	3,646	17.2%	$35,000 to $49,999	5,679	17.8	$35,000 to $49,999	6,102	+/- 1,078
$50,000 to $74,999	1,976	9.3%	$50,000 to $74,999	6,297	19.8	$50,000 to $74,999	6,662	+/-981
$75,000 to $99,999	400	1.9%	$75,000 to $99,999	2,817	8.8	$75,000 to $99,999	4,454	+/- 1,070
$100,000 to $149,999	204	1.0%	$100,000 to $149,999	1,643	5.2	$100,000 to $149,999	3,604	+/-808
			$150,000 to $199,999	368	1.2	$150,000 to $199,999	1,038	+/-447
$150,000 or more	62	0.3%	$200,000 or more	429	1.3	$200,000 or more	957	+/-465
Median household income (dollars)	23,663	(X)	Median household income (dollars)	38,204	(X)	Median household income (dollars)	41,748	+/- 2,945

Faulkner County is a strong example of increased wealth. It shows a 222.3% increase in dividends before exclusions with a 204% increase in adjusted gross income.

Table 10: Faulkner County Tax Return Data

	Number of Returns	Number of Exemptions	Adjusted Income	Wages & Salaries	Dividends Before Exclusions	Interest Received	Gross Rents & Royalties
1990	20,814	49,635	$551,153	$449,095	$4,930	$29,262	$18,903
2000	32,498	74,563	$1,376,962	$1,099,476	$14,083	$37,050	$30,045
2005	35,624	80,670	1,680,270	1,314,348	15,889	27,603	N/A
Percentage Change 1990 - 2005	71.2%	62.5%	204.9%	192.7%	222.3%	-5.7%	N/A

Source: IRS (numbers in thousands)

Employment has increased tremendously in Faulkner County with a civilian labor force of 31,913 in 1990 to 49,014 in 2006.

Table 11: Faulkner County Employment Data

	1990	2000	2004	% Change 1990-2000	% Change 1990-2000
Civilian Labor Force	31,913	45,335	49,014	42%	8%
Employment	29,618	43,704	46,615	48%	7%
Unemployment	2,295	1,631	2,399	-29%	47%
Unemployment Rate	7.2%	3.6%	4.9%	-3.6%	1.3%

Along with increased income and employment comes increased home ownership. The number of owner occupied housing units increased by nearly 17,000 from 1990 to 2006; and increase of 107%. The median home value skyrocketed from $55,400 in 1990 to $115,000 in 2006. This was a 107% change.

Table 12: Faulkner County Owner Occupied Households

	1990	2000	2006	Percentage Change 1990- 2006
Owner Occupied Housing	9,913	21,874	26,824	170%
Median Home Value	$55,400	$92,900	$115,000	107%

Case Study 3: White County, Arkansas

By 2025, the population of White County, Arkansas, is expected to increase to 91,640. The county's major industries include: manufacturing (21 percent), retail trade (16 percent), and transportation and warehousing (11 percent). Leasing land and mineral rights, drilling, and other activities of energy companies within White County will account for total economic activity of $892.2 million from 2005 to 2008. By 2008, 4.8 percent of White County's total employment or 1,597.8 jobs will be attributable to Fayetteville Shale play activities. Between 2005 and 2008, $55.6 million in local and state tax is attributable to energy company investments.

Table 13: White County Population 1990 – 2006

1990			2000			2006		
Total population	**54,676**	**100%**	**Total population**	**67,165**	**100%**	**Total population**	**72,560**	**100%**
SEX AND AGE			**SEX AND AGE**			**SEX AND AGE**		
Male	26,539	48.5%	Male	32,753	48.8%	Male	35,756	49.3%
Female	28,137	51.5%	Female	34,412	51.2%	Female	36,804	50.7%
Under 5 years	3,539	6.5%	Under 5 years	4,214	6.3%	Under 5 years	4,395	6.1%
5 to 17 years	10,160	18.6%	5 to 9 years	4,614	6.9%	5 to 9 years	4,897	6.7%
18 to 20 years	3,792	6.9%	10 to 14 years	4,740	7.1%	10 to 14 years	4,469	6.2%
21 to 24 years	3,541	6.5%	15 to 19 years	5,700	8.5%	15 to 19 years	5,992	8.3%
25 to 44 years	14,912	27.3%	20 to 24 years	5,676	8.5%	20 to 24 years	6,741	9.3%
45 to 54 years	5,775	10.6%	25 to 34 years	8,544	12.7%	25 to 34 years	8,956	12.3%
55 to 59 years	2,551	4.7%	35 to 44 years	9,710	14.5%	35 to 44 years	9,311	12.8%
60 to 64 years	2,394	4.4%	45 to 54 years	8,438	12.6%	45 to 54 years	9,611	13.2%
65 to 74 years	4,410	8.1%	55 to 59 years	3,416	5.1%	55 to 59 years	3,576	4.9%
75 to 84 years	2,805	5.1%	60 to 64 years	2,860	4.3%	60 to 64 years	4,337	6.0%
85 years and over	797	1.5%	65 to 74 years	4,808	7.2%	65 to 74 years	5,159	7.1%
			75 to 84 years	3,191	4.8%	75 to 84 years	3,962	5.5%
			85 years and over	1,254	1.9%	85 years and over	1,154	1.6%

White County benefited directly from the Fayetteville Shale play. The county experienced growth in median household income – from $19,879 in 1990 to $27,792 in 2006. Table 14 on the next page demonstrates this growth

Table 14: White County Income 1990 – 2006

1990		2000			2006		
Households	**19,879**	**Households**	**25,158**	**100%**	**Total households**	**27,454**	**+/- 1,038**
Less than $5,000	2,210	Less than $10,000	3,197	12.7%	Less than $10,000	2,284	+/-595
$5,000 to $9,999	2,886	$10,000 to $14,999	2,077	8.3%	$10,000 to $14,999	2,330	+/-660
$10,000 to $14,999	2,703	$15,000 to $24,999	4,539	18%	$15,000 to $24,999	5,190	+/- 1,025
$15,000 to $24,999	4,380	$25,000 to $34,999	3,598	14.3%	$25,000 to $34,999	3,561	+/-648
$25,000 to $34,999	3,000	$35,000 to $49,999	4,821	19.2%	$35,000 to $49,999	4,702	+/-887
$35,000 to $49,999	2,680	$50,000 to $74,999	4,193	16.7%	$50,000 to $74,999	5,110	+/- 1,013
$50,000 to $74,999	1,479	$75,000 to $99,999	1,477	5.9%	$75,000 to $99,999	2,676	+/-901
$75,000 to $99,999	240	$100,000 to $149,999	777	3.1%	$100,000 to $149,999	774	+/-387
$100,000 to $149,999	160	$150,000 to $199,999	177	0.7%	$150,000 to $199,999	433	+/-322
$150,000 or more	141	$200,000 or more	302	1.2%	$200,000 or more	394	+/-253
Median household income (dollars)	19,722	Median household income (dollars)	32,203	(X)	Median household income (dollars)	36,259	+/- 4,066

White County, while not as wealthy has the other counties shows increases in dividends of 146.7% while adjusted gross income increased 122.4% in the same period.

Table 15: White County Tax Return Data

	Number of Returns	Number of Exemptions	Adjusted Income	Wages & Salaries	Dividends Before Exclusions	Interest Received	Gross Rents & Royalties
1990	19,351	46,191	$442,316	$350,362	$4,561	$30,186	$14,399
2000	22,493	51,458	$787,262	$608,403	$8,543	$31,430	$24,006
2005	24,962	57,802	983,765	754,359	11,254	22,499	
Percentage Change	29.0%	25.1%	122.4%	115.3%	146.7%	-25.5%	N/A

Employment has increased tremendously in Faulkner County with a civilian labor force of 26,310 in 1990 to 32,008 in 2006.

Table 16: White County Employment Data

	1990	2000	2004	% Change 1990-2000	% Change 1990-2000
Civilian Labor Force	26,310	30,893	32,008	17%	4%
Employment	23,772	29,436	30,006	24%	2%
Unemployment	2,528	1,457	2,399	-43%	37%
Unemployment Rate	9.6%	4.7%	6.3%	-4.9%	1.6%

We see the same pattern in White County as in the other counties that were studied. Here, the median home value increased from $43,200 to $88,800 – an increase of 105%

Table 17: White County Owner Occupied Households

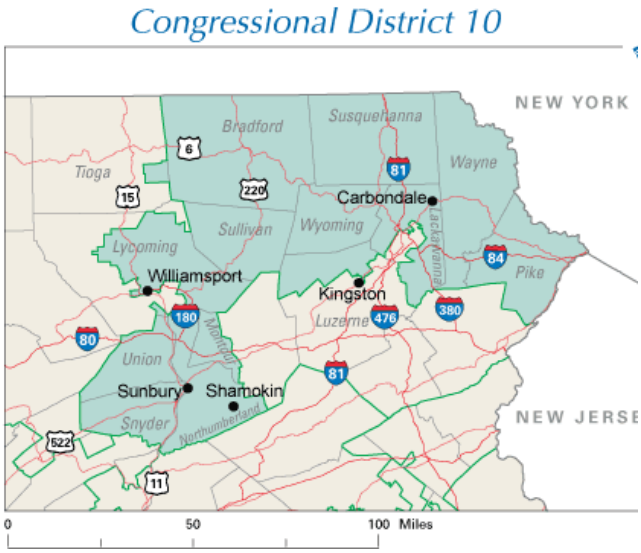
	1990	2000	2006	Percentage Change 1990-2006
Owner Occupied Housing	8,982	11,169	19,691	119%
Median Home Value	$43,200	$72,100	$88,800	105%

Potential Impact on Northeastern Pennsylvania

In Pennsylvania, companies have been drilling for natural gas for many years. However, such drilling has been mainly confined to western part of the state. In 2005 Pennsylvania produced about 168 billion cubic feet of natural gas. The average gas well production is less than 11 Mcf (thousand cubic feet) of natural gas per day (that's about enough gas to fuel one all-gas household for a month).[24] These numbers may soon increase exponentially. The analysis on the next few pages will make a comparison to the case studies and provide a glimpse into where the region may be headed.

Figure 8: 1990 District Map

Figure 9: 2000 District Map



[24] DEP Fact Sheet. Oil and Gas Well Drilling and Production in Pennsylvania.

The population statistics below reflect a 14 percent increase for the entire 10th Congressional District from 1990 - 2006. Comparing this with the counties in Texas and Arkansas, the population increase is significantly less. An assumption could be that the increase in population is due to an increase in job availability, which is attributable to the new industry. Also, natural gas exploration produced numerous ancillary jobs. And given that re-districting between the 1990 and 2000 Census essentially changed the composition of the 10th Congressional District by adding portions of Luzerne, Union, Snyder, Northumberland, and Montour Counties [and losing a small portion of Lackawanna County] the change from 2000 to 2006 is negligible.

Table 18: Northeastern PA - The 10th Congressional District

1990			2000			2006		
Total population	**565,681**	**100%**	**Total population**	**646,534**	**100%**	**Total population**	**649,330**	**+/-6,720**
Male	271,774	48%	Male	318,743	49.3%	Male	321,711	+/-3,868
Female	293,907	52%	Female	327,791	50.7%	Female	327,619	+/-4,075
Under 5 years	37,947	6.7%	Under 5 years	35,177	5.4%	Under 5 years	32,332	+/-1,476
5 to 17 years	98,963	17.4%	5 to 9 years	42,022	6.5%	5 to 9 years	33,170	+/-1,916
18 to 20 years	25,487	4.5%	10 to 14 years	46,517	7.2%	10 to 14 years	43,709	+/-2,317
21 to 24 years	28,532	5%	15 to 19 years	45,974	7.1%	15 to 19 years	47,857	+/-1,680
25 to 44 years	165,867	29.3%	20 to 24 years	34,115	5.3%	20 to 24 years	39,742	+/-1,839
45 to 54 years	57,582	10.1%	25 to 34 years	75,847	11.7%	25 to 34 years	70,481	+/-2,319
55 to 59 years	26,229	4.6%	35 to 44 years	101,532	15.7%	35 to 44 years	92,338	+/-2,343
60 to 54 years	29,955	5.3%	45 to 54 years	92,374	14.3%	45 to 54 years	102,258	+/-2,772
55 to 64 years	54,799	9.6%	55 to 59 years	35,599	5.5%	55 to 59 years	45,800	+/-1,986
			60 to 64 years	30,138	4.7%	60 to 64 years	34,625	+/-1,804
65 to 74 year	65,799		65 to 74 years	55,142	8.5%	65 to 74 years	52,214	+/-1,523
75 to 84 years	31,306	5.5%	75 to 84 years	38,609	6%	75 to 84 years	40,809	+/-1,672
85 years and over	9,014	1.6%	85 years and over	13,488	2.1%	85 years and over	13,995	+/-1,352
Median age (years)	N/A	(X)	Median age (years)	39.4	(X)	Median age (years)	41.8	+/-0.3

The median household income changes from $25, 648 to $41, 445, or 6 percent over the 16-year-period, are also negligible.

Table 19: 10th Congressional District Owner Occupied Households

1990			2000			2006		
Total households	**212,857**	**100%**	**Total households**	**250,770**	**100%**	**Total households**	**255,651**	**+/-3,168**
			Less than $10,000	24,469	9.8%	Less than $10,000	19,648	+/-1,596
Less than $10,000	37,268	17.5%	$10,000 to $14,999	20,763	8.3%	$10,000 to $14,999	19,049	+/-1,602
$10,000 to $14,999	23,473	11.0%	$15,000 to $24,999	39,364	15.7%	$15,000 to $24,999	35,706	+/-2,199
$15,000 to $24,999	42,883	20.1%	$25,000 to $34,999	37,093	14.8%	$25,000 to $34,999	33,671	+/-2,682
$25,000 to $34,999	37,748	17.7%	$35,000 to $49,999	46,300	18.5%	$35,000 to $49,999	43,050	+/-2,565
$35,000 to $49,999	37,664	17.7%	$50,000 to $74,999	47,039	18.8%	$50,000 to $74,999	50,543	+/-2,665
$50,000 to $74,999	23,570	11.1%	$75,000 to $99,999	18,926	7.5%	$75,000 to $99,999	26,806	+/-1,700
$75,000 to $99,999	5,685	2.7%	$100,000 to $149,999	11,234	4.5%	$100,000 to $149,999	18,285	+/-1,513
$100,000 to $149,999	2,887	1.4%	$150,000 to $199,999	2,543	1%	$150,000 to $199,999	4,883	+/-816
$150,000 or more	1,679	0.8%	$200,000 or more	3,039	1.2%	$200,000 or more	4,010	+/-791
Median household income (dollars)	25,648	(X)	Median household income (dollars)	35,996	(X)	Median household income (dollars)	41,445	+/-976

The housing chart on the following page reflects changes in both owner occupied housing and median home value. Compared with the percentage changes in counties with successful natural gas exploration, the 10th Congressional District reflects incremental changes over time.

Table 20: 10th Congressional District Housing

1990		2000		2006		Change
Owner occupied	152,807	Owner occupied	250,604	Occupied housing	255,651	67.30%
Median (dollars)	70,600	Median (dollars)	91,400	Median (dollars)	123,900	75.50%

Drilling and Production

Energy companies have been exploring in northeastern Pennsylvania for quite some time. Over a year ago, companies obtained drilling permits in Bradford and Lycoming counties.

The tables below show the number of permits issued and wells drilled in each Pennsylvania county examined. Lackawanna County does not currently have in place any permits issued or wells drilled; however, county records indicate that there are 85 leasing agreements in 2008. Wyoming County does not currently have any permits or wells drilled; however, there are in place 594 lease agreements with nine energy companies.

Table 21: Permits Issued

County	Month/Year										
	May 07	July 07	Aug 07	Sep 07	Oct 07	Nov 07	Dec 07	Jan 08	Feb 08	Mar 08	Apr 08
Bradford	2	-	-	-	-	-	-	3	-	-	2
Lycoming	3	-	2	1	2	1	6	2	12	12	8
Susquehanna	-	1	-	-	1	-	12	3	5	7	7
Wayne	-	-	-	-	-	-	-	-	-	-	1

Source: PA DEP

Table 22: New Well Drilled

County	Month/Year						
	Jul 07	Nov 07	Jan 08	Feb 08	Mar 08	Apr 08	May 08
Bradford					1	1	
Lycoming	1	1	1		2	3	
Susquehanna				1	2	2	1
Wayne					1		1

Source: PA DEP

At the time this study was completed, there was no data available on how much, if any, natural gas the region is producing.

Economic Impact

While it is very early in Pennsylvania's natural gas potential to make any predictions as to how much natural gas is available, experts estimate that the Marcellus Shale play has had more potential than both the Barnett and Fayetteville plays. Few can predict the output of a well at any point in time. Output declines quickly at first but decline in output slows towards the well's half life (10 – 15 years). Here, JUSC uses a conservative figure to its impact on an overall royalty.

Given this information JUSC can make general predictions of natural gas production in Pennsylvania.

Table 23: Potential Royalties from Natural Gas Drilling

Acres in Production Unit	100
And your Royalty % from your lease was	15%
Price for Natural Gas per Mcfe (value May 23, 2008)	$10
Daily Production Rate (MMcfe)	2
Then the TOTAL value of well Production/day is	$20,000
Your royalty per day would be	$3,000
Your royalty for YEAR 1 would be	$1,095,000
Total Principal Value of Royalty for a 20 Year period	$8,386,856

Table 24 Cash Flow for a Typical Gas Well in Southern Pennsylvania

Year	Gross Prod mfc	Net Prod. (7/8ths) mcf	Gas Price $/mfc	Working Interest Revenue - $	Expenses Leases oper. & overhead - $	Cost Depreciation $	Taxable Income $	PA Corporate Income Tax (99,9%) -$
1	16,544	14,476	8.00	115,808	3,600	31,020	81,188	**8,038**
2	10,969	9,598	8.00	76,783	3,600	20,567	53,616	**5,209**
3	8,490	7,429	8.00	59,430	3,600	15,919	39,911	**3,951**
4	7,039	6,159	8.00	49,273	3,600	13,198	32,475	**3,215**
5	6,070	5,311	8.00	42,490	3,600	11,381	27,509	**2,723**
6-10	22,486	19,675	8.00	157,402	18,000	42,161	97,241	**9,627**
11-15	15,906	13,918	8.00	111,342	18,000	29,824	63,518	**6,288**
16-20	12,633	11,054	8.00	88,431	18,000	23,687	46,744	**4,628**
21-25	10,623	9,295	8.00	74,361	18,000	19,918	36,443	**3,608**
26-30	9,240	8,085	8.00	64,680	18,000	17,325	29,355	**2,906**
Total	**120,000**	**105,000**			**108,000**		**507,000**	**50,193**

Cash Flow Assumptions:

*Drilling cost of $225,000 per well amortized over 30 years	* Lease operating and overhead expense of $300/well/month
*Landowner royalty of 1/8th (12.5%) of sales at wellhead	*PA Income Tax computed at corporate tax rate of 9.99%
*Wellhead gas price of $8.00/mfc	*This analysis does not include payment of state franchise or capital stock tax which is scheduled to phase out by 2010
*No escalation of prices or expenses	

Source: The Independent Oil & Gas Association of Pennsylvania

In 2006, oil and natural gas production royalties paid to Pennsylvania landowners totaled approximately $200 million. In 2006, Pennsylvania's oil and natural gas wells generated an estimated $100 million in state income tax revenues. Pennsylvania's wells produce 26 percent of the total amount of the Commonwealth's natural gas consumption. This volume of natural gas is equivalent to:

- 69 percent of the natural gas utilized by Pennsylvania's 2.6 million residential natural gas consumers; and
- 91 percent of the natural gas utilized by Pennsylvania's industries, which employ thousands of state residents.

Conclusion

The goal of this study is to assess the potential economic impact of land leasing and drilling of Marcellus Shale deposits, with particular emphasis on banking. It is intended to provide a comparison to other regions of the country that have experienced a sudden increase in population and wealth do to natural gas drilling from shale deposits. Looking at the case study regions from the "before and after" perspective allows us to infer the potential and possibilities in Northeastern Pennsylvania, specifically, the 10th Congressional District.

When we looked at the case study regions, we found unprecedented growth in population, income, and owner occupied housing. In Case Study 1 – we found that Barnett Shale has resulted in Denton County's population growing rapidly – it has more than doubled since 1990. Denton County residents also benefited directly from the Barnett Shale industry. The county experienced growth in median household income and wealth. Barnett Shale industry has also had a ripple effect on many business activities. The industry has increased the number of permanent maintenance, repair, and construction jobs by nearly 300. Jobs in the hospitality industry have increased by 365. Most notably, there have been more than 600 permanent jobs added in the retail trade category. The industry has also increased gross product and personal income.

Case Study 2 and 3 mirrored the results of Case Study 1. Although the growth in Arkansas is slower and on a smaller scale, it is still easy to see the affects the Fayetteville shale has already had on Faulkner and White Counties.

Faulkner County's population is expected to increase to 133,170 by 2025. In 1997 the population was just over 97,000. Leasing land and mineral rights, drilling, and other activities of energy companies within Faulkner County accounted for total economic activity of $308.6 million from 2005 to 2008. By 2008, 0.9 percent of Faulkner County employment or 484 jobs will be attributable to Fayetteville Shale play activities. A total of $21.5 million in local and state tax revenues will result from energy company investments made between 2005 and 2008.

The population of White County is expected to increase to 91,640 by 2025 – an increase of over 20,000 from 2005. Leasing land and mineral rights, drilling, and other activities of energy companies within White County will account for total economic activity of $892.2 million from 2005 to 2008. By 2008, 4.8 percent of White County's total employment or 1,597.8 jobs will be attributable to Fayetteville Shale play activities. Between 2005 and 2008, $55.6 million in local and state tax is attributable to energy company investments.

When we looked at Pennsylvania's 10th Congressional District we found significant potential for growth. Many of the counties that comprise the district are

already seeing some of Marcellus Shale's affects. Bradford, Lycoming, Susquehanna, and Wayne Counties all have permits issued and wells being drilled. Other counties in the district have several leasing agreements which may eventually lead to active natural gas wells.

Although the Marcellus Shale play is in its early development, the comparison to the case study counties allowed us to conclude that we are in for some growth in terms of wealth, employment, and housing. Experts from financial markets, geologists, government officials, and economists all predict that Marcellus shale is the next big opportunity for Appalachia, with unprecedented growth. Likewise, oil companies themselves have already invested hundreds of millions of dollars in the Pennsylvania Marcellus shale play, it is easy to conclude that opportunity exists.

It is likely that natural gas jobs will attract employees from all walks of life to our region. Because its so early in the Marcellus Shale play, we don't yet know when we will begin to see this increase or how rapid it may be. As more energy companies come to our regions and explore the drilling the picture will become clearer. The direct, indirect, and induced impact across the economy will also become clearer in the near future.

Natural Gas drilling from the Marcellus Shale has the potential to drastically change out region for the better. As jobs come and wealth increases we may find the population of Northeaster Pennsylvania increasing rapidly and we must be prepared. With rapid growth comes many challenges. Future JUSC analyses may look at the affects of natural gas drilling (noise, damage to roads, water usage, etc) as well as the factors that may come with growth such as housing shortages, crime, and crowded schools

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7 South Main Street, Suite 201, Wilkes-Barre, PA 18701
570.408.9850 * 570.408.9854 fax * www.urbanstudies.org
e:info@urbanstudies.org