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MSEEL Project Context: State of the Region (2001-2014)

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Resource Document Series

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Abstract

The Marcellus Shale Energy and Environmental Laboratory, or MSEEL is the nation's first integrated research initiative on shale gas drilling. An experimental hydraulic fracturing gas well is the centerpiece of the MSEEL project, "which West Virginia University launched in fall 2014 in partnership with Northeast Natural Energy, the National Energy Technology Laboratory of the U.S. Department of Energy and Ohio State University. The five-year, $11 million project is the first-ever long-term, comprehensive field study of shale gas resources in which scientists will study the process from beginning-to-end.[1]" Because one dimension of the MSEEL analysis is the economic impacts and implications of well-drilling activity, this report has been prepared to provide a statistical overview and description of the local and regional economies leading up to the initiation of the MSEEL project, and to set the stage generally for subsequent socioeconomic analyses. The report includes various graphs and tables that describe the local economy during the 2001 to 2014 period, providing a context within which to view the role of gas extraction activities in the economy.

[1] "Drilling to begin at experimental science well to be monitored by WVU, OSU researchers," Posted: Jun 26, 2015 10:55 AM EDT, Updated: Jul 26, 2015 10:55 AM EDT State Journal. http://www.statejournal.com/story/29416633/drilling-to-begin-at-experimental-science-well-to-be-monitored-by-wvu-osu-researchers

1 Introduction

Several major events in U.S. history occurred during the 2001-2014 period. The period began with the catastrophic 9/11 terrorist attacks that arguably shaped other financial and political events of subsequent years. That September event was unprecedented in U.S. history. It marked only the third time in history that the New York Stock Exchange was shut down for a period of time. In this case, it was closed from September 10 - 17. Besides the tragic human loss of that day, the economic losses were high. Some estimate that there was over $60 billion in insurance losses alone (Waugh, 2007). Approximately 18,000 small businesses were either displaced or destroyed in Lower Manhattan after the Twin Towers fell (Waugh, 2007). There was a buildup in homeland security on all levels. 9/11 was a catastrophic financial loss for the U.S. After the 9/11 terrorist attacks, the War on Terror was launched in Afghanistan and the Iraq War was launched shortly after in 2003. The cost of these wars is ongoing. In 2008, the Congressional Research Service had approved about $944 billion for the operations overseas (Fitzgerald and Cordesman, 2008). This has placed an incredible financial strain on the economy and it is impossible to know what the final cost will be at this time.

Severe weather also played a role during this era. On August 25, 2005, Hurricane Katrina hit the Gulf Coast of the U.S. as a strong Category 3 or low Category 4 storm (Jonkman et al., 2009). It quickly became the biggest natural disaster in U.S. history, almost destroying New Orleans due to severe flooding(Jonkman et al., 2009). Hurricane Rita quickly followed Katrina only to make matters worse. Between the two, more than $200 billion in damage was done (Plyer, 2016). 400,000 jobs were lost and 275,000 homes were destroyed(Plyer, 2016). Many of the jobs and homes were never to be recovered. Hundreds of thousands of people were displaced and over 1,000 were killed and more are missing (Plyer, 2016). The effect on oil and gasoline prices was long-lasting.

Financial issues also took a toll on the U.S. economy during this period. In September of 2008, a seemingly perfect storm of factors came together to engage the deepest economic downturn in not only the U.S., but across the globe, since the Great Depression (Stiglitz, 2010). The great investment banks that had stood on Wall Street began to collapse due to the sub-prime mortgage crisis and serious corporate fraud (Palley, 2011). During the last months of the Bush Administration, the federal government stepped in to bail out some of these institutions in order to keep the U.S. financial system afloat (Stiglitz, 2010). By the time the Obama Adminis-

tration reached the White House in January of 2009, the economy had contracted and the recession had taken hold. At the end of 2009, were are signs of recovery, but the process was slow (Palley, 2011). A few years later, the Affordable Care Act (Obamacare) began registering people for the expanded federal government health insurance program in 2013. This was in spite of a variety of waivers and problems in implementing the cumbersome rules and regulations of the program. Various states decided to allow the federal government to run the exchanges for them, while some states and the District of Columbia set up their own exchanges to sell the policies (Jones et al., 2014).

2 General Data

2.1 Employment

West Virginia's top five largest private employers are Wal-Mart, West Virginia United Health System, Charleston Area Medical Center, Kroger, and Mylan Pharmaceuticals. The ranking of the top five employers was unchanged from 2014. The retail giant Wal-Mart has been the state's largest private employer since 1998.

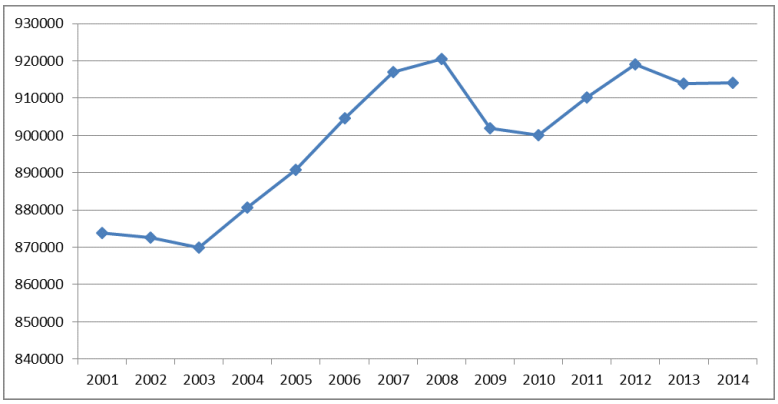

Figure 1: Total Employment (West Virginia)

A 2013 study indicated that 8.9 percent of employment in West Virginia was created by the oil and natural gas industry (PricewaterhouseCooper, 2013). The industry directly employed 35,925 people, or four percent of total state employment. Indirectly, the industry employed 22,374 people and induced 22,102 jobs (PricewaterhouseCooper, 2013). As Figure #1 shows West Virginia Experienced a sharp

increase in employment. This corresponded with the start of fracking's new golden age as oil and gas producers began to explore the nation's shale formations in earnest (Higginbotham et al., 2010).

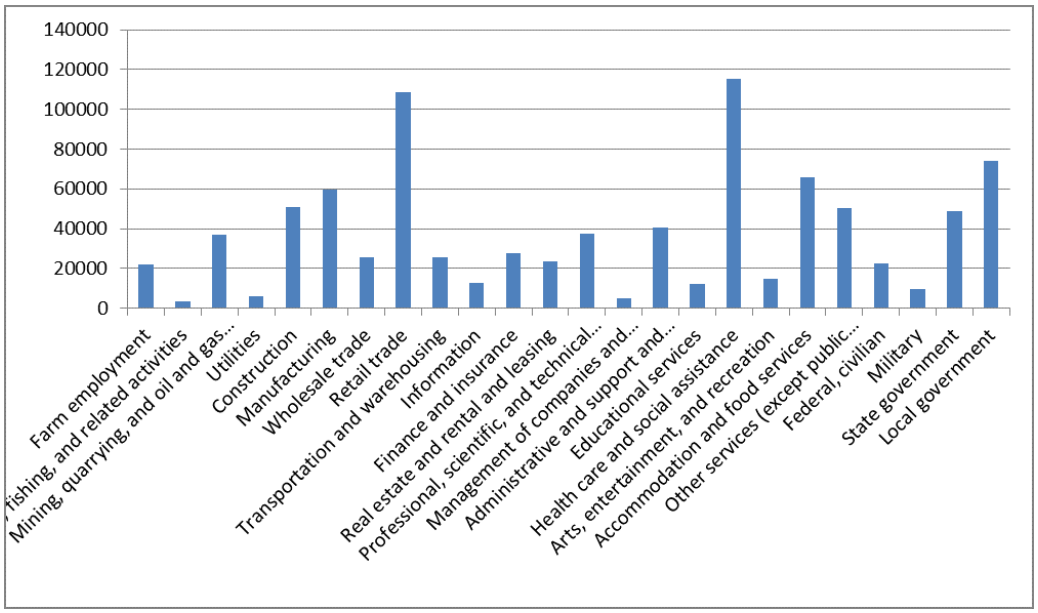

Figure 2: West Virginia: Average Sector Employment (2001-2014)

The most common industries in West Virginia by number of employees are Health Care and Social Assistance; Retail Trade; and Local Government. Compared to other states, West Virginia has an unusually high number of employees in the Mining sector (O'Leary and Boettner, 2012).

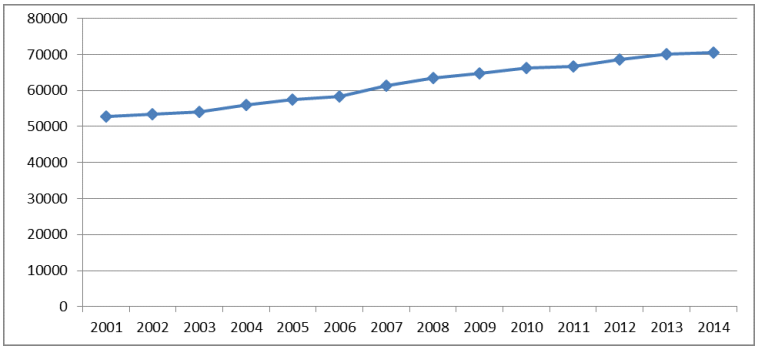

Figure 3: Monongalia: Total employment (number of jobs)

The top five employers in Monongalia County, the site of the experimental well, are West Virginia University, West Virginia University Hospitals, Mylan Pharmaceuticals, Inc., Monongalia County Board of Education and Monongalia General Hospital. Total employment in the county has steadily increased over the 2001-2014 time period reflecting its concentration in economically consistent sectors[2].

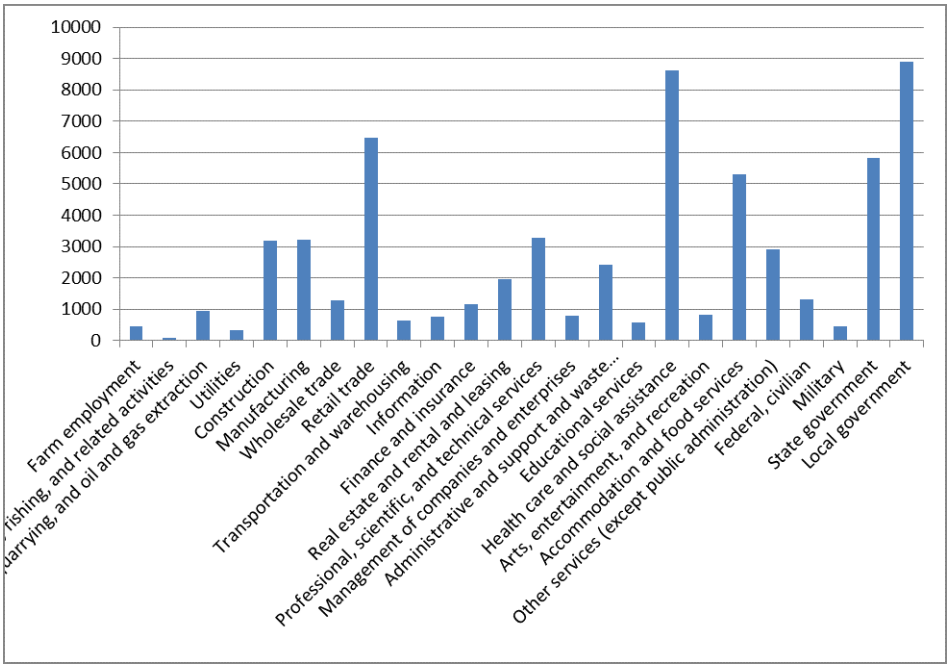

Figure 4: Monongalia: Average Sector Employment (2001-2014)

The most common industries in Monongalia County, WV by number of employees are Healthcare & Social Assistance; Retail trade; and Local Government. Its economy is driven by health and education resources, which are concentrated there in the city of Morgantown. West Virginia University (WVU), along with major hospitals and related health and social services, together generate almost 40% of the county's jobs (Hammond, 2011).

[2]Health care and social assistance is listed as a recession resistant sector by the BEA and BLS.

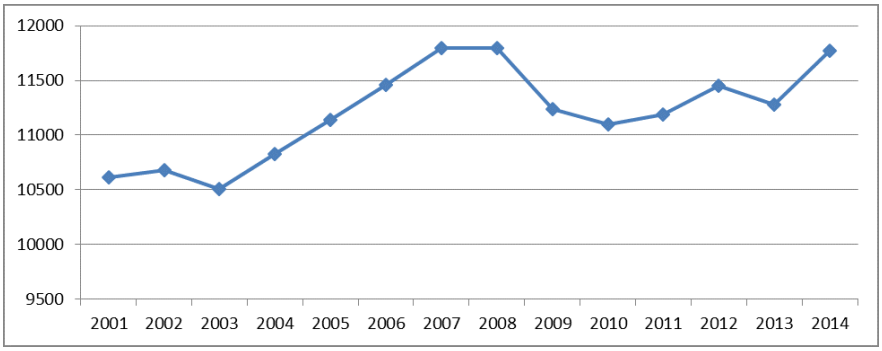

Figure 5: Preston: Total employment (number of jobs)

The top five employers in Preston County are the US Department of Justice, Preston County Board of Education, Preston Memorial Hospital, CW Wright Construction Company, Inc. and Wal-Mart Stores, Inc. The graph of total employment in Figure #5 closely mirrors that of state total employment in Figure #1. Preston started feeling the effects of the recession as early as 2008. The county experienced losses in total employment for the next two years. Fortunately in 2011 there was a rebound in job growth for Preston County.

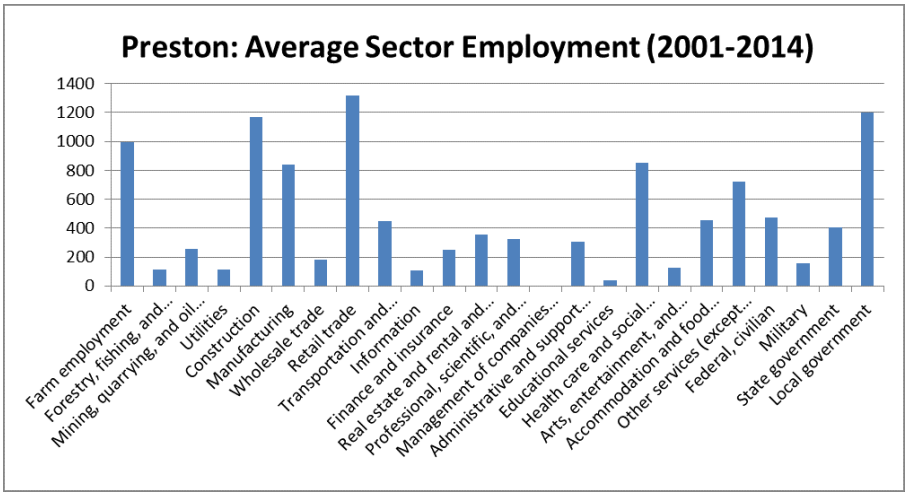

Figure 6: Preston: Average Sector Employment (2001-2014)

The most common industries in Preston County, WV by number of employees are Retail trade; Construction; and Local Government. The United States Penitentiary, Hazelton is a major employer in the state. It is a $129 million high security facility

with a satellite minimum security prison camp. The rural West Virginia County also has a significant amount of farm employment.

2.2 Unemployment and Per Capita Personal Income

The recession began to affect West Virginia employment in October of 2008. Between October 2008 and January 2010, West Virginia lost 32,400 jobs. Since then, the state has slowly added 11,600 jobs. While the situation does seem to be improving there has been little effect on the unemployment rate. The unemployment rate in 2014 at 6.6 percent is about one-third higher than the 2007 level.

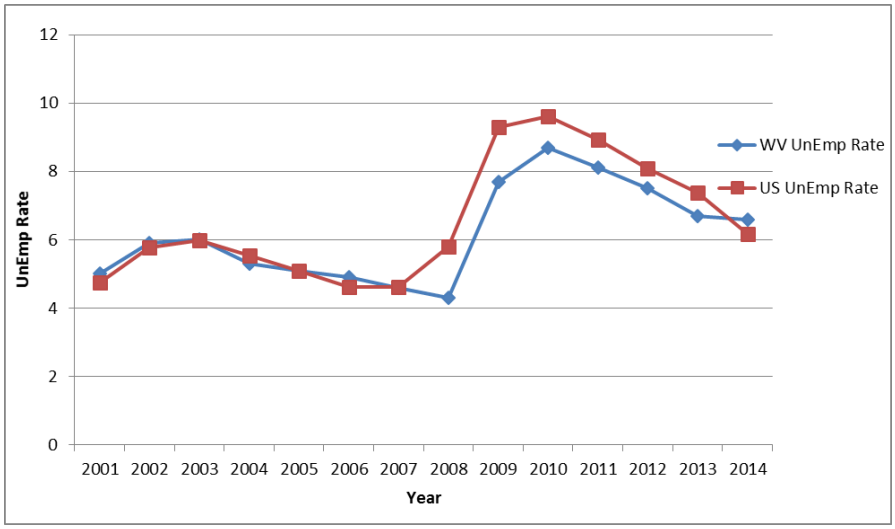

Figure 7: West Virgina v. US Unemployment Rate (2001-2014)

Further, the recovery has been unbalanced, with a net loss of jobs that paid high- or mid-level wages and a net increase of low-paying jobs. Of all the industries in the state, manufacturing and construction suffered the most. Construction saw a loss of 7,800 jobs, representing almost a quarter of all jobs lost. Manufacturing lost 7,200 jobs, over 22 percent of all jobs lost. Manufacturing jobs were already on the decline, the recession only accelerated the loss.

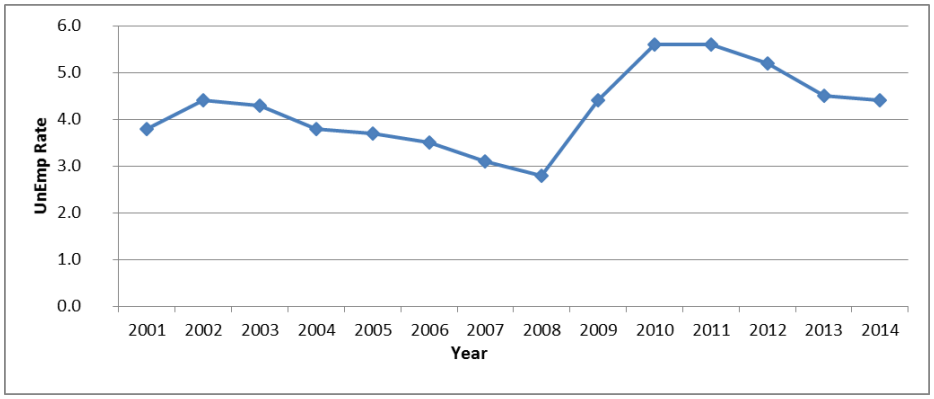

Figure 8: Monongalia Unemployment Rate (2001-2014)

Monongalia County has maintained a comparatively low unemployment rate over the 2001-2014 period. This is because Monongalia County, while having significant coal production, is primarily dependent on other sources of personal income. This income stems from education and health industries[3]. The economic conditions of the past few years have been extremely kind to employment needs in Monongalia County relative to the rest of the country. Unemployment rates were below five percent from 2001 to 2009 and below six percent for the entire 2001-2014 period. Monongalia County is well below the averages for West Virginia and the United States over the past ten years.

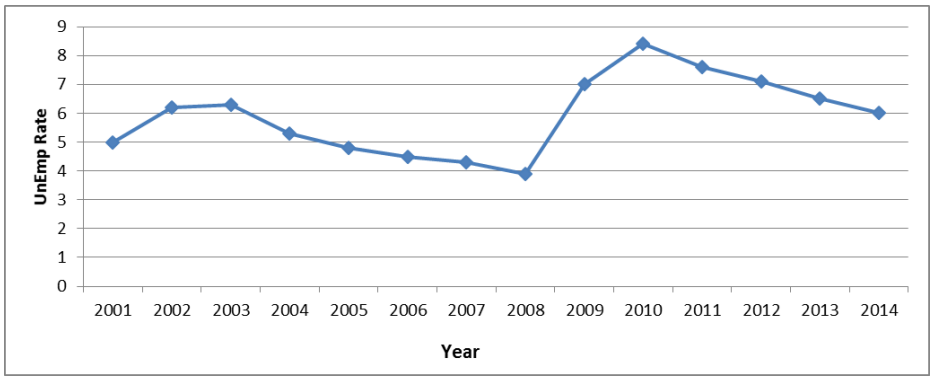

Figure 9: Preston Unemployment Rate (2001-2014)

Preston County suffered during the recession because it had a large number of construction jobs[4]. The county began to feel the effects of the recession as early

[3]Like West Virginia University and West Virginia University Hospitals.
[4]The CW Wright Construction Company is a major employer in the county.

as 2008 with an unemployment rate over 8% in 2010. However, like its neighbor Monongalia County, it has a large Healthcare & Social Assistance industry. The Hazelton Penitentiary also helped the county recover in the post-recession economy (Hammond, 2011).

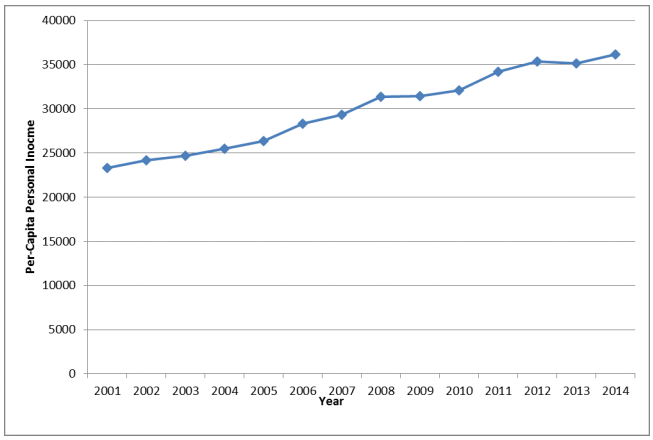

Figure 10: West Virginia Per-Capita Personal Income (2001-2014)

Historically, West Virginia has been one of the poorest states. It was the second poorest state in the United States of America in 2014. Its per capita personal income levels have lagged behind that of the nation for years. However, West Virginia's Per capita personal income has steadily increased over the 2001-2014 period (Figure #10). In 2010, West Virginia's personal income growth expanded while the national average fell 2.6 percent. There is a worry of a resource curse in the state. This happens where a reliance on extraction of natural resources ultimately lowers overall economic well-being (Higginbotham et al., 2010).

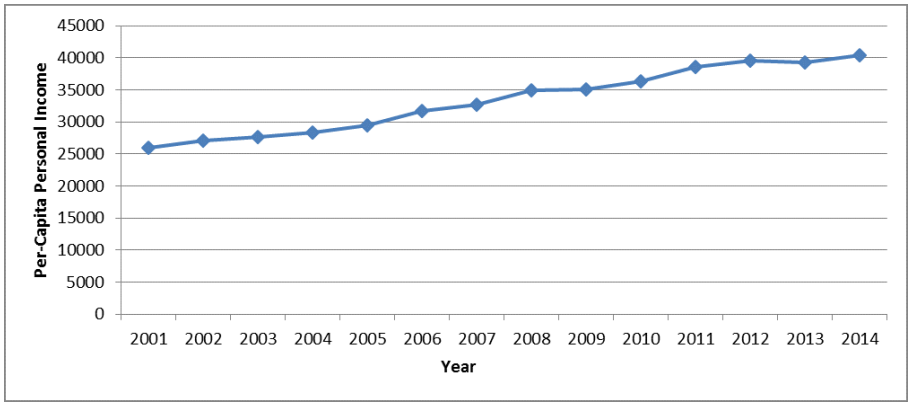

Figure 11: Monongalia, WV Per-Capita Personal Income (2001-2014)

Monongalia County has been above West Virginia in per capita income for the last few decades. By 2009, that difference had grown to 13.6%. Much of this disparity can be attributed to the multiplier effect of having West Virginia University and related services and facilities in Monongalia County. As shown by Figure #11, per capita income has increased steadily over the 2001-2014 period.

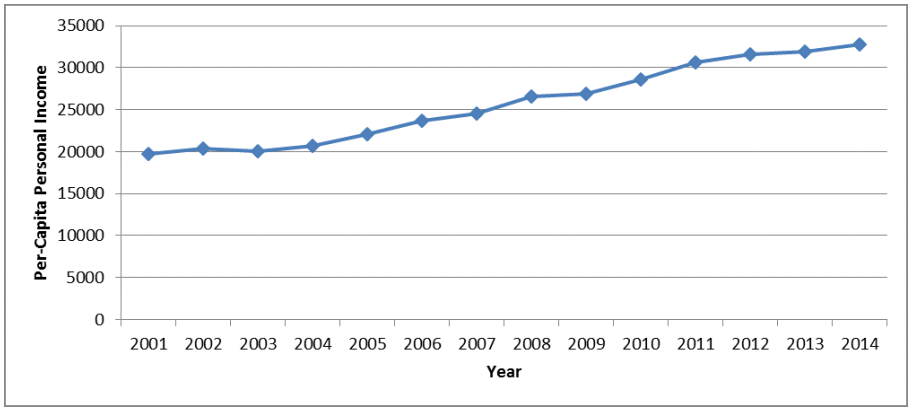

Figure 12: Preston, WV Per-Capita Personal Income (2001-2014)

Per-Capita income in Preston, WV has lagged behind the state and its neighbor Monongalia County. This is largely because its employment is in lower income industries. Figure #12 shows that the per capita income has steadily increased over the 2001-2014 period.

2.3 Gross Product and Per Capita GDP

West Virginia's GDP is shown above in Figure #13. It has steadily increased over the 2001-2014 time period. Natural resources have played an important role in West Virginia's economy for more than a century. With the discovery of coal and natural gas, extractive industries like mining and drilling developed to remove these resources, especially in the state's more remote areas. West Virginia remains an energy state, with an estimated 11% of its gross state product coming from extractive industries.

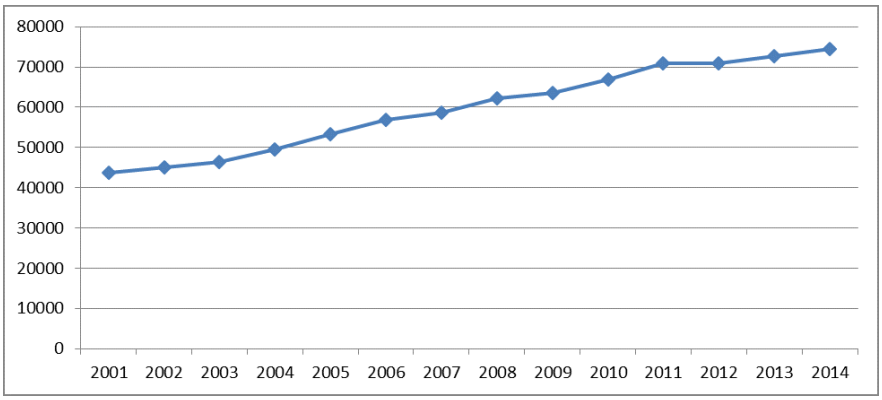

Figure 13: West Virginia: GDP (millions of current dollars)

The Morgantown Metropolitan Statistical Area (MSA), which includes both Monongalia and Preston Counties, continues to post solid growth in jobs and income. Figure #14 above shows that Per Capita Real GDP has consistently grown over the 2001-2014 period. These important indicators of an area's economic strength have surged in the Morgantown MSA during the last two decades and its unemployment rate has remained low(Hammond, 2011). One of the reasons that the economy of the Morgantown MSA fared much better than the rest of the country in recent years is that it is heavily weighted toward higher education and health care employment which are growing and relatively recession resistant sectors (Hammond, 2011).

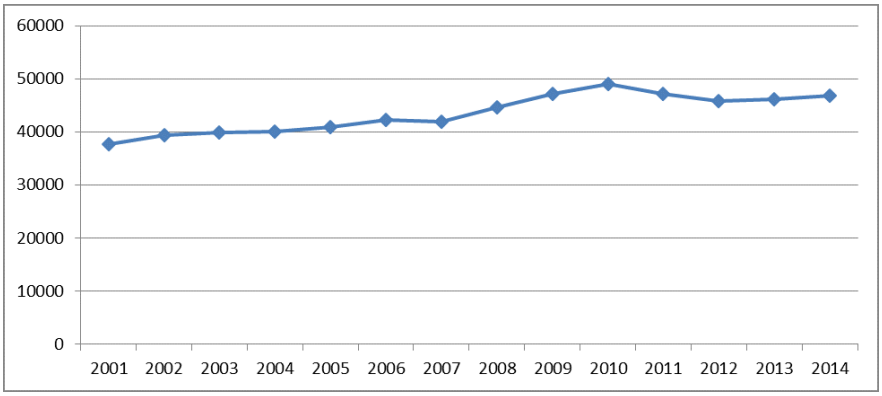

Figure 14: Morgantown, WV (MSA) Per Capita Real GDP

3 Mining and Related Activities

3.1 Fracking Overview and Gas Production

Fracking is the process of producing natural gas by injecting a mixture of water, sand and chemicals into the rock at high temperature and pressure. West Virginia also produces large amounts of natural gas. West Virginia is located in the heart of the Marcellus Shale Natural Gas Bed, which stretches from Tennessee north to New York in the middle of Appalachia (Moss, 2008). The Marcellus Shale is a major source of production of natural gas and oil and underlies an extensive area in West Virginia. In 2002, the United States Geological Survey (USGS) found that the Marcellus Shale contains about 1.9 trillion cubic feet of natural gas (USGS, 2002).

According to the U.S. Energy Information Administration (EIA), West Virginia has crude oil, natural gas, and coal bed methane and shale gas reserves. West Virginia is part of the Appalachian basin. Concerns about state losing coal jobs are being offset by the growth in the natural gas industry. Although West Virginia has benefited from natural gas drilling for many years, the recent discovery of the Marcellus Shale has set off a drilling boom. As a whole, the state's natural resource extraction employment outlook is healthy.

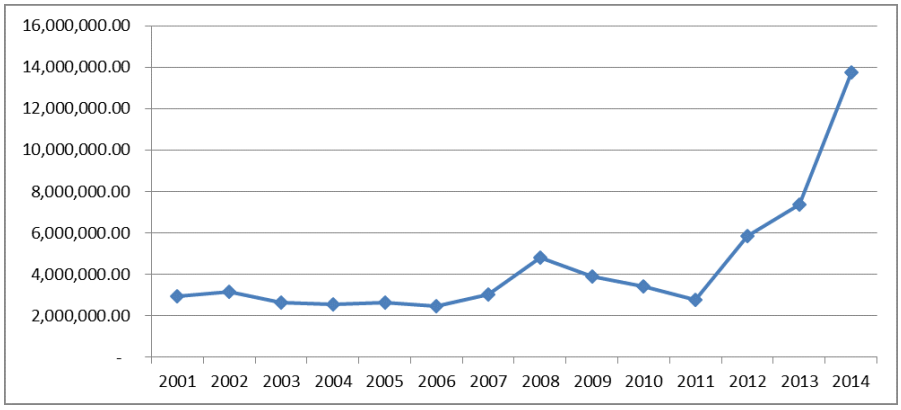

Figure 15: Monongalia, WV Gas Production (MCF)

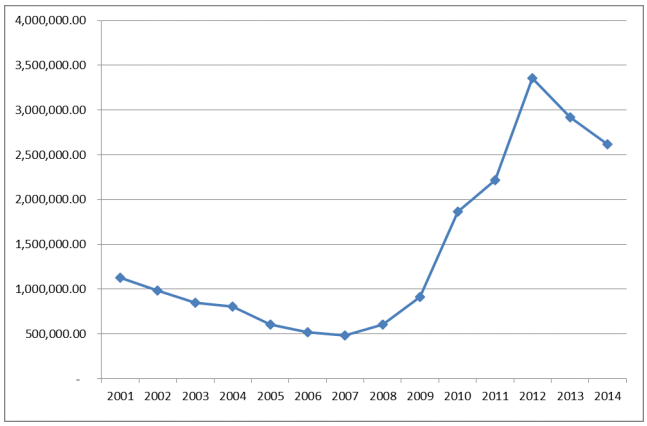

Figure 16: Preston, WV Gas Production (MCF)

As Figure #15 shows, gas production in Monongalia County has experienced rapid expansion over the last three years. Meanwhile, gas production in Preston County has fallen for the last three years. According to Drilling Edge there are currently 13 producing operators in Preston County and 21 producing operators in Monongalia County.

In 2002, the state issued one Marcellus Shale drilling permit. In 2008, over 800 permits were issued (Higginbotham et al., 2010). In 2009, however, only 426 permits were issued for wells[5]. Only 125 of those wells were actually drilled(Symonds and Jefferis, 2009). Currently, there are over 1,200 active Marcellus drilling sites in West

[5] A combination of horizontal and vertical wells.

Table 1: Well Permits in Monongalia, WV

County	Permit status	Well Type	Year	Number of Wells
Monongalia	Application received	Horizontal	2011	8
Monongalia	Permit commenced	Horizontal	2011	6
Monongalia	Permit completed	Horizontal	2011	6
Monongalia	Permit issued	Horizontal	2011	7
Monongalia	Application received	Horizontal	2014	1
Monongalia	Application received	Vertical	2014	18
Monongalia	Permit commenced	Vertical	2014	2
Monongalia	Permit completed	Vertical	2014	2
Monongalia	Permit issued	Horizontal	2014	1
Monongalia	Permit issued	Vertical	2014	18

Table 2: Well Permits in Preston, WV

County	Permit status	Well Type	Year	Number of Wells
Preston	Application received	Horizontal	2011	14
Preston	Application received	Vertical	2011	2
Preston	Permit commenced	Verticall	2011	5
Preston	Permit commenced	Horizontal	2011	5
Preston	Permit completed	Horizontal	2011	5
Preston	Permit completed	Vertical	2011	5
Preston	Permit issued	Vertical	2011	1
Preston	Permit issued	Horizonta	2011	11
Preston	Application received	Horizontal 6A	2014	18
Preston	Permit issued	Horizontal 6A	2014	13

Table 3: Drilling in Preston, WV and Monongalia, WV

County	Year	Well Status	Well Type	Numbers
Monongalia	2011	Active welll	Horizontal	7
Monongalia	2014	Active well	Horizontal 6A	2
Monongalia	2014	Permit issuedl	Horizontal 6A	17
Preston	2011	Active well	Horizontal	4
Preston	2014	Permit issued	Horizonta 6Al	12

Virginia (Higginbotham et al., 2010). Table #1 shows that recent applications and permits in Monongalia County have been for conventional vertical and horizontal gas wells. Conversely, Table #2 shows that recent applications and permits in Preston County have been for horizontal 6A wells.[6]

3.2 Focus on mining and related activities

One of the major resources in West Virginia's economy is coal. According to the Energy Information Administration (EIA), West Virginia is the second-leading coal producer in the United States (behind Wyoming), and the top coal-producing state in Appalachia. West Virginia's historical ties with the coal industry have strongly influenced the economic, political, and social structures of the state. Nearly all of the electricity generated in West Virginia is from coal-fired power plants. West Virginia produces a surplus of electricity and leads the Nation in net interstate electricity exports. While some may attribute coal industry woes to a regulatory "war on coal," other factors such as cheap natural gas and competition from other coal markets are driving forces.

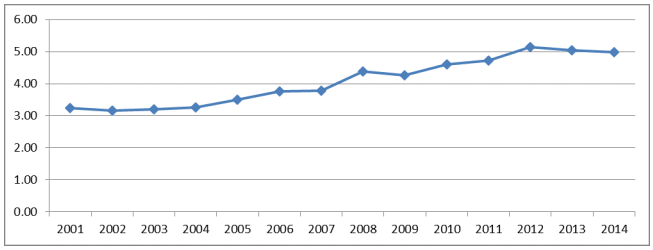

Figure 17: West Virginia Mining's portion of total employment (2001-2014)

Mining's portion of total state employment consistently increased from 2001-2012 with a slight drop in 2013 and 2014[7]. This is shown above in figure #17. The state is facing both an energy boom in north-central West Virginia and a coal bust in the south. Between 2008 and 2013, state coal production declined by 28% and almost 5,000 coal mining jobs has been lost (AFSC, 2014). Meanwhile, the north-central part of the state has seen an increase in coal and natural gas and oil jobs over the past five years.

[6]Article 6A of W.Va Code § 22-6A-12 applies to Natural gas well drilled using a horizontal drilling method that disturbs three acres or more, excluding pipelines, gathering lines and roads, or utilizes more than 210,000 gallons of water in any 30-day period.

[7]In this case Mining is comprised of mining, quarrying, and oil and gas extraction industries

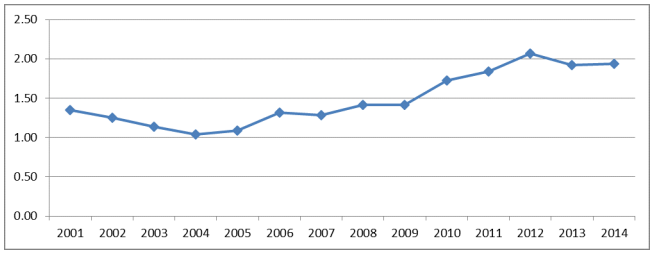

Figure 18: Monongalia, WV Mining's portion of total employment (2001-2014)

Mining employment in Monongalia County followed a similar path as the state for the 2001-2014 period[8]. Mining's portion of total state employment declined from 2001-2004, increased from 2005-2012, and dropped slightly in 2013 and 2014. In 2010, there were four companies operating underground mining operations at five mines. Notably, mining's portion of total employment in the county is rather low. Only in 2012 was the portion higher than 2%.

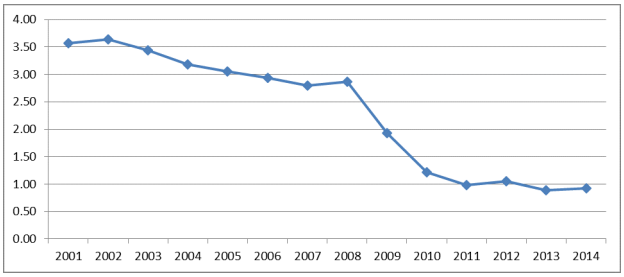

Figure 19: Preston, WV Mining's portion of total employment (2001-2014)

Mining employment in Preston, WV steadily declined from 2001-2008[9]. In 2008 there beginning of a sharp decline in mining employment began. Alpha Natural Resources, Inc. announced that its subsidiary, Kingwood Mining Company, LLC, would cease coal mining operations at the Whitetail Kittanning mining complex in Preston County, WV at the end of December, 2008. Additionally, efforts by steel producers to match production capacity to declining demand for steel products prompted them to reduce their raw material requirements. These events lead to the sharp decrease in mining employment in Preston, WV.

[8]In this case Mining is comprised of mining, quarrying, and oil and gas extraction industries
[9]In this case Mining is comprised of mining, quarrying, and oil and gas extraction industries

4 Summary

West Virginia's economic recovery from the Great Recession has been assisted by growth in the state's natural gas and oil industries. Sadly, several of the jobs West Virginia lost in the recession may not come back. Manufacturing and non-durable goods production represented over a quarter of the jobs lost in the recession. Both of these sectors have been steadily losing jobs for over a decade. It may take a long time for those sectors to recover to pre-recession levels.

Meanwhile, the Morgantown Metropolitan Statistical Area (MSA), which includes both Monongalia and Preston Counties, continues to show growth in jobs and income. It has fared better than the rest of the country and state in recent years. The Morgantown MSA did not see large employment declines during the recession. Even at the height of the recession, employment growth in the Morgantown MSA was above 1.5 percent, and only fell off in 2011 when it grew by 0.7 percent. This is primarily because it is geared toward higher education and health care employment. These sectors are growing and relatively recession resistant.

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Bureau of Economic Analysis. CA25N: Total Full-Time and Part-Time Employment by NAICS Industry.

Bureau of Economic Analysis. CA5N: Personal Income by Major Component and Earnings by NAICS Industry.

Bureau of Economic Analysis. GDP by Metro Statistical Area for all areas and components.

Bureau of Economic Analysis. Quarterly Gross Domestic Product by State

Drilling Edge. Oil & Gas Production in Monongalia County, WV. http://www.drillingedge.com/west-virginia/monongalia-county

Drilling Edge. Oil & Gas Production in Preston County, WV. http://www.drillingedge.com/west-virginia/preston-county