



Mountain Valley Pipeline Project

Docket No. CP16-__-000

Resource Report 5 – Socioeconomics

October 2015

Mountain Valley Pipeline Project Resource Report 5 – Socioeconomics

Resource Report 5 Filing Requirements	
Information	Location in Resource Report
Minimum Filing Requirements	
1. Describe socioeconomic conditions within the Project area. (§ 380.12(g)(1))	Section 5.2
2. Evaluate impact of any substantial immigration of people on governmental facilities and services and describe plans to reduce the impact on the local infrastructure. (§ 380.12(g)(2))	Sections 5.3.6 and 5.3.7
3. Describe on-site manpower requirements and payroll during construction and operation including number of construction personnel who currently reside within the impact area, would commute daily to the site from outside the impact area, or would relocate temporarily within the impact area. (§ 380.12(g)(3))	Sections 5.3.1 and 5.3.2. Appendix 5-A
4. Determine whether existing housing within the impact area is sufficient to meet the needs of the additional population. (§ 380.12(g)(4))	Section 5.3.3
5. Describe number and types of residences and businesses that would be displaced by the Project, procedures to be used to acquire these properties, and types and amounts of relocation assistance payments. (§ 380.12(g)(5))	Section 5.3.3.1
6. Conduct a fiscal impact analysis evaluating incremental local government expenditures in relation to incremental local government revenues that would result from construction of the Project. Incremental expenditures include, but are not limited to, school operating costs, road maintenance and repair, public safety, and public utility costs. (§ 380.12(g)(6))	Section 5.3.8

FERC Environmental Information Request for Resource Report 5 Dated March 13, 2015	
Request	Location in Resource Report
1. Estimate the number of temporary and permanent jobs that would be generated during construction and operation of the Project. Provide a breakdown of temporary Project-related construction jobs by construction spread (and the MPs and counties for each spread).	Sections 5.1, 5.3.1, and 5.3.2.
2. Identify areas along the proposed pipeline route (by census block) that contain populations of ethnic groups or minorities, economically disadvantaged, disabled, non-English speakers, children, or elderly, and evaluate if the Project would have adverse economic, environmental, or health impacts on those populations. Explain if the pipeline route was selected in a manner that would disproportionately affect minority or low-income populations.	Sections 5.2.7 and 5.3.9

**FERC Environmental Information Request for Resource Report 5
Dated August 11, 2015**

Request	Location in Resource Report
1. Update table 5.1-3 to include the workforce and construction schedule for each construction spread. Clarify if any of the construction spreads would be constructed in the same county during the same time period.	Section 5.1.3 and 5.3.1
2. Clarify what the “county total” row represents in table 5.2-5.	Table 5.2-5
3. Include the basis for the estimate that 10 percent of the workforce would be comprised of “local workers.” Revise section 5.3.1 to also include an estimate of the number of workers that would reside in West Virginia and Virginia (beyond commuting distance), respectively.	Section 5.3.1 ¹
4. Clarify if union labor be used during construction of the Project, and if not explain why.	Section 5.1
5. Revise section 5.3.2.1 to include a table and discussion of the expected construction and operational payroll by county and state. Where possible, include an estimate of total local worker payroll during construction and operation. Also include a table of expected materials costs by county and state. Where possible, include an estimate of total local material purchases during construction and operation.	Section 5.3.2.1, Appendix 5-A. ²
6. Include the months of high and low season(s) for tourism and recreation in the project area and metrics to characterize the degree of tourism that occurs (e.g., visitors per day for parks, number of visitors a year to a particular destination) at the major tourism and recreation locations that could be affected by construction or operation of the Project.	Section 5.3.2.3
7. We have received several comments questioning the ability for local emergency services to adequately respond to an emergency during construction and operation of the Project. Update section 5.3.5 to discuss the results of any coordination between Mountain Valley and local police departments, fire departments, and emergency medical services. Detail any arrangements for Mountain Valley to provide training, funding, or facilities to local first responders. If local departments have stated that they would have limited available resources, include mitigation measures to ensure enough fire, police, and emergency medical personnel would be available during construction and operation of the Project.	Resource Report 11
8. Clarify if Mountain Valley would utilize any temporary field “man-camps or worker camps” for housing workers during construction of the Project. If so, include details such as location, size, facilities, and utilities. Identify all permits that need to be obtained for such camps. Also analyze the potential effects the camps would have on soils, wetlands, waterbodies, wildlife, vegetation, cultural resources, land uses, traffic, and public services.	Section 5.3.3.1

¹ Based on current discussions with qualified construction contractors, MVP has revised this initial estimate upwards. Local workers are expected to account for approximately 25 percent of construction jobs (see Section 5.3.1).

² Section 5.3.2.1 provides estimates of total project expenditures expected to occur in West Virginia and Virginia, with additional detail provided in the FTI Consulting (2015a, 2015b) studies included as Appendix 5-A to this report. These expenditures are expected to occur statewide and are not disaggregated by county.

**FERC Environmental Information Request for Resource Report 5
Dated August 11, 2015**

Request	Location in Resource Report
<p>9. Update section 5.3.3 to include a more detailed discussion of those counties where housing for the workforce is expected to be limited or absent (i.e., Doddridge, Monroe, and Webster Counties). Include the areas/counties where workers are anticipated to be housed while working within these counties and the distance to the worksite. Discuss in more detail the potential conflict for hotels and temporary housing with tourism. Include a list, description, and capacity of existing recreational vehicle (RV) and campground facilities that would be located within commuting distance to the Project. Indicate what percentage of construction workers would bring their own RVs or pop-out trailers and utilize existing RV and campground facilities for temporary housing.</p>	<p>Sections 5.2.3 and 5.3.3</p>
<p>10. Include the results of research and interviews with major financial lenders in the counties crossed by the Project regarding any observed changes in the ability of persons to obtain a mortgage in relation to the presence of new or existing FERC-regulated pipelines and associated facilities (on the subject property or in the immediate vicinity), as well as in relation to other pipelines. Include full citations for all discussions.</p>	<p>Section 5.3.5.1</p>
<p>11. Include the results of research and interviews with major insurers in the counties crossed by the Project regarding any observed changes in the ability of persons to obtain property or home insurance in relation to the presence of new or existing FERC-regulated pipelines and associated facilities (on the subject property or in the immediate vicinity), as well as in relation to other pipelines. Include full citations for all discussions.</p>	<p>Section 5.3.5.2</p>
<p>12. Include an analysis of potential Project-related impacts on property values that reference the latest relevant studies on the subject. This literature review should include studies mentioned by stakeholders, such as:</p> <ul style="list-style-type: none"> • December 19, 2013 report by Joel Dyer in Boulder Weekly; and • 2013 study in Conversations for Responsible Economic Development. 	<p>Section 5.3.4</p>
<p>13. Section 5.3.5 states “a small share of non-local workers” could relocate with their families. Include an estimate of the number of workers that would relocate with their families. Estimate the average family size for workers who would relocate, and include those numbers in the population analysis. Estimate the number of school age children who would relocate because of the Project, and analyze their enrollment impact on local school districts.</p>	<p>Section 5.3.6</p>

**FERC Environmental Information Request for Resource Report 5
Dated August 11, 2015**

Request	Location in Resource Report
<p>14. Document consultations with state and local road and transportation agencies to develop a Residential Access and Traffic Management Plan. The Plan should address:</p> <ul style="list-style-type: none"> a. identification of existing roads that would be used for Project access; b. current average daily traffic counts and anticipated daily traffic counts during construction on local roads that would be used for Project access; c. increased traffic from Project-related activities (including commuting workers, construction equipment, and truck deliveries), including the number of workers cars, equipment, and trucks that would use local roads, and commuting periods; d. workers being bussed from collection points to the right-of-way; e. locations of commuting workers collection points and bus routes; f. detours and road blockage g. compaction on dirt roads; h. dust suppression; i. impacts on existing roads and measure to repair them; j. prior notification; k. maintaining access for home or business owners (including tourist venues and roads frequently used by tourists); l. in-road work relative to peak-traffic periods; m. safety measures (including signage, fencing and assurance of immediate backfill of trenches); n. adherence to road and bridge weight limits; o. locations of police detail (as specified in section 8.1.3.7); p. noise impacts; and q. tracking of soil and dirt onto paved roads from the right-of-way. 	Section 5.3.7 and Appendix 5-B
<p>15. Clarify if the estimated tax revenues in table 5.3-1 are for the entire construction period or an annual estimate.</p>	Table 5.3-3 (Section 5.3.8.1)
<p>16. Include copies of FTI Consulting's Economic Benefits of the Mountain Valley Pipeline Project in West Virginia and Economic Benefits of the Mountain Valley Pipeline Project in West Virginia reports dated December 2014.³</p>	Appendix 5-A
<p>17. Revise table 5.3-2 to include tax revenue estimates for Fayette County.</p>	Table 5.3-4 (Section 5.3.8.2)
<p>18. Identify counties and sub-areas (e.g., census block groups) along the pipeline route that contain a disproportionate number of minorities, low income households, elderly, children, disabled, and non-English speaking households in comparison to the averages for the nation and state. Explain how the pipeline route was selected relative to communities which contain disproportionate numbers of disadvantaged, minority, and low income populations.</p>	Sections 5.2.7 and 5.3.9

³ Note that these reports have been updated and the current versions dated October 2015 are included as Appendix 5-A.

U.S. Forest Service Comments on Resource Report 5		
Page/Section	Request	Location in Resource Report
General	Draft Resource Report 5 is focused on fire safety as it relates to pipeline incidents; this report should also address incidents originating beyond the pipeline whose management would be influenced by the pipeline. Address the impacts of an unplanned ignition (wildfire) on the pipeline, appurtenant facilities, valves, PCV markers along the pipeline, etc. Disclose the effect of the pipeline on wildfire suppression tactics that may, or may not, be used for incidents not originating from the pipeline.	Resource Report 11

U.S. Environmental Protection Agency Comments on Resource Report 5		
Page/Section	Request	Location in Resource Report
General	The Environmental Justice (EJ) assessment designed to identify minority populations and low income populations is incomplete and inadequate. The methodology used for the assessment is not described in detail and should include the following: 1) the benchmark values for West Virginia and Virginia; 2) the method and calculations used to create the percentages and figures; 3) the benchmark values in all the tables. Additionally, it is unclear if the assessment has been conducted in an appropriate manner because the values are not given, the methodology is not laid out in a plain and straight forward manner, and meaningful information related to such comparisons is not presented.	Sections 5.2.7 and 5.3.9
General	The tables presented in this document do not provide sufficient information to gain a full and meaningful understanding of where the at-risk populations in the study area are located. The report needs to name the census tracts, block groups, or communities that are areas of concern. The EJ study needs to show where these communities are. Afterwards, the report needs to discuss why it is an area of concern compared to other areas and how MVP will develop any needed mitigation or communicate with communities.	Sections 5.2.7 and 5.3.9
5-3	Table 5.1-1 should have a title as clarify as to what "Percent Total" means.	Table 5.1-1
5-9	There should be discussion on the number of farms that the final alignment and stations intersect. It should also discuss the number type of crops that will be affected and potential short-term mitigation for crops lost and long-term mitigation during operation.	Resource Report 8

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Appendix 5-B	Traffic and Transportation Management Plan

RESOURCE REPORT 5 SOCIOECONOMICS

LIST OF ACRONYMS AND ABBREVIATIONS

CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CRED	Conversations for Responsible Economic Development
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FTI	FTI Consulting Inc.
LDC	local distribution company
MVP	Mountain Valley Pipeline, LLC
NPS	National Park Service
Project	Mountain Valley Pipeline Project
RV	recreational vehicle
TCO	Columbia Gas Transmission
Transco	Transcontinental Gas Pipe Line Company, LLC
USFS	U.S. Forest Service
VDOT	Virginia Department of Transportation
WVDOT	West Virginia Department of Transportation

RESOURCE REPORT 5 SOCIOECONOMICS

Introduction

Mountain Valley Pipeline, LLC (MVP), a joint venture between EQT Midstream Partners, LP and affiliates of NextEra Energy, Inc., WGL Holdings, Inc., Vega Energy Partners, Ltd., and RGC Midstream, LLC, is seeking a Certificate of Public Convenience and Necessity from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act authorizing it to construct and operate the proposed Mountain Valley Pipeline Project (Project) located in 17 counties in West Virginia and Virginia. MVP plans to construct an approximately 301-mile, 42-inch-diameter natural gas pipeline to provide timely, cost-effective access to the growing demand for natural gas for use by local distribution companies (LDCs), industrial users and power generation in the Mid-Atlantic and southeastern markets, as well as potential markets in the Appalachian region.

The proposed pipeline will extend from the existing Equitrans, L.P. transmission system and other natural gas facilities in Wetzel County, West Virginia to Transcontinental Gas Pipe Line Company, LLC's Zone 5 compressor station 165 in Pittsylvania County, Virginia. In addition to the pipeline, the Project will include approximately 171,600 horsepower of compression at three compressor stations currently planned along the route, as well as measurement, regulation, and other ancillary facilities required for the safe and reliable operation of the pipeline. The pipeline is designed to transport up to 2.0 million dekatherms per day of natural gas. Resource Report 1 provides a complete summary of the Project facilities (see Table 1.2-2) and a general location map of the Project facilities (Figure 1.2-1).

The Project will be an interstate "open access" transmission pipeline, and as such, parties seeking to ship natural gas and parties seeking to receive natural gas have a right to access the pipeline. Furthermore, the ability to ship or receive natural gas is contingent on economic viability, including factors such as location and demand. As a transmission company, it will be necessary for MVP to work with LDCs to provide gas service to communities along the route. In Virginia, for example, the Roanoke Gas Company, Inc., a subsidiary of RGC Resources Inc. and affiliate of RGC Midstream LLC, is a shipper on MVP and intends to utilize gas from MVP to serve its customers and expand its customer base. As these LDCs have the authority to provide natural gas service, MVP is working with these companies to explore the feasibility of providing gas service along the route. Additionally, MVP is working closely with the localities and industrial end users to develop service solutions as these customers may also seek to be served directly by MVP.

The Project would have a positive economic impact on communities across Virginia and West Virginia. Construction of the Project will support thousands of jobs, significant economic activity throughout the region and will generate a significant amount of tax revenue for local governments to support local schools, roads and other important priorities of local government. While some of the construction jobs will be highly specialized and likely need to come from outside the area, there will be numerous job opportunities for local residents and local contractors.

Environmental Resource Report Organization

Resource Report 5 is prepared and organized according to the FERC *Guidance Manual for Environmental Report Preparation* (August 2002). This report is organized into four major sections and a separate section listing the sources used to prepare this report. Section 5.1 describes the analysis area for the socioeconomic assessment. Section 5.2 describes existing socioeconomic conditions, including population, economic conditions, housing, community services, transportation, tax revenues, and environmental justice. Section 5.3 describes how the existing socioeconomic conditions could be affected during construction and operation of the Project. Section 5.4 includes discussion of comments filed on the FERC record questioning the economic analysis prepared by FTI Consulting Inc. References used in the development of Resource Report 5 are listed in Section 5.5.

5.1 ANALYSIS AREA

The pipeline crosses 17 counties in two states: 11 counties in West Virginia, and 6 counties in Virginia (Table 5.1-1). Almost two-thirds of the pipeline (65 percent, 195.5 miles) is located in West Virginia. Miles per county in West Virginia range from 0.5 mile in Fayette County to 30.0 miles in Webster County. In Virginia, miles per county range from 1.7 miles (Craig County) to 36.7 miles (Franklin County) (Table 5.1-1).

The Project also involves the construction of three new compressor stations located along the pipeline route, with all three located in West Virginia (Table 5.1-2). Mainline block valves and meter stations would also be installed at various locations along the pipeline route (Table 5.1-2). Table 5.1-2 identifies the location of each facility, as well as the estimated construction start date, duration of construction, and peak monthly employment for each facility.

Pipeline construction would be divided into 11 spreads, ranging in length from 22.2 miles (Spread 2) to 39.5 miles (Spread 11) (Table 5.1-3). Table 5.1-3 identifies the counties that would be crossed by each spread, as well as the estimated construction start date, duration of construction (including initial clearing, and clean-up and restoration), and peak monthly employment for each spread. Construction would proceed concurrently for the first 7 spreads, extending a total of 17 months from Month 1 (January 2017) to Month 17 (May 2018). Construction would start in Month 11 (November 2017) for spreads 8 through 11, continuing for 19 months through Month 29 (May 2019).

MVP will competitively bid the Project's construction activities to qualified contractors with a proven track record of constructing large diameter projects with a resulting product that was environmentally sound and safe. The size and scope of MVP will likely result in the use of a unionized workforce, but the market and Project specifications requiring qualified staffing will dictate the workforce.

State/County <u>a/</u>	Miles <u>b/</u>	Percent of Total <u>c/</u>
West Virginia		
Wetzel	9.6	3%
Harrison	23.7	8%
Doddridge	4.8	2%
Lewis	27.5	9%
Braxton	14.7	5%
Webster	30.0	10%
Nicholas	24.7	8%
Greenbrier	21.2	7%
Fayette	0.5	0%
Summers	16.7	6%
Monroe	22.0	7%
Subtotal	195.5	65%
Virginia		
Giles	20.0	7%
Craig	1.7	1%
Montgomery	19.0	6%
Roanoke	8.3	3%
Franklin	36.7	12%
Pittsylvania	19.9	7%
Subtotal	105.5	35%
Total	301.0	100%
<p><u>a/</u> Counties are listed in the order crossed starting at the existing transmission system in Wetzel County, West Virginia and ending at the Transco Zone 5 compressor station 165 in Pittsylvania County, Virginia.</p> <p><u>b/</u> Total length of pipeline is 300.97 miles; however, sum for length of counties crossed shows a difference of 0.03 miles due to rounding.</p> <p><u>c/</u> This column represents the percent of the total pipeline length located in each county/state.</p>		

Facility	Approx. Milepost	County	State	Construction		
				Duration (months)	Start Date	Peak Work-force
Compressor Stations						
Bradshaw Station	2.8	Wetzel	WV	15	Jan 2017	100
Harris Station	77.5	Braxton	WV	15	Jan 2017	100
Stallworth Station	154.2	Fayette	WV	15	Jan 2017	100
Meter Stations <u>a/</u>						
Mobley Interconnect receipt	0	Wetzel	WV	9	Mar 2017	40
Sherwood Interconnect receipt	23.7	Harrison	WV	7	Mar 2017	40
WB Interconnect delivery	77.5	Braxton	WV	9	Mar 2017	40
Transco Interconnect delivery	301.0	Pittsylvania	VA	9	Feb 2018	40
<u>a/</u> The Roanoke Tap at MP 262.6 will be installed as part of pipeline construction spread 11 (see table 5.1-3)						

Spread	State	County	Milepost		Miles	Construction		
			From	To		Duration (months)	Start Date	Peak Workforce
1	West Virginia	Wetzel, Harrison	0.0	25.9	25.9	17	Jan 2017	715
2	West Virginia	Harrison, Doddridge, Lewis	25.9	48.1	22.2	17	Jan 2017	715
3	West Virginia	Lewis, Braxton	48.1	77.6	29.6	17	Jan 2017	715
4	West Virginia	Braxton, Webster	77.6	104.3	26.7	17	Jan 2017	715
5	West Virginia	Webster, Nicholas	104.3	127.9	23.7	17	Jan 2017	715
6	West Virginia	Nicholas, Greenbrier	127.9	154.2	26.3	17	Jan 2017	715
7	West Virginia	Greenbrier, Fayette, Summers, Monroe	154.2	181.8	27.6	17	Jan 2017	715
8	West Virginia/ Virginia	Monroe, Giles	181.8	204.8	23.0	19	Nov 2017	715
9	Virginia	Giles, Craig, Montgomery	204.8	234.0	29.3	19	Nov 2017	715
10	Virginia	Montgomery, Roanoke, Franklin	234.0	261.5	27.5	19	Nov 2017	715
11	Virginia	Franklin, Pittsylvania	261.5	301.0	39.5	19	Nov 2017	715
Total			na	na	301.0	na	na	na
na – not applicable								

5.2 AFFECTED ENVIRONMENT

5.2.1 Population

The 17 counties in the analysis area had a total combined population of 598,248 in 2013, with 44.7 percent of this total located in the 11 West Virginia counties, and the remaining 55.3 percent located in the six Virginia counties (Table 5.2-1). Population by county in West Virginia ranged from 8,344 in Doddridge County to 68,972 in Harrison County. In Virginia, population by county ranged from 5,210 in Craig County to 96,207 in Montgomery County (Table 5.2-1).

Population densities by county in West Virginia in 2013 ranged from 16.1 persons per square mile (persons/square mile) in Webster County to 165.8 persons/square mile in Harrison County. Population densities in the affected Virginia counties ranged from 15.8 persons/square mile in Craig County to 373.3 persons/square mile in Roanoke County (Table 5.2-1). The corresponding statewide densities were 77.1 in West Virginia and 209.2 in Virginia, compared to the national average density in the U.S. of 89.5 persons/square mile.

Geographic Area	2013 Population	2013 Population Density (persons/square mile)	Population Change (Percent)		Projected Population Change (Percent)	
			2000 to 2010	2010 to 2013	2010 to 2020	2020 to 2030
West Virginia	1,854,304	77.1	2.5	0.1	0.3	-1.3
Braxton	14,502	28.4	-1.2	-0.1	-2.8	-6.3
Doddridge	8,344	26.1	10.8	1.7	4.9	3.0
Fayette	45,599	68.9	-3.2	-1.0	-3.1	-4.1
Greenbrier	35,644	35.0	3.0	0.5	1.1	-1.7
Harrison	68,972	165.8	0.7	-0.2	-2.3	-4.7
Lewis	16,452	42.7	-3.2	0.5	-3.5	-6.8
Monroe	13,483	28.5	-7.4	-0.1	-1.1	-5.8
Nicholas	25,965	40.1	-1.2	-1.0	-1.4	-5.4
Summers	13,563	37.6	7.1	-2.6	-1.2	-3.6
Webster	8,893	16.1	-5.8	-2.9	-5.8	-9.6
Wetzel	16,204	45.3	-6.3	-2.3	-7.5	-10.8
Virginia	8,260,405	209.2	13.0	3.2	10.1	9.5
Craig	5,210	15.8	1.9	0.4	6.4	6.5
Franklin	56,335	81.6	18.8	0.3	11.1	9.7
Giles	16,925	47.6	3.8	-2.1	3.1	2.6
Montgomery	96,207	248.6	12.9	1.9	11.5	10.4
Pittsylvania	62,426	64.4	2.9	-1.7	0.4	0.0
Roanoke	93,524	373.3	7.7	1.2	6.5	5.7
Project County Total	598,248	68.9	4.7	0.0	3.1	1.8

Sources: U.S. Census Bureau 2000, 2010, 2014a, University of Virginia 2012, West Virginia University 2014

Population in West Virginia increased by 2.5 percent between 2000 and 2010, with population declining in seven of the 11 affected West Virginia counties over this period, and just one county (Doddridge County) experiencing more than a double digit increase (10.8 percent) (Table 5.2-1). Total population in West Virginia is projected to increase by just 0.3 percent between 2010 and 2020, with a net decrease of 1.3 percent projected from 2020 to 2030. Population decline is expected to continue in the seven affected West Virginia counties that lost population from 2000 to 2010. Population is also expected to decline in Harrison and Summers Counties while modest growth is projected for Doddridge and Greenbrier Counties.

Statewide, population in Virginia increased by 13 percent between 2000 and 2010, with all six affected counties experiencing net increases in population, ranging from 1.9 percent (Craig County) to 13 percent (Montgomery County) (Table 5.2-1). Population in Virginia is expected to continue to grow between 2010 and 2020, and over the following decade (2020 to 2030), with projected increases of 10.1 percent and 9.5 percent (Table 5.2-1). Population is projected to grow in five of the six affected Virginia counties over both time periods, with increases slightly higher than the statewide averages expected for Franklin and Montgomery Counties. Population in the remaining Virginia county, Pittsylvania County, is expected to remain constant (Table 5.2-1).

5.2.2 Economic Conditions

5.2.2.1 Employment and the Economy

Employment data by sector are presented by state and county in Tables 5.2-2 and 5.3-3. Location quotients, which compare the share of a county's employment with a benchmark region, in this case the corresponding states (West Virginia and Virginia), may be used to provide a broad measure of economic specialization.

Seven of the 11 counties in West Virginia have a larger share of total employment in agriculture than the state as a whole, with farm employment as a share of total employment ranging from 1.5 times (Nicholas and Webster Counties) to 6.8 times (Monroe County) the state average (Table 5.2-2). Braxton, Greenbrier, Monroe, and Wetzel Counties are also relatively specialized in the forestry and fishing sector. Doddridge and Lewis Counties have a relatively high concentration of employment in mining.

Four of the six Virginia counties that will be crossed by the Project are specialized in the agricultural sector, with farm employment as a share of total employment ranging from 2.9 times (Pittsylvania County) to 9.8 times (Craig County) the state average (Table 5.2-3). Five of the six counties are relatively specialized in the manufacturing sector, with employment concentrations ranging from 2 times (Roanoke County) to 3.3 times (Giles County) the state average (Table 5.2-3).

Statewide annual unemployment rates in West Virginia and Virginia were 6.5 percent and 5.2 percent in 2013, compared to a national rate of 7.4 percent (Table 5.2-4). Unemployment rates were higher than the state average in seven of the West Virginia counties that will be crossed by the Project, ranging from 7.1 percent (Greenbrier County) to 11.5 percent (Webster County). Unemployment rates in five of the six affected Virginia counties were higher than the state average, ranging from 5.5 percent (Franklin and Montgomery Counties) to 6.9 percent (Pittsylvania County), but were still lower than the national average (7.4 percent).

Per capita income in 2013 in West Virginia and Virginia was equivalent to 79 percent and 109 percent of national per capita income, respectively (Table 5.2-4). Per capita income was lower than the state per capita in nine of the 11 affected counties in West Virginia. In Virginia, per capita incomes were lower than the state per capita in all six Virginia counties (Table 5.2-4).

Table 5.2-2

Employment by Sector, West Virginia, 2013

Economic Sector	County											State of West Virginia
	Braxton	Doddridge	Fayette	Greenbrier	Harrison	Lewis	Monroe	Nicholas	Summers	Webster	Wetzel	
Total Employment <u>a/</u>	5,422	3,008	15,726	18,781	45,788	9,505	4,110	10,434	3,701	2,984	6,244	915,638
Percent of Total <u>b/</u>												
Farming	6.1	14.0	1.5	4.4	1.5	4.7	15.9	3.6	9.8	3.5	4.8	2.3
Forestry, fishing, related activities, and other	1.1	(D)	0.3	1.3	0.1	0.6	2.5	0.9	0.8	(D)	0.6	0.3
Mining	2.4	18.7	4.7	1.3	5.9	21.5	3.8	7.1	4.2	(D)	2.8	5.0
Utilities	0.6	(L)	0.6	0.3	0.9	0.6	(L)	0.2	(D)	(D)	(D)	0.6
Construction	6.4	(D)	4.3	4.3	5.8	4.4	7.9	3.9	4.8	2.0	9.1	5.3
Manufacturing	6.0	(D)	3.4	4.2	3.9	2.2	11.2	7.3	1.1	6.7	2.4	5.6
Wholesale trade	1.7	(D)	2.4	1.3	3.7	1.5	0.6	2.1	3.7	(D)	(D)	2.7
Retail trade	16.0	7.7	13.3	12.6	12.6	10.7	7.4	15.7	9.3	7.2	18.5	11.7
Transportation and warehousing	2.4	(D)	2.0	2.0	3.1	4.2	2.0	2.5	(D)	5.9	2.5	2.8
Finance and insurance	2.5	2.7	2.8	2.0	2.3	1.4	2.3	2.0	2.2	4.6	3.0	3.0
Real estate	1.9	2.3	2.4	3.6	3.0	3.0	(D)	2.1	2.7	(D)	2.1	2.8
Services (Consumer) <u>c/</u>	13.9	9.4	18.2	21.7	13.3	12.4	10.5	15.0	14.2	4.8	16.9	14.7
Services (Producer) <u>c/</u>	(D)	5.3	(D)	9.2	11.3	6.0	5.3	6.7	(D)	4.2	6.1	10.9
Services (Social) <u>c/</u>	13.6	7.1	(D)	16.7	14.3	(D)	7.5	(D)	11.2	11.1	(D)	14.9
Federal government	2.3	1.7	3.3	1.4	9.8	1.4	6.7	2.2	2.9	1.9	1.9	3.6
State and local government	16.5	17.4	19.8	13.7	8.5	15.1	12.5	16.2	20.0	18.7	17.9	13.7

Notes:

a/ Total employment includes self-employed individuals. Employment data are by place of work, not place of residence, and, therefore, include people who work in the area but do not live there. Employment is measured as the average annual number of jobs, both full- and part-time, with each job a person holds counted at full weight.

b/ Percentages for the counties do not sum to 100 because employment counts are not provided for sectors with less than 10 jobs or for sectors where counts would disclose confidential information. These sectors are identified by (D) or (L) in the above table. These numbers are, however, included in the totals.

c/ Nine 2-digit North American Industry Classification System (NAICS) service categories are combined here into these three divisions for ease of presentation.

-- Consumer services consists of: other services; arts, entertainment, and recreation; and accommodation and food services.

-- Producer services consists of: information; professional and technical services; management of companies and enterprises; and administrative and waste services.

-- Social services consists of: educational services; and health care and social assistance.

Source: U.S. Bureau of Economic Analysis 2015

Table 5.2-3							
Employment by Sector, Virginia, 2013							
Economic Sector	County						State of Virginia
	Craig	Franklin	Giles	Montgomery	Pittsylvania	Roanoke	
Total Employment <u>a/</u>	1,906	21,329	6,567	60,620	49,596	78,962	4,899,410
Percent of Total <u>b/</u>							
Farming	9.8	5.3	5.1	1.0	3.1	0.4	1.0
Forestry, fishing, related activities, and other	(D)	(D)	(D)	(D)	(D)	(D)	0.3
Mining	1.7	(D)	0.0	0.3	(D)	0.2	0.3
Utilities	(D)	(D)	(D)	0.1	(D)	(D)	0.2
Construction	6.5	9.7	(D)	(D)	4.4	(D)	5.5
Manufacturing	(D)	12.6	16.3	10.3	13.7	10.2	5.0
Wholesale trade	(D)	3.6	(D)	1.3	3.2	4.4	2.5
Retail trade	8.1	11.6	12.8	10.6	12.2	10.7	10.0
Transportation and warehousing	3.0	(D)	3.1	1.0	(D)	(D)	2.9
Finance and insurance	4.4	3.0	2.6	2.5	3.0	6.8	4.3
Real estate	6.9	4.2	1.9	3.8	2.2	4.8	4.3
Services (Consumer) <u>c/</u>	9.5	14.0	7.4	10.5	14.6	13.8	14.9
Services (Producer) <u>c/</u>	(D)	9.3	9.5	(D)	10.9	16.1	19.6
Services (Social) <u>c/</u>	7.2	(D)	9.1	9.5	15.7	(D)	11.4
Federal government	1.6	1.3	1.4	1.2	1.1	3.3	6.8
State and local government	12.3	11.0	13.3	27.9	13.2	8.5	10.9
Notes:							
<u>a/</u> to <u>c/</u> see corresponding notes in Table 5.2-2.							
Source: U.S. Bureau of Economic Analysis 2015							

County/State	Civilian Labor Force	Employed	Unemployed	Unemployment Rate (%)	Per Capita Income (\$)	Percent of State Per Capita ^{a/}
Braxton	5,606	5,106	500	8.9	27,602	78
Doddridge	3,245	3,051	194	6.0	23,704	67
Fayette	17,498	16,123	1,375	7.9	29,945	84
Greenbrier	15,103	14,027	1,076	7.1	34,126	96
Harrison	31,741	30,073	1,668	5.3	43,120	121
Lewis	8,153	7,708	445	5.5	38,491	108
Monroe	5,671	5,350	321	5.7	28,582	80
Nicholas	10,187	9,256	931	9.1	31,989	90
Summers	4,531	4,189	342	7.5	26,620	75
Webster	3,037	2,688	349	11.5	26,139	74
Wetzel	6,544	5,908	636	9.7	33,921	95
West Virginia	790,000	739,000	52,000	6.5	35,533	79
Craig	2,540	2,371	169	6.7	34,465	71
Franklin	28,262	26,714	1,548	5.5	35,374	72
Giles	8,213	7,664	549	6.7	32,119	66
Montgomery	48,601	45,920	2,681	5.5	31,168	64
Pittsylvania	31,676	29,501	2,175	6.9	33,244	68
Roanoke	49,083	46,551	2,532	5.2	43,418	89
Virginia	4,261,000	4,041,000	22,000	5.2	48,838	109
United States	155,389,000	143,929,000	11,460,000	7.4	44,765	na
^{a/} County per capita income is shown as a percent of the corresponding state average; state figures are shown as a percent of the national average. Sources: U.S. Bureau of Economic Analysis 2014; U.S. Bureau of Labor Statistics 2014, 2015.						

5.2.2.2 Agriculture

Agriculture is an important part of the local economy in the Project area, with relatively high concentrations of employment in the farm sector in seven of the 11 West Virginia counties and four of the six affected Virginia counties (Tables 5.2-2 and 5.2-3). Land in farms accounted for 28 percent of the total land area in the counties that will be crossed by the Project (1.58 million acres), with a total of 8,741 farms and an average farm size of 180 acres (Table 5.2-5).

Land in farms accounted for 23 percent of the total land area in West Virginia in 2012 and 33 percent of total land area in Virginia (Table 5.2-5). Livestock, poultry, and their products accounted for the majority of agricultural products sold by market value in both states, accounting for 83 percent of the total in West

Virginia and 64 percent in Virginia. Average farm sizes were 168 acres in West Virginia and 180 acres in Virginia.

Three counties (Greenbrier, West Virginia and Franklin and Pittsylvania Counties, Virginia) accounted for 37 percent of the farms, 41 percent of the land in farms, and 68 percent of agricultural market value for the counties crossed by the Project (Table 5.2-5; Figure 5.2-1).

Table 5.2-5 Summary of Agriculture by County and State, 2012							
County/State	Number of Farms	Land in Farms (acres)	Percent of Total Land Area	Average Farm Size (acres)	Market Value of Agriculture Products Sold	Total Market Value of Agriculture Products Sold	
						Crops (%)	Livestock, Poultry, and Products (%)
West Virginia	21,489	3,606,674	23	168	806,775	17	83
Braxton	386	88,911	27	230	4,858	20	80
Doddridge	352	65,364	32	186	2,271	34	66
Fayette	232	23,163	5	100	1,735	41	59
Greenbrier	819	190,178	29	232	76,757	3	97
Harrison	778	117,029	44	150	9,540	25	75
Lewis	476	82,460	33	173	7,014	14	86
Monroe	796	144,630	48	182	31,400	9	91
Nicholas	393	58,093	14	148	4,578	17	83
Summers	345	57,962	25	168	4,956	26	74
Webster	70	7,928	2	113	332	63	37
Wetzel	249	38,103	17	153	1,177	44	56
Virginia	46,030	8,302,444	33	180	3,753,287	36	64
Craig	207	46,625	22	225	4,886	27	73
Franklin	1,023	164,564	37	161	65,442	23	77
Giles	378	65,571	29	173	8,090	20	80
Montgomery	603	107,260	43	178	23,707	28	72
Pittsylvania	1,354	287,262	46	212	86,942	42	58
Roanoke	280	31,486	20	112	4,140	(D)	(D)
County Total a/	8,741	1,576,589	28	180	337,825	22	77

(D) Data suppressed by the Census to prevent disclosure of an individual respondent's data.
Numbers may not sum exactly due to rounding.
a/ The county total row represents the totals for the 17 counties that would be crossed by the pipeline.
Source: U.S. Department of Agriculture 2014

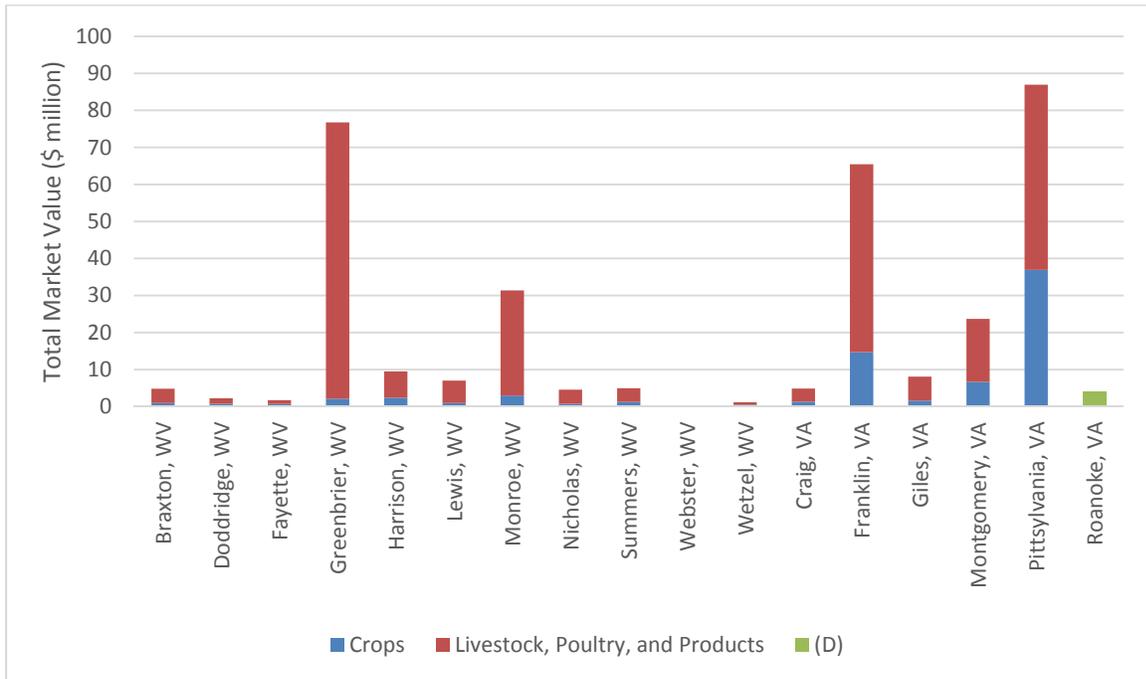


Figure 5.2-1 Total Market Value of Agricultural Products Sold, 2012

Source: U.S. Department of Agriculture 2014

(D) Data on type of product suppressed by the Census to prevent disclosure of an individual respondent's data

5.2.2.3 Recreation and Tourism

Recreation and tourism is not classified or measured as a standard industrial category and employment and income data are not specifically collected for this sector. Components of recreation and tourism activities are instead captured in other industrial sectors, primarily the retail sales and services sectors. Estimates of travel-related spending and associated employment in West Virginia for 2012 found that statewide, travel-related employment accounted for about 5 percent of total employment (Table 5.2-6). Viewed by county, travel-related employment ranged from about 1.6 percent to 10.8 percent of total employment, accounting for a larger share than the statewide average in five of the affected counties (Table 5.2-6).

Similar estimates developed for the Virginia Tourism Authority in 2013 found that travel-related employment accounted for about 5.3 percent of total statewide employment (Table 5.2-7). Travel-related employment accounted for a smaller share of total employment than the statewide average in all six of the affected Virginia counties, ranging from about 1.9 percent to 4.5 percent (Table 5.2-7).

5.2.3 Housing

Housing resources are summarized by county and state in Table 5.2-8. Data on housing units are estimates for 2013 prepared by the U.S. Census Bureau (2014b, 2014c). The Census Bureau defines a housing unit as a house, apartment, mobile home or trailer, group of rooms, or single room occupied or intended to be occupied as separate living quarters. Viewed by county, these estimates suggest that limited rental housing is available in a number of the affected counties in West Virginia, with less than 100 units available in five counties, and just eight available units identified in Doddridge County (Table 5.2-8). Less than 100 units were available in Craig County, Virginia.

Geographic Area	Travel Spending (\$ million)	Travel-Related Earnings (\$ million)	Travel-Related Employment	Percent of Total Employment
Braxton	40.2	7.8	328	6.0
Doddridge	6.7	1.2	50	1.6
Fayette	8.4	15.5	792	4.8
Greenbrier	243.7	83.2	2,064	10.8
Harrison	142.4	37.2	1,531	3.4
Lewis	47.3	12.1	539	5.5
Monroe	10.4	2.3	158	3.7
Nicholas	66.5	10.2	587	5.4
Summers	20.6	4.6	295	7.6
Webster	10.4	1.1	73	2.4
Wetzel	27.5	4.7	267	4.1
West Virginia	5,103.0	1,075.0	46,421	5.0

Source: Dean Runyan Associates 2013

Geographic Area	Travel Spending (\$ million)	Travel-Related Earnings (\$ million)	Travel-Related Employment	Percent of Total Employment ^{a/}
Craig	4.0	0.8	46	1.9
Franklin	96.6	21.0	1,190	4.5
Giles	24.8	4.3	230	3.0
Montgomery	132.7	24.8	1,320	2.9
Pittsylvania	67.9	12.5	620	2.1
Roanoke	156.4	29.2	1,500	3.2
Virginia	21,512.0	4,894.6	213,000	5.3

^{a/} Percent of total employment was estimated by comparing the travel-related employment estimate presented here with the number of people employed in each county in 2013 (U.S. Bureau of Labor Statistics 2014).
Source: U.S. Travel Association 2014

Data on hotels and motels are also presented by affected county in Table 5.2-8. These data, compiled by STR, a travel research firm, are for hotels, motels, and bed and breakfast inns with 15 or more rooms. The data suggest there is limited hotel and motel accommodation available in some of the affected counties. No hotels or motels with 15 or more rooms were identified in Doddridge or Monroe Counties, West Virginia or Craig County, Virginia (Table 5.2-8).

Table 5.2-8

Housing by State and County

County/State	Housing Units 2013				Hotels and Motels		Campgrounds and RV Parks <u>a/</u>	
	Total	Rental Vacancy Rate	Units Available for Rent	Seasonal, Recreational, or Occasional Use <u>b/</u>	Number of Facilities	Number of Rooms	Number of Facilities	Number of Spaces
Braxton	7,387	11.2	169	830	5	360	5	543
Doddridge	3,932	1.6	8	622	na	na	na	na
Fayette	21,544	8.7	389	796	8	531	20	457
Greenbrier	18,991	8.7	374	1,401	13	1,326	13	303
Harrison	31,443	7.1	548	398	16	1,475	1	na
Lewis	7,928	3.2	61	595	5	441	4	160
Monroe	7,576	8.6	94	615	na	na	1	48
Nicholas	13,009	8.8	201	1,287	9	667	6	552
Summers	7,657	6.4	76	1,039	3	191	3	553
Webster	5,417	2.8	25	689	1	23	1	88
Wetzel	8,152	11.4	184	380	4	188	na	na
West Virginia	880,951	7.8	17,009	44,013	NA	NA	NA	NA
Craig	2,764	8.7	32	299	na	na	na	na
Franklin	29,246	10.6	611	3,222	2	124	3	190
Giles	8,305	7.6	142	237	4	181	na	na
Montgomery	38,625	3.5	601	662	27	2,145	1	16
Pittsylvania	31,221	5.5	317	920	17	1,101	3	23
Roanoke	40,170	6.3	596	357	35	2,997	1	92
Virginia	3,381,332	6.7	72,738	88,891	NA	NA	NA	NA

Notes:
na – STR did not identify any hotels or motels in these counties; review of rvparking.com did not identify any campgrounds or RV parks in these counties or no data were available on the number of spaces.
NA – Data were not compiled for hotel and motel rooms or campgrounds and RV parks at the state level.
a/ Number of campgrounds and RV parks were compiled from rvparking.com. Actual numbers may vary. Information on the number of spaces was not available for some campgrounds/RV parks
b/ Housing units for seasonal, recreational, or occasional use are generally considered to be vacation homes. They are not included in the estimated number of housing units available for rent.
Source: rvparking.com 2015, STR 2015, U.S. Census Bureau 2014b, 2014c

The availability of temporary housing varies seasonally and geographically within the counties that are crossed by the Project. Demand for temporary housing is generally greatest during the tourism season in the summer months. In West Virginia, the statewide average hotel and motel occupancy rate was 63.8 percent during the first six months of 2012 (West Virginia Division of Tourism 2013). In Virginia, the statewide occupancy rate in February 2015 was 47.7 percent. Occupancy rate information provided for geographic areas in Virginia indicate that year-to-date occupancy rates for the two areas crossed by the

Project (the Virginia and Blacksburg/Wytheville areas) were 51.6 percent and 55.4 percent in July 2015 (Virginia Tourism Corporation 2015).

The data presented in Table 5.2-8 are for those counties that will be crossed by the Project only. Additional housing resources within daily commuting distance are available in larger communities as well as adjacent and nearby counties along parts of the route. Temporary accommodation is also available in the form of recreational vehicle (RV) and other types of campsites in the Project vicinity. Comprehensive data are not available for these types of resources, but information compiled from rvparking.com suggests that RV facilities are located within commuting distance of the pipeline route (Table 5.2-8).

5.2.4 Community Services

5.2.4.1 Police and Fire Services

Summary data for law enforcement and fire departments are presented by county and region in Table 5.2-9. These data provide a general overview of resources available in each county. In general, the number of police and fire departments is directly related to the overall size and population of the county, as well as the number of communities. Multiple law enforcement agencies and providers exist in the potentially affected counties, including state patrol, county sheriffs, and local police departments. In many cases, mutual aid agreements allow agencies to support one another in emergency situations. Multiple fire departments and districts also provide fire protection and suppression services in the affected counties. Many of these fire departments and districts are at least partially staffed by volunteers and tend to be housed in stations and fire houses in the larger communities.

County	Police Departments	Fire Departments
West Virginia		
Braxton	4	5
Doddridge	2	3
Fayette	9	11
Greenbrier	6	11
Harrison	9	14
Lewis	2	6
Monroe	1	4
Nicholas	3	7
Summers	3	6
Webster	3	4
Wetzel	5	10
Virginia		
Craig	1	2
Franklin	2	8
Giles	6	10
Montgomery	5	5
Pittsylvania	4	11
Roanoke	3	4
Source: Capitol Impact 2015		

5.2.4.2 Medical Facilities

Medical facilities in the counties crossed by the pipeline are identified in Table 5.2-10. Minor Project-related injuries would be treated at local medical facilities or emergency rooms. Workers with more serious injuries would be transported to one of the larger hospitals in the general vicinity.

Table 5.2-10		
Medical Facilities by County		
Hospital	County / City	Number of Beds
West Virginia		
Greenbrier Valley Medical Center	Greenbrier / Ronceverte	116
United Hospital Center	Harrison / Bridgeport	264
Louis A. Johnson VA Medical Center	Harrison / Clarksburg	na
Stonewall Jackson Memorial Hospital	Lewis / Weston	70
Summersville Memorial Hospital	Nicholas / Summersville	101
Wetzel County Hospital	Wetzel / New Martinsville	48
Virginia		
Carillion Franklin Memorial Hospital	Franklin / Rocky Mount	37
LewisGale Hospital - Montgomery	Montgomery / Blacksburg	88
Carillion New River Valley Medical Center	Montgomery / Christiansburg	146
Danville Regional Medical Center	Pittsylvania / Danville	250
Catawba Hospital	Roanoke / Catawba	270
Carillion Roanoke Memorial Hospital	Roanoke / Roanoke	740
LewisGale Medical Center	Roanoke / Salem	363
Salem VA Medical Center	Roanoke / Salem	na
na – not available		
Source: American Hospital Directory 2015		

5.2.4.3 Education

The total number of school districts, schools, students, and teachers are summarized by county in Table 5.2-11. Student/teacher ratios are also summarized by county. Student/teacher ratios, calculated by dividing the total number of students by the total number of full-time equivalent teachers, are a common measure used to assess the overall quality of a school. The national average student/teacher ratio for the 2012-2013 school year (the most recent available data) was 15.9. The statewide average ratios in West Virginia and Virginia were 14.3 and 12.3, respectively (National Education Association Research 2014).

Student/teacher ratios by county in West Virginia ranged from 12.7 (Doddridge County) to 14.3 (Lewis County). Student/teacher ratios in the six Virginia counties ranged from 11.7 (Craig County) to 13.6 (Giles County) (Table 5.2-11).

Table 5.2-11					
Schools by County, 2012-2013					
County	Number of School Districts	Total Number of Schools	Total Number of Students	Total Number of Teachers	Student/ Teacher Ratio (Average)
West Virginia					
Braxton	1	8	2,156	155	14.0
Doddridge	1	4	1,161	92	12.7
Fayette	1	20	6,867	498	13.8
Greenbrier	1	13	5,223	385	13.6
Harrison	1	26	10,935	783	14.0
Lewis	1	6	2,626	184	14.3
Monroe	1	5	1,852	131	14.1
Nicholas	1	17	4,035	296	13.6
Summers	1	5	1,569	112	14.1
Webster	1	6	1,493	111	13.4
Wetzel	1	9	2,818	216	13.1
Virginia					
Craig	1	2	694	59	11.7
Franklin	1	16	7,520	581	13.0
Giles	1	6	2,448	180	13.6
Montgomery	2	21	9,742	763	12.8
Pittsylvania	2	20	9,311	652	14.3
Roanoke	1	27	14,369	1064	13.5
Source: National Education Association Research 2014					

5.2.5 Transportation

The pipeline will cross numerous roads, ranging from unnamed four-wheel drive lanes to Interstate highways. A detailed list of the roads crossed by the Project is provided in Resource Report 8. Interstate and U.S. Highways crossed by the Project are identified in Table 5.2-12.

Access to the Project area in West Virginia would be via I-79 and I-64, both of which are crossed by the pipeline route. In addition, I-77 passes near the portion of the route in the southern part of the state. U.S. Highways providing access to the pipeline route in West Virginia include Highways 50, 33, 19, 60, and 219 all of which will be crossed by the Project.

Interstate and U.S. Highways Crossed by the Project			
Milepost	Highway	County	State
26.0	US Highway 50	Harrison	West Virginia
48.0	US Highway 33	Lewis	West Virginia
60.2	Interstate 79	Lewis	West Virginia
72.5	US Highway 19	Braxton	West Virginia
143.8	US Highway 60	Greenbrier	West Virginia
156.4	Interstate 64	Greenbrier	West Virginia
190.5	US Highway 219	Monroe	West Virginia
234.0	US Highway 11/460	Montgomery	Virginia
232.7	Interstate 81	Montgomery	Virginia
234.0	US Highway 11	Montgomery	Virginia
244.0	US Highway 221	Roanoke	Virginia
263.0	US Highway 220 (Virgil H Goode Highway)	Franklin	Virginia
295.2	US Highway 29	Pittsylvania	Virginia

In Virginia, access would be via I-81, which is crossed by the pipeline; I-77 passes near the portion of the Project in the western part of Virginia. U.S. Highways providing access to the pipeline route in Virginia include Highways 460, 11, 221, 220, and 29, all of which will be crossed by the Project.

5.2.6 Tax Revenues

5.2.6.1 Sales and Use Taxes

The state of West Virginia levies a 6 percent sales and use tax on all retail and rental sales. Municipalities have the option to levy additional sales and use taxes. None of the areas crossed by the Project levies additional sales and use tax (West Virginia State Tax Division 2015).

The general sales and use tax rate for Virginia is 5.3 percent (4.3 percent state tax and 1 percent local tax). Additional state tax is imposed in the Northern Virginia and Hampton Roads regions, neither of which is crossed by the Project.

5.2.6.2 Ad Valorem Taxes

Property or ad valorem taxes are an important source of general revenue for counties and municipalities in West Virginia and Virginia, typically providing a large share of general fund revenues. General fund revenues are presented by county in Table 5.2-13.

Table 5.2-13
General Revenues by County

West Virginia	General Fund Total Revenues (\$1,000s)	Virginia	General Fund Total Revenues (\$1,000s)
Braxton	4,387	Craig	6,675
Doddridge	5,589	Franklin	79,788
Fayette	11,333	Giles	51,810
Greenbrier	11,305	Montgomery	43,767
Harrison	26,631	Pittsylvania	58,971
Lewis	10,898	Roanoke	198,174
Monroe	2,809	Subtotal	439,176
Nicholas	8,390		
Summers	3,290		
Webster	2,531		
Wetzel	13,460		
Subtotal	100,625		

Sources: FTI Consulting 2015a, 2015b

5.2.7 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each federal agency to make the achievement of environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Executive Order further stipulates that the agencies conduct their programs and activities in a manner that does not have the effect of excluding persons from participation in them, denying persons the benefits of them, or subjecting persons to discrimination because of their race, color, or national origin.

Identifying whether disproportionately high and adverse impacts on minority and/or low-income populations would occur typically involves two steps: first, identifying whether minority and/or low-income communities are present, and, then, if these types of communities are present, evaluating whether high and adverse human health or environmental effects would disproportionately affect the identified community or communities.

Guidelines provided by the White House Council on Environmental Quality (CEQ) (1997) and U.S. Environmental Protection Agency (EPA) (1998) indicate that a minority community may be defined as either: 1) where the minority population comprises more than 50 percent of the total population; or 2) where the minority population is meaningfully greater than the minority population in the general population of an appropriate benchmark region used for comparison. Minority communities may consist of a group of individuals living in geographic proximity to one another, or a geographically dispersed set of individuals who experience common conditions of environmental effect. Further, a minority population exists if there is “more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds” (CEQ 1997).

The CEQ and EPA guidelines indicate that low-income populations should be identified based on the annual statistical poverty thresholds established by the U.S. Census Bureau. Like minority populations, low-income communities may consist of individuals living in geographic proximity to one another, or a geographically dispersed set of individuals who would be similarly affected by the proposed action or program. The U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of residents are below the poverty level (U.S. Census Bureau 2013a).

The 17 counties crossed by the pipeline range from approximately 251 square miles to more than 1,020 square miles (U.S. Census Bureau 2010). Larger and more populated geographic areas may have the effect of “masking” or “diluting” the presence of concentrations of minority and/or low-income populations (CEQ 1997; EPA 1998). Data were therefore also reviewed at the census tract and census block group levels. These levels may be summarized as follows:

Census Tract: Census tracts average about 4,000 residents and are designed to be relatively homogenous units with respect to population characteristics, economic status, and living conditions at the time of establishment. Census tracts often follow visible features, but may also follow governmental boundaries and other non-visible features. The pipeline crosses a total of 38 census tracts: 21 in West Virginia and 17 in Virginia.

Census Block Group: A census block group is a statistical subdivision of a census tract, generally defined to contain between 600 and 3,000 people and 240 and 1,200 housing units. Census block groups, as the name suggests consist of groups of blocks and are the smallest geographic unit for which the Census Bureau tabulates sample data. The pipeline crosses a total of 60 block groups: 38 in West Virginia and 22 in Virginia.

5.2.7.1 Race and Ethnicity

Counties

The population of West Virginia is predominantly White, with White persons comprising 93 percent of the total statewide population in 2010. The percent of the population identified as White in the affected West Virginia counties ranged from 92.2 percent (Summers County) to 98.4 percent (Wetzel County) (Table 5.2-14).

The population in Virginia is more diverse, with White persons comprising slightly less than two thirds (64.8 percent) of the total statewide population. White persons as a percent of the total population were higher than the state average in all of the affected Virginia counties, ranging from 74.4 percent (Pittsylvania County) to 95.9 percent (Giles County) (Table 5.2-15).

Census Block Groups

None of the census block groups crossed in West Virginia or Virginia had total minority populations that exceeded 50 percent, and, therefore, the population in these census blocks did not meet the definition of a minority community based on the 50 percent criteria identified by the CEQ (1997) and EPA (1998) guidelines. The minority population in each census block group was also compared with its respective county average in 2010 to identify areas where the minority population is potentially “meaningfully greater” than the minority population in the general population (defined as 20 percent higher than the benchmark region). None of the blocks groups crossed by the Project had a total minority population that was 20 percent higher than the respective county average.

Table 5.2-14

Minority, Low-Income, Children, Elderly, and Disabled Populations in West Virginia Project Area Counties

Population Variable	County											State of West Virginia
	Braxton	Doddridge	Fayette	Green-brier	Harrison	Lewis	Monroe	Nicholas	Summers	Webster	Wetzel	
MVP miles	14.7	4.8	0.5	21.2	23.7	27.5	22.0	24.7	16.7	30.0	9.6	195.5
Population (2010)	14,523	8,202	46,039	35,480	69,099	16,372	13,502	26,233	13,927	9,154	16,583	1,852,994
Median Household Income (2013)	31,848	34,817	33,771	37,895	43,183	36,199	41,234	40,064	33,784	27,645	37,969	41,043
Population Category as Percent of Total Population/Households <u>c/</u>												
White <u>a/</u>	97.8	96.6	92.9	93.9	95.0	97.5	97.1	97.9	92.2	98.2	98.4	93.2
African American/Black <u>a/</u>	0.4	1.4	4.6	2.7	1.6	0.4	0.7	0.2	4.6	0.2	0.1	3.4
American Indian/Alaska Native <u>a/</u>	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.1	0.1	0.2
Asian <u>a/</u>	0.2	0.2	0.2	0.4	0.5	0.3	0.1	0.3	0.2	0.1	0.2	0.7
Native HI & Other Pacific Islander <u>a/</u>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Some Other Race <u>a/</u>	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1
Two or More Races <u>a/</u>	0.8	1.0	1.2	1.4	1.4	0.9	1.2	0.9	1.3	1.0	0.6	1.3
Hispanic Origin (any race) <u>a/</u>	0.5	0.5	0.9	1.2	1.3	0.6	0.6	0.6	1.4	0.5	0.5	1.2
Total Minority Populations <u>a/</u>	2.2	3.4	7.1	6.1	5.0	2.5	2.9	2.1	7.8	1.8	1.6	6.8
Households in Poverty <u>b/</u>	20.4	14.4	20.2	20.0	17.2	19.5	14.6	18.2	22.3	25.3	19.3	17.5
Disability <u>c/</u>	19.6	15.1	26.3	19.0	19.7	17.7	22.2	22.4	28.4	21.1	15.7	19.1
Children (under 18 years of age) <u>a/</u>	20.7	20.4	20.5	20.1	22.0	20.7	21.0	21.2	18.1	21.6	20.9	20.9
Elderly (over 64 years of age) <u>a/</u>	17.5	16.2	16.9	19.3	16.5	17.9	19.6	17.1	19.3	17.5	19.5	9.1
Non-English Speakers at Home <u>b/</u>	0.1	0.0	0.2	0.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.3

a/ Percent of total population

b/ Percent of total households

c/ Percent of total civilian noninstitutionalized population

Sources: U.S. Census Bureau 2013b, 2013c, 2014d, 2014e, 2014f, 2014g

Table 5.2-15

Minority, Low-Income, Children, Elderly, and Disabled Populations in Virginia Project Area Counties

Population Variable	County						State of Virginia
	Craig	Franklin	Giles	Montgomery	Pittsylvania	Roanoke	
MVP miles	1.7	36.7	20.0	19.0	19.9	8.3	105.5
Population (2010)	5,190	56,159	17,286	94,392	63,506	92,376	8,001,024
Median Household Income (2013)	47,806	45,624	45,141	45,543	42,143	60,795	63,907
Population Category as Percent of Total Population/Households							
White <u>a/</u>	98.3	87.4	95.9	85.9	74.4	88.6	64.8
African American/Black <u>a/</u>	0.1	8.1	1.5	3.8	22.0	5.0	19.0
American Indian/Alaska Native <u>a/</u>	0.1	0.2	0.1	0.2	0.2	0.1	0.3
Asian <u>a/</u>	0.2	0.4	0.3	5.4	0.3	2.7	5.5
Native HI & Other Pacific Islander <u>a/</u>	0	0.0	0.0	0.0	0.0	0.0	0.1
Some Other Race <u>a/</u>	0	0.3	0.0	0.1	0.1	0.1	0.2
Two or More Races <u>a/</u>	0.6	1.1	0.9	1.9	0.9	1.4	2.3
Hispanic Origin (any race) <u>a/</u>	0.7	2.5	1.2	2.7	2.1	2.1	7.9
Total Minority Populations <u>a/</u>	1.7	12.6	4.1	14.1	25.6	11.4	35.2
Households in Poverty <u>b/</u>	8.8	12.9	14.7	22.4	14.9	6.8	10.8
Disability <u>c/</u>	19	15	21	9	17	11	11
Children (under 18 years of age) <u>a/</u>	21.4	20.8	21.7	16.0	21.2	21.8	23.2
Elderly (over 64 years of age) <u>a/</u>	17.1	17.6	18.0	9.8	17.2	17.2	6.9
Non-English Speakers at Home <u>b/</u>	0.0	0.5	0.1	2.0	0.6	1.6	3
<u>a/</u> Percent of total population <u>b/</u> Percent of total households <u>c/</u> Percent of total civilian noninstitutionalized population Sources: U.S. Census Bureau 2013b, 2013c, 2014d, 2014e, 2014f, 2014g							

5.2.7.2 Income and Poverty

Counties

Median household income in West Virginia and Virginia was equivalent to 77 percent and 120 percent, respectively, of the national median (\$53,046) in 2013. Median household income in the potentially affected counties in West Virginia was below the state median in nine of the 11 affected counties, ranging from 67 percent (Webster County) to 98 percent (Nicholas County) of the state median. Median household income in the other two counties (Monroe and Harrison Counties) was slightly above the state median, but still below the national median (Table 5.2-14). Median household income was below the state median in all the potentially affected Virginia counties and below the national median in five of the six counties (Table 5.2-15).

The estimated percent of households in West Virginia below the poverty level in 2013 was higher than the national average (17.5 percent versus 14.2 percent). The estimated percent of households below the poverty level in the potentially affected West Virginia counties exceeded the state average (17.5 percent) in eight

of the 11 counties, with the percent equal to or exceeding 20 percent in five of these counties (Braxton, Fayette, Greenbrier, Summers, and Webster Counties) (Table 5.2-14).

The estimated percent of households below the poverty level in Virginia in 2013 was lower than the national average (10.8 percent versus 14.2 percent). At the county level, estimated household poverty rates ranged from 6.8 percent (Roanoke County) to 22.4 percent (Montgomery County). Montgomery County was the only county crossed by the Project where the number of households below the poverty level exceeded 20 percent of all households (Table 5.2-15).

Census Block Groups

Household poverty data compiled as part of the U.S. Census Bureau’s American Community Survey are presented for 2013 by county and census block group for West Virginia and Virginia in Tables 5.2-16 and 5.2-17, respectively. These data are 5 year estimates based on data compiled from 2009 to 2013. The block group is the smallest geographic unit that these and other sample data are available. These tables identify block groups where at least 20 percent of the households are below the poverty level.

County/Block Group <u>a/</u> <u>b/</u>	Number of Households	Percent of Households Below Poverty
Braxton County	5,780	20.4
Block Group 1, Census Tract 9679	142	28.4
Fayette County	17,250	20.2
Block Group 3, Census Tract 211	363	22.0
Greenbrier County	15,409	20.0
Block Group 1, Census Tract 9503	314	22.3
Block Group 3, Census Tract 9503	580	29.3
Harrison County	27,599	17.2
Block Group 1, Census Tract 317	430	29.8
Block Group 2, Census Tract 317	371	22.6
Lewis County	6,451	19.5
Block Group 1, Census Tract 9672	428	24.8
Block Group 2, Census Tract 9672	240	26.3
Block Group 3, Census Tract 9676	582	23.5
Monroe County	5,648	14.6
Block Group 1, Census Tract 9502	502	25.7
Nicholas County	10,657	18.2
Block Group 2, Census Tract 9504	315	35.2
Block Group 3, Census Tract 9504	761	30.0
Summers County	5,350	22.3
Block Group 1, Census Tract 5	479	25.5
Webster County	3,928	25.3
Block Group 2, Census Tract 9701	425	22.6
Block Group 4, Census Tract 9701	589	33.8
Block Group 1, Census Tract 9703	857	20.0
<u>a/</u> The county totals are the benchmark values used for comparison in this table. <u>b/</u> Data are only shown for those census block groups with more than 20 percent of households below the poverty level. Source: U.S. Census Bureau 2014e		

At least 20 percent of households were below the poverty level in 16 of the 38 census block groups crossed by the pipeline in West Virginia (Table 5.2-16). These block groups were distributed along the pipeline route in nine of the 11 counties that will be crossed. In Virginia, at least 20 percent of households were below the poverty level in five of the 22 census block groups that will be crossed (Table 5.2-17).

County/Block Group <u>a/</u> b/	Number of Households	Percent of Households Below Poverty
Franklin County	23,358	12.9
Block Group 2, Census Tract 204	988	20.0
Block Group 1, Census Tract 209	586	24.2
Montgomery County	34,789	22.4
Block Group 1, Census Tract 214	390	32.1
Pittsylvania County	26,092	14.9
Block Group 4, Census Tract 103	369	29.3
Block Group 1, Census Tract 105	420	20.5
Notes: <u>a/</u> The county totals are the benchmark values used for comparison in this table. <u>b/</u> Data are only shown for those census block groups with more than 20 percent of households below the poverty level. Source: U.S. Census Bureau 2014e		

5.2.7.3 Other Populations of Concern

The below discussion addresses populations of disabled, non-English speakers, children, and elderly people in the areas crossed by the Project.

Disabled Populations

Counties

According to the U.S. Census, an estimated 12.1 percent of the total civilian noninstitutionalized population in the United States had a disability in 2013 (U.S. Census Bureau 2014g). The corresponding figures for West Virginia and Virginia were 19.1 percent and 11 percent, respectively (Tables 5.2-14 and 5.2-15). The share of the population with a disability in the affected West Virginia counties exceeded the state average in seven of the counties crossed, with all of the counties exceeding the national average (Table 5.2-14). In the Virginia counties, the share of the population with a disability exceeded the state and national averages in three of the counties that would be crossed (Table 5.2-15).

Census Tracts

The census tract is the smallest geographic unit for which comprehensive data on disability are available. The share of the population with a disability in each census tract crossed by the pipeline was compared to the share in the corresponding county. In West Virginia, the share of the population with a disability in the census tracts crossed was lower than the share in the corresponding county in nine of 21 tracts crossed, the same in one, and higher in the remaining 11, with the net difference where the share is higher ranging from 0.7 percent to 10.8 percent (U.S. Census Bureau 2014g).

In Virginia, the share of the population with a disability in the census tracts crossed was lower than the share in the corresponding county in six of 17 tracts crossed, the same in two, and higher in the remaining nine, with the net difference where the share is higher ranging from 0.4 percent to 6.7 percent (U.S. Census Bureau 2014g).

Non-English Speakers

Counties

An estimated 5 percent of total households in the United States were identified as limited English-speaking households in 2013 (U.S. Census Bureau 2014f). The corresponding figures for West Virginia and Virginia were 0.3 percent and 3 percent, respectively (Tables 5.2-14 and 5.2-15). Limited English-speaking households as a share of total households in the affected West Virginia counties was lower than the state average in all of the counties with the exception of Harrison County, where 0.6 percent of households were identified as limited-English speaking (Table 5.2-14). In the Virginia counties, the share of total households identified as limited English-speaking was lower than the state average in all six counties (Table 5.2-15).

Census Block Groups

The share of total households identified as limited English-speaking in the affected census block groups in West Virginia ranges from 0 to 1.5 percent and is very similar to the county level. In Virginia, the percentage of households identified as limited English-speaking ranges from 0 to 8.1 percent within crossed census block groups (U.S. Census Bureau 2014f).

Children and Elderly

Counties

In 2010, almost one-quarter (24 percent) of the U.S. population was under 18 years of age (U.S. Census Bureau 2013c). The corresponding figures for West Virginia and Virginia were 20.9 percent and 23.2 percent, respectively (Tables 5.2-14 and 5.2-15). In the West Virginia counties, children under 18 years of age as a share of total population ranged from 18.1 percent (Summers County) to 22 percent (Harrison County) (Table 5.2-14). In the Virginia counties, children as a share of total population was lower than the state average in all six counties, ranging from 16 percent (Montgomery County) to 21.8 percent (Roanoke County) (Table 5.2-15).

The share of the U.S. population over 64 years of age in 2010 was 7.4 percent (U.S. Census Bureau 2013c). In West Virginia and Virginia, the corresponding shares were 9.1 percent and 6.9 percent, respectively (Tables 5.2-14 and 5.2-15). The elderly share of total population in the affected West Virginia counties was much larger than the state average in all 11 counties, ranging from 16.2 percent (Doddridge County) to 19.6 percent (Monroe County) (Table 5.2-14). The elderly share of total population was also higher than the corresponding state average in all six Virginia counties, ranging from 9.8 percent (Montgomery County) to 18 percent (Giles County) (Table 5.2-15).

Census Block Groups

Review of population by age at the census block group level indicated that the shares of children and elderly in the population for each census block group were generally comparable with those in the corresponding county (i.e., the county the census block group is located within). The share of the population over 64 years of age exceeded the corresponding state averages in all the census block groups crossed.

5.3 ENVIRONMENTAL EFFECTS

5.3.1 Population

Overall construction and clean-up of the pipeline and associated facilities is expected to take 29 months, with a proposed construction start date in January 2017. Based on current discussions with qualified construction contractors, MVP estimates that local workers will account for approximately 25 percent of construction jobs for each spread for the duration of the Project. The remaining 75 percent of the construction workforce will consist of non-local workers. Local workers are defined here as those who normally reside within daily commuting distance of the work sites. In addition to this 25 percent, a further 10 percent of workers are expected to normally reside elsewhere in West Virginia and Virginia (i.e., beyond daily commuting distance), resulting in an estimated 35 percent of the total construction workforce expected to be hired in-state.

Non-local workers will temporarily relocate to the Project vicinity for the duration of their employment; some workers will possibly commute home on weekends, depending on the location of their primary residence. Individual non-local workers may also relocate along the length of the Project and between segments depending on their assignment. Very few, if any, of the non-local workers employed during the construction phase of each spread are expected to be accompanied by family members or permanently relocate to the affected areas.

Table 5.3-1 compares the projected average and peak numbers of non-local workers with existing population by construction spread. These estimates illustrate the numbers of non-local workers expected to be present during construction. Non-local workers seeking temporary accommodation would reside in daily commuting distance of their work sites. Some non-local workers would likely reside in the counties within which they are working; others may locate in larger communities in adjacent or nearby communities. This is discussed further in Section 5.3.3.

Existing EQT Corporation staff will be primarily responsible for operations and maintenance of the new pipeline and associated facilities. However, approximately 25 new jobs will also be required for operations and maintenance of the MVP Project facilities.

Spread	State	County	2013 Population <u>a/</u>	Average Employment		Peak Employment	
				Number of Non- Local Workers <u>b/, c/</u>	Percent of 2013 Population	Number of Non-Local Workers <u>b/, c/</u>	Percent of 2013 Population
1	West Virginia	Wetzel, Harrison	85,176	394	0.5	671	0.8
2	West Virginia	Harrison, Doddridge, Lewis	93,768	317	0.3	536	0.6
3	West Virginia	Lewis, Braxton	30,954	317	1.0	536	1.7
4	West Virginia	Braxton, Webster	23,395	382	1.6	641	2.7
5	West Virginia	Webster, Nicholas	34,858	317	0.9	536	1.5
6	West Virginia	Nicholas, Greenbrier, Fayette, Summers	61,609	317	0.5	536	0.9
7	West Virginia	Summers, Monroe	108,289	368	0.3	611	0.6
8	West Virginia/ Virginia	Monroe, Giles	30,408	289	1.0	536	1.8

Table 5.3-1

Projected Non-Local Workers by Construction Spread

Spread	State	County	2013 Population <i>a/</i>	Average Employment		Peak Employment	
				Number of Non-Local Workers <i>b/, c/</i>	Percent of 2013 Population	Number of Non-Local Workers <i>b/, c/</i>	Percent of 2013 Population
9	Virginia	Giles, Montgomery, Roanoke, Franklin	118,342	289	0.2	536	0.5
10	Virginia	Franklin	246,066	289	0.1	536	0.2
11	Virginia	Franklin, Pittsylvania	118,761	302	0.3	559	0.5

a/ Existing population data are estimates prepared by the U.S. Census Bureau 2014a. These estimates are presented by county in Table 5.2-1.

b/ Estimated numbers by construction spread include the estimated workforce required to build the compressor and meter stations (see Tables 5.1-2 and 5.1-3).

c/ Non-local workers are those who normally live outside daily commuting distance of the work sites. Non-local workers are assumed to comprise 75 percent of the total estimated workforce for each Project component.

5.3.2 Economic Conditions

5.3.2.1 Employment and the Economy

The pipeline will be constructed in 11 spreads, with overall Project construction and related clean-up expected to take 29 months. Actual construction activities are expected to take 24 months, with the pipeline and related facilities expected to be in-service at the end of 2018. Clean-up activities would continue for five months following the in-service date, with an estimated total of 300 workers expected to be employed across four spreads (Spreads 8 to 11). MVP estimates that it will spend approximately \$1.22 billion on labor, equipment, materials, and services in West Virginia (\$811 million) and Virginia (\$407 million) during Project construction, with an additional \$2.3 billion spent outside these states. These expenditures will generate economic activity and support employment and income elsewhere in the economy through the multiplier effect, as initial changes in demand “ripple” through the local economy and support indirect and induced impacts. Indirect and induced impacts may be defined as follows:

- *Indirect* impacts are generated by the expenditures on goods and services by suppliers who provide goods and services to the construction project. Indirect effects are often referred to as “supply-chain” impacts because they involve interactions among businesses.
- *Induced* impacts are generated by the spending of households associated either directly or indirectly with the proposed project. Workers employed during construction, for example, will use their income to purchase groceries and other household goods and services. Workers at businesses that supply the facility during construction or operation will do the same. Induced effects are sometimes referred to as “consumption-driven” impacts.

Two economic benefit studies prepared on behalf of MVP estimated the total (direct, indirect, and induced) employment expected to be generated and supported during Project-construction in West Virginia and Virginia, respectively (FTI Consulting 2015a, 2015b). These estimates developed using separate IMPLAN models for each state are based on projected spending. The total direct jobs estimated by FTI Consulting include those workers who would be directly employed in the field during Project-construction (e.g., construction foremen, pipe engineers, welders, and operators, etc.), as well as those workers who would be

directly employed elsewhere in West Virginia and Virginia providing Project-related technical services such as engineering and design, surveying, and permitting.

FTI Consulting estimated that the Project would generate and support an estimated 9,385 total (direct, indirect, and induced) jobs in West Virginia during Project construction, and an estimated 5,251 total jobs in Virginia (Figure 5.3-1). These estimates are presented in job-years. A job-year is the equivalent of one full-time job lasting a single year. Estimated job-years do not directly translate into numbers of workers, who may be employed on the Project for shorter periods. Total employment estimates are presented by state and type (direct, indirect, and induced) in Figure 5.3-1. These findings are discussed in more detail in the reports prepared by FTI Consulting (2015a, 2015b), which are included as Appendix 5-A to this report.

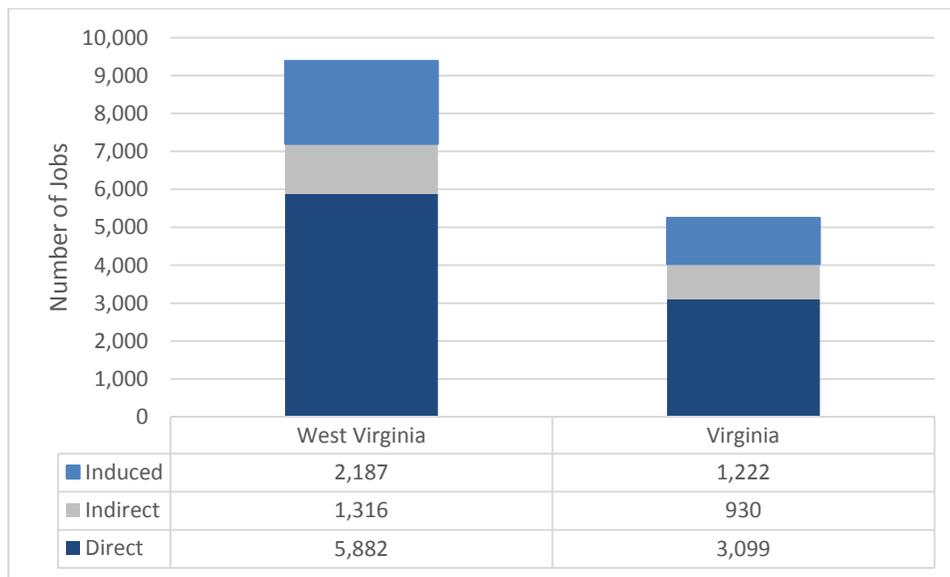


Figure 5.3-1 Total (Direct, Indirect, and Induced) Employment by State

Note: Estimates are totals for the entire construction period.
Source: FTI Consulting 2015a, 2015b

Based on average employee labor income estimates developed by FTI Consulting (2105a, 2015b), the direct employment totals identified in Figure 5.3-1 are expected to generate \$337.3 million in labor income in West Virginia and \$168.3 million in Virginia over the construction phase of the Project. Indirect and induced jobs supported during construction would also generate labor income in the affected states (Figure 5.3-2).

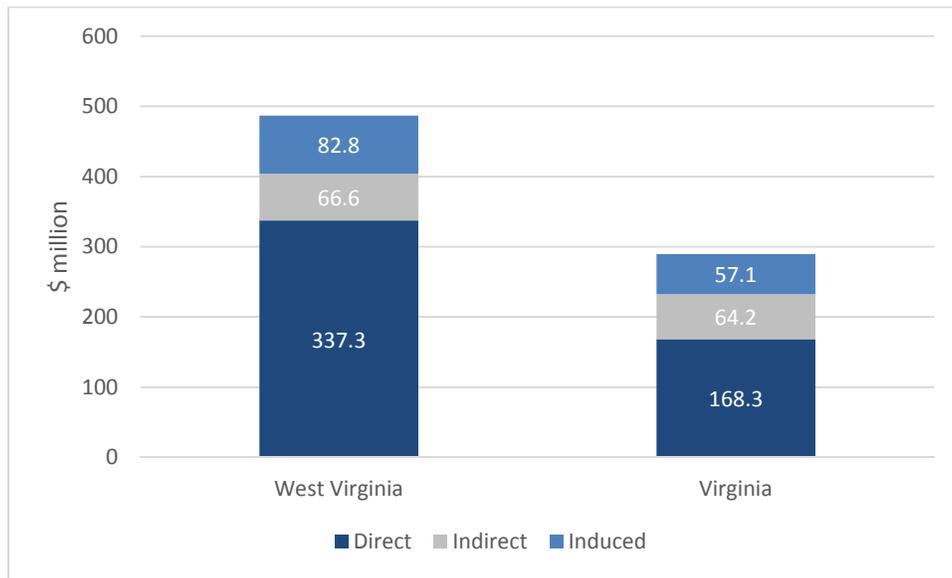


Figure 5.3-2 Total (Direct, Indirect, and Induced) Labor Income by State

Note: Estimates are totals for the entire construction period. Numbers are in millions of dollars.
Source: FTI Consulting 2015a, 2015b

Existing EQT Corporation staff will be primarily responsible for operations and maintenance of the new pipeline and associated facilities. However, approximately 25 new jobs will also be required for operations and maintenance of the MVP Project facilities. FTI Consulting (2015a, 2015b) estimated that operations and maintenance activities would also support indirect and induced employment elsewhere in the West Virginia and Virginia state economies, with estimated annual total (direct, indirect, and induced) employment of 54 jobs in West Virginia with average annual wages and benefits of about \$65,000 per job. In Virginia, FTI Consulting (2015b) estimated that operations and maintenance would generate and support a total of 34 direct, indirect, and induced jobs, with average annual wages and benefits of almost \$67,000 per job.

5.3.2.2 Agriculture

Livestock dominates the agricultural sectors in terms of total market value of agricultural products sold in nearly all of the counties crossed, accounting for more than 50 percent of total value in all cases (Table 5.2-5; Figure 5.2-1). Impacts to agricultural land are discussed in Resource Report 8 and include potential impacts to livestock grazing, crop production, agricultural drainage and irrigation systems, farmland preservation programs, and certified organic farms.

The total estimated disturbance to agricultural operations during construction and operation would be 998 acres and 259 acres, respectively (see Resource Report 8). These totals represent a very small share of the 1.6 million acres of land in farms in the 17 affected counties and are unlikely to noticeably affect overall agricultural production and employment in any of the affected counties. Landowners will be compensated for crop losses and other damages caused by construction activities. MVP will negotiate with and reimburse landowners/producers of products for damages or loss to their product as a result of the construction of the Project. This is discussed further in Resource Report 8.

5.3.2.3 Recreation and Tourism

Public comments received on the Project included concerns that the pipeline will negatively affect the recreation and tourism industry in the affected areas. Concerns were expressed that right-of-way clearing for the pipeline will affect the natural appearance of the landscape, key scenic views, and important recreation resources, including the Appalachian National Scenic Trail, Blue Ridge Parkway, and Jefferson National Forest. Recreation and tourism contributes directly to local economies through related expenditures (see Tables 5.2-6 and 5.2-7). Natural landscapes and recreation opportunities also contribute to the quality of life of existing residents and can serve to attract new residents, businesses, and other sources of income to a region. Recreation and tourism in the region typically peaks during summer vacation season between May and October and in October for viewing fall foliage. Available visitation estimates for the Appalachian National Scenic Trail, Blue Ridge Parkway, and Jefferson National Forest discussed below indicate that these resources receive a considerable number of visitors each year. These estimates are for the entire lengths of the trail and parkway, and the entire Jefferson National Forest. They provide some indication provide some indication of the overall popularity of these resources. Visitors to the parts of these resources in the vicinity of the Project represent much smaller shares of these totals.

The Appalachian National Scenic Trail is a 2,175-mile marked footpath that extends across 14 states, eight National Forests, six National Park Service units, one National Wildlife Refuge and about six dozen state parks and forests. The trail is used by day and weekend hikers, section-hikers (who hike the entire trail in sections) and through-hikers (who hike the entire length of the trail in one season). A recent U.S. Forest Service (USFS) report developed a total annual visitation estimate of 1.95 million for the entire trail based on survey data from 2007 (Zarnoch et al. 2011).

The Blue Ridge Parkway is 469 miles long and extends from Shenandoah National Park in Virginia to the Great Smoky Mountains National Park in North Carolina. Travel along the parkway generally peaks from May through October, declining substantially in the winter. The NPS estimated that there were 14.5 million visitors to the parkway for recreational purposes in 2010 based on average vehicle occupancy rates and excluding others who use the parkway for non-recreational purposes, such as commuting (National Park Service [NPS] 2013).

The Jefferson National Forest is managed by the USFS and administratively combined with the George Washington National Forest. Together, the two forests encompass nearly 1.8 million acres in West Virginia, Virginia, and Kentucky. An estimated 1.34 million people visited developed or dispersed recreation sites on the Forest (USFS 2004). The Jefferson National Forest is discussed in more detail in Section 5.3.10.

Potential impacts to recreational resources are addressed in Resource Report 8. MVP has consulted with the NPS, USFS, and the Appalachian Trail Conservancy with regards to crossing locations of the Jefferson National Forest, the Appalachian National Scenic Trail, and the Blue Ridge Parkway. Visual impacts are also addressed in Resource Report 8.

Visual impacts may result from the removal of vegetation, particularly in forested areas, and will likely be most visible where the pipeline parallels or crosses roads and where vegetation is removed between the right-of-way and residences. While there will be some visual impacts from construction and operation of the Project, Project-related changes to the existing landscape and scenic views are not expected to significantly affect the overall recreation and tourism experiences of residents and visitors to the region or discourage people from relocating to or visiting the region. Impacts to important recreation resources on

public lands will be minimized through consultation with the appropriate land management agencies. Detailed discussions of potential visual impacts on recreation and other sensitive resources are provided in Resource Report 8.

5.3.3 Housing

The majority of construction workers (an estimated 75 percent) will likely temporarily relocate to the vicinity of the Project area for the duration of their employment, possibly commuting home on weekends, depending on the location of their primary residence. Very few, if any, of the non-local workers employed during the construction phase of each spread are expected to be accompanied by family members. Workers temporarily relocating to work on the Project are expected to require motel or hotel rooms, rental housing (apartments, houses, or mobile homes), or provide their own housing in the form of RVs or pop-up trailers. Past evaluations of pipeline construction projects have estimated that 30 percent of workers temporarily relocating will provide their own housing (FERC 2014a).

Housing resources are summarized by construction spread in Table 5.3-2. In addition to these resources, the Project area includes numerous bed and breakfast establishments, cottages and cabins, and resorts and spas used by tourists. Data compiled by the U.S. Census (2014c), for example, identified a total of 44,013 housing units for seasonal, recreational, or occupation use in the 11 West Virginia counties that would be crossed by the Project, with a further 88,891 units identified in the six Virginia counties (Table 5.2-8). This category of housing is generally considered to be vacation homes and not included in the totals presented in Table 5.3-2. Vacation homes make up a relatively large share of the total housing stock in a number of the counties that would be crossed, accounting for 10 percent or more of housing in Braxton, Doddridge, Nicholas, Summers, and Webster Counties in West Virginia, and Craig and Franklin Counties in Virginia, compared to state averages of 5 percent in West Virginia and 3 percent in Virginia (Table 5.2-8). These units would continue to be available for recreationists and tourists, which should reduce the possibility that construction crews would displace these types of visitors.

Table 5.3-2 presents average and peak numbers of non-local workers by construction spread, as well as estimates of available rental housing, hotel and motel rooms, and campground and RV spaces. These estimates illustrate the numbers of non-local workers expected to be present during construction. Non-local workers seeking temporary accommodation would reside in daily commuting distance of their work sites. Some non-local workers would likely reside in the counties within which they are working; others may locate in larger communities in adjacent or nearby communities. Larger communities outside the counties that would be directly crossed, but within daily commuting distance of parts of the Project include Wheeling, Morgantown, and Charleston, West Virginia, among others.

MVP's current discussions with over 12 qualified construction contractors do not indicate the desire or need to establish man camps based on their feedback and evaluation of the individual spread breakout and facility geographic locations.

During Project operation, existing staff will be primarily responsible for operations and maintenance of the new pipeline and associated facilities; however, an estimated 25 new jobs will be created. New employees could be located at various locations along the pipeline or in EQT's headquarters. Therefore impact on existing housing from these new jobs in any one area will be minimal. Additional indirect and induced jobs expected to be supported elsewhere in West Virginia and Virginia as a result of Project operation and maintenance are in many cases likely already existing positions, and represent a very small share of available housing.

Table 5.3-2

Estimated Construction-Related Housing Demand by Construction Spread

Spread <u>c/</u>	State	County	Estimated Housing Demand <u>a/</u>		Estimated Available Housing Resources <u>b/</u>		
			Average Employment (Workers/ Month)	Peak Employment (Workers/ Month)	Housing Units Available for Rent <u>d/</u>	Hotel and Motel Rooms	RV Spaces <u>e/</u>
1	West Virginia	Wetzel, Harrison	394	671	732	1,663	na
2	West Virginia	Harrison, Doddridge, Lewis	317	536	617	1,916	160
3	West Virginia	Lewis, Braxton	317	536	230	801	703
4	West Virginia	Braxton, Webster	382	641	194	383	631
5	West Virginia	Webster, Nicholas	317	536	226	690	640
6	West Virginia	Nicholas, Greenbrier, Fayette, Summers	317	536	575	1,993	855
7	West Virginia	Summers, Monroe	368	611	933	2,048	1,361
8	West Virginia/ Virginia	Monroe, Giles	289	536	236	181	48
9	Virginia	Giles, Montgomery, Roanoke, Franklin	289	536	775	2,326	16
10	Virginia	Franklin	289	536	1,808	5,266	298
11	Virginia	Franklin, Pittsylvania	302	559	928	1,225	213

a/ An estimated 75 percent of the total construction workforce is assumed to be non-local for the duration of the Project.
b/ Housing data are presented by county in Table 5.2-8. Data are only presented for counties that would be directly crossed.
c/ Estimated housing demands by construction spread include the estimated workforce required to build the compressor and meter stations.
d/ Many of these available units include more than one bedroom and, if rented, could be occupied by more than one worker. A large number of in-migrating workers on similar projects typically rent a room in a house or live five in a rented house (BLM 2013).
e/ Data are presented for counties that would be directly crossed only. Data were compiled from rvparking.com. Actual numbers may vary and information on the number of spaces was not available for some campgrounds/RV parks.

5.3.3.1 Displacement of Residences and Businesses

MVP has no plans to displace or relocate any businesses as a result of construction or operation of the Project. MVP has identified two residences in close proximity to the site for the Stallworth Compressor Station. MVP has come to terms with the affected landowners and has agreed to purchase the affected properties. MVP will complete the purchases prior to the start of construction and will pay fair market value for the properties.

5.3.4 Property Values

For private and non-federal public lands, MVP will negotiate in good faith with property owners to obtain the required easements using valuations based on comparable property transactions and with reference to the particular characteristics and type of property. The agreement between MVP and the landowner will specify compensation for the easement, compensation for damage to property and loss of use during construction, and loss of renewable and nonrenewable or other resources. The agreement will also specify

uses of the permanent right-of-way after construction. In situations where MVP is unable to reach an agreement with a landowner and the Project is authorized by FERC, MVP will be granted the right of eminent domain under Section 7(h) of the Natural Gas Act and the procedures set forth under the Federal Rules of Civil Procedure (Rule 71A). Under these circumstances, the court determines compensation received by the landowner. MVP is committed to working with landowners to the maximum extent possible to negotiate easement agreements. Only after all avenues of negotiation have been exhausted and as a last resort, will MVP utilize the eminent domain process. MVP has elected to initiate the easement acquisition process with various property owners assuming the risk of the Project authorization. Should FERC decline the Project Certificate, landowners that have executed easements will retain the agreed upon compensation, and MVP will absorb all expended costs.

The impact a pipeline may have on the value of a tract of land depends on many factors, including the size of the tract, the values of adjacent properties, the presence of other utilities, the current value of the land, and the current land use. Subjective valuation is generally not considered in appraisals, but may affect individual decisions when a property is offered for sale, thus impacting the potential resale value. Purchase decisions are often based on the purchaser's plans for the property, such as use for agriculture, future residential development, a second home, or commercial/industrial development. If the presence of a pipeline interferes with those future plans, the potential buyer may decide against acquiring the property with a pipeline easement. However, each potential purchaser has different criteria and differing capabilities to purchase land.

Initial public comments received on the Project included concerns about the potential impact of the pipeline on property values. The Interstate Natural Gas Association of America conducted a national case study to determine if the presence of a pipeline on a piece of property affected the property value or sales price of the property (Allen, Williford & Seale, Inc. 2001). The study employed paired sales, descriptive statistics, and linear regression analysis to assess impacts to four separate, geographically diverse case study areas. The study found that there was not a significant impact on the sales price of properties located along natural gas pipelines. They further determined that neither the size of the pipeline (diameter) nor the product carried by a pipeline had any significant impact on sales price. The study also concluded that the presence of a pipeline did not impede the development of surrounding properties.

More recent studies investigating property values near natural gas pipelines are consistent with the findings of this earlier work. Fruits (2008) evaluated the impact of the South Mist Pipeline Extension on residential sales in Clackamas and Washington Counties, Oregon using a hedonic price modeling approach. Based on sales price data for 10,642 single family residential properties located within one mile of the pipeline, the study found that proximity to the pipeline had no statistically or economically significant impact on residential property values. Fruits (2008) noted that these results are consistent with previous studies and suggested that the positive amenity potential associated with pipeline proximity (i.e., the function of the pipeline easement as a greenbelt or buffer) may exceed any perceived costs associated with potential safety or environmental risks (Fruits 2008).

A 2008 market study conducted by PGP Valuation on behalf of Palomar Gas Transmission LLC also assessed the impacts of the South Mist Pipeline Extension on property values (Palmer 2008). Using a sales comparison methodology, the study evaluated sales data for a total of 18 properties encumbered by South Mist Pipeline Extension right-of-way easements and compared these with sales of other comparable unencumbered properties. Based on this analysis, PGP Valuation concluded that high-pressure natural gas

pipelines had no measurable long-term impact on property values. The study also concluded that variations in short-term values were either not substantial or non-existent and that residential properties were not impacted by the pipeline easement any more or less than other property types (Palmer 2008).

A third more recent study analyzed sales data from approximately 1,000 residential properties in Arizona to test whether proximity to a natural gas pipeline had an effect on real estate sales prices (Diskin et al. 2011). Using sales price information, the study compared sales prices for properties encumbered by or adjacent to a natural gas transmission pipeline with comparable properties not along a pipeline right-of-way. The study was unable to identify a systematic relationship between proximity to a pipeline and sales price or property value. The researchers cautioned that these results are limited to the dataset examined and should not be generalized to all geographic regions (Diskin et al. 2011).

Stakeholders have referenced several newspaper articles and reports that discuss and address the potential impacts of oil and gas development and pipelines on property values (Dyer 2012, Conversations for Responsible Economic Development [CRED] 2013). The first reference, Dyer (2012), is to a newspaper article that discusses the potential impacts of fracking on property values and references several studies that are primarily related to oil and gas shale development and do not directly relate to the Project. The second reference, CRED (2013), provides an overview of eight case studies that consider the impacts of pipeline spills, explosions, and fires on property values. One of the case studies referenced in the CRED report is the 2010 BP Deepwater Horizon Mobile Offshore Drilling Unit explosion; another involved the “largest-ever U.S. diluted bitumen spill”, which involved more than 20,000 barrels of oil leaking into the Kalamazoo River in Michigan in 2010. These and the other case studies directly address the property value effects following a significant incident, such as a spill, explosion, and fire, and do not address the potential effects of the presence of a pipeline in the absence of a major event. Further, just one of the case studies summarized in the CRED report addresses a natural gas pipeline-related incident.

A newspaper editorial in the Roanoke Times (Quesenberry 2015), which cited the above article and report, also referenced a recent case from the Court of Appeals of the State of California: *Gaviota Holdings LLC vs. Chicago Title Insurance Company*, which found in favor of an earlier trial court finding that the presence of an undisclosed gas and petroleum easement resulted in an 8 percent decline in value of a 38 acre oceanfront property in Santa Barbara, California. The loss estimated by an expert witness consisted of: 1) a 4 percent reduction due to the presence of a sign-posted natural gas transfer and metering facility on the property and a perceived negative market impact; and 2) a 4 percent reduction due to a loss of privacy caused by regular maintenance access by the easement holder.

Considering the diverse and credible research that concludes there is no long-term correlation between a loss of property value and the existence of natural gas transmission pipelines, MVP believes that it is reasonable to assert that there will be a minimal, if any, impact on long-term property values along the Project route.

5.3.5 Mortgages and Insurance

5.3.5.1 Mortgages

Several people commenting during scoping for this Project expressed concern that the presence of the pipeline may hinder the ability for a prospective buyer to obtain a mortgage or result in banks calling in existing mortgages because of the pipeline. The FERC (2014b) has attempted to investigate this issue in the past by contacting national banks, including Wells Fargo, Citizens Bank, Bank of America, and Chase

Bank, and asking them if the presence of a pipeline would affect their decision to provide a mortgage. None of these banks were willing to formally respond to the FERC's questions and asked that their correspondence not be cited. As a result, FERC (2014b) was unable to use the results of these contacts to determine whether the presence of a pipeline easement would affect the ability of a prospective homebuyer to obtain a mortgage.

Lenders consider many factors when assessing whether or not to offer a mortgage for a property. Most of these are directly related to the lender's evaluation of the prospective borrower's ability to repay the loan. A property value assessment and appraisal is also taken into consideration. As discussed in the Property Values section (Section 5.3.4), there is no conclusive evidence that the mere presence of a pipeline would negatively affect the value of a property. Furthermore, based on their experience in reviewing natural gas pipelines across the United States, the FERC has never documented an instance where a FERC-jurisdictional pipeline project has affected the ability of a prospective buyer to obtain a mortgage (FERC 2014b). As a result, the FERC (2014b) concluded that the presence of a pipeline would be unlikely to affect the ability of a prospective or existing buyer to obtain a mortgage for an affected property.

The MVP project team conducted additional, informal research by contacting mortgage loan departments at three large and well-known national banks, each of which provide services in MVP's two-state project region. The representatives requested that their names and companies not be identified; therefore, MVP is unable to provide direct quotes. MVP is, however, able to provide a synopsis of its findings based on aggregate information obtained during such discussions. In summary, lending institutions review mortgage applications on an individual, case-by-case basis and there are no standard guidelines in the review process that relate specifically to natural gas pipelines; therefore, reviewing and approving a mortgage application for a property with a gas pipeline is the same as it is for other energy infrastructure (i.e. electric transmission lines) that may be on or near a property, which does not typically impede a bank from completing a loan. This conclusion is further supported by the tens of thousands of mortgages that are granted throughout the country from a variety of lending sources, which involve properties that are located in proximity to natural gas pipelines and/or pipeline easements

5.3.5.2 Insurance

Stakeholders commenting during scoping for this project expressed concern that the presence of a pipeline easement could result in increased insurance rates for residential properties. The FERC (2014b) has attempted to investigate this issue in the past by contacting insurance agencies and asking whether the presence of a utility crossing would change the terms of an existing or new residential insurance policy, which types of utilities may cause a change, how a policy might change, and what factors would influence a change in the policy terms, including the potential for a policy to be dropped completely. Initial results of these enquiries suggested that the potential for a residential insurance policy to be affected could exist, but the extent of any action and corresponding corrective action would depend upon several factors including the terms of the individual landowner's policy and the terms of the Project applicant's own policy. The FERC's (2015b) attempts to confirm these findings and obtain more definitive information on conditions under which a policy may be modified or dropped, specific factors used to evaluate the action, and what corrective action could be undertaken by the landowner or Project applicant to mitigate any change in a policy were unsuccessful. Despite repeated attempts at follow-up, only one of the major insurance agencies contacted responded stating that they were unable to provide the requested information (FERC 2014b).

The MVP project team conducted additional, informal research by contacting four large and well-known insurance companies, each of which provide services in MVP's two-state project region to determine if the ability to obtain, or the cost to carry insurance, is affected by the presence of a natural gas pipeline. The representatives requested that their names and companies not be identified; therefore, MVP is unable to provide direct quotes. Additionally, MVP contacted and discussed this question with the West Virginia Offices of the Insurance Commissioner, and the Bureau of Insurance, a division of the Virginia State Corporation Commission. The representatives of these agencies requested that their names not be identified; therefore, we are unable to provide direct quotes. MVP is, however, able to provide a synopsis of its findings based on aggregate information obtained during these discussions. In summary, the overwhelming response from each of the six institutions was that natural gas pipelines are not an issue during the insurance underwriting process and the presence of energy infrastructure, such as a pipelines, has not historically affected rates or eligibility for residential insurance applications. Based on these conversations, there is no evidence that property insurers view properties that are located in proximity to natural gas pipelines any differently than those located in other areas.

5.3.6 Community Services

The temporary addition of construction workers to local communities is not expected to affect the levels of service provided by existing law and fire protection personnel. Law enforcement and fire departments within each region are identified by county in Table 5.2-9. Increased demands for local services that could occur from construction workers temporarily relocating to the affected areas would be short term.

Construction of the pipeline could result in increased demand for emergency services. Local police assistance will likely be required to facilitate traffic flows during construction at some road crossings and permits may be required for vehicle load and width limits for some of the vehicles delivering Project materials and supplies. MVP will work directly with local law enforcement, fire departments, and emergency medical services to coordinate for effective emergency response. Further, in accordance with 49 CFR 192.615, MVP will prepare an Emergency Response Plan for construction and operation of the pipeline and associated facilities.

Medical facilities located near the transmission line are identified by location in Table 5.2-10. Construction of the Project is not expected to have significant adverse impacts on local and regional medical facilities and services. The temporary relocation of workers to the counties along the pipeline route is not expected to affect existing levels of health care and medical services. Minor increases in demands for local services that could occur from workers temporarily relocating to the area would be short term.

Very few, if any, of the non-local workers employed during the construction phase of each spread are expected to be accompanied by family members. As a result, the number of school age of children expected to relocate is very limited and unlikely to noticeably affect school enrollment in the Project area.

5.3.7 Transportation

5.3.7.1 Road Crossings

Major state and federal transportation routes and highways that will be crossed by the pipeline are identified in Table 5.2-12. A detailed listing of all roads that would be crossed by the MVP Project is provided in Resource Report 1. Railroads and most main artery public roadways will be crossed by boring beneath the road or railroad, where the pipeline is installed horizontally underneath the railroad or roadway with no

disruption of the hard surface and no disruption of traffic flow during pipeline installation. Boring typically requires additional temporary workspace areas on both sides of the crossing for excavating bore pits while the road or railroad remains in operation. Little or no disruption of traffic is expected at road or railroad crossings where boring takes place.

Non-main artery, smaller roadways and drives will be crossed by open cut. Regardless of the method used, MVP will incorporate measures to maintain safety, minimize traffic disruption, and ensure that construction activities will not prevent the passage of emergency vehicles. Measures may include the creation of temporary travel lanes during construction or the placement of steel plate bridges to allow continued traffic flow during open trenching. Traffic lanes and residential access will be maintained, except for the temporary periods essential for pipeline installation. Provisions will be made to allow passage of emergency vehicles at all times. In areas where traffic volumes are high or other circumstances (e.g., congested areas) exist, MVP will employ a police detail to ensure traffic flow and the safety of pedestrians and vehicles. MVP will obtain all necessary permits for public road crossings or work within public road rights-of-way, including from the West Virginia Department of Transportation (WVDOT) and Virginia Department of Transportation (VDOT). Additional information is provided in the Traffic and Transportation Management Plan prepared for this Project (see Appendix 5-B).

5.3.7.2 Additional Traffic on Local Roads

In addition to the traffic impacts caused by road crossings, the temporary movement of construction equipment and materials and the daily commuting of employees to and from the construction work areas would add to existing traffic volumes on local roads. Construction activities will be spaced over 11 construction spreads, with each spread responsible for all construction activities within a specific milepost range along the pipeline (Table 5.1-3). These activities will include grading, trenching, pipe stringing, welding, lowering-in, backfilling, regrading, and restoration described more fully in Resource Report 1. Construction activities at each spread will proceed in sequence in an assembly-line fashion along the right-of-way, with one crew following the next from clearing until final clean-up. As a result, construction workers and equipment will not only be divided between 11 spreads, but will also be distributed at different locations within each spread.

Equipment and materials will be transported from various laydown areas and storage yards within the vicinity of the pipeline. Most construction equipment will remain on site during construction. Several construction-related trips will be made each day (to and from the job site) on each of the construction spreads. This level of traffic will remain consistent throughout the construction period and will typically occur during the early morning hours (from 5:00 to 6:00 a.m.) and evening hours (after 6:00 p.m.). Typically, the pipeline construction work week is six days, sometimes extending to seven days as required by the workload and construction schedule. During highway boring and hydrostatic testing, work could be conducted on a 24-hour basis until the boring and testing is complete.

Construction crews would commute to Project work areas in their personal or company vehicles. Workers will be deployed in various locations along each spread, thereby reducing the potential for congestion in any one area. Pipeline construction work is typically scheduled to take advantage of daylight hours and involves long (at least 10 hour) work days. With typical start and finish times of 7:00 a.m. and 7:00 p.m., most workers will commute to and from the construction right-of-way during off-peak hours. Some discrete activities (e.g. hydrostatic testing, tie-ins, purge and packing the pipeline facilities, etc.) may occur beyond

these timeframes. Because construction would move sequentially along the pipeline route, traffic flow impacts that do arise would be temporary on any given section of roadway.

Construction vehicles can pose concern when school buses are traveling their established routes. Communities expect for their children to have safe and timely travel to and from school. MVP will work with the governing School Districts or the School Transportation Departments in the Project area to identify school bus routes and times. Construction traffic will be limited or refrained during the bus route times with a published school bus route curfew time period. Additional information is provided in the Traffic and Transportation Management Plan prepared for this Project (Appendix 5-B).

5.3.8 Tax Revenues

5.3.8.1 Construction-Related Tax Revenues

Construction of the Project would generate sales and use tax revenue during the construction period. In addition to tax revenues resulting from direct Project-related expenditures, the Project will result in increases in state and local tax revenues as a result of the economic ripple effect of construction expenditures throughout the affected state and local economies. Estimates of aggregate tax revenues are presented by tax type and state in Table 5.3-3.

Type of Tax	West Virginia (\$ million) <u>a</u> , <u>b</u> /	Virginia (\$ million) <u>a</u> , <u>b</u> /
Sales Tax	13.4	6.5
Use Tax	na	8.7
Income Tax	12.4	7.0
Property Tax	7.4	8.6
Severance	3.4	na
Other	10.7	3.3
Total	47.3	34.1
na – Estimates not provided for this tax category. <u>a</u> / Estimated tax revenues are presented in millions of dollars. <u>b</u> / These estimates are aggregate totals for the entire construction period. Sources: FTI Consulting 2015a, 2015b		

5.3.8.2 Ad Valorem Tax Revenues

Estimated ad valorem taxes that will be paid once the pipeline is in service are presented by county and state in Table 5.3-4. Estimated ad valorem tax revenues as a share of general fund total revenues in the affected West Virginia counties will range from 7 percent (Harrison County) to 66 percent (Monroe County). In the affected Virginia counties, estimated ad valorem tax revenues as a share of general fund total revenues will range from less than 1 percent (Roanoke County) to 4 percent (Montgomery and Pittsylvania Counties) (Table 5.3-4).

County/State	General Fund Total Revenues (dollars) <u>a/</u>	Annual Ad Valorem Taxes (dollars) <u>a/</u>	Percent of General Fund Total Revenues
Braxton	4,387	1,500	34%
Doddridge	5,589	470	8%
Fayette	11,333	840	7%
Greenbrier	11,305	1,730	15%
Harrison	26,631	2,120	8%
Lewis	10,898	1,980	18%
Monroe	2,809	1,840	66%
Nicholas	8,390	2,240	27%
Summers	3,290	890	27%
Webster	2,531	1,610	64%
Wetzel	13,460	1,740	13%
West Virginia Subtotal	100,625	16,960	17%
Craig	6,675	103	2%
Franklin	79,788	2,159	3%
Giles	51,810	1,140	2%
Montgomery	43,767	1,780	4%
Pittsylvania	58,971	1,215	2%
Roanoke	198,174	957	0%
Virginia Subtotal	439,176	7,354	2%
na – Estimates not provided for this county. Note: less than 1 mile of the pipeline crosses Fayette County.			
<u>a/</u> Numbers are presented in 1,000s.			
Sources: FTI Consulting 2015a, 2015b			

5.3.9 Environmental Justice

5.3.9.1 Disproportionate High and Adverse Effects on Minority or Low Income Populations

Review of census data indicated that the populations in the counties that will be crossed by the pipeline route are predominantly White. Viewed by county, in West Virginia the share of the population identified as White exceeded 90 percent in all 11 counties that will be crossed (Table 5.2-14). In Virginia, the share of the population identified as White was above the state average in all six counties that will be crossed (Table 5.2-15). Data were also reviewed at the census block group level. None of the block groups that would be crossed were identified as potential minority communities (see Section 5.2.7.1).

Review of household poverty data indicated that 20 percent or more of total households were below the poverty line in five of the 11 counties that will be crossed in West Virginia (Braxton, Fayette, Greenbrier, Summers, and Webster Counties) (Table 5.2-14). The number of households below the poverty line also exceeded 20 percent in Montgomery County, Virginia (Table 5.2-15). As noted in Section 5.2.7, the

U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of residents are below the poverty level (U.S. Census Bureau 2013a). Data were also reviewed at the census block group level. The number of households below the poverty line was equal to or exceeded 20 percent in 16 of the 39 census block groups that would be crossed in West Virginia; these block groups were distributed along the pipeline route in 9 of the 11 counties that will be crossed (Table 5.2-17).

In Virginia, at least 20 percent of households were below the poverty level in five of the 21 census block groups that will be crossed (Table 5.2-18). These census block groups are located in Franklin, Montgomery, and Pittsylvania Counties. These data, as well as median household income data reviewed in Section 5.2.7.2, suggest that parts of the areas that will be crossed by the pipeline route are poorer than the corresponding states as a whole. Review of data on age indicated that the elderly share of the population, those over 64 years of age, exceeded of the corresponding state average in all the counties and census block groups that would be crossed (Section 5.2.7.3).

As discussed in Section 5.2.7, assessing the potential for disproportionately high and adverse impacts on minority and/or low-income populations typically involves two steps: first, identifying whether minority and/or low-income communities are present, and, then, if these types of communities are present, evaluating whether high and adverse human health or environmental effects would disproportionately affect the identified community or communities. As indicated in the above discussion, review of census data suggests the presence of low income and, to a much lesser extent, minority communities. However, construction of the Project is not expected to result in adverse and disproportionate human health or environmental effects to these communities, as discussed below. As a result, no environmental justice-related mitigation is proposed.

Construction of the Project is not expected to have high and adverse human health or environmental effects on any nearby communities. Adverse construction-related impacts would likely include increases in local traffic and noise, as well as dust, and could result in temporary delays at some highway crossings. These impacts would be temporary and localized and are not expected to be high. Construction workers temporarily relocating to the Project area would increase demand for local housing resources. Potential impacts on public safety are discussed in Resource Report 11.

Construction-related activities will result in some short-term visual impacts primarily on high-sensitivity viewers with foreground and possibly middle ground views. Visual impacts will likely result from the use of construction equipment and temporary lighting, as well as dust from clearing and grading. However, disturbance will be transient and of short duration as construction activities progress along the transmission line route. Visual impacts are discussed in more detail in Resource Report 8.

Construction could also increase demand for health care and municipal services, as well as potentially increase demand for police and fire protection services. However, these impacts are expected to be temporary and are not expected to measurably affect the quality of services currently received by local communities and residents.

Operation of the Project is not expected to have high and adverse human health or environmental effects on any nearby communities, or result in adverse and disproportionate human health or environmental effects to minority or low income communities.

5.3.9.2 Pipeline Route Selection

The route selection process that MVP used for the pipeline is discussed in Resource Reports 1 and 10. MVP planned and sited the pipeline based on engineering and environmental constraints, and attempted to avoid densely populated areas (cities or towns), neighborhoods, and isolated individual residences as much as possible regardless of the population makeup of the areas. Other siting considerations included topography, road crossings, waterbody crossings, and the desire to collocate with existing rights-of-way where feasible.

5.3.10 Jefferson National Forest

The Project crosses the Jefferson National Forest for approximately 3.4 miles in Monroe County, West Virginia and Giles, Craig and Montgomery Counties, Virginia. The Jefferson National Forest is managed by the USFS and is administratively combined with the George Washington National Forest. Together, the two forests encompass nearly 1.8 million acres in West Virginia, Virginia, and Kentucky. The Jefferson National Forest is managed for multiple uses including camping, hiking, wildlife conservation, and active management for timber and wood product production. According to the EIS prepared for the current Revised Land and Resource Management Plan for the Jefferson National Forest, an estimated 1.34 million people visited developed or dispersed recreation sites on the Forest (USFS 2004). This estimate does not include the millions of people that drive through the Forest.

Lands managed as part of the Jefferson National Forest are located in more than 20 counties in three states: Virginia, West Virginia, and Kentucky. The USFS estimated that management activities on the Jefferson National Forest supported more than 3,400 jobs and \$86 million in labor income in the counties and cities that contain Forest acreage, about 1 percent of total employment and labor income in the affected area (USFS 2004).

MVP continues to consult with the NPS and USFS with regards to crossing location, potential impacts, and mitigation strategies. MVP has also evaluated several alternative pipeline routes that include alternative crossing alignments through the Jefferson National Forest and alternative crossing locations of the Appalachian National Scenic Trail (see Resource Report 10 – Alternatives).

5.4 ECONOMIC STUDY COMMENTS

In reviewing the comments posted to the Docket by The Sierra Club – Virginia (Accession number 20151019-5187) that attached a study performed by Key-Log Economics (Key-Log) regarding the economic benefits of the MVP project, MVP has found that Key-Log's arguments are devoid of any analytical content, incorrectly characterize the analyses of FTI Consulting Inc. (FTI), and are generally not properly substantiated. In addition, the Key-Log study, which was written by an ecological economist, includes a number of comments that show a clear misunderstanding of how energy markets, systems, and finances operate. The summary listing below addresses Key-Log's main critiques of the MVP economic benefit reports provided by FTI – and provides a substantiated response that supports the basis and findings of FTI's MVP economic benefits analysis.

- *The chosen modeling technique and choice of region for analysis result in overestimates of regional benefit.*

Key-Log argues that these models are too “static.” This statement clearly shows that Key-Log does not fully appreciate when input-output models should and should not be deployed. Applying an input-output model, such as IMPLAN, is a well-accepted, standard approach for studying the economic

impacts of one-time construction events and static operational impacts in the energy industry. Economic input-output models are regularly used by natural gas pipeline companies to forecast the socioeconomic impacts of their projects to the FERC.

FTI appropriately analyzed the benefits on a state level. The MVP pipeline will traverse multiple counties in Virginia and West Virginia, and the economic benefits will expand beyond the limits of these specific counties in each state.

- *Most construction jobs will be filled by non-residents, further depressing the local economic impact.*

While most construction jobs will be filled by out-of-state workers, non-resident jobs were not included in FTI's economic impact numbers. FTI was careful to include only construction jobs created from spending on goods and services in the states of West Virginia and Virginia. That is, spending on goods and services outside of West Virginia and Virginia, which is estimated to be about two-thirds of the total project spending, was not included in FTI's analysis.

- *The studies' modeling approach is unreliable for predicting multiplier effects more than one year into the future. Only direct operation/maintenance jobs should be counted as long-term effects.*

The modeling approach used by FTI is appropriate for predicting future multiplier effects. The IMPLAN model assumes that the economy's structure between today and when operation begins in 2018 is nearly the same. That is a span of about three years. Key-Log implies that the structure of the economy could change significantly in more than a year and would therefore undermine the FTI economic impact modeling. Key-Log does not provide any supporting explanation for their statement. It is merely an implication that is not economically feasible.

- *The studies do not demonstrate how much, if any, fuel switching would actually occur.*

FTI forecasted potential switching, not actual switching. For each county, FTI thoroughly documented where there is residential, commercial, municipal, industrial, and transportation fuel switching potential based on detailed, bottom-up economic analysis of capital costs, operating costs, and maintenance costs of fuel switching. Actual fuel switching could differ from economic potential if private and government entities decided not to move forward even though the economic rationale justifies them to do so. FTI estimates economic potential, not economic behavior.

- *Estimated benefits for Franklin County, Virginia seem so unlikely given potential demand that they should be removed entirely.*

Key-Log provides no analytical support for this assertion and mischaracterizes FTI's findings. FTI clearly states that the Franklin County fuel switching is a "potential" and does not guarantee that it will occur.

- *The studies do not account for how future increases in gas prices and gas price volatility would affect either the likelihood of fuel switching in the first place or the long-run magnitude of any benefits from switching that still might occur.*

This statement demonstrates that Key-Log does not fully understand energy markets. All commodities have price volatility; therefore, switching from one fuel source to another is simply moving from one fuel's price volatility to another's. According to FTI, U.S. Henry Hub natural gas price volatility has been reduced by 35% from 2009-2015 as compared to 2003-2008. This downward shift in volatility is

due to the advent of low-cost, reliable shale gas, which MVP will transport to West Virginia, Virginia, Mid-Atlantic, and Southeast markets of the United States.

Key-Log also does not appreciate how wholesale price volatility translates to end-customers' bills. Due to the fact that utilities add fixed cost charges to their bills to recover investments and maintenance costs, the price volatility of wholesale natural gas is diminished considerably.

Key-Log contends that FTI does not address long-term price volatility. As explained above, volatility is muted by fixed costs on end-consumers bills. Also, the Energy Information Administration forecasts in its Reference Case that low, wholesale natural prices will continue for the next 25 years due to low-cost shale production and end-user efficiency improvements. In addition, it is important to note that the low and high price ranges of EIA's forecast show that the upper and lower bounds of natural gas prices will remain tight over the next 25 years.

- *The studies ignore energy conservation and/or renewables as additional alternatives to which would-be gas users could switch.*

This statement again demonstrates Key-Log's misunderstanding of energy markets. A detailed discussion of renewable energy alternatives is presented in greater detail in Resource Report 10. For the counties along the MVP route, a majority of existing fuel consumption is associated with residential, commercial, and municipal space heating as well as process heat for industrial operations. Renewables cannot provide the on-demand heating needs for these sectors. Natural gas provides low-cost, reliable energy security to heating buildings and providing process heat. As for energy conservation, federal law mandates that high efficiency appliances, such as natural gas force-air furnaces, are used in new installations. According to a survey of manufacturers, about 35 percent of gas furnaces sold in 2012 were ENERGY STAR® qualified, meaning at least 90 annual fuel utilization efficiency (EIA 2013). Further, consumers will be driven to seek to conservation whenever there is an economic opportunity to do so. Finally, it is important to note that energy conservation is important, but no amount of energy conservation will completely remove the need for heating a home or providing heat for an industrial process.

- *Estimated revenue increases are tied to fuel switching that may not occur.*

The tax revenue estimates in the FTI reports would occur regardless of fuel switching. MVP would be required to pay ad valorem (property) taxes as construction begins and when in operation. Additionally, the construction spending will create tax revenues to the counties and states due to MVP's spending on goods and services in the counties and states as well as money spent in the general economy by pipeline and supplier workers.

- *Any actual increases in tax revenue will fade over time.*

This represents another statement demonstrating that Key-Log does not comprehend the intricacies of energy markets and how revenues and costs flow through the system. If ad valorem (property) taxes were based solely on the investment cost less depreciation, Key-Log's statement would be true. However, this is not the case as both West Virginia and Virginia use a combined cost and capitalized income-based assessment to determine the taxable value of a pipeline.¹ Factoring in the capitalized

¹ FTI worked closely with state officials from West Virginia and Virginia to properly forecast ad valorem taxes based on each state's specific approach towards assigning taxable value to a pipeline.

income into the taxable value keeps the value of the pipeline from declining precipitously over time. Additionally, FTI used an average ad valorem tax revenue assessment in its report instead of using the ad valorem tax revenue from the peak year. FTI explains its process for calculating ad valorem taxes in detail in their reports.

- *Studies ignore potential reduction in net tax revenue due to changes in property values.*

A Fruits study in 2008 found that proximity to a natural gas pipeline had no statistically or economically significant impact on residential property values.

Key-Log makes statements that the MVP pipeline will induce “lost ecosystem services, such as water quality, flood control, and wildlife habitat and aesthetic value” without providing any analytical support and citing references with no connection to the subject matter or Key-Log’s assertions. For example, Key-Log cites Reid et al. 2005 as reference on “Lost Ecosystem Services,” but this report provides absolutely no discussion on natural gas pipelines and their impacts.

- *Studies ignore likely increases in local public service costs and fail to present estimates of net effects on local government finances.*

Key Log asserts that an example cost would be increases in “the number and training level of their first responders, purchase equipment, develop and keep updated emergency response and evacuation plans, and otherwise be prepared 24/7/365 for mass casualty events.” This is a broad statement without any support and should be disregarded for the following reasons:

- Key-Log fails to provide any supporting analysis or references indicating what the additional costs if any would entail for each county.
- Key-Log fails to mention that counties with existing pipelines (e.g., ETNG’s transmission line in VA) would already have first responders trained.
- Key-Log fails to mention that any additional training and staff (if any) would be inconsequential related to the tens of thousands to millions of dollars in tax benefits that counties will receive from property taxes.
- Key-Log fails to mention that natural gas pipelines have proven to be the safest form of transport and the occurrences of pipeline ruptures are highly unlikely.

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Mountain Valley Pipeline Project

Docket No. CP16-__-000

Resource Report 5

Appendix 5-A Economic Benefits of the Mountain Valley Pipeline Project in West Virginia and Virginia

OCTOBER 2, 2015



ECONOMIC BENEFITS OF THE MOUNTAIN VALLEY PIPELINE PROJECT IN WEST VIRGINIA

CRITICAL THINKING
AT THE CRITICAL TIME™

DISCLAIMER

The information contained herein has been prepared based upon financial and other data provided to FTI from the management and staff of EQT Corporation and from public sources. There is no assurance by anyone that this information is accurate or complete. FTI has not subjected the information contained herein to an audit in accordance with generally accepted auditing standards. Accordingly, FTI cannot express an opinion or any other form of assurance on, and assumes no responsibility for, the accuracy or correctness of the historical information or the completeness and achievability of the projected financial data, information and assessments upon which the enclosed report is presented.

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Executive Summary

EQT Corporation retained FTI Consulting (“FTI”) to examine the potential economic benefits of the Mountain Valley Pipeline (“MVP”) project to the State of West Virginia and the ten eleven counties through which the project is proposed. The MVP is a natural gas pipeline that will traverse approximately 300 miles across West Virginia and Virginia, including the West Virginia counties of Wetzel, Harrison, Doddridge, Lewis, Braxton, Webster, Nicholas, Greenbrier, Fayette, Summers, and Monroe, as shown in Figure 1.

Three types of economic benefits would occur from the construction and operation of the MVP project. These benefits include:

- **Construction Spending Benefits:** Expenditures on goods and services in the State would translate into job creation; economic benefits to West Virginia suppliers, their employees, and the overall economy; and new tax revenues.
- **Operational Benefits:** Once in service, the project would require a skilled workforce to operate and maintain the pipeline. Also, it would generate annual property tax revenues for the counties, providing an additional stream of funds.
- **Direct-Use Benefits:** The State and counties would benefit from the potential direct use of gas from the MVP project. The project would enhance gas service already available, help enable new gas service, and expand opportunities for commercial and manufacturing activities.

Construction Spending Benefits

From 2015 to 2018, the MVP project owners plan to spend \$811 million directly on resources (equipment, materials, labor, and services) in West Virginia. This direct spending would translate into \$594 million in cumulative Gross Regional Product over the four-year period, as summarized in Figure 2.

Figure 1 – Proposed MVP Path through West Virginia

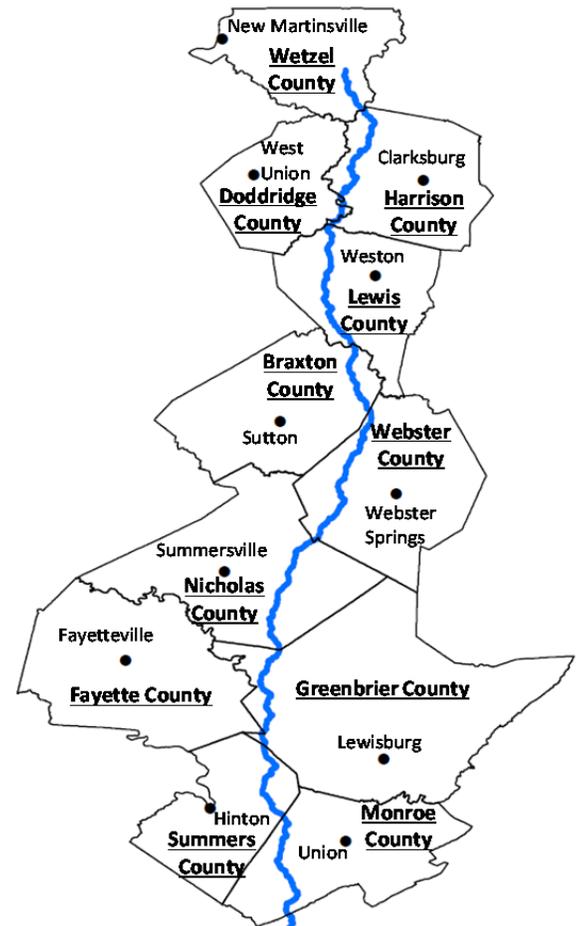
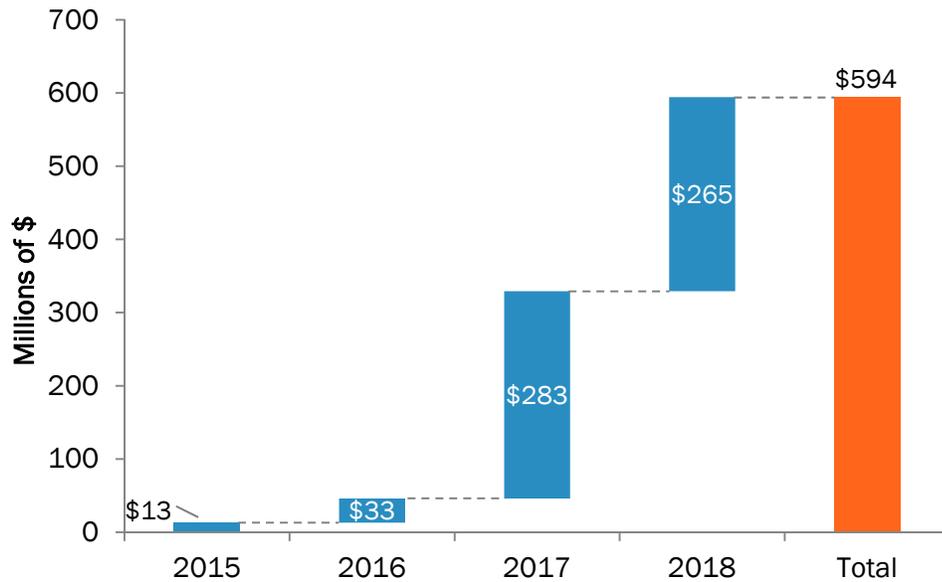
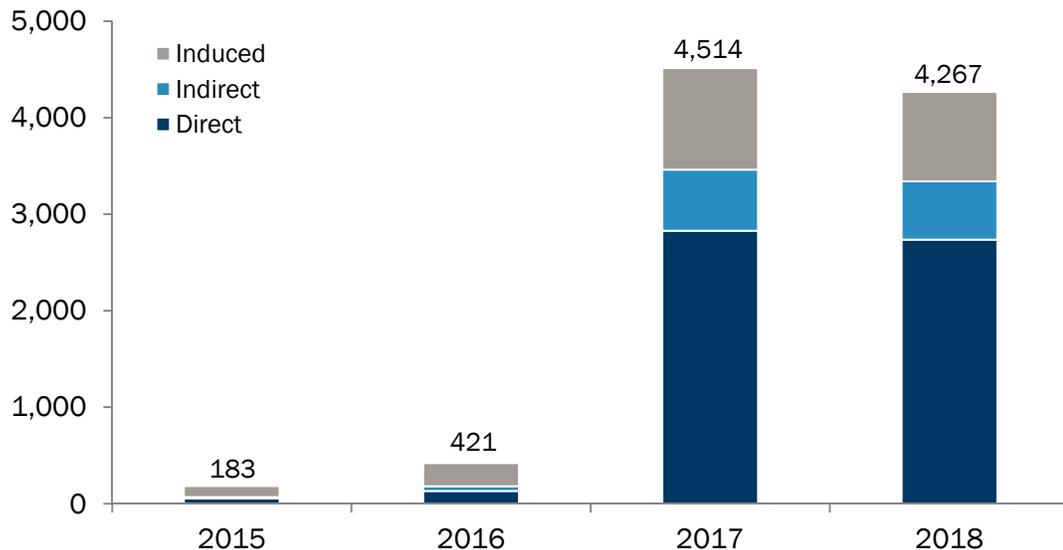


Figure 2 – MVP Additions to West Virginia’s Gross Regional Product



The MVP project would create more than 4,500 jobs at the peak of construction in 2017. 2,829 of these jobs would be directly associated with the project (labeled “direct” in Figure 3); 633 jobs would be created along the supply-chain (“indirect”); and 1,052 jobs would be created in the general economy.

Figure 3 – MVP Jobs Created in West Virginia by Year¹

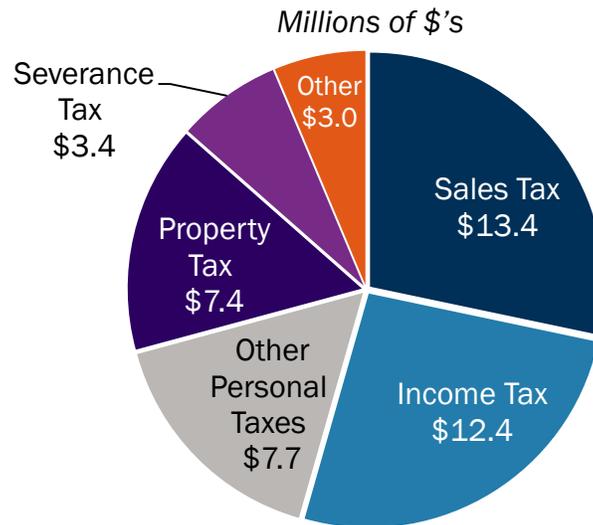


¹ The jobs shown in the figure are annual, full-time equivalent jobs (or job-years) that the MVP project contributes to the West Virginia economy from 2015-2018.

Cumulatively, the MVP project would create 9,384 job-years over the course of construction.

Another benefit of the MVP project is the increased state and local tax revenues that result from the economic ripple effect of construction expenditures. As shown in Figure 4, the project would generate \$47 million in aggregate tax revenues from 2015 to 2018.

Figure 4 – West Virginia State and Local Tax Revenues Generated during Construction, 2015–2018



Operational Benefits

Once in service, the MVP project would continue to benefit West Virginia's economy in three main areas. The first is in operational employment and spending. Ongoing operation and maintenance of the pipeline would support a total of 54 jobs across the state with average annual wages and benefits of almost \$65,000.

Annual tax revenues through ad valorem taxes (property taxes) represent the second area of operational benefits. Based on the estimated pipeline investments and county property tax rates, the MVP project owners would pay up to \$17 million in taxes annually. This amounts to 17% of the total 2013 combined budgets for the eleven counties.

Direct-use benefits of the pipeline's natural gas represent the third area where West Virginia and the counties potentially could benefit from the project and are discussed in further detail below.

Direct-Use Benefits

Residential, Commercial, and Municipal Buildings

In terms of direct gas-use benefits, the MVP project could provide significant fuel cost savings to the residential, commercial, and municipal sectors of Monroe, Summers, and Webster counties through fuel switching (i.e., switching fuels used for space heating and water heating from propane, fuel oil, diesel, and electricity to natural gas). These three counties have limited gas access compared to the

remaining eight counties along the proposed pipeline in West Virginia. The MVP proposed route will pass near the major towns in these counties (see Table 1).

Table 1 – Distance to MVP Proposed Route from Towns and Areas in Monroe, Summers, and Webster Counties

County	Major Towns	Distance from MVP Proposed Route
Monroe	• Union	8.2 mi.
	• Alderson	5.5 mi.
	• Peterstown	5.5 mi.
Summers	• Hinton	7.8 mi.
Webster	• Webster Springs	7.2 mi.
	• Cowen	1.2 mi.

Transportation Sector

The transportation sector in the eleven counties represents the largest opportunity for fuel switching. Conversion of the eleven counties’ fleet vehicles such as school buses, sanitary waste vehicles, and county vehicles could result in approximately \$500,000 in annual fuel switching savings. This amount includes the full cost of the delivered gas and CNG infrastructure required. Further savings, and thus disposable income, could be realized across the counties if the CNG stations were made available for public consumption. Furthermore, this amount is based on current low fuel prices. Savings would be significant higher if fuel prices were to increase.

Transitioning vehicles to natural gas (i.e., fuel switching) has become an increasing priority in West Virginia. In 2012, the Governor issued an executive order to create a Natural Gas Vehicle Task Force.² The State also has provided helpful tax credits to enable compressed natural gas (CNG) vehicle deployment.³ Using these credits, IGS Energy CNG Services (IGS) constructed and placed into operation three large-scale, public CNG refueling stations along Interstate 79 in the last two years (see Figure

Figure 5 - Locations of IGS’s Three CNG Stations Along I-79



² *Natural Gas Vehicle Task Force Report*, February 2013.

³ See <http://www.afdc.energy.gov/laws/all?state=WV>

5). One of these stations is located in Jane Lew in Lewis County and another in Bridgeport in Harrison County. Braxton County is one of the eleven counties along the proposed MVP route and could be another potential site for a CNG station along the I-79 corridor.

Interstate 64 represents another major corridor for potential CNG refueling stations in West Virginia. The interstate runs from St. Louis, MO, to the Virginia coast, and it intersects with Charleston near the IGS station along I-79. Summers and Greenbrier counties could be worthy candidates for future Interstate 64 CNG stations, especially as they are along the proposed MVP project path.

Future Benefits

The MVP project would provide manufacturing investment opportunities within the state and the counties. FTI interviews with county leaders indicate that natural gas access can be a major factor in businesses deciding to expand and locate operations in a county, particularly energy-intensive and advanced technology manufacturing. These businesses provide large economic benefits to communities from an employment, wage, and tax revenue perspective. Harrison County serves as an example. It has a thriving aerospace services industry in which the average annual wage is \$72,000. Harrison County also has an unemployment rate of only 5.2%.

Altogether, the proposed MVP project would provide a number of economic and employment benefits to West Virginia and the counties through which the project is planned. During construction, these benefits would result from capital spent directly within West Virginia and the counties. Once in service, MVP will employ people within the state to help operate and maintain the pipeline. Also, counties will collect property taxes from the pipeline. Finally, the pipeline will provide sizable opportunities for direct gas use in areas with and without gas access. These opportunities include additional supply reliability, fuel switching savings, and new energy-intensive and advanced technology businesses started in West Virginia.

1. Introduction

1.1. Project Background

The proposed MVP project is a FERC-regulated natural gas pipeline system that would span approximately 300 miles from the northern part of West Virginia to the southwestern part of Virginia.⁴ It is expected to provide at least two billion cubic feet per day or 3% of current U.S. gas demand to markets in the Mid- and South- Atlantic regions. The pipeline as proposed would pass through eleven West Virginia counties.

EQT Corporation has retained FTI Consulting (“FTI”) to examine the MVP project’s potential economic benefits along three areas – economic growth and employment resulting from construction expenditures, operational benefits in terms of jobs created and ad valorem taxes paid by the MVP project owners, and direct gas-use opportunities that would result within the counties.

1.2. Approach

Below we summarize the approaches taken for determining the economic benefits in the three areas.

Construction Economic Impacts and Job Creation Benefits

FTI applied the IMPLAN model to estimate the economic impact and jobs created from construction activities in West Virginia. The IMPLAN model is a general input-output modeling software and data system that tracks the movement of money through an economy, looking at linkages between industries along the supply chain, to measure the cumulative effect of spending in terms of job creation, income, production, and taxes. The IMPLAN data sets represent all industries within the regional economy – rather than extrapolating from national averages – and are derived primarily from data collected by federal agencies.⁵

The economic impacts that IMPLAN calculates can be broken into direct impacts, indirect impacts, and induced impacts, defined as follows:

- **Direct impacts:** the economic activity resulting from the MVP capital costs spent on industries residing in West Virginia. These are the industries that provide the ‘direct’ materials, construction labor, construction management, and technical services (e.g., engineering and

⁴ The MVP would be constructed and owned by Mountain Valley Pipeline, LLC, a joint venture of EQT Corporation (NYSE: EQT) and NextEra US Gas Assets, LLC, an indirect, wholly owned subsidiary of NextEra Energy, Inc (NYSE: NEE).

⁵ The 2012 IMPLAN Dataset includes data from the U.S. Bureau of Labor Statistics (BLS) Covered Employment and Wages (CEW) program; U.S. Bureau of Economic Analysis (BEA) Regional Economic Information System (REA) program; U.S. BEA Benchmark I/O Accounts of the U.S.; BEA Output estimates; BLS Consumer Expenditure Survey; U.S. Census Bureau County Business Patterns (CBP) Program; U.S. Census Bureau Decennial Census and Population Surveys; U.S. Census Bureau Censuses and Surveys; and U.S. Dept. of Agriculture Census.

design, surveying, and permitting) for the project. This is the first order impact of the MVP expenditures within the state.

- **Indirect impacts:** the economic activity resulting from the ‘direct’ industries spending a portion of their revenues on goods and services provided by their supply chain in West Virginia. These supply chain industries represent the second order or ‘indirect’ impacts of the original MVP expenditures in West Virginia.
- **Induced impacts:** the economic activity resulting from the spending of the income earned by employees within the ‘directly’ and ‘indirectly’ affected industries. The benefactors of induced impact are primarily consumer-related businesses such as retail stores, restaurants, and personal service industries. These ‘induced’ impacts represent the third order impact.

Through the direct, indirect, and induced impact calculations, IMPLAN provides the economic ripple effect, or multiplier, that tracks how each dollar of input, or direct spending, cycles through the economy to suppliers and ultimately to households.

The first step of the IMPLAN process was to collect the estimate for state-only spending for each of the major project cost categories. These categories included the following:

- Pipeline Materials
- Compressor materials
- Meters and regulator devices
- Technical services such as engineering design, survey, and permitting
- Construction and commissioning services
- Land and right of way acquisitions

Of the \$3.5 billion that the MVP project owners plan to spend, \$811 million is planned to be spent *directly* in West Virginia, with the difference being spent in Virginia and outside the two states.

FTI then assigned these cost categories to one of the 440 IMPLAN economic sectors as inputs to the model. The model was then run from 2015 to 2018 to provide the following direct, indirect, and induced economic impacts:

- **Gross Regional Product (GRP):** an industry’s value of production over the cost of its purchasing the goods and services required to make its products. GRP includes wages and benefits paid to wage and salary employees and profits earned by self-employed individuals (labor income), monies collected by industry that are not paid into operations (profits, capital consumption allowance, payments for rent, royalties and interest income), and all payments to government (excise taxes, sales taxes, customs duties) with the exception of payroll and income taxes.
- **Employment Contributions:** direct, indirect, and induced annual average jobs for full-time, part-time, and seasonal employees and self-employed workers.

- **State, Local, and Federal Taxes:** payments to government that represent employer collected and paid social security taxes on wages, excise taxes, sales taxes, customs duties, property taxes, severance taxes, personal income taxes, corporate profits taxes, and other taxes.
- **Labor Income:** the wages and benefits paid to wage and salary employees and profits earned by self-employed individuals. Labor income demonstrates a complete picture of the income paid to the entire labor force within the model.

Section 2.1 provides the results of the IMPLAN construction and employment benefits analysis.

Operational Job Creation and Ad Valorem Tax Benefits

The MVP project would create jobs within the state to operate and maintain the pipeline and would generate ad valorem tax (property tax) revenues for the counties along the proposed route. To estimate the job benefits of ongoing operations, FTI collected data from EQT on the annual direct employment required within the state to support the pipeline. We then applied the data within the IMPLAN framework described above to determine the total state-wide direct, indirect, and induced employment numbers and average wages.

For ad valorem taxes, FTI performed an analysis in conjunction with EQT utilizing a combination of gross cost and capitalized income approaches. To arrive at the project's gross cost-basis, FTI and EQT segmented the MVP cost budget into county-level cost budgets by allocating the materials, construction, commissioning, and related services costs for pipeline, meters, and regulators on a per mile basis. We then added in the materials, construction, and commissioning costs for materials specific to a county.⁶

The capitalized income approach was developed by creating a pro-forma financial analysis⁷, generating the necessary revenues to set the net present value of the project to zero, and then capitalizing the income stream. The gross cost and capitalized income approaches were given weightings of 40% and 60%, respectively, based on FTI conversations with West Virginia tax officials and tax attorneys. We next determined each county's ad valorem tax revenues by multiplying the weighted average tax basis by the assessment ratio of 60% and then by the county property tax rate.⁸ Section 2.2 provides the outcome of the operational benefits of the proposed MVP project.

Direct-Use Benefits

Direct-use benefits represent the third area of economic benefits from the proposed project. These benefits include fuel switching savings (e.g., replacing electricity, propane or fuel oil with gas) across

⁶ The MVP project plans to locate compressor stations in four counties along the proposed route.

⁷ The pro-forma was developed using a set of proxy assumptions for operational and maintenance costs, selling, general, and administrative costs, cost of capital, debt/equity ratio, construction and long-term interest rates, and depreciation method and period.

⁸ For oil and gas property in West Virginia, only 60% of the property tax rate is applied.

all economic sectors along with commercial and manufacturing expansions enabled by gas supply and access. As part of this assessment, FTI conducted reviewed press statements, conducted interviews with private and public entities in the counties and states, and interviewed local distribution companies and municipal agencies to gauge the fuel switching and manufacturing expansion potential in the counties.

Because eight of the eleven counties assessed in this analysis have gas access in major towns and areas and because the manufacturing sector representation is low in most of the counties, FTI's direct-use benefits analysis is mostly qualitative. The quantitative exception involved estimating the potential savings if municipal and private fleet vehicles in the counties were to switch to natural gas from gasoline and diesel. Based on public sources and interviews with county officials, we were able to approximate the number of fleet vehicles and their annual fuel consumption to develop a fuel savings estimate. We then applied costs for infrastructure development needed to support the fuel switching in order to calculate the net annual savings.

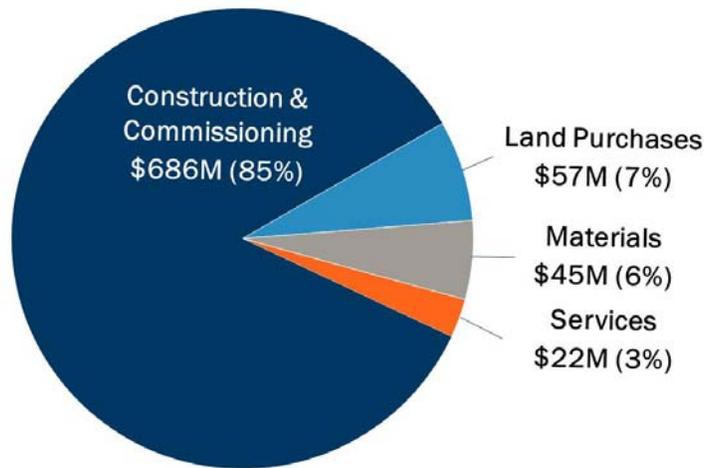
In addition to highlighting the current opportunities for fuel switching, we reviewed the potential for future opportunities that could result from having access to abundant natural gas supplies. We profiled several case studies in West Virginia of future manufacturing expansion potential that could occur with access to the MVP project. Section 2.3 provides the results from the direct-use benefits analysis.

2. Economic Benefits of the Mountain Valley Pipeline

2.1. Construction Economic Impacts and Job Creation

The MVP project owners estimate construction expenditures within the state to be \$811 million from 2015 to 2019, and these expenditures would translate into job creation and economic growth for the State and the counties. Figure 6 provides a breakdown of the cumulative MVP expenditures by major spending category in West Virginia.

Figure 6 – MVP Capital Expenditures in West Virginia Construction by Major Spending Category



This spending would result in construction peak year value-added or Gross Regional Product (“GRP”) of \$283 million in West Virginia. Over the course of the project construction, the project would generate \$594 million in cumulative GRP as shown in Figure 7.

Figure 7 – MVP Contributions to Gross Regional Product

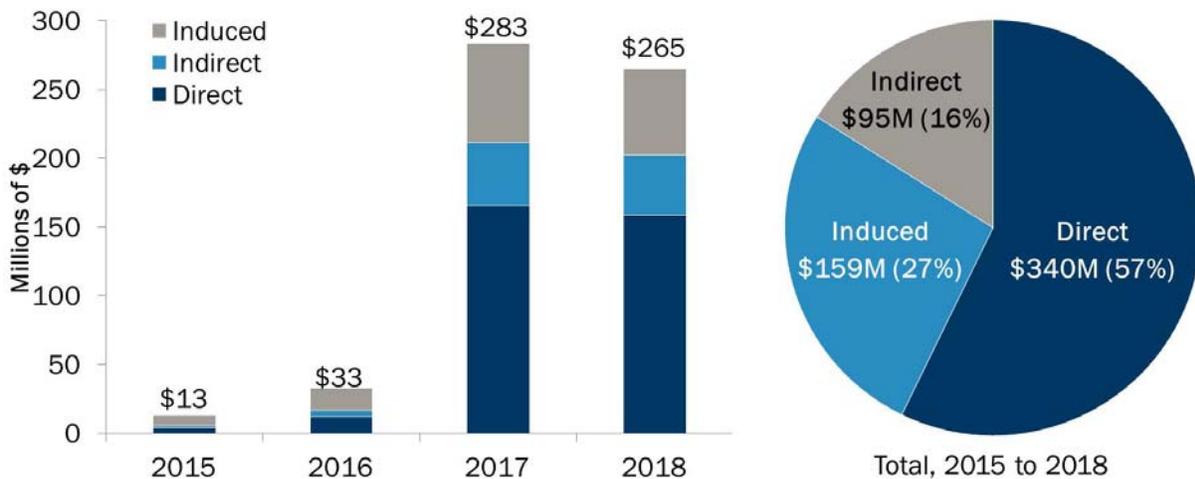
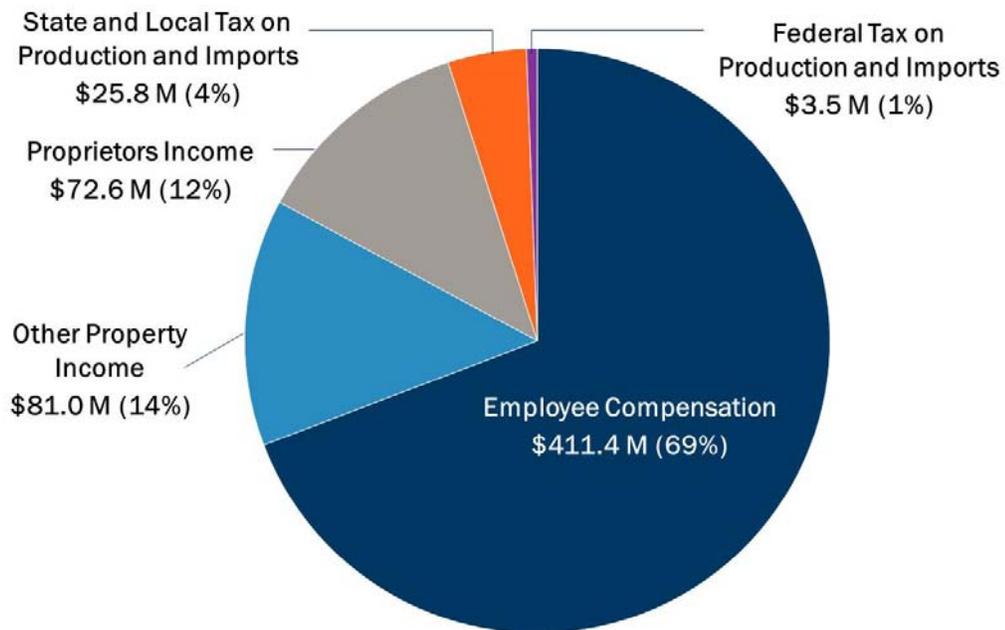


Figure 7 shows GDP segmented into direct, indirect, and induced GRP. As previously mentioned, 'direct' refers to the GRP occurring from the capital expenditures within the industry sectors immediately impacted. 'Indirect' represents the GRP impacts from suppliers to the directly impacted industries. 'Induced' GRP reflects the local spending of employee's wages and salaries of directly and indirectly affected industries.

GRP is defined as the summation of employee compensation, proprietor's income, other property income, and Federal, State, and local taxes on production and imports. Figure 8 shows that \$29 million in cumulative Federal, State, and local taxes would be generated from the MVP project construction.

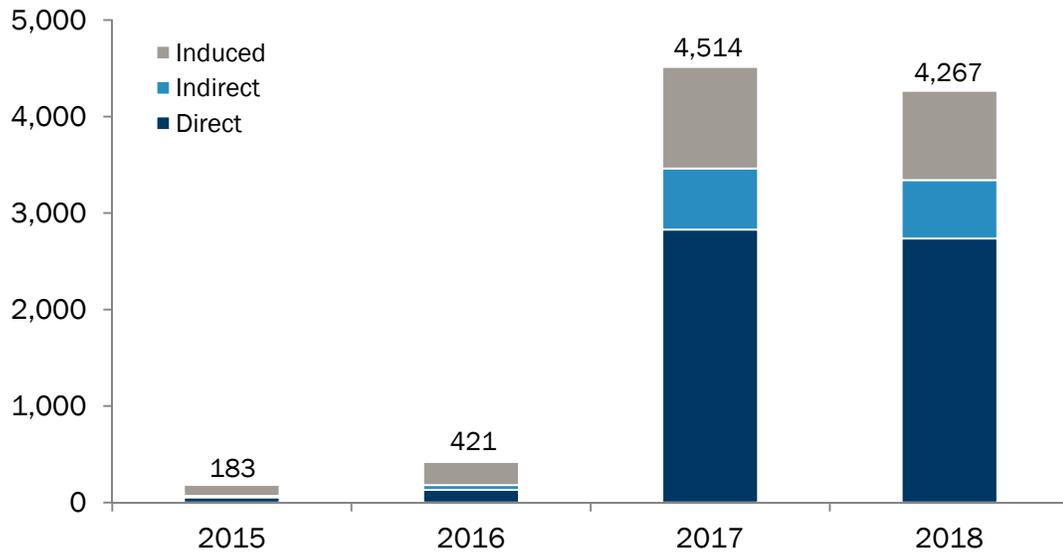
Figure 8 – Composition of MVP's Cumulative Gross Regional Product Contributions



In addition to the GRP benefits, the project will create 4,200 to 4,500 jobs within the state during peak construction activity (2017 and 2018). These jobs include construction jobs, indirect jobs (i.e., jobs created in the state by suppliers to the direct industries impacted), and induced jobs (i.e., jobs created in the state via the spending of construction workers and employees of businesses hired to supply materials and services in constructing the pipeline). Cumulatively, the MVP project would create nearly 9,400 job-years over the course of construction as shown in Figure 9.⁹

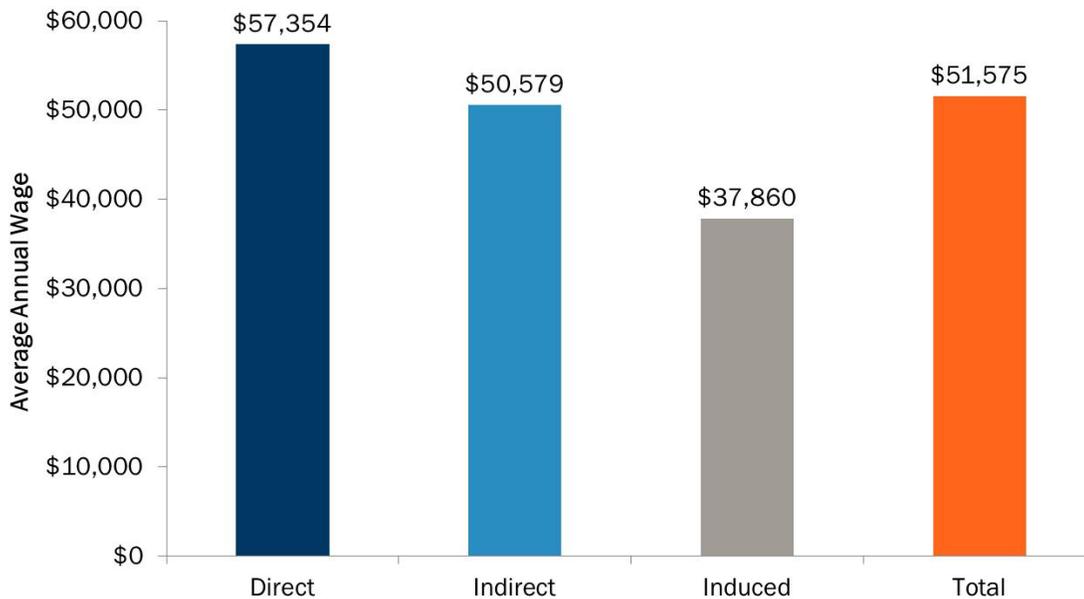
⁹ The MVP employment contributions are directly tied to the capital spending in each year and are best expressed in 'job-years'. A job-year is the equivalent of one full-time job lasting a single year.

Figure 9 – MVP Employment Contributions



The MVP employment contribution also would have a positive impact on West Virginia labor income. Figure 10 shows the average labor income per employee for direct, indirect, and induced jobs contributed by the MVP project.

Figure 10 – MVP West Virginia Average Employee Labor Income



2.2. Operational Benefits

The MVP project would contribute employment and generate county property or ad valorem taxes during operation. Once in service, operation and maintenance activities on the pipeline would

support a total of 54 jobs across the state with average annual wages and benefits of almost \$65,000 per job contributed.

In terms of property tax benefits, Table 2 shows the estimated ad valorem taxes generated by county once the pipeline is in service and compares these taxes to the counties' general fund budget.

Table 2 – Estimated Annual MVP Ad Valorem Taxes during Operation¹⁰

County	General Fund Total Revenues	Annual MVP Ad Valorem Taxes	Percent of General Fund Total Revenues
Braxton	\$ 4,387,000	\$ 1,500,000	34%
Doddridge	\$ 5,589,000	\$ 470,000	8%
Fayette	\$ 11,333,000	\$ 840,000	7%
Greenbrier	\$ 11,305,000	\$ 1,730,000	15%
Harrison	\$ 26,631,000	\$ 2,120,000	8%
Lewis	\$ 10,898,000	\$ 1,980,000	18%
Monroe	\$ 2,809,000	\$ 1,840,000	66%
Nicholas	\$ 8,390,000	\$ 2,240,000	27%
Summers	\$ 3,290,000	\$ 890,000	27%
Webster	\$ 2,531,000	\$ 1,610,000	64%
Wetzel	\$ 13,460,000	\$ 1,740,000	13%
Total 10 Counties	\$ 100,625,000	\$ 16,980,000	17%

Source: West Virginia State Auditors Office; FTI and EQT Calculations

In total, the ad valorem taxes generated during operation could represent up to 17% of the general fund revenues among all eleven West Virginia counties. In Monroe and Webster counties, the ad valorem taxes could represent approximately two-thirds of the general fund revenues.

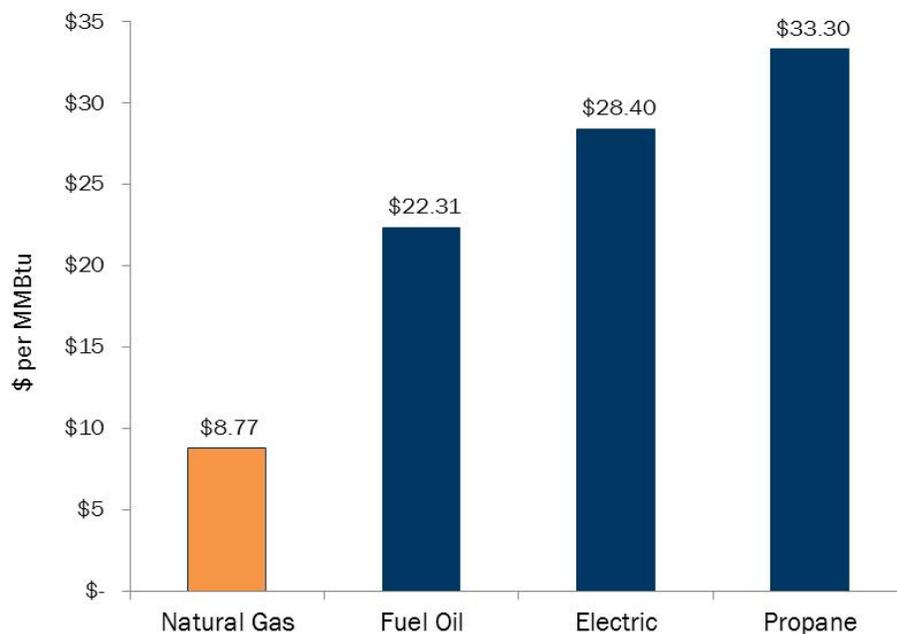
¹⁰ Dollars have been rounded to the nearest \$1,000. General Fund figures reflect the latest data available at https://www.wvsao.gov/LocalGovernment/ConBud_14-15.aspx

2.3. Direct-Use Benefits – Existing Opportunities

The shale gas revolution has helped lower natural gas prices almost 60% since 2008, which in turn has created a number of opportunities for greater investment, job creation and economic growth throughout the U.S. economy. Shale also has increased supply of natural gas, which has led to more price stability.

In West Virginia, natural gas prices have been more than 50% lower than other primary fuel sources as shown in Figure 11, making natural gas an economically attractive alternative to the residential, commercial, and municipal sectors.

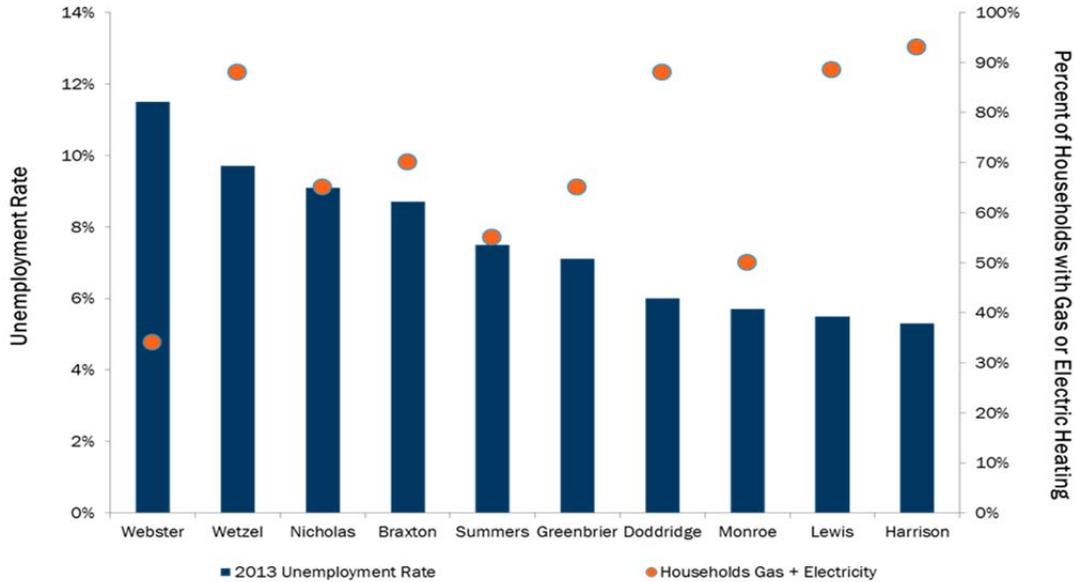
Figure 11 – 2014 Average Residential Winter Fuel Costs in West Virginia¹¹



The benefits of natural gas access go beyond consumer fuel cost savings. Natural gas Infrastructure is vital to the overall health of a local economy. For example, Figure 12 shows the unemployment rates in the eleven counties versus the percentage of households using natural gas or electric for space heating. While there are many factors involved in the health of a local economy, the general trend shows that infrastructure access can be correlated to economic performance.

¹¹ Used EIA residential prices for fuel oil and propane; used average Monongahela Power Co. residential price from EIA for electricity; used Dominion Hope industrial tariff for natural gas.

Figure 12 – Unemployment by County vs. Percent of Households Using Natural Gas or Electricity for Space Heating



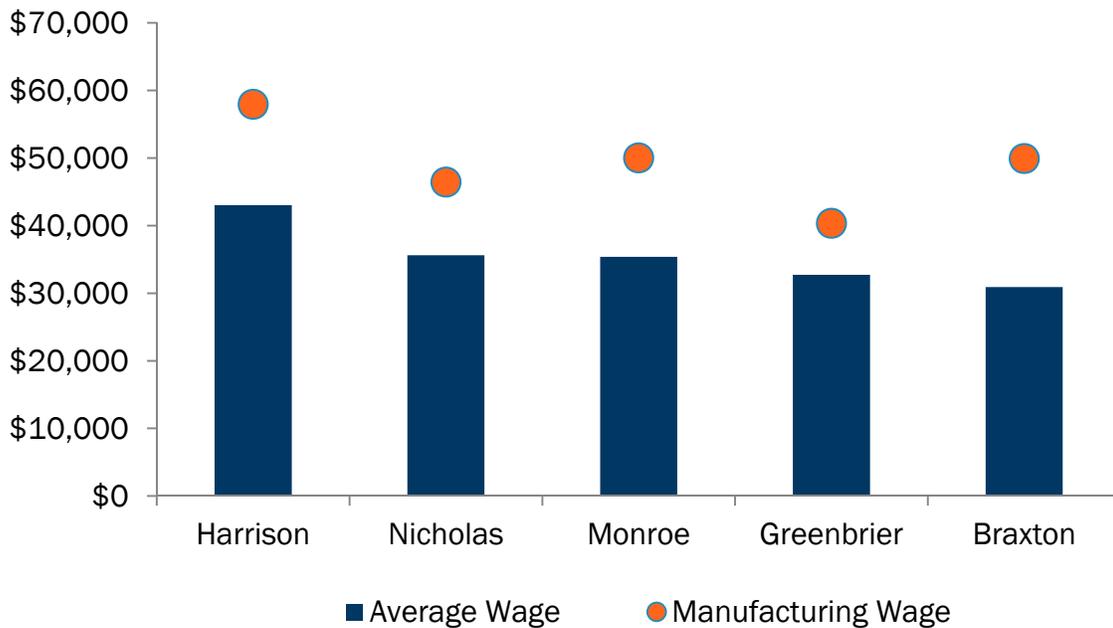
This is economic common sense – counties with extensive infrastructure access (rail, water, electricity, natural gas, interstates, broadband, etc.) are simply provided more opportunities to grow their economy. The contrast between Harrison and Webster counties – two counties along the proposed route – illustrates this point as highlighted in Table 3.

Table 3 – Comparison of Harrison and Webster County Economic Performance

	Harrison	Webster	
Infrastructure Access	Electric utility	County-wide	County-wide
	Gas access	79% of households	1% of households
	Water utility	All major towns	Limited to 8 mi. stretch along Rt. 20
	Interstate transport	I-79	N/A
	Rail transport	Clarksburg, Wallace, Shinnston, Bridgeport	Cowen
	Broadband	All major towns	Very limited
Economic Metrics	GDP per Capita (2014)	\$61,000	\$33,000
	Average Annual Wage (2013)	\$43,036	\$37,199
	Unemployment Rate (2014)	5.2%	11.3%

Infrastructure capacity and access also present opportunities for higher wages. As shown Figure 13, counties with energy-intensive and advanced technology manufacturing offer a significantly higher wage relative to other sectors. Manufacturing is an important growth engine to a community because manufacturing produces a multiplier effect by providing employees with more disposable income relative to other sectors as well as promoting growth in other industries that support manufacturing as part of the supply chain. Natural gas access also is important to retaining existing manufacturers who are searching for ways to reduce costs given natural gas' attractive costs relative to electricity, propane, and fuel oil.

Figure 13 – Employee Wage Comparison in Counties with Energy Intensive and Advanced Technology Manufacturing



In this section we review fuel switching and business expansion opportunities as they relate to the eleven counties along the proposed MVP route.

2.3.1. Fuel Switching Opportunities

Natural gas access is abundant in many parts of West Virginia due to the state’s long history of natural gas production. Eight of the eleven counties along the proposed MVP route have natural gas access in the major towns and areas. The MVP project could provide additional access and reliability to the residential, commercial, and municipal customers in these counties.

Three counties with limited gas access along the proposed route – Monroe, Summers, and Webster – could benefit significantly from the MVP project if they were to switch a sizable portion of their residential, commercial, and municipal energy users over to natural gas. Table 4 provides the location of the MVP project relative to major towns and other natural gas pipelines in these counties.

Table 4 – MVP Proximity to Major Towns and Other Pipelines in Counties with Limited Natural Gas Access

County	Proximity to Major Towns	Major Pipelines Intersecting MVP
Monroe	<ul style="list-style-type: none"> • Union – 8.2 mi. • Alderson – 5.5 mi. • Peterstown – 5.5 mi. 	Columbia Gas
Summers	<ul style="list-style-type: none"> • Hinton – 7.8 mi. 	Columbia Gas
Webster	<ul style="list-style-type: none"> • Webster Springs – 7.2 mi. • Cowen – 1.2 mi. 	N/A

Below we discuss the fuel switching potential for each of these counties in further detail.

Monroe County

Monroe County is a 474 square-mile county located in West Virginia with a population of 13,483. It is primarily a farming county, with a mix of livestock (cattle, dairy, and sheep) and crop farming (hay, corn, oats, wheat, and tobacco). Timber is also a major contributor to the economy.¹² Monroe County's nominal GDP in 2014 was \$190 million or \$14,107 per person.¹³ The county's economy has grown below the national average (-1.2% vs. 2.4%), but its unemployment has remained low relative to West Virginia and the national average (5.6% vs. 6.5% in West Virginia and 6.2% nationally)

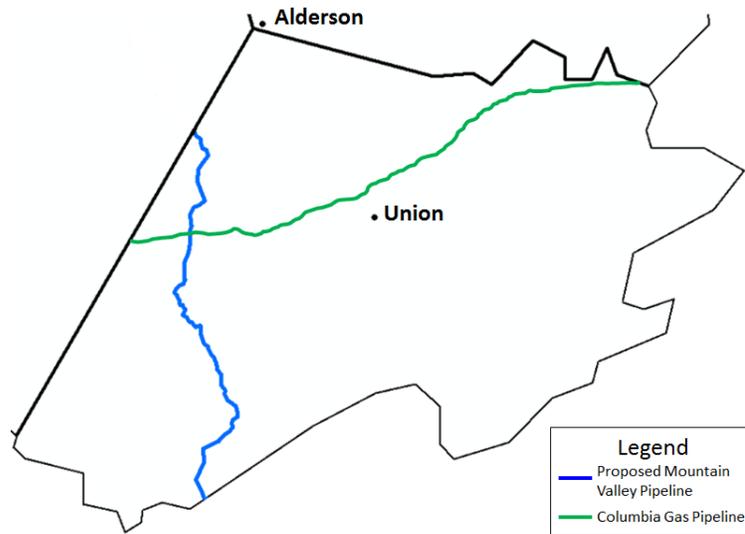
Union is the county seat and has a population of 565, Alderson, which is 40 miles from Union, is the largest town with a population of 1,184. Peterstown, 25 miles from Union, has a population of 653. Together these three towns represent 18% of the county's population.

In Monroe County, the MVP project would provide a vital north-south corridor as the Columbia Gas pipeline runs east-west (see Figure 14).

¹² <http://www.wvencyclopedia.org/articles/2024>

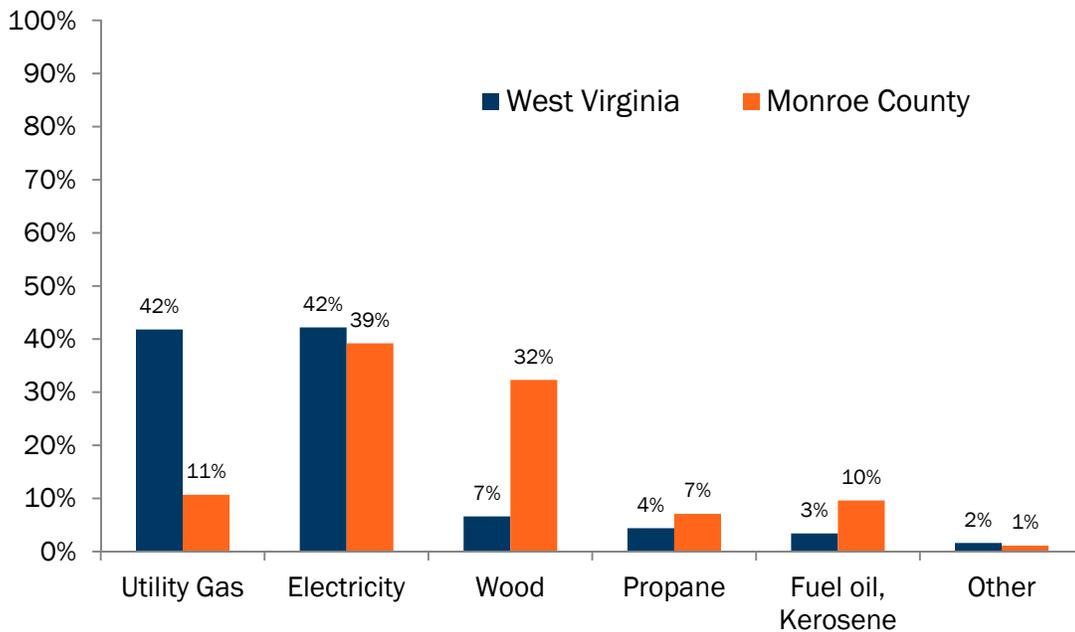
¹³ National Association of Counties. <http://www.uscounties.forg/countyTracker/index.html>

Figure 14 – Monroe County Pipelines – Existing and Proposed



The MVP project could offer fuel switching access opportunities to residential, commercial, municipal, and manufacturing customers in Monroe County. On the residential side, a relatively small percentage (11%) of homes in the county is heated with natural gas (see Figure 15). Commercial and municipal gas usage typically follows suit as gas consumption typically is driven by accessibility.

Figure 15 – Primary Space Heating Fuel Used in Monroe County versus the State, Percentage of Housing Units¹⁴



¹⁴ 2013 US Census Bureau 5 Year American Community Survey

There are two specific municipal opportunities in the county. Two schools located in Peterstown are heated using electricity that could be switched to gas.

The MVP project also could provide additional access to existing manufacturers if connected to the Columbia Gas pipeline. Below are the two main manufacturers in the county:

- **UTC Corporation:** UTC, formerly Goodrich, is a global supplier of systems and services for the aerospace and defense industries. The company employs 400 people at its Sensors and Integrated Systems plant in Union, WV. The facility is 140,000 square feet, and it is powered by a combination of electricity and natural gas.
- **M-Rock:** The company is a stone and brick designer and manufacturer in Peterstown, WV, and employs 25 people and has annual revenue of \$1M.

Summers

Summers County is a 368 square-mile county located in south-east West Virginia with a population of approximately 13,500 and has a household count of approximately 5,500. Summers County's economy has had challenges. Its nominal GDP in 2014 was \$221 million or \$16,316 per person.¹⁵ The real GDP shrunk by 1.9% from 2013 to 2014¹⁶ compared to the U.S. GDP real growth of 2.4%¹⁷ during the same time period. Additionally, the county unemployment rate was 7.4% in 2014, compared to 6.5% in West Virginia and 6.2% nationally.

Hinton is the county seat and largest city with a population of 2,676 and represents 20% of the county population. Hinton has gas access.

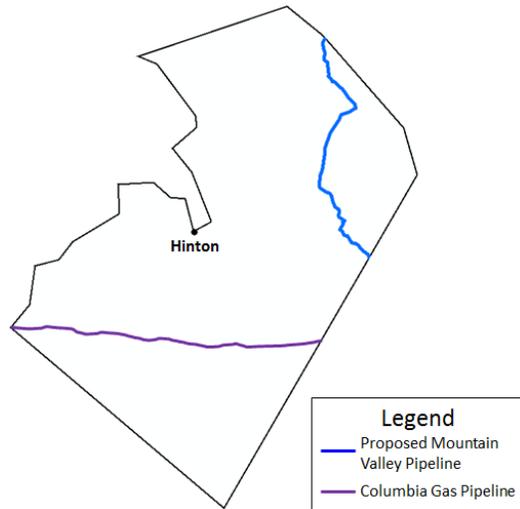
Like Monroe County, Summers County has the Columbia Gas pipeline running east-west through the county, and the MVP project would provide a vital north-south natural gas corridor (see Figure 16).

¹⁵ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

¹⁶ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

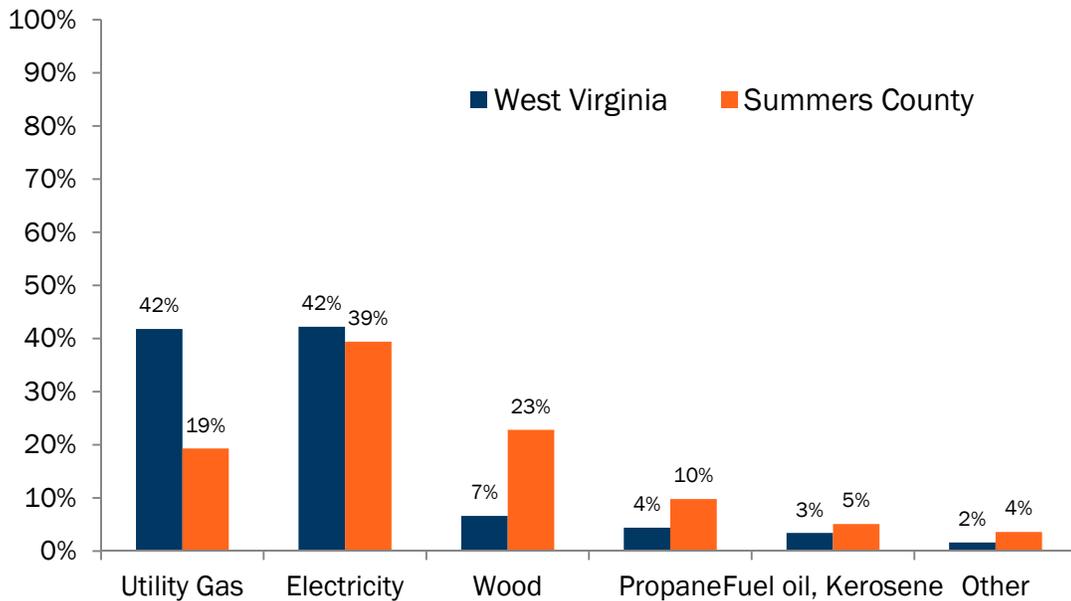
¹⁷ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

Figure 16 – Summers County Natural Gas Pipeline Map



The MVP project could offer fuel switching opportunities across all economic sectors. On the residential side, a relatively small percentage (19%) of homes in Summers County is heated with natural gas (see Figure 17). These are mainly homes in Hinton. Commercial and municipal natural gas customers have access in Hinton as natural gas consumption typically is driven by accessibility.

Figure 17 – Primary Space Heating Fuel Used in Summers County versus the State, Percentage of Housing Units¹⁸



¹⁸ 2013 US Census Bureau 5 Year American Community Survey

The planned route of the MVP pipeline would run through the northeastern portion of Summers County. The route would be near Alderson (5.5 miles away), which is just outside the county on the border of Monroe and Greenbrier counties. Alderson is an important economic center for this portion of Summers County. As such, the community in Summers County area near Alderson could benefit from having gas access for fuel switching purposes.

Webster

Webster County is a 556 square-mile county located in the center of West Virginia. It has a population of approximately 8,900 and has a household count of approximately 4,000. The county's economy has had some challenges. Its nominal GDP in 2014 was \$294 million or \$33,000 per person.¹⁹ While the county's GDP grew by 2.8% from 2013 to 2014²⁰ compared to the U.S. GDP real growth of 2.4%²¹ during the same time period, the county's unemployment rate has been high – 11.3% in 2014 compared to 6.5% in West Virginia and 6.2% nationally.

Webster Springs is the largest town with a population of 776 and is also the county seat. Cowen is the second largest town in the county with a population of 541. Together these towns represent approximately 15% of the county's population.

Overall, the economic development in the county has been scattered mainly due to a lack of infrastructure. There is no major interstate that runs through the county. As such, infrastructure is primarily available along the Route 20 corridor, which runs from Camden-on-Gauley in the southern part of the county through, Cowen, Webster Springs, nearby Diana, and Cleveland on the northern part of the county.

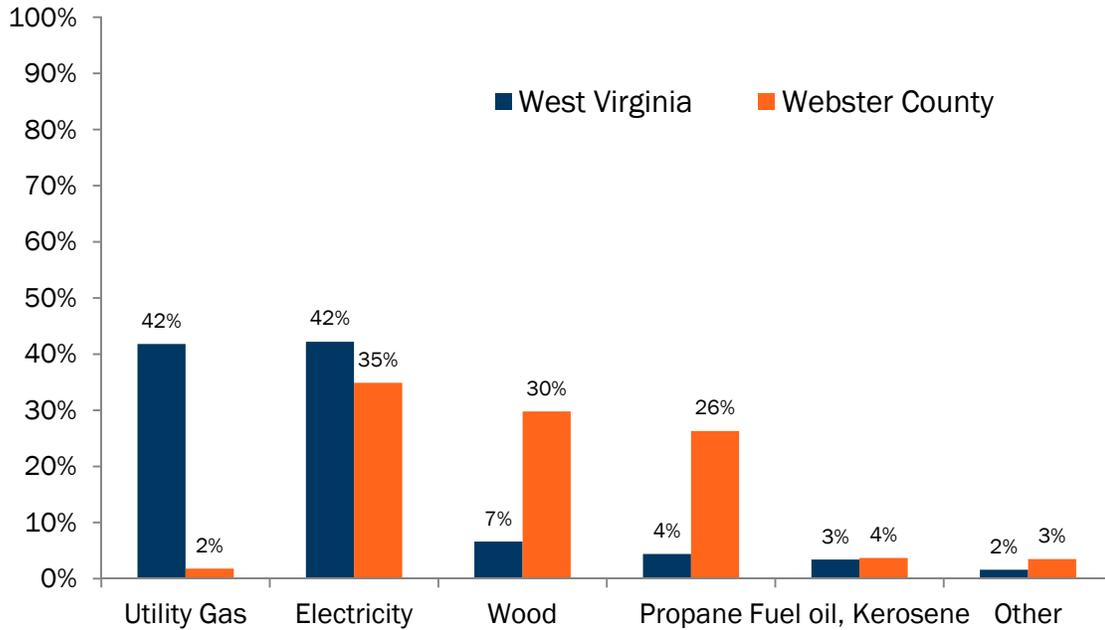
Currently there is no gas service in the county. Electricity, wood, and propane are the main residential home heating sources for the county as shown in Figure 18.

¹⁹ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

²⁰ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

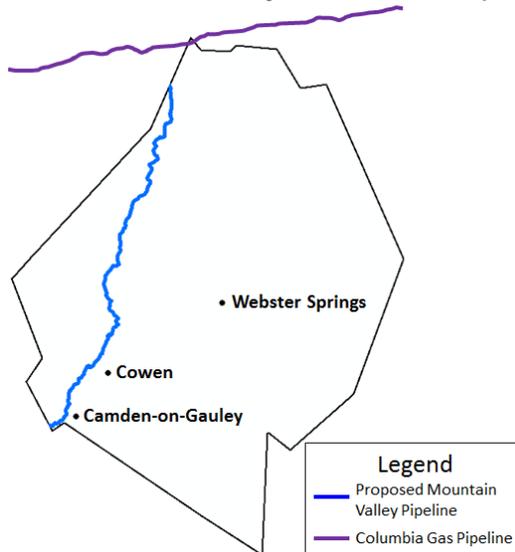
²¹ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

Figure 18 - Primary Space Heating Fuel Used in Webster County versus the State, Percentage of Housing Units²²



The residential, commercial, and municipal sectors, particularly in Cowen and Camden-on-Gauly, could benefit from the MVP pipeline as it would run through the western part of the county as shown in Figure 19.

Figure 19 - Webster County Natural Gas Pipeline Map



²² 2013 US Census Bureau 5 Year American Community Survey

Within Webster County, Cowen represents the best opportunity for fuel switching as the MVP project would run within 1.2 miles of the town. Cowen has a population of 541, and it does not have gas access. Furthermore, Cowen offers the best opportunities for business expansion due to its flat terrain and rail access.

2.3.2. Business Expansion Opportunities

A major natural gas pipeline, such as the proposed MVP project, can draw new businesses that require high volumes of natural gas, particularly energy-intensive and advanced technology manufacturers. These businesses can provide large economic benefits to communities from an employment, wage, and tax revenue perspective as their multiplier effects (the amount of indirect and induced GRP and employment created per dollar of investment) is large. For example, for each job created within the petrochemical industry 12 other jobs are created along the supply chain and from general economic spending.²³ The multiplier or ripple effects for the petrochemical industry are large because the industry has an above average capital investment to direct employment ratio.

In this section we discuss existing, business expansion opportunities in select counties along the proposed MVP route. These opportunities mainly center on West Virginia's gas sector as a number of counties along the proposed route have sizable natural gas operations. The MVP pipeline offers an opportunity for developers to move their natural gas via the pipeline to ten other counties in West Virginia, six counties in Virginia, and a large portion of the U.S. Southeast

Doddridge

The primary growth sector for Doddridge County in recent years has been the oil and gas sector. Mark West in 2013 opened a new gas processing facility outside West Union that employs approximately 25 people. The company plans to triple its capacity in the near future. During the construction of the facility, Mark West employed about 200 local electricians, pipefitters, welders, carpenters and other tradespeople.²⁴ The Mark West facility, along with other parts of natural gas industry, provides on average wages that are 2.5 times higher than the county average as shown in Table 5 in the Resources and Mining sector.

²³ IMPLAN, 2012

²⁴ <http://www.wvillustrated.com/story/20280391/new-markwest-natural-gas-processing-online-in-doddridge-co>

Table 5 – Annual Average Wages in Doddridge County by Sector²⁵

Sector	Average Annual Wage
Resources and Mining	\$104,946
Construction	\$40,780
Government	\$32,216
Commercial	\$25,549
Manufacturing	N/A
Weighted Average	\$39,016

Table 5 illustrates that the natural gas industry is an important near-term driver for Doddridge County's economic performance.

Lewis

Existing manufacturing expansion opportunities in Lewis County are limited. Viking Pools, which manufactures hot tubs, spas and whirlpool baths, and Tamarack Log Homes, which manufactures log homes, are large employers but likely have few needs for additional gas supplies. Both are located at the industrial park near the Jane Lew exit of I-79.

The primary growth sector for Lewis County in recent years has been the natural gas industry. The county has become an operational hub for many companies involved in Marcellus Shale development. Companies such as Nexus Drilling, Chesapeake Energy, and Superior Well Services have expanded operations significantly, employing approximately 1,500 people or 20% of the workforce in the county. The average wage for oil and gas extraction employees in Lewis County has been ~\$77,300. It is worth noting that Lewis County now has the third lowest unemployment in the state after Monongalia and Jefferson counties.

This boon has been helpful in offsetting manufacturing decline. In 2013 Halliburton shut down their cement plant operations in Weston, WV, and moved it 150 miles away to Zanesville, OH. The company had employed approximately 75 people.

Wetzel

The primary growth sector for Lewis County in recent years has been the oil and gas sub-sector under Resources and Mining. The drilling activity in Wetzel has led to a boom in government revenue with a large increase in tax revenue. Local property tax revenue has nearly tripled since 2005 with

²⁵ Workforce WV. http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

significant increases to severance tax revenue as well.²⁶ The average wage for oil and gas extraction employees in Wetzel County has been ~\$73,800.

FTI has found that gas development represents the near-term economic growth opportunity for the county. Wetzel County could benefit further from natural developments in the county by training more county residents to work in the field and exploring approaches for transitioning out-of-state workers to be re-located within the county. This would provide additional disposable income within the counties borders.

2.4. Direct-Use Benefits – Future Opportunities

The shale gas revolution in the last few years has created a manufacturing renaissance in the United States. The increased supply of natural gas has stabilized prices leading to greater investment, job creation and economic growth. Manufacturing is an important growth engine to a community because manufacturing produces a multiplier effect that promotes growth in other industries.

Our interviews with county representatives, regional partnership leaders, and manufacturers inside and outside the county identified that businesses value abundant and reliable gas service, and that access to natural gas is a primary criterion for determining where to locate new manufacturing facilities. Anecdotal evidence from these interviews place lost manufacturing opportunities at 50% for counties without gas access. Clearly, access to a pipeline could have considerable impacts on the local economy in terms of jobs, economic output, and tax revenues.

Below we highlight the major manufacturing employers in eight of the eleven counties along the proposed route. Additional gas access to these manufacturers could help enable expansions by providing a low-cost resource to their operations.

²⁶ <http://www.wvpolicy.org/wp-content/uploads/2014/04/Impacts-of-Drilling-in-Wetzel-County.pdf>

Table 6 – Major Manufacturing and Oil & Gas Employers by County

County	Major Manufacturing and Oil & Gas Employers	Products	Est. Employees
Braxton	Weyerhaeuser	Oriented strand board	140
	Appalachian Timber Services	Rail ties	80
	Braxton Lumber	Lumber Mill	20
Doddridge	Mark West	Natural Gas Processing	
Greenbrier	ABB	Industrial motors	160
	Mullican Flooring	Hardwood flooring	120
Harrison	Aurora Flight Services	Aerospace vehicles	160
	Bombardier Services	Airline maintenance	400
	Europtec	Glass fabrication	60
	Graftech	Graphite products	175
	Pratt & Whitney	Airline repair/engine manufacturing	400
	Stockmeier Urethanes	Chemicals products	15
Lewis	Viking Pools	Bathtub and spas	75
	Tamarack Log Homes	Log homes	7
Monroe	UTC Aerospace Systems	Aerospace products	400
	M-Rock	Stone/brick design	25
Nicholas	B/E Aerospace	Aircraft cabin products	160
	Columbia Wood Products	Hardwood products	380
Webster	Allegheny Wood Products	Hardwood products	175
	Jim C. Hamer Company	Hardwood products	75
	Northwest Hardwoods	Hardwood products	

Beyond these existing manufacturers, new manufacturers could emerge with the development of the MVP project. The Marcellus and Utica shale gas formations have created a number of manufacturing opportunities for West Virginia, Pennsylvania, and Ohio. Together, these two gas formations account for 16.6 Bcf/d or more than 20% of U.S. production²⁷ and are enticing companies to build massive chemical projects in these states. Several projects to build ethane crackers are being considered, and the MVP project along with other oil and gas infrastructure project may attract these and similar manufacturing investments to West Virginia, spurring economic growth, high-paying jobs, and additional tax revenues for the counties and State.

²⁷ EIA Drilling Productivity Report, October 14, 2014.

Below we present four case studies on proposed projects that, if built, would have significant economic benefits to West Virginia and surrounding areas.

1. Odebrecht

Odebrecht is a Brazilian conglomerate consisting of businesses in the fields of engineering, construction, chemicals and petrochemicals. It has proposed the construction and operation of a world-scale ethane cracker and three polyethylene manufacturing plants in Parkersburg, WV, along with water treatment and energy co-generation facilities.²⁸ Odebrecht estimates the plant to cost \$3.8 billion. Typically, ethane project investments of this magnitude employ more than 2,000 construction workers at their peak and 200-300 full-time employees during operation. The facility would be supplied by ethane and natural gas from the Marcellus and Utica shales.

This proposal is an example of how West Virginia could move further down the value chain from a fuels producer to a producer of value added petrochemical products. As Kevin DiGregorio, Executive Director of West Virginia-based Chemical Alliance Zone, stated, “[a] cracker in West Virginia just makes sense. The chemical industry historically follows abundant raw materials, and the vast amount of ethane in the Marcellus Shale provides a great foundation for new chemical manufacturing investments.”²⁹

Odebrecht has stated that a final investment decision will be made by the end of 2015.

2. Aither

Aither Chemical is evaluating locations in OH, PA, and WV to build a plant that would produce ethylene and related products.³⁰ Aither estimates the plant would cost \$200 to \$750 million and create 200 permanent jobs and 2,000 temporary construction jobs, with indirect job creation from the project resulting in as many as 1,400 more permanent jobs.³¹ The plant would produce up to 600 million pounds of ethylene, 300 million pounds of acetic acid, 80 million pounds of carbon dioxide, and 40 million pounds of carbon monoxide each year, generating \$450 million in annual revenues. The plant would use natural gas and ethane from the Marcellus Shale.

The Aither plant is another example of the manufacturing potential in the Marcellus and Utica areas. The economic benefits of these facilities are highly multiplicative, with 7– 10 times the indirect jobs (jobs related to supplier to these facilities) being created. The supply chain economic benefits are recognized by state governments. For example, West Virginia Governor Earl Ray Tomblin signed into

²⁸ “Odebrecht Moves Forward with WV Cracker Plant Plans.” Marcellus Drilling News. Sep. 2, 2014.

<http://marcellusdrilling.com/2014/09/odebrecht-moves-forward-with-wv-cracker-plant-plans>

²⁹ “Industry Leaders Speak on Cracker.” The Weirton Daily Times. Dec. 2, 2013.

<http://www.weirtondailytimes.com/page/content.detail/id/607182/Industry-leaders-speak-on-cracker.html?nav=5006>

³⁰ “Aither Chemicals Mulls Plans for Cracker and PE plant in Marcellus Shale region.” Plastics News. April 18, 2013.

<http://www.plasticsnews.com/article/20130418/NEWS/130419906/aither-chemicals-mulls-plans-for-cracker-and-pe-plant-in-marcellus-shale-region>

³¹ <http://www.plasticsnews.com/article/20130418/NEWS/130419906/aither-chemicals-mulls-plans-for-cracker-and-pe-plant-in-marcellus-shale-region>

law in 2012 a tax incentive plan designed to lure an ethane cracker plant to West Virginia. The law gives a 25-year property tax break to companies that spend more than \$2 billion on such a facility.

3. Other Opportunities in the Region

Other similar investments reflect the potential for West Virginia counties to attract these types of manufacturing opportunities.

Shell has proposed the construction of an ethane cracker in Monaca, PA, in Beaver County, 35 miles northwest of Pittsburgh. The facility would be capable of producing 1.5 million tons of ethylene and 1.6 million tons of polyethylene annually and employ 400 people. Supporting the plant's operations would be three on-site natural gas-fired turbines, four emergency diesel generators, two cooling towers, and a water treatment facility.³²

A partnership of PTT Global Chemical and Marubeni Corp is evaluating the construction of an ethane cracker on a 400-acre site at Mon River Industrial Park in Allenport, PA, as well as two undisclosed locations in Ohio and West Virginia, to take advantage of the natural gas supply from the Marcellus and Utica formations.³³

Appalachian Resins plans to construct a \$1 billion ethane cracker plant on a 50-acre site in Monroe County, OH, 130 miles east of Columbus. The project, which had initially been planned for West Virginia, is expected to bring 150 to 200 full-time jobs once the plant is running. The plant would be about one-third the size of the Shell and Odebrecht plants and could open in late 2018 or early 2019.³⁴

³² Natural Gas Intelligence. "Shell Chemical Details Plans for PA Cracker in First Permit Application." Aug 5, 2014. <http://www.naturalgasintel.com/articles/99275-shell-chemical-details-plans-for-pa-cracker-in-first-permit-application>

³³ "Thai-Japanese Duo Angling for Another Marcellus Ethane Cracker." PowerSource. Sep. 28, 2014. <http://powersource.post-gazette.com/powersource/companies-powersource/2014/10/16/Brazil-group-visits-to-learn-more-about-shale/stories/201410150210>

³⁴ "Cracker Plant in the Works for Monroe County." The Columbus Dispatch. Oct. 16, 2014. <http://www.dispatch.com/content/stories/business/2014/08/29/cracker-plant-in-the-works-for-monroe-county.html>

3. Summary

The proposed MVP pipeline would provide a number of direct-use benefits to the eleven counties in West Virginia through which the pipeline would run. First, the pipeline would benefit existing customers as it would help ensure future access to a reliable supply of natural gas. Natural gas is already abundant in many parts of West Virginia due to the state's long history of gas operations. Eight of the eleven counties along the proposed MVP route have natural gas access in the major towns and areas. The MVP project could provide additional access and reliability for the residential, commercial, and municipal customers in these counties.

Second, the shale gas revolution has helped lower natural gas prices, making natural gas an economically attractive alternative to existing fuel sources. Counties with limited access to natural gas could realize significant benefits from the MVP pipeline if they were to switch a sizeable portion of their residential, commercial, municipal, and manufacturing customers from the existing fuel source over to natural gas. In Monroe County and Summers County, which both have limited access to natural gas, the MVP project would provide a north to south corridor to complement the Columbia Gas pipeline that runs east to west. In Webster County, which does not currently have access to natural gas, the MVP pipeline would run through the western part of the county and within 1.2 miles of the town of Cowen, the second-largest town in the county.

Third, a major natural gas pipeline like the MVP could draw new businesses that require high volumes of natural gas, particularly energy-intensive and advanced technology manufacturers that pay high wages. An example is Harrison County, which has a thriving aerospace industry, an average annual wage of \$72,000, and an unemployment rate of 5.2%. Mark West in Doddridge County serves as another example of manufacturing benefits. The company plans to triple the capacity of its gas processing facility in Doddridge County, which provides wages 2.5 times higher than the county's average. Further evidence of the potential for natural gas to attract major investments in manufacturing is illustrated from investments in ethane cracker plants that are being considered. These include several plants being considered by Odebrecht, Aither, Shell, PTT Global/Marubeni, and Appalachian Resins.

These types of investments can provide large economic benefits to communities from an employment, wage, and tax revenue perspective. Input-output modeling software such as IMPLAN can help to estimate the magnitude of these impacts. In addition to the initial economic impact of the investment, businesses along the supply chain benefit through ripple, or multiplier, effects, as do households in the form of higher wages and disposable income.

Appendix: County Economic and Energy Profiles

1. Braxton

Economic Profile

Braxton County is a 517 square-mile county located in the center of West Virginia. It has a population of approximately 14,500 and has a household count of approximately 5,800. The county has had an underperforming economy. Its nominal GDP in 2014 was \$371 billion or \$25,600 per person.³⁵ The real GDP declined by 1.2% from 2013 to 2014³⁶ compared to the U.S. GDP real growth of 2.4%³⁷ during the same time period. Additionally, the county unemployment rate has been high – 8.8% in 2014 compared to 6.5% in West Virginia and 6.2% nationally.³⁸

Sutton is the largest town with a population of 1,030 and is also the county seat. Gassaway is the second largest town in the county with a population of more than 900. Together these towns represent approximately 13% of the county's population. The vast majority of the population lives in rural parts of the county that does not have access to natural gas.

The county counted 343 employers in 2013 with total employment of 3,814 or 11.1 employees per employer.³⁹ Approximately 9% of the County residents work in manufacturing as shown in Table 7.

Table 7 – Employment in Braxton County by Sector⁴⁰

Sector	Employment	Percent of Total Employment
Commercial	2,293	60%
Government	938	25%
Manufacturing	330	9%
Construction	206	5%
Resources and Mining	47	1%
Total	3,814	100%

³⁵ NACO County Tracker, 2013.

³⁶ Ibid.

³⁷ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

³⁸ Bureau of Labor Statistics

³⁹ Workforce WV. http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

⁴⁰ Ibid.

While the commercial sector represents a large portion of the Braxton County economy, manufacturing is also an important sector. Manufacturing employs 330 workers, representing 9% of the jobs in the county. Below are some of the largest manufacturers:

- **Weyerhaeuser:** A public company, located in Heaters, that produces oriented strand board for the construction industry. The facility can produce approximately 500 million square feet of OSB per year, and it employs 140 people.
- **Appalachian Timber Services:** A privately-owned company that produces cross ties, switch ties, bridge ties, timber crossings, and custom wood products for the rail industry. It employs approximately 80 people.
- **Braxton Lumber:** A privately-owned lumber mill in Heaters. It employs approximately 20 people with annual revenue of \$100K.

All three companies are closely situated nearby the I-79 corridor. These facilities mainly use electricity to drive their operations. For Weyerhaeuser, natural gas is used for process heating.

In Braxton County, the economic impact of manufacturing jobs is clear. As Table 8 shows, manufacturing wages are the second highest across all job sectors in the county (\$57,944 per year) and are 35% higher than the average wage in the County.

Table 8 – Annual Average Wages in Braxton County by Sector⁴¹

Sector	Average Annual Wage
Resources and Mining	\$83,048
Manufacturing	\$57,944
Government	\$54,172
Construction	\$52,844
Commercial	\$34,899
Weighted Average	\$43,036

Energy Profile

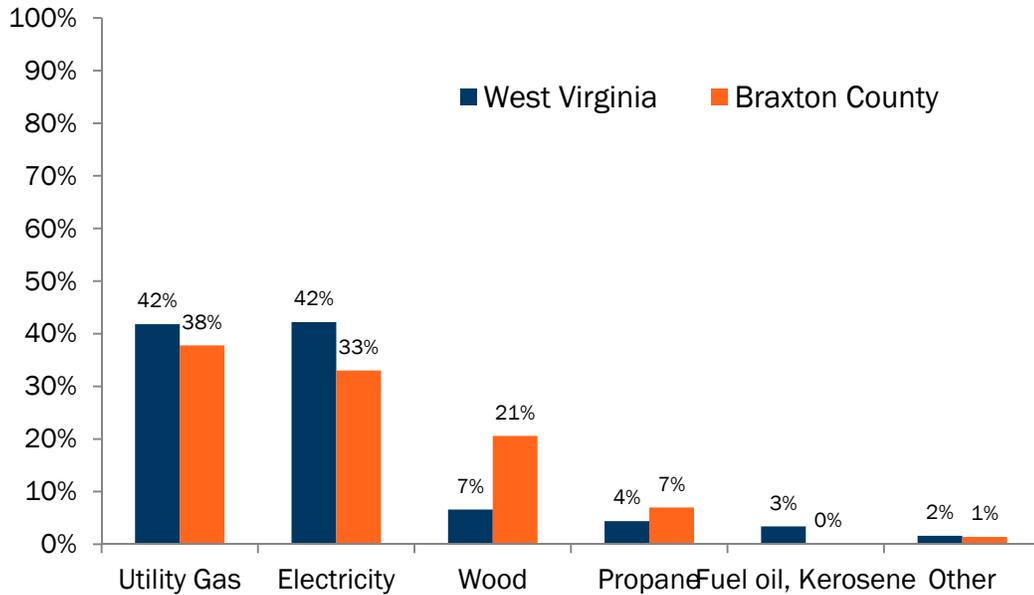
There is a surprising amount of gas accessibility in Braxton County given its low population density. The gas source for Sutton and Gassaway is from West Virginia gas productions wells (native supply).

Natural gas and electricity are the main residential home heating sources for the county as shown in Figure 20. A large portion of households in the county's towns use natural gas as their primary fuel

⁴¹ Workforce WV. <http://www.workforcewv.org/lmi/EandWAnnual/ew13cnty025.html>.

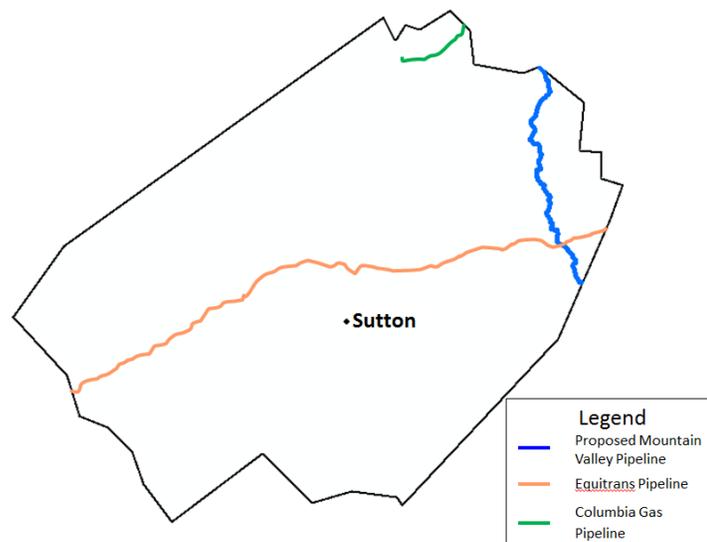
source for home and water heating. Typically, commercial and municipal buildings follow the same pattern since natural gas use often is driven by accessibility. Dominion Hope serves these towns.

Figure 20 - Primary Space Heating Fuel Used in Braxton County versus the State, Percentage of Housing Units⁴²



The residential, commercial, and municipal sectors could benefit significantly from the proposed MVP pipeline as it would intersect on the east side of the county with the Columbia Gas Transmission Corporation’s pipelines as shown in Figure 21. The MVP pipeline, if connected to this pipeline, could provide gas supply to Braxton County consumers as native production declines.

Figure 21 - Braxton County Natural Gas Pipeline Map



⁴² 2013 US Census Bureau 5 Year American Community Survey

2. Doddridge

Economic Profile

Doddridge County is a 320 square-mile county located in the northwest part of West Virginia with a population of approximately 8,300 and has a household count of approximately 3,000. The county has a growing economy. Its nominal GDP in 2014 was \$174 million or \$20,877 per person.⁴³ The real GDP grew by 3.3% from 2013 to 2014, after growing nearly 20% the previous year,⁴⁴ compared to the U.S. GDP real growth of 2.4%⁴⁵ during the same time period. Additionally, the county unemployment rate was 5.9% in 2014, compared to 6.5% in West Virginia and 6.2% nationally.

West Union is the county seat and is the largest town with a population of 825. The Route 23 corridor in the northern part of the county is considered the population center of the county.

Doddridge County has experienced economic development challenges because of a lack of infrastructure. There is no interstate and mainline water access is restricted to an approximately eight-mile stretch along Route 23. There is also limited 3-phase electricity, which is required for large manufacturing and commercial facilities, and limited broadband.

In 2013, the county counted 110 employers with total employment of 1,246 or 11.3 employees per employer.⁴⁶ A majority of the county employment is in the commercial and government sectors (79%) as shown in Table 9.

Table 9 – Employment in Doddridge County by Sector⁴⁷

Sector	Employment	Percent of Total Employment
Commercial	455	36%
Government	530	43%
Resources and Mining	144	12%
Construction	119	10%
Manufacturing	0	0%
Total	1,248	100%

⁴³ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁴⁴ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁴⁵ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file “gdp2q15_2nd.xls” Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁴⁶ WorkForce WV: http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html

⁴⁷ WorkForce WV: http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html

Resource and mining represents 12 % of the county employment and is composed entirely of oil and gas production. This sub-sector has grown in recent years.⁴⁸ As evidence, Mark West in 2013 opened a new gas processing facility outside West Union that employs approximately 25 people. The company plans to triple its capacity in the near future. During the construction of the facility, Mark West employed about 200 local electricians, pipefitters, welders, carpenters and other tradespeople.⁴⁹

As Table 10 shows, the resources and mining industry, which includes the Mark West facility, has significantly higher wages, on average, than the other major sectors.

Table 10 – Annual Average Wages in Doddridge County by Sector⁵⁰

Sector	Average Annual Wage
Resources and Mining	\$104,946
Construction	\$40,780
Government	\$32,216
Commercial	\$25,549
Manufacturing	N/A
Weighted Average	\$39,016

Natural gas is important to the county's economic growth. FTI found that oil and gas development represents the near-term economic growth driver for the county. The MVP pipeline offers an opportunity for developers to move their natural gas via the pipeline to ten other counties in West Virginia, six counties in Virginia, and a large portion of the U.S. Southeast, which could translate into significant impacts to the county's economy. In Lewis County, for example, the oil and gas sector comprises approximately 20% of the workforce and the average wages for the sector lead all other sectors. Coincidentally, Lewis County has the third lowest county unemployment rate in the State.

While having good timber resources, the timber industry currently is not very active due to economics. This is partially due to infrastructure constraints as timber companies are challenged to get timber out of the county via the existing road infrastructure.

There are no major manufacturers in Doddridge County; however, Simonton Windows in neighboring Ritchie County is a large employer of county residents.

⁴⁸ <http://www.drillingedge.com/west-virginia/doddridge-county>

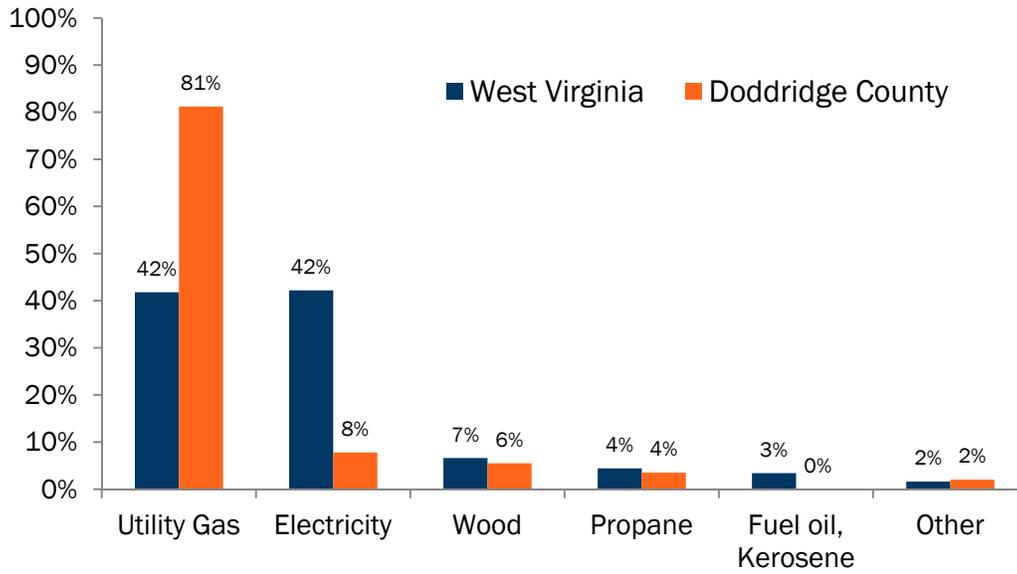
⁴⁹ <http://www.wvillustrated.com/story/20280391/new-markwest-natural-gas-processing-online-in-doddridge-co>

⁵⁰ WorkForce WV: http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html

Energy Profile

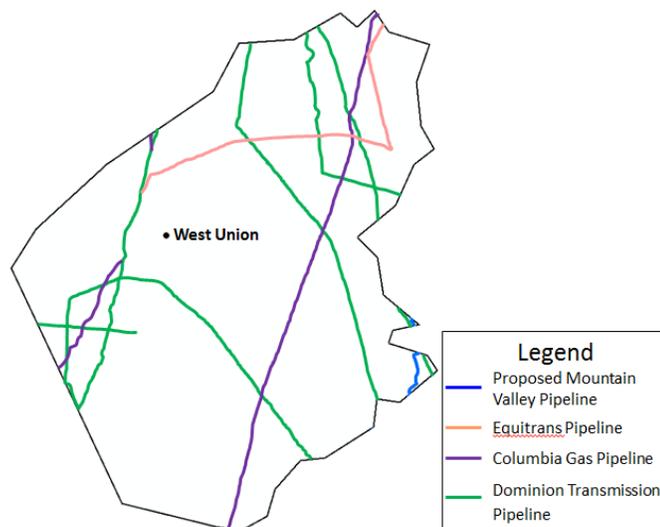
Due to native natural gas production, gas is the primary residential home heating source for the county as shown in Figure 22. Typically commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility. Peoples Gas serves West Union.

Figure 22 – Primary Space Heating Fuel Used in Doddridge County versus the State, Percentage of Housing Units⁵¹



All sectors could benefit significantly from the MVP pipeline as it would intersect the Dominion pipeline on the east side of the county (Figure 23). If connected with this pipeline, MVP could provide gas supply as native production declines.

Figure 23 – Doddridge County Natural Gas Pipeline Map



⁵¹ 2013 US Census Bureau 5 Year American Community Survey

3. Greenbrier

Economic Profile

Greenbrier County in West Virginia covers 1,025 square miles and is home to 35,644 residents. The county has a relatively strong economy. Its nominal GDP in 2014 was \$1.3 billion or \$36,472 per person.⁵² The real GDP declined by 1.5% from 2013 to 2014⁵³ compared to the U.S. GDP real growth of 2.4%⁵⁴ during the same period. Additionally, the county unemployment rate was 7.0% in 2014, compared to 6.5% in West Virginia and 6.2% nationally.

Lewisburg is the county seat and with 3,330 residents is the most populous city. Other cities include Ronceverte (pop. 1,765; five miles from Lewisburg), White Sulphur Springs (pop. 2,444; 10 miles from Lewisburg), and Fairlea (pop. 1,747; 2 miles from Lewisburg). The community of Maxwellton is home to the Rahall Technology and Business Center, a 137,000 square foot facility adjacent to the Greenbrier Valley Airport, and which the Greenbrier Chamber of Commerce describes as the eastern anchor of the I-64 technology corridor between Lewisburg, White Sulphur Springs, and Beckley. The Greenbrier Valley Economic Development Corporation (GVEDC) owns the facility in addition to the Fountain Springs business park in Monroe County and the Edray business park in Pocahontas County.

The county counted 1,108 employers in 2013 with total employment of 13,524 or 12.2 employees per employer.⁵⁵ Approximately 6% of the County residents work in manufacturing (see Table 11).

Table 11– Employment in Greenbrier County by Sector⁵⁶

Sector	Employment	Percent of Total Employment
Commercial	9,566	71%
Government	2,478	18%
Manufacturing	768	6%
Construction	368	3%
Resources and Mining	344	3%
Total	13,524	100%

⁵² National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁵³ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁵⁴ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file “gdp2q15_2nd.xls” Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁵⁵ Workforce WV. http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

⁵⁶ Ibid.

In Greenbrier County, manufacturing employs over 700 workers, representing 6% of the jobs in the county. Below are some of the largest manufacturers in the county:

- **ABB:** ABB is a large supplier of industrial motors and drives, generators for the wind industry, and power grids, with 145,000 employees worldwide. Its Lewisburg manufacturing center produces process automation instrumentation. The plant is 95,000 square feet and employs 160 people.
- **Mullican Flooring:** Mullican is a manufacturer of hardwood flooring products in Ronceverte, WV, with approximately 120 employees.

In Greenbrier County, the manufacturing sector provides a significant economic impact as shown in Table 12. Manufacturing wages are the second highest across all job sectors in the county (\$40,323 per year) and are 23% higher than the average wage in the county.

Table 12 – Annual Average Wages in Greenbrier County by Sector⁵⁷

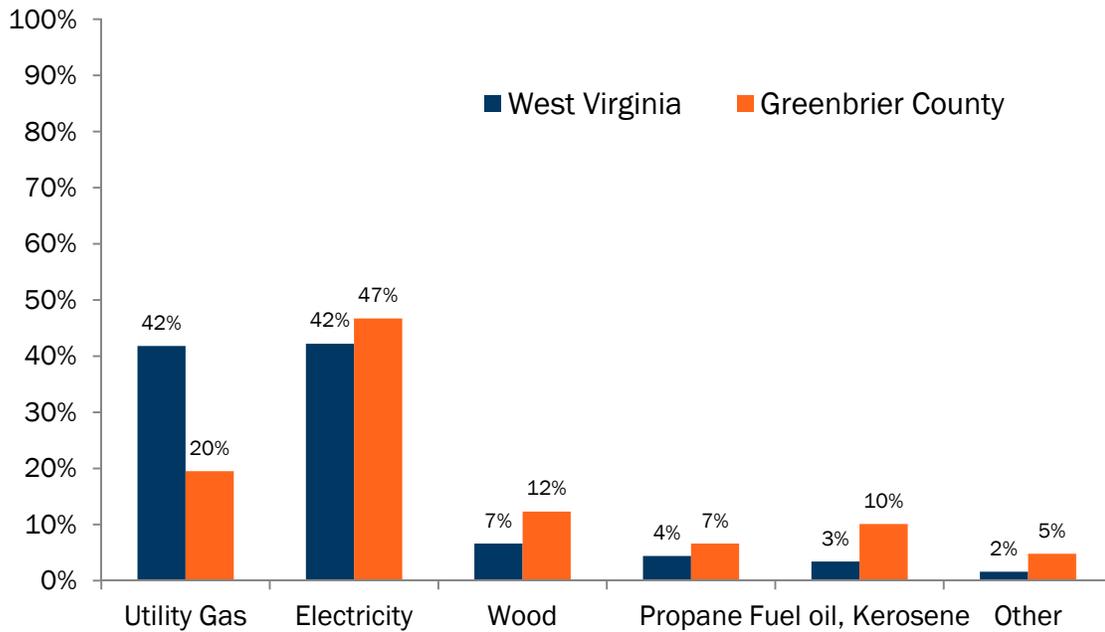
Sector	Average Annual Wage
Resources and Mining	\$59,974
Manufacturing	\$40,323
Government	\$35,973
Commercial	\$30,416
Construction	\$29,282
Weighted Average	\$32,718

Energy Profile

Residential, commercial, and municipal access to natural gas also is available in the larger towns. Homes in rural areas rely on wood, propane and fuel oil for heat. Overall residential natural gas usage in Greenbrier County is significantly lower than the rest of the state (See Figure 24).

⁵⁷ WorkForce WV. http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html

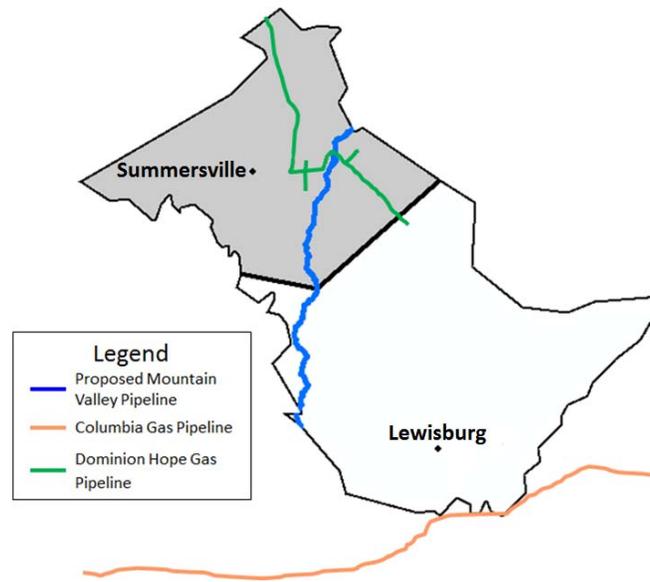
Figure 24 - Primary Space Heating Fuel Used in Greenbrier County versus the State, Percentage of Housing Units⁵⁸



The Mountain Valley pipeline is currently planned to traverse the western section of the county. Most the towns and businesses are in the Lewisburg area and toward the eastern border. The pipeline could bring natural gas supply to the western portion of the county, which could enable economic growth. See Figure 25 below.

⁵⁸ 2013 US Census Bureau 5 Year American Community Survey.

Figure 25 – Greenbrier County Natural Gas Pipeline Map



Outside of Lewisburg, The Greenbrier resort in White Sulphur Springs is one of the largest commercial consumers of electricity and natural gas in the county and the state. The complex includes 710 bedrooms, 9 restaurants and a casino. Due to its size, the resort buys its natural gas from wholesale marketing company. It then pays a transport charge to deliver the gas. Additional gas supply in Greenbrier County would be welcomed by the resort.

For the manufacturing sector in Greenbrier County, the primary fuel sources are electricity and natural gas. Natural gas is used mainly for heating. The manufacturing facilities are located where natural gas sources are available, so there is no fuel switching potential.

4. Harrison

Economic Profile

Harrison County is a 417 square-mile county located in north-central West Virginia with a population of approximately 69,000 and has a household count of approximately 27,900. The county has a strong economy. Its nominal GDP in 2013 was \$4.2 billion or \$60,900 per person.⁵⁹ The real GDP declined by 0.3% from 2013 to 2014⁶⁰ compared to the U.S. GDP real growth of 2.4%⁶¹ during the same time period. Additionally, the county unemployment rate was 5.2% in 2014, compared to 6.5% in West Virginia and 6.2% nationally.

Clarksburg is the largest town with a population of 16,360 and is also the county seat, followed by Bridgeport (pop. 8,149) and then Shinnston (pop. 2,186). Together these three towns and cities represent approximately 40% of the county's population.

The county counted 2,091 employers in 2013 with total employment of 34,881 or 16.7 employees per employer.⁶² A majority of the county employment is in the commercial and government sectors (86%). Approximately 6% of the County residents work in manufacturing as shown in Table 13.

Table 13 – Employment in Harrison County by Sector⁶³

Sector	Employment	Percent of Total Employment
Commercial	22,048	63%
Government	7,965	23%
Manufacturing	2,097	6%
Construction	1,702	5%
Resources and Mining	1,069	3%
Total	34,881	100%

In Harrison County, the economic impact of manufacturing jobs is clear. As Table 14 shows, manufacturing wages are the second highest across all job sectors in the county (\$57,944 per year) and are 35% higher than the average wage in the County.

⁵⁹ "County Tracker 2013 – Harrison County, WV," National Association of Counties, January 2014.

⁶⁰ Ibid.

⁶¹ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁶² WorkForce WP: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html; FTI analysis.

⁶³ Ibid.

Table 14– Annual Average Wages in Harrison County by Sector⁶⁴

Sector	Average Annual Wage
Resources and Mining	\$83,048
Manufacturing	\$57,944
Government	\$54,172
Construction	\$52,844
Commercial	\$34,899
Weighted Average	\$43,036

In Harrison County, manufacturing employs over 2,000 workers, representing 6% of the jobs in the county. The primary fuel sources for Harrison County manufacturers are electricity and natural gas. Below are some of the largest manufacturers in the county:

- **Aurora Flight Services:** the company develops and manufactures advanced unmanned systems and aerospace vehicles. In Bridgeport, the shop fabricates and assembles composites and metal aerostructures.
- **Bombardier Services Corporation:** The privately-held company does business in Bridgeport, WV, as the West Virginia Air Center, a modern, 125,000 square foot facility where it employs 400 people to perform airline maintenance, repair, and overhaul services.
- **EuropTec:** a manufacturer of acid etched anti-glare glass, EagleEtch®, and a specialist in glass processing and fabrication for the display industry. It employs approximately 60 people.
- **Graftech:** The privately-held company has a facility in Anmoore, WV, where it produces specialty carbon and graphite products through a baking process in natural gas-fired, high temperature ovens and electrically heated furnaces from raw materials consisting of petroleum coke and coal tar pitch.
- **Pratt & Whitney Engine Services (PWES):** The company provides aerospace and manufacturing jobs to 400 employees at its overhaul and repair facility in Bridgeport, WV. In 1988 and 1999, PWES expanded its operations by adding 123,000 square feet, bringing the overall size to 200,000 square feet. Additionally, in 1997, the Joint Primary Aircraft Training System (JPATS) Program began in Bridgeport. New JPATS engines are assembled and tested and the overhaul and repair of the engines are completed at the Bridgeport facility. These engines directly support the aircraft that are used to train new U.S. Air Force and Navy pilots.

⁶⁴ WorkForce WP: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html; FTI analysis.

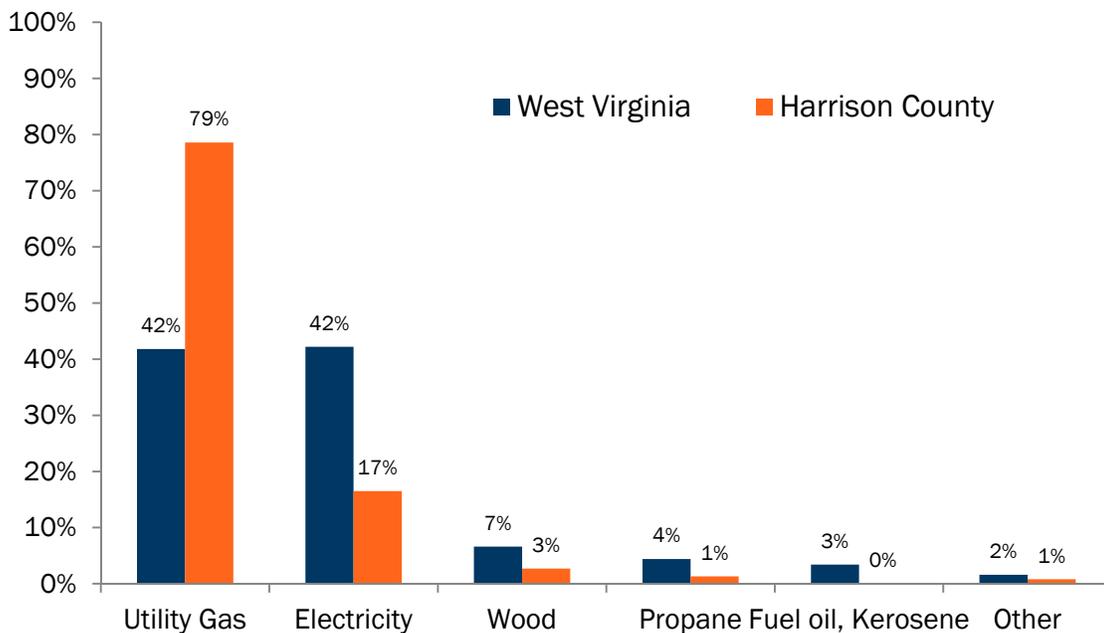
- Stockmeier Urethanes:** a German company that produces polyurethane products such as sport surfaces, weather-resistant elastomers for roofs, parking decks and trucks, structural adhesives, casting resins for cable, electrical and technical applications, and ancillary products such as cleaners and catalysts. The Clarksburg facility is a blending facility that employs approximately 15 people.

PWES, Bombardier, and Aurora are situated at the Mid-Atlantic Aerospace Complex located at the North Central West Virginia Airport, which is adjacent to I-279. The average annual salary for the 650 employees in the aerospace industry in Harrison County is \$72,000. This park has natural gas access provided by Dominion Hope.

Energy Profile

Natural gas is the main residential home heating sources for the county (see Figure 26). We understand that a large portion of households in populated areas use natural gas as their primary fuel source for home and water heating. Typically, commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility. We confirmed that twenty-four schools in the Harrison County system are served by natural gas from Dominion Hope.

Figure 26 – Primary Space Heating Fuel Used in Harrison County versus the State, Percentage of Housing Units⁶⁵

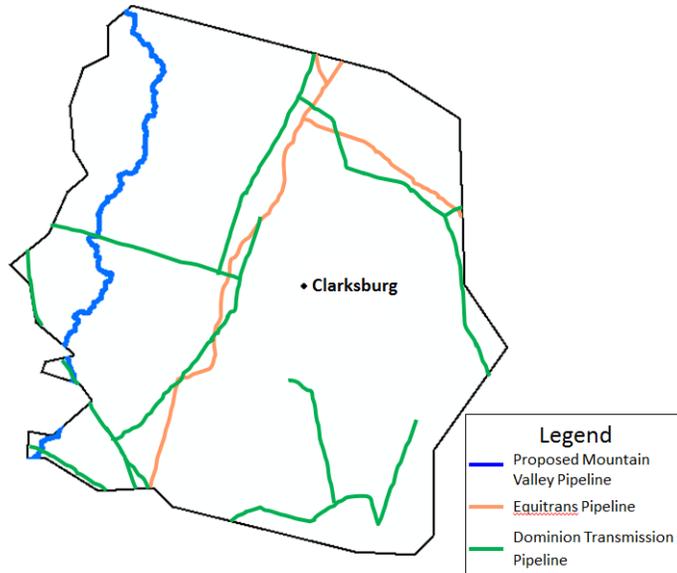


The residential, commercial, and municipal sectors could benefit significantly from the MVP pipeline as it would intersect the Dominion pipelines on the west side of the county as shown in Figure 27.

⁶⁵ 2013 US Census Bureau 5 Year American Community Survey

The MVP pipeline, if connected with this pipeline, could provide gas supply to Harrison County consumers as native production declines.

Figure 27 – Harrison County Natural Gas Pipeline Map



5. Lewis

Economic Profile

Lewis County is a 390 square-mile county located in north-central West Virginia at the crossroads of Interstate 79 and U.S. 33. It has a population of approximately 16,500 with a household count of approximately 6,900. The county has a strong economy. Its nominal GDP in 2014 was \$1.2 billion or \$72,939 per person.⁶⁶ The real GDP grew by 4.6% from 2013 to 2014⁶⁷ compared to the U.S. GDP real growth of 2.4%⁶⁸ during the same time period. Additionally, the county unemployment rate was 5.4% in 2014, compared to 6.5% in West Virginia and 6.2% nationally.

Weston is the county seat with a population of 4,110. There is also the small town of Jane Lew with a population of around 400. Together these areas represent approximately 27% of the county's population.

The county counted 482 employers in 2013 with total employment of 7,120 or 14.8 employees per employer.⁶⁹ A large portion of the county employment is in the commercial and government sectors (71%). Within Medical care for central West Virginians is today one of the county's chief sources of employment and income.⁷⁰

Resources and mining, the second largest sector, is focused completely on gas development, which has been a growth sector for the county. Approximately 3% of the County residents work in manufacturing as shown in Table 15.

Table 15 – Employment in Lewis County by Sector⁷¹

Sector	Employment	Percent of Total Employment
Commercial	3,647	51%
Resources and Mining	1,530	21%
Government	1,450	20%
Construction	270	4%
Manufacturing	223	3%
Total	7,120	100%

⁶⁶ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁶⁷ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁶⁸ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁶⁹ WorkForce WV: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

⁷⁰ <http://www.wvencyclopedia.org/articles/1362>

⁷¹ WorkForce WP: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

Viking Pools, which manufactures hot tubs, spas and whirlpool baths, represents the primary manufacturing employer in Lewis County. Tamarack Log Homes (which is classified as construction, but could be considered quasi-manufacturing) is another large employer. Both are located at the industrial park near the Jane Lew exit of I-79.

The annual average wages for the construction and manufacturing sectors in Lewis County range from \$41,200 to \$45,100 as shown in Table 16, which is around the average for the county and is well below the annual average salary of \$72,000 at the more high-end manufacturing facilities of Bombardier and Pratt & Whitney in Harrison County.

Table 16– Annual Average Wages in Lewis County by Sector⁷²

Sector	Average Annual Wage
Resources and Mining	\$77,305
Construction	\$45,087
Manufacturing	\$41,174
Government	\$35,641
Commercial	\$33,896
Weighted Average	\$44,231

The primary growth sector for Lewis County in recent years has been the oil and gas sub-sector under Resources and Mining. The county has become an operational hub for many companies involved in Marcellus Shale development. Companies such as Nexus Drilling, Chesapeake Energy, and Superior Well Services have expanded operations significantly, employing approximately 1,500 people or 20% of the workforce in the county. The average wage for oil and gas extraction employees in Lewis County has been ~\$77,300. It is worth noting that Lewis County now has the third lowest unemployment in the state after Monongalia and Jefferson counties.

This boon has been helpful in offsetting manufacturing decline. In 2013 Halliburton shut down their cement plant operations in Weston, WV, and moved it 150 miles away to Zanesville, OH. The company had employed approximately 75 people.

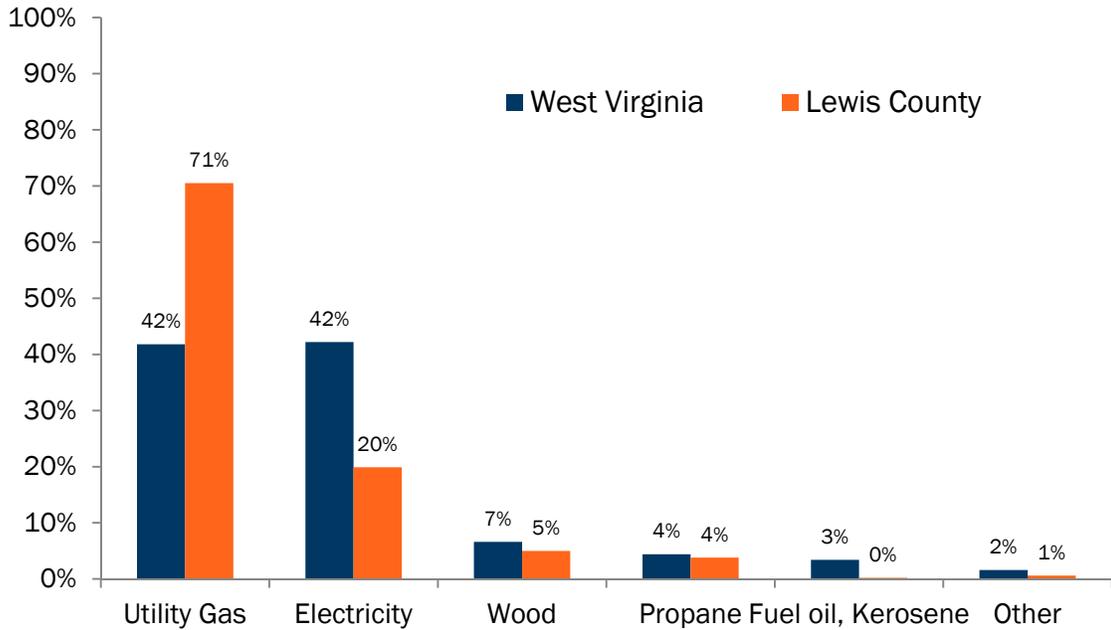
Energy Profile

Large quantities of oil and natural gas were found around 1900 in Lewis County, which created a manufacturing boom. The gas attracted several glass manufacturers to the county. Gas production is still a major part of the county's profile, and production continues in the Weston and Jane Lew areas.

⁷² WorkForce WP: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html; FTI analysis.

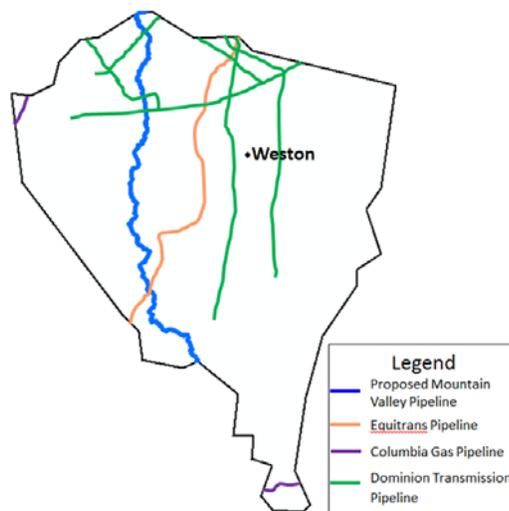
Due to native natural gas production, gas is the primary residential home heating source for the county as shown in Figure 28. Typically commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility. Dominion Hope serves these towns.

Figure 28 – Primary Space Heating Fuel Used in Lewis County versus the State, Percentage of Housing Units⁷³



All economic sectors could benefit significantly from the MVP pipeline as it would overlap with the Equitrans and Dominion Pipelines as shown in Figure 29. The MVP pipeline, if connected, could provide additional gas supply to Lewis County consumers as native production declines.

Figure 29 – Lewis County Natural Gas Pipeline Map



⁷³ 2013 US Census Bureau 5 Year American Community Survey

6. Monroe

Economic Profile

Monroe County is a 474 square-mile county located in West Virginia with a population of 13,483. Its nominal GDP in 2014 was \$190 million or \$14,107 per person.⁷⁴ The county has had a relatively underperforming economy. The real GDP declined by 1.2% from 2013 to 2014⁷⁵ compared to the U.S. GDP real growth of 2.4%⁷⁶ during the same time period; however, the country unemployment rate was 5.6% in 2014, compared to 6.5% in West Virginia and 6.2% nationally.

Union is the county seat and has a population of 565, Alderson, which is 40 miles from Union, is the largest town with a population of 1,184. Peterstown, 25 miles from Union, has a population of 653. Together these three towns represent 18% of the county's population.

Monroe County is primarily a farming county, with a mix of livestock (cattle, dairy, and sheep) and crop farming (hay, corn, oats, wheat, and tobacco). Timber is also a major contributor to the economy.⁷⁷

The county counted 230 employers in 2013 with total employment of 1,888 or 8.2 employees per employer.⁷⁸ Monroe only has one major employer, UTC Aerospace, which represents approximately 21% of the jobs in the county (see Table 17).

Table 17 – Employment in Monroe County by Sector⁷⁹

Sector	Employment	Percent of Total Employment
Government	718	38%
Commercial	617	33%
Manufacturing	400	21%
Construction	111	6%
Resources and Mining	42	2%
Total	1,888	100%

⁷⁴ National Association of Counties. <http://www.uscounties.forg/countyTracker/index.html>

⁷⁵ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁷⁶ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁷⁷ <http://www.wvencyclopedia.org/articles/2024>

⁷⁸ Workforce WV. <http://www.workforcewv.org/lmi/EandWAnnual/ew13cnty025.html>.

⁷⁹ Workforce WV. <http://www.workforcewv.org/lmi/EandWAnnual/ew13cnty025.html>.

UTC, formerly Goodrich, is a global supplier of systems and services for the aerospace and defense industries and is located in Union. The facility is 140,000 square feet, and it is powered by a combination of electricity and natural gas. The other major employer in the county is M-Rock, which is a stone and brick designer and manufacturer in Peterstown, WV, and employs 25 people and has annual revenue of \$1M.

The manufacturing sector provides the highest average annual wage in Monroe County (see Table 18).

Table 18 – Annual Average Wages in Monroe County by Sector^{80,81}

Sector	Average Annual Wage
Manufacturing	\$50,000
Government	\$41,120
Construction	\$29,283
Resources and Mining	\$26,426
Commercial	\$20,959
Weighted Average	\$34,573

There are a number of county residents who work outside the county at The Greenbrier resort at White Sulphur Springs, the Celanese plant in Narrows, Virginia, and MeadWestvaco plant in Covington, Virginia.⁸²

Energy Profile

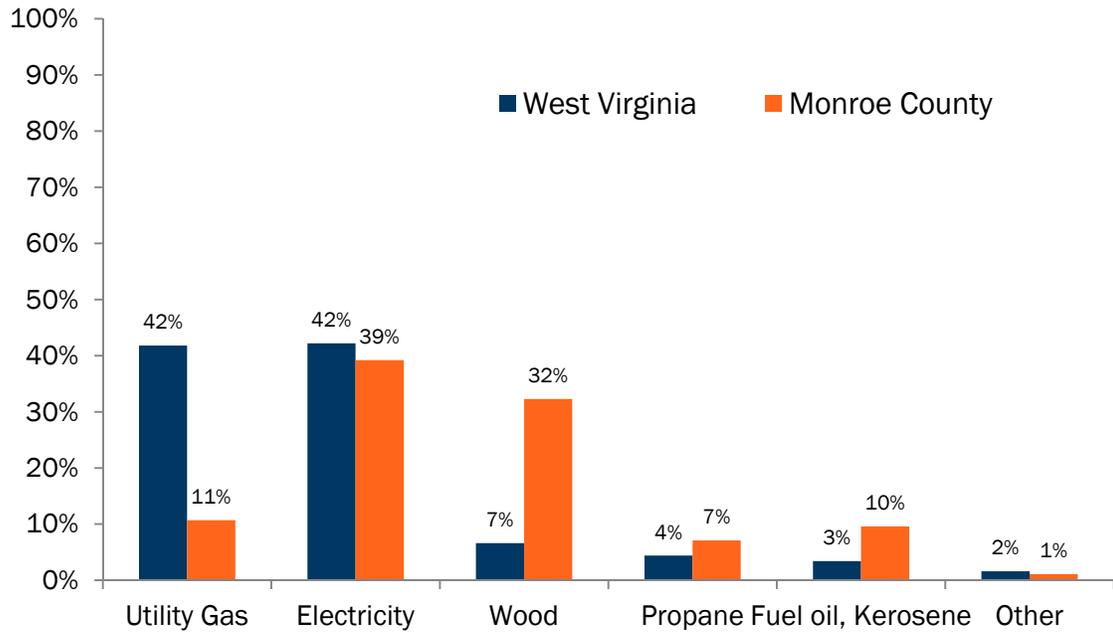
Electricity and wood are the main residential home heating sources for the county (see Figure 30). Typically, commercial and municipal buildings follow the same pattern since fuel choice often is driven by accessibility so there is ample opportunity for switching to natural gas with potential access in the county. Monroe only has natural gas service in the small towns of Union and Petersburg.

⁸⁰ Workforce WV. <http://www.workforcewv.org/Imj/EandWAnnual/ew13cnty025.html>.

⁸¹ We assumed \$50,000 for the UTC manufacturing facility in Monroe that employs approximately 400 people because data for UTC was not available. This is a conservative assumption, relative to the \$72,000 average wage for aerospace jobs in Harrison County.

⁸² <http://www.wvencyclopedia.org/articles/2024>

Figure 30 – Primary Space Heating Fuel Used in Monroe County versus the State, Percentage of Housing Units⁸³



While there is a Columbia Gas pipeline that runs east-west through the county, most of the communities in the county do not have gas access or have very limited gas access.⁸⁴ It is possible that the residential, commercial, and municipal sectors could benefit significantly from the MVP pipeline as it would intersect with the Columbia Gas Pipeline on the west side of the county as shown in Figure 31.

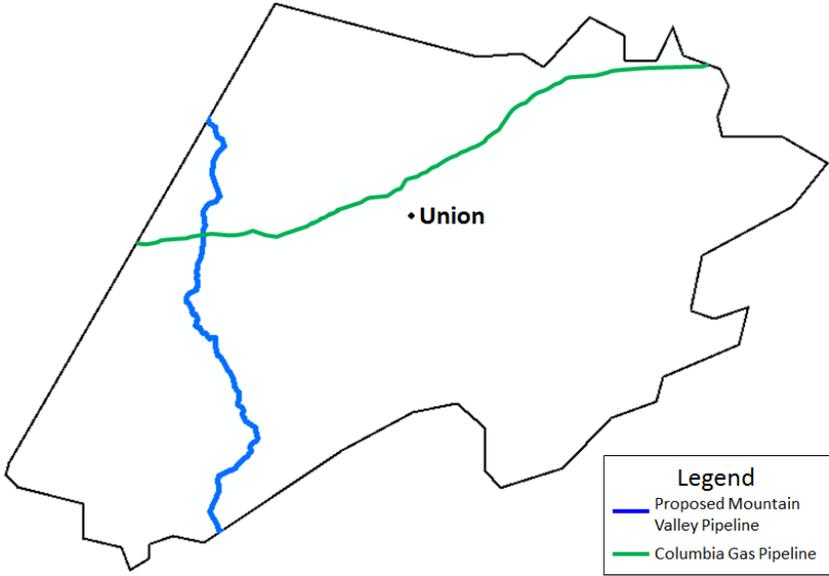
The MVP pipeline could provide access to existing manufacturers if connected to the existing Columbia Gas pipeline.

Two of the schools in the county are heated using natural gas. The other two schools, both located in Peterstown, are heated using electricity. They are within the service area for natural gas, but they are older buildings that have always used electricity.

⁸³ 2013 US Census Bureau 5 Year American Community Survey

⁸⁴ Interviews with Monroe county officials indicated that part of Peterson is served by Mountaineer and that other towns likely do not have gas access.

Figure 31 – Monroe County Pipelines – Existing and Proposed



7. Nicholas

Economic Profile

Nicholas County is a 654 square-mile county located in the center of West Virginia. It has a population of approximately 26,000. The county has had an underperforming economy. Its nominal GDP in 2014 was \$937 million or \$36,072 per person.⁸⁵ The real GDP grew by 1.4% from 2013 to 2014⁸⁶ compared to the U.S. GDP real growth of 2.4%⁸⁷ during the same time period. Additionally, the county unemployment rate has been high – 9.0% in 2014 compared to 6.5% in West Virginia and 6.2% nationally.⁸⁸

Summersville is the largest town with a population of 3,572 and is also the county seat. Richwood, 25 miles to the east, has a population of 2,051. Together these two towns represent approximately 20% of the county's population.

The county counted 711 employers in 2013 with total employment of 7,983 or 11.2 employees per employer.⁸⁹ A large portion of the county employment is in the commercial and government sectors (79%) as shown in Table 19.

Table 19 – Employment in Nicholas County by Sector⁹⁰

Sector	Employment	Percent of Total Employment
Commercial	4,539	57%
Government	1,746	22%
Manufacturing	741	9%
Resources and Mining	700	9%
Construction	257	3%
Total	7,983	100%

Approximately 9% of the County residents work in manufacturing. Below are the largest manufacturers in the county:

⁸⁵ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁸⁶ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁸⁷ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file “gdp2q15_2nd.xls” Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁸⁸ Bureau of Labor Statistics

⁸⁹ Workforce WV. <http://www.workforcewv.org/lmi/EandWAnnual/ew13cnty025.html>.

⁹⁰ Workforce WV. <http://www.workforcewv.org/lmi/EandWAnnual/ew13cnty025.html>.

- **B/E Aerospace:** the company is a manufacturer of aircraft cabin interior products and a leading provider of aerospace fasteners, consumables, and logistics services. This is a global company with its De-Icing Systems location in Fenwick, WV. The facility employs approximately 160 people.
- **Columbia Forest Products:** the company is North America's largest manufacturer of hardwood plywood and hardwood veneer products, with a manufacturing location in Craigsville, WV. The facility employs approximately 380 people.

Together, Columbia Wood Products and B/E Aerospace the companies employ approximately 70% of those employed in the county's manufacturing sector.

Manufacturing has had a significant economic impact In Nicholas County. As Table 20 shows, manufacturing wages are the second highest across all job sectors in the county (\$46,434 per year) and are 30% higher than the average wage in the County.

Table 20 – Annual Average Wages in Nicholas County by Sector⁹¹

Sector	Average Annual Wage
Resources and Mining	\$70,155
Manufacturing	\$46,434
Government	\$39,355
Construction	\$34,554
Commercial	\$27,133
Weighted Average	\$35,609

Outside of the manufacturing sector, Nicholas County is known for economic resources including bituminous coal, limestone quarries, timber, fruit farms, tobacco, and livestock.⁹²

Within the residential, commercial, and municipal sectors, we identified a few fuel switching opportunities. Two schools use coal boilers for space heating and water heating, and one school uses propane.

⁹¹ Workforce WV. <http://www.workforcewv.org/lmi/EandWAnnual/ew13cnty025.html>.

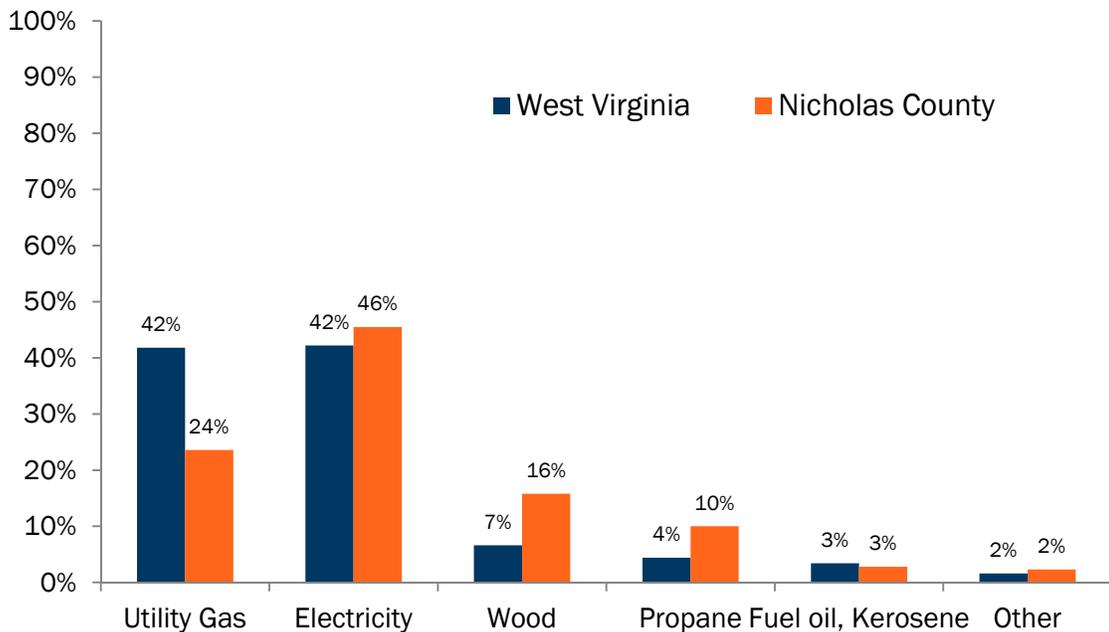
⁹² <http://www.wvencyclopedia.org/articles/1670>

Energy Profile

There is a surprising amount of gas accessibility in Nicholas County given its low population density. The gas source for Summersville and Richwood is from West Virginia gas productions wells (native supply).

Electricity is the main residential home heating source for the county as shown in Figure 32, and it is mainly used a heating source outside of Summersville and Richwood. It is worth noting that Nicholas County is home to the Summersville Hydroelectric Project – an 80 MW hydro plant that generates 220 gigawatt hours annually.

Figure 32 – Primary Space Heating Fuel Used in Nicholas County versus the State, Percentage of Housing Units⁹³

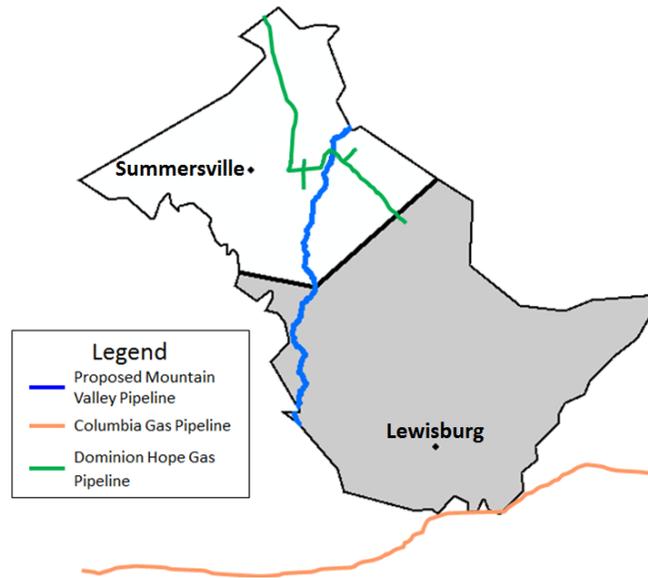


Within Summersville and Richwood, a large portion of households use natural gas as their primary fuel source for home and water heating. Typically, commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility. Dominion Hope is the utility serving these towns.

The residential, commercial, and municipal sectors could benefit significantly from the MVP pipeline as it would intersect with the Dominion Hope pipeline near the center of the county as shown in Figure 33. The MVP pipeline, if connected with these pipelines, could provide additional gas supply to Nicholas County consumers as native production declines.

⁹³ 2013 US Census Bureau 5 Year American Community Survey.

Figure 33 – Nicholas County Natural Gas Pipeline Map



For the manufacturing sector, the primary fuel source is electricity with some natural gas used for process heat and steam.

8. Summers

Economic Profile

Summers County is a 368 square-mile county located in south-east West Virginia with a population of 13,563 and has a household count of approximately 5,500. Its nominal GDP in 2014 was \$221 million or \$16,316 per person.⁹⁴ The real GDP shrunk by 1.9% from 2013 to 2014⁹⁵ compared to the U.S. GDP real growth of 2.4%⁹⁶ during the same time period. Additionally, the county unemployment rate was 7.4% in 2014, compared to 6.5% in West Virginia and 6.2% nationally.

Hinton is the county seat and largest city with a population of 2,676 and represents 20% of the county population.

Summers has been challenged with economic growth, starting in the 1950s when a combination of factors led to the decline of the local economy. These factors included technology changes in coal mining, the depletion of older mines, no viable local manufacture of coking coal, and the replacement of the coal-fired locomotives with diesel-fired locomotives.

Other economic challenges in Summers County include terrain and infrastructure. Summers County is a mountainous county. The flat areas, where manufacturers would want to locate, typically are along the rivers and are considered flood plains. For infrastructure, there is no interstate highway that runs through the county, which has limited the county's development. There is, though, the main rail line for CSX that runs from Chicago to Washington, D.C. It runs through Hinton and then Alderson.

The county counted 193 employers in 2013 with total employment of 2,091 or 10.8 employees per employer.⁹⁷ A large portion of the county employment is in the commercial and government sectors (93%). Approximately 1% of the County residents work in manufacturing as shown in Table 21.

Table 21 – Employment in Summers County by Sector⁹⁸

Sector	Employment	Percent of Total Employment
Commercial	1,174	56%
Government	779	37%
Construction	83	4%
Resources and Mining	32	2%
Manufacturing	23	1%
Total	2,091	100%

⁹⁴ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁹⁵ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁹⁶ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁹⁷ WorkForce WV: http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html

⁹⁸ WorkForce WV: http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html

Summers County has a small manufacturing sector. The annual average wages for the manufacturing sector is \$21,593 as shown in Table 22, which is lower than the average for the county.

Table 22– Annual Average Wages in Summers County by Sector⁹⁹

Sector	Average Annual Wage
Construction	\$39,293
Commercial	\$27,955
Government	\$27,695
Manufacturing	\$21,593
Resources and Mining	\$18,176
Weighted Average	\$28,089

The planned route of the MVP pipeline in the northeastern portion of the county is near Alderson, which is just outside the county on the border of Monroe and Greenbrier counties. Alderson is 5.5 miles from the planned route, and the intersection of the pipeline path and existing rail infrastructure could enable some manufacturing development in the northeastern part of the county.

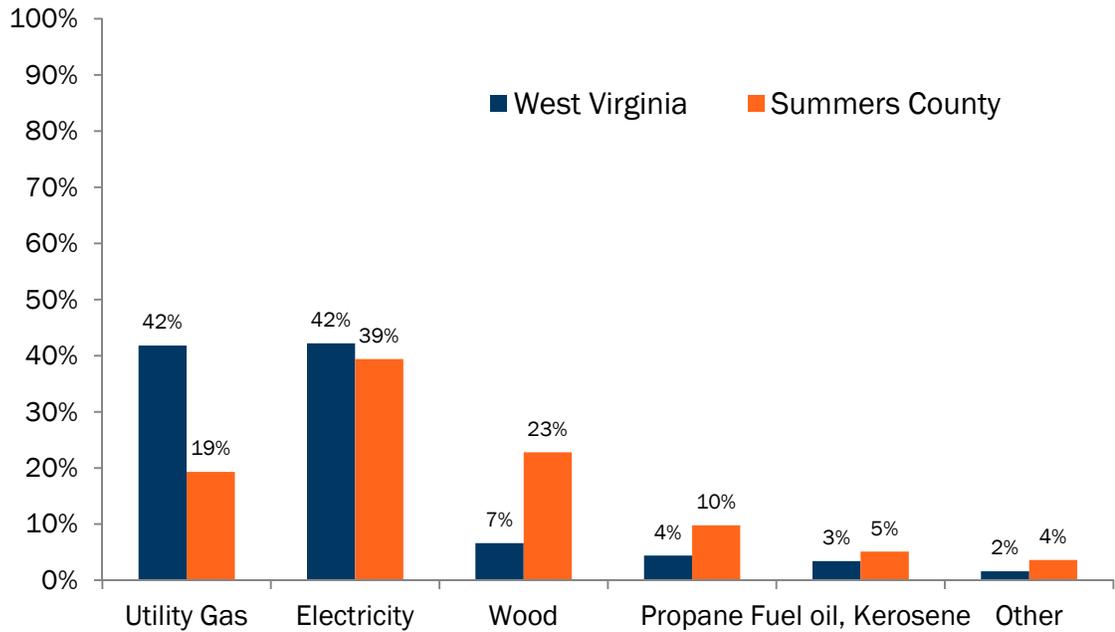
Energy Profile

Summers County has limited amounts of natural gas production and this production has been declining over the years.¹⁰⁰ Electricity is the primary residential home heating source for the county as shown in Figure 34. Mountaineer Gas serves the town of Hinton via the interstate Columbia Gas line, but other parts of the county do not have access to natural gas.

⁹⁹ WorkForce WP: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html; FTI analysis.

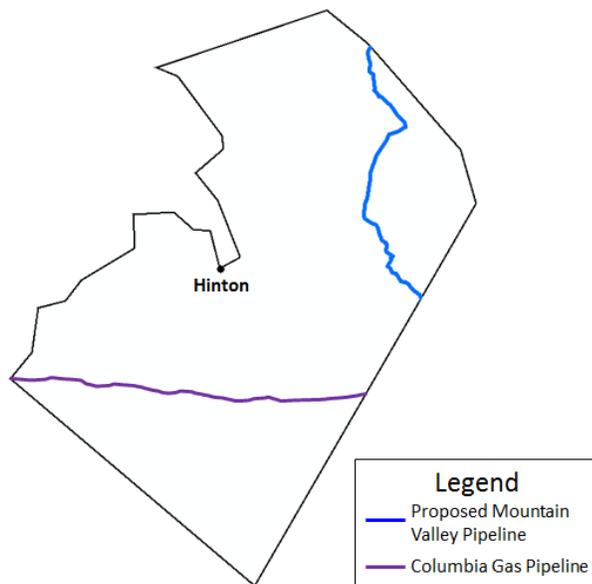
¹⁰⁰ <http://www.drillingedge.com/west-virginia/summers-county>

Figure 34 – Primary Space Heating Fuel Used in Summers County versus the State, Percentage of Housing Units¹⁰¹



All sectors could benefit from the MVP. The pipeline could give access to the developing portions of the northeastern part of the county near Alderson (Figure 35). Alderson sits outside the county and straddles Monroe and Greenbrier Counties. Alderson is provided gas via the Columbia Gas pipeline with which the MVP project would intersect in Monroe County.

Figure 35 – Summers County Natural Gas Pipeline Map



¹⁰¹ 2013 US Census Bureau 5 Year American Community Survey.

9. Webster

Economic Profile

Webster County is a 556 square-mile county located in the center of West Virginia. It has a population of approximately 8,900 and has a household count of approximately 5,200. The county has had an underperforming economy. Its nominal GDP in 2013 was \$297 million or \$33,000 per person.¹⁰² The real GDP increased by 2.8% from 2013 to 2014¹⁰³ compared to the U.S. GDP real growth of 2.4%¹⁰⁴ during the same time period. Additionally, the county unemployment rate has been high – 11.3% in 2014 compared to 6.5% in West Virginia and 6.2% nationally.

Webster Springs is the largest town with a population of 776 and is also the county seat. Cowen is the second largest town in the county with a population of 541. Together these towns represent approximately 15% of the county's population.

Overall, the economic development in the county has been scattered. There is no major interstate that runs through the county. As such, infrastructure is primarily available along the Route 20 corridor, which runs from Camden-on-Gauley in the southern part of the county through, Cowen, Webster Springs, nearby Diana, and Cleveland on the northern part of the county.

Webster County has also been limited in terms of usable land for large commercial or manufacturing development. The Monongahela National Forest occupies the southeastern part of the county and Holly River State Park is located in the north of the county. Together, these parks consume about one-third of the county's acreage. The majority of useable raw land is located in the southwestern part of the county where post-mining land sites present possible development opportunities.

The county counted 198 employers in 2013 with total employment of 1,919 or 10 employees per employer.¹⁰⁵ The commercial and government sectors represent 69% of the employment in the county. Tourism represents a large portion of the commercial sector. Another 19% of the employment within the county is in the resources and mining sector, which comprises mainly timber production and coal mining. About 9% of the County residents work in manufacturing (see Table 23).

¹⁰² National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

¹⁰³ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

¹⁰⁴ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

¹⁰⁵ WorkForce WV: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

Table 23 – Employment in Webster County by Sector¹⁰⁶

Sector	Employment	Percent of Total Employment
Commercial	775	40%
Government	566	29%
Resources and Mining	373	19%
Manufacturing	181	9%
Construction	24	1%
Total	1,919	100%

Wood and lumber product manufacturing has a large presence in Webster. Allegheny Wood Products produces oriented strand board for the construction industry. Other companies include Northwest Hardwoods and the Jim C Hamer Company. Table 24 shows the average annual salary by sector.

Table 24 – Annual Average Wages in Webster County by Sector¹⁰⁷

Sector	Average Annual Wage
Resources and Mining	\$71,228
Government	\$35,894
Manufacturing	\$29,523
Construction	\$29,151
Commercial	\$23,815
Weighted Average	\$37,199

Cowen represents the best opportunity for Webster County to benefit from manufacturing and commercial development derived from the MVP project for the following reasons:

- The proposed MVP pipeline would be nearby (1.2 miles away)
- There are large tracts of usable land for commercial or manufacturing development
- The town has rail service

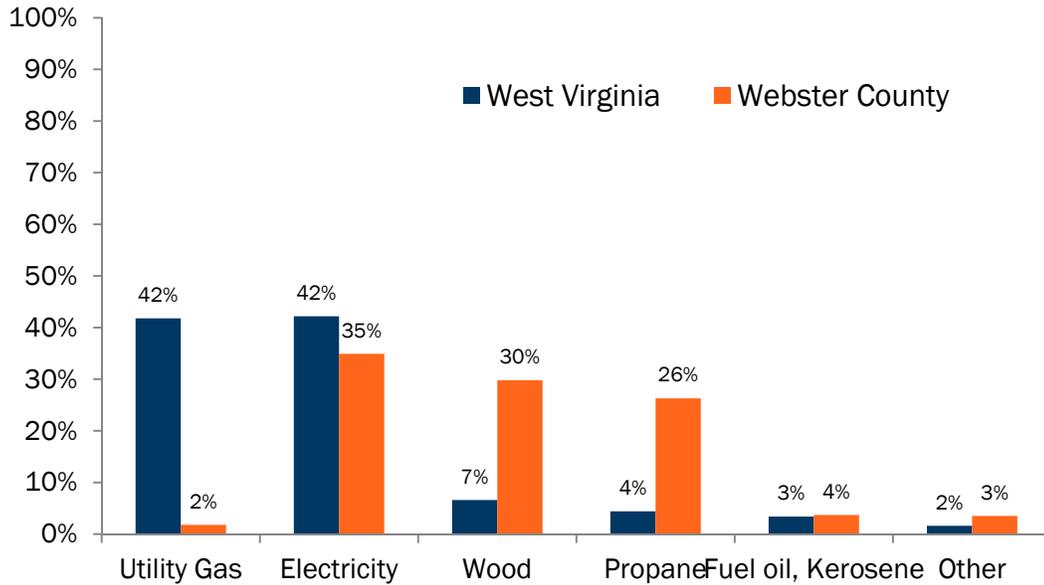
¹⁰⁶ WorkForce WV: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

¹⁰⁷ WorkForce WV: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html; FTI analysis.

Energy Profile

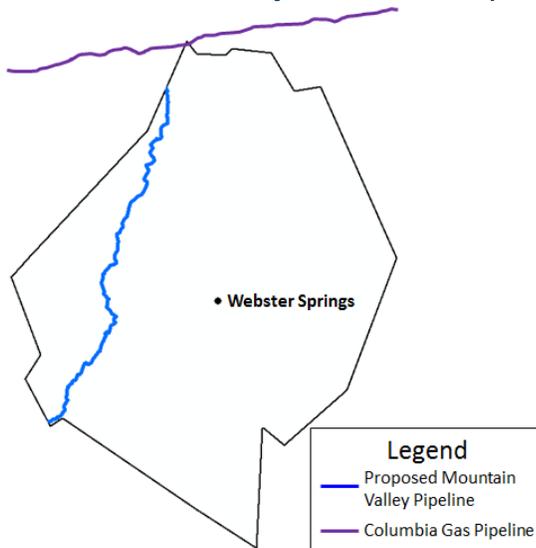
Currently there is no gas service in the county. Electricity, wood, and propane are the main residential home heating sources for the county as shown in Figure 36.

Figure 36 - Primary Space Heating Fuel Used in Webster County versus the State, Percentage of Housing Units¹⁰⁸



All sectors, particularly in Cowen and Camden-on-Gauly, could benefit from the MVP pipeline as it would run through the western part of the county (Figure 37).

Figure 37 - Webster County Natural Gas Pipeline Map



¹⁰⁸ 2013 US Census Bureau 5 Year American Community Survey.

10. Wetzel

Economic Profile

Wetzel County is a 361 square-mile county located in northern West Virginia. It has a population of approximately 16,200 with a household count of approximately 6,900. Its nominal GDP in 2013 was \$435 million or \$26,833 per person.¹⁰⁹ The real GDP declined by 1.4% from 2013 to 2014¹¹⁰ compared to the U.S. GDP real growth of 2.4%¹¹¹ during the same time period, although real GDP in Wetzel had grown by 10% the previous year. Additionally, the county unemployment rate has been high – 9.6% in 2014 compared to 6.5% in West Virginia and 6.2% nationally.

New Martinsville is the county seat with a population of 5,300. There is also Paden City with a population of more than 2,500, although the city is split between Wetzel County and Tyler County to the southwest. Together these cities represent approximately 40% of the county's population.

The economic development in the county is diverse. While no large industry is located within the county, many residents work at the nearby Bayer Corporation, PPG Industries (Natrium Plant near New Martinsville) or Ormet Aluminum Corporation. A commerce park is located in New Martinsville which serves as the hub of business activity for the region.

The county counted 419 employers in 2013 with total employment of 4,633 or 11 employees per employer.¹¹² A large portion of the county employment is in the commercial and government sectors (85%). The Wetzel County Board of Education employs more than 450 workers, and is the largest employer in the county. Only 3% of the County residents work in manufacturing (see Table 25).

Table 25 – Employment in Wetzel County by Sector¹¹³

Sector	Employment	Percent of Total Employment
Commercial	2,827	61%
Government	1,129	24%
Construction	424	9%
Manufacturing	130	3%
Resources and Mining	123	3%
Total	4,633	100%

¹⁰⁹ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

¹¹⁰ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>.

¹¹¹ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file “gdp2q15_2nd.xls” Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

¹¹² WorkForce WV: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

¹¹³ WorkForce WP: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

Natural gas is important to the county's economic growth. The resources and mining sector (primarily composed of oil and gas sub-sector) has an average annual wage of almost \$74,000 or 2.5 times more than the average county wage rate as shown in Table 26.

Table 26 – Annual Average Wages in Wetzel County by Sector¹¹⁴

Sector	Average Annual Wage
Resources and Mining	\$73,791
Construction	\$47,834
Government	\$34,831
Manufacturing	\$33,630
Commercial	\$23,223
Weighted Average	\$29,939

The drilling activity in Wetzel has led to a boom in government revenue with a large increase in tax revenue. Local property tax revenue has nearly tripled since 2005 with significant increases to severance tax revenue as well.¹¹⁵

Currently, most of the gas development jobs have gone to out-of-state workers where the industry is more developed and workers are more experienced. Wetzel County could benefit significantly by transitioning out-of-state workers to be re-located within the county. This would provide additional disposable income within the counties borders.

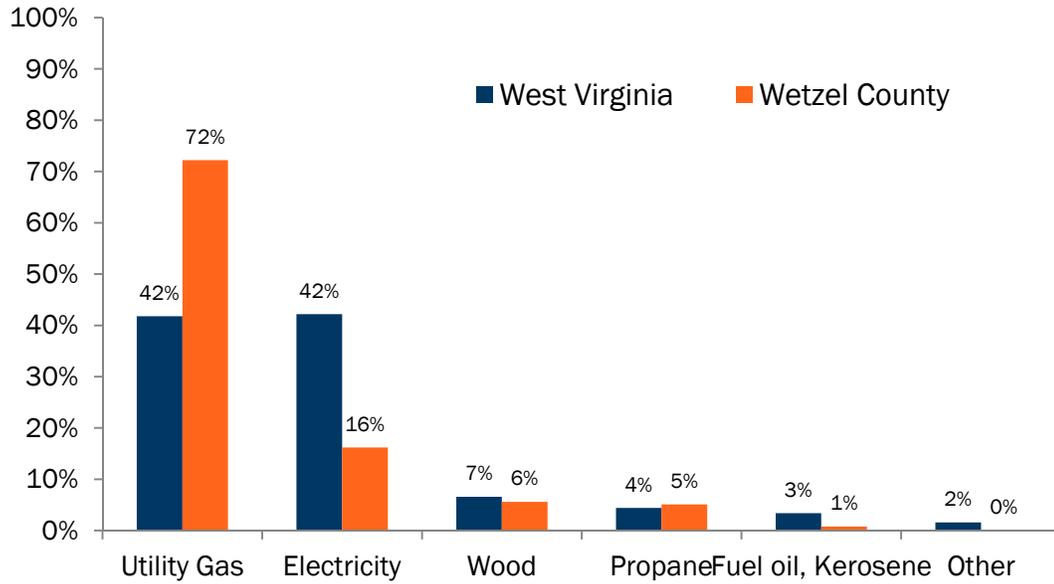
Energy Profile

Oil and gas exploration and development began with the drilling of the first gas well in Hundred in 1886. Oil and gas wells were also developed in Pine Grove, Smithfield, Folsom, and Proctor. Many of these wells continue to be active today. Due to native natural gas production, gas is the primary residential home heating source for the county as shown in Figure 38. Typically commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility. Mountaineer Gas Company serves New Martinsville while Dominion Hope serves the rest of Wetzel County.

¹¹⁴ WorkForce WP: http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html; FTI analysis.

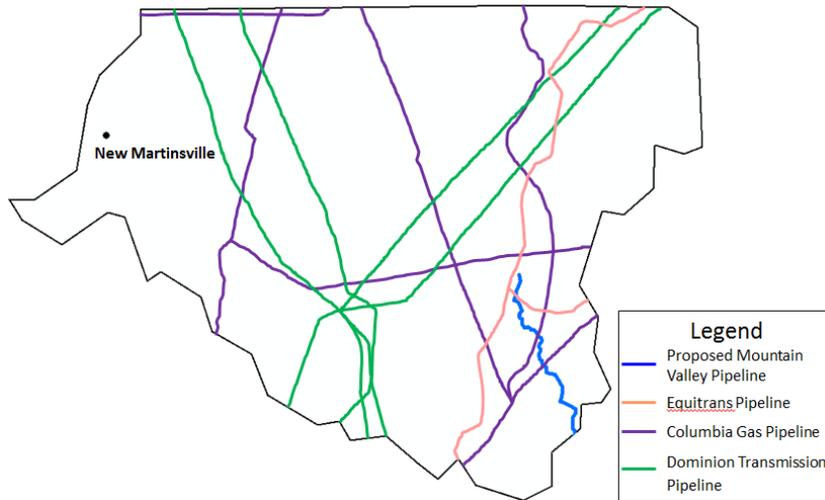
¹¹⁵ <http://www.wvpolicy.org/wp-content/uploads/2014/04/Impacts-of-Drilling-in-Wetzel-County.pdf>

Figure 38 – Primary Space Heating Fuel Used in Wetzel County versus the State, Percentage of Housing Units¹¹⁶



The residential, commercial, and municipal sectors could benefit significantly from the MVP pipeline as it would intersect the Columbia Gas and Equitrans pipelines in the southeastern part of the county, as shown in Figure 39. The MVP pipeline, if connected with these pipelines, could provide gas supply to additional Wetzel County consumers.

Figure 39 – Wetzel County Natural Gas Pipeline Map



It is worth noting that New Martinsville has its own electricity generating plant – the hydroelectric facility at Hannibal locks and dam – which produces 37 megawatts.¹¹⁷

¹¹⁶ 2013 US Census Bureau 5 Year American Community Survey.

11. Fayette

Economic Profile

Fayette County is a 668 square-mile county located in the center of West Virginia. It has a population of approximately 45,600 with a household count of approximately 17,000. Its nominal GDP in 2013 was \$1.3 billion or \$28,500 per person.¹¹⁸ The real GDP grew by 0.9% from 2013 to 2014¹¹⁹ compared to the U.S. GDP real growth of 2.4%¹²⁰ during the same time period. The county unemployment rate is higher than average – 7.7% in 2014 compared to 6.5% in West Virginia and 6.2% nationally.

Fayetteville is the county seat with a population of 2,900. Oak Hill is the largest city in the county, with a population of 7,700.

The economy of Fayette is diverse. It historically has been a coal mining area, and Kingston Mining is still one of its largest employers. The largest manufacturer is WVA Manufacturing in Alloy, a joint venture between Globe Specialty Metals and Dow Corning, which produces silicon metals. Fayette County also is home to the state's only maximum security prison, Mount Olive Correctional Complex.

The county counted 1,000 employers in 2013 with total employment of 11,525 or 11.5 employees per employer.¹²¹ A large portion of the county employment is in the commercial and government sectors (87%). The Fayette County Board of Education is the largest employer in the county. Only 4% of the County residents work in manufacturing (Table 27).

Table 27 – Employment in Fayette County by Sector¹²²

Sector	Employment	Percent of Total Employment
Commercial	6,806	59%
Government	3,233	28%
Resources and Mining	663	6%
Manufacturing	478	4%
Construction	345	3%
Total	11,525	100%

¹¹⁷ <http://www.wvencyclopedia.org/articles/1158>

¹¹⁸ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

¹¹⁹ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>.

¹²⁰ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file “gdp2q15_2Nd.xlsx” Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

¹²¹ WorkForce WV: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

¹²² WorkForce WP: http://www.workforcewv.org/lmi/Earnings_N_Wages/EnW.html

While the manufacturing sector in Fayette County is relatively small, the average wages are high, As Table 28 shows, manufacturing wages are the second highest across all job sectors in the county (\$55,999 per year) and are 59% higher than the average wage in the County.

Table 28 – Annual Average Wages in Fayette County by Sector¹²³

Sector	Average Annual Wage
Resources and Mining	\$77,720
Manufacturing	\$55,999
Government	\$36,252
Construction	\$32,852
Commercial	\$29,285
Weighted Average	\$35,285

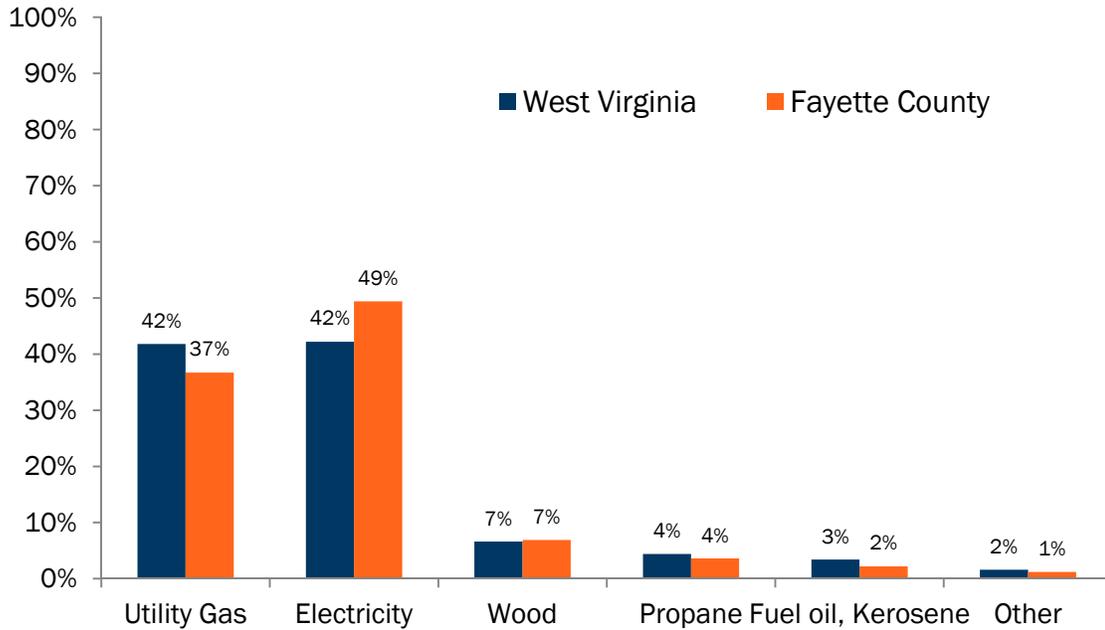
The Resources and Mining sector has the highest wages in the county, representing the historically strong coal mining industry in Fayette.

Energy Profile

There is a significant amount of gas accessibility in Fayette County. Natural gas and electricity are the main residential home heating sources for the county as shown in Figure 40. Typically, commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility. Natural gas usage in Fayette County is just below the average for the entire state of West Virginia. Dominion Hope serves the county with natural gas.

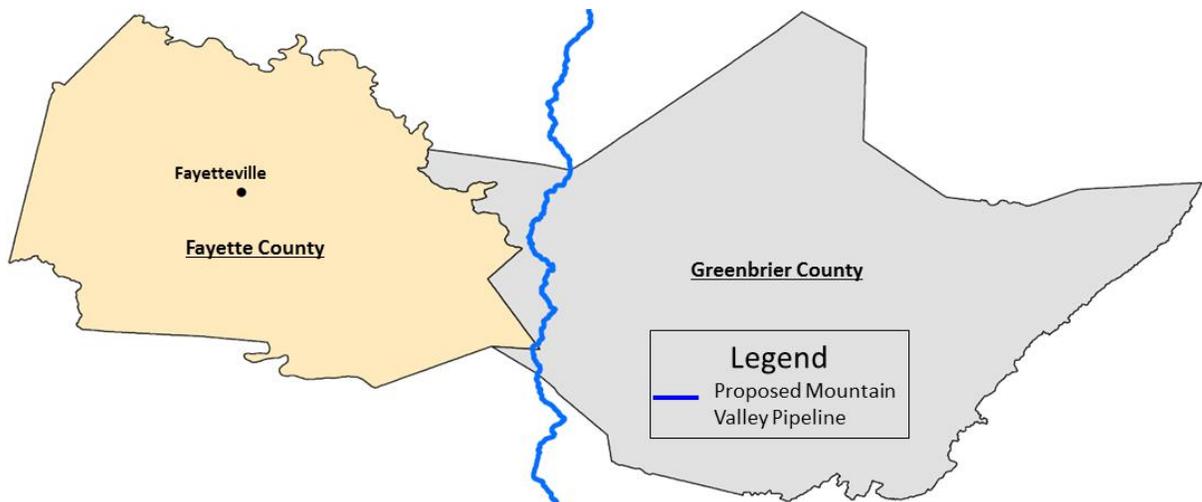
¹²³ WorkForce WP: http://www.workforcewv.org/Imi/Earnings_N_Wages/EnW.html; FTI analysis.

Figure 40 – Primary Space Heating Fuel Used in Fayette County versus the State, Percentage of Housing Units¹²⁴



The Mountain Valley pipeline is currently planned to traverse the eastern border of the county. Most the towns and businesses are in the central part of the county. The pipeline could expand natural gas supply to the eastern portion of the county, which could enable economic growth in that area (Error! Reference source not found.Figure 41).

Figure 41 – Fayette County Natural Gas Pipeline Map



¹²⁴ 2013 US Census Bureau 5 Year American Community Survey.



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About FTI Consulting

FTI Consulting, Inc. is a global business advisory firm dedicated to helping organizations protect and enhance enterprise value in an increasingly complex legal, regulatory and economic environment. FTI Consulting professionals, who are located in all major business centers throughout the world, work closely with clients to anticipate, illuminate and overcome complex business challenges in areas such as investigations, litigation, mergers and acquisitions, regulatory issues, reputation management and restructuring.

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OCTOBER 2, 2015



ECONOMIC BENEFITS OF THE MOUNTAIN VALLEY PIPELINE PROJECT IN VIRGINIA

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DISCLAIMER

The information contained herein has been prepared based upon financial and other data provided to FTI from the management and staff of EQT Corporation and from public sources. There is no assurance by anyone that this information is accurate or complete. FTI has not subjected the information contained herein to an audit in accordance with generally accepted auditing standards. Accordingly, FTI cannot express an opinion or any other form of assurance on, and assumes no responsibility for, the accuracy or correctness of the historical information or the completeness and achievability of the projected financial data, information and assessments upon which the enclosed report is presented.

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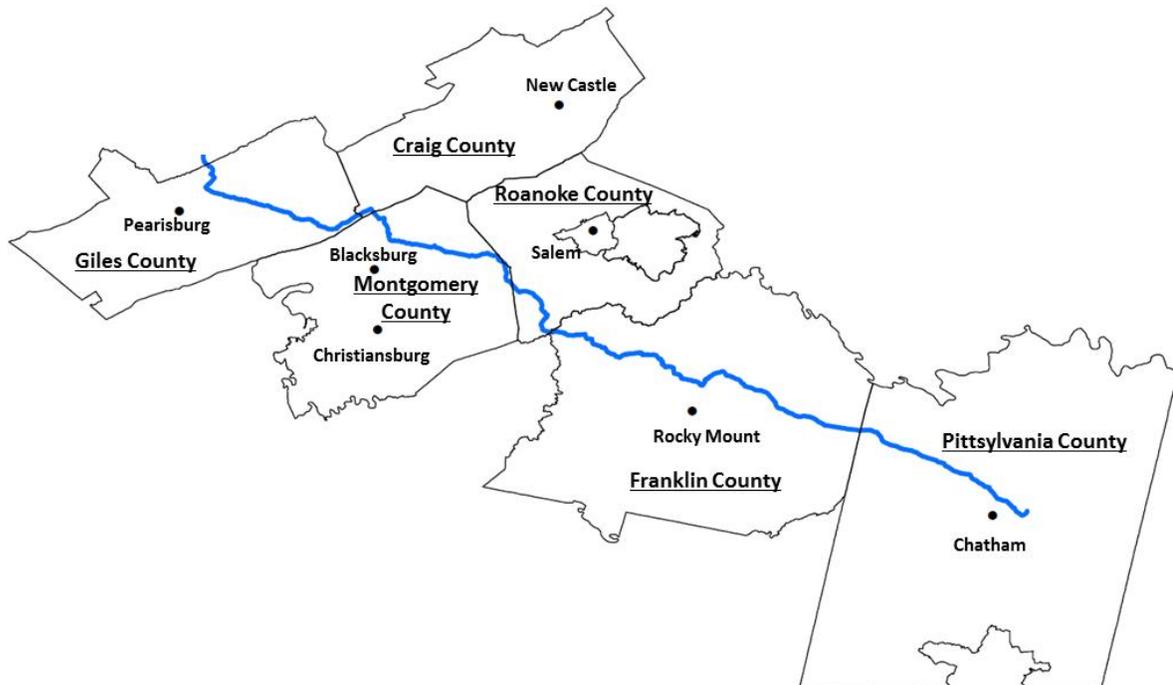
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Executive Summary

EQT Corporation retained FTI Consulting (“FTI”) to examine the potential economic benefits of the Mountain Valley Pipeline (“MVP”) project to the Commonwealth of Virginia and the six counties through which the project is proposed. The MVP is a natural gas pipeline that will traverse approximately 300 miles across West Virginia and Virginia, including the Virginia counties of Craig, Franklin, Giles, Montgomery, Pittsylvania, and Roanoke, as shown below in Figure 1.

Figure 1 – Proposed Mountain Valley Pipeline through Virginia



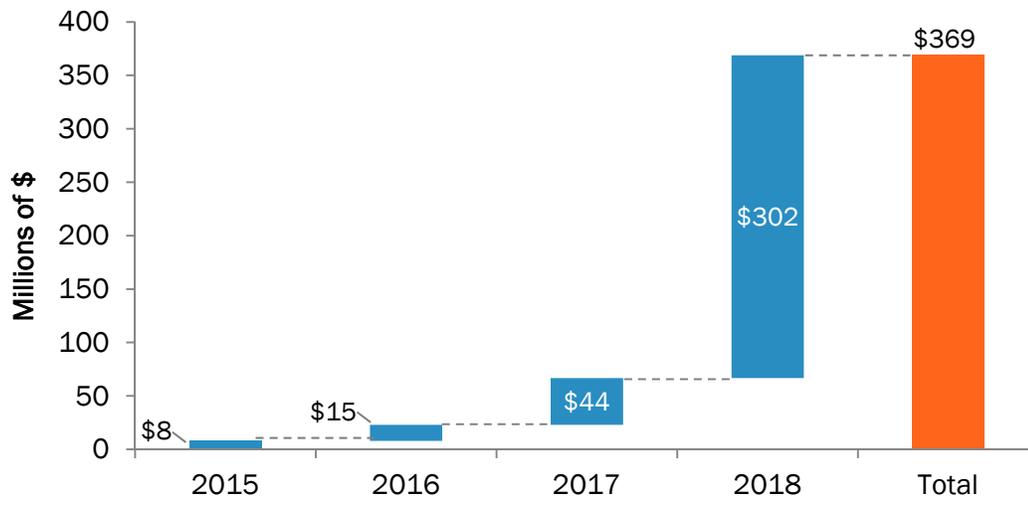
Three types of economic benefits would occur from the construction and operation of the MVP project. These benefits include:

- **Construction Spending Benefits:** Expenditures on goods and services in the Commonwealth would translate into job creation along with economic benefits to Virginia suppliers, their employees, and the overall economy.
- **Operational Benefits:** Once in service, the project would require a skilled workforce to operate and maintain the pipeline. Also, it would generate annual property tax revenues for the counties, providing an additional stream of funds.
- **Direct-Use Benefits:** The Commonwealth and counties would benefit from the potential direct use of gas from the MVP project. The project would enhance gas service already available, help enable new gas service, and expand opportunities for commercial and manufacturing activities.

Construction Spending Benefits

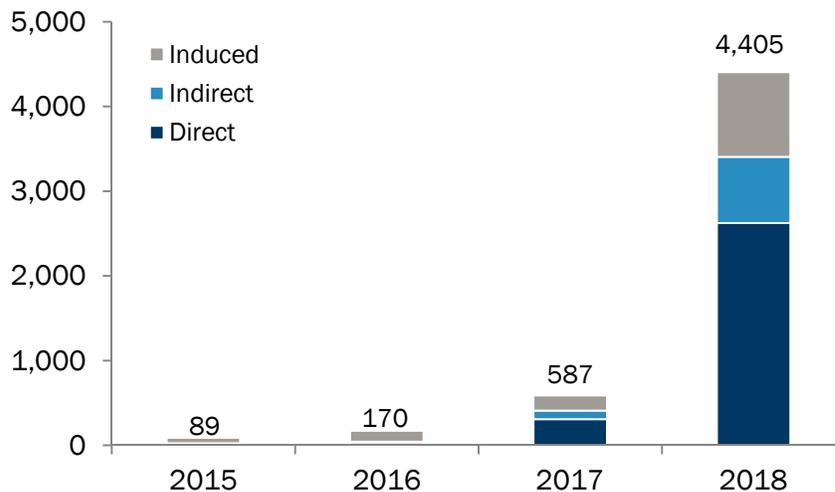
From 2015 to 2018, the MVP project owners plan to spend \$407 million directly on resources (equipment, materials, labor, and services) in Virginia. This direct spending would translate into \$369 million in cumulative Gross Regional Product over the four-year period, as summarized in Figure 2.

Figure 2 – MVP Additions to Virginia’s Gross Regional Product



The MVP project would create approximately 4,400 jobs at the peak of construction in 2018. More than 2,600 of these jobs would be directly associated with the project (labeled “direct” in Figure 3); 780 jobs would be created along the supply-chain (“indirect”); and, just under 1,000 jobs would be created in the general economy.

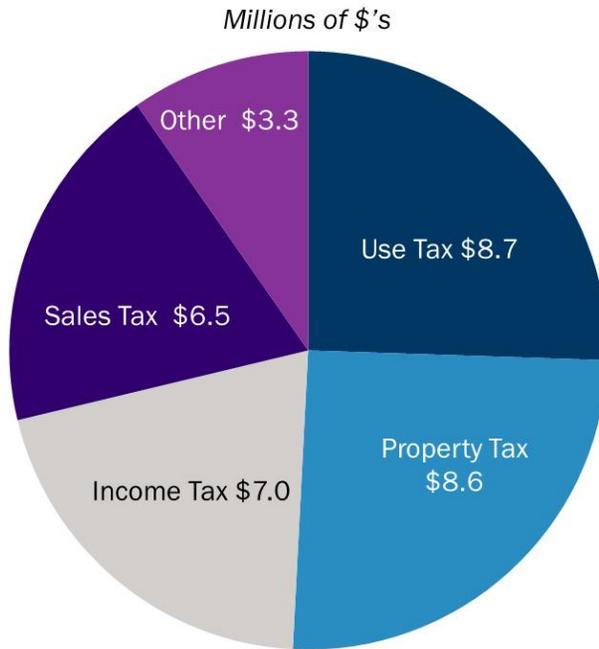
Figure 3 – MVP Jobs Created in Virginia by Year



Cumulatively, the MVP project would create approximately 5,250 job-years over the course of construction.¹

Another benefit of the MVP project is the increased state and local tax revenues that result from the economic ripple effect of construction expenditures. As shown in Figure 4, the project would generate nearly \$34 million in aggregate tax revenues from 2015 to 2018 during construction.

Figure 4 – Virginia State and Local Tax Revenues Generated during Construction, 2015–2018



Operational Benefits

Once in service, the MVP project would continue to benefit Virginia’s economy along three main areas. The first is in operational employment and spending. Ongoing operation and maintenance of the pipeline would support a total of 34 jobs across the state with average annual wages and benefits of almost \$67,000.

Annual tax revenues through ad valorem taxes (property taxes) represent the second area of operational benefits. Based on the estimated pipeline investments and county property tax rates, the MVP project owners would pay up to \$7.4 million in taxes annually.

Direct-use benefits of the pipeline’s natural gas represent the third area where the Commonwealth and counties potentially could benefit from the project and are discussed in further detail below.

¹ The MVP employment contributions are directly tied to the capital spending in each year and are best expressed in ‘job-years’. A job-year is the equivalent of one full-time job lasting a single year.

Direct-Use Benefits

In terms of direct gas-use benefits, the MVP project could provide \$3.6 million in annual savings from fuel switching (i.e., switching from propane, fuel oil, diesel, or electricity to natural gas) across the six counties, with a large portion of this savings occurring in Franklin County. A detailed demand analysis identified \$1.0 million of annual potential savings in the Rocky Mount area of the county (see Table 1) since the area is not served by natural gas. The MVP project represents a unique opportunity as it would run within four miles of Rocky Mount, which is the largest town in Franklin County and serves as the county's manufacturing hub. These benefits are based on current fuel prices and could increase significantly if fuel prices rise.²

Table 1 – Savings from Fuel Switching to Natural Gas in the Rocky Mount Area

Sector	Annual Savings (thousands of \$'s)
Residential & Commercial	\$562
Municipal	\$156
Manufacturing	\$297
Total Annual Savings	\$1,015

Beyond Franklin County, the other four counties currently have varying degrees of natural gas access. Table 2 provides estimates of the potential fuel-switching savings for the residential, commercial, and municipal sectors in these counties, totaling \$2.6 million annually.

Table 2 – Fuel-Switching Opportunities and Savings in Four Other Virginia Counties

County	Fuel-Switching Opportunities	Annual Savings (thousands of \$'s)
Pittsylvania	<ul style="list-style-type: none"> • The Town of Gretna • > 450 municipal and private fleet vehicles • 18 public schools 	\$763
Roanoke	<ul style="list-style-type: none"> • >500 municipal and private fleet vehicles 	\$669
Giles	<ul style="list-style-type: none"> • The Town of Pembroke • Part of the Town of Narrows • 100 municipal and private fleet vehicles • Eastern Elementary 	\$653
Montgomery	<ul style="list-style-type: none"> • >300 municipal and private fleet vehicles 	\$537
Total		\$2,623

² FTI's previous report on December XX, 2014, was based on 2013 average fuel costs.

In addition to the Table 2 savings, the MVP project could provide economic benefits to existing manufacturers. FTI's interviews with county leaders indicated that natural gas access can play a major role in business decisions to expand operations. For example, global technology and specialty materials company Celanese was considering re-locating its Giles County facility due to the impact of EPA regulations. Natural gas access enabled Celanese to retain its operations without moving, by replacing its coal boilers with natural gas boilers and having a 16-mile natural gas pipeline constructed, thereby keeping 600 high-paying jobs.

Access to natural gas also can draw new businesses, particularly energy-intensive and advanced technology manufacturing. These manufacturers can provide significant economic benefits to communities from an employment, wage, and tax revenue perspective. Celanese and industrial and mineral resources company LHoist in Giles County serve as examples. The average annual manufacturing wage in Giles County is \$61,400 or 61% more than the average annual wage of \$38,100 for all jobs in the county in 2013.

Altogether, the proposed MVP project would provide a number of economic and employment benefits to Virginia and the counties along the proposed route. During construction, these benefits would result from capital spent directly within Virginia and the jobs created. Once in service, MVP will employ people within the state to help operate and maintain the pipeline. Also, counties will collect property taxes from the pipeline. Finally, the pipeline would provide sizable opportunities for direct gas-use in areas with and without gas access. These opportunities include additional supply reliability, fuel-switching savings, and new energy-intensive and advanced technology businesses started in Virginia.

1. Introduction

1.1. Project Background

The proposed MVP project is a FERC-regulated natural gas pipeline system that would span approximately 300 miles from the northern part of West Virginia to the southwestern part of Virginia.³ It is expected to provide at least two billion cubic feet per day or approximately 3% of current U.S. gas demand to markets in the Mid- and South Atlantic regions. The pipeline as proposed would pass through six Virginia counties – Giles, Craig, Montgomery, Roanoke, Franklin, and Pittsylvania.

EQT Corporation has retained FTI Consulting (“FTI”) to examine the MVP project’s potential economic benefits along three areas – economic growth and employment resulting from construction expenditures, operational benefits in terms of jobs created and ad valorem taxes paid by the MVP project owners, and direct gas-use opportunities that would result within the counties.

1.2. Approach

Below we summarize the approaches taken for determining the economic benefits in the three areas.

1.2.1. Construction Economic Impacts and Job Creation Benefits

FTI applied the IMPLAN model to estimate the economic impact and jobs created from construction activities in Virginia. The IMPLAN model is a general input-output modeling software and data system that tracks the movement of money through an economy, looking at linkages between industries along the supply chain, to measure the cumulative effect of spending in terms of job creation, income, production, and taxes. The IMPLAN data sets represent all industries within the regional economy – rather than extrapolating from national averages – and are derived primarily from data collected by federal agencies.⁴

The economic impacts that IMPLAN calculates can be broken into direct impacts, indirect impacts, and induced impacts, defined as follows:

- **Direct impacts:** the economic activity resulting from the MVP capital costs spent on industries residing in Virginia. These are the industries that provide the ‘direct’ materials, construction labor, construction management, and technical services (e.g., engineering and design,

³ The MVP would be constructed and owned by Mountain Valley Pipeline, LLC, a joint venture of EQT Corporation (NYSE: EQT) and NextEra US Gas Assets, LLC, an indirect, wholly owned subsidiary of NextEra Energy, Inc (NYSE: NEE).

⁴ The 2012 IMPLAN Dataset includes data from the U.S. Bureau of Labor Statistics (BLS) Covered Employment and Wages (CEW) program; U.S. Bureau of Economic Analysis (BEA) Regional Economic Information System (REA) program; U.S. BEA Benchmark I/O Accounts of the U.S.; BEA Output estimates; BLS Consumer Expenditure Survey; U.S. Census Bureau County Business Patterns (CBP) Program; U.S. Census Bureau Decennial Census and Population Surveys; U.S. Census Bureau Censuses and Surveys; and U.S. Dept. of Agriculture Census.

surveying, and permitting) for the project. This is the first order impact of the MVP expenditures within the state.

- **Indirect impacts:** the economic activity resulting from the ‘direct’ industries spending a portion of their revenues on goods and services provided by their supply chain in Virginia. These supply chain industries represent the second order or ‘indirect’ impacts of the original MVP expenditures in Virginia.
- **Induced impacts:** the economic activity resulting from the spending of the income earned by employees within the ‘directly’ and ‘indirectly’ affected industries. The benefactors of induced impact are primarily consumer-related businesses such as retail stores, restaurants, and personal service industries. These ‘induced’ impacts represent the third order impact.

Through the direct, indirect, and induced impact calculations, IMPLAN provides the economic ripple effect, or multiplier, that tracks how each dollar of input, or direct spending, cycles through the economy to suppliers and ultimately to households.

The first step of the IMPLAN process was to collect the estimate for state-only spending for each of the major project cost categories. These categories included the following:

- Pipeline Materials
- Compressor materials
- Meters and regulator devices
- Technical services such as engineering design, survey, and permitting
- Construction and commissioning services
- Land and right of way acquisitions

Of the \$3.5 billion that the MVP project owners plan to spend, \$407 million is planned to be spent *directly* in Virginia, with the difference being spent in West Virginia and outside the two states.

FTI then assigned these cost categories to one of the 440 IMPLAN economic sectors as inputs to the model. The model was then run from 2015 to 2018 to provide the following direct, indirect, and induced economic impacts:

- **Gross Regional Product (GRP):** an industry’s value of production over the cost of its purchasing the goods and services required to make its products. GRP includes wages and benefits paid to wage and salary employees and profits earned by self-employed individuals (labor income), monies collected by industry that are not paid into operations (profits, capital consumption allowance, payments for rent, royalties and interest income), and all payments to government (excise taxes, sales taxes, customs duties) with the exception of payroll and income taxes.
- **Employment Contributions:** direct, indirect, and induced annual average jobs for full-time, part-time, and seasonal employees and self-employed workers.

- **State, Local, and Federal Taxes:** payments to government that represent employer collected and paid social security taxes on wages, excise taxes, sales taxes, customs duties, property taxes, severance taxes, personal income taxes, corporate profits taxes, and other taxes.
- **Labor Income:** the wages and benefits paid to wage and salary employees and profits earned by self-employed individuals. Labor income demonstrates a complete picture of the income paid to the entire labor force within the model.

Section 2.1 provides the results of the IMPLAN construction and employment benefits analysis.

1.2.2. Operational Job Creation and Ad Valorem Tax Benefits

The MVP project would create jobs within the state to operate and maintain the pipeline and would generate ad valorem tax (property tax) revenues for the counties along the proposed route. To estimate the job benefits of ongoing operations, FTI collected data from EQT on the annual direct employment required within the state to support the pipeline. We then applied the data within the IMPLAN framework described above to determine the total state-wide direct, indirect, and induced employment numbers and average wages.

Our ad valorem tax analysis was developed by using a capitalized income approach. This approach involved creating a pro-forma financial analysis of the entire project⁵, generating the necessary revenues to set the net present value of the project to zero, and then capitalizing the operating income stream. We then allocated the capitalized income between Virginia and West Virginia by each state's share of the gross cost-basis. Next, we took the Virginia capitalized income value and divided it among the counties based on the gross cost value of the project within each county. Finally, we multiplied the each county's allocated capitalized income by the county property tax rate. Section 2.2 provides the outcome of this analysis.

1.2.3. Direct-Use Benefits

Direct-use benefits represent the third area of economic benefits from the proposed project. These benefits include fuel switching savings (e.g., replacing electricity, propane or fuel oil with gas) and commercial and manufacturing expansions enabled by gas supply and access. As part of this assessment, FTI conducted reviewed press statements, conducted interviews with private and public entities in the counties and states, and interviewed local distribution companies and municipal agencies to gauge the fuel switching and manufacturing expansion potential in the counties.

Four of the six counties - Giles, Montgomery, Pittsylvania, and Roanoke – have natural gas access in many of the major cities, towns, and areas. There are portions of these counties, however, with

⁵ The pro-forma was developed using a set of proxy assumptions for operational and maintenance costs, selling, general, and administrative costs, cost of capital, debt/equity ratio, construction and long-term interest rates, and depreciation method and period.

limited or no access. The other two counties, Franklin and Craig, have no natural gas access. FTI conducted a bottom-up, quantitative natural gas fuel switching potential and savings analysis for the areas in Franklin County with limited or no natural gas access. To estimate the potential demand and its associated economics, FTI conducted the following steps:

1. Perform a bottom-up demand potential analysis
2. Determine the consumer savings from switching to natural gas
3. Estimate the switching infrastructure and equipment costs
4. Perform a discounted cash flow analysis

Bottom-up Demand Potential Analysis

FTI conducted an analysis of Franklin County’s bottom-up demand potential by estimating what could be a reasonable amount of existing and future potential. Existing potential is defined as gas consumption made available via switching from a current fuel source, such as No. 2 fuel oil or propane, and from grid electricity consumption. An example of gas switching potential is Ferrum College. The college recently switched approximately two-thirds of its thermal fuel source to biomass from No. 2 fuel oil.⁶ To be reasonable in our existing potential estimate, we assumed that the remaining one-third of No. 2 fuel oil is a candidate for natural gas switching.

For future potential, we examined both expansion opportunities at “existing” and “new” locations. “Existing” expansion opportunities represent prospective extensions of current capacity, while “new” opportunities represent businesses that decide to locate their operations in the county because of new or additional gas service. The “new” opportunities are explained in a more anecdotal, case-study fashion as opposed to being actual, pending opportunities. We do rely on them, however, in a quantitative manner to show how they might improve the economics of adding natural gas service. In some instances, “new” opportunities could be similar to obtaining an “anchor” store in a retail setting. Such a store would enhance the economics of smaller stores in the same setting and form the critical mass needed to make the economics of the entire system attractive.

Consumer Savings from Gas Switching

We define the consumer savings from gas switching to be the following:

Consumer Savings = (Current costs for fuel and grid electricity consumption) – (Costs for natural gas fuel and gas-fired electricity consumption)

The fixed costs of the infrastructure, such as the pipeline connection network and meters to the consumer, and equipment conversion/replacement, such as boilers, hot water heaters, and furnaces, are not included in the consumer savings calculation. Instead those costs are reflected in the next step.

FTI estimates the consumer savings to total \$6.5M for all sectors and conversion of fleet vehicles.

⁶ http://www.ferrum.edu/campus_life/news/Articles/ferrum_college_to_go_greener_with_new_biomass_boiler.html

Infrastructure and Equipment Costs

Infrastructure costs and equipment costs are fixed costs that do not vary with the amount of consumption. They are borne by the consumer at the tariff rate. This rate includes the regulated rate of return that an LDC or other regulated gas distribution entity can earn on its investment.

We assume the following items represent infrastructure costs:

- **Interconnection costs** – either a tee or “hot tap” of a pipeline
- **Metering station** – a pressure reducing valve, meter, valves and associated equipment for “letting” down the pressure from the interstate pipeline to the pressure on the gas distribution system and measuring the amount of gas consumption
- **Lateral** – the pipeline from the metering station to the distribution system or new consumer
- **Distribution system** – the pipeline distribution network that transports the gas to final consumers

In addition to the interconnection costs, there are the costs of new gas equipment. For example, a household, commercial entity, or manufacturing plant would need to upgrade or replace a water heater or boiler to accommodate gas as a fuel.

Discounted Cash Flow Analysis

The discounted cash flow (DCF) analysis shows whether the cost of switching to gas is economic. The DCF of the consumer savings must exceed the DCF of the infrastructure and equipment combined, as shown below:

$$\text{DCF (Consumer Savings)} > \text{DCF (Infrastructure Costs + Equipment Costs)}$$

Both the consumer savings and equipment are discounted at a rate commensurate with the sector or business type, while the infrastructure costs are discounted at the regulated rate of return.

The DCF analysis does not factor in items such as consumer apprehension to high initial equipment cost expenditures and the availability of infrastructure financing. High initial cost expenditures, for example, include a household paying upfront for the gas furnace and installation. Depending on a household’s economics, an upfront payment may not be an option. Utility financing of infrastructure includes the actual financing of infrastructure to meet the demand. If the demand is not fully subscribed, banks may be unwilling to finance a project.

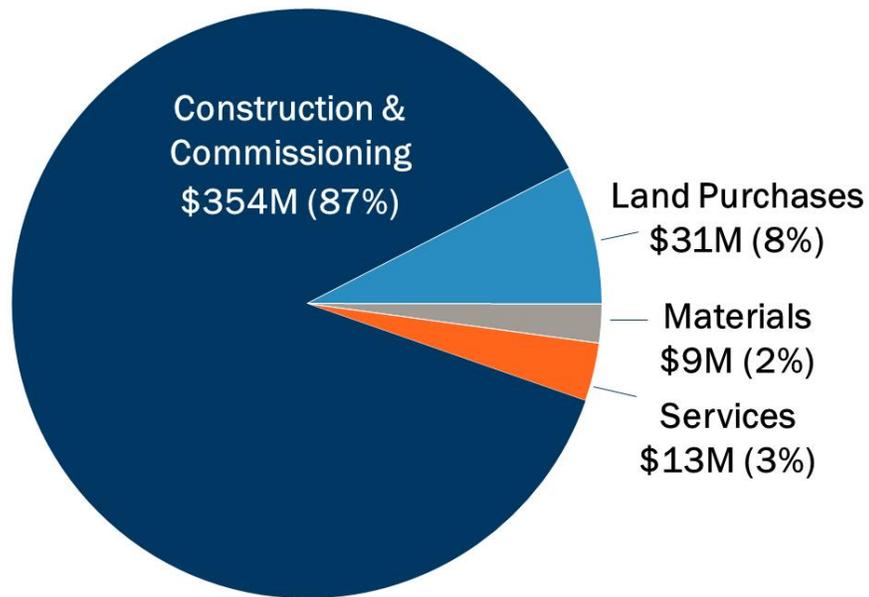
The analysis shows that the economics are favorable for fuel switching and business expansion when natural gas access is available.

2. Economic Benefits of the Mountain Valley Pipeline

2.1. Construction Benefits

The MVP project owners estimate construction expenditures within the state to be \$407 million from 2015 to 2019, and these expenditures would translate into job creation and economic growth for the Commonwealth and the counties. Figure 5 provides a breakdown of the cumulative MVP expenditures by major spending category in Virginia.

Figure 5 – MVP Capital Expenditures in Virginia by Major Spending Category



This spending would result in construction peak year value-added or Gross Regional Product (“GRP”) of \$302 million in Virginia. Over the course of the project construction, the project would generate \$369 million in cumulative GRP as shown in Figure 6.

Figure 6 – MVP Contributions to Gross Regional Product

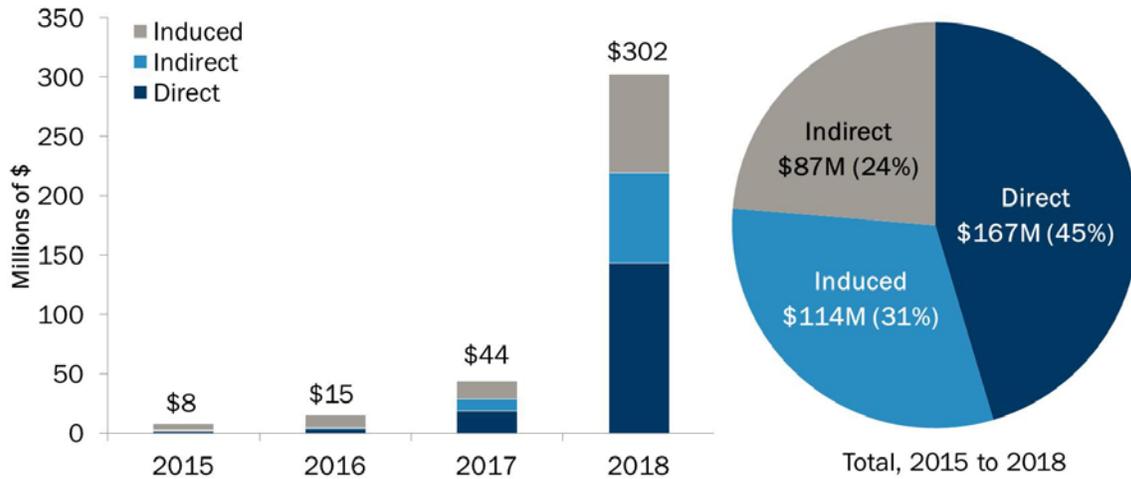
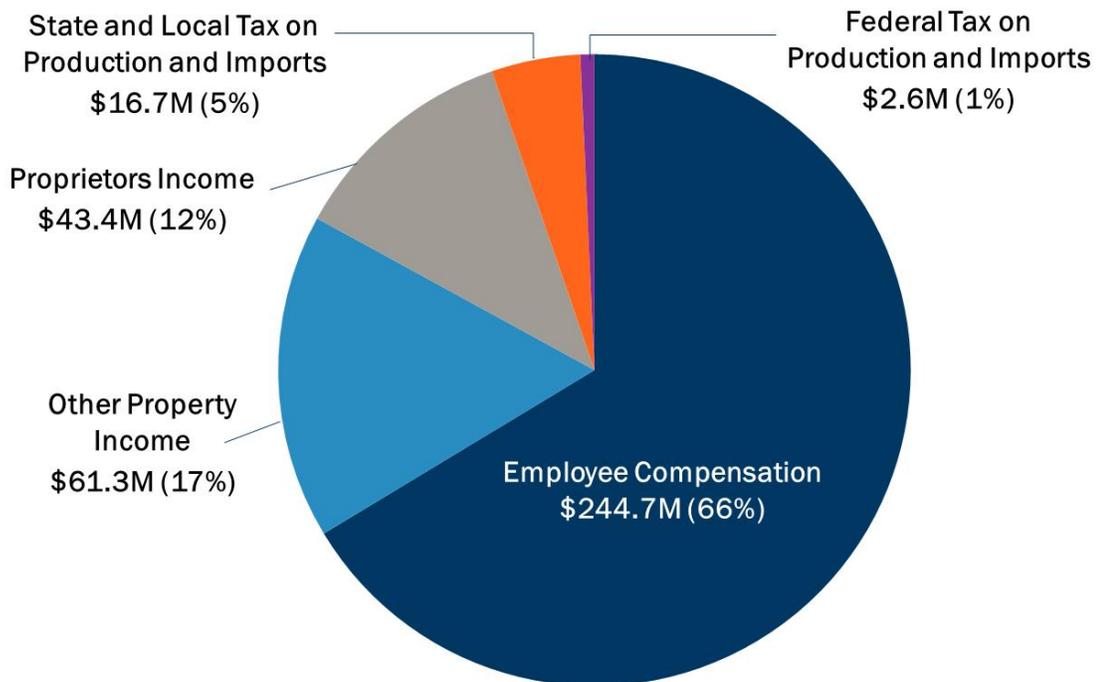


Figure 6 shows GDP segmented into direct, indirect, and induced GRP. As previously mentioned, ‘direct’ refers to the GRP occurring from the capital expenditures within the industry sectors immediately impacted. ‘Indirect’ represents the GRP impacts from suppliers to the directly impacted industries. ‘Induced’ GRP reflects the local spending of employee’s wages and salaries of directly and indirectly affected industries.

GRP is defined as the summation of employee compensation, proprietors’ income, other property income, and Federal, State, and local taxes on production and imports. Figure 7 shows that \$19 million in cumulative state and local taxes would be generated from the MVP project construction.

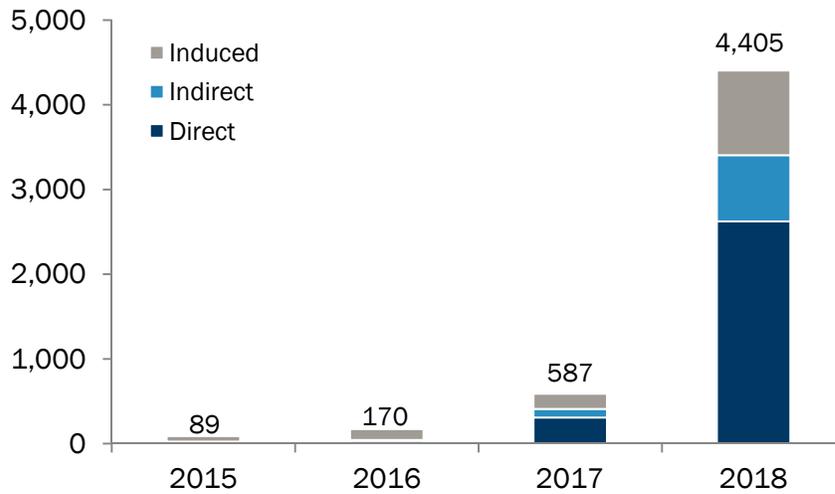
Figure 7 – Composition of MVP’s Cumulative Gross Regional Product Contributions



In addition to the GRP benefits, the project would spur approximately 4,400 jobs within the state in 2018 at peak construction activity. These jobs include construction jobs, indirect jobs (i.e., jobs created in the state by suppliers to the direct industries impacted), and induced jobs (i.e., jobs created in the state via the spending of construction workers and employees of businesses hired to construct the pipeline). Cumulatively, the MVP project would create approximately 5,250 job-years over the course of construction as shown in Figure 8.⁷

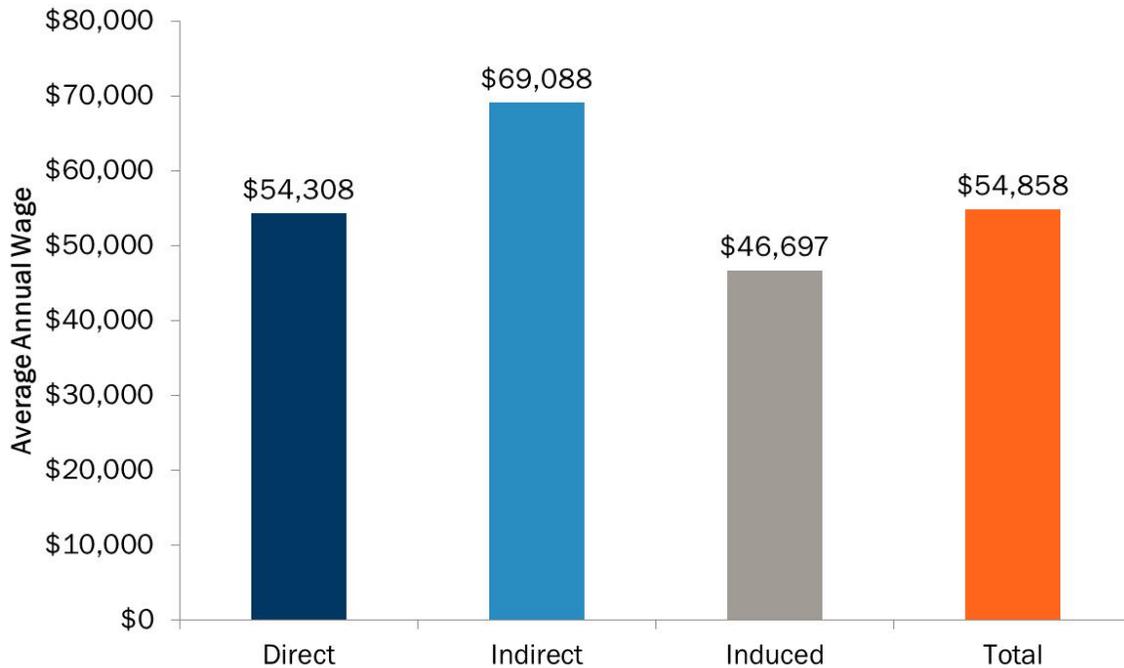
⁷ The MVP employment contributions are directly tied to the capital spending in each year and are best expressed in 'job-years'. A job-year is the equivalent of one full-time job lasting a single year.

Figure 8 - MVP Employment Contribution



The MVP employment contribution also would have a positive impact on employee compensation relative to the median income in the state. Figure 9 shows the average employee compensation for direct, indirect, and induced jobs from the MVP project.

Figure 9 – MVP Average Employee Labor Income



2.2. Operational Benefits

The MVP project would contribute employment and generate county property or ad valorem taxes during construction and operation. Once in service, the MVP project would continue to benefit

Virginia's economy in three main areas. The first is in operational employment and spending. Ongoing operation and maintenance of the pipeline would support a total of 34 jobs across the state with average annual wages and benefits of almost \$67,000 per job contributed.

In terms of property taxes, Table 3 shows the estimated ad valorem taxes by county once the pipeline is in service and compares these taxes to the counties' general fund budget.

Table 3 – Estimated Annual MVP Ad Valorem Taxes during Operation⁸

County	General Fund Total Revenues	Annual MVP Ad Valorem Taxes	Percent of General Fund Total Revenues
Craig	\$6,675,000	\$103,000	1.5%
Franklin	79,778,000	2,159,000	2.7%
Giles	51,810,000	1,140,000	2.2%
Montgomery	43,767,000	1,780,000	4.1%
Pittsylvania	58,971,000	1,215,000	2.1%
Roanoke	198,174,000	957,000	0.5%
Total 5 Counties	\$439,176,000	\$7,354,000	1.7%

Source: County Websites; FTI and EQT Calculations

In total, the ad valorem taxes generated during operation could represent up to 1.7% of the general fund revenues among all six Virginia counties. Ad valorem tax revenues provide counties with a number of options on how to allocate their revenues to constituents

2.3. Direct-Use Benefits – Existing Opportunities

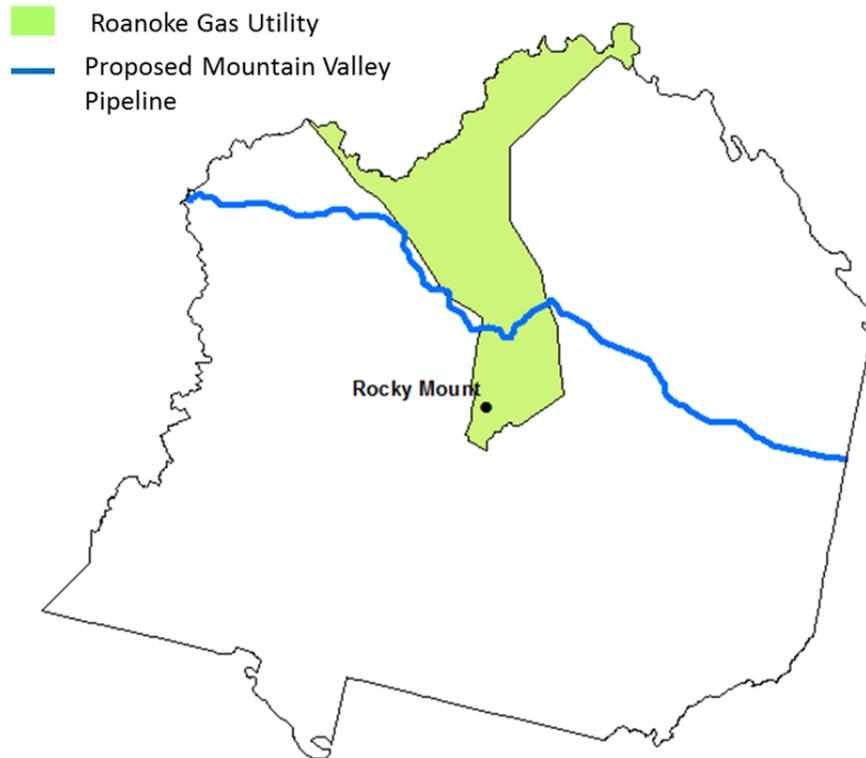
The following section reviews and discusses existing opportunities and savings in each county that could occur as a result of switching to natural gas from electricity, fuel oil, or electricity. These opportunities exist in each of the county's end-use energy consumption sectors – residential & commercial, municipal buildings, manufacturing, and transportation (fleet vehicles). The shale gas revolution has enabled these switching opportunities as it has increased the supply of natural gas, lowered its cost, and stabilized prices.

⁸ Dollars have been rounded to the nearest \$1,000. General Fund figures reflect the latest data available from county websites.

2.3.1. Franklin County

Franklin County, which has 56,000 residents, currently does not have natural gas service for its homes or businesses. The proposed Mountain Valley Pipeline (MVP) project could provide the county with a source of natural gas, particularly in the town of Rocky Mount, which is the county seat and serves as the county’s manufacturing hub. The pipeline is planned to cut across the middle of the county and to pass less than four miles north of Rocky Mount (see Figure 10).

Figure 10 – Roanoke Gas Company Franchise Territory in Franklin County



This route would lower the cost of pipeline access as compared to tapping into the closest access point in the Clearbrook area on the Roanoke Gas Company (Roanoke Gas) system. Clearbrook is more than 10 miles away from Rocky Mount.

The Franklin County situation represents the classic “chicken-or-the-egg” dilemma: Should infrastructure be constructed in anticipation of a major potential consumer arriving or should infrastructure development wait until a major consumer shows concrete interest in locating in the Rocky Mount area?

Bottom-up Demand Potential Analytical Approach

To answer the above question, FTI conducted a bottom-up demand potential analysis for the Rocky Mount and Ferrum areas by estimating what could be a reasonable amount of existing potential. Existing potential is defined as gas consumption made available via switching from a current fuel source, such as No. 2 fuel oil or propane, or electricity.

FTI performed the following steps for this analysis:

1. Perform a bottom-up demand potential analysis
2. Determine the consumer savings from switching to natural gas
3. Estimate the switching infrastructure and equipment costs
4. Perform a discounted cash flow analysis

These steps examine gas demand and economics from the perspective of the final consumer. The consumer savings calculated in Step 2 need to cover the infrastructure and equipment costs that would appear as fixed costs on a consumer's gas bill.

Findings

Residential

We conducted primary research, interviewed county officials, and interviewed gas LDCs in municipalities outside the counties to estimate residential switching potential. We estimate that the total residential natural gas switching opportunity for space heating and water heating in the Rocky Mount area of Franklin County is 82,000 MMBtu. Switching to gas would equate to 72 million standard cubic feet (MMSCF) in annual gas consumption and would produce an annual fuel savings of \$827,000, exclusive of supporting infrastructure and equipment installation costs. Factoring in the conversion costs, we have estimated that the residential sector could almost break even on the investment without being subsidized by commercial and manufacturing consumers.

Commercial

Most commercial entities use fuel oil or propane for their space heating and water heating needs. Older commercial entities, such as the main building for the Carilion Franklin Memorial Hospital and the remainder of Ferrum College that was not switched over to biomass-based heating⁹, tend to use fuel. Newer commercial entities tend to use propane.

⁹ http://www.ferrum.edu/campus_life/news/Articles/ferrum_college_to_go_greener_with_new_biomass_boiler.html

We estimate the natural gas switching potential for the commercial entities in Rocky Mount and Ferrum is 99 MMSCF annually, which would equate to \$1.5M in annual savings. These savings are based on fuel cost savings and does not account for the annualized cost of supporting gas infrastructure and installing or retrofitting equipment. Factoring in the annualized cost of the investments, we estimate the savings to be \$1.1M annually for the commercial sector.

Manufacturing

We estimate that the annual fuel demand for manufacturers in the Rocky Mount area is approximately 21,000 MMBtu, which, if converted to natural gas, would equate to 18.3 MMSCF. Switching to gas would result in \$346,000 in annual savings before equipment and labor. Factoring in the annualized cost of supporting gas infrastructure and installing or retrofitting equipment, the savings for manufacturers would total \$297,000 annually.

It is important to note the role of manufacturing in the Franklin County. Manufacturing jobs in the county average \$35,200 in weekly wages versus an average of \$31,500 across all industries.¹⁰ In Giles County where almost 23% of workers are employed in manufacturing, the average weekly wage is almost \$61,400. Giles has a high concentration of energy-intensive manufacturing, something that could be part of Franklin County's economic profile especially if the MVP project were to be built.

Municipal Buildings

We conservatively assumed that gas would be used only as a substitute fuel for space heating and water heating and not for on-site electricity generation due to the small load size per building. Municipal buildings consume approximately 36,505 MMBtu. Of this demand, we estimate the natural gas demand potential to be 32.1 MMSCF per year, which would equate to \$360,000 per year in savings, including the costs of conversion.

Fleet Vehicles

For transportation, we estimate there are more than 400 fleet vehicles – school buses, other school vehicles, county vehicles, and solid waste disposal trucks – located in Franklin County. These vehicles consume 587,500 gallons of gasoline and diesel fuel annually as shown in Table 4, which equates to \$2.2 million in annual costs. We estimate the natural gas switching potential to be 76.1 MMSCF per year if all vehicles were switched to natural gas. With current low fuel prices, the annual fuel savings would only partially offset the equipment conversion/ replacement and infrastructure costs. Savings would be significant if fuel prices were to increase.

¹⁰ Virginia Employment Commission Report, Franklin County Community Profile, page 26.

Table 4 – Estimated Municipal Fleet Vehicle Annual Energy Consumption

	Transportation Fuels (gallons)	Equivalent Natural Gas Consumption (MMSCF)
School Buses	250,000	33.7
Other School Vehicles	110,000	13.2
Solid Waste Trucks	115,000	15.6
County Vehicles	112,500	13.6
Total	587,500	76.1

Electricity Generation

Appalachian Power, a unit of American Electric Power, provides electricity to customers in Franklin County. The nearest utility-scale electricity generator is a hydroelectric and pumped storage facility at Smith Mountain Lake just outside of Franklin County. In 2012, this facility had a net generation of -73 gigawatt hours (GWh) out of a total gross generation of 321 gigawatt hours.¹¹ The pumped storage capabilities of the facility allowed Appalachian Power to produce electricity from the facility during peak hours while consuming electricity during off-peak hours as it refilled the reservoir, thus the negative generation from the facility.

Because of the net negative generation from the Smith Mountain Lake hydro facility, Appalachian Power must import electricity into the county to balance the demand. Franklin County could be a site for a new gas, baseload or peaking facility. The combination of the proposed MVP project route and the existing electric transmission infrastructure coming from the Smith Mountain Lake Hydro and Pumped Storage facility could make locating a gas power plant in Franklin County attractive. A commercial size gas peaking facility generally consumes 400 MMSCF annually whereas an average gas baseload facility consumes 12,000 MMSCF annually.¹²

Summary

Converting existing households, businesses and municipal buildings to natural gas would generate gas demand of 221 million standard cubic feet (MMSCF) annually. The county also counts more than 400 fleet vehicles, which over time could be candidates for compressed natural gas vehicle

¹¹ Energy Information Administration form EAI-923

¹² Assumes 100 MW for a gas peak facility operating at a 5% capacity factor and 500 MW for a gas baseload facility operating at a 40% capacity factor.

replacement. If completely converted, these vehicles would generate another 76.1 MMSCF in annual demand. These totals by sector are shown in Table 5.

Table 5 – Natural Gas Demand Potential in Rocky Mount and Ferrum Areas

Sector	MMSCF
Residential	71.9
Commercial	98.8
Manufacturing	18.3
Municipal Buildings	32.1
Total (without fleet vehicles)	221
Fleet Vehicles	76.1
Total (with fleet vehicles)	297.2

Potential fuel savings from switching totals \$4.2 million annually, before equipment and labor costs. Factoring in conversion costs, the savings is \$1.0 million annually with the biggest savings coming from commercial entities and the conversion as shown in Table 6.

Table 6 – Annualized Savings from Fuel Switching in the Rocky Mount Area

	Total (thousands of \$'s)
Fuel Savings	\$4,222
• Residential	\$827
• Commercial	\$1,469
• Manufacturing	\$346
• Municipal Buildings	\$439
• Transportation	\$1,140
<i>Less Equipment and Labor (Amortized)</i>	\$3,207
Total Annual Savings	\$1,015

Generally, the minimum demand level for an economic interconnection is approximately one billion cubic feet (1,000 MMSCF) annually¹³. While Franklin County existing demand potential is about one-third of this amount, the benefits shown in Table 6 may justify the investment. If the generally accepted minimum threshold must be met, Franklin County would need to find demand anchors of

¹³ Based on industry interviews. This is an approximation as each situation depends on locational circumstances, such as the terrain for the pipeline extension and the profile of gas consumption throughout the year.

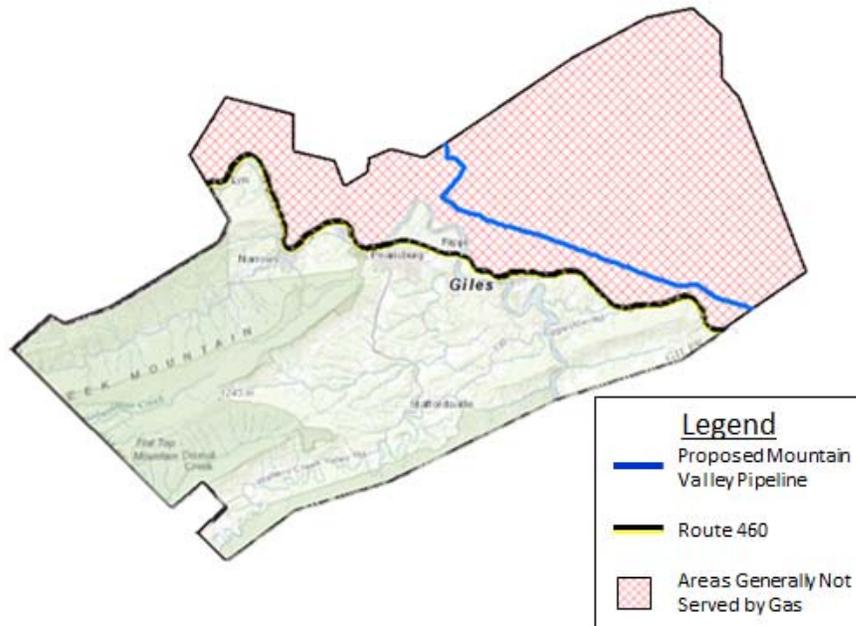
approximately 700 MMSCF in annual consumption to justify gaining access. Potential anchors that would satisfy the remaining demand requirement might include:

- **New Power Generation:** a 150 MW gas peaking power plant¹⁴
- **Combined Heat and Power (CHP):** a 10 MW CHP plant located at a manufacturing site or near commercial or municipal buildings to serve electricity demand and heating loads.¹⁵
- **A major manufacturer:** a manufacturer similar in size to Nestlé Purina PetCare in King William County, which recently was extended gas service via a 12 mile gas pipeline.
- **A number of small to medium manufacturers:** a doubling of the current manufacturing capacity in the Rocky Mount area would almost meet the general economic threshold level for interconnection.

2.3.2. Giles County

The type of fuel used in Giles County for residential and commercial heating is mainly bifurcated between natural gas and electricity. Most of the consumers in Pearisburg and Narrows use gas. However, these towns represent only 27% of the county households and commercial entities. Outside of these towns where the population density declines, residential and commercial consumers typically use electricity. While Columbia Gas has franchise rights to the county, it cannot service the remaining parts of the county economically due to distance from the gas system and sparse population density. We understand from interviews that the eastern portion of Giles County (east of the New River & Rt. 460) has no gas access as shown in Figure 11.

Figure 11 – Portion of Giles County without Gas Access



¹⁴ Assumes 9.2 MMBtu/MWh heat rate and 5% capacity factor

¹⁵ Assumes 7 MMBtu/MWh heat rate and an 85% capacity factor

In order to develop a fuel switching benefits analysis, FTI conducted extensive research that included review of news articles, conversations with private and public entities in the county, and interviews with local distribution companies and municipal agencies inside and outside the county. This research enabled us to profile the county's potential unmet natural gas demand. Potential unmet demand includes switching from current forms of energy to natural gas and the possibility of locating new, tangible opportunities, such as manufacturing and power generation in the county.

Our analysis found that the switching potential in the residential and commercial sectors are minimal due to existing gas service in the two largest towns – Pearisburg and Narrows. We did, however, find substantial opportunities for switching and expansion in the manufacturing and power generation sectors, which could have significant economic benefit impacts on Giles County. As such our analysis focuses mainly on these opportunities.

Approach for Assessing Natural Gas Potential

FTI examined new demand opportunities across all end-use sectors. These included opportunities for switching to gas in the residential, commercial, and municipal sectors and fuel switching, self-generation of power, and manufacturing expansion in the manufacturing and electric sectors. We collected data through primary research and interviews with county officials, LDCs, commercial entities, and manufacturers. These data allowed us to estimate potential demand, which we translated into direct economic benefits.

Natural Gas Potential and Economic Benefits by Sector

Manufacturing and Power Generation

The manufacturing and power generation sectors represent an important part of Giles County's economy. The sectors employ approximately 1,025 people, which equates to 23% of the total eligible workers and 36% of the total wage income in the county.¹⁶ As such, Giles County stands to benefit significantly from the MVP project. Table 7 provides a summary of the major manufacturers and power generation operators in Giles County.

¹⁶ Virginia Employment Commission Report, Giles County Community Profile, page 22.

Table 7 – Major Manufacturers in Giles County

Company	Products	Employees	Primary Fuels Used	Miles from MVP Pipeline
Celanese	Acetate	600	Coal, Electricity	4
Jennmar	Mining supports	~200	Electricity	7
LHoist	Chemical lime	120	Coking Coal, Electricity	1
UFP Mid-Atlantic	Wood products	~75	Natural Gas, Electricity	4
AEP Glen Lyn	Electricity	~75	Coal	9
GE Fairchild	Mining vehicles	50	Propane, Electricity	9

Manufacturers in Giles County use a mix of fuel types. The primary reliance on coal for some manufacturers has been due to the economics associated with pipeline access, available capacity, and reliability. As shown in Table 7, the proposed MVP project would run close to major manufacturing and power generation facilities in Giles County. MVP could provide greater accessibility and reliability to those already using gas and enable switching to coal for those currently without gas access.

The Celanese Acetate plant in Giles County exemplifies the economic benefits of providing gas access. Celanese was faced with upgrading its coal-fired boilers to comply with EPA's Boiler Maximum Achievable Control Technology Rule that will take effect in 2016. One option for Celanese was to re-locate if the upgrade costs became prohibitively expensive. Another option was to replace the coal-fired boilers with gas-fired boilers; however, this option was not certain because Celanese was 16 miles from The Columbia Gas Transmission Corporation (TCO) interstate pipeline. Celanese worked with TCO and Columbia Gas of Virginia to access the TCO interstate pipeline network, allowing Celanese to remain in Giles County and retain 600 employees. Additionally, Celanese's construction of the gas boilers created 200 temporary construction jobs and added twenty-two new permanent jobs at the site.

To estimate the opportunity and potential savings resulting from increased natural gas supply and access in the county, we conducted interviews and primary research to evaluate the demand potential for fuel switching and capacity expansion. Table 8 below shows the potential demand for these opportunities. We have aggregated these opportunities to protect company confidential information.

Table 8 – Manufacturing Potential Demand by Opportunity

Opportunity	Annual Potential Demand (MMSCF)
Fuel Switching	7,500
Capacity Expansion	1,000
Total	8,500

In terms of economic benefits, we have translated these potential demand opportunities into increases in direct jobs and wages in the county. We estimate an increase of 51 manufacturing and power sector jobs and \$3.1 million in additional direct wages. There are also indirect and induced economic impacts that would result from these opportunities, which we have not quantified here.¹⁷

Transportation

For transportation fuels, county end-use sectors consume primarily refined oil products – diesel and gasoline – along with insignificant volumes of natural gas and biofuels. Our interviews and research indicate approximately 100 fleet vehicles could be switched from gasoline and diesel to natural gas. In total, there is an annual fuel switching potential of 18 MMSCF, equating to \$118,000 in annual cost savings, inclusive of the cost of infrastructure development and vehicle retrofitting/replacement. If pursued, this switching process likely would occur over a number of years as vehicles are retired and replaced with compressed natural gas (CNG) vehicles.

Residential & Commercial

For the residential and commercial sectors, we examined the switching potential for those areas without natural gas access. Based on our interviews with county officials, approximately one-half of Narrows and all of Pembroke do not have natural gas service. Assuming the residents and commercial entities in these areas use primarily electricity, we estimate a total switching potential of 35.6 MMSCF, equating to \$342,000 in annual savings. This savings amount is inclusive of distribution investment and equipment replacement.

¹⁷ Indirect impacts include increases in GDP, jobs, wages, and tax revenues that are created by manufacturers procuring goods and services from other county employers. Induced impacts include the multiplier benefits to the county's economy from increasing the amount of disposable income to spend on goods and services (e.g., increased residential and commercial spending on food would, in turn, create more grocery and retail stores and employment). This is also known as the multiplier effect.

2.3.3. Montgomery County

Montgomery County is home to 96,207 residents in Virginia. The county encompasses the towns of Blacksburg and Christiansburg, which are the most populated towns in the county containing a majority of the manufacturing and commercial employers. Nearly half of the residents live in Blacksburg, home to Virginia Polytechnical Institute and State University (Virginia Tech). Atmos and Roanoke Gas both service Montgomery County, with Atmos servicing the western part of the state and Roanoke Gas servicing the eastern part. One area not serviced by either company is Riner, VA.

Montgomery County has a total employment of 40,633. The majority (52%) are workers in the commercial sector, followed by government (33%) and manufacturing (12%). Many manufacturers use natural gas and electricity to fuel their businesses.

Manufacturing jobs are among the highest paying jobs in Montgomery County. The average annual wage is \$53,700 versus a weighted average of \$40,300 for all sectors in the county. Energy intensive manufacturers can have even higher wages.

Some of the largest manufacturers in Montgomery County include the following:

- Moog, Inc.
- Federal Mogul Corp
- Lexington Rowe Furniture
- Corning Glass Works
- United Pet Group
- New River Energetics

Natural Gas Potential and Economic Benefits in the County

Natural gas access is common in much of Montgomery County. Two-thirds of county residents use natural gas as their primary fuel source for home heating.¹⁸ As such, there is only a handful of existing, fuel switching opportunities available. Switching the rest of the Virginia Tech Central Steam Plant over to gas and transitioning the municipal and private fleet vehicles to gas are the two main opportunities based on our research.

Currently, the Virginia Tech Central Steam Plant uses 78% coal, 20% natural gas, and 2% fuel oil to run the facility. Switching the coal to natural gas likely would be an economic cost to Virginia Tech because coal is less expensive than natural gas on an energy-equivalent basis. Switching to gas, however, would help in reducing air emissions from the facility.

For fleet vehicles, we estimate that there are more than 300 vehicles that could be switched from gasoline and diesel to natural gas. In total, there is an annual fuel switching potential of 66 MMSCF, equating to \$537,000 in annual cost savings, inclusive of the cost of infrastructure development and

¹⁸ 2013 US Census Bureau 5 Year American Community Survey.

vehicle retrofitting/replacement. If pursued, this switching process likely would occur over a number of years as vehicles are retired and replaced with compressed natural gas (CNG) vehicles.

2.3.4. Pittsylvania

Pittsylvania County is home to 63,500 residents in Virginia. The towns of Chatham, Hurt, and Gretna are the most populated towns in the county, containing a majority of the manufacturing and commercial employers. The City of Danville, located along the southern border of the county, is not within the county.

The Williams Transco Pipeline cuts across the county and provides natural gas access to Chatham. Columbia Gas serves Hurt, which is a small town in the northern part of the county. Some areas bordering Danville, such as Ringgold, are served by the City of Danville. Most other towns, including Gretna, do not have natural gas service. The proposed Mountain Valley Pipeline (MVP) project has the potential to provide the unserved areas of the county with natural gas service and would be an additional source of natural gas to improve access and reliability throughout the county to support anticipated growth.

Manufacturing jobs are among the highest paying jobs in Pittsylvania County. The average annual wage is \$43,700 versus a weighted average of \$31,400 for all sectors in the county. Energy intensive manufacturers can have even higher wages.

Natural Gas Potential and Economic Benefits in the County

Municipal Buildings

Pittsylvania has 20 schools across the county, with 9,000 students. Only 2 of these schools are served by natural gas. Chatham High School is served by Columbia Gas, and Twin Springs Elementary, just north of Danville, is served by the City of Danville. The two small administrative buildings in Chatham also are served by natural gas.

Fuel oil is the primary heating fuel in the other 18 schools. The annual fuel oil usage by type of school is as follows:

- High School: 20,000 gallons
- Middle School: 15,000 gallons
- Elementary School: 10,000 gallons

We estimate the natural gas switching potential for the schools is 29.3 MMSCF annually, which would equate to \$487,000 in annual cost savings, inclusive of installing or retrofitting gas equipment.

Fleet Vehicles

For transportation, we estimate there are more than 450 fleet vehicles located in Pittsylvania County. These vehicles consume approximately 684,000 gallons of gasoline and diesel fuel annually as shown in Table 9. We estimate the natural gas switching potential to be 89.6 MMSCF per year if all vehicles were switched to natural gas, which would equate to just covering equipment conversion/replacement and infrastructure costs under the current environment of low energy prices, but could provide significant cost savings if fuel prices were to rise.

Table 9 - Estimated Fleet Vehicle Annual Energy Consumption

	Transportation Fuels (gallons)	Equivalent Natural Gas Consumption (MMSCF)
School Buses	362,000	48.8
Solid Waste Trucks	128,000	17.3
Other School Vehicles	123,000	14.8
County Vehicles	71,000	8.6
Total	684,000	89.6

Residential

The town of Chatham has natural gas service, but most other towns, such as Gretna, a town of 1,250 people north of Chatham, are not served by natural gas. Switching Gretna to natural gas would equate to 21 MMSCF in annual gas consumption. Costs for conversion would slightly outweigh benefits unless an existing manufacturer such as Amthor International or a new manufacturing were to be included on the distribution system.

Manufacturing

The manufacturing sector accounts for 17% of the jobs in the county and is a sector that could benefit significantly from having more reliable natural gas service. Natural gas is an influencing factor in retaining existing manufacturers and attracting new ones to the county. With annual wages that are 40% higher than the average wages in the county, the manufacturing sector is crucial to the local economy and would only be bolstered by the MVP project.

As seen in cases throughout Virginia recently, access to natural gas is a major factor when businesses decide to invest in facilities, expand and modernize operations, and locate or relocate plants. Access to natural gas can draw new businesses to areas and ensure current businesses remain committed to the long-term success of their operations within the community.

2.3.5. Roanoke

Roanoke County is home to 93,524 residents. Parts of western Salem stretch into Roanoke County and form the Glenvar and Dixie Caverns areas, where there is significant commercial and manufacturing activity. The county does not include the cities of Roanoke and Salem located within the county.

Roanoke Gas currently serves businesses and residences throughout the county. The proposed Mountain Valley Pipeline (MVP) project has the potential to provide the county with an additional source of natural gas to improve access and reliability throughout the county and support anticipated growth. This is especially the case in the southwestern portion of the county along the proposed pipeline's route.

Roanoke County has a total employment of more than 34,000. The majority (73%) are workers in the commercial sector, followed by government (15%) and manufacturing (8%). The majority of manufacturers use gas and electricity,

Manufacturing jobs are among the highest paying jobs in Roanoke County. The average annual manufacturing wage is \$46,020 versus a weighted average of \$39,234 for all sectors in the county. Energy intensive manufacturers can have even higher wages. The largest manufacturers in Roanoke County include:

- Americold
- Blue Ridge Beverage
- Industrial Battery and Charger
- New Millenium
- Novozymes
- RR Donnelly
- Synchrony
- Tectron

Our analysis found that the switching potential in the residential and commercial sectors are minimal due to existing gas service to the county. We did, however, find opportunities for expansion in the manufacturing sector, which could have significant economic benefit impacts on Roanoke County. As such, our analysis focuses mainly on these opportunities.

The primary benefit of the pipeline to the manufacturing sector in Roanoke County would be the increased supply to the existing network, attracting more manufacturers to locate new sites within Roanoke County. Additionally, the increased supply would help support network expansion in the western and other developing areas of the county.

Natural gas is important to retaining existing manufacturers and attracting new manufacturers to the county. Our interviews and analysis identified that manufacturers value abundant and reliable gas service and that access to natural gas is a primary criterion for determining where to locate new manufacturing facilities.

2.4. Direct-Use Benefits – Future Opportunities

Natural gas is important to retaining existing manufacturers and attracting new manufacturers to the county. Our interviews with county representatives, regional partnership leaders, and manufacturers inside and outside the county identified that businesses value abundant and reliable gas service, and that access to natural gas is a primary criterion for determining where to locate new manufacturing facilities. Below we examine four case studies where natural gas service has provided significant economic benefits to communities in Virginia.

2.4.1. Celanese Conversion from Coal to Gas Boilers

Celanese is a global technology and specialty materials company that engineers and manufactures a wide variety of products. Celanese first established operations in Giles County, VA in 1939 and is one of the world's largest producers of cellulose acetate tow. Today, Celanese Acetate is the biggest employer in Giles County, with approximately 600 employees.

Celanese invested \$150M in its Giles County operation to replace its coal-fired boilers with natural gas-fired boilers.¹⁹ This investment allows the company to reduce its greenhouse gas emissions, improve its energy efficiency, and meet new EPA emissions standards moving forward. Virginia competed against and beat out global options for this investment. The project, combined with other efforts at the site, enabled the creation of at least 22 full-time Celanese positions and requires approximately 200 construction workers. It also affirms the commitment of Celanese towards their Giles County operations.

2.4.2. Pipeline Project to Serve Nestlé Purina PetCare Company

Nestlé Purina PetCare Company is part of the Swiss-based nutrition, health and wellness company. Nestlé Purina's opened the King William, VA facility in 1998 and today it employs 160 people at the Fontainebleau Industrial Park Plant.

In April 2010, the Virginia governor announced a 12-mile natural gas pipeline project in King William County.²⁰ Area businesses including Nestlé Purina joined with the Commonwealth to provide the \$6.5M investment for the project to expand the Virginia Natural Gas network, extending it to the King William, VA facility. Nestlé Purina provided this investment as an ongoing commitment to operational environmental efficiency and a move towards cleaner energy. Nestlé Purina also made significant investments in equipment upgrades at the plant to reduce emissions and improve the plant's operating efficiency.

¹⁹ http://www.roanoke.com/business/news/giles_county/celanese-plant-in-giles-county-completes-conversion-to-boilers-fueled/article_94b6215e-f50b-54d9-88dc-28d8a442f3d3.html

²⁰ <http://www.yesvirginia.org/AboutUs/NewsItem/1050>

In addition to Nestlé Purina PetCare, officials expect the pipeline to support business development along the U.S. 360 corridor, especially at the industrial parks located along the route.

2.4.3. Gas Service Expansion in Caroline County

In 2012, the Virginia General Assembly enacted the Natural Gas Infrastructure Expansion for Economic Development (NEED) legislation, which allows natural gas utilities to expand infrastructure as necessary to provide natural gas to economic development projects to unserved areas. Caroline County became the first community to assist a business through this program with the construction of a new 6 mile pipeline to Hoover Treated Woods Products. The natural gas pipeline connection would begin at the Caroline Public Utilities Department. From there it would run northeast behind the high school and middle school and then turning east until it reaches Hoover Wood Products in the Milford industrial park. Both schools are expected to utilize the pipeline, which measures six inches in diameter.

Hoover Treated Woods Products provides lumber and plywood products for fire retardant and preservative applications. Hoover operates five treatment facilities and has been operating in Caroline since 1979. “We are very excited about having natural gas service for our Caroline County facility,” said Tim Borris, vice president, Hoover Treated Wood Products. “Natural gas improves our operation by reducing our energy costs and improving our cost position making us more competitive.”²¹

2.4.4. Mohawk Industries in Carroll County

Mohawk Industries is a Fortune 400 flooring company headquartered in Calhoun, Georgia. Mohawk is a leading producer of residential and commercial carpet, ceramic tile, hard wood flooring, laminate flooring and bath and area rugs. In 2005 Mohawk acquired a manufacturing facility in Carroll County, VA, from Wayne-Tex Industries. The facility employs 150 people. For years Mohawk tried to gain access to the Patriot natural gas pipeline that runs through the county to upgrade its operations, but Atmos, which held the certificate to provide natural gas service in the county, had failed to build an interconnect and the lateral. As a result, Mohawk began considering moving the operation to Georgia.

“We have lost business prospects because we did not have natural gas,” said the chairman of the county’s Industrial Development Authority (IDA). “Carroll County was at a competitive disadvantage to other communities.”

The IDA worked with Mohawk to develop a plan to deliver gas to the plant. IDA awarded the certificate to operate in the county to Roanoke Gas. The IDA also contributed funds to construct the line to the plant. As a result 150 jobs were retained in Carroll County.

²¹ <https://www.columbiagasva.com/about-us/news-archive/2014/09/17/caroline-county-company-is-the-first-beneficiary-of-legislation-to-promote-natural-gas-service-expansion-to-unserved-areas-of-virginia>

3. Summary

The proposed MVP pipeline would provide several benefits to the six counties in Virginia through which the pipeline would run. Four of the six counties along the proposed MVP route have natural gas access in the major towns and areas. The pipeline would benefit existing customers as it would help ensure future access to a reliable supply of natural gas. These customers include manufacturing firms, which pay higher wages and make up a substantial portion of these counties' economies.

The shale gas revolution has helped lower natural gas prices, making natural gas an economically attractive alternative to existing fuel sources. FTI estimated the potential demand for switching to natural gas and the associated savings, which can be millions of dollars a year. Franklin County, which does not have gas service, could benefit due to the proximity of the proposed MVP pipeline to Rocky Mount, the county's manufacturing hub. The transportation sector in many of the counties could also benefit by switching county vehicles (school buses, solid waste trucks, and other vehicles) to using natural gas.

The MVP pipeline could also help retain or attract manufacturers. Interviews with county representatives, regional partnership leaders, and manufacturers identified that businesses value abundant and reliable gas service. In Giles County, the Celanese Acetate, which employs 600 people, invested \$150M to replace its coal-fired boilers with gas-fired boilers.

These types of investments can provide large economic benefits to communities from an employment, wage, and tax revenue perspective. Input-output modeling software such as IMPLAN can help to estimate the magnitude of these impacts. In addition to the initial economic impact of the investment, businesses along the supply chain benefit through ripple, or multiplier, effects, as do households in the form of higher wages and disposable income.

Appendix I: County Economic and Energy Profiles

1. Franklin

Economic Profile

Franklin County, VA is a 683 square-mile county located in Southwest Virginia with a population of 56,012. It is 8 miles south of Roanoke, 173 miles southwest of Richmond, and 70 miles north of Greensboro, NC. Rocky Mount is the largest town in the county with approximately 5,000 residents and many of the county's employers. Ferrum has a population of approximately 2,000 and is home to Ferrum College, a small liberal arts institution. Much of the recent growth in the county has occurred in the Smith Mountain Lake area. Significant portions of the county's workforce are in health care and manufacturing.

The county had 1,312 employers in 2013 with total employment of 13,528 or 10.3 employees per employer. Table 10 provides the employment by sector.²²

Table 10 – Employment in Franklin County by Sector

Sector	Employment	Percent of Total Employment
Commercial	7,083	52.4%
Manufacturing	2,662	19.7%
Government	2,416	17.9%
Construction	1,015	7.5%
Other	352	2.6%
Total	13,528	100.0%

Franklin County's commercial entities employ 7,083 people. The commercial sector represents 52.4% of the total employment in Franklin County. The two largest commercial employers are Carilion Franklin Memorial Hospital, which employs 290 people, and Ferrum College, employing approximately 300 people.

²² Virginia Employment Commission, Franklin County Community Profile, page 20.

Approximately 20% of the County residents work in manufacturing with M.W. Manufacturers being the largest overall employer with ~800 employees.²³ The major energy-intensive manufacturers in Franklin County are all located in or around Rocky Mount and include the following:

- **McAirlaids:** A private company that makes paper products used in food packaging, hygiene, medical products, industrial filtration, and table decoration. The facility is about 5 miles outside of the town of Rocky Mount. It runs primarily on electricity but also uses propane for industrial space heaters.
- **M.W. Manufacturers:** The largest employer in the county is a manufacturer of window and door products for the residential construction industry that is owned by Ply Gem Industries (NYSE: PGEM). The facility rests on 38.7 acres occupied by a 578,000 square foot building and employees 600-1,000 workers.
- **Newbold Corporation:** A privately-held company with a manufacturing facility that produces solutions for positive patient identification, plastic cards, dog tag embossing, and retail technology/implementation for point of sale (POS) services. The facility is 100,000 square feet and employs approximately 90 people. The facility operates primarily on electricity with propane used for heating and backup electricity.
- **Ronile:** An employee-owned company that supplies custom dyed accent yarns, space-dyed nylon, polyester, acrylic, and other fibers to the carpet, rug, home furnishing, craft, and automotive markets. Ronile employs 100-300 workers in Rocky Mount. It uses a combination of electricity and biomass for operations.
- **Solution Matrix:** A manufacturer of cold therapy wraps. The facility is about 5 miles outside of the town of Rocky Mount, in the same industrial park as McAirlaids. The plant is 48,000 square feet and runs on electricity and propane.
- **Trinity Packaging Corporation:** A privately-owned business that manufactures plastics products (retail store bags, mailing envelopes, food service bags, lawn and garden bags, etc.). The facility has 300-600 employees. Trinity is investing \$9.5 million in an expansion project that will create 25 new jobs.²⁴
- **The Uttermost Company:** An upscale furniture manufacturer that operates a 600,000 square foot facility in Rocky Mount.

²³ Virginia Employment Commission Report, Franklin County Community Profile, page 22.

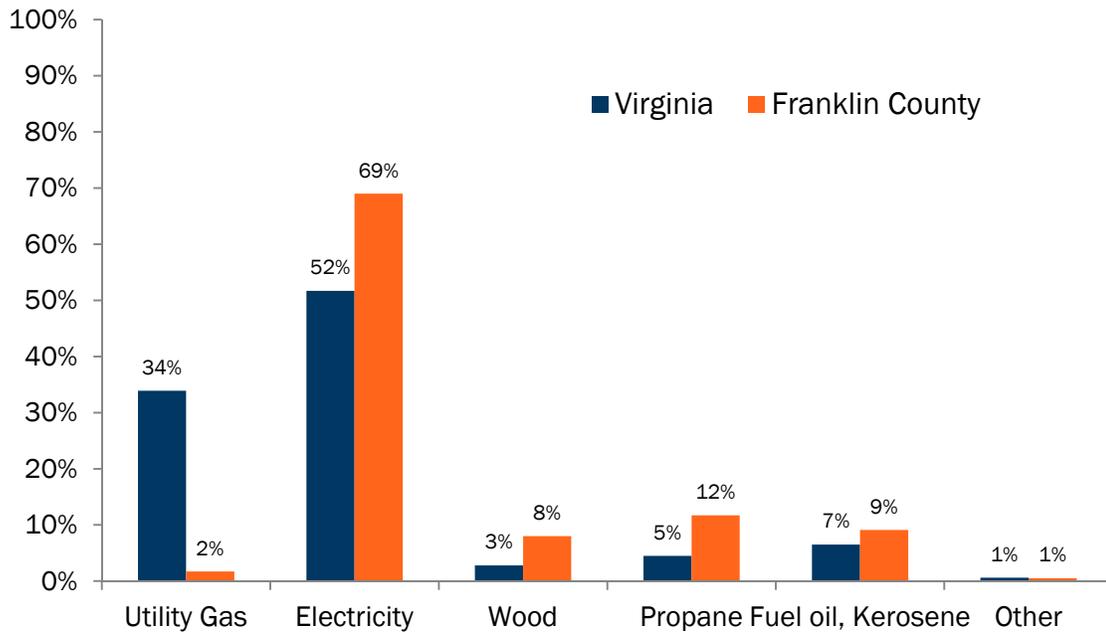
²⁴ www.thefranklinnewspost.com/article.cfm?ID=27728

Energy Profile

Residential and Commercial

There are approximately 23,500 housing units in Franklin County, of which approximately 1,900 units are located in Rocky Mount. Almost seventy percent of Franklin County households use electricity as their source for space heating as shown in Figure 12.

Figure 12 – Primary Space Heating Fuel Used in Franklin County versus the Commonwealth, Percentage of Housing Units²⁵



Typically natural gas consumption by commercial entities follows a similar pattern as residential since the decision to use natural gas is driven often by accessibility.

Municipal

The Franklin County municipal buildings principally include administration and schools. These buildings use electricity, fuel oil and/or propane for space heating and water heating. Most of the boilers in the Franklin County schools are equipped already to burn natural gas, especially in the northern part of the county.

²⁵ 2013 US Census Bureau 5 Year American Community Survey

Most commercial entities use electricity and/or propane for their space heating and water heating needs. Older buildings tend to use electricity and fuel oil, such as the main building for the Carilion Franklin Memorial Hospital.

Manufacturing

Since the manufacturers in Franklin County established their facilities in an area without natural gas, they rely primarily on electricity with propane where necessary. One manufacturer, Ronile, converted to biomass (wet sawdust) eight years ago for steam generation.

2. Giles

Economic Profile

Giles County is a 683 square-mile county located in Southwest Virginia with a population of 16,923. The county has a relatively strong economy. Its nominal GDP in 2014 was \$706 million or \$41,595 per person. The real GDP grew by 3.0% from 2013 to 2014²⁶ compared to the U.S. GDP growth of 2.4% during the same time period.²⁷ While its 2014 unemployment rate of 6.0% is above the Virginia average of 5.2%, it is just below the national average of 6.2%.

The county had 349 employers in 2013 with total employment of 4,530 or 13.0 employees per employer.²⁸ Almost one-quarter of the County residents works in manufacturing as shown in Table 11, with Celanese being the largest overall employer with ~600 employees.

Table 11 – Employment in Giles County by Sector

Sector	Employment	Percent of Total Employment
Commercial	2,053	45.3%
Manufacturing	1,025	22.6%
Government	868	19.2%
Construction	497	11.0%
Other	87	1.9%
Total	4,530	100%

²⁶ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

²⁷ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file “gdp2q15_2nd.xlsx” Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

²⁸ Virginia Employment Commission Report, Giles County Community Profile, page 20.

The average annual Giles County wage across all sectors in 2013 was \$38,100 as shown in Table 12. This wage rate was driven mainly by the high-paying 1,025 manufacturing jobs in the County, which averaged \$61,400 annually. Table 12 indicates that Giles County manufacturers paid, on average, 64% more than the next two highest-paying sectors (Government and Construction) in the county.

Table 12 – Annual Average Wages in Giles County by Sector²⁹

Sector	Average Annual Wage
Manufacturing	\$61,400
Government	\$37,300
Construction	\$36,900
Commercial	\$28,700
Arts, Entertainment, and Recreation	\$10,100
Weighted Average	\$38,100

The presence of manufacturing in Giles County also has a large influence on total wages paid. Table 13 shows that manufacturing represents over 36% of total wage income in Giles County while representing only 23% of employment. This is evidence of the extraordinary impact that manufacturing has on average county wage income.

Natural gas access could provide a significant boost in total wage income for Giles County. Combining the average wage rate for manufacturing with the 73 direct jobs potential from the previous section, we estimate that having additional gas capacity and access could increase total direct county-wide wages by almost \$4.5 million.

²⁹ Virginia Employment Commission Report, Giles County Community Profile, page 26.

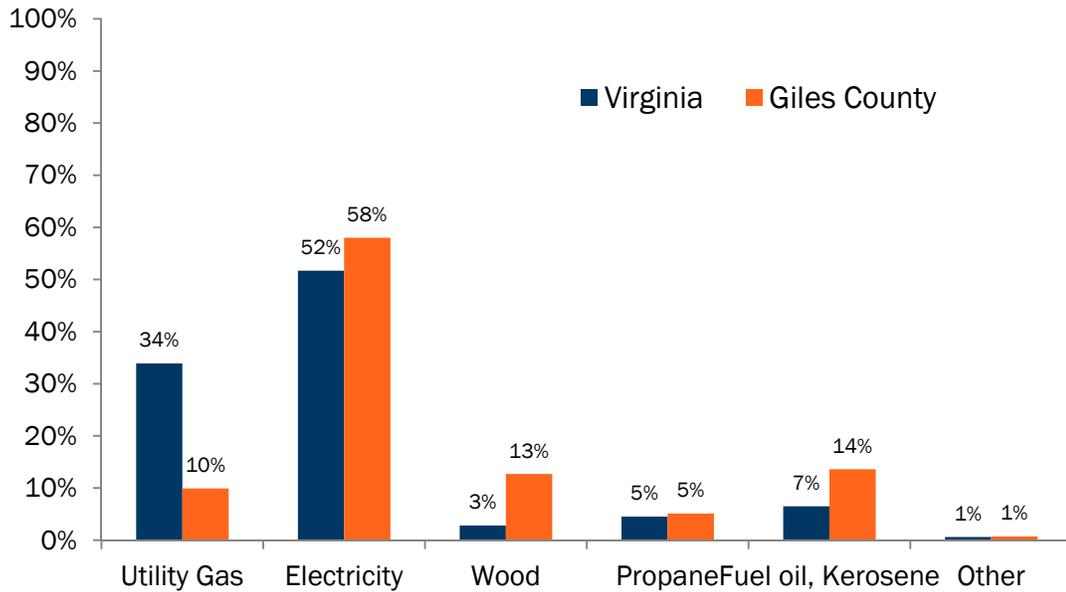
Table 13 – Giles County Total Wages by Sector – 2013 vs. Additional Jobs from MVP

Sector	2013 Total Wages	Share of Total Wages
Manufacturing	\$62,900,000	36.4%
Government	\$32,400,000	18.8%
Construction	\$18,300,000	10.6%
Commercial	\$58,900,000	34.1%
Arts, Entertainment, and Recreation	\$100,000	0.1%
Total	\$172,700,000	100%

Energy Profile

In the residential sector, approximately 58% of the 7,126 housing units in Giles County use electricity for home heating as shown in Figure 13, and 10% use natural gas. The remaining households use an almost equal mix of wood and fuel oil/kerosene.

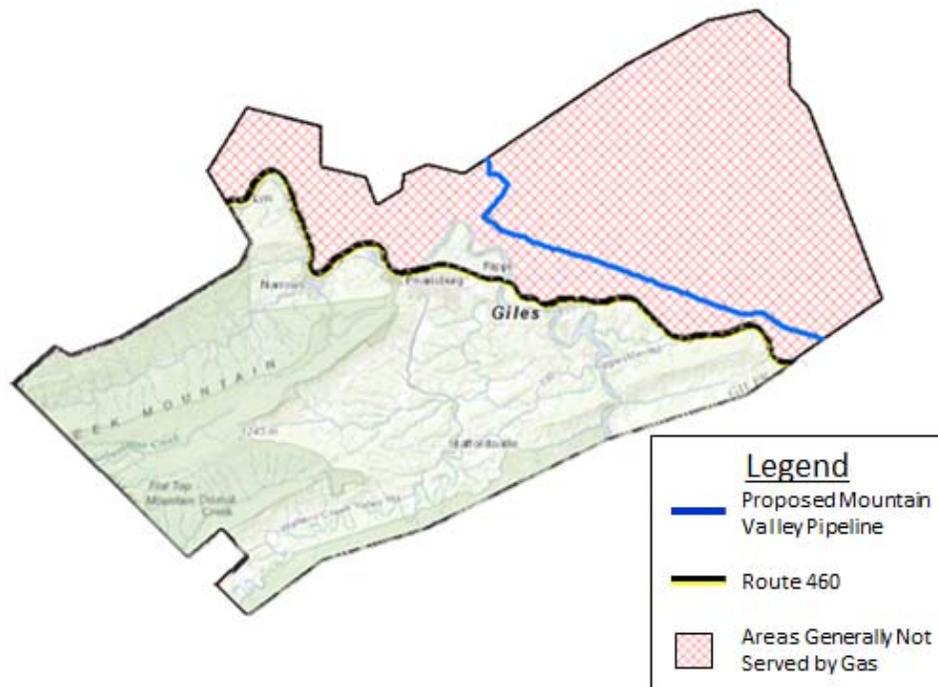
Figure 13 – Primary Space Heating Fuel Used in Giles County versus the Commonwealth, Percentage of Housing Units³⁰



Most of the consumers in Pearisburg and Narrows use gas and are serviced by Columbia Gas. However, these towns represent only 27% of the county households and commercial entities. Outside of these towns where the population density declines, residential and commercial consumers typically use electricity. Columbia Gas is the local distribution county (LDC) in Giles County with franchise rights. . We understand from interviews that the eastern portion of Giles County (east of the New River & Rt. 460) has no gas access as shown in Figure 14.

³⁰ 2013 US Census Bureau 5 Year American Community Survey.

Figure 14 – Portion of Giles County without Gas Access



In the manufacturing and electric sectors, there is a mix of fuel types used as shown in Table 14. The primary reliance on coal for some of its fuel has been due to economics associated with pipeline access, available capacity, and reliability.

Table 14 – Primary Fuel Consumed by Major Manufacturers in Giles County

Manufacturer	Fuel
Celanese	Coal, but switching to gas
LHoist	Coking Coal
Glen Lyn Power Plant	Coal, slated to be closed
Jennmar	Electricity
UFP Mid-Atlantic	Gas
GE Fairchild	Propane

For transportation fuels, county end-use sectors consume primarily refined oil products – diesel and gasoline – along with insignificant volumes of natural gas and biofuels.

3. Montgomery

Economic Profile

Montgomery County, VA is a 389 square-mile county located in Southwest Virginia with a population of 96,207. The county has a relatively strong economy. Its nominal GDP in 2013 was \$6.0 billion or \$62,366 per person.³¹ The real GDP grew by 1.4% from 2013 to 2014³² compared to the U.S. GDP real growth of 2.4%³³ during the same time period. Its 2014 unemployment rate of 5.2% is at the Virginia average and just the national average of 6.2%.

The county counted 2,105 employers in 2013 with total employment of 40,633 or 19 employees per employer.³⁴ Approximately 12% of the County residents work in manufacturing as shown in Table 15.

Blacksburg is the largest town with a population of 42,620 and is home to Virginia Polytechnic Institute and State University, better known as Virginia Tech. Virginia Tech is one of the nation's leading educational institutions and research universities. Blacksburg is also home to the Virginia Tech Corporate Research Center which is a research/business park that supports the region's high tech industries with over 140 high tech companies and research centers employing more than 2,000 people.³⁵

Table 15 – Employment in Montgomery County by Sector³⁶

Sector	Employment	Percent of Total Employment
Commercial	21,158	52.1%
Government	13,255	32.6%
Manufacturing	4,742	11.7%
Construction	1,077	2.7%
Other	401	1.0%
Total	40,633	100%

Manufacturing employs over 4,700 workers, representing 12% of the jobs in the county. Below are some of the largest manufacturers:

³¹ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

³² National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

³³ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xlsx.xls" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

³⁴ Virginia Economic Development Partnership Report, Montgomery County Community Profile, page 4.

³⁵ Virginia Economic Development Partnership Report, Montgomery County Community Profile, page 3.

³⁶ Virginia Economic Development Partnership Report, Montgomery County Community Profile, page 22; FTI analysis.

- **Corning Glass Works:** A public company, located in Blacksburg, VA, that produces specialty glass, ceramics, and other materials used in the consumer electronics, telecommunications, transportation, and life sciences industries. The Blacksburg facility manufactures automotive ceramic substrates.
- **Federal Mogul Corp:** A publicly-traded company that creates products used in automotive, light commercial, heavy-duty and off-highway vehicles, as well as in power generation, aerospace, marine, rail and industrial. Located in Blacksburg, VA, it employs over 400 people.
- **Lexington Rowe Furniture Inc.:** An upscale furniture manufacturer located in Elliston, VA.
- **Moog, Inc.:** A public designer, manufacturer, and integrator of precision motion control products and systems, located in Blacksburg, VA. The Blacksburg location is specifically a design and manufacturing facility for motors, resolvers and fiber optic devices for military and aerospace markets and they also manufacture large slip rings for medical applications. Moog has 400,000 square feet in Montgomery County and relies primarily on electricity for processes.
- **New River Energetics:** Operated by Alliant Techsystems, and located in Radford, VA. This is a business involved in loading, assembling, and packing medium-caliber ammunition, as well as developing and producing commercial propellants. The company has 10 employees and \$1,000,000 in annual sales.
- **United Pet Group Inc.:** The aquatics division of United Pet Group is located in Blacksburg, VA. The company is a marketer and manufacturer of consumer and commercial aquatics products for the pet supplies industry.

Manufacturing jobs represent the highest wages among all job sectors in Montgomery County. As Table 16 shows, with an average of \$53,700 per year, manufacturing jobs are 33% higher than the average wage in the County.

Table 16 – Annual Average Wages in Montgomery County by Sector³⁷

Sector	Average Annual Wage
Manufacturing	\$53,700
Government	\$50,200
Construction	\$40,000
Commercial	\$31,500
Arts, Entertainment, and Recreation	\$11,900
Weighted Average	\$40,300

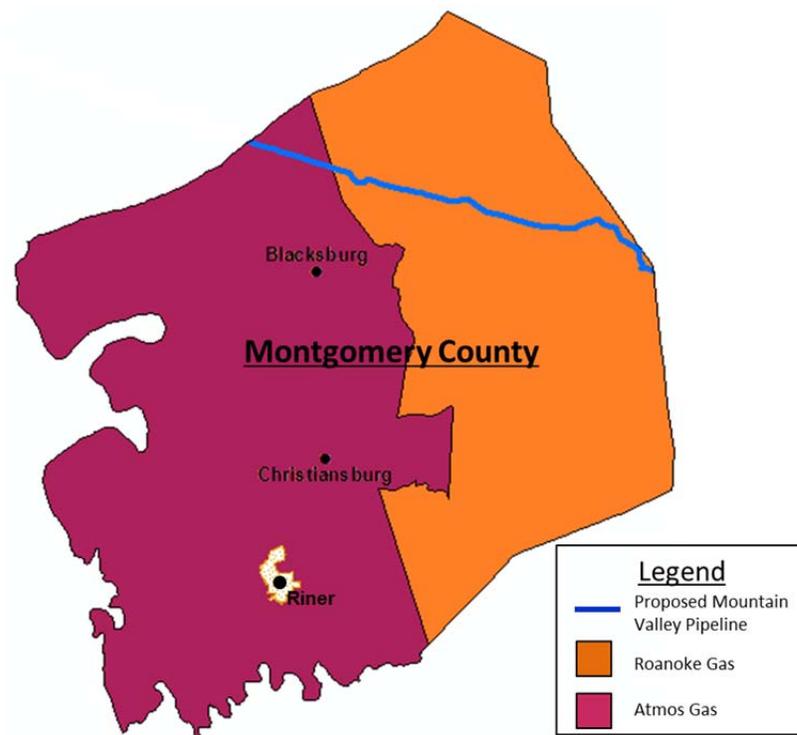
³⁷ Virginia Employment Commission Report, Montgomery County Community Profile, page 26; FTI analysis.

Furthermore, our analysis determined that energy-intensive manufacturers generally pay more than other manufacturing jobs. For example, in Giles County, where energy-intensive companies such as Celanese and LHoist are the top employers in the sector, average wages are more than \$60,000, which is 58% higher than the average wage in Montgomery County.

Energy Profile

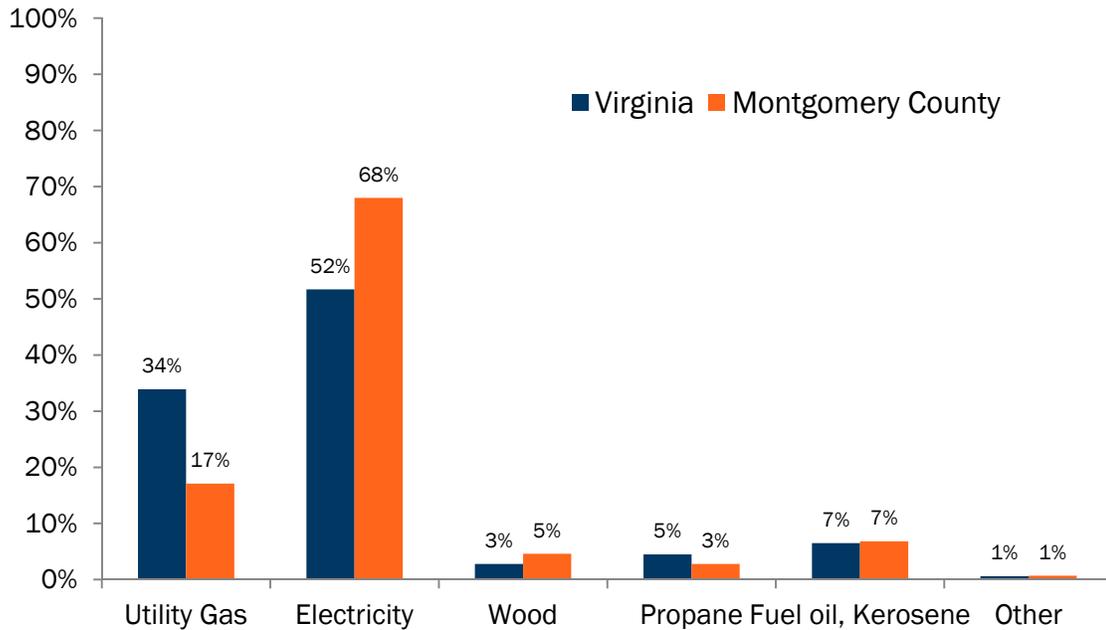
There is natural gas access in most of Montgomery County through Atmos in the western portion of the county and Roanoke Gas in the east as shown in Figure 15. One small area that is not served by natural gas is Riner, VA, which is south of Christiansburg.

Figure 15 – Natural Gas Service Territories in Montgomery County



A large portion of households (68%) use electricity as their primary fuel source for home heating as shown in Figure 16, and 17% use natural gas. Typically, commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility.

Figure 16 – Primary Space Heating Fuel Used in Montgomery County versus the Commonwealth, Percentage of Housing Units³⁸



For the manufacturing sector, the primary fuel sources are natural gas and electricity.

4. Pittsylvania

Economic Profile

Pittsylvania County, VA is a 978 square-mile county located in the Piedmont region of Virginia with a population of 62,246. Its nominal GDP in 2014 was \$4.0 billion or \$64,000 per person. The real GDP declined by 2.3% from 2013 to 2014³⁹ compared to the U.S. GDP real growth of 2.4% during the same time period.⁴⁰ Its 2014 unemployment rate of 7.5% is above both the Virginia average of 5.2% and the national average of 6.2%.

The city of Danville, which is outside of the county, is located along the southern border of Pittsylvania. This economically diverse county has a substantial manufacturing and commercial base due to access to highway and rail transportation systems. Chatham is the largest town in Pittsylvania.

³⁸ 2013 US Census Bureau 5 Year American Community Survey.

³⁹ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁴⁰ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2Nd.xlsx" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

Pittsylvania County has a total employment of 11,824. The majority (47%) are workers in the commercial sector, followed by government (25%) and manufacturing (17%) as shown in Table 17. The county counted 1,223 employers in 2013 with an average employment of 9 employees per employer.⁴¹

Table 17 – Employment in Pittsylvania County by Sector

Sector	Employment	Percent of Total Employment
Commercial	5,510	46.6%
Government	2,979	25.2%
Manufacturing	2,020	17.1%
Construction	941	8.0%
Other	374	3.2%
Total	11,824	100%

Manufacturers in Pittsylvania County employ more than 2,000 people, which represent 17.1% of the total employment in the county. Manufacturers are primarily located around the Danville perimeter and in the Chatham area, and most have access to natural gas.

- **Amthor International:** A private company that manufactures tanks for fuel, propane, water and tank trucks. The company employees over 100 people in an 86,000 square foot facility located in Gretna, Virginia.
- **Elkay Wood Products Company:** Manufacturer of wood kitchen cabinets and countertops, which employs 500 employees at the Ringgold, Virginia location.
- **Owens Brockway Glass:** Creates glass contains for food, beer, wine, spirits and non-alcoholic beverage industries. Owens has locations in North American, Latin America, Europe, Asia and Australia. It also has a facility in Ringgold, Virginia.
- **Swedwood Danville LLC:** A furniture manufacturer which is a Swedish based subsidiary of IKEA. Production facility and local head office are located in Ringgold, Virginia, occupying one million square feet and employing 400 workers.

⁴¹ Virginia Employment Commission Report, Pittsylvania County Community Profile, page 22.

- **Times Fiber Communication:** A global manufacturer of high quality cables, fiber optic management equipment, and interconnect products for cable television, satellite, data, and powering applications for broadband communications networks. There is a facility located in Chatham, Virginia.
- **Unique Industries:** A wholesale supplier of party goods, located in Blairs, Virginia. Unique Industries employs over 350 associates in a 750,000 square foot facility. Facility uses natural gas.

Natural gas is important to retaining existing manufacturers and attracting new manufacturers to the county. Our interviews and analysis identified that manufacturers value abundant and reliable gas service and that access to natural gas is a primary criterion for determining where to locate new manufacturing facilities.

Manufacturing jobs represent the highest wages among all job sectors in Pittsylvania County. As Table 18 shows, with an average of \$43,700 per year, manufacturing jobs are 40% higher than the average wage in the County.

Table 18 – Annual Average Wages in Pittsylvania County by Sector⁴²

Sector	Average Annual Wage
Manufacturing	\$43,700
Government	\$35,600
Construction	\$29,600
Commercial	\$24,400
Arts, Entertainment, and Recreation	\$21,000
Weighted Average	\$31,400

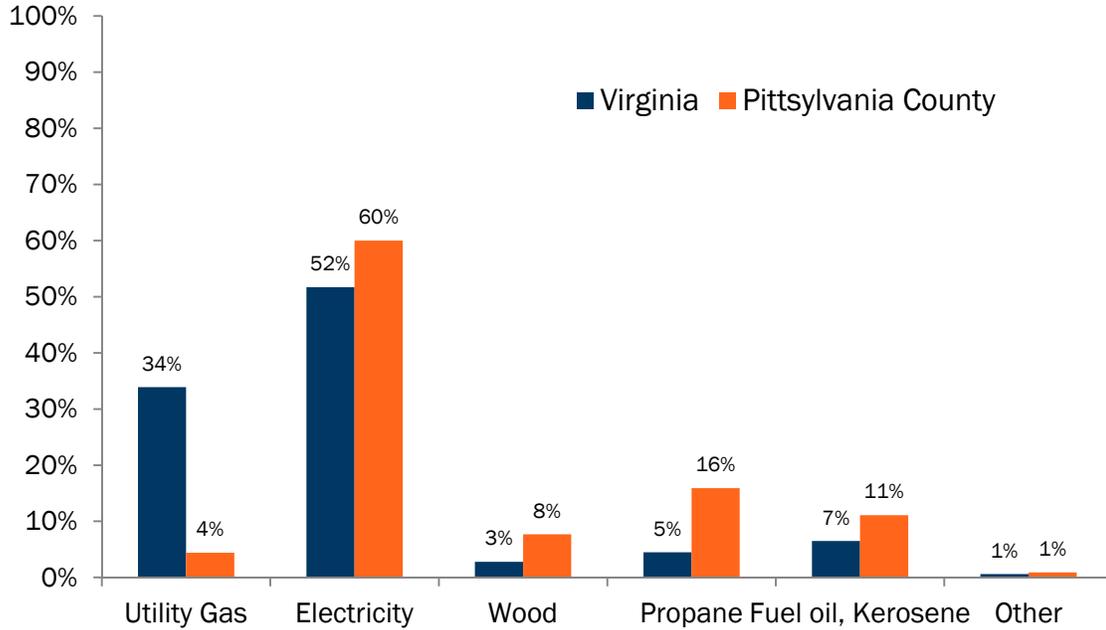
Energy Profile

The Williams Transco Pipeline cuts across the state and provides natural gas access to Chatham. Columbia Gas serves Hurt, which is a small town in the northern part of the county. Some areas bordering Danville, such as Ringgold, are served by the City of Danville. Most other towns, including Gretna, do not have natural gas service. As a result, large portion of households (60%) use

⁴² Virginia Employment Commission Report, Pittsylvania County Community Profile, page 26.

electricity as their primary fuel source for home heating as shown in Figure 16, and only 4% use natural gas.

Figure 17 – Primary Space Heating Fuel Used in Pittsylvania County versus the Commonwealth, Percentage of Housing Units⁴³



The majority of manufacturers use gas and electricity.

⁴³ 2013 US Census Bureau 5 Year American Community Survey.

5. Roanoke

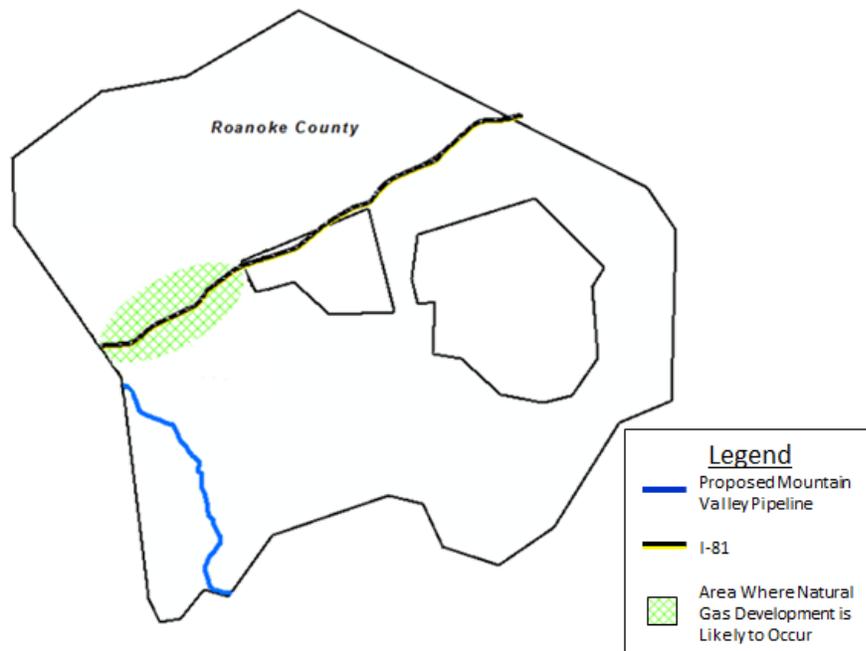
Economic Profile

Roanoke County, VA is a 251 square-mile county located in Southwest Virginia with a population of 93,524. It is the largest urban county in Virginia west of Richmond and the suburban hub of the Roanoke Valley. With I-81 running through Roanoke, the county has easy access to major markets along the east coast and is close to a number of major universities.

The county has a relatively strong economy. While its nominal GDP in 2014 was \$7.0 billion or \$75,000 per person, real GDP growth was only 0.8% from 2013 to 2014⁴⁴ compared to the U.S. real GDP growth of 2.4%.⁴⁵ The unemployment rate in Roanoke County is 5.0%, which is just below the Virginia average of 5.2% and below the national average of 6.2%.

There are two independent cities within the Roanoke County boundaries that are not part of the county – Roanoke and Salem. Parts of western Salem stretch into Roanoke County and form the Glenvar and Dixie Caverns areas, where there is significant commercial and manufacturing activity. According to the Roanoke County Department of Economic Development, much of the county’s industrial development likely will occur along I-81 in the Dixie Caverns and Glenvar areas as shown in Figure 18. This area is in need of additional gas infrastructure.

Figure 18 – Areas Where Natural Gas Development is Likely to Occur



⁴⁴ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

⁴⁵ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file “gdp2q15_2Nd.xlsx” Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

The county counted 2,269 employers in 2013 with total employment of 34,301 or 15.1 employees per employer.⁴⁶ Approximately 8.4% of County residents work in manufacturing as shown in Table 19. The Roanoke County School Board is the largest employer in the county.

Table 19 - Employment in Roanoke County by Sector⁴⁷

Sector	Employment	Percent of Total Employment
Commercial	24,764	72.2%
Government	4,997	14.6%
Manufacturing	2,892	8.4%
Construction	978	2.9%
Entertainment	447	1.3%
Other	223	0.7%
Total	34,301	100%

Manufacturers in Roanoke County employ approximately 2,900 people and represent 8% of the total employment in the county. Most of these manufacturers already have access to natural gas through Roanoke Gas. Below are some of the largest manufacturers in the county:

- **Americold:** Located in Glenvar. Americold provides temperature controlled warehousing and logistics with the largest network in the US.
- **Blue Ridge Beverage:** Located in Glenvar – one of five locations throughout Virginia. Blue Ridge Beverage is a wholesale beverage distributor. The Glenvar facility is 78,000 square feet.
- **Industrial Battery and Charger:** Located in Glenvar. Largest independent and family owned distributor of industrial batteries and chargers in the US. Operates 12 branch locations covering AL, FL, GA, KY, NC, SC, TN, VA, and DC.
- **New Millenium:** Located in Glenvar. Provides structural steel building solutions. 6 locations across the US including a manufacturing facility. Salem plant manufactures steel joists and metal decking.
- **Novozymes:** Located near Dixie Caverns in the Center for Research and Technology. Novozymes is a leader in innovation, provide biological solutions used in the production of

⁴⁶ Virginia Employment Commission Report, Roanoke County Community Profile, page 20.

⁴⁷ Virginia Employment Commission Report, Roanoke County Community Profile, page 22.

numerous products such as biofuel, detergents, feed, and crops. The Salem facility is one of 10 in the U.S. and 33 worldwide.

- **RR Donnelley:** Located in Glenvar. RR Donnelley provides printing services to clients around the world. The company employs over 57,000 worldwide and has \$10.5B in sales. This plant is currently a large electricity consumer.
- **Synchrony:** Headquartered in Glenvar. Manufactures many products including active magnetic bearings, high speed motors and generators, and power electronics for clean, efficient, and reliable rotating machinery. The Salem manufacturing facilities span 57,800 square feet.
- **Tecton:** Located near Dixie Caverns in the Center for Research and Technology. Tecton designs and manufactures fiberglass products for the construction industry. The Salem facility is 73,500 square feet on a 20 acre site.

Manufacturing jobs represent among the highest wages among all job sectors in Roanoke County. As Table 20 shows, with an average of \$46,020 per year, manufacturing jobs are 17% higher than the average wage in the county.

Table 20 - Annual Average Wages in Roanoke County by Sector⁴⁸

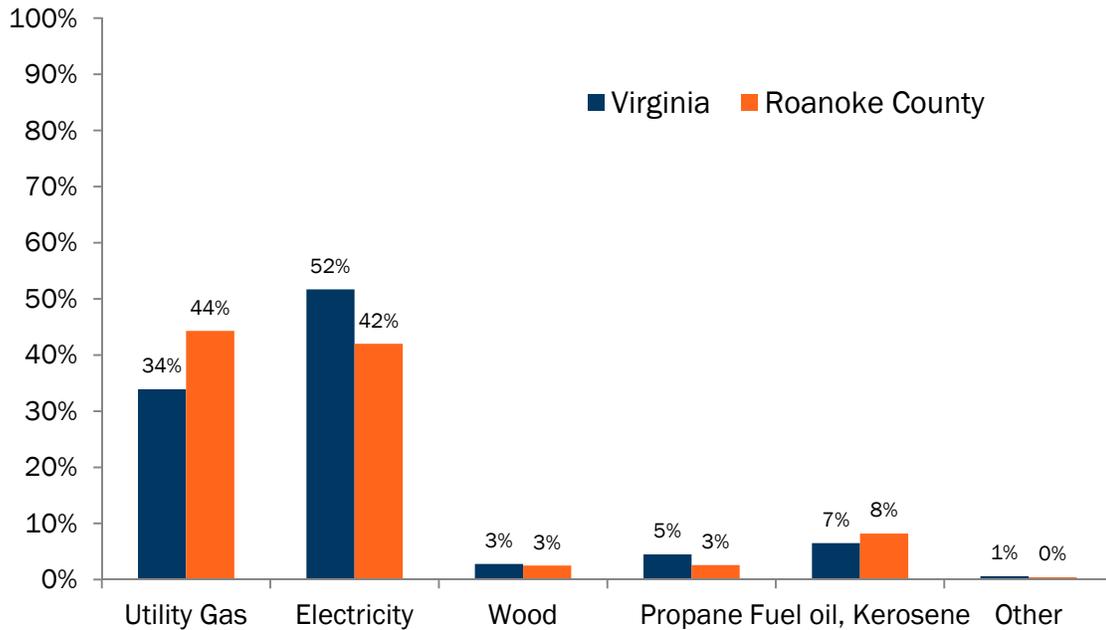
Sector	Average Annual Wage
Government	\$51,480
Manufacturing	\$46,020
Commercial	\$36,111
Construction	\$33,592
Entertainment	\$12,792
Weighted Average	\$39,234

Energy Profile

The residential, commercial, and municipal sectors in Roanoke County mainly use gas and electricity as their home heating fuel choice. As Figure 19 shows, the majority of households use natural gas as their primary fuel source for home heating. Typically, commercial and municipal buildings follow the same pattern since natural gas as a fuel choice often is driven by accessibility.

⁴⁸ Virginia Employment Commission Report, Roanoke County Community Profile, page 26.

Figure 19 – Primary Space Heating Fuel Used in Roanoke County versus the Commonwealth, Percentage of Housing Units⁴⁹



Based on our interviews, we found that the majority of manufacturers use gas and electricity to drive their processes. This preference for gas over other fuels typically is due to accessibility of gas relative to where manufacturers are located in the county along with the cost of gas. It is worth noting that a significant amount of manufacturing electricity consumption could be transferred to on-site, distributed generation if the economics and load profile of the consumption are amenable.

For transportation fuels, we found that traditional oil-refined fuels – gasoline and diesel – represent the vast majority of fuel consumption. Alternative transportation fuels, such as compressed natural gas, could be a substitute, especially for fleet vehicles.

6. Craig

Craig County is a 331 square-mile county located in Southwest Virginia with a population of 5,210. This sparsely-populated county had a nominal GDP in 2014 of \$85.5 million or \$16,411 per person. The real GDP declined slightly by 0.3% from 2013 to 2014⁵⁰ compared to the U.S. GDP growth of

⁴⁹ 2013 US Census Bureau 5 Year American Community Survey.

⁵⁰ National Association of Counties. <http://www.uscounties.org/countyTracker/index.html>

2.4% during the same time period.⁵¹ Its 2014 unemployment rate of 6.3% is above the Virginia average of 5.2%, and only slightly above the national average of 6.2%.

Craig is a rural county, with Jefferson National Forest and Niday State Park covering nearly two-thirds of the county. The county has not stop lights and is criss-crossed by Virginia Scenic Byways.⁵² New Castle, the county seat, is the only town in the county. It has a population of only 153.

As shown in Table 11, Craig County had 674 employees in 2013 and no manufacturing sector.⁵³ A large portion of the county employment is in the commercial and government sectors (82%). The Craig County Public School system is the largest employer. Many of Craig's residents commute into nearby Roanoke.

Table 21 – Employment in Craig County by Sector

Sector	Employment	Percent of Total Employment
Commercial	294	44%
Government	258	38%
Construction	16	2%
Manufacturing	0	0%
Other	106	16%
Total	674	100%

The average annual Craig County wage across all sectors in 2013 was \$30,024 as shown in Table 12. Government is the only sector that earns wages above the county average.

⁵¹ <http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>; file "gdp2q15_2nd.xlsx" Table 1 – Real Gross Domestic Product and Related Measures: Percent Change from Preceding Period.

⁵² <http://craigcountyva.gov/about/>

⁵³ Virginia Employment Commission Report, Craig County Community Profile, page 20.

Table 22 – Annual Average Wages in Craig County by Sector⁵⁴

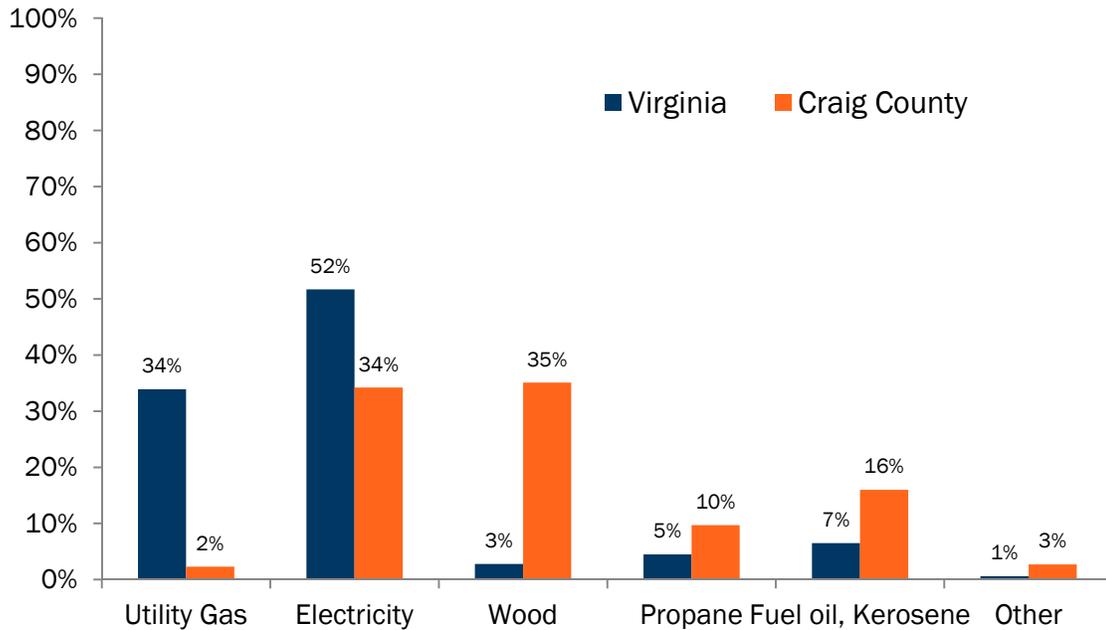
Sector	Average Annual Wage
Government	\$39,156
Commercial	\$27,079
Construction	\$20,384
Other	\$17,420
Weighted Average	\$30,024

Energy Profile

Craig County generally has no natural gas access. As Figure 13 shows, the majority of the county's households use wood (35%), electricity (34%), and delivered petroleum-based fuels (26%) for home heating. The commercial and municipal sectors consume mainly electricity and petroleum-based fuels for space heating purposes.

⁵⁴ Virginia Employment Commission Report, Craig County Community Profile, page 26.

Figure 20 – Primary Space Heating Fuel Used in Craig County versus the Commonwealth, Percentage of Housing Units⁵⁵



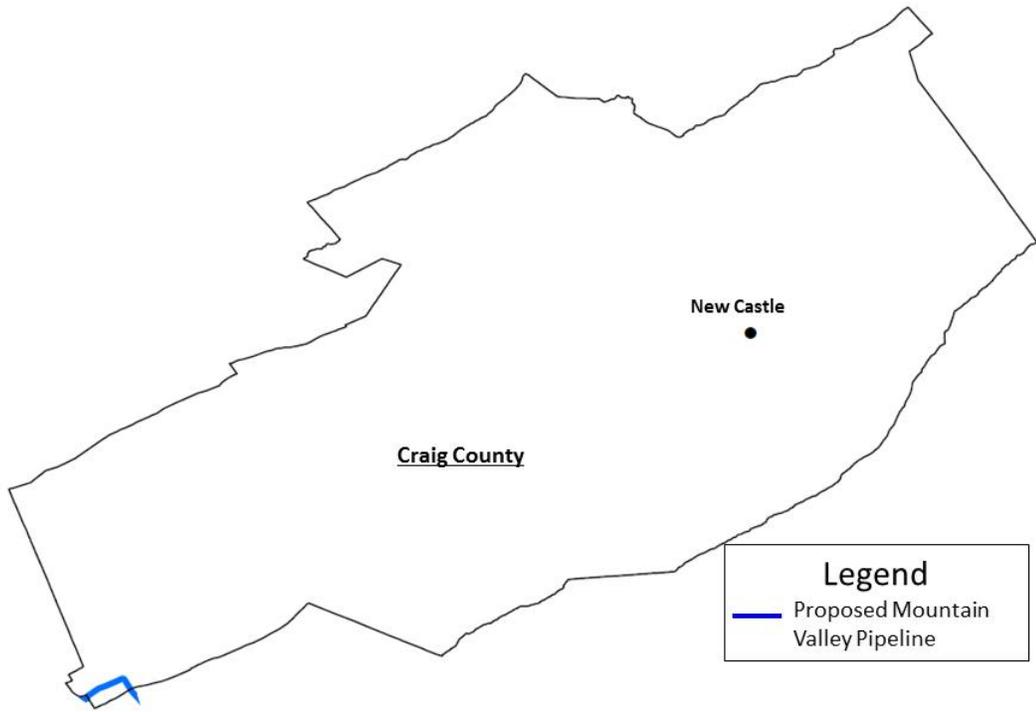
The MVP project would clip the southwestern corner of the Craig County with a 1.8 mile segment (Figure 21). The Town of New Castle, which would be 9 to 14 miles from the planned route, is not served by natural gas. The MVP project could create a savings opportunity for consumers if they were to switch to natural gas. Delivered natural gas prices in 2014 in Virginia were 65% less than the cost of average residential electricity prices in Craig County.

While there currently is no manufacturing activity in Craig County, the MVP project could help attract new manufacturers to the county as it would provide access to a supply of affordable fuel. The benefits of manufacturing to an economy are clear. In neighboring Giles County, the manufacturing sector employs over 1,000 people, accounting for \$63 million in annual wages or \$63,000 in average annual wages per employee.

Fuel switching in municipal and private vehicle fleets presents a possible savings opportunity, but only if a refueling station was shared with Roanoke County along I-81. There are about 15 potential county vehicles, which if converted from gasoline and diesel, would yield about \$60,000 in annual county savings.

Figure 21 – Proposed Route of MVP Pipeline in Craig County

⁵⁵ 2013 US Census Bureau 5 Year American Community Survey.





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Mountain Valley Pipeline Project

Docket No. CP16-__-000

Resource Report 5

Appendix 5-B Traffic and Transportation Management Plan



Mountain Valley Pipeline Project

Docket No. CP16-__-000

Traffic and Transportation Management Plan

October 2015

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1.0 Introduction

Mountain Valley Pipeline, LLC (MVP) has developed this Traffic and Transportation Management Plan to describe the measures MVP and their Contractors will take to minimize potential impacts on federal, state and local roadways during the construction of the Project. This plan outlines traffic impact minimization measures, noxious weed control measures, and dust control methods that will be used on the Project to reduce impacts during construction.

Operations and maintenance activities will be conducted with light vehicles at very few occasions that should have no impact to roadways and traffic once the project is in-service.

2.0 Traffic Impacts

Prior to construction, MVP will obtain applicable Federal, State/Commonwealth, and local road use and crossing permits, as required. MVP personnel will comply with all permit requirements and conditions to provide for public safety and minimize impacts on public roads. Copies of this *Traffic and Transportation Management Plan* and applicable road use and crossing permits will be provided to the appropriate personnel and maintained at each Contractors' field office.

MVP's Traffic Coordinator will consult with State/Commonwealth and local agencies regarding detour routes, speed/load limits, and other use limitations, conditions, or restrictions on the roads that will be utilized during construction. Before the start of construction, MVP will work with these agencies to obtain the most up-to-date traffic information for the roadways in the MVP Project area as well as ongoing road reconstruction or improvement projects in the vicinity of the pipeline route and facilities area. Where local, private roadways will be affected, MVP will coordinate with landowners and lessees of properties to mitigate potential impacts on those roads. Similarly, where roads on public lands will be affected, MVP will coordinate with the appropriate managing agency to mitigate potential impacts on roads or implement required traffic and transportation procedures. As discussed further in the following sections, MVP will place and maintain traffic control measures, such as flag persons, warning signs, lights, and/or barriers, as appropriate, to ensure the safety of construction workers and the public and to minimize traffic congestion. MVP will maintain traffic flow and emergency vehicle access on roadways with traffic control personnel or detour signs, where necessary. MVP's Traffic Coordinator will work with local law enforcement, fire departments, and emergency medical services to coordinate access for effective emergency response during construction. Contractors will be directed to comply with local weight limitations and restrictions on area roadways.

MVP strives to mitigate the increase in construction-related truck traffic on local roads shared with community and school buses in suburban and more densely populated rural areas. Key components to a successful community partnership include:

- Central point of command for construction traffic route plan. MVP will have a Traffic Coordinator reporting to the Safety Program Manager responsible for maintaining traffic related plans, procedures, records, and documents.
- School bus curfews. Often times construction vehicles can pose concern when school buses are traveling their established routes. The community expects for their children to have safe and timely travel to and from school. MVP will work with the governing School Districts or the School Transportation Department in the project area to identify the bus routes and times. Construction traffic will be limited or refrained during the bus route times with a published

school bus route curfew time period. Speed enforcement. In more rural areas, law enforcement is often not staffed to handle a sudden increase in traffic. Establishing a third-party contractor to assist in monitoring the speed of the route not only keeps contractor and the public safe but lends accountability to MVP. Inevitably, contractors will end up off of bonded routes. The Traffic Coordinator will be able to actively monitor these issues and reduce unbonded travel that can become costly if damage occurs. The Coordinator can also be useful in diffusing potential hostile situations with neighbors and landowners.

All impacts shall be within the guidelines of all applicable agencies, as well as approval from landowners. A list of state and county contacts is provided in the table below. At completion of the Project, MVP will restore all roads back to their original level of service or better, unless MVP is directed otherwise in writing by the landowner or regulatory agency. Pre-construction video will be used to document the roadway condition prior to Project usage.

County, State Requirements			
	Phone	Website	Contact Name/Position
State Agency			
West Virginia Department of Transportation (WVDOT)	(304) 558-0384	http://www.transportation.wv.gov	Wayne Kessinger, Permits Section Administrator
WVDOT	(304) 842-1500	http://www.transportation.wv.gov	Gary Clayton, P.E., Statewide Oil and Gas Coordinator
West Virginia County			
Wetzel	(304) 455-8217	http://www.wetzelcounty.wv.gov/	Larry Lemon, County Commissioner
Harrison	(304) 624-8690	http://www.harrisoncountywv.com/	Linda Cross, Deputy Director of Planning Commission
Doddridge	(304) 873-2631	http://www.doddridgecounty.wv.gov/	George Eidel, OES Manager
Lewis	(304) 269-8200	http://www.lewiscountywv.org/	Cindy Whetsell, County Administrator
Braxton	(304) 765-2835	http://www.braxtoncounty.wv.gov/	Edie Tichner, Administrative Assistant
Webster	(304) 847-7600	http://www.webstercounty.wv.gov/	Traci Dean, County Administrator/Floodplain Manager
Nicholas	(304) 872-0811	http://www.nicholascountywv.org/	David Brown, County Maintenance Assistant Supervisor
Greenbrier	(304) 647-6689	http://www.greenbriercounty.net/	Kelly Banton, Commission Assistant
Fayette	(304) 574-4273	http://www.fayettecounty.wv.gov/	Tim Richardson, Zoning Enforcement Officer
Summers	(304) 466-7126	http://www.summerscountywv.org/	Greg Bandall, County Assessor
Monroe	(304) 772-3096	http://www.monroecountywv.net/	Donald Evans, County Clerk
West Virginia Community			
Smithfield (town)	(304) 334-5641	N/A	
Salem (city)	(304) 838-3635	http://www.local.wv.gov/salem/	Ronnie Davis, City Manager
Cowen (town)	(304) 226-3101	http://www.local.wv.gov/cowen/	Tammy Crue, Mayor
Camden-on-Gauley (town)	(304) 226-8667	http://www.local.wv.gov/camdenongauley/	Lisa Cutlip, Mayor
Quinwood (town)	(304) 438-6658	N/A	Cassandra Childers, Town Clerk
Rainelle (town)	(304) 438-7191	http://www.rainelle-wv.com/	Eddie Midkiff, Town Recorder
Rupert (town)	(304) 392-5682	http://www.local.wv.gov/rupert/	Jim Nichols, Mayor

County, State Requirements			
	Phone	Website	Contact Name/Position
State Agency			
Virginia Department of Transportation (VDOT)	(540) 381-7194	http://www.virginiadot.org/	Paul Brown, Area Land Use Engineer
Virginia County			
Giles	(540) 921-2525	http://www.gilescounty.org/	Bryan Reed, Subdivision Agent/VDOT Project Administrator
Montgomery	(540) 394-2148	http://www.montgomerycountyva.gov/	Emily Gibson, Planning Director
Roanoke	(540) 776-7190	http://www.roanokecountyva.gov/	Richard Caywood, Assistant County Administrator
Franklin	(540) 483-3030	http://www.franklincountyva.gov/	Neil Holthouser, Director of Planning/Community Development
Pittsylvania	(434) 432-7974	http://pittsylvaniacountyva.gov/	Greg Sides, Assistant County Administrator
Virginia Community			
Pearisburg (town)	(540) 921-0340	http://www.pearisburg.org/	Rick TawneyTown Engineer/Director of Public Works
Pembroke (town)	(540) 626-7191	http://www.pembrokeva.org/	Stanley Lucas, Utility Director
Newport (village)	(540) 544-6822	http://www.newportrecreation.com/	Ava Howard, Community Action Committee Marketing Director
Blacksburg (town)	(540) 961-1100	http://www.blacksburg.gov/	Randy Formica, Construction Engineer
Boones Mill (town)	(540) 334-5404	http://www.townofboonesmill.org/	Jane Campbel, Town Treasurer
Rocky Mount (town)	(540) 483-0907	http://www.rockymountva.org/	Josh Gibson, Town Planner
Chatham (town)	(434) 432-8153	http://www.chatham-va.gov/	Bob Hanson, Director of Public Works

3.0 Pipeline Road Crossings

MVP will construct road and highway crossings in accordance with the permit requirements and the construction drawings for the crossing. No work on any such crossing shall be started before obtaining all applicable permits from the regulatory agencies. At a minimum, MVP will maintain single lane traffic on all roads and shall provide flagmen, road signs and all other signaling required by the governing authority to supervise the flow of traffic. MVP will provide barricades, warning signs, flares, lanterns, flagmen and such other protective measures required to maintain traffic and to safeguard the public at all times.

Any damage to paved or blacktop roads shall be repaired per specifications provided by the regulatory agencies. Road surfaces other than hard surface roads (i.e., paved, blacktop, or concrete) shall be backfilled in well-tamped 6-inch layers and shall be finished with a well-tamped surface matching the existing road. If flowable fill is used, it will be in accordance with the appropriate mix per agency specifications. For all types of crossings, additional or other limitations may be provided by the governing municipality and must prevail.

At the end of each workday, MVP will make passable any open-cut driveways for ingress and egress. This may be accomplished by using steel plates. Any and all steel plates used for such purposes shall be properly pinned (i.e., secured in place) and ramped on each end to allow traffic flow. The backfilling road crossings shall be performed immediately after the pipe is installed and in accordance with requirements established by the applicable permit.

4.0 Construction Traffic

An increase in traffic to local and state roads will be expected throughout the day between the hours of 6 am to 7 pm. The temporary traffic will include transportation for construction workers in light and heavy duty trucks, as well as tractor trailers hauling machinery and materials. Impacts are expected to be minor and short term because construction spreads and personnel will be geographically dispersed and personnel will commute to and from work areas in early morning and late evening during nonpeak traffic hours. Traffic will be entering and leaving off-site locations such as laydown yards, right-of-way and additional temporary workspace for the purpose of pipeline construction, hauling material and roadway maintenance. Once the material and heavy equipment are placed on the right-of-way, construction equipment will move in a linear manner along the right-of-way as work progresses, minimizing traffic on local roads. The amount of equipment moved by hauling from site to site will be reduced due to the accessibility created by the construction right-of-way.

MVP intends to make road improvements at areas that are not conducive to heavy hauling and large traffic volume, in addition to maintaining all bonded roads during construction, and finally returning the roads back to their original or better level of service, meaning their original width and length, unless MVP is directed otherwise in writing by the landowner or state agency.

5.0 Noxious Weeds

To prevent noxious weeds from transporting along roadways, MVP developed the following plan:

- The prompt seeding and revegetation of areas of disturbed soils with certified weed-free seed.
- Encourage the cleaning of equipment and vehicles prior to entering or leaving each management area. (Pressure wash in a designated area only.)
- Minimize soil disturbance, where possible.

- Use certified weed-free mulch/straw for erosion control.
- Mowing of weeds in newly revegetated areas during the first season of establishment prior to seed formation of the weeds in the revegetated area. Care will be taken to encourage seed formation and growth of new native plants.

6.0 Fugitive Dust Control

Dirt and gravel during construction periods in dry weather can create an inhospitable environment for neighbors and workers. MVP developed the Fugitive Dust Control Plan to address this issue. Highlights of that Plan are also discussed below.

Implementation of construction and restoration best management practices and operational controls will be used to mitigate fugitive dust emissions. The project earth disturbance permit will outline specific practices that control fugitive dust, including a construction sequence; use of rock construction entrances; and temporary soil stabilization methods. Operational controls are also implemented, including the use of a reduced speed limit on unpaved access roads as well as sweeping/vacuuming paved roadways when Project-related soils are tracked out onto paved surfaces.

Wet suppression, using water, is the predominate method of suppressing fugitive dust on unpaved roads and gravel pads as it causes finer materials to adhere into larger particles. Increasing the moisture content of the finer materials may be accomplished either naturally or mechanically. Moisture content of unpaved road surfaces can be naturally increased through rainfall. Moisture content can also be increased mechanically through the application of water. The amount of water required to sufficiently control fugitive dust emissions is dependent on the characteristics of materials (e.g., surface moisture content), ambient conditions (e.g., rainfall, humidity, temperature), activities occurring in the area (e.g., vehicle traffic, vehicle weight, speeds), etc.

The following actions will be taken to reduce fugitive dust from our operations:

I. Pipeline Construction Activities and Other Earth Disturbances

Fugitive dust emissions from vegetation removal, clearing and grading, cutting and filling, topsoil removal, trenching, backfilling and stockpile storage will be controlled to a great extent by following the construction sequencing and disturbing limited areas at a time. If sustained visible dust plumes occur, dust suppression can be achieved by applying water along the travel lane and disturbed land via water truck. Spoil piles left undisturbed for four or more days should be temporarily stabilized with seed and mulch to prevent wind and water erosion.

II. Unpaved Roads

Fugitive dust emissions generated by motorized equipment and miscellaneous vehicle traffic will be controlled by wet suppression as necessary. Fugitive dust emissions from active access roads will be controlled by periodic wetting of surfaces using a water truck. During periods of high truck traffic, road surfaces will be wetted more frequently to minimize dust emissions. Watering will occur less frequently if weather conditions (e.g., rain, frozen surfaces, etc.) are adequate to suppress dust. On unpaved roads, MVP will limit the speed limit to reduce the potential of fugitive dust emissions. On unpaved roads, MVP will reduce the speed limit to reduce the potential of fugitive dust emissions.

III. Paved Roads

Fugitive dust emissions from paved roads will be controlled with a combination of water trucks, power washers, sweeping and/or vacuuming, as appropriate, to minimize the amount of fugitive dust that is generated and built up on the road surfaces.

IV. Track-out onto Roads

Trackout of loose materials will be controlled using rock construction entrances on access roads that begin at a junction with paved roads; this is done to prevent tracking of mud onto public roadways. In the event that loose material goes beyond the rock construction entrance, sweeping and or vacuuming will be used to remove the materials. In the event that loose material goes beyond the rock construction entrance, sweeping and or vacuuming will be used to remove the materials.

V. Deposition on Other Premises

MVP will take all appropriate actions to prevent the deposition of solid or liquid materials onto any other premises from the Project site and access roads that may cause or contribute to visible dust emissions. Preventive actions may include, but are not limited to dust control, such as wet suppression, the operation of a sweeper truck on paved roadways equipped with water suppression, and the operation of a vacuum truck.

VI. Tackifiers

Contractor may propose the use of tackifiers to reduce fugitive dust provided that the product to be utilized has been approved by the appropriate federal and state agencies where its application will occur. Contractor will detail the proposed use of any such substances in their dust control plan and provide copies of the material safety data sheets and application procedures. Typically, tackifiers used are DustFloc, RoadFloc and Kodiak Super TACKMixes.

6.1 INSPECTION, MONITORING, AND RECORD KEEPING

The construction contractor will implement the dust control measures specified in this plan. All construction personnel will be informed of the measures in this plan. Environmental inspectors will have primary responsibility for monitoring and enforcing the implementation of dust control measures by the construction contractor. The inspectors will also be responsible for ensuring that these measures are effective and proper documentation is maintained. When environmental conditions are dry, inspection of dust control measures will be conducted daily, and the environmental inspectors will be responsible for recording the following information on a daily basis:

- weather conditions, including temperature, wind speed and wind direction;
- number of water trucks in use;
- incidents where dust concentration is such that special abatement measures must be implemented;
- condition of soils (damp, crusted, unstable, other) on the right-of-way and other construction sites;
- condition of soils (damp, crusted, unstable, other) on access roads;
- condition of track-out pads;
- overall status of dust control compliance.

This information will be incorporated into the environmental inspector's daily report, and significant

instances of non-compliance with the plan will be reported to the Construction Manager as soon as they are discovered.

7.0 Transportation Management on Federal Lands

7.1 U.S. FOREST SERVICE

The MVP will cross roads and utilize access roads on U.S. Forest Service (USFS) lands in the Jefferson National Forest (JNF) in West Virginia and Virginia. Traffic and transportation management activities on these lands will conform to the standards and guidelines contained within the Land and Resource Management Plan (LRMP) of the JNF for road use, maintenance, and construction. Applicable standards and guidelines, as well as site-specific requirements for traffic and transportation management activities, will be addressed in the *Plans of Development or Construction, Operations, and Maintenance Plans* prepared for the USFS lands crossed by the MVP. Potentially applicable standards and guidelines are listed below.

- Roads shall be designed and constructed to the standard necessary to provide access and manage resources according to management prescription desired conditions and public safety (JNF LRMP FW-230).
- All new and reconstructed roads will blend into the landscape to the extent practical (JNF LRMP FW-232).
- Apply the level of maintenance needed to protect the investment, facilitate resource management, and provide for user safety (JNF LRMP FW-234).
- Closed system roads are planted with native or desirable non-native wildflowers, forbs, shrubs, and/or grasses (JNF LRMP FW-235).
- Specify management requirements for permittee access roads in the designated use permit, where roads are included in the authorization (JNF LRMP FW-248).

7.2 NATIONAL PARK SERVICE

The MVP will cross National Park Service lands along the Blue Ridge Parkway in Virginia. MVP will use the Conventional Bore drill construction method to install the proposed pipeline under the parkway, which will avoid direct impacts on the parkway. No impacts on traffic along the Blue Ridge Parkway are anticipated.