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FTI CONSULTING

ECONOMIC BENEFITS OF THE MOUNTAIN VALLEY PIPELINE PROJECT IN VIRGINIA

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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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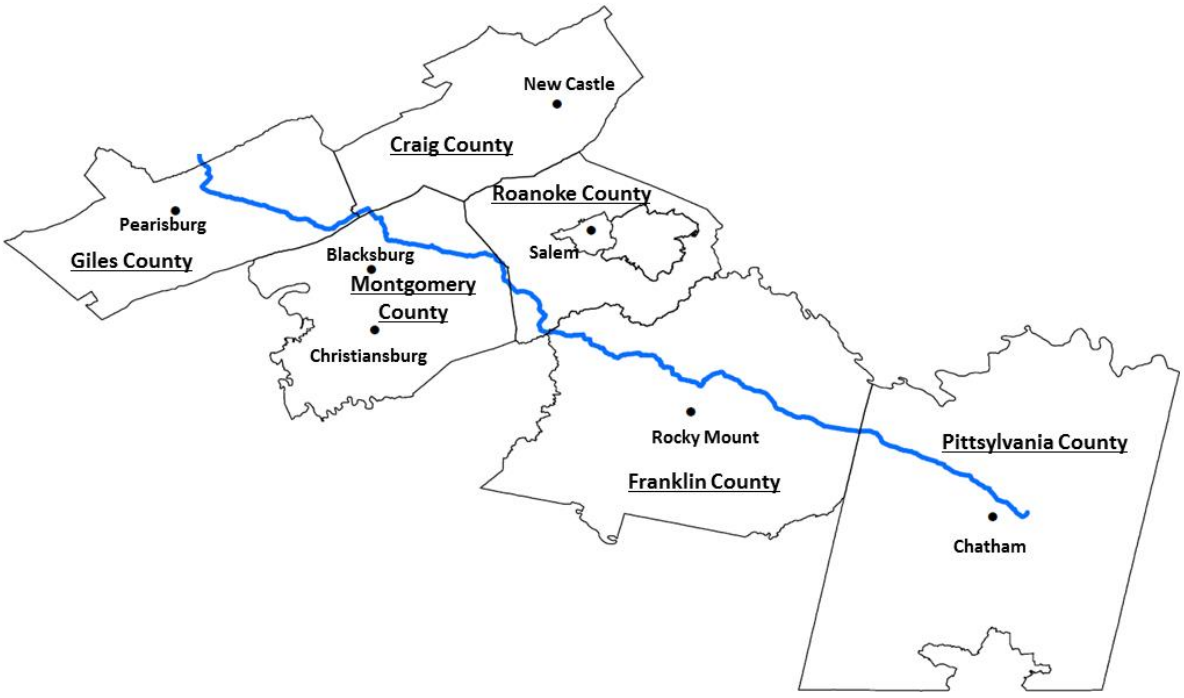
Executive Summary

EQT Corporation retained FTI Consulting ("FTI") to examine the potential economic benefits of the Mountain Valley Pipeline ("MVP") project to the 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



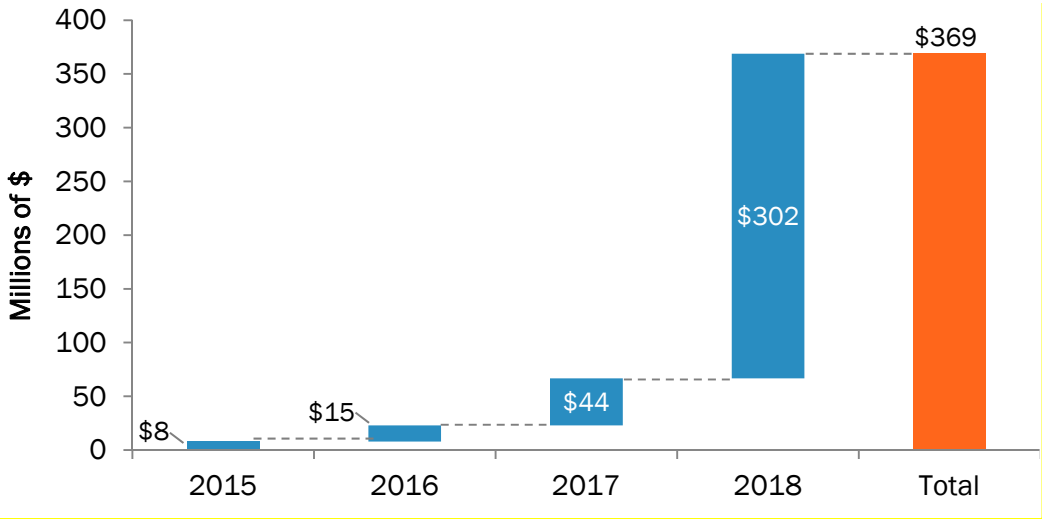
Three types of economic benefits would occur from the construction and operation of the MVP project. These benefits include:

- **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

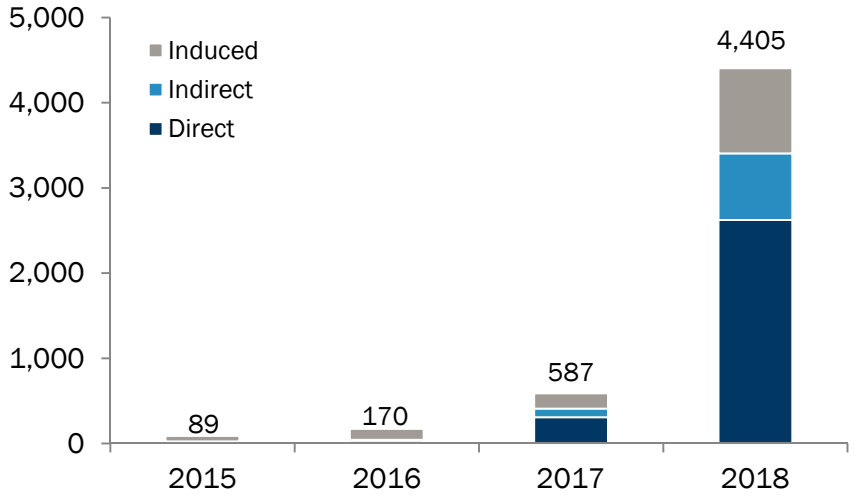
From 2015 to 2018, the MVP project owners plan to spend $407 million directly on resources (equipment, materials, labor, and services) in Virginia. This direct spending would translate into $369 million in cumulative Gross Regional Product over the four-year period, as summarized in Figure 2.

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.

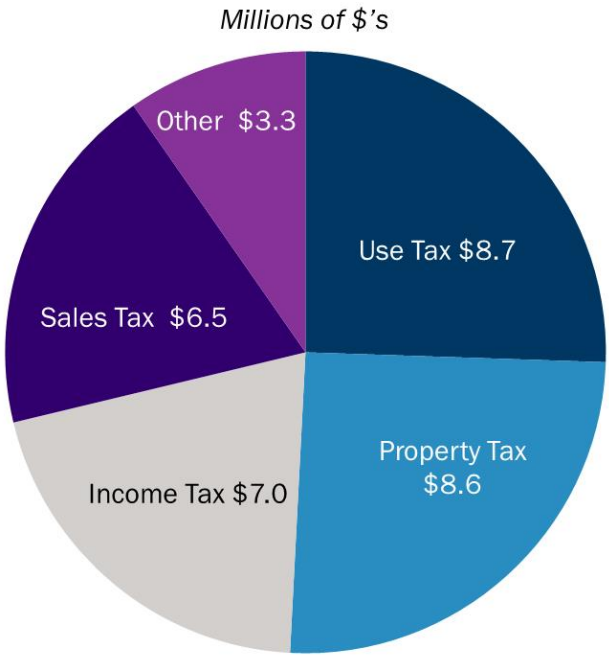
Figure 3 – MVP Jobs Created in Virginia by Year



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	• The Town of Gretna • > 450 municipal and private fleet vehicles • 18 public schools	$763
Roanoke	• >500 municipal and private fleet vehicles	$669
Giles	• The Town of Pembroke • Part of the Town of Narrows • 100 municipal and private fleet vehicles • Eastern Elementary	$653
Montgomery	• >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 project[5], 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.

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[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:

DCF (Consumer Savings) > 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.

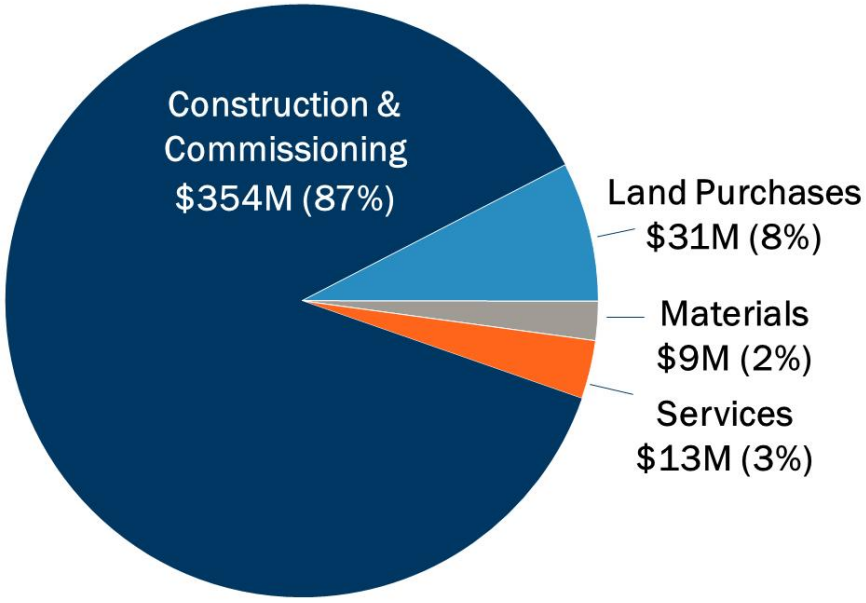
The analysis shows that the economics are favorable for fuel switching and business expansion when natural gas access is available.

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

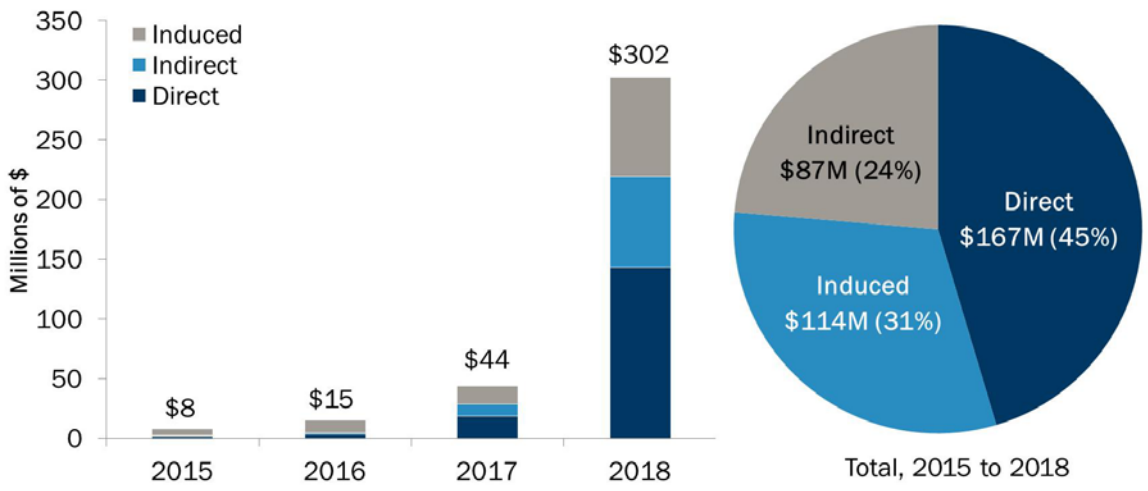
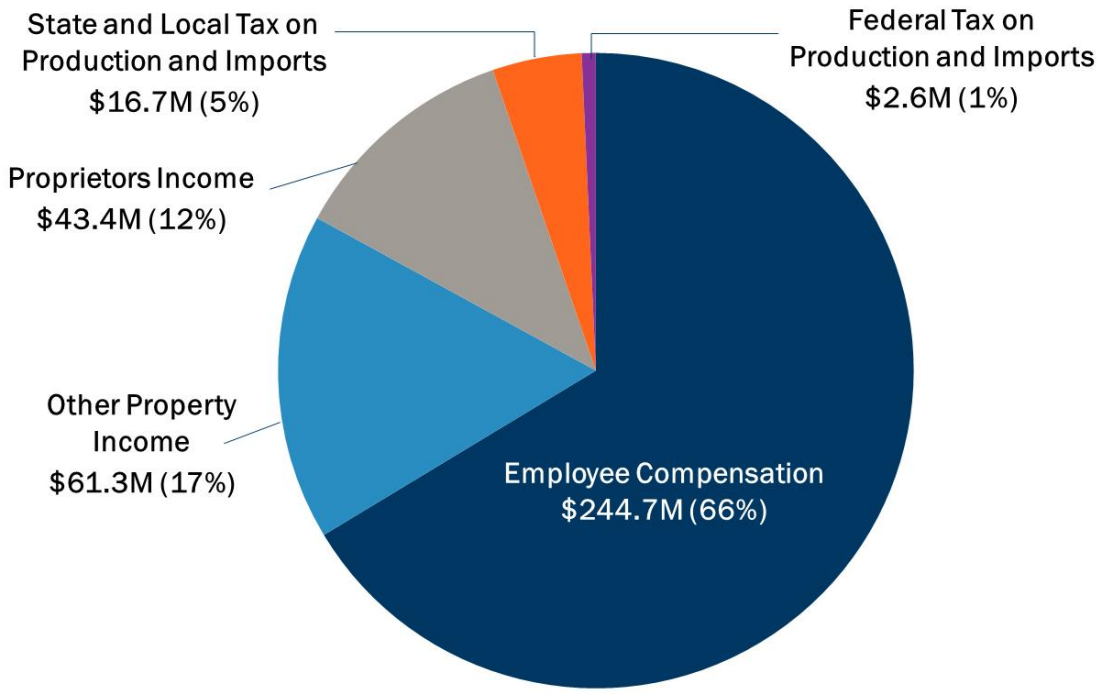


Figure 6 shows GDP segmented into direct, indirect, and induced GRP. As previously mentioned, 'direct' refers to the GRP occurring from the capital expenditures within the industry sectors immediately impacted. 'Indirect' represents the GRP impacts from suppliers to the directly impacted industries. '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.

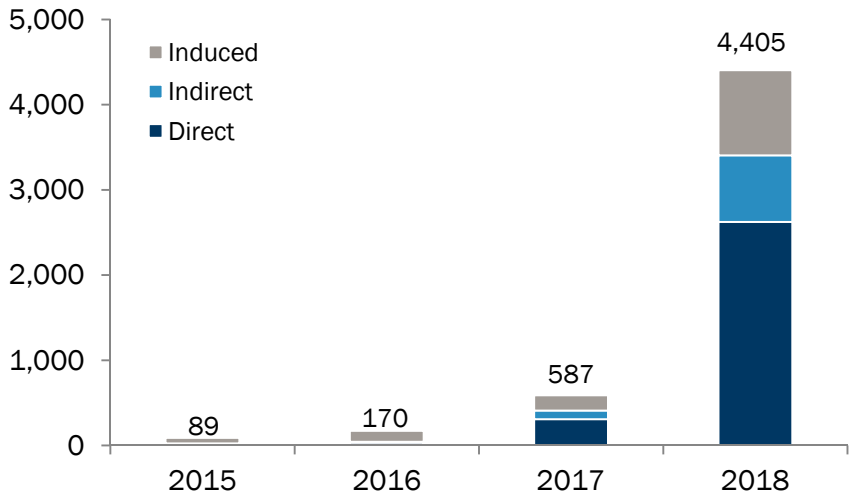
Figure 7 – Composition of MVP's Cumulative Gross Regional Product Contributions



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]

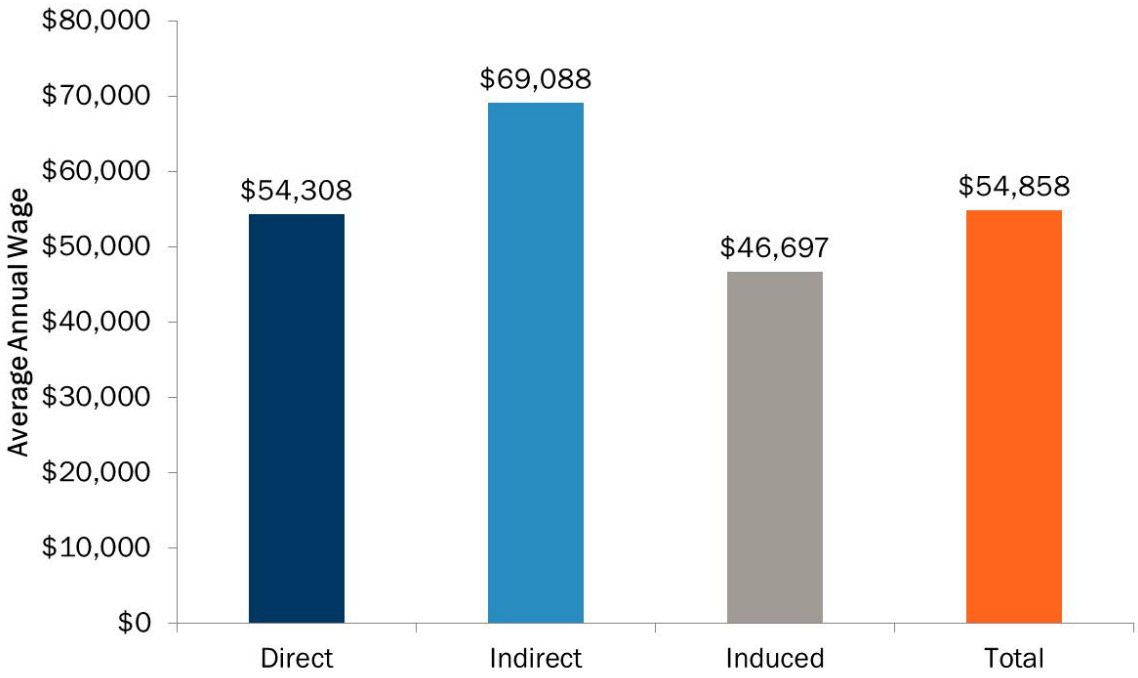
[7] The MVP employment contributions are directly tied to the capital spending in each year and are best expressed in 'job-years'. A job-year is the equivalent of one full-time job lasting a single year.

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 Operation[8]

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

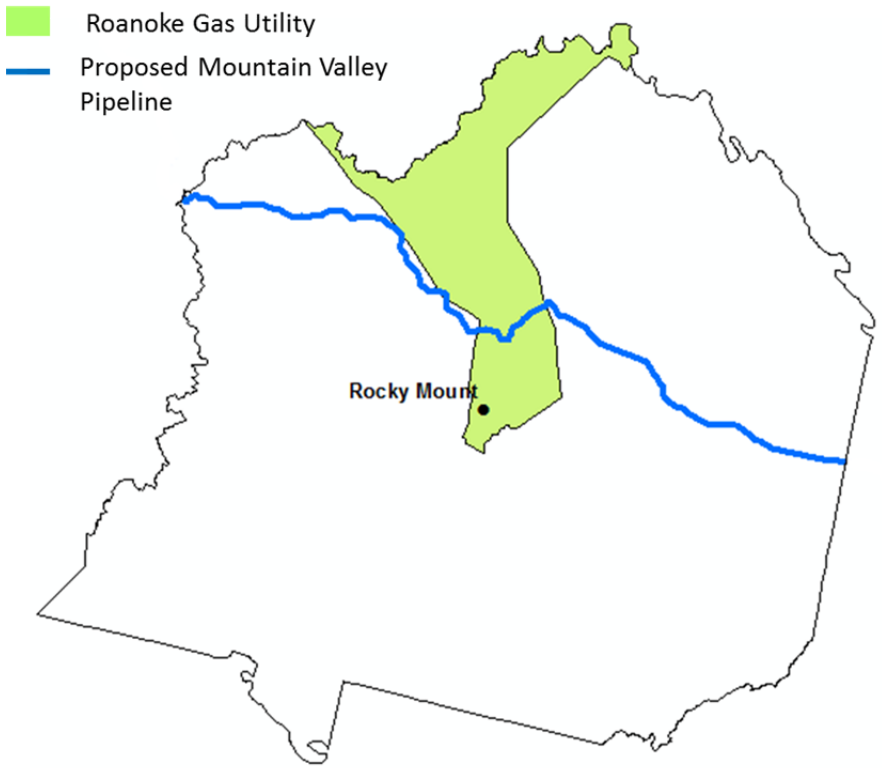
The following section reviews and discusses existing opportunities and savings in each county that could occur as a result of switching to natural gas from electricity, fuel oil, or electricity. These opportunities exist in each of the county's end-use energy consumption sectors – residential & commercial, 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



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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 heating[9], 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
Less Equipment and Labor (Amortized)	*$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) annually[13]. 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.

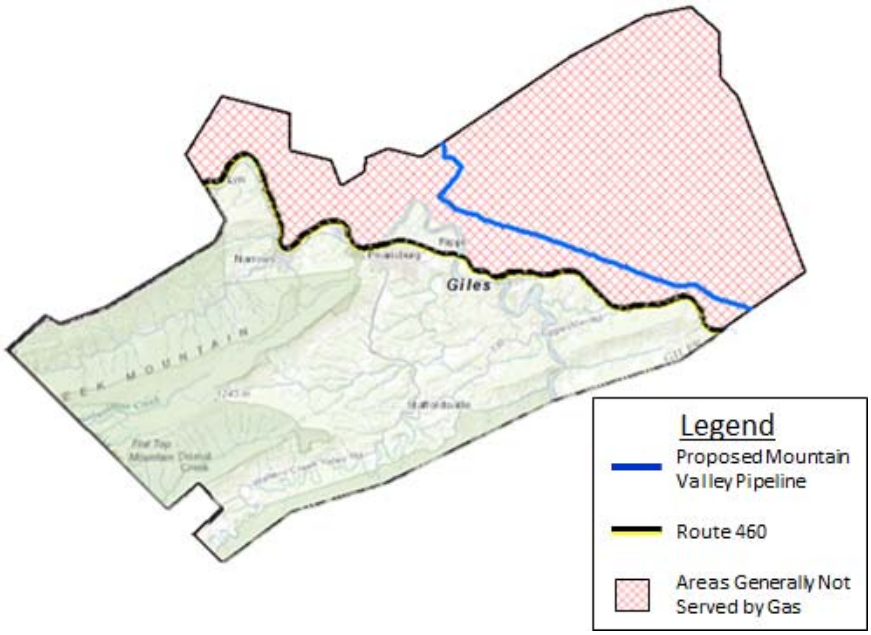
approximately 700 MMSCF in annual consumption to justify gaining access. Potential anchors that would satisfy the remaining demand requirement might include:

- **New Power Generation**: a 150 MW gas peaking power plant[14]
- **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.

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[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.

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[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 country 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.

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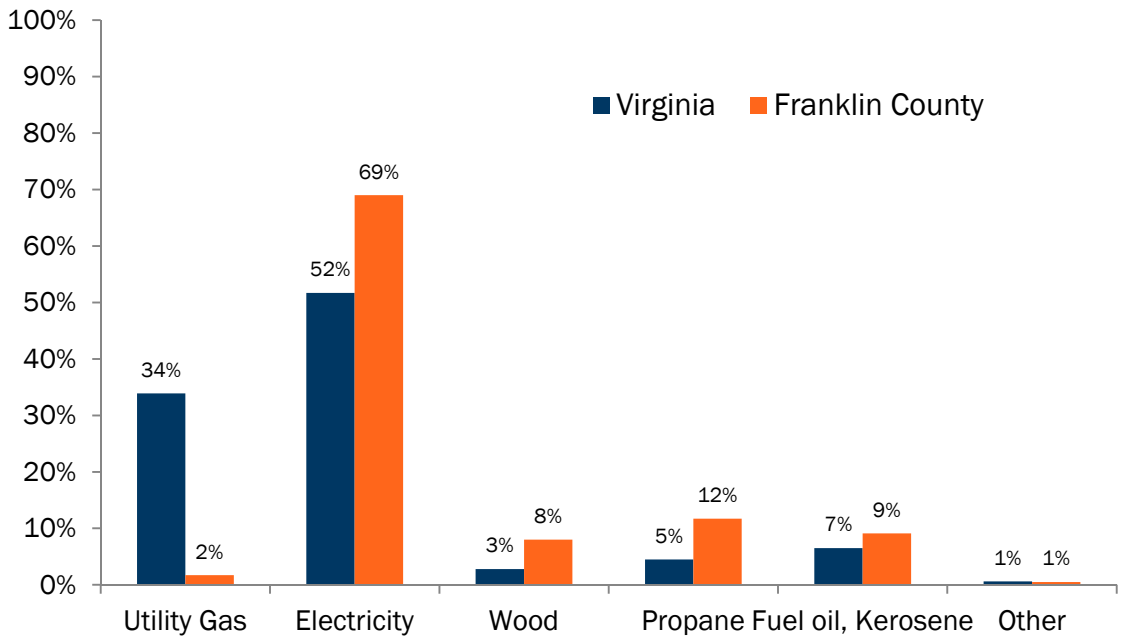
[23] Virginia Employment Commission Report, Franklin County Community Profile, page 22.
[24] www.thefranklinnewspost.com/article.cfm?ID=27728

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 Units[25]



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 2014[26] 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 Sector[29]

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.

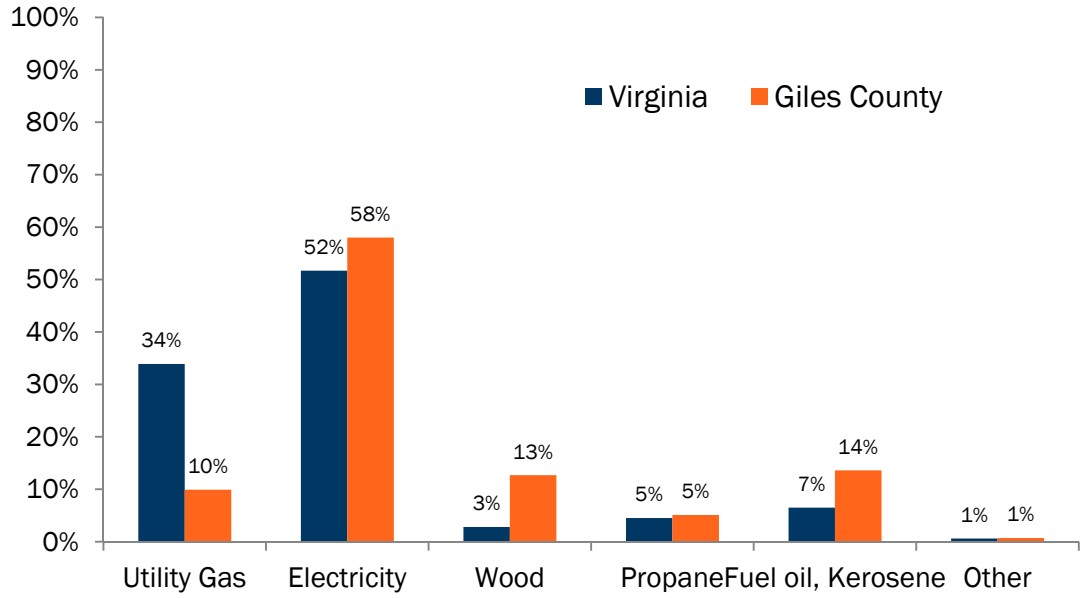
Table 13 – Giles County Total Wages by Sector – 2013 vs. Additional Jobs from MVP

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.

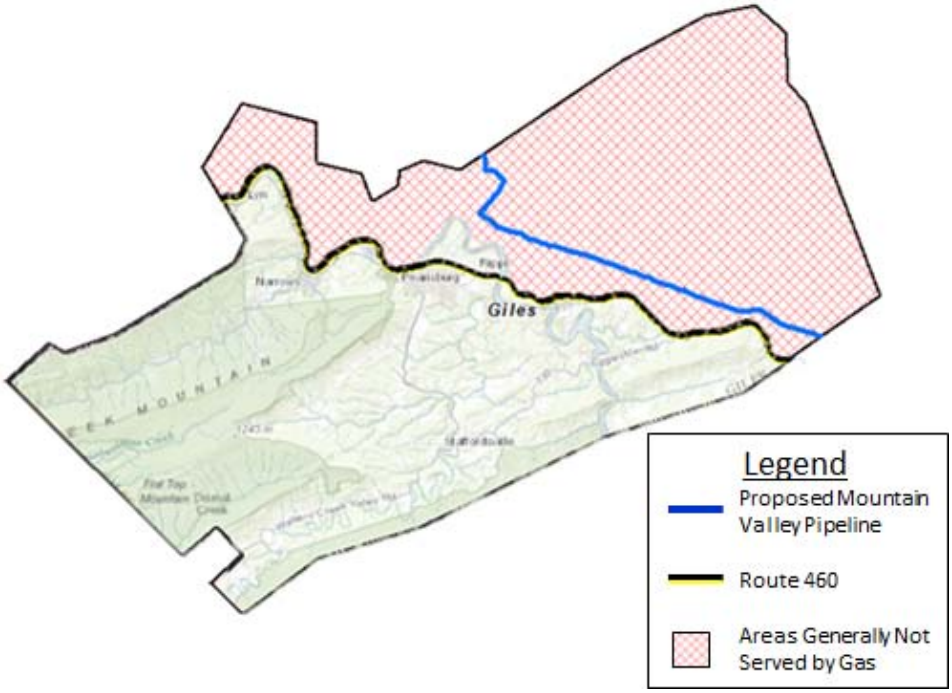
Figure 13 – Primary Space Heating Fuel Used in Giles County versus the Commonwealth, Percentage of Housing Units[30]



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 2014[32] 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 Sector[36]

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:

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[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 Sector[37]

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

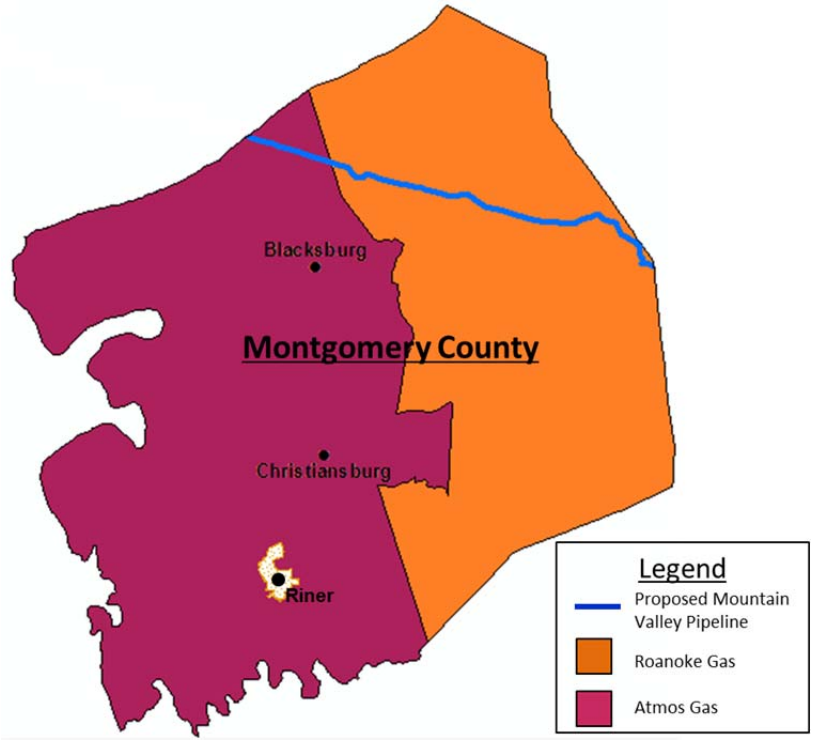
[37] Virginia Employment Commission Report, Montgomery County Community Profile, page 26; FTI analysis.

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

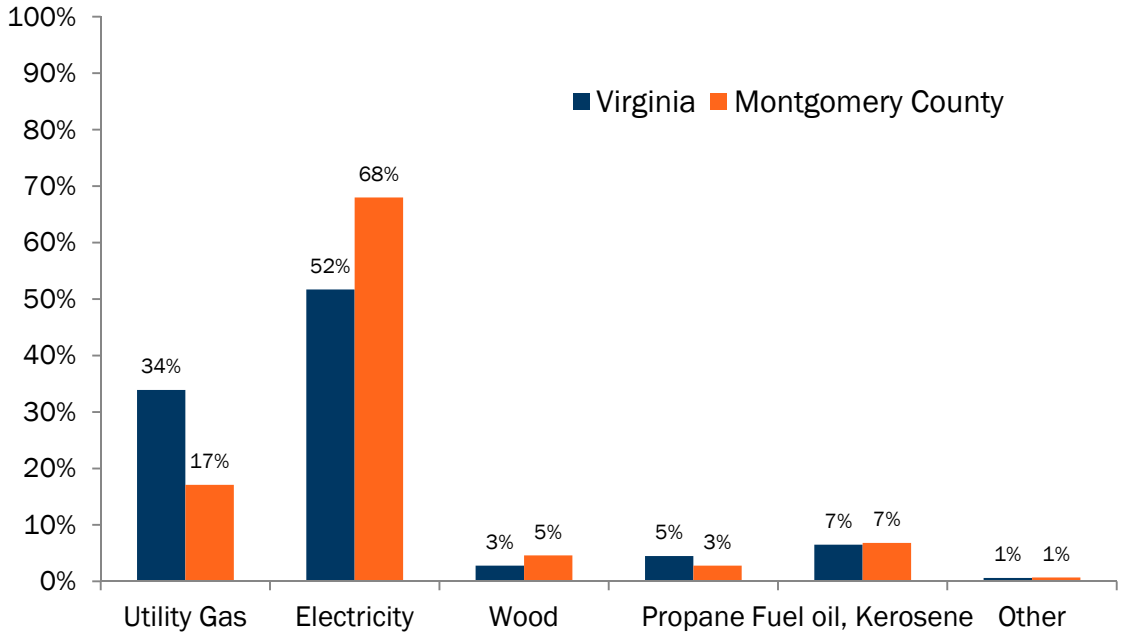
There is natural gas access in most of Montgomery County through Atmos in the western portion of the county and Roanoke Gas in the east as shown in Figure 15. One small area that is not served by natural gas is Riner, VA, which is south of Christiansburg.

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 Units[38]



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 2014[39] 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 Sector[42]

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**

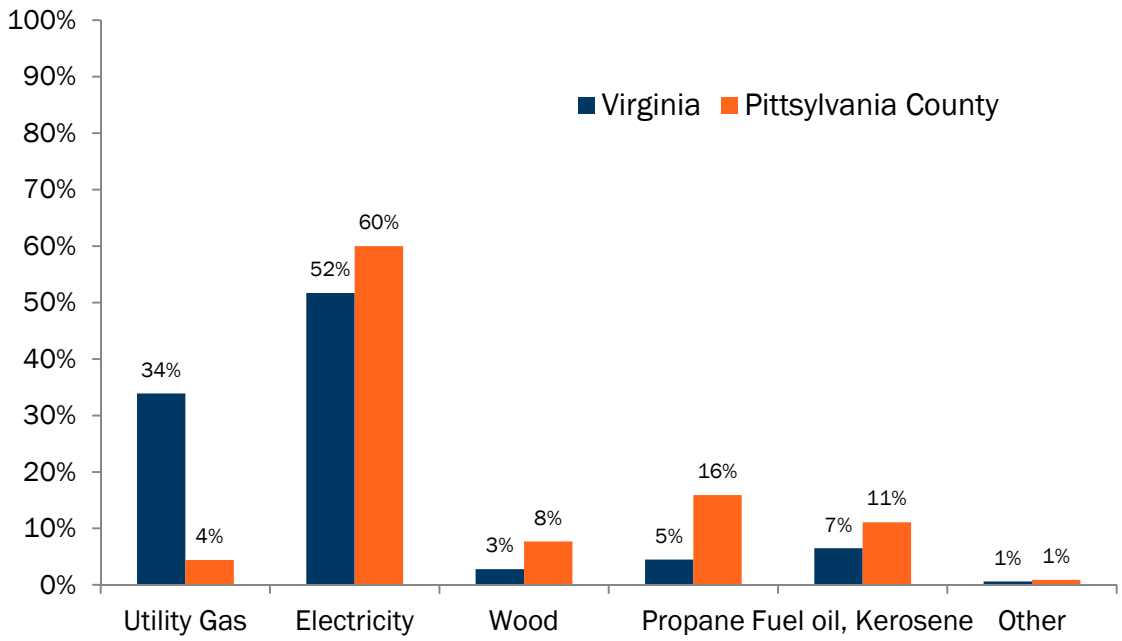
Energy Profile

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 Units[43]



The majority of manufacturers use gas and electricity.

[43] 2013 US Census Bureau 5 Year American Community Survey.

5. Roanoke

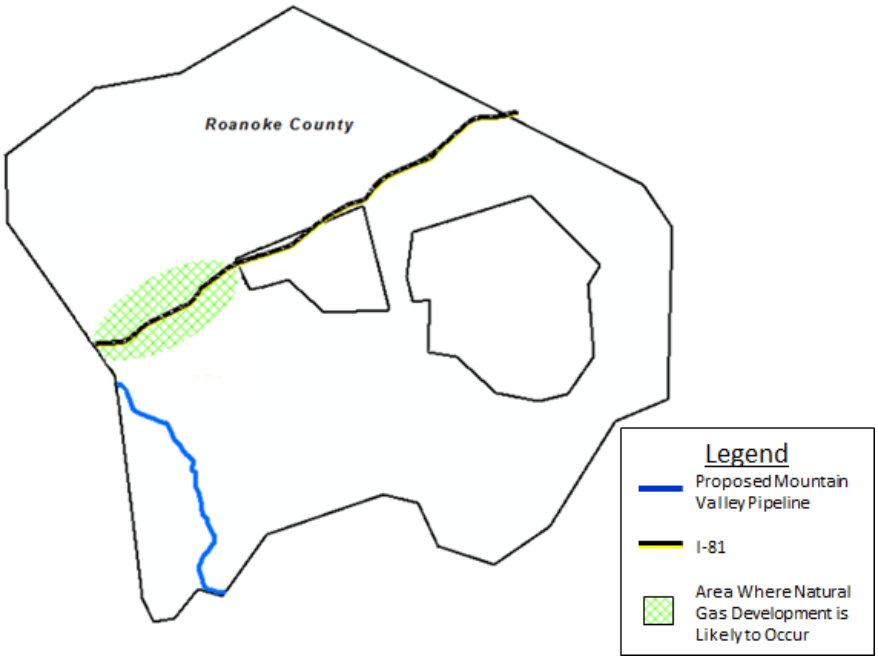
Economic Profile

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 2014[44] 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 Sector[47]

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 distributer 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 Donnelly 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 Sector[48]

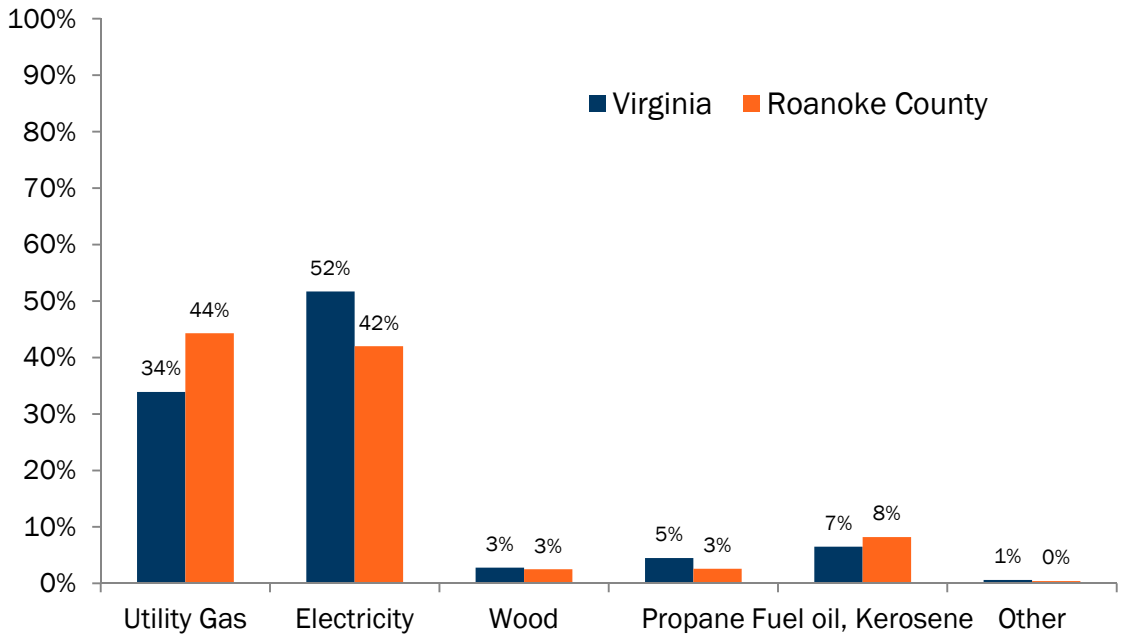
Sector	Average Annual Wage
Government	$51,480
Manufacturing	$46,020
Commercial	$36,111
Construction	$33,592
Entertainment	$12,792
Weighted Average	**$39,234**

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 Units[49]



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 2014[50] 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 Sector[54]

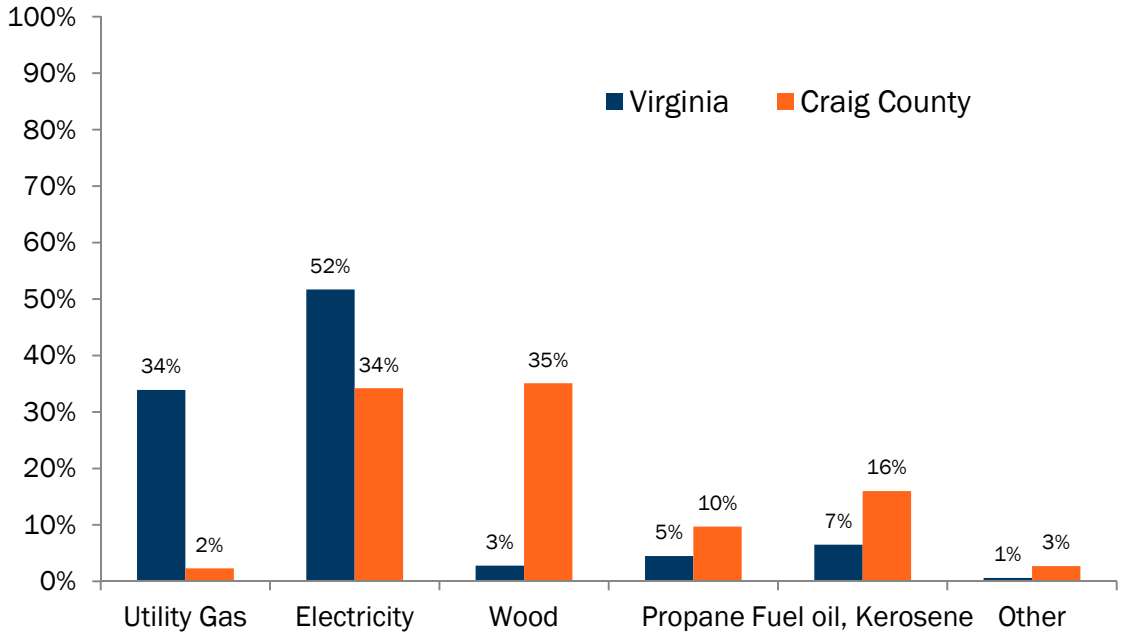
Sector	Average Annual Wage
Government	$39,156
Commercial	$27,079
Construction	$20,384
Other	$17,420
Weighted Average	**$30,024**

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 Units[55]



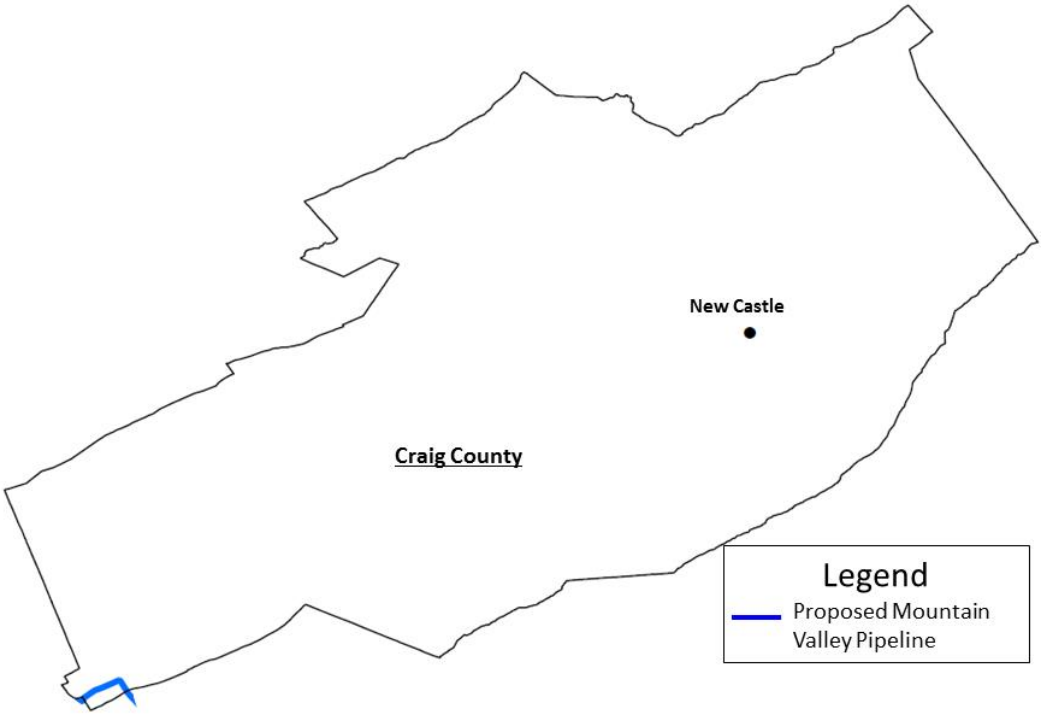
The MVP project would clip the southwestern corner of the Craig County with a 1.8 mile segment (Figure 21). The Town of New Castle, which would be 9 to 14 miles from the planned route, is not served by natural gas. The MVP project could create a savings opportunity for consumers if they were to switch 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.


New Castle
Craig County
Legend
Proposed Mountain Valley Pipeline

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AT THE CRITICAL TIME™

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