



Applied Economics Clinic

Economic and Policy Analysis of Energy, Environment and Equity

Atlantic Coast Pipeline: Economics and Manufacturing Jobs

Prepared for the Natural Resources Defense Council

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Executive Summary

The Atlantic Coast Pipeline (ACP) is a proposed new natural gas pipeline that is currently planned to travel through West Virginia, Virginia, and North Carolina and is intended to bring natural gas to markets in those states. Dominion Transmission, Inc. (“Dominion”), the leading percentage owner of the pipeline, has made several arguments in favor of the project based on reports it commissioned from ICF International (ICF) and Chmura Economics & Analytics (Chmura). In this report, we examine the merit of each of these claims and find them to be unsupported based on available data.

Questionable cost savings

Dominion claims that the ACP will save consumers money by supplying the region’s power producers with shale gas, even accounting for the additional cost to transport the gas from farther away. This claim assumes a large difference in price between the regional natural gas hub that currently services the West Virginia, Virginia, and North Carolina territory (Transco Zone 5) and the natural gas hub that will service the territory once the ACP is operational (Dominion South). A critique of ICF’s analysis notes that, historically, the price differential has not been as large as Dominion projects, and therefore, this assumption may not be justified. The price differential between the two hubs has already declined substantially in the last few years as new pipeline capacity has been added in the region, and Dominion itself is projecting a significantly smaller differential than ICF did in its most recent long-term projections. In fact, testimony using Dominion’s own, more recent cost projections concludes that Dominion’s customers may actually pay \$1.61 to \$2.36 billion more with the ACP than without the ACP over the next 20 years.

Modest increases in customer demand

The ICF report also predicts demand for natural gas will increase substantially over the next 20 years due to power capacity retirements and additions. However, in their most recent Integrated Resource Plans, Dominion and its pipeline partner Duke Energy (Duke Energy Carolinas and Duke Energy Progress) have lowered forecasted demand by 15,468 GWh in 2025 since the ICF report was released. This reduction in future energy load reflects a reduced need for new natural gas combined cycle generating capacity, and a corresponding reduction in demand for natural gas.

Job growth is a coin toss

The Chmura report claims that these assumed lower electricity prices will spur growth in manufacturing spending and employment. However, based on an examination of the relationship between new and expanded natural gas capacity, electricity prices, and manufacturing jobs using publicly available data, we find no reliable trend in these relationships. There is no clear support for the claim that the ACP would lead to additional opportunities for new manufacturing in the region, and this is likely the case for other new natural gas pipelines such as the Mountain Valley Pipeline.



I. Natural gas price differentials

New long-haul interstate natural gas pipelines have the potential to bring natural gas from regions where it is produced to regions without their own natural gas production. An influx of natural gas could lower utility bills for customers of natural gas and electric service in the receiving region. This report questions whether, and under what circumstances, utilities should pay to reserve the right to transport natural gas via a new pipeline, and examines common claims by pipeline developers regarding regional differences in the price of natural gas, forecasted growth in the demand for natural gas, and economic benefits to states from construction jobs and tax revenues. Developers for the Atlantic Coast and Mountain Valley Pipelines,¹ two proposed pipelines in the Mid-Atlantic region, have made these types of claims. While this report specifically analyzes those claims made by the developers of the Atlantic Coast Pipeline, the regional trends in natural gas pricing and demand as well as economic benefits from new pipeline capacity apply to both.

The Atlantic Coast Pipeline (ACP) is a proposed new natural gas pipeline that will begin in Harrison County, West Virginia and travel 600 miles to its currently proposed terminus in Robeson County, North Carolina.² Three laterals would extend from the pipeline, with the first reaching Chesapeake, Virginia, and the second and third connecting to two Dominion Energy electric generating stations in Brunswick and Greenville counties, respectively.³ The proposed pipeline route is shown in Figure 1, below.

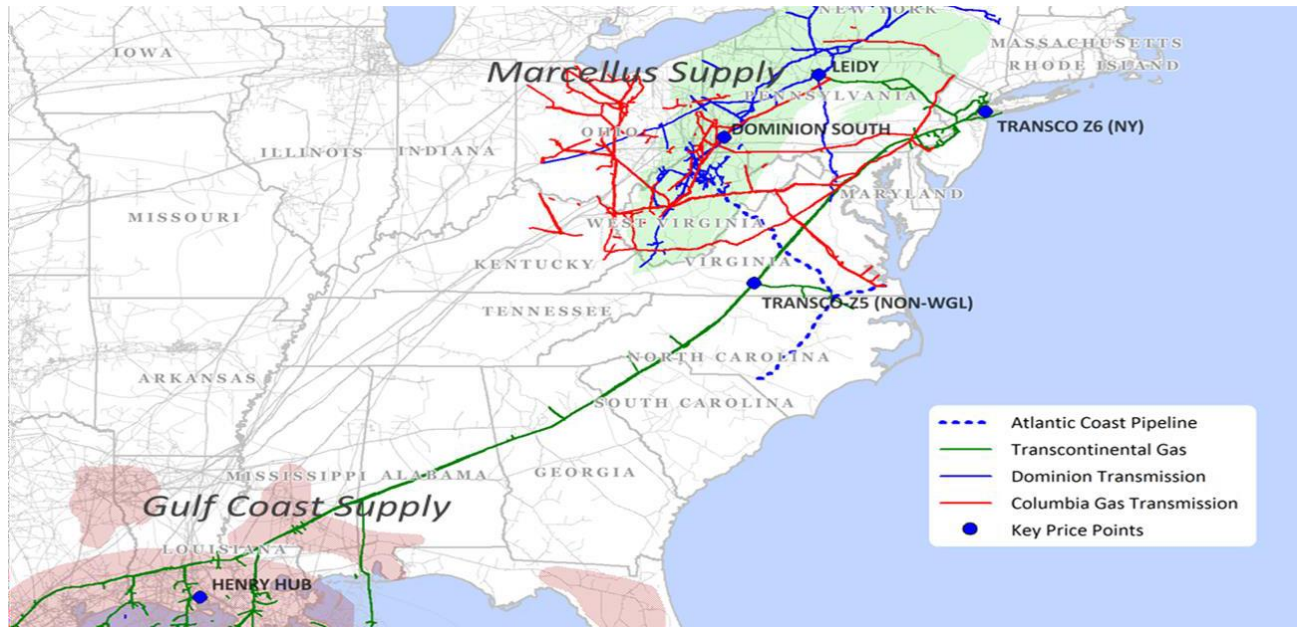
¹ The Mountain Valley Pipeline (MVP) is a proposed new natural gas pipeline that would stretch 303 miles from the Equitrans transmission system in Wetzel County, West Virginia to connect to the Transco natural gas pipeline at the Transco Zone 5 compressor station in Pittsylvania County, Virginia.

² At least one comment from a Dominion executive has suggested that the ACP may extend into South Carolina. See: <http://southeastenergynews.com/2017/11/29/north-carolina-seeks-more-information-on-atlantic-coast-pipeline-development-claims/>

³ Atlantic Coast Pipeline. 2017. About ACP. Available at: <https://atlanticcoastpipeline.com/about/default.aspx>



Figure 1. Atlantic Coast pipeline route and key pricing hubs



Source: ICF, Ventyx.⁴

In 2015, Dominion Transmission, Inc. (Dominion), the largest owner of the ACP project, commissioned ICF International (ICF) to assess the impact of the pipeline on market area natural gas and electric prices. The ACP will provide access to natural gas at the Dominion South market hub, the pricing point in the Marcellus shale from which the ACP would transport natural gas supply to Virginia and North Carolina. The ICF report claims that this natural gas will be lower cost than natural gas from both Henry Hub and Transco Zone 5, the segment of the Transcontinental Gas Pipeline that runs from North-Central South Carolina to the Virginia-Maryland border, and which currently delivers natural gas to the region. These pricing hubs are also shown in Figure 1.

The difference in natural gas prices at different regional hubs is known as the “basis differential” and results from market inefficiencies or constraints on pipeline capacity that limit the movement of natural gas between regions. ICF forecasts future basis differentials and estimates that entities purchasing natural gas from the Dominion South hub could save \$1.61/MMBtu on average compared to purchasing natural gas supplies delivered into the market.⁵ ICF calculates that this cost savings greatly exceeds the additional cost of transporting Dominion South natural gas via the ACP and will result in net savings to customers.⁶

⁴ ICF International. 2015. The Economic Impacts of the Atlantic Coast Pipeline. Page 4. Available at: <https://www.dominionenergy.com/library/domcom/pdfs/gas-transmission/atlantic-coast-pipeline/acp-icf-study.pdf>

⁵ Id. Page 9.

⁶ Ibid.



A 2015 critique of ICF’s analysis notes that its “assumption of a large difference between Henry Hub and Dominion South natural gas prices may not be justified based on available price data.”⁷ The authors go on to point out that ICF’s results “depend on the continuing divergence of Dominion South and Henry Hub prices. If these price points are converging, the implied savings—and resulting economic impacts—would decrease or perhaps disappear.”⁸

Many new and expanded natural gas pipelines have been completed since February 2015, greatly reducing supply constraints and narrowing the basis differentials between Henry Hub and the various hubs in Appalachia. The U.S. Energy Administration (EIA) notes that just over 4.0 billion cubic feet per day (Bcf/d) of inter-regional pipeline capacity was added during 2016 alone. This lowered the basis differential between Henry Hub and Dominion South from \$1.79/MMBtu⁹ at the beginning of 2015 to \$0.49/MMBtu by the end of 2016, a reduction of almost 73 percent.¹⁰ An additional 7.2 Bcf/d of additional capacity is currently under construction and is expected to be fully operational by the end of 2017.¹¹

Testimony from Gregory Lander before the Commonwealth of Virginia State Corporation Commission uses Dominion’s own 2017 Integrated Resource Plan (IRP) data to demonstrate that even Dominion is forecasting reduced price differentials compared to ICF’s more outdated 2015 analysis. Under Dominion’s most recent natural gas price forecast, the price spread between Dominion South and Transco Zone 5 was only 0.46 dollars per dekatherm day (\$/Dthd). The basis differentials assumed by Dominion in its 2017 IRP are lower than those used by ICF in its analysis, and use of these values would reduce ICF’s calculated customer benefits. Mr. Lander’s testimony concludes that “the ACP will actually **increase** (emphasis in original) customer costs between \$1.61 and \$2.36 billion”¹² over the initial 20-year contract period.

⁷ Stanton, Elizabeth A., et al. 2015. Atlantic Coast Pipeline Benefits Review. Synapse Energy Economics. Page 1. Available at: <http://www.synapse-energy.com/sites/default/files/Atlantic-Coast-Pipeline-Benefits-Review-14-150.pdf>

⁸ Id. Page 3.

⁹ Calculated using data from Natural Gas Intelligence.

¹⁰ US Energy Administration. 2017. Natural gas pipeline projects lead to smaller price discounts in Appalachian region. Available at: <https://www.eia.gov/todayinenergy/detail.php?id=32512>

¹¹ Ibid.

¹² Testimony of Gregory M. Lander before the Commonwealth of Virginia State Corporation Commission. 2017. Case No. PUR-2017-00051.



II. Electricity demand

The 2015 ICF study also argues that the ACP is needed because of increasing demand for natural gas as the primary fuel source for electric power generation in Virginia and North Carolina.¹³ Through the use of its Gas Market Model (GMM) and Integrated Planning Model (IPM), ICF forecasts that 9,900 MW of coal and nuclear capacity in the region will retire between 2014 and 2035, and that 20,200 MW of new natural gas-fired combined cycle (NGCC) capacity is needed to both replace this retired capacity and meet growing demand over this 20-year period.¹⁴ ICF predicts that this new NGCC capacity will cause power sector demand for natural gas to grow at a rate of 6.3 percent annually over the analysis period, rising from 1.0 Bcf/d in 2014 to 3.7 Bcf/d in 2035.¹⁵

ICF does not provide its assumptions about electric demand growth that underlie these predictions of increased natural gas use from the power sector in Virginia and North Carolina, and in fact, its report has been criticized for being “largely inauditable, meaning (it) lack(s) the transparency and verifiable data necessary for independent review.”¹⁶ However, electric utilities in the territories that would be served by the ACP have revised forecasts of electric demand downward in the two years since ICF released its analysis.

In their 2014 Integrated Resource Plans (IRPs), Duke Energy Carolinas and Duke Energy Progress forecasted average growth in electric sales in their respective service territories of just over 1 percent per year.^{17,18} In their 2017 IRPs, released in September, the utilities lowered their demand forecasts to reflect 0.4 percent and 0.6 percent annual growth, respectively, and reduced the amount of new natural gas capacity that they have planned for construction between 2020 and 2022.^{19,20}

¹³ ICF International. 2015. The Economic Impacts of the Atlantic Coast Pipeline. Page 6.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Stanton, Elizabeth A., et al. 2015. Atlantic Coast Pipeline Benefits Review. Synapse Energy Economics. Page 1.

¹⁷ Duke Energy Carolinas. 2014. Integrated Resource Plan. Page 80. Available at: <http://www.energy.sc.gov/files/view/2014DukeEnCarIRP.pdf>

¹⁸ Duke Energy Progress. 2014. Integrated Resource Plan. Page 14. Available at: <http://www.energy.sc.gov/files/view/PROGRESS2014IRP.pdf>

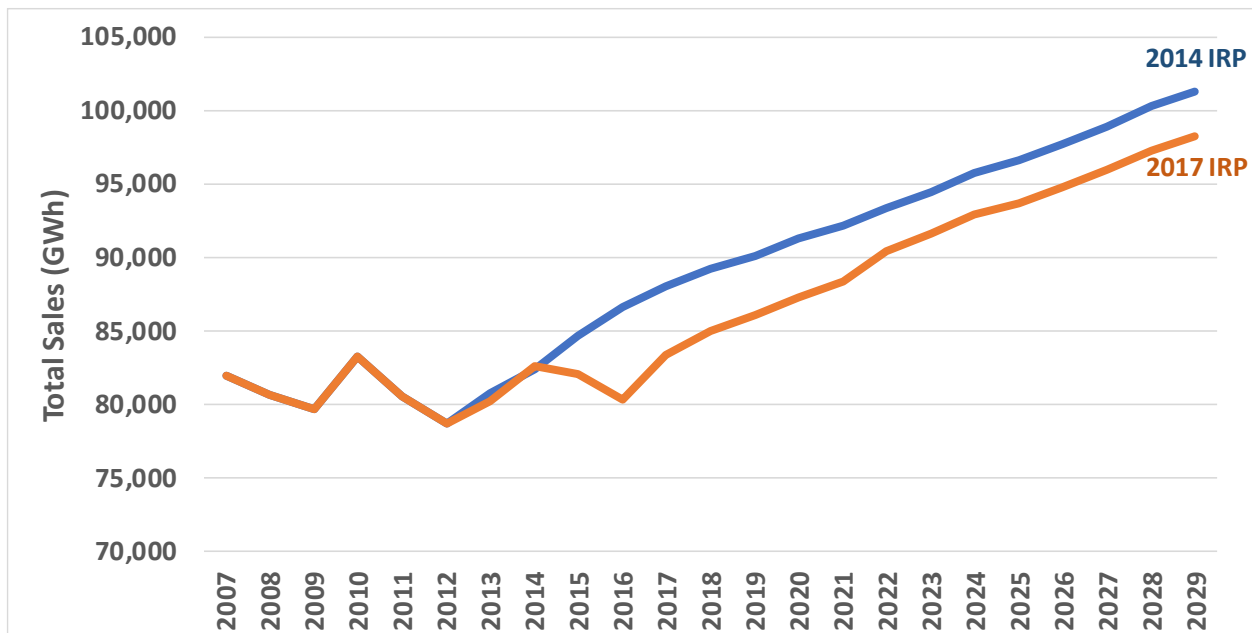
¹⁹ Duke Energy Carolinas. 2017. Integrated Resource Plan. Pages 44 and 78. Available at: <http://www.energy.sc.gov/files/view/2017%20Duke%20Energy%20Carolinas%20Integrated%20Resource%20Plan.pdf>

²⁰ Duke Energy Progress. 2017. Integrated Resource Plan. Pages 48 and 59. Available at: <https://www.scribd.com/document/358089739/Duke-Energy-Progress-LLC-2017-Integrated-Resource-Plan-Update-and-2017-REPS-Compliance-Plan#download>



Dominion Virginia’s 2017 IRP also reflects a lower load forecast compared to its 2014 IRP (Figure 2). Both Dominion forecasts assume similar rates of growth in future annual sales, but the 2017 forecast predicts sales in 2017 to be approximately 4,600 GWh lower than forecasted in the 2014 IRP, similar to Dominion’s annual sales in 2010. It is important to note that while Dominion’s forecasted rate of growth has remained the same in the last several years, forecasts from PJM, the regional electric transmission grid operator for Virginia and several other eastern states, show the rate of growth in the DOM zone has been declining.²¹

Figure 2. Dominion forecasts of annual sales to all customers



Source: Dominion.^{22,23}

²¹ PJM Load Forecast Report. 2017. Available at: <https://www.pjm.com/~media/library/reports-notice/load-forecast/2017-load-forecast-report.ashx>

²² Dominion Virginia Power and Dominion North Carolina Power. 2014. Integrated Resource Plan. Available at: http://www.lexis securitiesmosaic.com/gateway/FedReg/integrated-resource-planning_va-irp-2014.pdf

²³ Dominion. 2017. Virginia Electric and Power Company’s Report of Its Integrated Resource Plan. Available at: <https://www.dominionenergy.com/library/domcom/pdfs/corporate/2017-irp.pdf?la=en>



Overall, in the three years since the ACP was first proposed, Duke and Dominion's revised electricity demand forecasts reflect the need for much less new electric generating capacity. Compared to the utilities' initial predictions, Duke's forecast is 12,549 GWh lower and Dominion's is 2,919 GWh lower, for a total reduction in expected annual demand of 15,468 GWh by the end of 2025.²⁴ This is equivalent to the power produced by two large natural gas combined cycle facilities operating at capacity factors of 70 to 80 percent.²⁵ A reduction in electricity demand of this magnitude would lower the demand for natural gas from the ACP by approximately 375 million cubic feet of natural gas per day, or 25 percent of the pipeline's maximum capacity.²⁶

²⁴ Duke Energy Carolinas. 2014. Integrated Resource Plan. Page

²⁵ This is equal to 2,207 MW of natural gas combined cycle capacity operating at an assumed capacity factor of 80 percent, or 2,523 MW if a 70 percent capacity factor is assumed. Lower assumed capacity factors would increase the number of MW of avoided capacity.

²⁶ Dominion's Greensville Power Station is a 1,585 MW natural gas combined cycle facility currently under construction in Virginia. Assuming the unit operates at the average capacity factor of 80.12 percent as projected in Dominion's 2017 IRP, the unit would produce 11,125 GWh of electricity. The Transco Virginia Southside Expansion II pipeline project would deliver 250 million cubic feet per day of natural gas to serve the power plant. Using this ratio, avoided generation of 15,468 GWh would avoid 375 million cubic feet of natural gas use per day.



III. Natural gas pipelines, electric rates, and manufacturing jobs

Dominion also commissioned a report from Chmura Economics & Analytics—released in September 2014—that examined the economic impacts of the ACP.²⁷ The Chmura report claims that the construction and operation of the ACP would have positive impacts on both spending and employment in West Virginia, Virginia, and North Carolina. The report also asserts that the existence of the ACP would lead to additional opportunities for new manufacturing, but makes no attempt to quantify those benefits.

In this section, we examine on a state by state basis the claim that lower electricity prices lead to more manufacturing jobs. Industrial electricity price data were taken from the U.S. EIA from 2015 to 2017.²⁸ Manufacturing jobs data were taken from the U.S. Bureau of Labor Statistics.²⁹ We compared the percentage change in electricity prices to the percentage change in the number of manufacturing jobs in each state from January 2015 to January 2017, as shown in Figure 3.

²⁷ Chmura Economics & Analytics. 2014. The Economic Impact of the Atlantic Coast Pipeline in West Virginia, Virginia, and North Carolina. Page 1. Available at: <https://www.coastalreview.org/wp-content/uploads/2017/03/acp-chmura-report-091014-1-1.pdf>

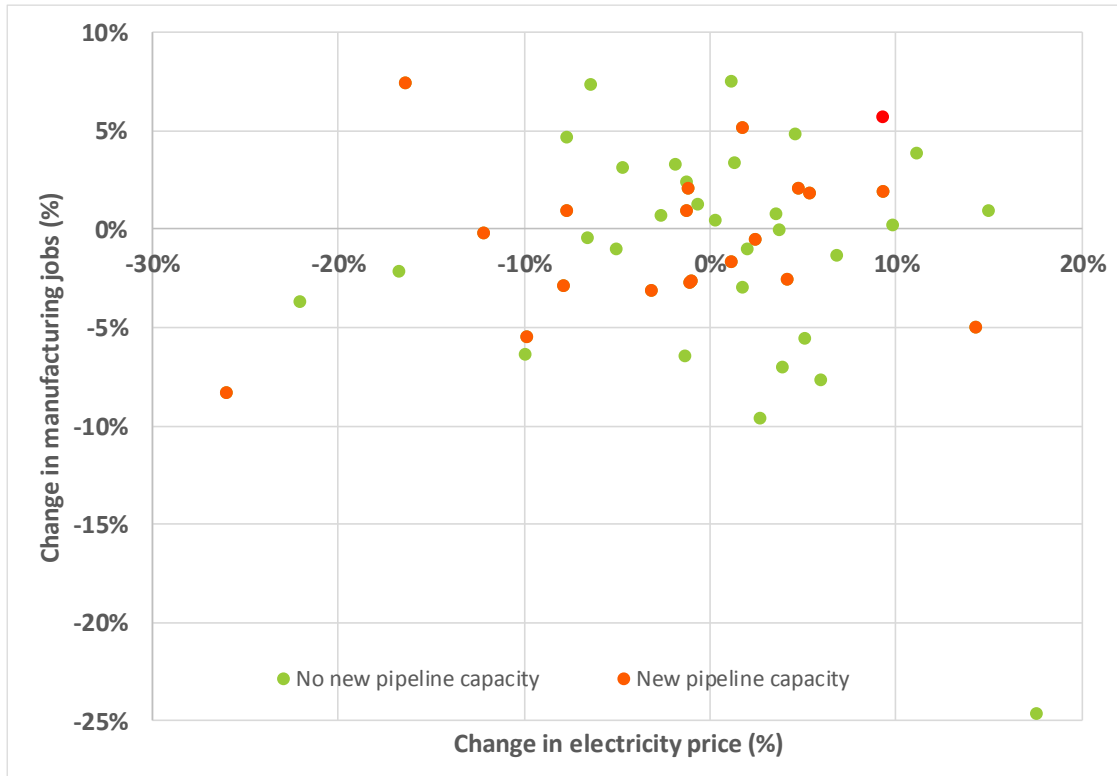
²⁸ U.S. Energy Information Administration. 2017. Electric Power Monthly. Available at: https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a

Because seasonality affects the price of electricity, and because 2017 is only a partial year, we used data from January 2015 to January 2017 only.

²⁹ U.S. Bureau of Labor Statistics. 2017. State Employment and Unemployment Archived News Releases: U.S. Bureau of Labor Statistics. Available at: <https://www.bls.gov/bls/news-release/laus.htm#current>



Figure 3. Change in industrial electricity price compared to change in manufacturing jobs, by state



The data are evenly distributed among the four quadrants in Figure 3. Of the states that realize declines in their electricity prices over the two-year period from 2015 to 2017, a similar number see a negative change in their number of manufacturing jobs as see a positive change. The same is true for states in which electricity prices rose—manufacturing jobs increased in some states and decreased in others. This distribution is quantified in Table 1, below.

Table 1. Matrix of states with falling/rising electricity prices and manufacturing jobs

| | | Electricity Prices | |
|------|------|--------------------|------|
| | | Fell | Rose |
| Jobs | Fell | 13 | 13 |
| | Rose | 11 | 13 |



The smallest number in Table 1 are the eleven states that saw a decline in electricity prices and a corresponding increase in the number of manufacturing jobs between 2015 and 2017: California, Florida, Georgia, Mississippi, Montana, Nevada, New Hampshire, New Jersey, North Carolina, Ohio, and South Carolina. Recent historical data thus show little evidence of decline in electricity prices being associated with additional opportunities for manufacturing on a state by state basis.

Among just the states that built pipelines, the results are similarly distributed. We quantified the number of states with natural gas pipelines (new builds and expansions) that were completed between 2015 and 2017, and assigned them to the four quadrants shown in Table 1. New and expanded natural gas pipelines passed through twenty different states,³⁰ and Table 2 shows states with new pipeline capacity in each of the four quadrants relating to electricity prices and manufacturing jobs.

Table 2. Matrix of states with new natural gas pipeline capacity under combinations of changes in electricity prices and manufacturing jobs

| | | Electricity Prices | |
|------|------|--------------------|------|
| | | Fell | Rose |
| Jobs | Fell | 7 | 4 |
| | Rose | 4 | 5 |

Table 2 shows that states with new and expanded natural gas pipeline capacity are distributed between all four quadrants relating to changes in electricity price and number of manufacturing jobs. Seven states with additional pipeline capacity saw both falling electricity prices and losses to manufacturing jobs, including Virginia,³¹ one of the states in which the ACP and MVP would deliver natural gas. West Virginia—a major natural gas producer and the origin for a number of new natural gas pipelines including the ACP and MVP—has experienced increased electricity prices coupled with losses in manufacturing jobs in the state.

Recent evidence from states with new natural gas pipeline capacity shows no support for the conclusion that the addition of new pipelines leads to additional opportunities for new manufacturing jobs in those states. There is also no support for claims that the ACP or the MVP would lead to an increased number of manufacturing jobs in West Virginia, Virginia, and North Carolina.

³⁰ AL, CT, IL, IN, KY, LA, MA, MS, NE, NV, NJ, NY, OH, OR, PA, RI, TN, TX, VA, and WV.

³¹ Transco’s Southside Expansion I project was completed in the third quarter of 2015.



IV. Conclusions

When seeking approval for new long-haul interstate natural gas pipelines, project developers often make the following claims:

- 1) Pipelines are needed to take advantage of the basis differentials between regions and transport lower cost gas from regions in which it is produced to regions with no natural gas production and, therefore, higher priced gas;
- 2) The need for new pipelines is driven by forecasted growth in demand for natural gas from the electricity sector for power generation; and
- 3) States with new pipeline capacity will derive economic and employment benefits from the direct construction and operation of the pipeline, and well as from any benefits that are induced by the presence of the pipeline.

Unsurprisingly, Dominion, the largest owner of the Atlantic Coast Pipeline, has made exactly these claims. As we have shown in Section I, however, assumptions by the independent consultant hired by Dominion about the future divergence between natural gas prices at regional hubs are no longer supported by either recent basis differentials or even Dominion's own, more recent projections from its 2017 Integrated Resource Plan.

Claims attributing a need for the ACP to load growth from electricity demand are also unsupported. Dominion, Duke Energy Carolinas, and Duke Energy Progress have revised their assumptions about electric load growth to reflect a lower rate of growth (Duke) or a lower starting point for growth (Dominion). Moreover, the regional electric transmission grid operator for the region that includes Virginia has lowered the forecasted growth rate in the region. These lower utility demand forecasts would eliminate the need for a large amount of new natural gas generating capacity and avoid 375 million cubic feet per day of natural gas delivery.

Finally, recent data on states with new natural gas pipeline capacity does not support the claim that the addition of a new natural gas pipeline in a state is correlated with lower industrial electricity prices or an increase in the number of manufacturing jobs in that state.