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Estimating the Economic Impact of the Construction and Operation of the Plains and Eastern Clean Line Project

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Estimating the Economic Impact of the Construction and Operation of the Plains and Eastern Clean Line Project

*Produced for
Clean Line Energy Partners LLC*



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Executive Summary

Clean Line Energy Partners LLC (Clean Line) is proposing to build the Plains & Eastern Clean Line project, an approximately 700-mile, high voltage direct current transmission line and associated facilities with the capacity to deliver 4,000 megawatts (MW) of wind power from the Oklahoma Panhandle region to utilities and customers in Arkansas, Tennessee, and other markets in the Mid-South and Southeast, areas that lack access to low-cost renewable power. The project will deliver enough energy to power more than one million homes annually in the Mid-South and Southeastern United States.

Currently, wind development in the Oklahoma Panhandle region is limited by a lack of transmission. The construction of the proposed transmission line is expected to stimulate the construction of over 4,500 MW of additional wind farms in the Panhandle region.¹ The newly-built wind generation will be connected to a converter station in Texas County, Oklahoma, via a collector system comprised of alternating current lines. The wind power will then be transmitted to Arkansas and Tennessee where it will be distributed to customers throughout the Mid-South and Southeast. A converter station in Pope County, Arkansas, will deliver enough low cost renewable energy to supply over 160,000 Arkansas homes annually. Another delivery converter station will be sited at the eastern end of the project in Shelby County, Tennessee.

Researchers from the Center for Business and Economic Research at the University of Arkansas estimated the economic impact of the construction and operation of the Plains & Eastern Clean Line project in Arkansas. The construction of the project itself, including the production of inputs such as conductor wire and insulators, among others, will create a peak demand for approximately 858 direct construction and manufacturing jobs in Arkansas and will further create 695 indirect and induced jobs in Arkansas. On average, the construction of the Clean Line project in Arkansas will create approximately 855 jobs during the 30 month construction period, and 693 indirect and induced jobs. In addition to those jobs, the operation of the Plains & Eastern Clean Line will create a demand for 41 permanent operations and maintenance jobs in Arkansas with 28 associated indirect and induced jobs.²

¹ Though the Plains & Eastern Clean Line project's nameplate delivery capacity is 4,000 MW, a higher capacity of wind farms is likely to be installed in the Panhandle region. Because wind transmitted on the transmission line will incur electrical losses and wind farms do not produce at maximum output at all times, building wind capacity that exceeds the project's capacity can increase utilization of the transmission line, and therefore lower delivered cost.

² The impacts of construction and operation of the transmission line and converter station were estimated using the IMPLAN model. IMPLAN is a regional impact model that enables the evaluation of the economic impact of specific activities such as manufacturing, constructing, and operating transmission lines within an economy. The specific impacts analyzed include direct, indirect, and induced effects on economic output, employment, and income.

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Plains & Eastern Clean Line Economic Inputs

The development of the Plains & Eastern Clean Line across three states will cost an estimated \$2 billion including transmission structures, conductor wire, insulators, converter stations and other related activities. Clean Line provided detailed estimates of the costs associated with the various activities in the manufacturing, construction and operation of the transmission line. The estimated portion of the project cost in Arkansas is \$657 million and an estimated \$441 million of that total cost is assumed to be spent within the state on the manufacturing and construction of the line and converter station. The table below provides a breakdown of how Clean Line anticipates that capital expenditure will be distributed in Arkansas.

Table 1: Plains & Eastern Clean Line Total Investment

Portion of Project Cost in Arkansas	\$656,841,964
Total Project Expenditure in Arkansas	\$440,942,403

In addition to the investment associated with the construction of the transmission line, the Plains & Eastern Clean Line is expected to stimulate the development of over 4,500 MW of wind farms. The development of the wind farms enabled by the Plains & Eastern Clean Line will require an investment of approximately \$8 billion. As a result of the increase in wind development due to the Plains & Eastern Clean Line, there will be economic benefits throughout the region. While some significant portion of the wind turbine blades and other components will likely be manufactured in Arkansas, it isn't possible at this time to generate a precise estimate. Therefore, wind supply chain impacts in Arkansas are not included in this analysis.

Economic Impacts of Construction of the Plains & Eastern Clean Line

The estimation of the total economic activity generated by the construction of the Plains & Eastern Clean Line project in Arkansas includes economic activity generated by the production of components such as the construction of the converter station and the activities related to the construction of the transmission line in twelve Arkansas counties. In addition, Clean Line has signed preferred supplier agreements with two manufacturers in Arkansas: with General Cable in Malvern, Arkansas, to manufacture the conductor wire used across the project area, and with Sediver to manufacture glass insulators at a new manufacturing facility in West Memphis, Arkansas. The manufacturing activity associated with the production of conductor wire and insulators is included in the economic impact analysis.

Table 2: Economic Impacts from the Construction of the Plains & Eastern Clean Line

Category	Impact	Direct	Indirect and Induced	Total
Arkansas	Peak Employment ¹	858	695	1,553
	Average Employment ²	855	693	1,548
	Labor Income ³	\$106,722,490	\$75,046,466	\$181,768,954
	Economic Output	\$421,308,149	\$243,058,881	\$664,367,026
1. All employment figures are full time equivalents. 2. Average employment figures are over the 30-month construction period. 3. Labor income is wage and proprietor income.				

Operations and Maintenance

In addition to the one-time effects associated with the initial construction and development of the Plains & Eastern Clean Line project, there will be annual economic impacts, beginning after the conclusion of construction, from the operation and maintenance of the Plains & Eastern Clean Line.

Table 3: Annual Economic Impacts from Plains & Eastern Clean Line Operations and Maintenance

Category	Impact	Direct	Indirect and Induced	Total
Arkansas	Employment ¹	41	28	69
	Labor Income	\$1,946,306	\$1,177,156	\$3,123,463
	Economic Output	\$6,135,824	\$3,718,111	\$9,853,935
1. All employment figures are full time equivalents and represent annual employment.				

Summary

The construction of the Plains & Eastern Clean Line will create a peak demand for approximately 858 direct construction and manufacturing jobs in Arkansas and will further create 695 indirect and induced jobs in Arkansas. On average, the construction of the Clean Line project in Arkansas will create approximately 855 jobs during the 30 month construction period, and 693 indirect and induced jobs^[KRR1]. The total labor income from the construction of the transmission line will be over \$180

million and the economic output will be over \$660 million in Arkansas during the 30 month construction period. In addition to the construction and manufacturing jobs, the operation of the Plains & Eastern Clean Line will create an estimated demand for 41 permanent operations and maintenance jobs, and will further create 28 indirect and induced jobs in Arkansas. The total labor income in Arkansas resulting from the operations and maintenance of the transmission line will be over \$3 million, and the economic output in Arkansas will be nearly \$10 million.

These impacts include the manufacturing activity associated with the production of conductor wire and insulators in Arkansas in accordance with Clean Line’s preferred supplier agreements with General Cable (Malvern, Hot Spring County) and Sediver (West Memphis, Crittenden County). These specific impacts are highlighted in the next section. These impacts are based on estimated expenditures provided by Clean Line based on engineering, consulting, and third party estimates. The true expenditures may exceed or fall short of these expenditure estimates. The assumed costs are based on current industry market prices, and do not reflect purchase orders or agreements with General Cable and Sediver.

Economic Impacts Resulting from Preferred Supplier Agreements

Hot Spring County Impacts from Local Equipment Purchases

Clean Line has a preferred supplier agreement with General Cable in Hot Spring County. Under this agreement, General Cable will manufacture the conductor wire required for the entire length of the transmission line. Clean Line estimates that the project will require the purchase of more than \$130 million in conductor wire over the construction period. The final expenditure with General Cable will depend on a number of factors, including the cost, specifications and length of conductor wire needed for the project.³

Table 4: Hot Spring County Impacts from Local Equipment Purchases

Category	Impact	Direct	Indirect and Induced	Total
<i>Hot Spring County</i>	Employment ¹	135	70	205
	Labor Income	\$21,447,708	\$6,087,552	\$27,535,260
	Economic Output	\$133,870,454	\$23,217,651	\$157,088,105
1. All employment figures are full time equivalents and represent peak employment.				

³ The Hot Spring County impacts do not incorporate impacts from surrounding counties and broader statewide spending. These leakages are captured within the total statewide impacts section which includes all impacts including those attributable to General Cable expenditures.

Crittenden County Impacts from Local Equipment Purchases

Clean Line has a preferred supplier agreement with Sediver, which will build a new insulator manufacturing facility in Crittenden County. Clean Line estimates that the project will require the purchase of more than \$60 million in insulator material over the construction period. The final expenditure will depend on a number of factors, including the cost and specifications of the insulator material needed for the project.⁴

Table 5: Crittenden County Impacts from Local Equipment Purchases

Category	Impact	Direct	Indirect and Induced	Total
<i>Crittenden County</i>	Employment ¹	47	52	99
	Labor Income	\$7,849,664	\$4,886,357	\$12,736,021
	Economic Output	\$65,905,809	\$15,216,555	\$81,122,364
1. All employment figures are full time equivalents and represent peak employment.				

⁴ The Crittenden County impacts do not incorporate impacts from surrounding counties and broader statewide spending. These leakages are captured within the total statewide impacts section which includes all impacts including those attributable to the Crittenden County expenditures.

Methodology

This study employs an input-output approach to evaluate the economic impact of constructing and operating the Plains & Eastern Clean Line. The study relies on estimating multiplier impacts from a widely used input-output model, the IMPLAN model. IMPLAN is a regional impact model that enables the evaluation of the economic impact of specific activities such as manufacturing, constructing, and operating transmission lines within an economy. The basic data sources for the current edition of the IMPLAN database and the model used in this study are the Input-Output Accounts of the United States, developed by the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), and county income and employment data published by BEA and the Bureau of Labor Statistics (BLS). The model reflects 2012 industrial structure and technology, and 2012 prices (trade flows in the model are expressed in 2012 dollars). Economic impacts for this study are appropriately adjusted and provided in 2014 dollars. IMPLAN uses a 525-sector input/output model to measure the effects of three types of impacts: direct, indirect, and induced. Direct impacts consist of employment and purchases of goods and services in the region resulting from certain, specific activities—in this case, manufacturing, construction, and operation of the transmission line and associated facilities in Arkansas. Indirect (inter-industry) impacts consist of goods and services purchased by the firms that supply inputs consumed in the direct activity. Induced impacts consist of increased household purchases of goods and services in the region by employees of direct and indirect employers. The model generates multipliers, which summarize the magnitude of the indirect and induced effects generated by a given direct change, to estimate changes in output, income, and employment. In other words, the multiplier is the ratio of total impact to direct impact. The manufacturing and construction activities produce one-time impacts for the counties involved, while the operation of the transmission line produces annual impacts.

In this model, employment, which is an output generated by IMPLAN, refers to all full-time, part-time, and temporary positions that are created by the economic activity. Employment that is measured in this study reflects the total jobs that will be created within a state without accounting for the residence of the employees.

Clean Line provided detailed estimates of the costs associated with the various activities in the construction and operation of the transmission line. The study authors from the Center for Business and Economic Research aggregated those detailed estimates of the transmission construction components into per mile construction costs for the transmission line then applied IMPLAN multipliers to arrive at the economic impact of the transmission line construction in the twelve Arkansas counties. Similarly, the authors used IMPLAN multipliers and information about the costs of building the converter station in Arkansas and the purchase of materials such as electrical conductor wire and glass insulator material from Arkansas companies to estimate the associated one-time economic impacts.

Study Limitations

Impact studies provide useful estimates of potential economic impacts given a broad set of assumptions. However, the true impacts are unknown and will only be realized once the project is completed and all actual effects are analyzed. The assumptions guide the results and should be understood along with limitations of both the general input-output methodology as well as data or calculation limitations specific to the study at hand. Some specific limitations include:

- Input-output models such as IMPLAN assume slack resources and fixed prices. This may result in an overstatement of impacts if actual economic resources are fully, or nearly fully utilized. Given capital and labor mobility and current national labor and capital market slack, it is unlikely that this assumption will adversely affect the results.
- Impact estimates are to be interpreted as long run economic effects as downstream linkages take time to adjust to changes in demand. While many of the impacts are reported as single-year impacts, their full effect may take more than one year to be realized.⁵
- All direct expenditure estimates were provided by Clean Line based on engineering, consulting, and third party estimates. The true expenditures may exceed or fall short of these expenditure estimates. The assumed costs are based on current industry market prices, and do not reflect purchase orders or agreements with manufacturers, including the expenditure estimates with General Cable and Sediver.
- Construction cost estimates provided by Clean Line are based upon estimated line miles. The final route has not been fully determined. This may impact the total expenditures once construction commences.
- Expenditure inputs were aggregated into three primary categories: Manufacturing, Construction, and Services due to the limitations of IMPLAN industry linkages. In counties where an input industry doesn't currently exist, placing the expenditures into a more broad definition of the industry can provide estimates of approximate impacts. For example, in a county where equipment manufacturing doesn't currently exist, placing the new expenditure from construction activity into the more broadly defined "manufacturing" category yields the next best estimate of the resulting impact based upon the broader manufacturing linkages within the county. As of the most recent IMPLAN data set, some of the specific disaggregated NAICS categories do not exist within the study area, creating the need to aggregate the industry categories to obtain impact results.

⁵ See McGregor, Swales, and Yin (1996), "A Long-Run Interpretation of Regional Input-Output Analysis," *Journal of Regional Science*, Vol. 36(3), pp. 479-501.

Additionally, the study does not include:

- Any environmental impacts (costs or benefits) associated with transmission line and/or wind farm development;
- The potential impacts of regulations associated with the development of renewable energy or, conversely, the continued use of existing fossil fuel power plants;
- External benefits of continued wind development including the development of local construction, manufacturing, and services industries and stable energy pricing due to further wind farm development and long term contracts with local energy distributors;
- Potential changes to local energy prices and generation costs resulting from increased wind power generation; or
- Detailed impacts from multi-year operation.

Simplifying Assumptions:

- Transmission line and converter station construction is assumed to begin in Q3 2016 and complete in Q4 2018. Construction impacts assume a 30-month timeline. Impacts from longer lead-time items that are typically manufactured before the expected start of construction are spread across the 30-month timeframe. Actual construction may begin later than this, depending on regulatory approvals and other factors, however, later implementation of the project would not change the results in a material way.

Authors

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Kathy Deck is the Director of the Center for Business and Economic Research in the Sam M. Walton College of Business at the University of Arkansas. Her research interests include local economic development, industry market structure, and education and health care economics.

In providing applied economic research as part of the outreach mission of the Walton College, Deck has managed studies for a variety of clients including: Arvest Bank Group, the Arkansas Economic Development Commission, the Arkansas Department of Parks and Tourism, and the Northwest Arkansas Council. Deck also acts as a media resource for economic analysis of current events and trends. She was named Communicator of the Year in 2009 by the Northwest Arkansas Public Relations Society of America, was recognized as one of the 40 under 40 by Arkansas Business and the Northwest Arkansas Business Journal, and was named a Woman of Influence by Arkansas Business.

Deck earned a B.A. in economics from the College of William and Mary and a M.S. in economics from the University of Wisconsin-Madison. Before joining the Center for Business and Economic Research, Deck was the antitrust economist for the Arizona Attorney General.

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Mervin provides applied economic research for clients like the Arkansas Economic Development Commission, the University of Arkansas, the Northwest Arkansas Council, and the Jones Center for Families, and others. Mervin also provides economic analysis of current events and trends for local and state media outlets. He was selected to be a member of Arkansas State Chamber's Leadership Arkansas Class VIII, Arkansas Business 20 in their 20's, and Northwest Arkansas Business Journal Fast 15. Mervin also serves as the Vice-Chair of the board of the Ozark Literacy Council.

Mervin earned a B.A. in Economics and International Relations and a Masters in Public Administration and Public Policy from the University of Arkansas.