

The Economic Impact of Longwall Mining in Greene and Washington Counties

February 2015

Prepared for
The Pennsylvania Coal Alliance
by the
Pennsylvania Economy League of Greater Pittsburgh
11 Stanwix Street, 17th Floor
Pittsburgh, Pennsylvania 15222

412.281.1890



PENNSYLVANIA
ECONOMY LEAGUE
Information, Insight, Integrity.

Executive Summary

To estimate the economic impact of the longwall mining industry in Greene and Washington Counties, the Pennsylvania Economy League of Greater Pittsburgh (PELGP) used IMPLAN – an input-output model – and data from longwall mining operators on capital expenditures and employment from 2013.

The IMPLAN model determines the impact that an industry’s activity has on the economy, measured using employment and total value added. These are defined as follows:

- **Employment** – Includes both full- and part-time workers
- **Total Value Added** – The contribution of a project to the economy, comprised of Labor Income, Property Owner Income, and Indirect Business Taxes

The longwall mining industry produces a significant economic impact in Greene and Washington Counties in two ways. The first is through employment in the longwall mining industry. Direct employment in the industry results in indirect and induced employment and total value added in related and supporting industries. The second analysis calculates how capital spending from the longwall mining industry results in direct employment and subsequent indirect and induced effects. The economic impacts that longwall mining added to the economies of Greene and Washington Counties in 2013 are summarized below.ⁱ

Analysis 1: Operations of the Longwall Mining Industry

Through its 2013 operations, the longwall mining industry provides support through direct, indirect and induced impacts:

- **Approximately 7,350 full- and part-time jobs**, 3,550 of these directly in the longwall mining industry. For each direct job an additional 1.1 jobs are generated throughout Greene and Washington counties.
- **Approximately \$1.94 billion in total value added to the Counties’ economies**, \$1.5 billion of this directly created by the longwall mining industry. This includes:
 - Approximately \$535 million in labor income (\$504 million in employee compensation and \$31 million in proprietors’ income);
 - Property income contributed about \$1.3 billion; and
 - Indirect business taxes added more than \$81 million to the economy.

ⁱ There is overlap between these analyses, so the figures from the two analyses should not be added together as this would overstate the impact of the longwall mining industry’s overall impact. Additionally, the operations effect is year to year (annual) while the capital expenditures effect is a one-time impact for 2013.

Analysis 2: Capital Expenditures of the Longwall Mining Industry

Through its 2013 capital expenditures, the longwall mining industry provided support through direct, indirect or induced impacts for:

- **Approximately 2,340 full- and part-time jobs**, 1,363 of these directly.
- **Approximately \$282 million in total value added to the Counties' economies**, \$210 million of this directly created by the longwall mining industry. This includes:
 - Approximately \$164 million in labor income (\$151 million in employee compensation and \$13 million in proprietors' income);
 - Property income contributed about \$110 million; and
 - Indirect business taxes added more than \$8 million to the economy.

Table of Contents

- 1 Introduction 2
 - 1.1 Origins of this report 2
 - 1.2 Longwall mining in Greene and Washington Counties 2
- 2 The economic impact of the longwall mining industry in Greene and Washington Counties 4
 - 2.1 Analysis 1: Operations 4
 - 2.2 Analysis 2: Capital Expenditures 6
- 3 Methodology: Analyzing the economic impact of longwall mining 7
 - 3.1 Indirect and induced economic impacts 7
 - 3.2 Selecting a model for estimating the impact of longwall mining 8
 - 3.3 Modeling the impact of the longwall mining industry 9

1 Introduction

1.1 Origins of this report

The Pennsylvania Coal Alliance is ‘an initiative of PA bituminous coal mining operators, their employees, and industry suppliers to educate the public and policymakers about the coal industry in Pennsylvania.’ Through aggressive advocacy and education, the Pennsylvania Coal Alliance seeks to influence public policy, public opinion, and the marketplace in support of the coal economy. The organization asked the Pennsylvania Economy League of Greater Pittsburgh, LLC (PELGP) to perform an economic impact study of longwall mining in Greene County and Washington County in Pennsylvania. This study looks at longwall mining’s annual impact on the counties’ economies, using 2013 as a baseline year. This report builds on research and material prepared by PELGP in a 2014 report on the economic impact of the coal industry for the Pennsylvania Coal Alliance.

The Pennsylvania Economy League (PEL) was founded in 1936 by business and civic leaders seeking to improve the quality of government and promote economic development in Pennsylvania. PELGP, a regional branch of PEL, is the public policy research affiliate of the Allegheny Conference on Community Development. PELGP provides research and analysis on critical issues for the region’s competitiveness to support improvements for living and doing business in the region. With a rich history of civic and community involvement and its emphasis on comparative research and policy analysis, the organization holds a statewide reputation for objectivity, integrity and consensus-building.

1.2 Longwall mining in Greene and Washington Counties

Longwall mining is a type of underground mining used to extract coal. In the longwall method, a high-powered double drum shearer mines the face of the longwall panel. The shearer cuts, on average, 36-in of coal from its short dimension (the width) known as the longwall face. Longwall operations use room-and-pillar mining methods to develop the main entries and the gate road entries that outline the rectangular panels. At some of the larger longwall mines, one pass of the shearer along a 1,200 to 1,500-ft long face supplies enough coal to fill a unit train. It can take several thousand cuts or slices along the longwall face to completely mine a panel. When a cut is taken, the longwall shield supports move behind the advancing face and allow the strata above the previous position to fall into the void. The entire void area is called the “gob”.ⁱⁱ

ⁱⁱ University of Pittsburgh, *The Effects of Subsidence Resulting from Underground Bituminous Coal Mining, 2008-2013*, December 2014

The longwall method of mining is the most productive and efficient form of coal mining, with recovery rates of nearly 80 percent. However, because of geological factors, its application is limited to certain areas.

In Pennsylvania, longwall mining takes place only in Greene and Washington counties. Greene County ranks third nationally in coal production. Mine 84 in Greene County was in the process of being closed, while another mine, Harvey Mine, was being opened. Neither mine had production in 2013. Table 1 contains details on these mines.ⁱⁱⁱ Longwall mines were responsible for 58 percent of the bituminous coal production in Pennsylvania in 2013, accounting for over 33 million tons of 58 million. Two longwall mines – Bailey Deep Mine and Enlow Fork Mine – produced the most coal of any other Pennsylvania mines.



Figure 1 - Shearing a longwall mine in Pennsylvania

Table 1 - Longwall mines and production in Greene and Washington Counties in 2013

Longwall Mine	Operating Company	County	Production (tons)
Bailey Deep Mine	Consol Energy	Greene	11,321,481
Blacksville #2 Mine	Consol Energy	Greene	3,139,164
Cumberland Mine	Alpha Natural Resources	Greene	5,576,502
Emerald Deep Mine	Alpha Natural Resources	Greene	3,584,579
Enlow Fork Mine	Consol Energy	Greene/Washington	10,111,722
Harvey Mine	Consol Energy	Greene	0
Mine 84	Consol Energy	Washington	0
Total Longwall Mines	-	-	33,733,448
Total all PA Bituminous Mines	-	-	57,967,127

ⁱⁱⁱ Pennsylvania Department of Environmental Protection, *2013 Bituminous Underground Mines Reporting Production – Listed by County*, 2015

2 The economic impact of the longwall mining industry in Greene and Washington Counties

2.1 Analysis 1: Operations

As shown in Table 2, the longwall mining industry is a vital contributor to Greene and Washington Counties' economies through operations of the industry. The longwall mining industry provided support through direct, indirect and induced impacts:

- **Approximately 7,350 full- and part-time jobs**, 3,550 of these directly in the longwall mining industry. For each direct job an additional 1.1 jobs are generated throughout Greene and Washington counties.
- **Approximately \$1.94 billion in total value added to the Counties' economies**, \$1.5 billion of this directly created by the longwall mining industry. This includes:
 - Approximately \$535 million in labor income (\$504 million in employee compensation and \$31 million in proprietors' income);
 - Property income contributed about \$1.3 billion; and
 - Indirect business taxes added more than \$81 million to the economy.

Table 2 - The economic impact of longwall mining operations in 2013

Longwall Mining Industry: Operations	Direct	Indirect	Induced	Total
Employment Impact	3,550	1,930	1,887	7,367
Total Value Added Impact	\$1,515,503,531	\$288,891,626	\$139,697,450	\$1,944,092,608
Labor Income	\$306,676,117	\$152,973,721	\$75,650,866	\$535,300,704
Employee Compensation	\$294,459,799	\$142,512,606	\$66,714,975	\$503,687,380
Proprietor Income	\$12,216,318	\$10,461,115	\$8,935,891	\$31,613,324
Other Property Income	\$1,153,005,092	\$123,568,764	\$50,819,460	\$1,327,393,316
Indirect Business Taxes	\$55,822,322	\$12,349,142	\$13,227,125	\$81,398,588

The longwall mining industry is the third largest by employment in Greene and Washington Counties. Only the ‘*employment and payroll of local government/education*’ industry and the ‘*wholesale trade*’ industry employed more people, according to the IMPLAN results. In terms of total value added, the longwall mining industry adds more than double to Greene and Washington Counties’ economies than the next industry (*wholesale trade*). Table 3 shows the top five industries that supported Greene and Washington Counties’ economies in 2013. The Gross Domestic Product (GDP) of the two counties totaled about \$14.5 billion and the longwall mining industry represented over 13 percent of that total in 2013.

Table 3 - Top five industries impacting Total Value Added in Greene and Washington counties in 2013

Industry	Total Value Added	Direct Employees
Coal mining (longwall)	\$1,944,092,608	3,550
Wholesale trade	\$761,587,650	5,211
Real estate	\$582,986,513	3,550
Construction of new power and communication structures	\$567,402,307	1,235
Support activities for oil and gas operations	\$543,577,324	2,909
<i>Total all Industries (including top five)</i>	<i>\$14,475,310,136</i>	<i>134,575</i>

2.2 Analysis 2: Capital Expenditures

Most one-time industry investments are not accounted for in the operations analysis in the previous section. A separate analysis is needed to calculate the impact of construction and purchasing of equipment for the longwall mining industry in 2013.

The capital expenditure numbers are reported directly from the companies operating longwall mines. Capital expenditures for 2013 were spent on upgrades, in terms of new construction and equipment, for six longwall mines and one preparation plant. The total reported capital expenditures for 2013 was **\$404,376,677**.

As shown in Table 4, through capital expenditures in Greene and Washington Counties, the longwall mining industry provides support through direct, indirect or induced impacts for:

- **Approximately 2,340 full- and part-time jobs**, 1,363 of these directly.
- **Approximately \$282 million in total value added to the Counties' economies**, \$210 million of this directly created by the longwall mining industry. This includes:
 - Approximately \$164 million in labor income (\$151 million in employee compensation and \$13 million in proprietors' income);
 - Property income contributed about \$110 million; and
 - Indirect business taxes added more than \$8 million to the economy.

Table 4 - The economic impact of longwall mining capital expenditures in 2013

Longwall Mining Industry: Capital Expenditures	Direct	Indirect	Induced	Total
Employment Impact	1,363	398	578	2,339
Total Value Added Impact	\$209,874,459	\$29,407,887	\$42,807,287	\$282,089,633
Labor Income	\$121,920,975	\$19,020,028	\$23,182,828	\$164,123,830
Employee Compensation	\$114,080,391	\$16,335,552	\$20,444,644	\$150,860,586
Proprietor Income	\$7,840,585	\$2,684,475	\$2,738,184	\$13,263,244
Other Property Income	\$86,619,321	\$7,744,613	\$15,570,505	\$109,934,439
Indirect Business Taxes	\$1,334,163	\$2,643,247	\$4,053,954	\$8,031,364

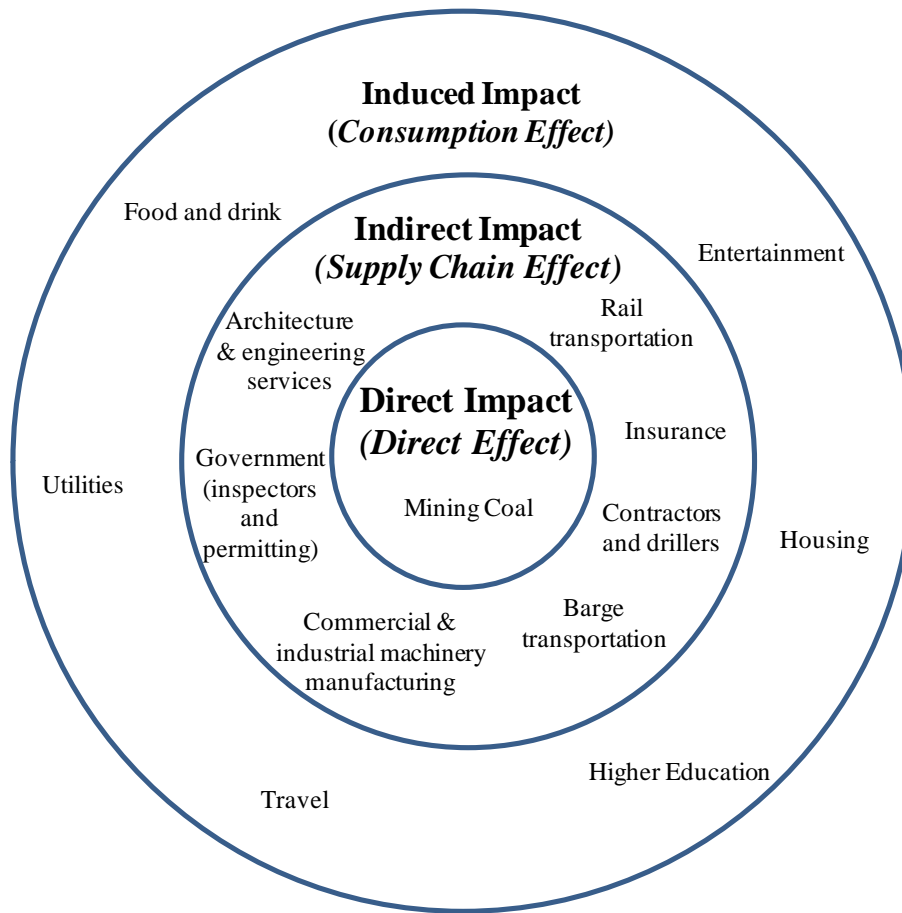
3 Methodology: Analyzing the economic impact of longwall mining

3.1 Indirect and induced economic impacts

The economic impact of longwall mining in Greene and Washington Counties is not limited to the employment, compensation, and capital expenditures within the industry itself. Through its supply chain, the longwall mining industry creates jobs in related industries. These jobs would not exist without longwall mining activity. Similarly, the wages paid to employees have an effect on the broader economy as employees use their compensation to buy goods and services for their personal use.

The **Direct Spending** of the longwall mining industry is the total the industry spends on payroll, and goods and services (including capital expenditures). That direct spending is then spent again by the recipient employees and local businesses. Employees use their salaries and wages to purchase goods and services from other businesses for personal consumption – this is termed **Induced Spending**. Businesses make their own purchases and hire employees, who then spend their salaries and wages throughout the local, regional and state economies – this is termed **Indirect Spending**. A chain reaction of indirect and induced spending continues, with subsequent rounds of additional spending gradually diminished through savings, taxes and expenditures made outside the state. This economic ripple effect, or **Multiplier**, is measured by “input-output” economic models, which estimate the number of times each dollar of input, or direct spending, cycles through the economy in terms of indirect and induced output, additional spending, personal income and employment. Figure 2 presents an illustration of direct, indirect and induced impacts of the longwall mining industry.

Figure 2 - The direct, indirect, and induced impact of the longwall mining industry



3.2 Selecting a model for estimating the impact of longwall mining

There are several input-output models commonly used by economists to estimate multiplier effects. Because of the complexity of measuring multiplier effects, all of the models have limitations. Still, economists generally agree that the models can provide an approximate measure of the indirect and induced spending, total jobs and personal income generated by a given amount of direct spending in a particular geographic area.

For this analysis, PELGP employed the IMPLAN model, which organizes the economy into 440 separate industries and has comprehensive data on every geographic area of the United States, sourced from federal agencies such as the Bureau of Economic Analysis.^{iv} It was initially developed and used in 1984 by the U.S. Department of Agriculture, in conjunction with the

^{iv} IMPLAN's state and industry specific input-output multipliers are based on numerous data sources, including the Bureau of Economic Analysis (BEA) Covered Employment and Wages, BEA Regional Economic Information System Data, BEA Output data, National Income and Product Accounts, BEA current benchmark I-O Study, the Consumer Expenditure Survey among others. The IMPLAN model assembles all of the data into a consistent accounting framework following the definitions and conventions of the US input-output benchmark study and the US National Income and Product Accounts.

University of Minnesota. In 1993, the technology was transferred to a new company, the Minnesota IMPLAN Group, Inc. (MIG, Inc.). Today, their tools are in use by more than 1,000 public and private institutions.

The IMPLAN model determines the impact that each industry has on the economy, including employment, total value added, employee compensation, proprietor income and property income. These are defined as follows:

- **Employment** – Includes both full- and part-time workers.
- **Total Value Added** – The contribution of a project to the economy. It is calculated by taking the sum of the following components:
 - **Labor Income** – made up of:
 - *Employee Compensation* – Payroll costs for the industry, including salaries and benefits
 - *Proprietor Income* – Payments received by self-employed individuals as income, including income received by private business owners
 - **Other Investor and Property Owner Income** – Payments for rents received on properties, royalties from contracts, dividends paid by corporations and corporate profits earned by corporations
 - **Indirect Business Taxes** – Includes excise, sales, property and production taxes and various fees but not payroll taxes or end of year income taxes.

3.3 Modeling the impact of the longwall mining industry

PELGP modeled the impact of the longwall mining industry within Greene and Washington Counties. The longwall mining industry will have economic impacts outside those counties, and coal industry companies located outside the two counties will have an impact on their economies, but for purposes of this analysis, these impacts were not considered. Studies done at the state level on the impact of longwall mining in Pennsylvania may not align with these results because of this difference in geographic scope.

PELGP conducted two separate analyses to show the impact of the longwall mining industry in Greene and Washington counties. The first analysis uses direct employment in the longwall mining industry in Greene and Washington Counties in 2013. The data was obtained from longwall mining company reports and Pennsylvania Department of Environmental Protection. PELGP defined the core industry as the ‘*mining coal*’ IMPLAN industry sector.

The second section analyzes the capital expenditures that longwall mining companies made in 2013 in Greene and Washington Counties, obtained from longwall mining company reports. PELGP defined the capital expenditures as a mixture of the IMPLAN industry sectors ‘*construction of other new nonresidential structures*’ and ‘*mining machinery and equipment manufacturing.*’

Disclaimer

The Pennsylvania Economy League of Greater Pittsburgh, LLC. (PELGP) makes no representation, warranty or guarantee regarding the conclusions of this economic impact study. PELGP acknowledges Pennsylvania Coal Alliance shall retain ownership of all materials provided to PELGP during the data collection phase of this project.

Pennsylvania Coal Alliance acknowledges PELGP's ownership in the final product. The results may be used by the both parties for advocacy, training, statistical, educational and media purposes supporting the importance of and/or impact of the Coal Industry and may not, without the express approval of all parties be sold to any third party or used for any other purpose.

Pennsylvania Coal Alliance shall not take any action that might negatively affect the distinctive quality of, or goodwill associated with, the materials, or adversely affects the reputation of the PELGP and its affiliates.