

Study of Construction Employment in Marcellus Shale Related Oil and Gas Industry

2008-2014

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I. Introduction

In the summer of 2014, the Labor Education Program at the School of Labor and Employment Relations at the University of Illinois conducted a retrospective analysis of natural gas/Marcellus Shale employment data from 2008-2014 for parts of Ohio, Pennsylvania, and West Virginia. The work was completed for the Institute for Construction Economics Research (ICERES) at Michigan State University.

The analysis relied on data collected from three sources. First, employment data on seven trades was drawn from Industrial Info Resource (IIR). IIR is a provider of global industrial market intelligence. Their clients include equipment manufacturers, servicing companies, distributors, manufacturer representatives, labor unions and placement services that sell products and services into the industrial market. For this study IIR provided an understanding of the impact that the Marcellus Shale has had on construction employment in union and nonunion sectors within specific trades as well as industrial plant project spending. For purposes of comparisons to pre and post Marcellus Shale employment figures for the specified region, the IIR data covers the years 2000 to the first six months of 2014.

A second source was the National Maintenance Agreement (NMA). As described by the National Maintenance Agreements Policy Committee, the NMA is a “series of collective bargaining agreements utilized by more than 2,000 industrial contractor companies who employ members of fourteen building trades international unions (see National Maintenance Agreements Policy Committee, Inc. website at <http://nmapc.org/about/>).” The NMA provided the researchers with actual worked hours on Marcellus Shale projects for selected trades and importantly provided employment data for three trades not covered by the IIR data set. A sample of the types of facilities that account for work hours done under the NMA, include compressor stations, meter stations, and cryogenic plants. Projects that account for reported work hours include but are not limited to the following tasks: installation of piping and set compressors, crane work and excavating, scaffolding erection and dismantling, and installing

underground piping and underground pipeline headers. All of the NMA utilized data was for unionized contractors and trades and covered 2008 to 2013.

Finally, employment data was provided by the AFL-CIO's North America's Building Trades Unions (NABTU). NABTU provided data from 2008 to the first half of 2014 on the actual hours worked by selected trades on Marcellus Shale natural gas projects in order to supplement and cross-check the reliability of other data sources. Employment data for the Operating Engineers and Laborers was utilized because of the diverse and expansive array of jobs that the two trades perform on oil and gas projects. For example, as explained by the International Union of Operating Engineers, work performed by Operating Engineers includes land clearing and grubbing, construction of right-of-ways, construction of the drill pads, heavy man-hours from the crane rental vendors that support all of the drilling operations, extensive man-hours in equipment rental and maintenance yards, as well as construction of the pump and compressor stations. This employment data was not fully captured by the IIR or NMA data sources. In addition, employment data from the Insulators Union was collected because their hours were not included in either the IIR or NMA worked hours.

It is important to note that this report is not meant to be a geological analysis of the Marcellus Shale Play or a technical description of the physical work performed to harness natural gas or an analysis of full economic impacts on the areas effected. It is, instead, a "look back" at actual worked hours in construction on oil and gas projects developed because of shale gas exploration.

II. Scope of Work and Data

In this report, we capture a large population of projects being proposed by industrial owners that include new plant construction, capital work at existing facilities, and maintenance turnarounds, shutdowns and outages. While we have not uncovered every event that's taken place, our findings reveal all the large capital expenditures and scheduled maintenance activity.

Employment data was based on 1,326 completed projects. The project population included in this assessment are confirmed, completed or currently in construction. While the primary time frame for our analysis is 2008 to the first half of 2014, for comparative purposes data going back to the year 2000 were also included in order to widen the trend line of activity.

This report places all employment activity into three (3) classifications based on their relationship to natural gas development. The first, *direct relationship* identifies which industries is a direct result of Marcellus Shale development. The second, *indirect relationship*, refer to those industries that benefit from shale production. Finally, in order to provide some comparative analysis, industry spending that has *no relationship* to oil, gas or condensate production from the Marcellus Shale is provided. The classifications are further elaborated below:

Direct Relationship: Industries of Bulk Storage Terminals, Pipelines and Stations, Production/Processing Plants and Petroleum

Indirect Relationship: Plants that utilize a high rate of Natural Gas as a feedstock or fuel such as Steel Mills, Pulp and Paper Mills, Chemical Processing Plants and Natural Gas-Fired Power Generation Plants. This group includes pipe mills producing product for drilling and pipeline gathering.

No Relationship: All other industries that would naturally develop expand or perform improvements and maintenance regardless of the shale development.

The oil and gas industry *direct and indirect* employment data reported in this study is related to natural gas projects drawn from a “but for” perspective. Meaning that “but for” construction on natural gas projects the employment impact would not have occurred.

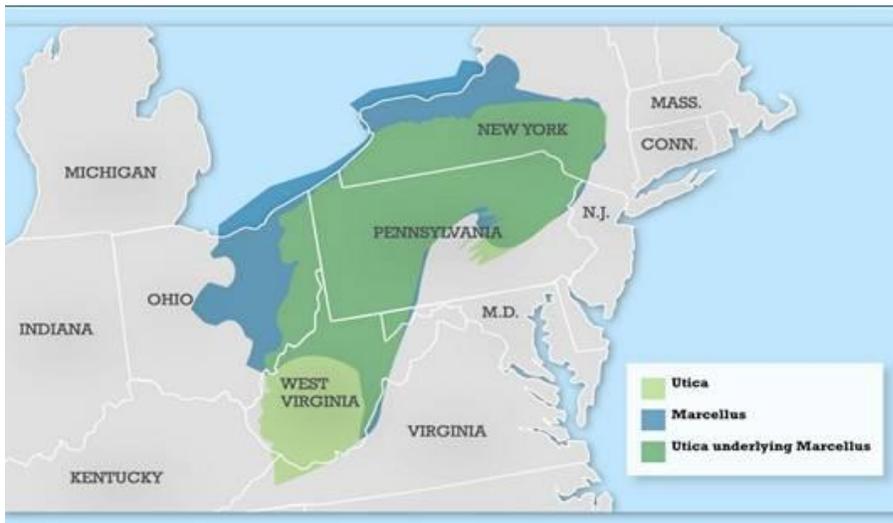
This report presents the actual labor hours worked for thirteen trades and the estimated construction workers required for all capital and maintenance activities. The following crafts have been selected for this study: Boilermakers, Operating Engineers, Electricians, Pipefitters, Ironworkers, Plumbers, Laborers, Insulators, Carpenters, Sheet Metal Workers, Painters, Plasterers and Masons and Teamsters.

Employment data was drawn from locations that reflect the geological footprint of the Marcellus Shale Play.

The following states and counties were included:

- Maryland (Garrett, Allegany and Washington Counties)
- Virginia (Frederick, Clarke, Highland, Rockingham, Augusta and Shenandoah Counties)
- Pennsylvania (All Counties)
- Ohio (Eastern Counties)
- West Virginia (All Counties)

Marcellus Shale Play



III. National Shale Related Industry Overview

The oil and gas industry has been on an accelerated growth path since the beginning of the Marcellus/Utica Shale developments in 2006. According to the data collected by Industrial Info Resource for this report, construction and maintenance spending reached \$5 billion in 2013, growing by 61 percent from the previous year.¹ In that year alone the industry created over 4,600 construction jobs in eight trades, and the upward trend continues. In 2014, \$6.5 billion has already been committed.

Over just the last 6 years, approximately 72.3 million labor hours came from major plant capital and maintenance work in the oil and gas and related indirect industries with an annual growth rate of 30.7 percent. The year 2013 reached an all-time high with over 9 million labor hours recorded. This represents a 40 percent increase over 2012.

The build-out of the oil and gas industry in 2013 resulted in an additional 5,500 craft worker jobs. Estimating off the median base wage rates of each craft, over \$247 million was paid out to workers in this industry as a result of ongoing construction activities.

Conversely, construction activity in non-shale related oil and gas industries has fallen by 53.7 percent since 2008 when it reached its peak of 14.8 million labor hours. Last year, this group of industries only generated 6.6 million hours for the eight trades highlighted in this report. At one time, 7,100 full time construction jobs were created annually. That number has dropped to 3,300 jobs.

¹ . Data in this section drawn from a labor market analysis of Marcellus Shale from Industrial Information Resources, July 2014.

IV. Key Study Findings (all hours and workers reported include union and nonunion labor)

1. *Cumulative Direct and Indirect Labor Hours Worked by All Trades on All Marcellus Shale Derived Oil and Gas Development Projects (2008-2014*).*

Trade	Hours
BOILERMAKER	2,783,661
CARPENTERS	407,912
ELECTRICIAN	7,511,582
IRONWORKER	5,194,560
INSULATORS	809,832
LABORER	15,947,748
OPERATOR	21,098,159
PAINTERS	13,914
PIPEFITTER	13,113,968
PLASTERERS & MASONS	54,536
PLUMBER	554,887
SHEET METAL WORKERS	29,952
TEAMSTERS	5,135,183
Total All	72,655,894*

**2014 Data includes labor hours through the first six months only*

2a. *Cumulative Number of Actual Construction Workers By All Trades Employed Based on 2,000 Hours Worked on Direct and Indirect Projects (2008-2014*).*

Trade	Number of Workers
BOILERMAKER	1,392
CARPENTERS	204
ELECTRICIAN	3,756
IRONWORKER	2,597
INSULATORS	405
LABORER	7,974
OPERATOR	10,549
PAINTERS	7
PIPEFITTER	6,557
PLASTERERS & MASONS	27
PLUMBER	277
SHEET METAL WORKERS	15
TEAMSTERS	2,568
Total All	36,328*

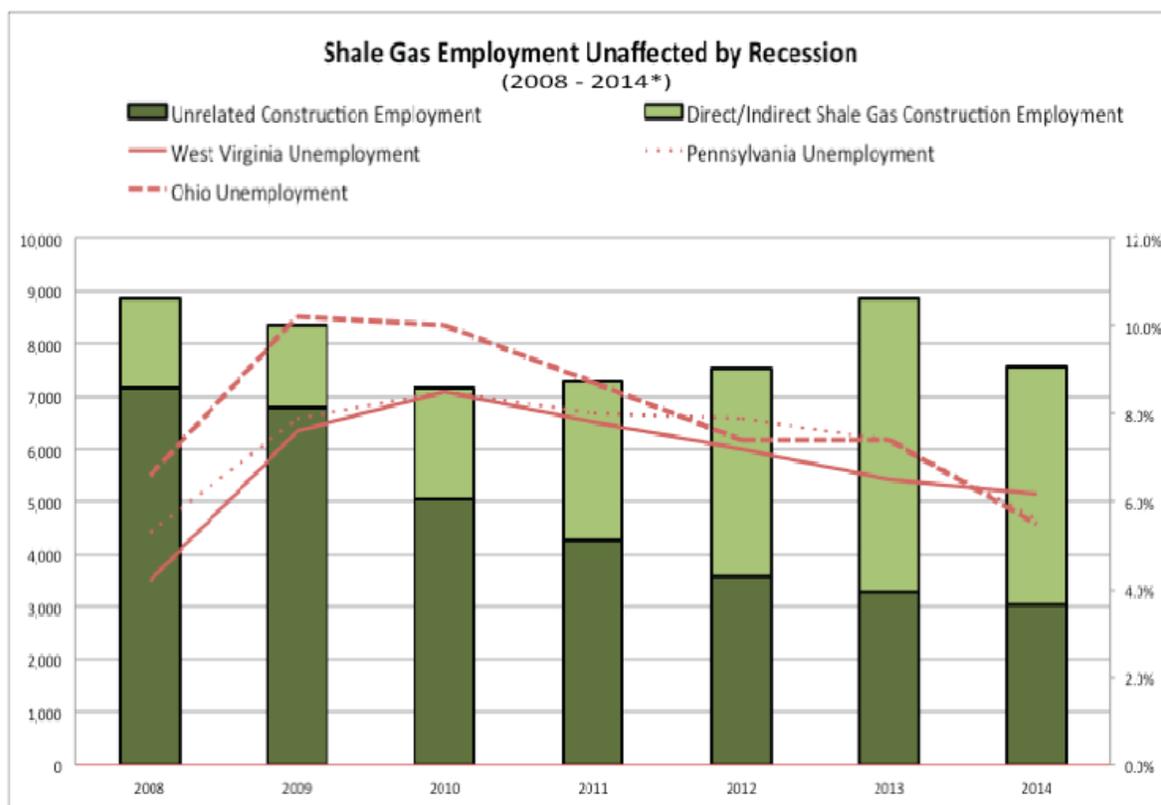
**2014 Data includes labor hours through the first six months only*

2b. Cumulative Number of Actual Construction Workers By All Trades Employed Based on 1,600 Hours Worked on Direct and Indirect Projects (2008-2014*).

Trade	Number of Workers
BOILERMAKER	1,740
CARPENTERS	255
ELECTRICIAN	4,695
IRONWORKER	3,247
INSULATORS	506
LABORER	9,967
OPERATOR	13,186
PAINTERS	9
PIPEFITTER	8,196
PLASTERERS & MASONS	34
PLUMBER	347
SHEET METAL WORKERS	19
TEAMSTERS	3,209
Total All	45,410*

* 2014 Data includes labor hours through the first six months only

3. *Number of People Employed in Construction on Shale Related Projects Compared to Non-Shale Related Projects (2008-2014*) in Relationship to Construction Unemployment in Ohio, Pennsylvania and West Virginia.*



V. Conclusion

A preliminary examination of employment data in states related to the Marcellus Shale Play (i.e., Maryland, Virginia, Pennsylvania, Ohio and West Virginia) reveals that natural gas exploration has been a strong engine of job growth. From 2008 to the first half of 2014, over 72 million hours of direct and indirect construction labor has been worked on natural gas and oil projects related to the Marcellus Shale. These hours translate to 36,321 actual construction workers (based on a standard 2,000 hours of work) and engaged in oil and gas work that would not have occurred “but for” natural gas exploration in the Marcellus Shale geological footprint. It is important to note however, that based on a more realistic denominator of 1,600 annual hours of work, the number of actual construction workers is 45,402.

It is important to note that for purposes of this report the total hours worked were drawn from thirteen building trades (i.e., Boilermakers, Operating Engineers, Electricians, Pipefitters, Ironworkers, Plumbers, Laborers, Insulators, Painters, Plasterers and Masons Sheet Metal Workers, Carpenters and Teamsters). However, additional employment data, not assessed in this report, related to state road construction connected to natural gas development projects, as well as hours worked as part of local union agreements would increase the employment impacts.

In addition, an analysis of Marcellus Shale employment data reveals that the expansion of natural gas development first beginning in 2006 and accelerating during the recessionary 2008-2013 period, has repositioned construction employment in the Oil and Gas Industry. While employment in non-shale related oil and gas industries sharply declined from 2008 forward, employment activity on natural gas projects in the Marcellus Shale Play rose significantly.

From 2000 to 2007 there were 44,942,046 total hours worked on all oil and gas related projects (see Appendix, Table A and B). A total number of 28,089 construction workers (based on the 1,600-hour formula) were employed on all oil and gas related projects (see Appendix, Table C). By comparison, in nearly eighteen months less time the total hours worked on just Marcellus Shale projects was 72,655,894. More revealingly, prior to the peak of the recession in the first quarter of 2008, the majority of people employed in the oil and gas industry in the designated region were working in traditional industries unrelated to natural gas development. However by 2012 the relationship has flipped. Since 2012 employment on Marcellus Shale natural gas projects represents the majority of oil and gas related construction work being done in the area. Additionally, beginning in 2008 the ramp up of natural gas-related production has been much steeper than for projects related to conventional oil and gas wells.

The transformation of employment in the oil and gas industry has had an additional virtuous effect. An examination of national and relevant state unemployment data for the construction

industry indicates that “but for” natural gas projects the region would have experienced substantially higher incidences of construction industry job displacement.

It is worth once again stating that this report presents employment data for *actual hours worked* on Marcellus Shale projects from 2008 to the first half of 2014. The analysis does not include any projected or indirect or induced employment impacts. Finally, the report does not offer an estimate of the relative mix of union and nonunion hours worked.

One possible future research project on the impacts of natural gas related construction could include conducting an analysis, which examines the indirect and induced overall economic effects of employment in the industry. This study would examine, for example, the relationship between employment in the natural gas industry and employment in unrelated fields. Additionally, such an analysis could estimate the total income tax dollars generated from natural gas employment in a particular jurisdiction. Also, a research study could examine possible employment effects related to work on roads and other support activities connected to expansion of natural gas and oil projects. A final project could more extensively explore the effects of natural gas construction on a region’s unemployment rate and the related budgetary impacts for state and local governments.

Appendix (all hours and workers reported include union and nonunion labor)

A. *Annual Cumulative Labor Hours Worked by All Trades on All Oil and Gas Industry Projects by Year (2000-2007).*

Year	Total Hours
2000	4,188,337
2001	3,363,791
2002	2,568,103
2003	1,776,682
2004	2,602,205
2005	3,622,016
2006	10,526,218
2007	16,294,694
TOTAL	44,942,046

B. *Annual Cumulative Labor Hours Worked by All Trades on All Oil and Gas Industry Projects by Trade (2000-2007)*

Trade	Total Hours
Teamster	5,211,593
Plumber	1,094,588
Pipefitter	9,989,153
Operator	3,564,314
Laborer	5,316,018
Ironworker	3,933,718
Electrician	11,526,254
Boilermaker	4,306,408
Total	44,942,046

C. Cumulative Number of Actual Construction Workers By All Trades Employed Based on 1,600 Hours Worked on Direct and Indirect Projects (2000-2007)

Trade	Total Hours
Teamster	3,257
Plumber	684
Pipefitter	6,243
Operator	2,228
Laborer	3,323
Ironworker	2,459
Electrician	7,204
Boilermaker	2,692
Total	28,089