

# THE ECONOMIC IMPACT OF COAL AND COAL-FIRED POWER GENERATION IN WEST VIRGINIA

WINTER 2021



West Virginia University

JOHN CHAMBERS COLLEGE OF  
BUSINESS AND ECONOMICS

Bureau of Business and  
Economics Research

# **The Economic Impact of Coal and Coal-Fired Power Generation in West Virginia**

is published by:

Bureau of Business & Economic Research  
West Virginia University College of Business and Economics

PO Box 6527, Morgantown, WV 26506-6527  
(304) 293-7831; bebureau@mail.wvu.edu  
bber.wvu.edu

---

**WRITTEN BY**

**Christiadi PhD**

Research Associate

**Eric Bowen PhD**

Research Assistant Professor

**John Deskins PhD**

Director

**Priscila Borges Marques Dos Santos**

Research Scholar

---

Funding for this research was provided by the West Virginia Coal Association. The opinions herein are those of the authors and do not necessarily reflect those of the West Virginia Coal Association or the West Virginia University Board of Governors.

© Copyright 2021 WVU Research Corporation



## Table of Contents

List of Figures and Tables .....	iv
Executive Summary.....	v
1 Introduction .....	1
2 Coal and the West Virginia Economy: Recent Trends .....	2
3 West Virginia Coal Exports .....	11
4 Economic Impact of Coal Production in West Virginia .....	14
5 Economic Impact of Coal-Fired Power Generation in West Virginia .....	16
5.1 Grant County .....	17
5.2 Harrison County.....	18
5.3 Marion County.....	19
5.4 Marshall County .....	20
5.5 Mason County .....	21
5.6 Monongalia County .....	22
5.7 Pleasants County .....	23
5.8 Putnam County.....	24
5.9 Total Economic Impact of Coal-Fired Power Plants In West Virginia.....	25
6 Economic Impact of Coal Mining and Coal-Fired Power Generation.....	26
7 Appendix .....	27



## List of Figures and Tables

Figure 1: Economic Impact of Coal Mining and Coal-Fired Power Generation in West Virginia .....	vi
Figure 2: Annual Coal Production, West Virginia vs Other U.S. States .....	2
Figure 3: West Virginia Share of U.S. Annual Coal Production .....	3
Figure 4: West Virginia Regional Coal Production .....	4
Figure 5: Coal Mining Employment in West Virginia .....	5
Figure 6: Average Annual Wage by Industry, West Virginia, 2019 .....	6
Figure 7: Coal Mining Share of Total Employment and Wages .....	7
Figure 8: Distribution of West Virginia Coal by Consumer .....	8
Figure 9: West Virginia Coal Shipments to Power Plants by Destination State, 2011 vs 2019.....	9
Figure 10: U.S. Coal Demand Forecast.....	10
Figure 11: Coal Exports, West Virginia vs Other U.S. States .....	11
Figure 12: West Virginia Coal Exports as a Share of U.S. Coal Exports .....	12
Figure 13: West Virginia Coal Exports as a Share of the State’s Total Exports .....	13
Figure 14: Economic Impact of Coal Mining in West Virginia.....	15
Figure 15: West Virginia Coal Power Plants Included in the Analysis.....	16
Figure 16: Economic Impact of Coal-Fired Power Plant in Grant County .....	17
Figure 17: Economic Impact of Coal-Fired Power Plant in Harrison County .....	18
Figure 18: Economic Impact of Coal-Fired Power Plant in Marion County .....	19
Figure 19: Economic Impact of Coal-Fired Power Plant in Marshall County .....	20
Figure 20: Economic Impact of Coal-Fired Power Plant in Mason County .....	21
Figure 21: Economic Impact of Coal-Fired Power Plants in Monongalia County .....	22
Figure 22: Economic Impact of Coal-Fired Power Plant Pleasants County.....	23
Figure 23: Economic Impact of Coal-Fired Power Plant in Putnam County.....	24
Figure 24: Economic Impact of All Coal-Fired Power Generations in West Virginia .....	25
Figure 25: Economic Impact of Coal Mining and Coal-Fired Power Generation in West Virginia .....	26
Appendix 1: West Virginia Coal Exports by Country of Destination, 2020 .....	27
Appendix 2: World Coal Exports, West Virginia vs. Other Counties, 2020 .....	28



## Executive Summary

While coal production in West Virginia has declined by more than 50 percent over the past decade or so, the sector remains an important part of the state's economy. In this report, we consider the contribution of coal mining and coal-fired power generation to the state's employment base, economic output, and tax revenue.

We begin with a detailed examination of recent trends in coal production, employment, employee compensation, and coal distribution for West Virginia over the past several years. We also consider coal exports, which may provide a potential growth area as domestic demand for coal declines over the long term.

The core of this report is an estimate of the economic impact of coal and coal-fired power generations on the West Virginia economy. Statistics indicate that coal mining directly employs more than 13 thousand workers in West Virginia who earn a total compensation of around \$1.5 billion annually. Further, our estimates indicate that coal mines spend a total of around \$6.5 billion in the state's economy directly. However, the total economic impact of the industry does not end there. As coal mines operate, they purchase various inputs from local suppliers, thereby increasing demand for upstream businesses. Further, as coal mine employees spend their earnings in the local economy, further economic activity is created. Finally, the primary downstream purchaser of coal—coal-fired electric power generation—injects billions of dollars into the state's economy, with more than 2,000 high-wage workers. Highlights of our economic impact analysis are as follows:

### Coal Mining

- Coal mining generated approximately \$9.1 billion in total economic activity in the state of West Virginia in 2019.
- Coal mining supported nearly 27 thousand jobs in West Virginia in 2019.
- Coal mining provided around \$2.1 billion in employee compensation in West Virginia in 2019.
- Coal mining generated around \$514 million in severance tax, and other state and local tax revenue for West Virginia and its local governments.

### Coal-Fired Power Generation

- Coal-fired power generation generated approximately \$4.8 billion in total economic activity in the state of West Virginia in 2019. This impact is net of the impact associated with the purchase of West Virginia coal, which is already accounted for in the coal mining impact above.
- Coal-fired power generation supported nearly 6.6 thousand jobs in West Virginia in 2019.
- Coal-fired power generation provided around \$725 million in employee compensation in West Virginia in 2019.
- Coal-fired power generation supported more than \$97 million select state and local tax revenue for West Virginia and its local governments.

### Coal Mining and Coal-Fired Power Generation

- Coal mining and coal-fired power generation combined generated approximately \$13.9 billion in total economic activity in the state of West Virginia in 2019.
- Coal mining and coal-fired power generation combined supported nearly 33.3 thousand jobs in West Virginia in 2019.



- Coal mining and coal-fired power generation combined provided around \$2.8 billion in employee compensation in West Virginia in 2019.
- Coal mining and coal-fired power generation combined supported more than \$611 million severance tax and select state and local tax revenue for West Virginia and its local governments.

**Figure 1: Economic Impact of Coal Mining and Coal-Fired Power Generation in West Virginia**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, billions)</b>	9.4	4.5	13.9
<b>Employment (thousand jobs)</b>	15.4	17.9	33.3
<b>Employee Compensation (\$, billions)</b>	1.8	1.1	2.8
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	611.3

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes severance, sales, personal income, property, and corporation net income taxes.



# 1 Introduction

While coal production in West Virginia has declined by more than 50 percent over the past decade or so, the sector remains an important part of the state's economy. In this report, we consider the contribution of coal mining and coal-fired power generation to the state's employment base, economic output, and tax revenue.

We begin in Section 2 with a detailed examination of recent trends in coal production, employment, employee compensation, and coal distribution for West Virginia over the past several years. In Section 3, we consider coal exports, which may provide a potential growth area as domestic demand for coal declines over the long term.

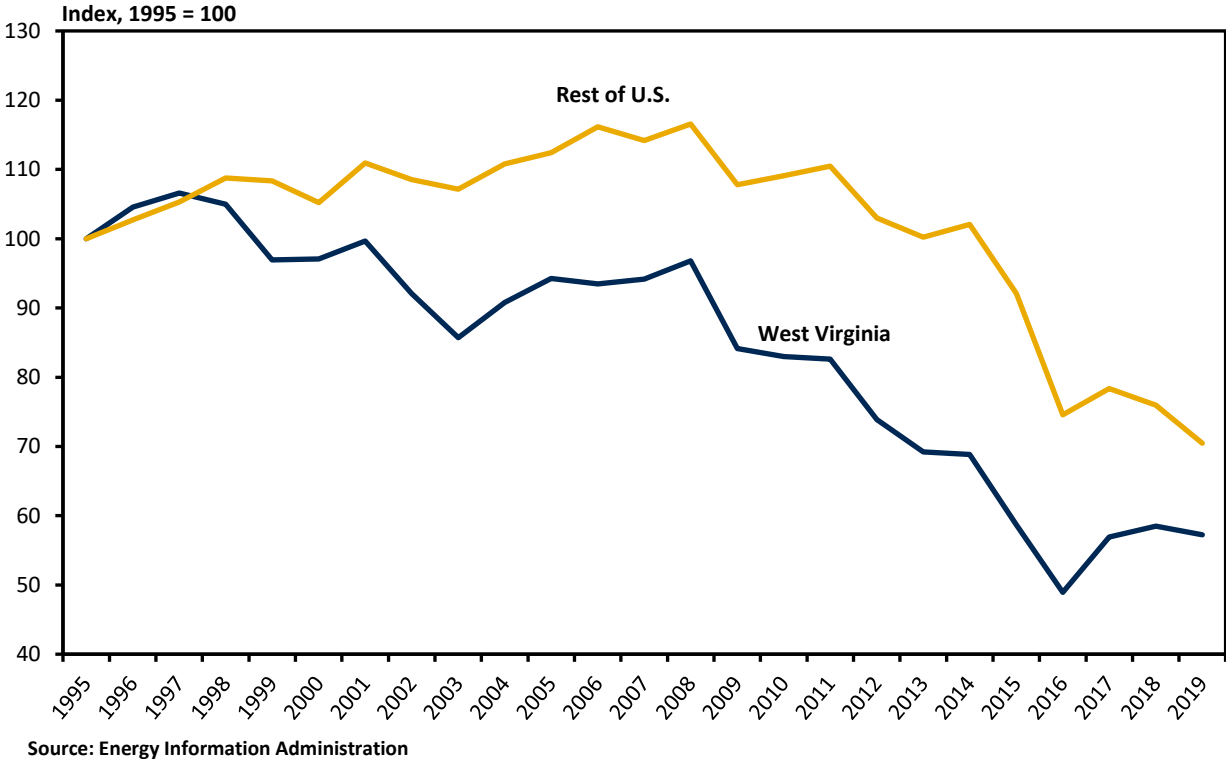
The core of this report is an estimate of the economic impact of coal and coal-fired power generation on the West Virginia economy, which we present in Sections 4 and 5, respectively. Statistics indicate that coal mining directly employs more than 13 thousand workers in West Virginia who earn a total compensation of around \$1.5 billion annually. Further, our estimates indicate that coal mines spend a total of around \$6.5 billion in the state's economy directly. However, the total economic impact of the industry does not end there. As coal mines operate, they purchase various inputs from local suppliers, thereby increasing demand for upstream businesses. Further, as coal mine employees spend their earnings in the local economy, further economic activity is created. Finally, the primary downstream purchaser of coal in the state—coal-fired electric power generation—injects billions of dollars into the state's economy, with more than 2 thousand high-wage workers.



## 2 Coal and the West Virginia Economy: Recent Trends

**STATE AND U.S. COAL PRODUCTION:** The coal industry in both West Virginia and the U.S. have experienced substantial declines over much of the past decade. The downturn was felt more strongly in West Virginia than the rest of the U.S. through 2016. Total coal production in West Virginia peaked in 2008 at nearly 158 million tons then declined to less than 80 million tons in 2016, a nearly 50 percent decline. Over the same period, in the rest of the U.S., production fell from one billion tons to just over 0.6 billion tons, a decline of about 36 percent. Contrary to these general trends, coal production in West Virginia rose back up in 2017 and stayed at around 93 million tons through 2019, or an increase of more than 15 percent. During the same period, coal production in the rest of the US declined by 5 percent (see Figure 2).

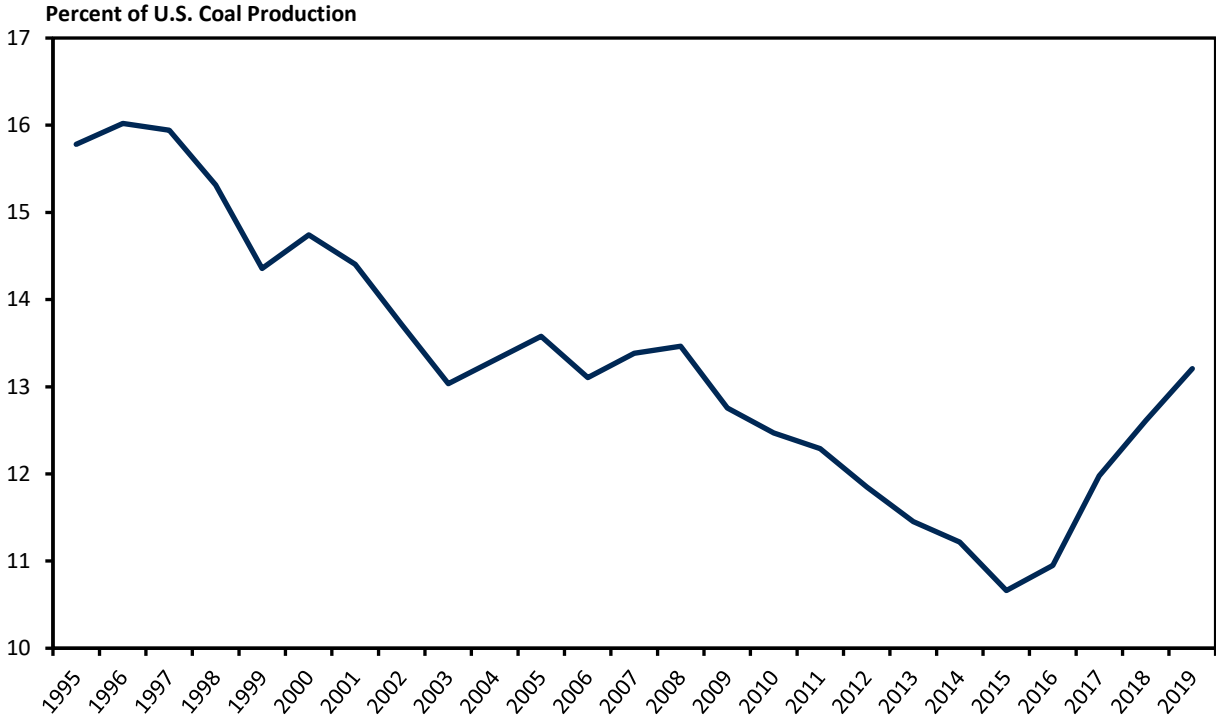
**Figure 2: Annual Coal Production, West Virginia vs Other U.S. States**





Having experienced steep declines in production, West Virginia’s share of U.S. coal production declined through 2016 as well, but rebounded in the three following years. West Virginia accounted for 15.8 percent of U.S. coal production in 1995. The share fell to 11.0 percent in 2016 and before rising back up in 2017 and to 13.2 percent in 2019 (see Figure 3). West Virginia remains the second-largest coal producer in the U.S., behind only Wyoming, whose share of U.S. coal production in 2019 was around 39 percent.

**Figure 3: West Virginia Share of U.S. Annual Coal Production**

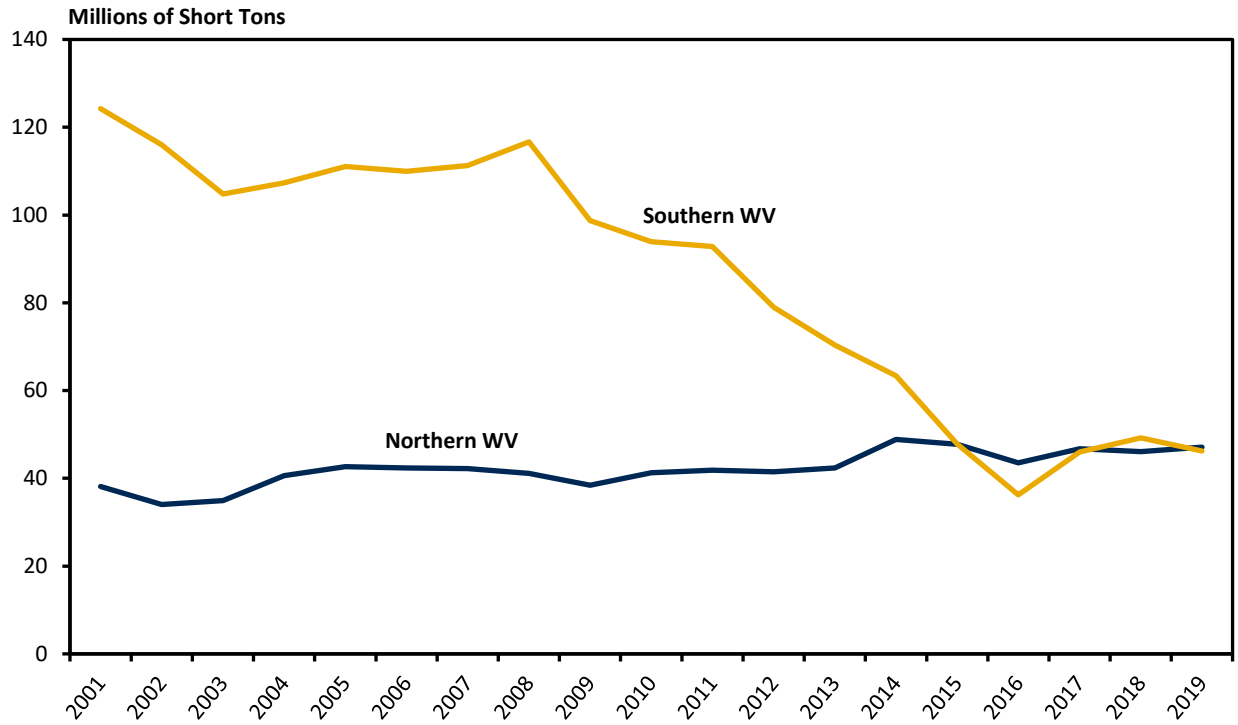


Source: Energy Information Administration  
Note: Share was calculated based on production quantity.



**REGIONAL COAL PRODUCTION:** Most of the decline in coal production in West Virginia occurred in the state’s southern coal fields – part of the Central Appalachian Coal Basin. Between 2008 and 2019, Southern West Virginia coal production dropped from nearly 117 million tons to about 46 million tons, a decline of about 60 percent. In contrast, during the same period the Northern West Virginia coal production (part of the Northern Appalachian Coal Basin) rose by a smaller margin. Consequently, Southern West Virginia’s share of total state coal production dropped from nearly 74 percent in 2008 to about 50 percent in 2019 (see Figure 4).

**Figure 4: West Virginia Regional Coal Production**

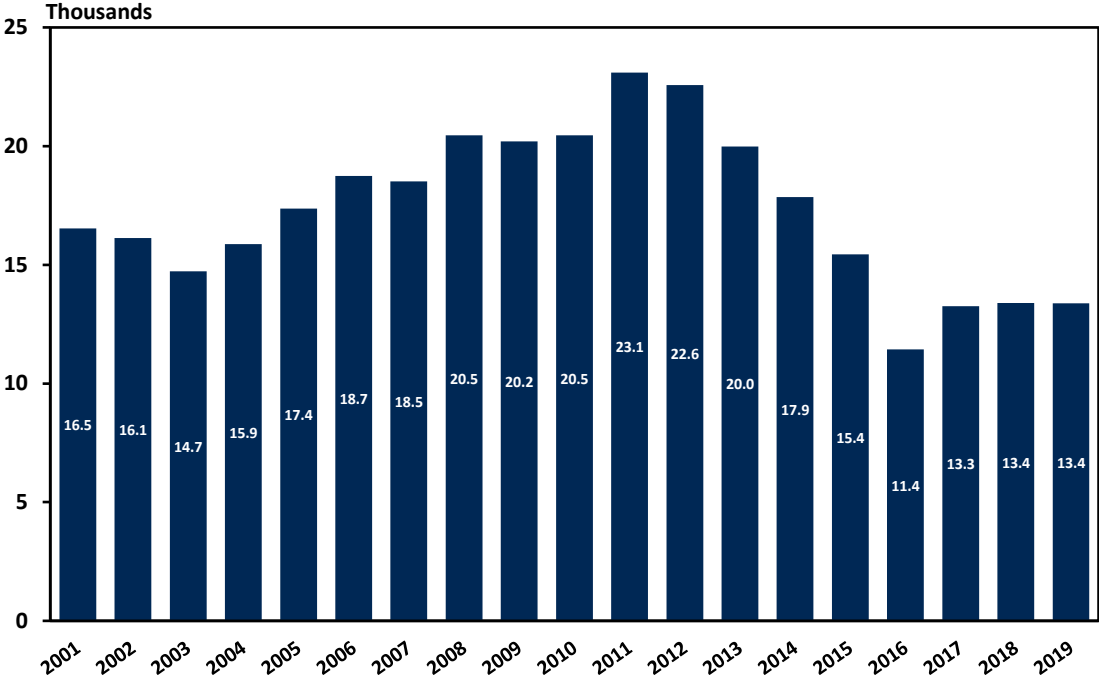


Source: Energy Information Administration



**COAL MINING EMPLOYMENT:** As shown in Figure 5, approximately 13.4 thousand workers were employed in the coal mining industry in 2019.<sup>1</sup> This reflects a decline of around 3.1 thousand jobs, or about 19 percent, from 2001.

**Figure 5: Coal Mining Employment in West Virginia**



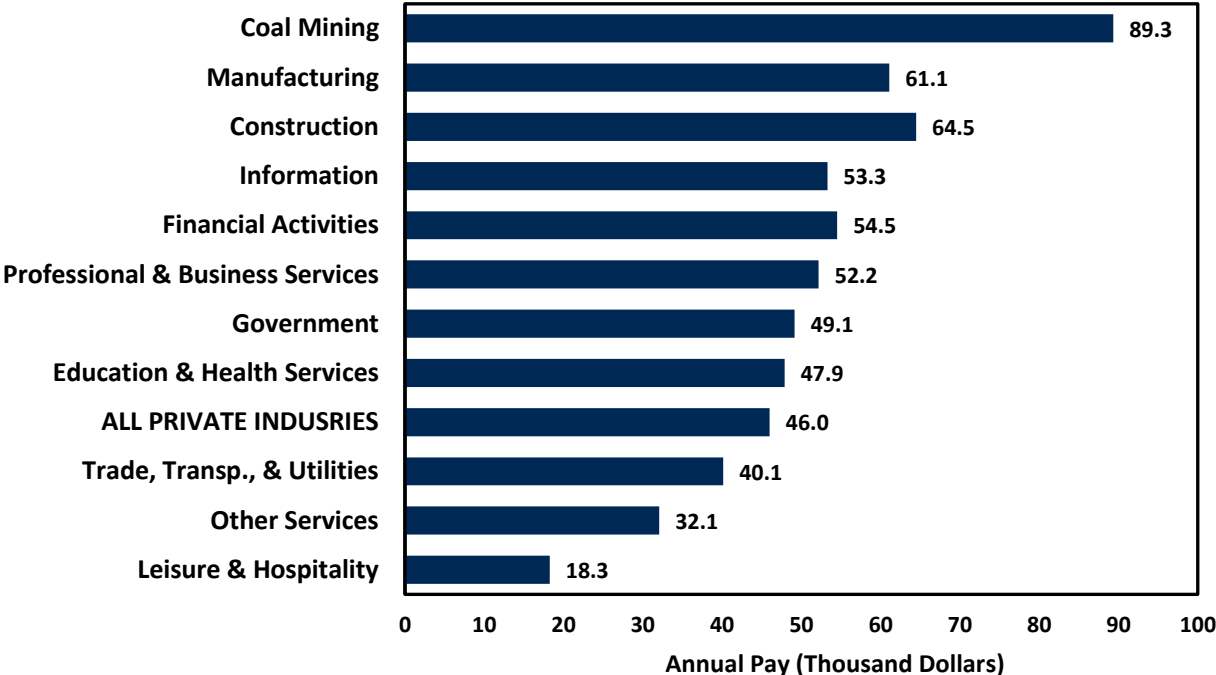
Source: Quarterly Census of Employment and Wages (QCEW), Bureau of Labor Statistics

<sup>1</sup> This specifically represents jobs in the coal mining sector, classified as NAICS code 2121.



**COAL MINING WAGES:** The coal industry’s contribution to the West Virginia economy is more pronounced when we consider employee income. In 2019, the coal industry paid its workers an average of \$89.3 thousand annually. This wage is nearly double the average annual wages for all private industries in the state (Figure 6). While coal mining accounted for nearly 2.5 percent of all jobs in private industries in West Virginia in 2019, earnings from coal mining accounted for 4.7 percent of total earnings from private industries (see Figure 7).

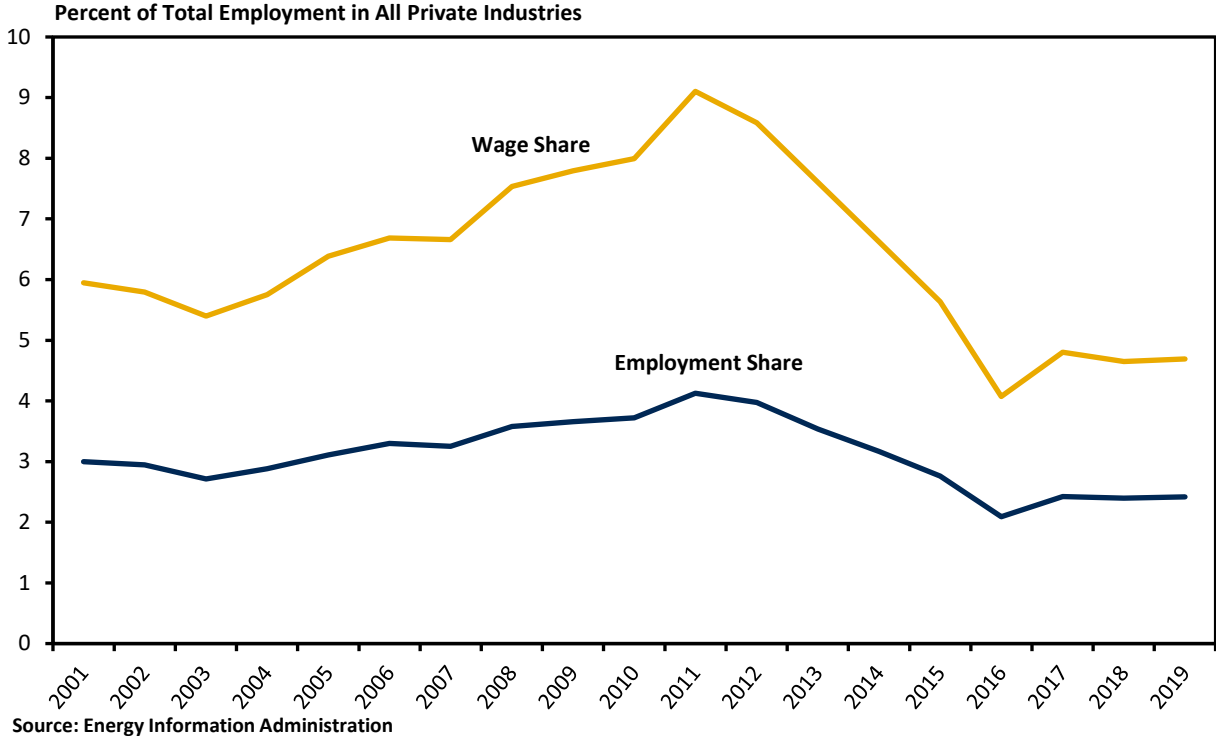
**Figure 6: Average Annual Wage by Industry, West Virginia, 2019**



Source: Quarterly Census of Employment and Wages (QCEW), Bureau of Labor Statistics

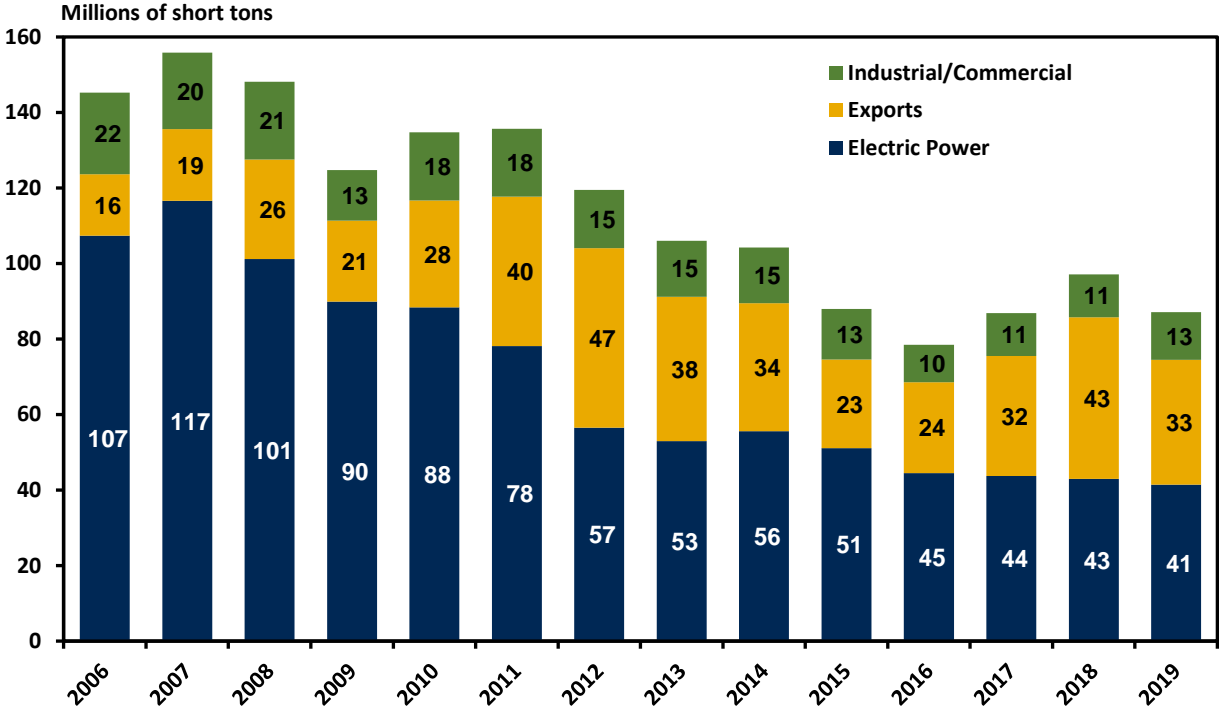


Figure 7: Coal Mining Share of Total Employment and Wages



**COAL DISTRIBUTION AND DEMAND:** Now we turn to how West Virginia coal is distributed among its users (Figure 8). The majority of the West Virginia coal is used for electric power generation, although the amount used has declined substantially, from over 100 million tons as recently as 2008 to 41 million tons in 2019, a nearly 60 percent drop. International coal exports have experienced significant volatility over the past decade or so, and are discussed in greater detail below in Section 3.

**Figure 8: Distribution of West Virginia Coal by Consumer**

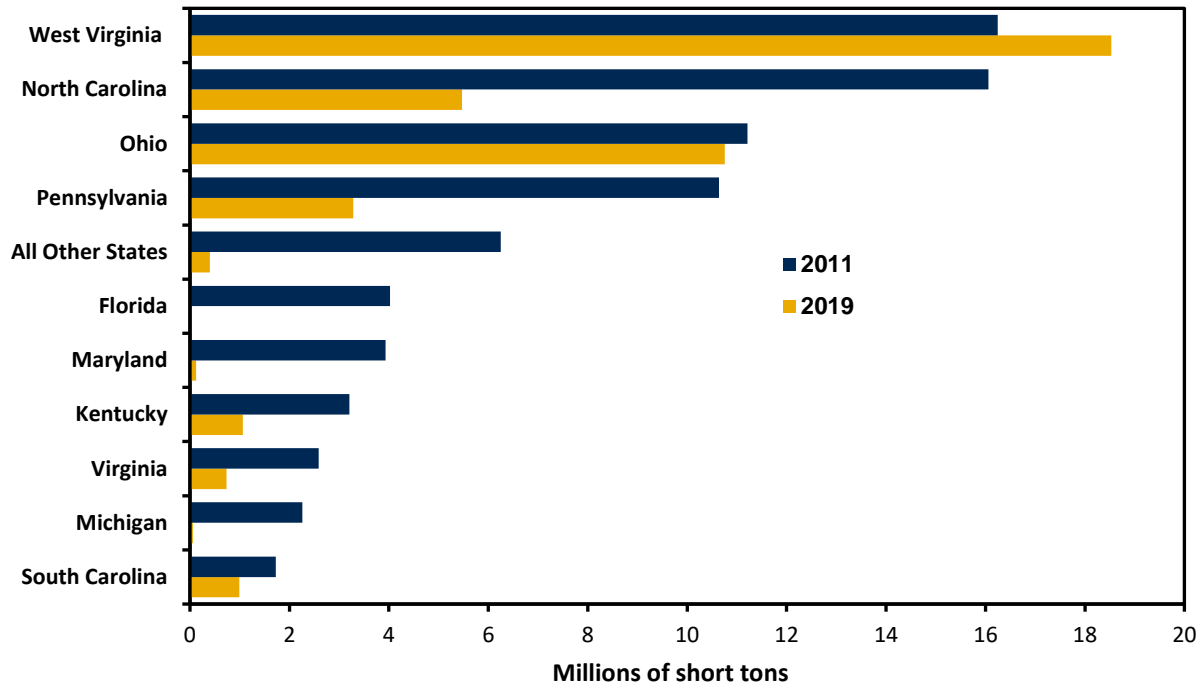


Source: Energy Information Administration



Figure 9 shows the breakdown of domestic coal shipments to electric power-plants by destination state. In 2011 more than 16 million tons of coal went to power-plants within the state of West Virginia. About the same amount was shipped to North Carolina’s power-plants that same year. In 2019, the amount shipped within the state increased to over 18.5 million tons, but the amount of coal shipped to North Carolina dropped to less than 5.5 million tons, a 66 percent decline. The amount shipped to the other states also dropped substantially during the same period.

**Figure 9: West Virginia Coal Shipments to Power Plants by Destination State, 2011 vs 2019**

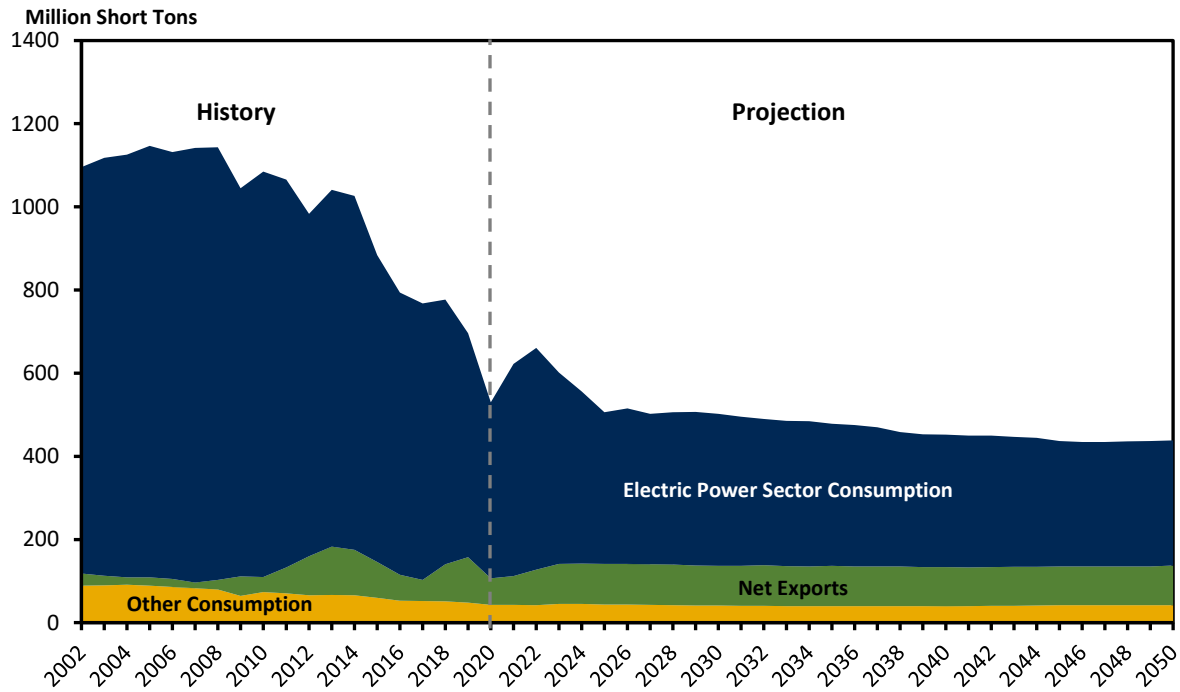


Source: US Energy Information Administration



**COAL PRODUCTION FORECAST:** After looking at recent trends in coal consumption we now examine coal consumption projections for the long run. The U.S. Energy Information Administration (EIA) predicts that after a big drop in 2020, due in part to the Covid-19 pandemic, the domestic demand for U.S. coal is expected to rise in 2021. However, as competition with natural gas continues, the domestic demand for coal is expected to drop again in 2023, and will gradually decline after that through 2050 (Figure 10). Coal exports are expected to grow slowly over the next decade, and will stay relatively flat after that through 2050.

**Figure 10: U.S. Coal Demand Forecast**



Source: Annual Energy Outlook 2021, U.S. Energy Information Administration

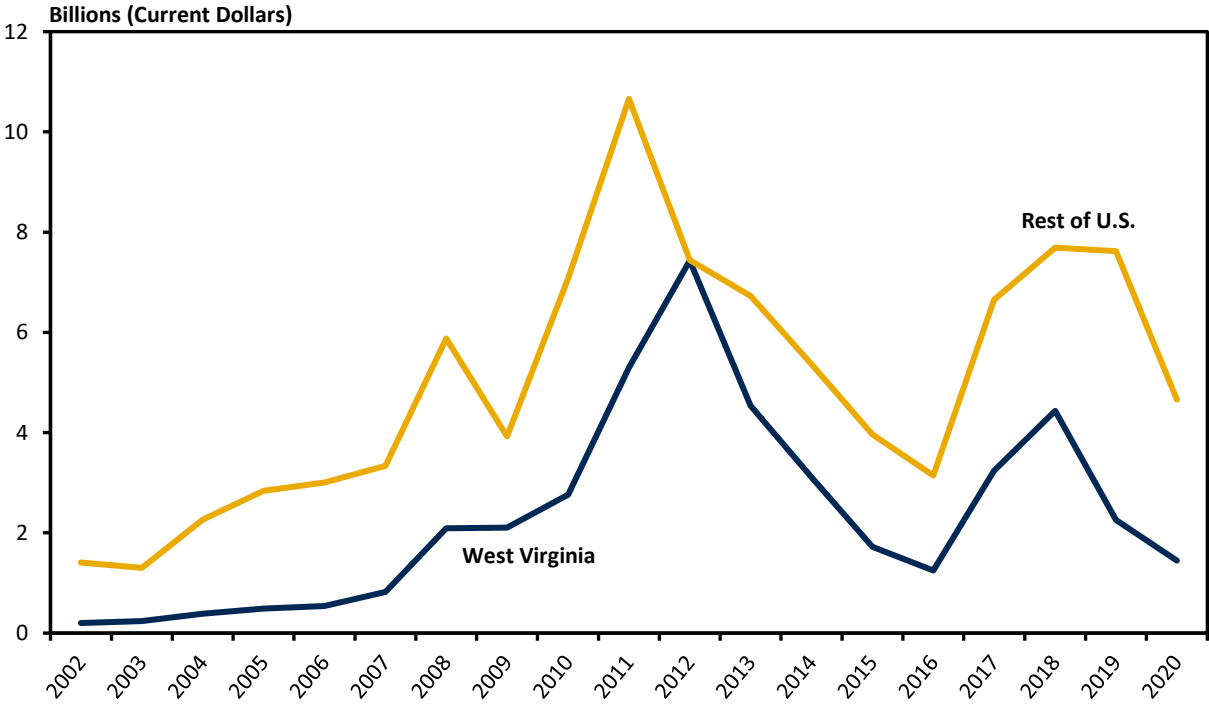




### 3 West Virginia Coal Exports

**WEST VIRGINIA AND U.S. COAL EXPORTS:** West Virginia coal exports experienced significant volatility over much of the past decade. The total value of the state’s coal exports declined from nearly \$7.5 billion in 2012 to about \$4.5 billion in 2018, before dropping again to nearly \$1.5 billion in 2020. Figure 11 shows that West Virginia coal exports have consistently made up a large share of U.S. coal exports, and both figures fluctuate in a similar pattern over time. In Figure 12 we report West Virginia coal exports as a share of total U.S. coal exports measured both by market value and by tonnage.

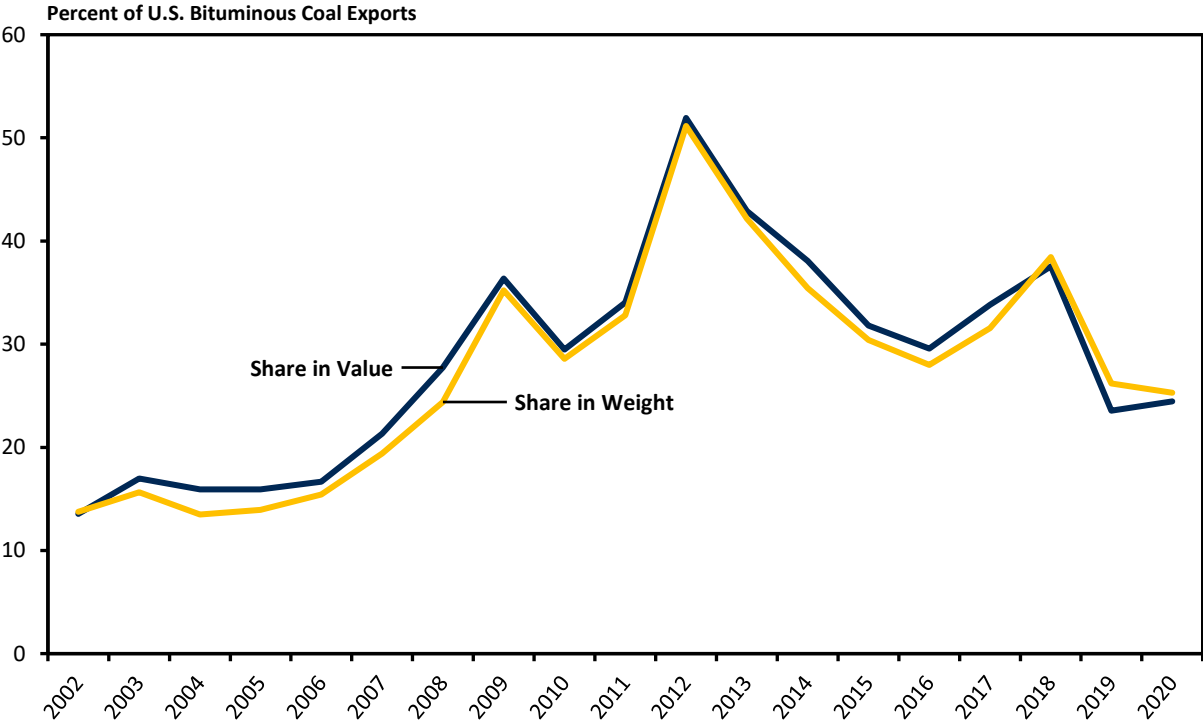
**Figure 11: Coal Exports, West Virginia vs Other U.S. States**



Source: USA Trade Online



Figure 12: West Virginia Coal Exports as a Share of U.S. Coal Exports



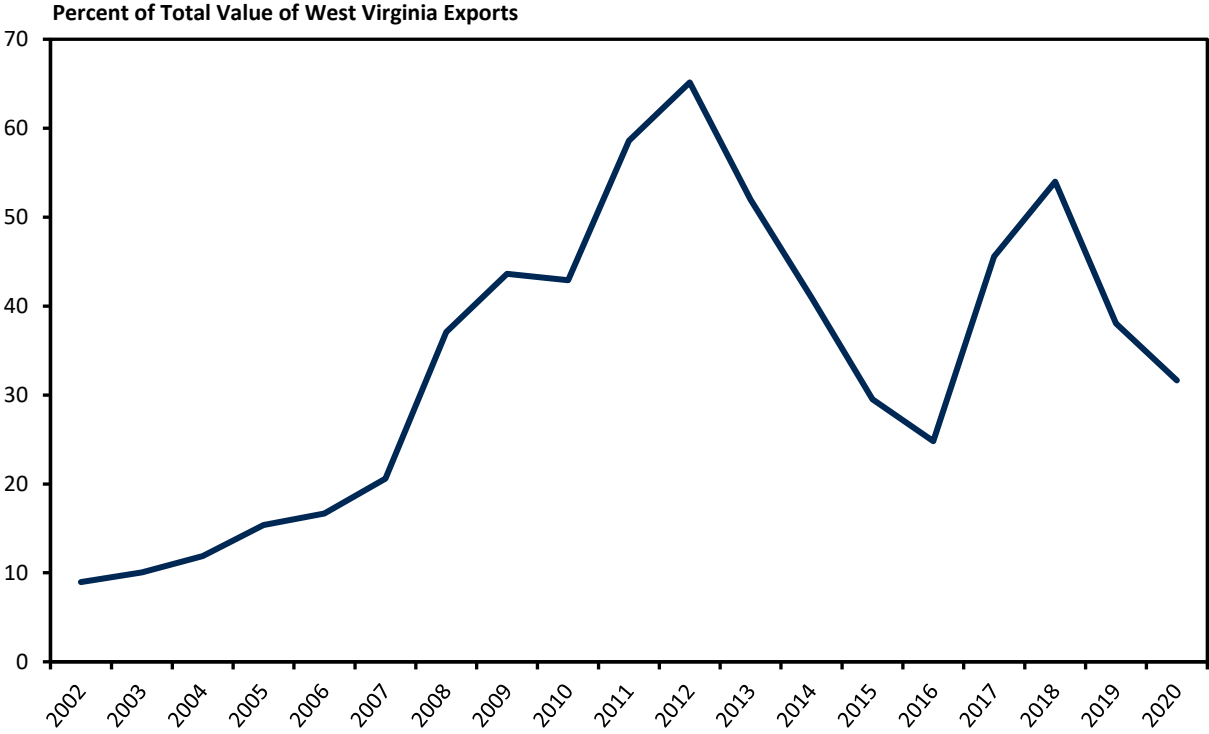
Source: USA Trade Online  
Note: Shares are measured by market value.



**WEST VIRGINIA COAL EXPORTS AS A SHARE OF TOTAL WEST VIRGINIA EXPORTS:** Comparing West Virginia coal exports and the state’s total exports yields a similar picture. Coal exports accounted for less than 10 percent of the state’s total exports in 2002, gradually rising over time and peaking at 65 percent in 2012, before dropping to less than 25 percent in 2016. The share rose again to 54 percent in 2018, but dropped to less than 32 percent in 2020 (see Figure 13).

More information about West Virginia’s coal export destinations and how the state’s coal exports is ranked among the coal exporting countries can be found in Appendices 1 and 2.

**Figure 13: West Virginia Coal Exports as a Share of the State’s Total Exports**



Source: USA Trade Online



## 4 Economic Impact of Coal Production in West Virginia

In this section we examine the economic impact of coal production on the West Virginia economy in 2019. To estimate the economic impact, we use IMPLAN modeling software, an industry-standard input output software, which applies a detailed model of the West Virginia economy that outlines how industry-specific trade-flows interact with key economic indicators such as employment, income, output, and tax revenue. Our analysis consists of two aspects of the coal economy: First, in Section 4, we consider the economic impact of coal mining. In Section 5 we consider the impact of the coal fired electric power generation, the primary user of coal in the state.

**ECONOMIC IMPACT ANALYSIS BACKGROUND:** Expenditures that take place directly to mine coal and compensate coal mine workers are referred to as the direct economic impact of coal mining.<sup>2</sup> However, the total economic impact of coal mining is not limited to the direct impact, but also includes the secondary economic impacts accrued as those initial direct expenditures are re-spent throughout the rest of the economy. For example, to support coal mining, contractors providing services such as site preparations, tunneling, coal stripping, truck transportation, etc., will increase their production in correspondence with an increase in coal mining. As these suppliers increase production, their subsequent suppliers will increase production, and so on. All of this additional economic activity that stems from coal mining is referred to as indirect impacts. In addition, the coal mine and these suppliers employ numerous workers, part of whose income will be spent in the West Virginia economy, generating additional output, income, and employment. This activity associated with employees spending their income in the state is referred to as induced impacts. These indirect and induced impacts together form what is known as the “multiplier effect.” The original stimulus to the economy from the operation’s total expenditures is re-spent multiple times through the rest of the economy. The combined direct impact and secondary impacts constitute the total economic impact of coal mining.

---

<sup>2</sup> Employment data are provided by the U.S. Bureau of Labor Statistics, Quarterly Censuses of Employment and Wages, NAICS code 2121, shown in Figure 4 above.



**ECONOMIC IMPACT OF COAL MINING** We estimate the direct expenditures at coal mines in West Virginia as an average of two close estimates: the 2019 coal mining’s total output from IMPLAN and the sales value of coal produced in West Virginia in 2019. We estimate that coal mines in West Virginia spent around \$6.5 billion in output in 2019. As reported in Figure 14, this direct expenditure is estimated to generate \$2.6 billion in secondary output impacts, resulting in a total economic impact of \$9.1 billion in output in the West Virginia economy.

Further, the 13,400 coal mining jobs in West Virginia in 2019 are expected to generate 13,300 additional jobs in the state economy, resulting in a total employment impact of just under 26,700 jobs. The large multiplier (2.0) is driven by the fact that coal miners earn unusually large incomes. Further, coal mining generates around \$2.1 billion in total employee compensation in the state. Finally, coal mining is estimated to generate more than \$514 million in select state and local tax revenue.

**Figure 14: Economic Impact of Coal Mining in West Virginia**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, billions)</b>	6.5	2.6	9.1
<b>Employment (thousand jobs)</b>	13.4	13.3	26.7
<b>Employee Compensation (\$, billions)</b>	1.5	0.7	2.1
<b>State and Local Tax Revenue (\$, millions)</b>	--	--	514.0

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes severance, sales, personal income, property, and corporation net income taxes.



## 5 Economic Impact of Coal-Fired Power Generation in West Virginia

In this study we also consider the economic impact of the primary user of coal in West Virginia – coal-fired electric power generation. We estimate the economic impact of all West Virginia coal-power plants located in eight counties across in the state (Figure 15). Three power stations are operating in Monongalia County, including First Energy Fort Martin Power Station, Longview Power Plant, and Morgantown Energy Facility. The three stations combined generated more than 12.3 million megawatt hours (MWh) of electricity in 2019. Another station owned, First Energy Harrison Power Station, located in Harrison County, generated a total of 12.9 million MWh of electricity in the same year. Another large plant is John Amos, located in Putnam County, generated 9.8 million MWh of electricity. All coal-fired plants combined generated more than 58 million MWh of electricity in 2019.

In the next section we present the impact based on the county in which the power stations are located. We estimate the plant’s direct output impact based on its total electricity generation as shown in Figure 15 and the typical electricity-generation-output ratio for the state of West Virginia as estimated by IMPLAN for the last five years.

It is important to note that for the coal-fired power plants, coal mining serves as the main supporting sector. When we estimate the economic impact of power plants we would normally include the multiplier impact that goes through all power plants’ supporting sectors, including coal mining. However, since the impact of coal mining is already accounted for above, we exclude coal purchases in this section of the analysis to avoid double counting these impacts.

**Figure 15: West Virginia Coal Power Plants Included in the Analysis**

County	Plant	Total Generation (MWh)
1. Grant	Mt. Storm	4,533,104
2. Harrison	First Energy Harrison Power Station	12,894,205
3. Marion	Grant Town Power Plant	598,016
4. Marshall	Mitchell (WV)	5,040,707
5. Mason	Mountaineer	8,255,230
6. Monongalia	First Energy Fort Martin Power Station	6,701,026
Monongalia	Longview Power Plant	5,264,653
Monongalia	Morgantown Energy Facility <sup>3</sup>	344,130
7. Pleasants	First Energy Pleasants Power Station	4,533,104
8. Putnam	John E Amos	9,796,207
<b>All Plants</b>		<b>58,392,451</b>

Source: US Energy Information Administration

<sup>3</sup> Morgantown Energy Facility still generated electricity in 2019, albeit a small amount, and for that reason is included in the analysis. The plant, however, stopped generating electricity in 2020.



## 5.1 Grant County

Mt. Storm, owned by Virginia Electric and Power Company, is the only coal-fired power station located in Grant County. The plant generated 4.5 million MWh of electricity in 2019. We estimate that the plant generated a direct output of \$204 million in 2019. As this output circulated in the state economy, and after the impact of its purchase of West Virginia coal is excluded, we estimate that the plant generated more than \$147 million in secondary output impacts, resulting in a total economic impact of more than \$351 million output in the West Virginia economy.

In terms of employment, we estimate that the Mt. Storm power plant directly employed nearly 140 workers. They are expected to generate 258 additional jobs in the state economy, resulting in a total employment impact of more than 396 jobs. All these workers earned nearly \$50 million in employee compensation. The unusually large employment multiplier (2.8) is driven primarily by two reasons: the impact spreads from a highly capital-intensive sector to more labor-intensive sectors and power-plant workers also earn large incomes. For these same reasons, this large employment multiplier will continue to be present in all power plants analyzed in this study.

Finally, this coal-fired power plant is estimated to generate nearly \$7 million in select state and local tax revenue (see Figure 16).

**Figure 16: Economic Impact of Coal-Fired Power Plant in Grant County**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	204.2	147.3	351.5
<b>Employment (jobs)</b>	139	258	396
<b>Employee Compensation (\$, millions)</b>	25.9	23.7	49.6
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	6.9

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



## 5.2 Harrison County

There is only one coal-fired power station located in Harrison County, First Energy Harrison Power Station, which is owned by Monongahela Power Company. This plant is one of the largest coal-fired power plants and is indeed the biggest user of West Virginia coal in the state. The plant generated 12.9 million MWh of electricity in 2019. We estimate that the plant’s direct output in 2019 was about \$597 million. As this output circulated in the state economy, and after the impact of its purchase of West Virginia coal is excluded, it is estimated that the plant generated about \$517 million in secondary output impacts, resulting in a total economic impact of more than \$1.1 billion output in the West Virginia economy.

In terms of employment, we estimate that the plant directly employed 414 workers. They are expected to generate more than 1,066 additional jobs in the state economy, resulting in a total employment impact of 1,480 jobs. They earned about \$178 million in employee compensation.

Finally, this coal-fired power plant is estimated to generate nearly \$24 million in select state and local tax revenue (see Figure 17).

**Figure 17: Economic Impact of Coal-Fired Power Plant in Harrison County**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	596.8	517.5	1,114.3
<b>Employment (jobs)</b>	414	1,066	1,480
<b>Employee Compensation (\$, millions)</b>	73.0	105.0	178.0
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	23.6

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.





### 5.3 Marion County

Marion County also has one coal-fired power station, Grant Town Power Plant. The plant utilizes both waste coal and natural gas in its operation. The plant generated nearly 600 thousand MWh of electricity in 2019. We estimate that the plant’s direct output in 2019 was around \$28 million. As this output circulated in the state economy, and after the impact of its purchase of West Virginia coal is excluded, we estimate that the plant generated about \$25 million in secondary output impact, resulting in a total economic impact of more than \$53 million output in the West Virginia economy.

In terms of employment, we estimate that the plant directly employed 21 workers and generated 59 secondary employment impact, resulting in a total employment impact of 80 jobs in the state economy. They earned about \$7.5 million in employee compensation.

Finally, this coal-fired power plant is estimated to generate nearly \$1 million in select state and local tax revenue (see Figure 18).

**Figure 18: Economic Impact of Coal-Fired Power Plant in Marion County**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	28.1	25.1	53.2
<b>Employment (jobs)</b>	21	59	80
<b>Employee Compensation (\$, millions)</b>	2.9	4.6	7.5
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	1.0

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



### 5.4 Marshall County

Marshall County has one coal-fired power station, Mitchel (WV), owned by Kentucky Power Company. The plant utilizes primarily coal with a small amount of petroleum in its operation. The plant generated more than 5 million MWh of electricity in 2019. We estimate that the plant’s direct output in 2019 was around \$275 million. After excluding the impact of the plant’s purchase of West Virginia coal, we estimate that the plant generated around \$143 million in secondary output impact, resulting in a total economic impact of more than \$418 million output in the West Virginia economy.

In terms of employment, we estimate that the plant directly employed 185 workers. An additional 476 secondary employment impact is estimated to be generated, resulting in a total employment impact of more than 660 jobs in the state economy. They earned nearly \$65 million in employee compensation.

Finally, this coal-fired power plant is estimated to generate nearly \$9 million in select state and local tax revenue (see Figure 19).

**Figure 19: Economic Impact of Coal-Fired Power Plant in Marshall County**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	275.1	143.4	418.5
<b>Employment (jobs)</b>	185	476	661
<b>Employee Compensation (\$, millions)</b>	35.6	29.2	64.8
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	8.9

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



## 5.5 Mason County

The Mountaineer power plant, owned by Appalachian Power Company, is the only coal-fired power station located in Mason County. The plant utilizes primarily coal and a little bit of petroleum in its operation. It purchases the coal primarily from both West Virginia and Kentucky. The plant generated around 8.3 million MWh of electricity in 2019. We estimate that the plant's direct output in 2019 was about \$410 million. As this output circulated in the state economy, and after the impact of its purchase of West Virginia coal is excluded, it is estimated that the plant generated about \$209 million in secondary output impacts, resulting in a total economic impact of more than \$619 billion output in the West Virginia economy.

In terms of employment, we estimate that the plant directly employed nearly 300 workers. They are expected to generate more than 677 additional jobs in the state economy, resulting in a total employment impact of 976 jobs. These workers earned around \$83 million in employee compensation.

Finally, this coal-fired power plant is estimated to generate more than \$11 million in select state and local tax revenue (see Figure 20).

**Figure 20: Economic Impact of Coal-Fired Power Plant in Mason County**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	410.0	209.2	619.2
<b>Employment (jobs)</b>	299	677	976
<b>Employee Compensation (\$, millions)</b>	44.1	38.9	83.0
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	11.5

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



## 5.6 Monongalia County

Unlike the other counties, Monongalia County has three operating power plants in 2019. They are First Energy Fort Martin Power Station, Longview Power Plant, and Morgantown Energy Facility. The three power plants generated around 12.3 million MWh of electricity in 2019. We estimate that the plant's direct output in 2019 was around \$612 million. As this output circulated in the state economy, and after the impact of its purchase of West Virginia coal is excluded, it is estimated that the plants together generated around \$476 million in secondary output impacts, resulting in a total economic impact of nearly \$1.1 billion output in the West Virginia economy.

In terms of employment, we estimate that the plants directly employed nearly 430 workers. They are estimated to generate more than 1,100 additional jobs in the state economy, resulting in a total employment impact of more than 1,600 jobs. These workers earned a combined \$164 million in employee compensation.

Finally, these coal-fired power plants are estimated to generate around \$21.6 million in select state and local tax revenue (see Figure 21).

**Figure 21: Economic Impact of Coal-Fired Power Plants in Monongalia County**

Type of Impact	Direct	Indirect and Induced	Total
Output (\$, millions)	612.4	475.9	1,088.3
Employment (jobs)	429	1,182	1,611
Employee Compensation (\$, millions)	73.1	90.7	163.8
State & Local Tax Revenue (\$, millions)	--	--	21.6

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



## 5.7 Pleasants County

First Energy Pleasants Power Station, owned by Allegheny Energy Supply Company LLC., is the only coal-fired power station located in Pleasants County. The plant utilizes primarily coal and a little bit of natural gas in its operation. It generated nearly 5 million MWh of electricity in 2019. We estimate that the plant generated a direct output of around \$231 million in 2019. As this output circulated in the state economy, and after the impact of its purchase of the West Virginia coal is excluded, we estimate that the plant generated nearly \$143 million in secondary impacts, resulting in a total economic impact of more than \$374 million in the West Virginia economy.

In terms of employment, we estimate that the Pleasants Power plant directly employed more than 160 workers. They are expected to generate 226 additional jobs in the state economy, resulting in a total employment impact of more than 387 jobs. These workers earned a combined of \$54 million in employee compensation.

Finally, this coal-fired power plant is estimated to generate more than \$7 million in select state and local tax revenue (see Figure 22).

**Figure 22: Economic Impact of Coal-Fired Power Plant Pleasants County**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	231.2	142.9	374.1
<b>Employment (jobs)</b>	161	226	387
<b>Employee Compensation (\$, millions)</b>	27.7	26.3	54.0
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	7.4

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



## 5.8 Putnam County

The John E Amos plant, owned by Appalachian Power Company, is the only coal-fired power station located in Putnam County. This plant is also one of the largest coal-fired power plants and is one of the biggest user of West Virginia coal in the state. The plant generated nearly 10 million MWh of electricity in 2019. We estimate that the plant’s direct output in 2019 was around \$525 million. As this output circulated in the state economy, and after the impact of its purchase of West Virginia coal is excluded, it is estimated that the plant generated around \$242 million in secondary output impacts, resulting in a total economic impact of more than \$768 million in the West Virginia economy.

In terms of employment, we estimate that the plant directly employed 365 workers. They are expected to generate around 668 additional jobs in the state economy, resulting in a total employment impact of 1,033 jobs. These employees earned a combined more than \$124 million in employee compensation.

Finally, this coal-fired power plant is estimated to generate more than \$16 million in select state and local tax revenue (see Figure 23).

**Figure 23: Economic Impact of Coal-Fired Power Plant in Putnam County**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	525.6	242.7	768.4
<b>Employment (jobs)</b>	365	668	1,033
<b>Employee Compensation (\$, millions)</b>	64.1	60.3	124.4
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	16.4

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



## 5.9 Total Economic Impact of Coal-Fired Power Plants In West Virginia

Figure 24 recaps the economic impact generated by all the coal-fired power plants in West Virginia. We estimate that the plants combined generate a direct output impact of \$2.9 billion in 2019. After excluding the purchase of West Virginia coal used in their operation, we estimate that this direct impact generates \$1.9 billion in secondary output impacts, resulting in a total economic impact of \$4.8 billion output in the West Virginia economy.

We estimate that all the coal-fired power stations in the state employed directly about 2,000 workers. They are expected to generate more than 4,600 additional jobs in the state economy, resulting in a total employment impact of more than 6,600 jobs. Further, coal-fired power plants generate around \$725 million in total employee compensation in the state. Finally, coal-fired power plants are estimated to generate more than \$97 million in select state and local tax revenue.

**Figure 24: Economic Impact of All Coal-Fired Power Generations in West Virginia**

Type of Impact	Direct	Indirect and Induced	Total
<b>Output (\$, millions)</b>	2,883.5	1,904.1	4,787.6
<b>Employment (jobs)</b>	2,012	4,611	6,623
<b>Employee Compensation (\$, millions)</b>	346.4	378.6	725.0
<b>State &amp; Local Tax Revenue (\$, millions)</b>	--	--	97.3

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes sales, personal income, property, and corporation net income taxes.



## 6 Economic Impact of Coal Mining and Coal-Fired Power Generation

Finally, we recap the economic impact of both coal mining and all coal-fired power plants in West Virginia. We estimate that coal mining and coal-fired power plants combined generate a direct output impact of \$9.4 billion in 2019. We further estimate that this direct impact generates \$4.5 billion in secondary output impacts, resulting in a total economic impact of nearly \$14 billion output in the West Virginia economy.

We estimate that both coal mining and all coal-fired power stations in the state employed directly more than 15 thousand workers. They are expected to generate nearly 18 thousand additional jobs in the state economy, resulting in a total employment impact of more than more than 33 thousand jobs. Further, coal mining and coal-fired power plants generate around \$2.8 billion in total employee compensation in the state. Finally, coal mining and coal-fired power plants are estimated to generate more than \$611 million in severance tax and select state and local tax revenue.

**Figure 25: Economic Impact of Coal Mining and Coal-Fired Power Generation in West Virginia**

Type of Impact	Direct	Indirect and Induced	Total
Output (\$, billions)	9.4	4.5	13.9
Employment (thousand jobs)	15.4	17.9	33.3
Employee Compensation (\$, billions)	1.8	1.1	2.8
State & Local Tax Revenue (\$, millions)	--	--	611.3

Notes: Output, Employee Compensation, and Taxes are measured in 2019 dollars. Tax impact includes severance, sales, personal income, property, and corporation net income taxes.





## 7 Appendix

**WEST VIRGINIA COAL EXPORT DESTINATIONS:** The international demand for West Virginia’s coal comes from various countries. The list of the primary importing countries can drastically change from year to year. Despite the fluctuations, however, the West Virginia coal exports to the top seven destination countries have remained strong since at least 2010. The largest exports in 2020 went to India at a total value of \$355 million, followed by Ukraine at nearly \$329 million, Brazil at \$113 million and the Netherlands at \$103 million (see Appendix 1).

### Appendix 1: West Virginia Coal Exports by Country of Destination, 2020

Country of Destination	Value of Exports (Millions, 2020\$)	Percent Share
1. India	355.1	24.6
2. Ukraine	328.5	22.7
3. Brazil	113.4	7.8
4. Netherlands	103.3	7.1
5. Morocco	64.4	4.5
6. South Korea	64.2	4.4
7. Italy	55	3.8
8. Japan	52.4	3.6
9. Canada	49.1	3.4
10. China	38.4	2.7
11. Turkey	25.2	1.7
12. Dominican Republic	22.9	1.6
Rest of the World	173.2	12

Source: USA Trade Online



**WEST VIRGINIA AND WORLD COAL EXPORTS:** Appendix 2 compares the state’s coal exports to world coal exports. Australia is the largest coal exporter in the world, exporting more than \$44 billion worth of coal in 2020, accounting for nearly 38 percent of total world coal exports. Indonesia came in second place with nearly \$22 billion worth of coal exports. The U.S. is fourth place, shipping nearly \$10 billion worth of coal in 2020. U.S. coal exports account for over 8 percent of total world’s coal exports, and accordingly, West Virginia’s coal exports account for over 2 percent. If West Virginia were a country in itself, it would be the world’s tenth largest coal exporter.

**Appendix 2: World Coal Exports, West Virginia vs. Other Counties, 2020**

Country / State of Origin	Value of Exports (Billions, 2020\$)	Percent Share
1. Australia	44.4	37.5
2. Indonesia	21.5	18.2
3. Russia	16	13.5
4. United States	9.9	8.3
<b>West Virginia</b>	<b>2.3</b>	<b>1.9</b>
5. Colombia	5.2	4.4
6. Canada	5.2	4.4
7. South Africa	4.8	4.1
8. The Netherlands	3.2	2.7
9. Mongolia	3.1	2.6
10. Mozambique	1	0.8
Rest of the World	4.1	3.4

Source: [worldtopexports.com](http://worldtopexports.com) and USA Trade Online



## About the Bureau of Business and Economic Research

Since the 1940s, the BBER's mission has been to serve the people of West Virginia by providing the state's business and policymaking communities with reliable data and rigorous applied economic research and analysis that enables the state's leaders to design better business practices and public policies. BBER research is disseminated through policy reports and briefs, through large public forums, and through traditional academic outlets. BBER researchers are widely quoted for their insightful research in state and regional news media. The BBER's research and education/outreach efforts to public- and private-sector leaders are typically sponsored by various government and private-sector organizations.

The BBER has research expertise in the areas of public policy, health economics, energy economics, economic development, economic impact analysis, economic forecasting, tourism and leisure economics, and education policy, among others. The BBER has a full-time staff of three PhD economists and one master's-level economist. This staff is augmented by PhD student research assistants. The BBER also collaborates with affiliated faculty from within the College of Business and Economics as well as from other parts of WVU.

To learn more about our research, please visit our website at <http://www.be.wvu.edu/bber>.

