Economic Impact of the Arizona Mining Industry

2018

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ARIZONA
MINING ASSOCIATION

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Direct Impact

The Arizona mining industry includes copper and molybdenum, lead, zinc, gold, silver, uranium, and other metal ore producers, as well as coal. Arizona mineral mining firms in 2018 employed 11,249 Arizona workers with a payroll of $1.2 billion, extracting output valued at $6.5 billion. These measures describe the direct impact of the Arizona mining industry.

Indirect Impact

Purchases of intermediate goods and services by the mining industry and its workers support Arizona businesses across the mining supply chain, creating an indirect impact of 27,714 more jobs, personal income of $1.6 billion, and additional output produced by Arizona businesses of $5.0 billion.

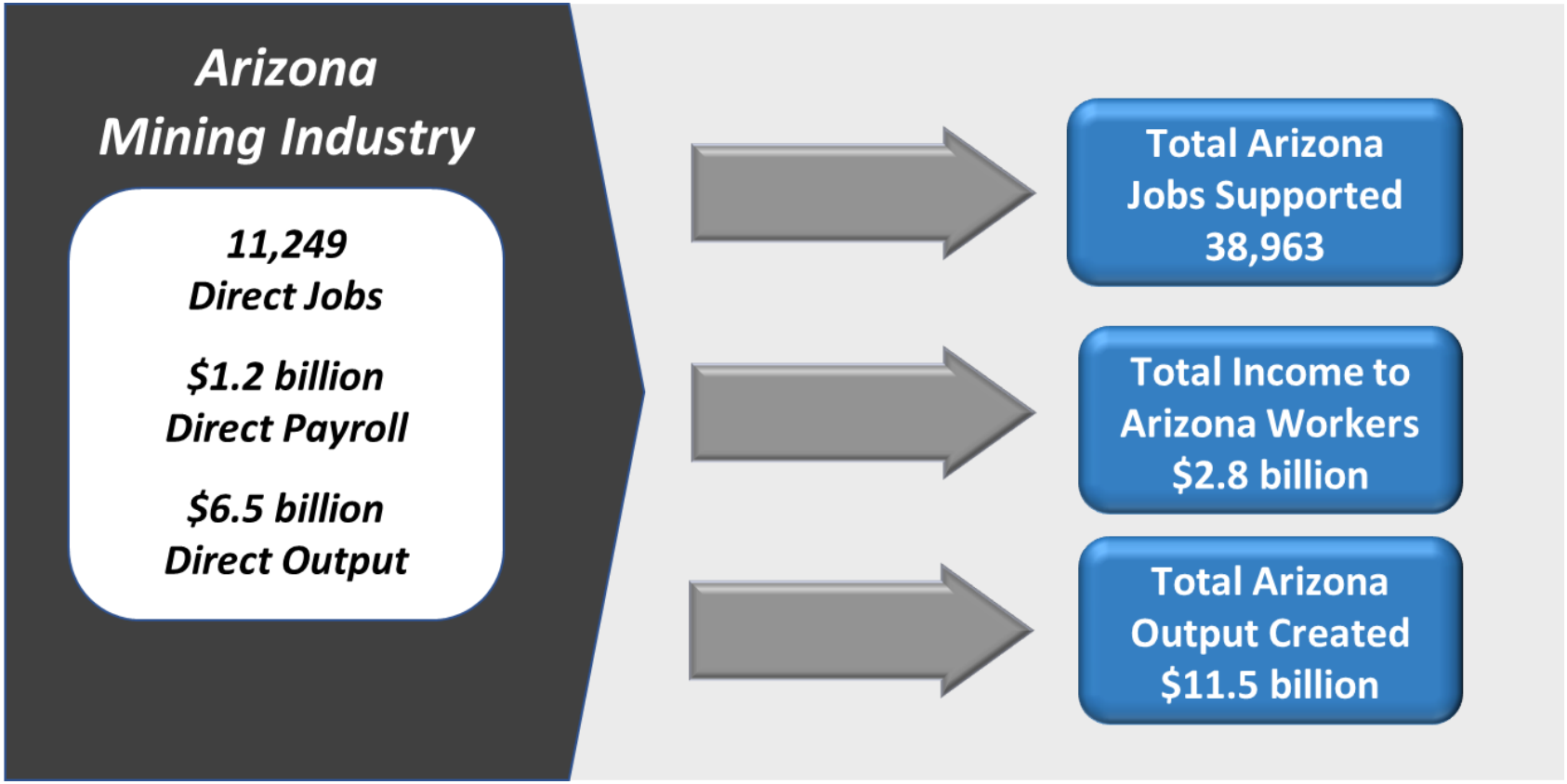
Total Impact

The Arizona mining industry had a total economic impact of $11.5 billion in 2018. The total impact is the sum of direct and indirect impacts. Total Arizona employment due to the mining industry was 38,963 workers with personal income of $2.8 billion.

Total Economic Impact $11.5 billion

Arizona Mining: $11.5 billion Economic Impact in 2018

Total output due to Arizona mining activity was $11.5 billion in 2018, an increase of 13 percent over 2017. Total jobs due to mining were up by 8 percent. The $6.5 billion mining industry direct output was an increase of 10 percent over 2017, while direct mining employment rose by 15 percent over the prior year.



The Arizona Mining Industry

Mining has played a central role in the economy of Arizona since statehood. In 1910, one-quarter of Arizona workers were employed in the mining industry. By 1970, after the state population had increased more than eightfold, copper mining was still touted as one of the Five Cs which formed the backbone of the Arizona economy. Over the past four decades, the Arizona population has more than tripled in size and the economy has continued to become more diverse, experiencing rapid growth in new high-technology industries such as semiconductors and aerospace. Because of the diversification of the state's economy, the share of mining employment in total employment has declined in Arizona, as it has throughout the United States.

Nevertheless, Arizona remains one of the top producers of copper in the world, and the mining industry holds a significant place in the state's economy. Arizona consistently ranks among the top five states for non-fuel mineral resource production, ranking 2nd in 2017 and again in 2018.

Copper has been the predominant product of mining activity in Arizona for more than a century. This continues to be the case today. Other notable Arizona mining outputs include molybdenum, coal, gold, silver and uranium. The value of Arizona's mining output in 2018 was $6.5 billion. Copper represented by far the largest component, at $5.9 billion, followed by coal at $366 million and other metal ore products at $159 million.

Arizona 2nd for Non-Fuel Mineral Production in 2018

According to the U. S. Geological Survey, Arizona was second in the nation in the value of 2018 non-fuel mineral production. Non-fuel mineral production includes sand and gravel, cement, and crushed stone as well as copper and other minerals such as molybdenum, lead, zinc, gold, silver, coal and uranium.

State	Rank	Value	Percent of U.S. Total
Nevada	1	$7.9 billion	9.6%
Arizona	2	$6.7 billion	8.2%
Texas	3	$6.0 billion	7.3%
California	4	$4.6 billion	5.5%
Minnesota	5	$4.1 billion	4.9%

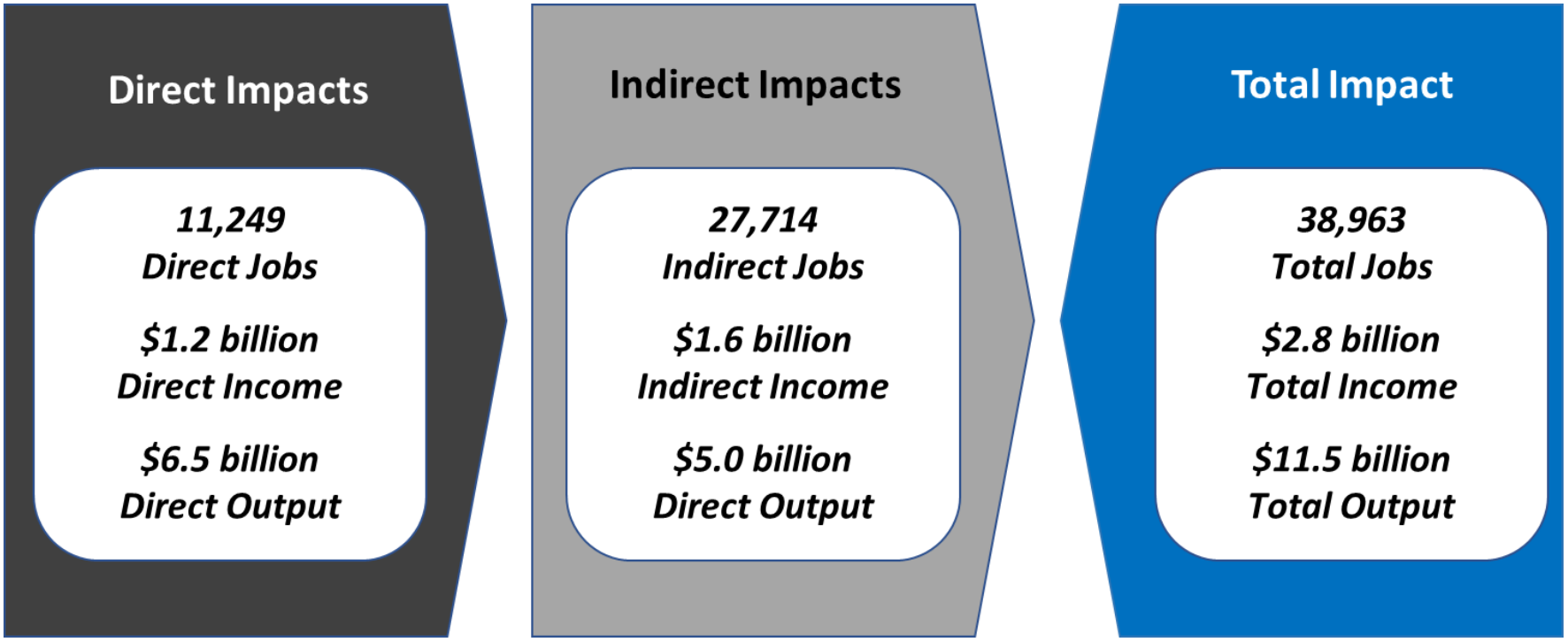
Source: U. S Geological Survey, 2019

Arizona Mining Industry Impacts

The total economic impact includes both the direct and indirect impacts of mining operations. The direct impact is measured by mining output, employment, and personal and business income created by Arizona mining activity. Indirect impacts arise as firms purchase goods and services across the supply chain, and when employees spend their wages to make consumer purchases (induced impacts). Indirect impacts are often referred to as "multiplier" impacts. Direct and indirect impacts combine to create the total economic impact of the Arizona mining industry, as shown by the graphic on the following page.

Total Impact is the Sum of Direct & Indirect Impacts

In 2018, the mining industry produced direct output valued at $6.5 billion, and there were 11,249 direct mining jobs. As mining firms purchased intermediate goods and services and workers spent their incomes, an additional $5.0 billion of indirect Arizona output was created, along with another 27,714 jobs. The total economic impact of the Arizona mining industry was $11.5 billion of output and 38,963 total jobs with $2.8 billion total income.



Direct Economic Impact

The Arizona mining industry includes copper and molybdenum, lead, zinc, gold, silver, uranium, and other metal ore producers, as well as coal. The 2018 direct impact of the mining industry was $6.5 billion of output produced and creation of 11,249 mining jobs with worker income of $1.2 billion.

Direct Impact	Output ($ millions)	Value Added* ($ millions)	Personal Income ($ millions)	Employment
Copper	$5,946	$1,347	$1,155	10,645
Coal	366	53	45	416
All Other Metal Ore	159	24	20	188
Direct Impact	*$6,471*	*$1,424*	*$1,220*	*11,249*

The mining industry value added contributed $1.4 billion to Arizona's Gross Domestic Product (GDP) in 2018. Value added is equal to output minus the cost of intermediate inputs, supplies and materials in production, and therefore is smaller than total output.

Indirect impacts occur as workers spend their incomes (induced effects), and as mining firms make purchases from Arizona suppliers. This multiplier process created an indirect impact of 27,714 *additional* Arizona jobs and *additional* output of $5.0 billion, with *additional* income to workers of $1.6 billion and *additional* value added to Arizona Gross State Product of $2.7 billion.

Indirect Economic Impact

Indirect Impact	Output ($ millions)	Value Added ($ millions)	Personal Income ($ millions)	Employment
Supplier Purchases	$1,490	$902	$461	5,824
Worker Spending	2,299	1,214	697	14,342
Government Spending*	1,204	554	423	7,548
Indirect Impact	*$4,993*	*$2,669*	*$1,581*	*27,714*

*Taxes paid by firms and workers provide revenues for government spending, removed from the input-output analysis and estimated in this study as a separate impact. Government spending of tax revenues from mining created output of $1.2 billion and 7,548 additional jobs supported throughout the economy.

Indirect Impacts Benefit Other Arizona Industries

As Arizona's mining industry spending recycled in the economy, indirect impacts benefited other Arizona industries with additional sales, jobs and worker incomes. Wholesale and retail trade felt the greatest impact from mining activity in 2018, followed by the business services sector.

Arizona Industries	Output ($ millions)	Personal Income ($ millions)	Employment
Wholesale & Retail Trade	729	267	4,958
Business Services	585	284	4,072
Banking, Insurance & Real Estate	561	113	2,485
Health Care Services	382	210	2,891
Leisure Activity & Food Services	260	95	3,381
Transportation & Warehousing	178	64	1,111
Government & Education	157	58	860
All Other Industries	2,141	490	7,956
Indirect Impact	*$4,993*	*$1,581*	*27,714*

Total Economic Impact

The total economic impact of the Arizona mining industry is the sum of direct and indirect impacts ($11.5 billion as measured by output). Mining operations supported 38,963 total jobs in the Arizona economy with total personal income to workers of $2.8 billion. The total value added to Gross State Product was $4.1 billion. The ratio of total impact to direct impact is a measure of the multiplier effect. ***The employment multiplier of 3.5 shows each mining job supports 2.5 additional jobs in the Arizona economy.***

Total impact	Output ($ millions)	Value Added ($ millions)	Personal Income ($ millions)	Employment
Direct Impact	6,471	1,424	1,220	11,249
Indirect Impact	4,993	2,669	1,581	27,714
Total Impact	*$11,464*	*$4,093*	*$2,801*	*38,963*

Tax Impact of The Mining Industry

As mining firms buy supplies and produce output they pay state, local and federal taxes. Workers pay taxes on their earnings and consumer purchases. Businesses and workers pay property and other taxes. Mining operators pay additional taxes based on the value of output. Total state and local tax revenues associated with the Arizona mining industry's economic activity summed to $370 million in 2018. Federal taxes due to mining in Arizona were $521 million.

Taxes Paid By	State and Local* ($ millions)	Federal ($ millions)	Total ($ millions)
Mining Firms	109	153	262
Mining Workers	152	214	365
Supplier Firms	47	66	113
Supplier Workers	62	88	151
All Tax Impacts	*$370*	*$521*	*$891*

State and local taxes were estimated by calculating the ratio of state and local taxes to income and applying this ratio to income earned by producers of direct and indirect impacts. Federal taxes were computed internally from the IMPLAN model using current Federal tax rates.

County Impacts

Direct output and employment in the accompanying table measure mining production and jobs in each county. Total output and employment include all multiplier effects of indirect spending and employment supported by the presence of mining activity and sales in that county.

Arizona County	Direct Output ($ millions)	Direct Employment	Total Output ($ millions)	Total Employment
Apache	0.0	0	0.0	0
Cochise	27.7	48	49.0	167
Coconino	21.7	37	38.3	131
Gila	706.8	1,217	1,250.0	4,256
Graham	384.7	663	680.4	2,316
Greenlee	2,215.0	3,815	3,917.3	13,337
La Paz	6.0	10	10.6	36
Maricopa	361.2	622	638.9	2,175
Mohave	30.1	52	53.2	181
Navajo	181.2	416	320.5	1,091
Pima	1,186.7	2,044	2,098.7	7,145
Pinal	743.6	1,281	1,315.0	4,477
Santa Cruz	0.0	0	0.0	0
Yavapai	606.3	1,044	1,072.2	3,651
Yuma	0.0	0	0.0	0
Total Impacts	$6,471.0	11,249	$11,464.2	38,963

Economic Impact Methodology

This study analyzes the economic impacts of mining for the state of Arizona for 2018. Four impact measures were used: output, employment, personal income, and value added. Output is the value of annual production for the mining industry. Employment is the average annual number of mining jobs. Personal income is wages and benefits paid to workers, plus self employed income. Value added, the mining industry contribution to Arizona Gross State Product, includes personal income plus before-tax business income. firms at each stage of production "add value" when they buy inputs and then process these inputs for sale to the next stage of production at a new higher price sufficient to cover the costs of the initial inputs plus compensation to workers plus a return to the business enterprise.

The total economic contribution or impact of the mining industry includes direct and indirect impacts. Direct mining output was obtained from the U. S. Geological Survey. Statistics on 2018 direct employment for each mining sector in Arizona counties and the state were obtained from the Quarterly Census of Employment and Wages, from the U.S. Bureau of Labor Statistics, supplemented with EMSI estimates for nondisclosed data. Jobs were checked against county figures from the Mine Safety and Health Administration. Personal income from mining was obtained from the U. S. Bureau of Economic Analysis.

Indirect impacts occur as workers spend their incomes (induced effects), and as mining firms purchase materials and services from Arizona suppliers. Indirect impacts were measured through application of an input-output model (IMPLAN) based on Arizona data. The model estimates indirect or multiplier effects from direct impacts and also has state-specific values for other useful variables such as output per worker, and the proportion of inputs each producer purchases locally. In addition, the IMPLAN model internally computes direct and indirect value added as reported in the accompanying tables.

Economic Impact Data Sources

The following data sources were used in this study:

1. **Arizona Department of Revenue, Phoenix, Arizona**
2. **EMSI http://www.economicmodeling.com/**
3. **IMPLAN Group and IMPLAN System, Huntersville, N.C.**
4. **U. S. Bureau of Labor Statistics, Washington, D. C.**
5. **U.S Census Bureau, Washington, D.C.**
6. **U. S. Geological Survey, Washington, D.C.**
7. **U.S. Mine Safety and Health Administration, Denver, CO**

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