

CHAPTER 2 NATURAL RESOURCES AND MINING SECTOR



This chapter provides an overview of the contribution of the natural resources and mining sector to the economy and the use of transportation services by the sector.

The natural resources and mining sector consists of two related subsectors: (1) the agriculture, forestry, fishing and hunting subsector, which engages in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats and (2) the mining,

quarrying and oil and gas extraction subsector, which extracts naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas.¹

Table 2-1 Overview of the Natural Resources and Mining Sector's Contribution to Gross Domestic Product (GDP) and Use of Transportation

Natural Resources and Mining Sector	Value	Year (latest year data is available)
Contribution to GDP	\$500.9 billion	2015
Use of transportation	\$47.4 billion	2014
Amount of transportation required to produce a dollar of output	4.2¢	2014
Number of transportation and material moving workers		
Agriculture, Forestry, Fishing and Hunting	40,910	2015
Mining, quarrying, and oil and gas extraction	112,610	2015
Transportation and material moving workers as percent of sector's work force		
Agriculture, Forestry, Fishing and Hunting	9.9	2015
Mining, quarrying, and oil and gas extraction	13.9	2015
Median annual wage of transportation and material moving workers		
Agriculture, Forestry, Fishing and Hunting	\$26,410	2015
Mining, quarrying, and oil and gas extraction	\$42,250	2015
Number of trucks used	2,418 thousand	2002
Truck miles accumulated	27,532 million	2002
Shipments made by mining industry (excluding oil and gas)		
Value	\$99.9 billion	2012
Tons	2.9 billion	2012
Ton-miles	859.3 billion	2012
Average miles per shipment	47	2012

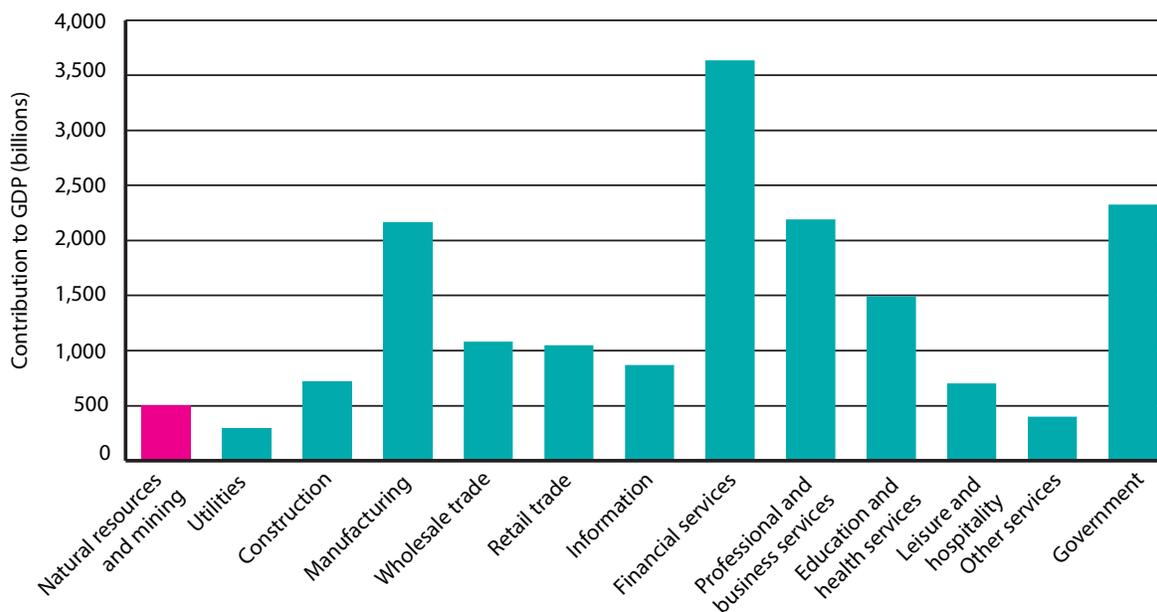
NOTE: Table presents latest data available, as of Aug. 11, 2016.

*Data on number of trucks and truck miles accumulated was last collected in the Vehicle Inventory and Use Survey for 2002.

SOURCE: Data for this table is drawn from figures and tables presented throughout this chapter.

¹ U.S. Department of Labor, Bureau of Labor Statistics, Industries at a Glance, www.bls.gov/iag/tgs/iag_index_naics.htm, as of Sept. 1, 2015

Figure 2-1 Natural Resources and Mining Sector's Contribution to Gross Domestic Product, 2015



NOTE: GDP = \$17,947 billion

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, Value Added by Industry, available at <http://bea.gov> as of August 11, 2016.

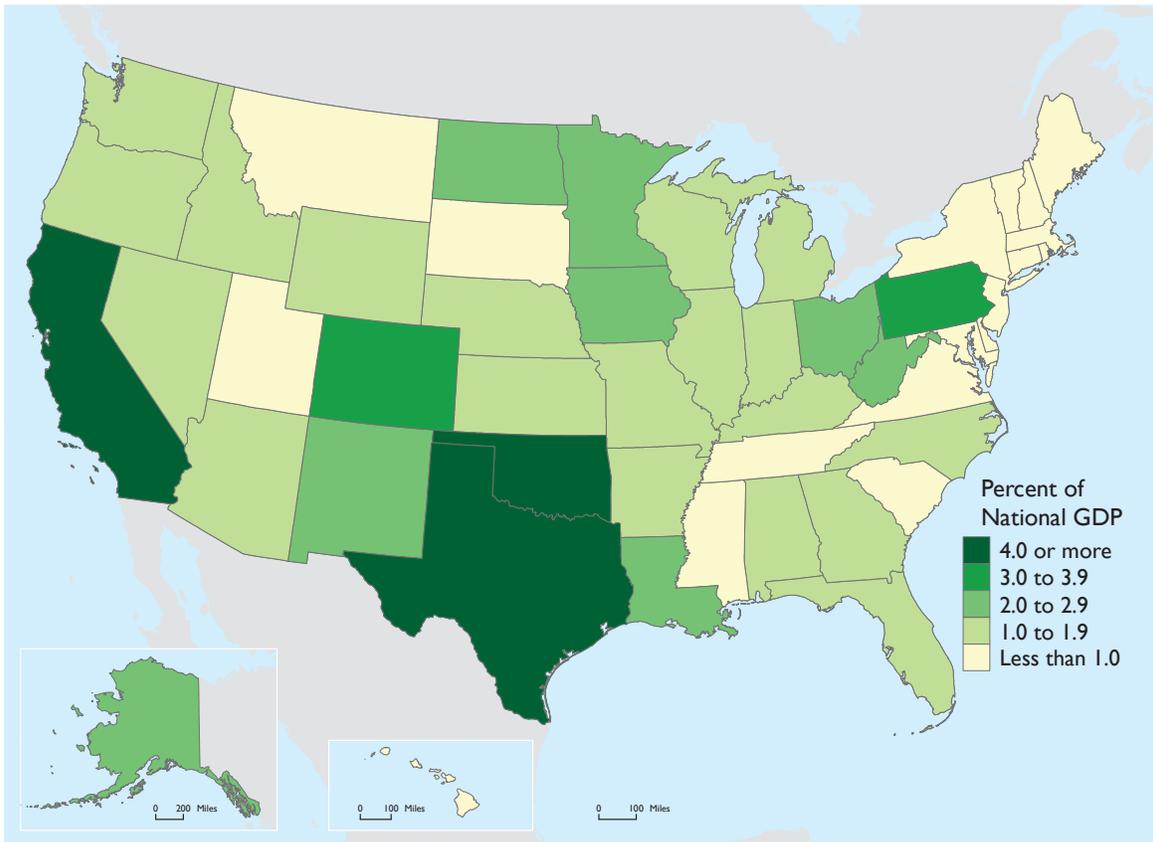
The natural resources and mining sector uses less transportation services than any of the other sectors except utilities in absolute dollars, but per dollar of output this sector requires more transportation services than most of the other sectors. The sector relies heavily on truck transportation services, shipping the most tons and largest value of product by truck, and employing the largest number of transportation workers as heavy and tractor-trailer truck drivers (see table 2-1).

In 2015 the natural resources and mining sector contributed \$500.9 billion (2.8 percent) to the national economy, as measured by gross domestic product (GDP) (figure 2-1). The sector contributed less than other sectors to the economy but generates the raw materials other sectors need to produce finished products. The manufacturing sector, for example, purchases wheat from the natural resources and mining sector to produce bread.

The largest dollar value of natural resources and mining activity occurred in Texas (\$146.3 billion) followed by California (\$49.5 billion), and Oklahoma (\$23.0 billion)—each of which accounted for 4 percent or more of national activity in the natural resources and mining sector in 2015 (figure 2-2, table 2-2). This is primarily driven by oil extraction in Texas, agriculture in California, and a combination of these activities in Oklahoma.

Computing the percent of natural resources and mining sector activity as a percent of a gross state product (GSP), rather than as a share of GDP, also provides useful insights to U.S. production. Nationally, Texas produced the most natural resources and mining products in 2014. However, natural resources and mining activity accounted for a smaller share of GSP in Texas (9.2 percent) than in Wyoming (24.4 percent), Alaska (18.8 percent), and North Dakota (17.9 percent) —the

Figure 2-2 State Contributions to Natural Resources and Mining Related GDP
(percent of national GDP related to natural resources and mining), 2015



NOTE: Data not available for Delaware, District of Columbia, or Rhode Island.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product by State, available at <http://bea.gov> as of August 2016.

Table 2-2 States Contributing 4.0 Percent or More to National GDP Related to Natural Resources and Mining in 2015

State	Natural resources and mining (Natural resources and mining related GDP = \$500.9 billion)			All products and services (Total national GDP = \$17.8 trillion)	
	Natural resources and mining related GDP (billions)	Percent of national GDP related to natural resources and mining	Rank (1=contributes most to national GDP related to natural resources and mining, 51=least)	Dollar contribution to national GDP (billions)	Rank (1=contributes most to national GDP, 51=least)
Texas	146.3	29.2	1	1,586.5	2
California	49.5	9.9	2	2,458.5	1
Oklahoma	23.0	4.6	3	180.4	29

NOTE: Latest available data do not sum to latest available industry totals (shown in figure 2-1) due to difference in source data vintage.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product by State, available at <http://bea.gov> as of Aug. 11, 2016.

three states where natural resources and mining activity accounted for one-sixth or more of GSP in 2015. Natural resources and mining activity accounted for a smaller share of GSP in Texas than in Wyoming, Alaska, and North Dakota due to substantial manufacturing activity in Texas. Manufacturing activity accounted for 14.3 percent (\$227.5 billion) of GSP in Texas, while it accounted for only 5.7 percent of GSP in Wyoming (\$2.2 billion), 3.0 percent of GSP in Alaska (\$1.6 billion), and 6.9 percent of GSP in North Dakota (\$3.8 billion) in 2015. (see Appendix A)

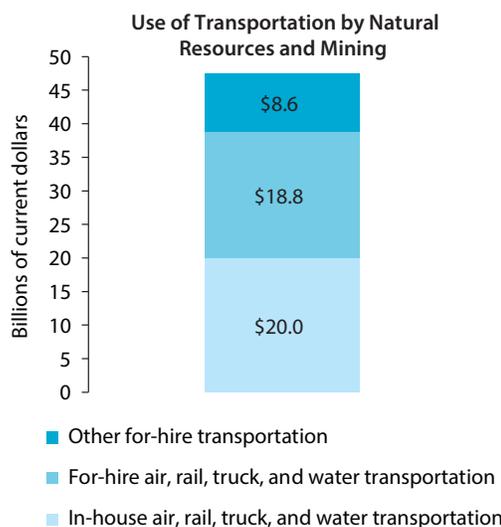
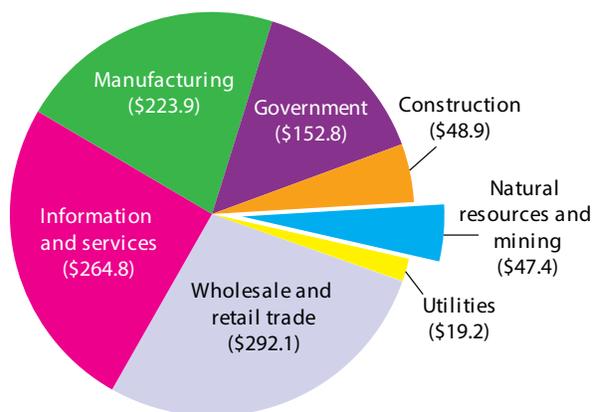
The natural resources and mining sector was the second smallest user of transportation services in 2014 (\$47.4 billion), using 2.5 times more transportation services than the utilities sector (the smallest user of transportation

services) in 2014. Looking at air, rail, truck, and water transportation, the natural resources and mining sector used more in-house operations (\$20.0 billion) than for-hire (\$18.8 billion) services (figure 2-3).

The natural resources and mining sector used \$47.4 billion of transportation services in 2014 (figure 2-4). In 2014, the sector used:

- Primarily truck transportation services (e.g., in acquiring seed or moving agricultural output to silos or mining products to the railhead), which accounted for 61.4 percent (\$29,112 million) of all transportation services used by the sector.
- More in-house truck transportation operations (\$19,494 million) than for-hire truck transportation services (\$9,618 million), with

2-3. Use of Transportation by the Natural Resources and Mining Sector, 2014 (current dollars, billions)



NOTE: In-house transportation consists of transportation services (air, rail, truck, and water) provided by nontransportation industries for their own use. For-hire transportation consists of the services provided by transportation firms to industries and the public on a fee-basis. Airlines, railroads, transit agencies, common carrier trucking companies, and pipelines are examples of for-hire transportation industries. "Other" for-hire transportation includes: Transit and passenger ground transportation (excluding State and local government passenger transit); Pipeline; Sightseeing transportation and transportation support; Parcel delivery, courier, and messenger services (excluding U.S. Postal Service); Warehousing and storage; and Other transportation and support activities.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transportation Satellite Accounts, available at <http://www.bts.gov> as of Aug. 2016.

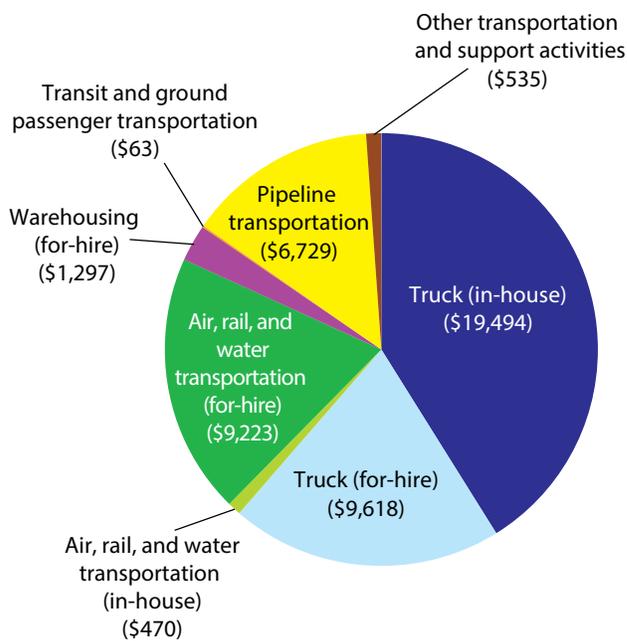
in-house truck transportation operations accounting for nearly half (41.1 percent) of all transportation services used (\$19,494 million out of \$47,429 million). In-house truck transportation consists of the trucking operations carried out by farms with their own trucks, for instance, in moving wheat to the mill.

- Air, rail, and water transportation services (used for instance, to move grain or coal on barges) summed to 20.4 percent (\$9,693

million) of all the transportation services used by the sector, a majority of which is for-hire (19.4 percent, or \$9,223 million).

- A significant amount of pipeline transportation, which accounted for 14.2 percent (\$6,729 million) of the transportation services used by the natural resources and mining sector.
- A smaller amount of for-hire transit and ground passenger transportation (e.g., bus transportation purchased for farm laborers) (0.1 percent, or \$63.0 million) than any other transportation mode.

Figure 2-4 Natural Resources and Mining Sector's Use of Transportation by Mode, 2014 (current dollars, millions)



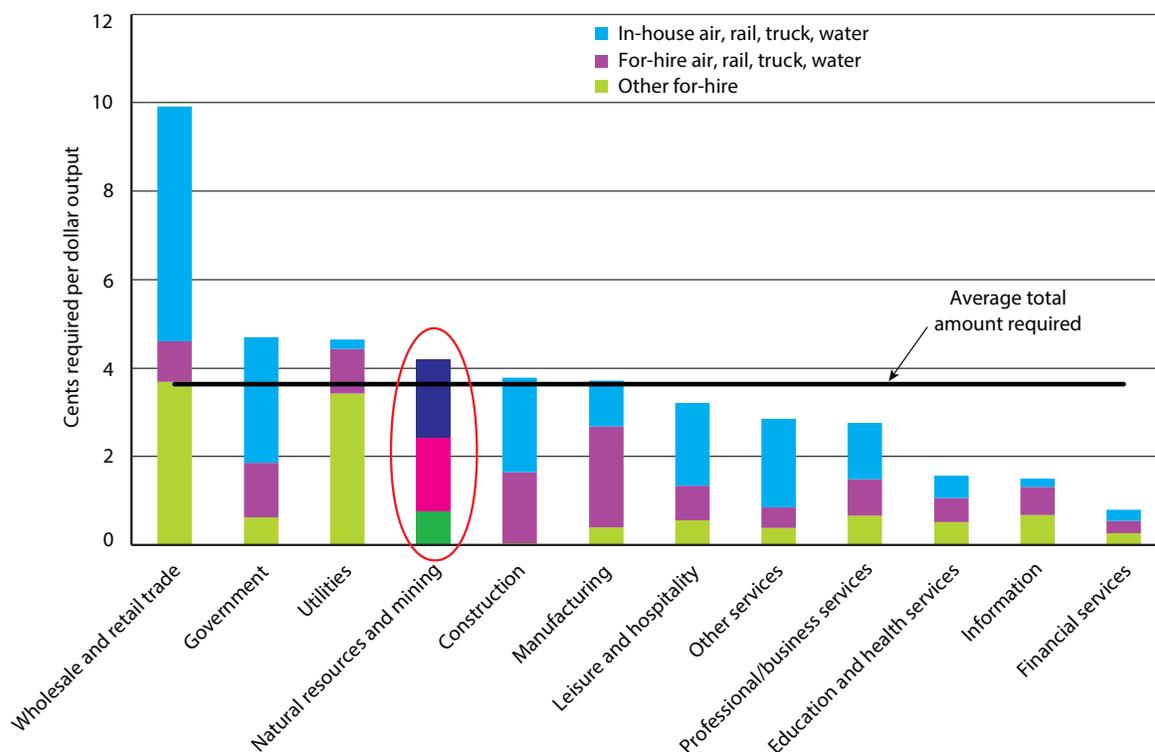
NOTE: In-house transportation consists of transportation services (air, rail, truck, and water) provided by nontransportation industries for their own use. For-hire transportation consists of the services provided by transportation firms to industries and the public on a fee-basis. Airlines, railroads, transit agencies, common carrier trucking companies, and pipelines are examples of for-hire transportation industries. Transit and passenger ground transportation excludes State and local government passenger transit. Other transportation includes sightseeing transportation.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transportation Satellite Accounts, available at <http://www.bts.gov> as of Aug. 2016.

The natural resources and mining sector required more transportation services in producing output than the average sector in 2014, albeit substantially less transportation services than the sector depending the most on transportation services. In 2014, the natural resources and mining sector required 4.2¢ worth of transportation services to produce one dollar of output, while the most dependent sector (wholesale and retail trade) required 9.9¢ worth of transportation services to produce one dollar of output (figure 2-5).

The overall transportation requirement to produce one dollar of output in 2014 for the natural resources and mining sector (4.2¢) was relatively modest compared to other inputs. Transportation services were the fourth most important input. Natural resources and mining products, including support activities (e.g., geophysical surveying and mapping

Figure 2-5 Transportation Required Per Dollar of Output by the Natural Resources and Mining Sector, 2014



NOTE: In-house transportation consists of transportation services (air, rail, truck, and water) provided by nontransportation industries for their own use. For-hire transportation consists of the services provided by transportation firms to industries and the public on a fee-basis. Airlines, railroads, transit agencies, common carrier trucking companies, and pipelines are examples of for-hire transportation industries. "Other" for-hire transportation includes: Transit and passenger ground transportation (excluding State and local government transit); Pipeline; Sightseeing transportation and transportation support; Parcel delivery, courier, and messenger services (excluding U.S. Postal Service); Warehousing and storage; and Other transportation and support activities.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transportation Satellite Accounts, available at <http://www.bts.gov> as of Aug. 2016.

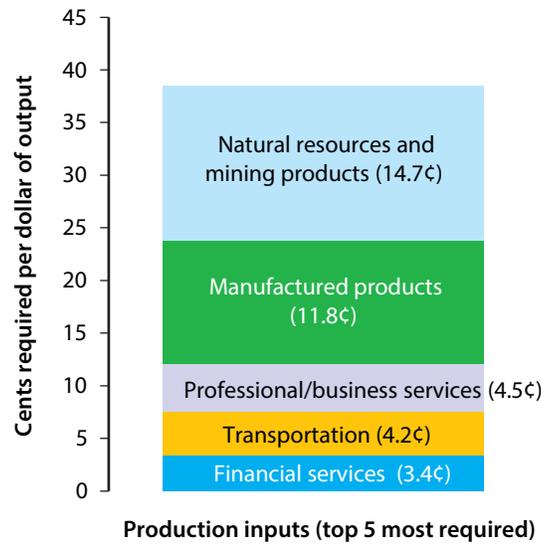
services used in mining), were the most important input, requiring 14.7¢ worth of natural resources and mining products to produce one dollar of output (figure 2-6).

The natural resources and mining sector consists of both agricultural and mining activities. In 2015 the agriculture, forestry, fishing, and hunting industry (agriculture industry) employed 40,910 transportation and material moving workers, accounting for 9.9 percent of its entire work force. The mining, quarrying, and oil and gas extraction industry (mining industry) employed 112,610

transportation and material moving workers, accounting for 13.9 percent of its entire work force (figure 2-7). Transportation workers include motor vehicle operators, ship engineers, aircraft pilots and flight engineers, etc. Material moving workers support transportation activities and include occupations such as cleaners of vehicles and ship loaders.

Transportation and material moving workers in the agriculture, forestry, fishing and hunting industry (agriculture industry) earned a median wage of \$26,410 in 2015, while workers of all

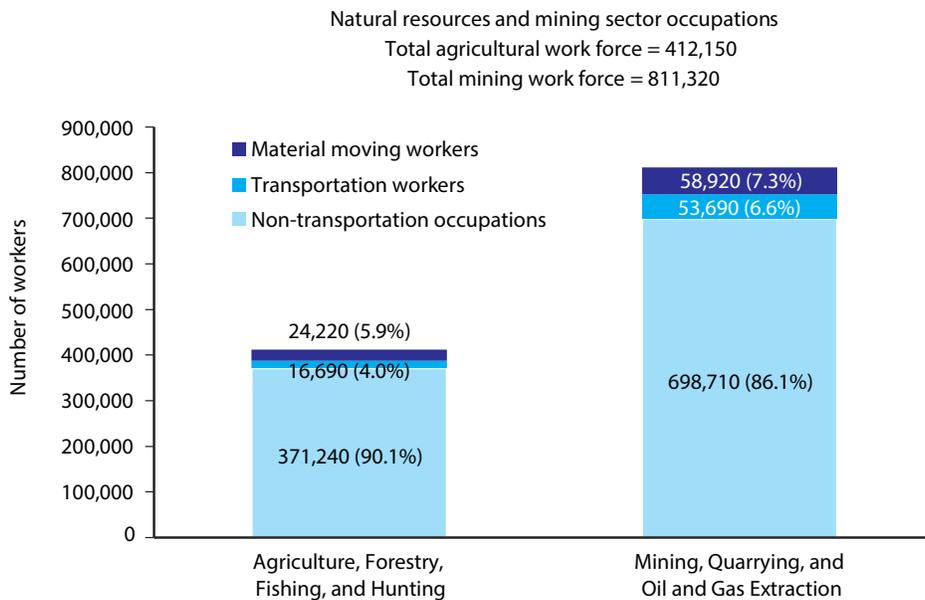
Figure 2-6 Top 5 Most Required Inputs by the Natural Resources and Mining Sector to Produce a Dollar of Output, 2014



NOTE: Transportation includes in-house and for-hire.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Transportation Satellite Accounts, available at <http://www.bts.gov> as of Aug. 2016.

Figure 2-7 Number of Workers Employed in Natural Resources and Mining Sector by Occupation, 2015



NOTE: Total for transportation occupations includes supervisors of material moving workers, which could not be separated from supervisors of transportation workers.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Occupational Employment and Wages, available at <http://www.bls.gov/oes> as of August 2016.

occupations in the agriculture industry earned a lower median wage (\$21,890). Transportation and material moving workers in the mining, quarrying and oil and gas extraction industry (mining industry) earned a median wage of \$42,250 in 2015, while workers of all occupations in the mining industry earned a higher median wage (\$49,570) (figure 2-8).

The agriculture and mining industries employed the largest number of transportation workers as heavy and tractor-trailer truck drivers. Heavy and tractor-trailer truck drivers accounted for 30.5 percent of all transportation and material moving occupations in the agriculture industry and 37.0 percent of all transportation and material moving occupations in the mining industry. In the agriculture industry, heavy and tractor-trailer

Figure 2-8 Median Annual Wage and Employment for Most Common Transportation Occupations (Top 3) in Natural Resources and Mining Sector, 2015



NOTE: Top three transportation occupations are the transportation occupations employing the largest number of workers and are selected from detailed occupation group in Bureau of Labor Statistics Occupational Employment and Wages table. Material moving occupations not included in the selection of the top three transportation occupations. First-line supervisors of machine and vehicle operators includes first-line supervisors of material moving occupations

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Occupational Employment and Wages, available at <http://www.bls.gov/oes> as of August 2016.

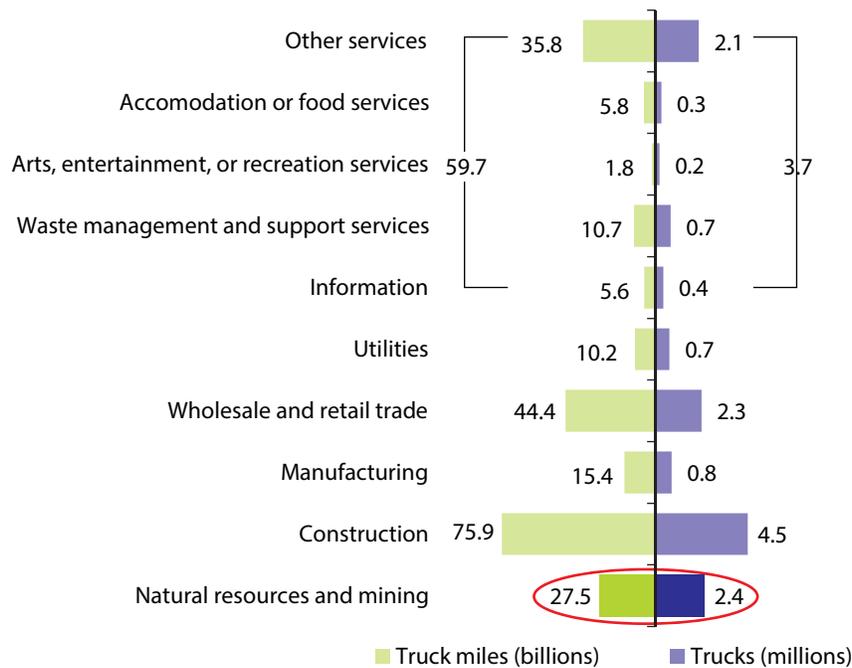
truck drivers earned a median wage of \$36,070, while workers of all occupations in the agriculture industry earned a lower median wage (\$21,890). In the mining industry, heavy and tractor-trailer truck drivers earned a median wage of \$40,490, while workers of all occupations in the mining industry earned a higher median wage (\$49,570) (figure 2-8).

The 2002 Vehicle Inventory and Use Survey (VIUS) is the most recent survey of vehicle ownership and use by industry. According to the 2002 VIUS, the natural resources and mining sector operated 2.4 million trucks —the second largest number of trucks used by an industry. The other services industry and the wholesale and retail trade industry operated fewer trucks than the natural resources and mining industry but accumulated more miles (figure 2-9).

The 2012 Commodity Flow Survey (CFS) shows that the mining (excluding oil and gas) industry shipped 2.9 billion tons of raw materials and finished goods domestically, valued at \$99.8 billion, and accounted for 859.3 billion ton-miles. Trucks carried 60.0 percent of the tonnage shipped by the mining industry and 44.6 percent of the value but accounted for only 8.3 percent of the ton-miles. The mining industry, however, tended to use modes other than truck to ship goods long distances. Rail ton-miles exceeded the ton-miles of all other modes and accounted for 79.0 percent of all ton-miles. The average shipment distance was shorter by truck (37 miles per shipment) than by all other modes and longest by air (2,732 miles per shipment) (figure 2-10).

The CFS does not provide shipment characteristics for the natural resources industry.

Figure 2-9 Trucks Used and Truck Miles Accumulated for Business by the Natural Resources and Mining Industry, 2002

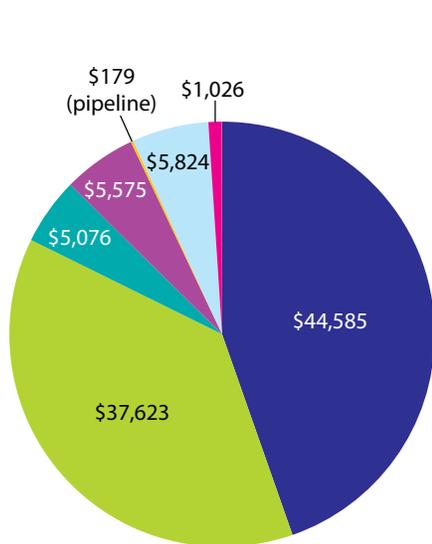


NOTE: Totals for trucks in use only.

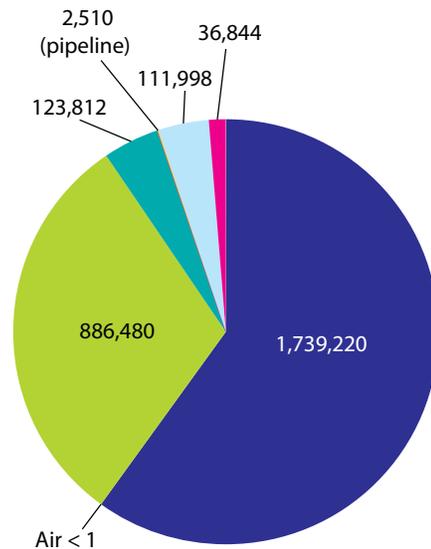
SOURCE: U.S. Census Bureau, 2002 Economic Census Vehicle Inventory and Use Survey, Table 2a, available at <https://www.census.gov/prod/ec02/ec02tv-us.pdf> as of Aug. 2012

Figure 2-10 Characteristics for Shipments Made by Mining (excluding oil and gas) Industry by Mode of Transportation, 2012

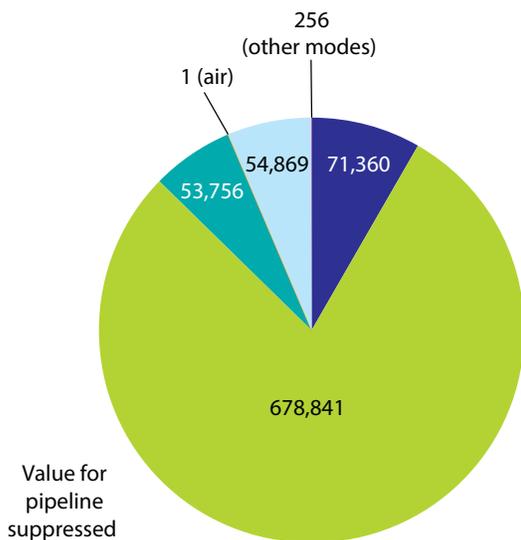
- Truck
- Pipeline
- Rail
- Multiple modes
- Water
- Other modes
- Air (incl truck and air)



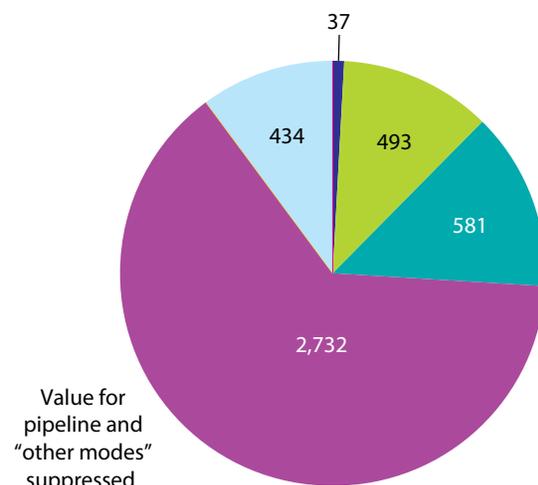
Value of shipments (millions of dollars)
total value of shipments = \$99.9 billion



Tons (thousands)
total tons shipped = 2.9 billion



Ton miles (millions)
total ton-miles = 859.3 billion



Average miles per shipment
average miles per shipment = 47

NOTE: Value for modes may not sum to total due to data suppression and rounding.

SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Commodity Flow Survey 2012, available at www.bts.gov as of Oct. 2015