

SULFUR

(Data in thousand metric tons of sulfur unless otherwise noted)

Domestic Production and Use: In 2017, recovered elemental sulfur and byproduct sulfuric acid were produced at 98 operations in 27 States. Total shipments were valued at about \$585 million. Elemental sulfur production was 9.03 million tons; Louisiana and Texas accounted for about 54% of domestic production. Elemental sulfur was recovered, in descending order of tonnage, at petroleum refineries, natural-gas-processing plants, and coking plants by 37 companies at 92 plants in 26 States. Byproduct sulfuric acid, representing about 7% of production of sulfur in all forms, was recovered at six nonferrous smelters in five States by four companies. Domestic elemental sulfur provided 66% of domestic consumption, and byproduct acid accounted for about 5%. The remaining 29% of sulfur consumed was provided by imported sulfur and sulfuric acid. About 90% of sulfur consumed was in the form of sulfuric acid.

<u>Salient Statistics—United States:</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017^e</u>
Production:					
Recovered elemental	8,590	9,050	8,890	9,070	9,030
Other forms	<u>616</u>	<u>587</u>	<u>646</u>	<u>673</u>	<u>630</u>
Total (rounded)	9,210	9,640	9,540	9,740	9,660
Shipments, all forms	9,200	9,670	9,560	9,750	9,750
Imports for consumption:					
Recovered, elemental ^e	2,990	2,370	2,240	1,820	2,010
Sulfuric acid, sulfur content	972	1,000	1,160	1,050	940
Exports:					
Recovered, elemental	1,770	2,010	1,840	2,050	2,260
Sulfuric acid, sulfur content	54	53	58	58	66
Consumption, apparent, all forms ¹	11,300	11,000	11,000	10,500	10,300
Price, reported average value, dollars per ton of elemental sulfur, f.o.b., mine and (or) plant	68.71	80.07	87.62	37.88	60.00
Stocks, producer, yearend	160	141	138	144	136
Employment, mine and (or) plant, number	2,600	2,600	2,600	2,500	2,400
Net import reliance ² as a percentage of apparent consumption	19	12	14	7	6

Recycling: Typically, between 2.5 million and 5 million tons of spent sulfuric acid is reclaimed from petroleum refining and chemical processes during any given year.

Import Sources (2013–16): Elemental: Canada, 81%; Mexico, 11%; Venezuela, 3%; and other, 5%. Sulfuric acid: Canada, 63%; Mexico, 20%; and other, 17%. Total sulfur imports: Canada, 76%; Mexico 14%; Venezuela, 2%; and other, 8%.

<u>Tariff: Item</u>	<u>Number</u>	<u>Normal Trade Relations</u>
		<u>12–31–17</u>
Sulfur, crude or unrefined	2503.00.0010	Free.
Sulfur, all kinds, other	2503.00.0090	Free.
Sulfur, sublimed or precipitated	2802.00.0000	Free.
Sulfuric acid	2807.00.0000	Free.

Depletion Allowance: 22% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: Total U.S. sulfur production in 2017 was estimated to have decreased slightly from 2016 and shipments were about the same as those of 2016. Domestic production of elemental sulfur from petroleum refineries and recovery from natural gas operations decreased slightly. Domestically, refinery sulfur production is expected to remain relatively constant as well as byproduct sulfuric acid, unless one or more of the remaining nonferrous-metal smelters close. Decreased U.S. sulfur production in 2017 was the result of the hurricanes in the Gulf Coast region that temporarily shut down several refineries and the closure of three facilities in Alabama and Texas.

Domestic phosphate rock consumption was lower in 2017 than in 2016, which resulted in decreased demand for sulfur to process the phosphate rock into phosphate fertilizers.

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World sulfur production was unchanged but is likely to steadily increase for the foreseeable future. The largest increases in sulfur production during the next 5 years are expected to take place in India, Kazakhstan, Kuwait, Malaysia, and Saudi Arabia. New sulfur demand associated with phosphate fertilizer projects is expected in India, Indonesia, Malaysia, Morocco, and Saudi Arabia.

Contract sulfur prices in Tampa, FL, began 2017 at around \$110 per ton. The price decreased to \$65 per ton at the end of July but increased to about \$69 per ton in mid-October. Export prices were higher than domestic prices. In the past few years, sulfur prices have been variable, a result of the volatility of the demand for sulfur.

World Production and Reserves:

	Production—All forms		Reserves ³
	2016	2017 ^e	
United States	9,740	9,660	Reserves of sulfur in crude oil, natural gas, and sulfide ores are large. Because most sulfur production is a result of the processing of fossil fuels, supplies should be adequate for the foreseeable future. Because petroleum and sulfide ores can be processed long distances from where they are produced, sulfur production may not be in the country to which the reserves were attributed. For instance, sulfur from Saudi Arabian oil may be recovered at refineries in the United States.
Australia	900	900	
Brazil	530	530	
Canada	5,320	5,300	
Chile	1,800	1,800	
China	17,750	17,800	
Finland	820	820	
Germany	3,800	3,800	
India	3,130	3,200	
Iran	2,200	2,200	
Italy	550	550	
Japan	3,420	3,400	
Kazakhstan	3,120	3,100	
Korea, Republic of	2,430	2,400	
Kuwait	850	850	
Mexico	1,160	1,200	
Netherlands	530	530	
Poland	1,200	1,200	
Qatar	1,900	1,900	
Russia	6,960	7,000	
Saudi Arabia	4,900	4,900	
Turkmenistan	600	600	
United Arab Emirates	5,300	5,300	
Venezuela	700	700	
Other countries	<u>3,200</u>	<u>3,300</u>	
World total (rounded)	83,000	83,000	

World Resources: Resources of elemental sulfur in evaporite and volcanic deposits and sulfur associated with natural gas, petroleum, tar sands, and metal sulfides amount to about 5 billion tons. The sulfur in gypsum and anhydrite is almost limitless, and 600 billion tons of sulfur is contained in coal, oil shale, and shale rich in organic matter. Production from these sources would require development of low-cost methods of extraction. The domestic sulfur resource is about one-fifth of the world total.

Substitutes: Substitutes for sulfur at present or anticipated price levels are not satisfactory; some acids, in certain applications, may be substituted for sulfuric acid.

^eEstimated.

¹Defined as production + imports – exports + adjustments for industry stock changes.

²Defined as imports – exports + adjustments for industry stock changes.

³See [Appendix C](#) for resource and reserve definitions and information concerning data sources.