

SULFUR

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

Domestic Production and Use: In 2018, recovered elemental sulfur and byproduct sulfuric acid were produced at 95 operations in 27 States. Total shipments were valued at about \$670 million. Elemental sulfur production was 9.0 million tons; Louisiana and Texas accounted for about 55% of domestic production. Elemental sulfur was recovered, in descending order of tonnage, at petroleum refineries, natural-gas-processing plants, and coking plants by 35 companies at 90 plants in 26 States. Byproduct sulfuric acid, representing about 7% of production of sulfur in all forms, was recovered at five nonferrous smelters in four States by four companies. Domestic elemental sulfur provided 67% of domestic consumption, and byproduct acid accounted for about 5%. The remaining 28% of sulfur consumed was provided by imported sulfur and sulfuric acid. About 90% of sulfur consumed was in the form of sulfuric acid.

Salient Statistics—United States:	2014	2015	2016	2017	2018^e
Production:					
Recovered elemental	9,050	8,890	9,070	9,070	9,000
Other forms	587	646	673	575	670
Total (rounded)	9,630	9,540	9,740	9,640	9,700
Shipments, all forms	9,670	9,560	9,750	9,700	9,700
Imports for consumption:					
Recovered, elemental ^e	2,370	2,240	1,820	1,860	1,900
Sulfuric acid, sulfur content	1,000	1,160	1,050	954	1,000
Exports:					
Recovered, elemental	2,010	1,840	2,060	2,340	2,300
Sulfuric acid, sulfur content	53	58	59	83	100
Consumption, apparent, all forms ¹	11,000	11,000	10,500	10,000	10,000
Price, reported average value, dollars per ton of elemental sulfur, f.o.b., mine and (or) plant	80.07	87.62	37.88	46.40	70.00
Stocks, producer, yearend	141	138	144	124	110
Employment, mine and (or) plant, number	2,600	2,600	2,500	2,400	2,400
Net import reliance ² as a percentage of apparent consumption	12	14	7	4	5

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 (2014–17): Elemental: Canada, 78%; Mexico, 8%; Kazakhstan, 4%; Russia, 4%; and other, 6%. Sulfuric acid: Canada, 62%; Mexico, 20%; and other, 18%. Total sulfur imports: Canada, 73%; Mexico 12%; Kazakhstan, 3%; Russia, 3%; and other, 9%.

Tariff: Item	Number	Normal Trade Relations 12–31–18
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 2018 was estimated to have increased slightly from that of 2017 and shipments were slightly less than those of 2017. 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.

Domestic phosphate rock consumption in 2018 was estimated to be 9% lower than that in 2017, which resulted in decreased demand for sulfur to process the phosphate rock into phosphate fertilizers.

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World sulfur production was about the same as it was in 2017 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, Kuwait, and Saudi Arabia. New sulfur demand associated with phosphate fertilizer projects is expected in Brazil, China, Egypt, India, and Turkey.

Contract sulfur prices in Tampa, FL, began 2018 at around \$110 per ton. The sulfur price continued to increase throughout the year and increased to about \$140 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
	2017	2018 ^e	
United States	9,640	9,700	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	5,460	5,500	
Chile	1,800	1,800	
China ⁴	17,400	17,000	
Finland	940	940	
Germany	888	890	
India	3,430	3,400	
Iran	2,200	2,200	
Italy	511	510	
Japan	3,490	3,500	
Kazakhstan	3,520	3,500	
Korea, Republic of	3,080	3,100	
Kuwait	850	850	
Mexico	551	550	
Netherlands	520	520	
Poland	1,240	1,200	
Qatar	2,100	2,100	
Russia	7,080	7,100	
Saudi Arabia	6,000	6,000	
Turkmenistan	610	610	
United Arab Emirates	3,300	3,300	
Venezuela	700	700	
Other countries	<u>3,460</u>	<u>3,500</u>	
World total (rounded)	80,200	80,000	

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, but usually at a higher cost.

^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.

⁴China sulfur production includes byproduct elemental sulfur recovered from natural gas and petroleum, the estimated sulfur content of byproduct sulfuric acid from metallurgy, and the sulfur content of sulfuric acid from pyrite.