

SULFUR

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

Domestic Production and Use: In 2021, recovered elemental sulfur and byproduct sulfuric acid were produced at 95 operations in 27 States. Total shipments were valued at about \$740 million. Elemental sulfur production was estimated to be 7.5 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-metal smelters in four States by four companies. Domestic elemental sulfur provided 59% of domestic consumption, and byproduct sulfuric acid accounted for about 5%. The remaining 36% 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>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021^e</u>
Production:					
Recovered elemental	9,070	9,000	8,110	7,310	7,500
Other forms	<u>560</u>	<u>672</u>	<u>596</u>	<u>581</u>	<u>600</u>
Total (rounded)	9,630	9,670	8,710	7,890	8,100
Shipments, all forms	9,680	9,690	8,700	7,900	8,200
Imports for consumption:					
Recovered elemental ^e	1,850	2,230	1,850	2,230	2,500
Sulfuric acid	954	997	971	1,200	1,100
Exports:					
Recovered elemental	2,340	2,390	2,200	1,310	1,700
Sulfuric acid	80	112	72	64	140
Consumption, apparent, all forms ¹	10,100	10,400	9,250	9,960	10,000
Price, reported average value, free on board, mine and (or) plant, dollars per ton of elemental sulfur	46.40	81.20	51.10	24.40	90
Stocks, producer, yearend	124	118	124	109	120
Employment, mine and (or) plant, number	2,400	2,400	2,400	2,400	2,400
Net import reliance ² as a percentage of apparent consumption	4	7	6	21	18

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 (2017–20): Elemental: Canada, 73%; Russia, 17%; Kazakhstan, 5%; and other, 5%. Sulfuric acid: Canada, 61%; Mexico, 18%; Spain, 7%; Germany, 5%; and other, 9%. Total sulfur imports: Canada, 69%; Russia, 11%; Mexico, 6%; Kazakhstan, 4%; and other, 10%.

<u>Tariff:</u>	Item	Number	Normal Trade Relations <u>12–31–21</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 2021 was estimated to have increased by 3% from that of 2020, and shipments also increased by 4% from those of 2020. Domestic production of elemental sulfur from petroleum refineries and recovery from natural gas operations increased by 3%. However, in the first 6 months of 2021, U.S. sulfur production was lower than 2020 because of the cold weather that affected the central United States in mid-February, leading to the largest reduction in Gulf Coast refining operations over the past several years. In addition, Hurricanes Ida and Nicholas brought Gulf Coast refining to a standstill. Domestically, refinery sulfur production is expected to increase as refining utilization increases. Domestic byproduct sulfuric acid is expected to remain relatively constant, unless one or more of the remaining nonferrous-metal smelters close.

SULFUR

Domestic phosphate rock consumption in 2021 was estimated to have remained the same as that in 2020, which resulted in the same consumption of sulfur to process the phosphate rock into phosphate fertilizers.

World sulfur production was slightly more than it was in 2020 as a result of increased demand and is likely to steadily increase for the foreseeable future. New sulfur demand associated with phosphate fertilizer projects is expected mostly in Africa, and sulfur demand likely will also increase in Asia and Eastern Europe.

Contract sulfur prices in Tampa, FL, began 2021 at around \$69 per long ton. The sulfur price decreased to \$195 per long ton in mid-July, and then decreased to \$183 per long ton by the end of September. Fourth-quarter 2021 prices remained at \$183 per long ton. In the past few years, sulfur prices have been variable, a result of the volatility in the demand for sulfur. High sulfur prices in 2021 were a result of supply issues.

World Production and Reserves:

	Production, all forms		Reserves³
	<u>2020</u>	<u>2021^e</u>	
United States	7,890	8,100	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 are expected to 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	500	500	
Canada	4,900	4,900	
Chile	1,300	1,300	
China ⁴	17,300	17,000	
Finland	717	720	
Germany	633	630	
Greece	500	500	
India	3,460	3,500	
Iran	2,200	2,200	
Japan	3,040	3,000	
Kazakhstan	4,480	4,500	
Korea, Republic of	3,080	3,100	
Kuwait	620	600	
Poland	992	1,000	
Qatar	2,000	2,000	
Russia	7,530	7,500	
Saudi Arabia	6,500	6,500	
South Africa	900	900	
Turkmenistan	700	700	
United Arab Emirates	6,000	6,000	
Other countries	<u>3,600</u>	<u>3,600</u>	
World total (rounded)	79,800	80,000	

World Resources:³ Resources of elemental sulfur in evaporite and volcanic deposits, and sulfur associated with natural gas, petroleum, tar sands, and metal sulfides, total 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 that is 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 shipments + imports – exports.

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

³See Appendix C for resource and reserve definitions and information concerning data sources.

⁴Sulfur production in China 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.