

# SAND AND GRAVEL (INDUSTRIAL)<sup>1</sup>

(Data in thousand metric tons unless otherwise noted)

**Domestic Production and Use:** In 2022, industrial sand and gravel production was an estimated 97 million tons valued at an estimated \$5.7 billion. The quantity of industrial sand and gravel sold or used increased by 30% and the value increased by 78% compared with that in 2021. Industrial sand and gravel was produced by 122 companies from 201 operations in 32 States. The leading producing States were, in descending order of production, Texas, Wisconsin, Illinois, Louisiana, Missouri, Oklahoma, Arkansas, Alabama, California, and Tennessee. Combined production from these States accounted for about 87% of total domestic sales and use. Approximately 75% of the U.S. tonnage was used as hydraulic-fracturing sand (frac sand) and well-packing and cementing sand; and 10% as glassmaking sand. Other common uses were, in decreasing quantity of use, foundry sand, whole grain fillers for building products, filtration sand, and recreational sand, which accounted for 9%, combined. Other minor uses were, in decreasing quantity of use, chemicals, abrasives, roofing granules, silicon and ferrosilicon, ceramics, fillers, filtration gravel, traction, and metallurgic flux, which accounted for 3%, combined. Other unspecified uses accounted for 3%, combined.

## **Salient Statistics—United States:**

	<b><u>2018</u></b>	<b><u>2019</u></b>	<b><u>2020</u></b>	<b><u>2021</u></b>	<b><u>2022<sup>e</sup></u></b>
Sold or used	126,000	108,000	75,800	74,600	97,000
Imports for consumption	392	389	417	350	350
Exports	6,550	5,620	4,070	5,430	6,400
Consumption, apparent <sup>2</sup>	120,000	103,000	72,100	69,500	91,000
Price, average value, dollars per metric ton	56.10	46.10	29.50	42.40	58
Employment, quarry and mill, number <sup>e</sup>	8,000	7,500	4,500	5,300	6,000
Net import reliance <sup>3</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** Recycled cullet (pieces of glass) represents a significant proportion of reused silica. About 33% of glass containers are recycled. Some abrasive, foundry, frac sands are recycled or reclaimed.

**Import Sources (2018–21):** Canada, 87%; Vietnam, 3%; Brazil, Taiwan, and Turkey, 2% each; and other, 4%.

<b><u>Tariff:</u></b>	<b><u>Item</u></b>	<b><u>Number</u></b>	<b><u>Normal Trade Relations</u></b> <b><u>12–31–22</u></b>
	Sand containing 95% or more silica and not more than 0.6% iron oxide	2505.10.1000	Free.

**Depletion Allowance:** Industrial sand or pebbles, 14% (domestic and foreign).

**Government Stockpile:** None.

**Events, Trends, and Issues:** U.S. apparent consumption of industrial sand and gravel was estimated to be 91 million tons in 2022, a 31% increase from that in 2021. The most important driving force in the industrial sand and gravel industry remained the production and sale of hydraulic-fracturing sand. For several years, the consumption of frac sand increased as hydrocarbon exploration in the United States transitioned to natural gas and petroleum extracted from shale deposits. However, industrial sand and gravel consumption decreased in recent years, primarily as a result of decreased natural-gas- and petroleum-well drilling in North America and oil well completion activity. These decreases were exacerbated by restrictions imposed as the result of the global coronavirus disease 2019 (COVID-19) pandemic. These restrictions resulted in a significant decline in consumption of petroleum products, which in turn prompted a decrease in demand for frac sand. In 2022, industrial sand and gravel consumption increased as demand for frac sand increased. The increased demand for frac sand also led to higher prices for frac sand. Imports of industrial sand and gravel in 2022 were an estimated 350,000 tons, unchanged from those in 2021. Imports of silica are generally of two types—small shipments of very high purity silica or a few large shipments of lower grade silica shipped only under special circumstances (for example, very low freight rates). The United States remained a net exporter of industrial sand and gravel; U.S. exports of industrial sand and gravel were an estimated 6,400,000 tons, an 18% increase from those in 2021.

The United States was the world's leading producer and consumer of industrial sand and gravel based on estimated world production figures. Collecting definitive data on industrial sand and gravel production for most nations is difficult because of the wide range of terminology and specifications used by different countries. The United States remained a major exporter of industrial sand and gravel, shipping it to almost every region of the world. High global demand for U.S. industrial sand and gravel is attributed to its high quality and to the advanced processing techniques used in the United States for many grades of industrial sand and gravel, meeting specifications for virtually any use.

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The industrial sand and gravel industry continued to be concerned with safety and health regulations and environmental restrictions in 2022, especially those concerning crystalline silica exposure. In 2016, the Occupational Safety and Health Administration (OSHA) finalized regulations to further restrict exposure to crystalline silica at quarry sites and in other industries that use materials containing it.

Local shortages of industrial sand and gravel were expected to continue to increase owing to land development priorities, local zoning regulations, and logistical issues, including ongoing development and permitting of operations producing hydraulic-fracturing sand. These factors may result in future sand and gravel operations being located farther from high-population centers. Increased efforts to reduce cost, emissions, and the risk of exposure to crystalline silica have led to an increase of undried “wet sand” being sold or used as frac sand instead of conventional “dry sand.” Industrial sand was used for commercial thermal energy storage for the first time in 2022.

### World Mine Production and Reserves:

	Mine production		Reserves <sup>4</sup>
	<u>2021</u>	<u>2022<sup>e</sup></u>	
United States	74,600	97,000	Large. Industrial sand and gravel deposits were widespread.
Argentina	<sup>e</sup> 3,600	3,900	
Australia	<sup>e</sup> 4,000	4,000	
Bulgaria	<sup>e</sup> 8,150	8,600	
Canada	4,650	5,000	
China	<sup>e</sup> 87,700	88,000	
France	<sup>e</sup> 11,000	12,000	
Germany	<sup>e</sup> 9,870	11,000	
India	<sup>e</sup> 11,900	12,000	
Indonesia	<sup>e</sup> 3,540	3,500	
Italy	<sup>e</sup> 13,000	14,000	
Malaysia	<sup>e</sup> 3,900	4,500	
Mexico	<sup>e</sup> 2,500	2,700	
Netherlands	<sup>e</sup> 54,000	54,000	
Poland	<sup>e</sup> 5,180	5,500	
Russia	<sup>e</sup> 7,300	7,300	
South Africa	<sup>e</sup> 2,080	2,300	
Spain	<sup>e</sup> 5,990	6,000	
Turkey	11,200	11,000	
United Kingdom	<sup>e</sup> 5,300	5,300	
Other countries	<u><sup>e</sup>23,200</u>	<u>25,000</u>	
World total (rounded)	353,000	380,000	

**World Resources:**<sup>4</sup> Sand and gravel resources of the world are large. However, because of their geographic distribution, environmental restrictions, and quality requirements for some uses, extraction of these resources is sometimes uneconomical. Quartz-rich sand and sandstone, the main sources of industrial silica sand, occur throughout the world.

**Substitutes:** Alternative materials that can be used for glassmaking and for foundry and molding sands are chromite, olivine, staurolite, and zircon sands. Although costlier and mostly used in deeper wells, alternative materials that can be used as proppants are sintered bauxite and kaolin-based ceramic proppants.

<sup>e</sup>Estimated. E Net exporter.

<sup>1</sup>See also the Sand and Gravel (Construction) chapter.

<sup>2</sup>Defined as production (sold or used) + imports – exports.

<sup>3</sup>Defined as imports – exports.

<sup>4</sup>See Appendix C for resource and reserve definitions and information concerning data sources.