

SAND AND GRAVEL (INDUSTRIAL)¹

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: In 2016, industrial sand and gravel valued at about \$4.3 billion was produced by 254 companies from 347 operations in 35 States. The value of production of industrial sand and gravel in 2016 decreased by 12% compared to the previous year. Leading States were, in order of tonnage produced, Wisconsin, Illinois, Texas, Missouri, Minnesota, North Carolina, Michigan, Oklahoma, Louisiana, and Arkansas. Combined production from these States accounted for 82% of the domestic total. About 72% of the U.S. tonnage was used as hydraulic-fracturing sand and well-packing and cementing sand; 8% as other whole-grain silica; 7% as glassmaking sand; 4% as foundry sand; 1%, each, as whole-grain fillers and building products, other ground silica, and ground and unground sand for chemicals; and 6% for other uses.

Salient Statistics—United States:	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016^e</u>
Production	50,600	62,100	110,000	103,000	91,700
Imports for consumption	306	160	244	290	280
Exports	4,360	2,960	4,450	3,890	2,630
Consumption, apparent	46,600	59,300	106,000	99,400	89,400
Price, average value, dollars per ton	52.80	55.80	74.90	47.10	46.62
Employment, quarry and mill, number ^e	3,500	3,800	4,000	3,500	3,500
Net import reliance ^e as a percentage of apparent consumption	E	E	E	E	E

Recycling: Some foundry sand is recycled, and recycled cullet (pieces of glass) represents a significant proportion of reused silica. About 34% of glass containers are recycled.

Import Sources (2012–15): Canada, 86%; Mexico, 6%; and other, 8%.

Tariff: Item	Number	Normal Trade Relations <u>12–31–16</u>
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 89.4 million tons in 2016, a 10% decrease from that of the previous year. Mine output was sufficient to accommodate many uses, which included ceramics, chemicals, container, fillers (ground and whole grain), filtration, flat and specialty glass, foundry, hydraulic fracturing, and recreational uses. Production of hydraulic-fracturing sand to support extraction of natural gas and petroleum from shale deposits continued to decline in 2016, but remained at historically high levels. New and more efficient hydraulic-fracturing techniques, which require more silica sand use per well (mostly for secondary recovery at mature wells) could stabilize demand for hydraulic-fracturing sand. Imports of industrial sand and gravel in 2016 decreased by 3% to about 280,000 tons from 290,000 tons in 2015. 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). Although the United States remains a net exporter of industrial sand and gravel, exports of industrial sand and gravel decreased by 32% in 2016 compared with those of 2015.

The United States was the world's leading producer and consumer of industrial sand and gravel based on estimated world production figures. It is difficult to collect definitive data on silica sand and gravel production in most nations because of the wide range of terminology and specifications found among different countries. The United States remained a major exporter of silica sand and gravel, shipping it to almost every region of the world. The high level of exports was attributed to the high-quality and advanced processing techniques used in the United States for many grades of silica sand and gravel, meeting virtually every specification.

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The industrial sand and gravel industry continued to be concerned with safety and health regulations and environmental restrictions in 2016, especially those concerning crystalline silica exposure. In 2016, the Occupational Safety and Health Administration finalized new regulations to further restrict exposure to crystalline silica at mine sites and other industries that use it. Phased implementation of the new regulations are scheduled to take effect from 2017 through 2021. Local shortages of industrial sand and gravel were expected to continue to increase owing to local zoning regulations and land development alternatives, including ongoing development and permitting of operations producing hydraulic-fracturing sand. Natural gas and petroleum operations that use hydraulic fracturing may also undergo increased scrutiny. These situations are expected to cause future sand and gravel operations to be located farther from high-population centers.

World Mine Production and Reserves:

	Mine production ^e		Reserves ³
	2015	2016	
United States	103,000	91,700	Large. Industrial sand and gravel deposits are widespread.
Australia	6,000	6,000	
Canada	1,700	1,700	
Chile	1,250	1,300	
Czech Republic	1,270	1,350	
Finland	2,400	2,400	
France	8,750	8,750	
Germany	7,500	7,500	
India	3,400	3,400	
Italy	13,900	13,900	
Japan	3,000	2,800	
Malaysia	1,200	2,000	
Mexico	3,600	3,600	
Moldova	3,800	3,800	
Norway	1,000	1,000	
Poland	2,300	2,700	
Saudi Arabia	1,260	1,300	
South Africa	2,300	2,100	
Spain	3,400	3,400	
Turkey	8,000	8,000	
United Kingdom	4,000	4,000	
Other countries	6,000	6,000	
World total (rounded)	189,000	179,000	

World Resources: 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 uneconomic. 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 more costly and mostly used in deeper wells, alternative materials that can be used as proppants are sintered bauxite and kaolin-based ceramic proppants.

^eEstimated. E Net exporter.

¹See also Sand and Gravel (Construction).

²Defined as imports – exports.

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