SILICON

(Data in thousand metric tons of silicon content unless otherwise noted)

Domestic Production and Use: Five companies produced silicon materials at eight plants, all east of the Mississippi River. Most ferrosilicon was consumed in the ferrous foundry and steel industries, predominantly in the Eastern United States, and was sourced primarily from domestic quartzite (silica). The main consumers of silicon metal were producers of aluminum alloys and the chemical industry. The semiconductor and solar energy industries, which manufacture chips for computers and photovoltaic cells from high-purity silicon, respectively, accounted for only a small percentage of silicon demand.

Salient Statistics—United States:	2013	2014	2015	2016	2017[e]
Production:					
Ferrosilicon and silicon metal[1, 2]	392	401	411	384	405
Imports for consumption:					
Ferrosilicon, all grades[1]	157	186	162	155	150
Silicon metal	118	139	140	122	140
Exports:					
Ferrosilicon, all grades[1]	10	9	9	7	10
Silicon metal	38	45	37	60	62
Consumption, apparent:[3]					
Ferrosilicon, all grades[1]	W	W	W	W	W
Silicon metal[2]	W	W	W	W	W
Total	631	670	661	601	625
Price, average, cents per pound:					
Ferrosilicon, 50% Si[4]	103	108	101	83	92
Ferrosilicon, 75% Si[5]	94	98	88	71	83
Silicon metal[2, 5]	122	140	127	91	110
Stocks, producer, yearend:					
Ferrosilicon and metal[1, 2]	25	27	33	27	25
Net import reliance[6] as a percentage of apparent consumption:					
Ferrosilicon, all grades[1]	<50	<50	>50	>50	<50
Silicon metal[2]	<50	<50	<50	<50	<50
Total	39	42	38	36	35

Recycling: Insignificant.

Import Sources (2013–16): Ferrosilicon: Russia, 36%; China, 23%; Canada, 12%; Venezuela, 9%; and other, 20%. Silicon metal: South Africa, 25%; Brazil, 24%; Canada and Australia, 14% each; and other, 23%. Total: Russia, 20%; Brazil, Canada, and China, 13% each; and other, 41%.

Tariff: Item	Number	Normal Trade Relations 12–31–17
Silicon, more than 99.99% Si	2804.61.0000	Free.
Silicon, 99.00%–99.99% Si	2804.69.1000	5.3% ad val.
Silicon, other	2804.69.5000	5.5% ad val.
Ferrosilicon, 55%–80% Si:		
More than 3% Ca	7202.21.1000	1.1% ad val.
Other	7202.21.5000	1.5% ad val.
Ferrosilicon, 80%–90% Si	7202.21.7500	1.9% ad val.
Ferrosilicon, more than 90% Si	7202.21.9000	5.8% ad val.
Ferrosilicon, other:		
More than 2% Mg	7202.29.0010	Free.
Other	7202.29.0050	Free.

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SILICON

Depletion Allowance: Quartzite, 14% (Domestic and foreign); gravel, 5% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: Combined domestic ferrosilicon and silicon metal production in 2017, expressed in terms of contained silicon, increased from that of 2016. Domestic production during the first 9 months of 2017 was slightly more than that during the same period in 2016. By September 2017, average U.S. ferrosilicon spot market prices had increased by 11% and 18%, for 50%-grade and 75%-grade ferrosilicon, respectively, and the average silicon metal spot market price had increased by 21% compared with the annual average spot prices in 2016. The increase in silicon metal prices was attributed to preliminary rulings of ongoing trade cases. Owing to increasing demand and continuing trade cases, operations in Argentina, South Africa, and the United States that had been operating below capacity were restarting, or planning to restart, full operations.

Excluding the United States, ferrosilicon accounts for about 61% of world silicon production on a silicon-content basis. The leading countries for ferrosilicon production were, in descending order and on a contained-weight basis, China, Russia, and Norway. For silicon metal, the leading producers were China, Norway, and France. China accounted for approximately 65% of total global estimated production of silicon materials in 2017.

World Production and Reserves:

	Production[e, 7]		Reserves[8]
	2016	2017	
United States	[9]384	405	The reserves in most major producing countries are ample in relation to demand. Quantitative estimates are not available.
Bhutan[10]	69	69	
Brazil	110	110	
Canada	51	51	
China	5,000	4,800	
France	120	120	
Iceland[10]	79	79	
India[10]	59	59	
Malaysia[10]	82	110	
Norway	380	380	
Russia	750	750	
South Africa	85	85	
Spain	81	75	
Ukraine[10]	66	61	
Other countries	310	280	
World total (rounded)	7,600	7,400	

World Resources: World and domestic resources for making silicon metal and alloys are abundant and, in most producing countries, adequate to supply world requirements for many decades. The source of the silicon is silica in various natural forms, such as quartzite.

Substitutes: Aluminum, silicon carbide, and silicomanganese can be substituted for ferrosilicon in some applications. Gallium arsenide and germanium are the principal substitutes for silicon in semiconductor and infrared applications.

[e]Estimated. W Withheld to avoid disclosing company proprietary data.
[1]Ferrosilicon grades include the two standard grades of ferrosilicon—50% and 75% silicon—plus miscellaneous silicon alloys.
[2]Metallurgical-grade silicon metal.
[3]Defined as production + imports – exports + adjustments for industry stock changes.
[4]CRU Group transaction prices based on weekly averages.
[5]S&P Global Platts mean import prices based on monthly averages.
[6]Defined as imports – exports + adjustments for industry stock changes.
[7]Production quantities are the silicon content of combined totals for ferrosilicon and silicon metal, except as noted.
[8]See Appendix C for resource and reserve definitions and information concerning data sources.
[9] Reported figure.
[10]Silicon content of ferrosilicon only.