

MAGNESIUM METAL¹

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: In 2017, primary magnesium was produced by one company in Utah at an electrolytic process plant that recovered magnesium from brines from the Great Salt Lake. Secondary magnesium was recovered from scrap at plants that produced magnesium ingot and castings, and from aluminum alloy scrap at secondary aluminum smelters. Primary magnesium production in 2017 was estimated to have decreased from that of 2016. Information regarding U.S. primary magnesium production was withheld to avoid disclosing company proprietary data. The leading use for primary magnesium metal, which accounted for 34% of reported consumption, was in aluminum-base alloys that were used for packaging, transportation, and other applications. Castings accounted for 30% of primary magnesium metal consumption, desulfurization of iron and steel, 22%; wrought products, 6%; and other uses, 8%. Consumption of magnesium as a reducing agent for metals production decreased dramatically compared with that in 2016 because of the shutdown of a titanium sponge producer in Utah at the end of 2016. About 52% of the secondary magnesium was consumed for structural uses and about 48% was used in aluminum alloys.

Salient Statistics—United States:	2013	2014	2015	2016	2017^e
Production:					
Primary	W	W	W	W	W
Secondary (new and old scrap)	79	81	88	96	120
Imports for consumption	47	54	51	47	43
Exports	16	17	15	19	15
Consumption:					
Reported, primary	66	64	64	47	40
Apparent ²	W	W	W	W	W
Price, yearend:					
U.S. spot Western, dollars per pound, average	2.13	2.15	2.15	2.15	2.15
China, free on board, dollars per metric ton, average	2,615	2,325	1,825	2,390	2,220
Stocks, producer, yearend	W	W	W	W	W
Employment, number ^e	420	420	420	420	400
Net import reliance ³ as a percentage of apparent consumption	<50	<50	<50	<50	<25

Recycling: In 2017, about 23,000 tons of secondary magnesium was recovered from old scrap and 97,000 tons were recovered from new scrap. Aluminum-base alloys accounted for 52% of the secondary magnesium recovered, and magnesium-based castings, ingot, and other materials accounted for about 48%.

Import Sources (2013–16): Israel, 27%; Canada, 22%; China, 10%; United Kingdom, 8%; and other, 33%.

Tariff:	Item	Number	Normal Trade Relations
			12–31–17
	Unwrought metal	8104.11.0000	8.0% ad val.
	Unwrought alloys	8104.19.0000	6.5% ad val.
	Scrap	8104.20.0000	Free.
	Powders and granules	8104.30.0000	4.4% ad val.
	Wrought metal	8104.90.0000	14.8¢/kg on Mg content + 3.5% ad val.

Depletion Allowance: Dolomite, 14% (Domestic and foreign); magnesium chloride (from brine wells), 5% (Domestic and foreign).

Government Stockpile: None.

Events, Trends, and Issues: The sole U.S. producer of primary magnesium temporarily shut down some capacity at the end of 2016 citing the shutdown of a titanium sponge plant that had been a major customer, and this capacity was not expected to restart in the foreseeable future.

In China, a new 100,000-ton-per-year plant in Qinghai Province that would produce magnesium from lake brines was completed in 2017 and was expected to ramp up to full capacity in early 2018. Some plants producing magnesium using the Pidgeon (silicothermic reduction) process were expected to shut down, owing to energy cost increases and to comply with environmental regulations ordered by the Government of China.

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Producers in China dominate magnesium production, but several projects were under development to increase primary magnesium metal capacity elsewhere. One company conducted laboratory testing to recover magnesium from its dolomite deposit in Nevada and was planning to conduct a feasibility study for a proposed plant. In May, a company in Quebec, Canada, started production of magnesium from serpentine contained in asbestos tailings at its 200-ton-per-year pilot plant and was planning to construct a 50,000-ton-per-year plant. Another company was testing its process for producing magnesium from serpentine-bearing asbestos tailings in the same region of Quebec. A company in Australia was conducting a feasibility study for a 5,000-ton-per-year plant to recover magnesium from coal fly ash.

The use of magnesium in automobile parts continued to increase as automobile manufacturers sought to decrease vehicle weight in order to comply with fuel-efficiency standards. Magnesium castings have substituted for aluminum, iron, and steel in some automobiles. The substitution of aluminum for steel in automobile sheet was expected to increase consumption of magnesium in aluminum alloy sheet. Although some magnesium sheet applications have been developed for automobiles, these were generally limited to expensive sports cars and luxury vehicles, automobiles where the higher price of magnesium is not a deterrent to its use.

World Primary Production and Reserves:

	Primary production		Reserves ⁴
	2016	2017 ^e	
United States	W	W	Magnesium metal is derived from seawater, natural brines, dolomite, serpentine, and other minerals. The reserves for this metal are sufficient to supply current and future requirements.
Brazil	16	16	
Canada	—	(⁵)	
China	871	930	
Iran	2	5	
Israel	23	24	
Kazakhstan	10	10	
Korea, Republic of	10	10	
Russia	58	60	
Turkey	5	15	
Ukraine	5	8	
World total (rounded)	⁶ 1,000	⁶ 1,100	

World Resources: Resources from which magnesium may be recovered range from large to virtually unlimited and are globally widespread. Resources of dolomite, serpentine, and magnesium-bearing evaporite minerals are enormous. Magnesium-bearing brines are estimated to constitute a resource in the billions of tons, and magnesium could be recovered from seawater along world coastlines.

Substitutes: Aluminum and zinc may substitute for magnesium in castings and wrought products. The relatively light weight of magnesium is an advantage over aluminum and zinc in castings and wrought products in most applications; however, its high cost is a disadvantage relative to these substitutes. For iron and steel desulfurization, calcium carbide may be used instead of magnesium. Magnesium is preferred to calcium carbide for desulfurization of iron and steel because calcium carbide produces acetylene in the presence of water.

^eEstimated. W Withheld to avoid disclosing company proprietary data. — Zero.

¹See also Magnesium Compounds.

²Defined as primary production + secondary production from old scrap + imports – exports + adjustments for industry stock changes.

³Defined as imports – exports + adjustments for industry stock changes.

⁴See [Appendix C](#) for resource and reserve definitions and information concerning data sources.

⁵Less than ½ unit.

⁶Excludes U.S. production.