MAGNESIUM METAL[1]

(Data in thousand metric tons unless otherwise specified)

Domestic Production and Use: In 2023, primary magnesium was produced by one company in Utah at an electrolytic process smelter that recovered magnesium from brines from the Great Salt Lake. Secondary magnesium was recovered from scrap at smelters that produced magnesium ingot and castings and from aluminum alloy scrap at secondary aluminum smelters. 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 64% of reported consumption, was in castings, principally used for the automotive industry. Aluminum-base alloys that were used for packaging, transportation, and other applications accounted for 18% of primary magnesium metal consumption; desulfurization of iron and steel, 4%; and all other uses, 14%. About 32% of secondary magnesium was consumed for structural uses, and about 68% was used in aluminum alloys.

Salient Statistics—United States:	2019	2020	2021	2022	2023[e]
Production:					
Primary	W	W	W	W	W
Secondary (new and old scrap)	102	95	103	107	100
Imports for consumption	59	61	54	89	95
Exports	10	15	10	9	4
Consumption:					
Reported, primary	57	54	51	50	55
Apparent[2]	W	W	W	W	W
Price, annual average:[3]					
U.S. spot Western, dollars per pound	2.47	2.48	3.73	7.59	5.00
European free market, dollars per metric ton	2,426	2,149	5,011	5,206	3,200
Stocks, producer, yearend	W	W	W	W	W
Employment, number[e]	400	400	400	400	400
Net import reliance[4] as a percentage of apparent consumption	>25	>25	>25	>50	>50

Recycling: In 2023, about 25,000 tons of secondary magnesium was recovered from old scrap and 75,000 tons was recovered from new scrap. Aluminum-base alloys accounted for about 52% of the secondary magnesium recovered, and magnesium-based castings, ingot, and other materials accounted for about 48%.

Import Sources (2019–22): Magnesium metal (99.8% purity): Turkey, 32%; Russia, 25%; Israel, 23%; Canada, 7%; and other, 13%. Magnesium alloys (magnesium content): Czechia, 23%; Taiwan, 23%; Hungary, 12%; Germany 9%; and other, 33%. Sheet, powder, and other (magnesium content): Mexico, 23%; Austria, 22%; China,[5] 17%; Taiwan, 14%; and other, 24%. Scrap: Canada, 35%; Mexico, 17%; China, 15%; India, 8%; and other, 25%. Combined total (includes magnesium content of alloys, metal, powder, scrap, sheet, and other): Canada, 18%; China,[5] 9%; Israel, 9%; Taiwan, 9%; and other, 55%.

Tariff: Item	Number	Normal Trade Relations 12–31–23
Unwrought metal	8104.11.0000	8% ad valorem.
Unwrought alloys	8104.19.0000	6.5% ad valorem.
Waste and scrap	8104.20.0000	Free.
Powders and granules	8104.30.0000	4.4% ad valorem.
Wrought metal	8104.90.0000	14.8¢/kg on magnesium content + 3.5% ad valorem.

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

Government Stockpile: None.

Events, Trends, and Issues: Production issues continued throughout the year at the only U.S. primary magnesium smelter. On September 29, 2021, the producer of primary magnesium in Utah declared force majeure on supply contracts, citing equipment failures. Details on the amount of capacity affected and the expected restart date were not reported by the company. The shutdown of capacity was cited as the reason why the average annual U.S. spot Western price in 2022 nearly doubled from the annual average price in 2021, but in 2023 the annual average price decreased by about one-third as consumers contracted deliveries from new suppliers. Some aluminum smelters were reported to have switched from using primary magnesium to secondary magnesium alloys imported from Canada, Czechia, Hungary, the Republic of Korea, and Taiwan. Although imports of magnesium alloys decreased slightly in 2023 from those in 2022, they were more than double those in 2021 and increased by more than 200% since 2019.

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MAGNESIUM METAL

Domestic consumption of magnesium for castings used in the automotive industry decreased because of a 6-week-long labor dispute between three major automobile manufacturers and the union representing many of their employees. The trend of magnesium substituting for other materials in automobiles was expected to continue as manufacturers sought to decrease vehicle weight for increased fuel efficiency. Magnesium metal ingot imports were an estimated 39,000 tons in 2023 compared with 20,000 tons in 2022. Increased imports were attributed to the disruption of production at the sole primary magnesium producer since September 2021.

In August, the U.S. International Trade Commission completed a 5-year review of antidumping duties on magnesium imports from China. In 1995, antidumping duties were imposed on magnesium imports from China at a rate of 108.26%. The duties are to be reviewed every 5 years. The review concluded that revocation of the duties would likely lead to material injury to domestic magnesium producers; therefore, the antidumping duties were retained. Despite the duty on magnesium imports from China, some consumers in the United States were willing to pay the duty to obtain the magnesium that they needed owing to decreased domestic supply since 2021. More than 1,300 tons of unwrought magnesium metal was imported from China through the end of September 2023, and 3,900 tons was imported in the full year 2022; between 2009 and 2021, imports from China were less than 150 tons each year.

Magnesium prices in Europe generally decreased during the first half of the year compared with those in the last quarter of 2022 because demand decreased. Prices in Europe increased from a range of $3,050 to $3,150 per ton at the end of July to a range of $3,350 to $3,500 per ton at the end of September. The price increase in Europe was attributed to concerns of supply shortages after regulators in China ordered several coke facilities to shut down temporarily to address pollution concerns. Coke gas is the energy source used by many magnesium producers in China, the leading supplier of magnesium to consumers in Europe. Prices in Europe decreased to the prior range by October once producers in China were able to restart capacity. The 2023 annual average price range for magnesium in Europe was estimated to be 40% less than that in 2022.

World Primary Production and Reserves:

	Smelter production[e]		Reserves[6]
	2022	2023	
United States	W	W	Magnesium metal can be derived from seawater, natural brines, dolomite, serpentine, and other minerals. The reserves for this metal are sufficient to supply current and future requirements.
Brazil	22	22	
China	[7]933	830	
Iran	5	5	
Israel	[7]22	22	
Kazakhstan	27	25	
Russia	21	20	
Turkey	14	15	
Ukraine	2	—	
World total (rounded)[8]	1,050	940	

World Resources:[6] 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.

[e]Estimated. W Withheld to avoid disclosing company proprietary data. — Zero.

[1]See also the Magnesium Compounds chapter.

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

[3]Source: S&P Global Platts Metals Week.

[4]Defined as imports – exports ± adjustments for industry stock changes.

[5]Includes Hong Kong.

[6]See Appendix C for resource and reserve definitions and information concerning data sources.

[7]Reported.

[8]Excludes U.S. production.