

MAGNESIUM METAL¹

(Data in thousand metric tons unless otherwise noted)

Domestic Production and Use: In 2020, 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 2020 was estimated to have decreased from that of 2019. 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 47% 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 33% of primary magnesium metal consumption; desulfurization of iron and steel, 16%; and all other uses, 4%. About 33% of the secondary magnesium was consumed for structural uses, and about 67% was used in aluminum alloys.

Salient Statistics—United States:

	2016	2017	2018	2019	2020^e
Production:					
Primary	W	W	W	W	W
Secondary (new and old scrap)	101	112	109	101	90
Imports for consumption	45	42	47	59	61
Exports	19	14	12	10	12
Consumption:					
Reported, primary	69	65	51	55	50
Apparent ²	W	W	W	W	W
Price, annual average:³					
U.S. spot Western, dollars per pound	2.15	2.15	2.17	2.45	2.50
European free market, dollars per metric ton	2,190	2,265	2,550	2,425	2,100
Stocks, producer, yearend	W	W	W	W	W
Employment, number ^e	420	400	400	400	400
Net import reliance ⁴ as a percentage of apparent consumption	<25	<25	<50	<50	<50

Recycling: In 2020, about 25,000 tons of secondary magnesium was recovered from old scrap and 65,000 tons was recovered from new scrap. Aluminum-base alloys accounted for about 55% of the secondary magnesium recovered, and magnesium-based castings, ingot, and other materials accounted for about 45%.

Import Sources (2016–19): Canada, 23%; Israel, 20%; Mexico, 11%; Russia, 8%; and other, 38%.

Tariff:	Item	Number	Normal Trade Relations 12–31–20
	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.

Prices and demand for magnesium fluctuated during much of the year in response to the COVID-19 pandemic. The price in Europe spiked in February compared with the price at the end of January but then declined by mid-March. The price increase in Europe in February and early March was attributed to concerns that shutdowns of smelters in China would cause shortages of magnesium. During January and February, producers in China shut down some capacity citing travel and work restrictions, less demand because of the pandemic, and heavy snowfall in the northwest part of China. But as many secondary aluminum smelters and diecasters in Europe temporarily shut down production in February and March, magnesium consumption decreased. Prices in Europe decreased during April and May, on decreased demand, but increased in June. Decreased production in China during the summer months was

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cited for increased magnesium prices in Europe. In September, prices in Europe declined. In the United States, spot sales of magnesium declined dramatically in April and May, causing the price to drop. Diecasters producing parts for the automobile industry as well as secondary aluminum smelters decreased magnesium consumption in response to shutdowns of automobile assembly lines, aluminum extruders, and aluminum rolling mills. By midyear, consumption of magnesium by aluminum smelters and diecasters stabilized but prices remained at lower levels in the United States and dropped again in August.

Producers in China dominate global magnesium metal production, but several projects were under development to increase primary magnesium metal capacity elsewhere and in China. In the United States, one company obtained a location to build a pilot plant to test magnesium production from a dolomite deposit in Nevada. A company in Quebec, Canada, started construction of a secondary magnesium smelter with completion expected by midyear 2021. Then the company planned to construct a primary magnesium smelter to produce magnesium from serpentine-bearing asbestos tailings. A company in Australia was planning to start construction in 2021 on a 3,000-ton-per-year plant to recover magnesium from coal fly ash with completion expected to take 18 months.

The use of magnesium in automobile parts continued to increase as automobile manufacturers sought to decrease vehicle weight in response to consumer desires for increased fuel efficiency. 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:

	Smelter production		Reserves⁵
	2019	2020^e	
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	20	
China	970	900	
Israel	21	20	
Kazakhstan	25	20	
Russia	67	60	
Turkey	7	11	
Ukraine	8	5	
World total (rounded) ⁶	1,120	1,000	

World Resources:⁵ 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. NA Not available. W Withheld to avoid disclosing company proprietary data.

¹See also Magnesium Compounds.

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

³Source: Platts Metals Week.

⁴Defined as imports – exports + adjustments for industry stock changes.

⁵See Appendix C for resource and reserve definitions and information concerning data sources.

⁶Excludes U.S. production.