

LITHIUM

(Data in metric tons of lithium content unless otherwise noted)

Domestic Production and Use: Chile was the leading lithium chemical producer in the world; Argentina, China, and the United States also were major producers. Australia, Canada, Portugal, and Zimbabwe were major producers of lithium ore concentrates. The United States remained the leading importer of lithium minerals and compounds and the leading producer of value-added lithium materials. Because only one company produced lithium compounds from domestic resources, reported production and value of production were withheld from publication to avoid disclosing company proprietary data. Estimation of value for the lithium mineral compounds produced in the United States is extremely difficult because of the large number of compounds used in a wide variety of end uses and the great variability of the prices for the different compounds. Two companies produced a large array of downstream lithium compounds in the United States from domestic or South American lithium carbonate. A U.S. recycling company produced a small quantity of lithium carbonate from solutions recovered during the recycling of lithium batteries.

Although lithium markets vary by location, global end-use markets are estimated as follows: ceramics and glass, 31%; batteries, 23%; lubricating greases, 10%; air treatment, 5%; continuous casting, 4%; primary aluminum production, 3%; and other uses, 24%. Lithium use in batteries expanded significantly in recent years because rechargeable lithium batteries were being used increasingly in portable electronic devices and electrical tools.

Salient Statistics—United States:	2005	2006	2007	2008	2009^e
Production	W	W	W	W	W
Imports for consumption	3,580	3,260	3,140	3,160	2,000
Exports	1,720	1,500	1,760	1,820	1,000
Consumption:					
Apparent	W	W	W	W	W
Estimated	2,500	2,500	2,100	2,000	1,200
Employment, mine and mill, number	59	61	68	68	68
Net import reliance ¹ as a percentage of apparent consumption	>50%	>50%	>50%	>50%	>50%

Recycling: Insignificant, but increasing through the recycling of lithium batteries.

Import Sources (2005-08): Chile, 63%; Argentina, 35%; China, 1%; and other, 1%.

Tariff:	Item	Number	Normal Trade Relations
			12-31-09
	Other alkali metals	2805.19.9000	5.5% ad val.
	Lithium oxide and hydroxide	2825.20.0000	3.7% ad val.
	Lithium carbonate:		
	U.S.P. grade	2836.91.0010	3.7% ad val.
	Other	2836.91.0050	3.7% ad val.

Depletion Allowance: 22% (Domestic), 14% (Foreign).

Government Stockpile: None.

Events, Trends, and Issues: Market conditions deteriorated for lithium-based products in 2009. Sales volumes for the major lithium producers were reported to be down between 15% and 42% by mid-2009. Consumption by lithium end-use markets for batteries, ceramics and glass, grease, and pharmaceuticals all decreased. A major spodumene producer in Canada closed its mine owing to market conditions. The leading lithium producer in Chile announced it would lower its lithium prices by 20% in 2010. Despite the economic downturn in the lithium market, a host of new companies explored for lithium on claims worldwide in 2009. Many claims in Nevada, as well as in Argentina, Australia, Bolivia, and Canada, have been leased or staked.

The only active lithium carbonate plant in the United States was a brine operation in Nevada. Subsurface brines have become the dominant raw material for lithium carbonate production worldwide because of lower production costs compared with the mining and processing costs for hard-rock ores. Two brine operations in Chile dominate the world market and a facility at a brine deposit in Argentina produced lithium carbonate and lithium chloride. A second brine operation was under development in Argentina. Worldwide, most lithium minerals mined were used directly as ore concentrates in ceramics and glass applications rather than as feedstock for lithium carbonate and other lithium compounds.

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Batteries, especially rechargeable batteries, are the market for lithium compounds with the largest growth potential. Demand for rechargeable lithium batteries continued to gain market share over rechargeable nonlithium batteries for use in cordless tools, portable computers and telephones, and video cameras. Major automobile companies were pursuing the development of lithium batteries for hybrid electric vehicles—vehicles with an internal combustion engine and a battery-powered electric motor. Most commercially available hybrid vehicles use other types of batteries, although future generations of these vehicles may use lithium. Nonrechargeable lithium batteries were used in calculators, cameras, computers, electronic games, watches, and other devices.

As part of the American Recovery and Reinvestment Act of 2009, the U.S. Department of Energy funded \$2.4 billion in grants to accelerate the development of United States manufacturing capacity for batteries and electric-drive components and for the deployment of electric-drive vehicles. The grants, designed to help launch an advanced battery industry in the United States, represent the single largest investment in advanced battery technology for hybrid and electric-drive vehicles ever made. Lithium-ion battery technology figured prominently in the grant awards, with approximately \$940 million in grant money received by lithium battery materials suppliers, lithium battery manufacturers, and a lithium battery recycler.

World Mine Production and Reserves: Reserves estimates for Argentina, Australia, and Chile have been revised based on new information from Government and industry sources.

	Mine production		Reserves ²
	2008	2009 ^e	
United States	W	W	38,000
Argentina	3,170	2,200	800,000
Australia	6,280	4,400	580,000
Brazil	160	110	190,000
Canada	690	480	180,000
Chile	10,600	7,400	7,500,000
China	3,290	2,300	540,000
Portugal	700	490	NA
Zimbabwe	500	350	23,000
World total (rounded)	³ 25,400	³ 18,000	9,900,000

World Resources: The identified lithium resources total 2.5 million tons in the United States and approximately 23 million tons in other countries. Among the other countries, identified lithium resources for Bolivia and Chile total 9 million tons and in excess of 7.5 million tons, respectively. Argentina and China each contain approximately 2.5 million tons of identified lithium resources.

Substitutes: Substitutes for lithium compounds are possible in batteries, ceramics, greases, and manufactured glass. Examples are calcium and aluminum soaps as substitutes for stearates in greases; calcium, magnesium, mercury, and zinc as anode material in primary batteries; and sodic and potassic fluxes in ceramics and glass manufacture. Lithium carbonate is not considered to be an essential ingredient in aluminum potlines. Substitutes for aluminum-lithium alloys in structural materials are composite materials consisting of boron, glass, or polymer fibers in engineering resins.

^eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data.

¹Defined as imports – exports + adjustments for Government and industry stock changes.

²See [Appendix C for definitions](#). Reserve base estimates were discontinued in 2009; see [Introduction](#).

³Excludes U.S. production.