

CEMENT

(Data in thousand metric tons, unless otherwise noted)

Domestic Production and Use: In 2001, about 85 million tons of portland cement and 4 million tons of masonry cement were produced at a total of 116 plants in 37 States, by 1 State agency and about 40 companies. There were also two plants in Puerto Rico. The ex-plant value of cement production, excluding Puerto Rico, was about \$7.1 billion, and the value of total sales (including imported cement) was about \$8.8 billion. Most of the cement was used to make concrete, worth at least \$38 billion. Total cement consumption (sales) rose slightly to a new record level. Imported cement and clinker (to make cement) accounted for about 25% of the cement sold; total imports declined significantly, owing to higher domestic production capacity and a weakening construction market. Clinker, the main intermediate product in cement manufacture, was produced at 109 plants, with a combined apparent annual capacity of about 91 million tons. Including several facilities that merely ground clinker produced elsewhere, total finished cement (grinding) capacity was about 105 million tons. Texas, California, Pennsylvania, Michigan, Missouri, and Alabama, in descending order, were the six largest producing States and accounted for about one-half of U.S. production. About 74% of cement sales went to ready-mixed concrete producers, 13% to concrete product manufacturers, 7% to contractors (mainly for road paving), 4% to building materials dealers, and 2% to other users.

Salient Statistics—United States:¹	1997	1998	1999	2000	2001^e
Production, portland and masonry ²	82,582	83,931	85,952	87,846	89,600
Production, clinker	72,686	74,523	76,003	78,138	78,900
Shipments to final customers, including exports	96,801	103,696	108,862	110,048	111,000
Imports of hydraulic cement for consumption	14,523	19,878	24,578	24,561	23,700
Imports of clinker for consumption	2,867	3,905	4,164	3,673	2,100
Exports of hydraulic cement and clinker	791	743	694	738	880
Consumption, apparent ³	96,018	103,457	108,862	110,470	114,000
Price, average mill value, dollars per ton	73.49	76.46	78.27	78.56	79.00
Stocks, mill, yearend	5,784	5,393	6,367	7,566	6,000
Employment, mine and mill, number ^e	17,900	17,900	18,000	18,000	18,000
Net import reliance ⁴ as a percentage of apparent consumption	14	19	21	20	21

Recycling: Cement kiln dust is routinely recycled to the kilns, which can also burn a variety of waste fuels and recycled raw materials such as slags. Cement itself generally is not recycled, but there is a small amount of recycling of concrete for use as aggregate.

Import Sources (1997-2000):⁵ Canada, 22%; Thailand, 12%; China, 11%; Venezuela, 8%; Greece, 8%; and other, 39%. Import sources were diversifying, with Asian sources (especially China, Korea, and Thailand) becoming major suppliers since 1998; Thailand became the single largest source of imported cement and clinker (combined) in 2000.

Tariff: Item	Number	Normal Trade Relations 12/31/01
Cement clinker	2523.10.0000	Free.
White portland cement	2523.21.0000	Free.
Other portland cement	2523.29.0000	Free.
Aluminous cement	2523.30.0000	Free.
Other hydraulic cement	2523.90.0000	Free.

Depletion Allowance: Not applicable. Certain raw materials for cement production have depletion allowances.

Government Stockpile: None.

Events, Trends, and Issues: Continued very low interest rates, long project lead times, and strong public sector spending by the Federal Government allowed cement consumption levels to rise modestly in 2001 despite the generally much weaker general economy. Cement consumption in 2002 was expected to stagnate or decline somewhat, especially where projects relied on tenuous State funding. Cement company ownership continued to consolidate, notably with the largest U.S.-owned and overall second largest U.S. producer being purchased by a foreign company in 2000 and two of the major foreign-owned producers merging early in 2001.

Concern continued over the environmental impact of cement manufacture, particularly the emissions of carbon dioxide, handling of cement kiln dust (CKD), and emissions of nitrogen oxides. The cement industry is one of the largest sources of carbon dioxide emissions, and U.S. cement producers were voluntarily seeking to reduce emissions. Carbon dioxide reduction strategies by the cement industry were aimed at lower emissions per ton of

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cement, rather than total emissions. Reduction strategies included installation of more fuel efficient kiln technologies, partial substitution of non-carbonate sources of calcium oxide in the kiln raw materials, and partial substitution of cementitious additives for portland cement in the finished cement products.

The rapid rise in fossil fuel costs in 2000 abated somewhat in 2001 but fuel costs remained of concern to the cement industry. Some cement companies burn solid or liquid waste materials in their kilns as a low-cost substitute for fossil fuels. Cement kilns can be an effective and benign way of destroying such wastes; the viability of the practice and the type of waste(s) burned hinge on current and future environmental regulations and their associated costs. The trend, tempered by administrative constraints, appears to be towards increased use of waste fuels. Environmental issues common to mining, such as restrictions on silica in dust, also affect cement raw materials quarries.

Although still relatively minor in the United States, there is growing use worldwide of natural and synthetic pozzolans as partial or complete replacements for portland cement. Pozzolans are materials that, in the presence of free lime, have hydraulic cementitious properties; examples include some volcanic ashes and industrial byproducts such as granulated blast furnace slag, fly ash, and silica fume. Pozzolanic cements, including blends with portland, can have performance advantages over some straight portland cements for certain applications. Because pozzolans do not require the energy-intensive clinker manufacturing (kiln) phase of production, their use reduces the unit monetary and environmental costs of cement manufacture. In the United States, most pozzolan consumption continued to be as sales directly to concrete manufacturers rather than within blended cements sold by cement plants.

World Production and Capacity:

	Cement production		Yearend clinker capacity ⁶	
	2000	2001 ^e	2000	2001
United States (includes Puerto Rico)	89,510	91,100	⁶ 91,228	93,000
Brazil	39,208	40,000	45,000	45,000
China	583,190	595,000	550,000	550,000
Egypt	24,143	22,000	24,000	30,000
France	20,000	21,000	24,000	24,000
Germany	38,000	40,000	43,000	43,000
India	95,000	100,000	110,000	115,000
Indonesia	27,789	28,000	45,000	45,000
Iran	20,000	23,000	26,000	27,000
Italy	36,000	36,000	46,000	46,000
Japan	81,300	82,000	96,000	96,000
Korea, Republic of	51,255	52,000	62,000	62,000
Mexico	31,677	30,000	40,000	40,000
Russia	32,400	35,000	65,000	65,000
Spain	30,000	30,000	40,000	40,000
Taiwan	18,500	18,500	24,000	26,000
Thailand	32,000	32,000	48,000	48,000
Turkey	35,825	36,000	33,000	33,000
Other countries (rounded)	<u>330,000</u>	<u>340,000</u>	<u>350,000</u>	<u>350,000</u>
World total (rounded)	1,600,000	1,650,000	1,700,000	1,800,000

World Resources: Although individual company reserves are subject to exhaustion, cement raw materials, especially limestone, are geologically widespread and abundant, and overall shortages are unlikely in the foreseeable future. Local shortages generally can be met through imports of cement and/or clinker.

Substitutes: Virtually all portland cement is utilized either in making concrete or mortars and, as such, competes in the construction sector with concrete substitutes such as clay brick, glass, aluminum, steel, fiberglass, wood, stone, and asphalt. Pozzolans and similar materials are being used as partial or complete substitutes for portland cement for some concrete applications.

^eEstimated.

¹Portland plus masonry cement, unless otherwise noted. Excludes Puerto Rico.

²Includes cement made from imported clinker.

³Production of cement (including from imported clinker) + imports (excluding clinker) - exports - changes in stocks.

⁴Defined as imports - exports + adjustments for Government and industry stock changes.

⁵Hydraulic cement and clinker.

⁶Reported.