

Cement

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INTRODUCTION

Portland cement was first made by bricklayer Joseph Aspdin in England in 1824, and is the primary ingredient of concrete. Basic raw materials for cement manufacture include limestone, alumina (shale or clay), silica (sand), and iron oxide. This raw mix is burned in a long rotary kiln at temperatures of 1500°C to produce an intermediate product called clinker. Clinker is then interground to a fine powder with about 5% gypsum, used as a set retarder, to produce portland cement. Cement is shipped in powder form to ready-mix concrete plants where it is combined with coarse and fine aggregates and water to form concrete, ready for use in numerous construction applications.

CANADIAN INDUSTRY

Portland cement is produced from 16 plants in five provinces (Nova Scotia, Quebec, Ontario, Alberta and British Columbia) by seven companies (Figure 1). Cement manufacturers in Canada shipped an estimated 14.1 Mt of portland cement valued at \$1.50 billion in 2003, based on preliminary data, compared to shipments of 13.7 Mt valued at \$1.44 billion in 2002, based on revised data (Table 1). Portland cement production has been on a steady upward trend since 1992 with average annual increases of 3%, as shown in Figure 2, while clinker exports have remained steady. Plant capacity utilization (Figure 2, Table 3) decreased to 80%.

Most cement companies are integrated companies in the building products sector and have interests that include cement, concrete and aggregates. Lafarge North America Inc., based in Herndon, Virginia, and owned by Lafarge Group of France, operates seven cement plants located across Canada. The company, an integrated building products company, also has operations in the aggregates, con-

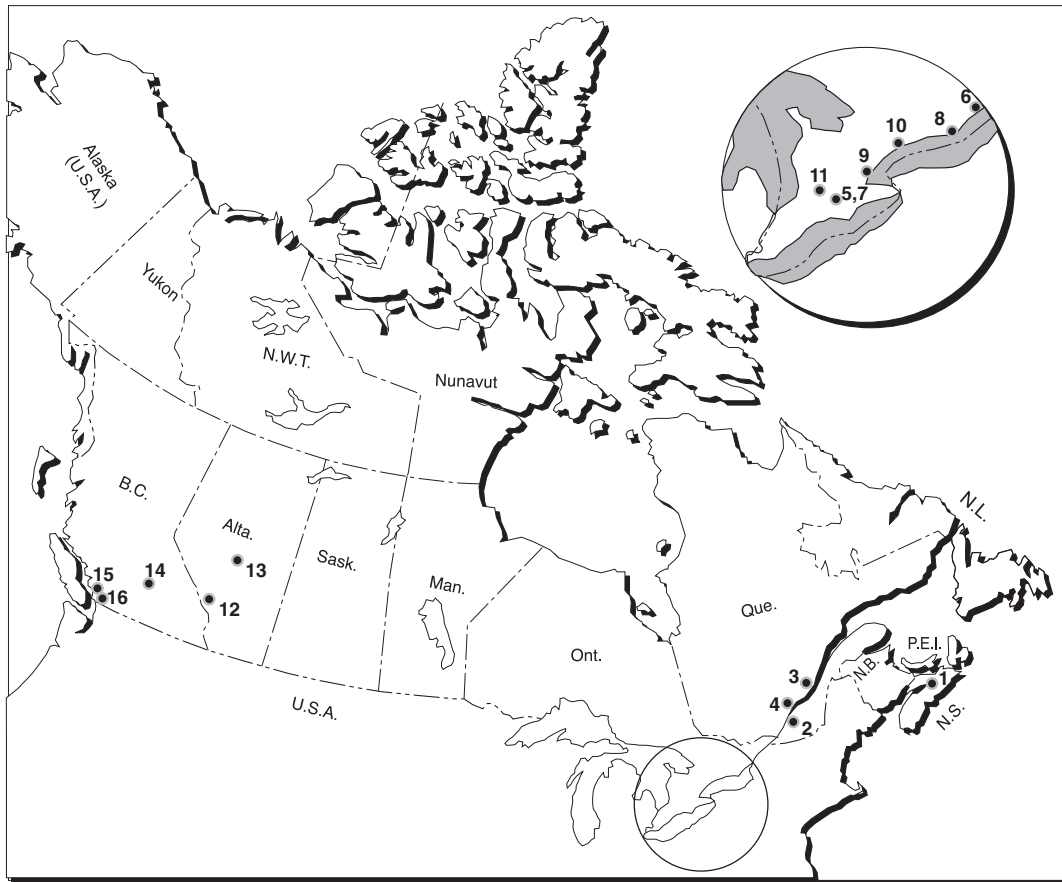
crete and gypsum sectors. St. Lawrence Cement Inc. of Montréal, Quebec, operates plants in Quebec and Ontario and is owned by Swiss-based Holcim AG. St. Marys Cement (Canada) Inc., of Toronto, Ontario, produces cement from two plants in Ontario. The company is a subsidiary of Votorantim Cimentos of Sao Paulo, Brazil. Essroc Canada Inc., owned by Italcementi Group of Italy, operates a cement plant in Picton, Ontario. Lehigh Inland Cement Limited and Lehigh Northwest Cement Limited, owned by Heidelberg Cement Group of Germany, operate plants in Alberta and British Columbia, respectively. Other cement plants are owned by Ciment Québec Inc., at Saint-Basile, Quebec, and Federal White Cement Ltd., at Woodstock, Ontario.

Cement plants that were in operation in 2003 are listed in Table 2, which also shows clinker and finish-grinding capacities, according to data from the U.S. Portland Cement Association. Primary-stage clinker production is more indicative of ultimate cement production capacity because this is the most capital/energy-intensive stage and clinker can be stockpiled for later use or sale. Total clinker capacity in Canada is estimated at 15.97 Mt/y, a slight increase over 2002 capacity. Estimated grinding capacity increased 1.1% over 2002.

Atlantic Canada has one operating cement plant, located at Brookfield, Nova Scotia, owned by Lafarge Canada Inc. In Quebec, total clinker capacity at three plants is 2.71 Mt/y. The three cement plants, two in the Montréal area and one near Québec City, account for about 22% of Canada's total output. There are seven plants in southern Ontario, between Kingston and St. Marys, that account for about 8.1 Mt/y of clinker capacity and for 44% of Canada's total portland cement production. Five cement plants in western Canada (Alberta and British Columbia) account for about 29% of clinker capacity and contributed 31% of total cement production in 2003.

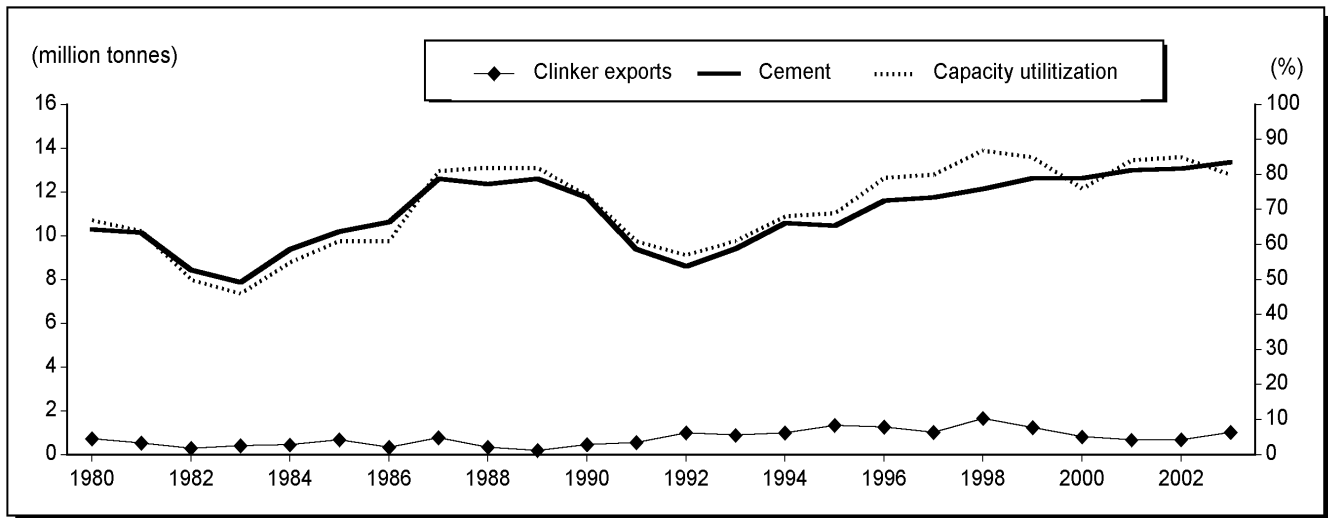
As a measure of activity in the Canadian construction industry and a general barometer of trends in cement shipments, Table 5 shows the value of construction by type, according to Statistics Canada. When comparing activity in 2003 to 2002, there was an overall increase of 8.0% to \$131.1 billion for all types of construction, with most of this gain attributable to residential and non-residential building construction.

**Figure 1
Cement Producers in Canada, 2003**



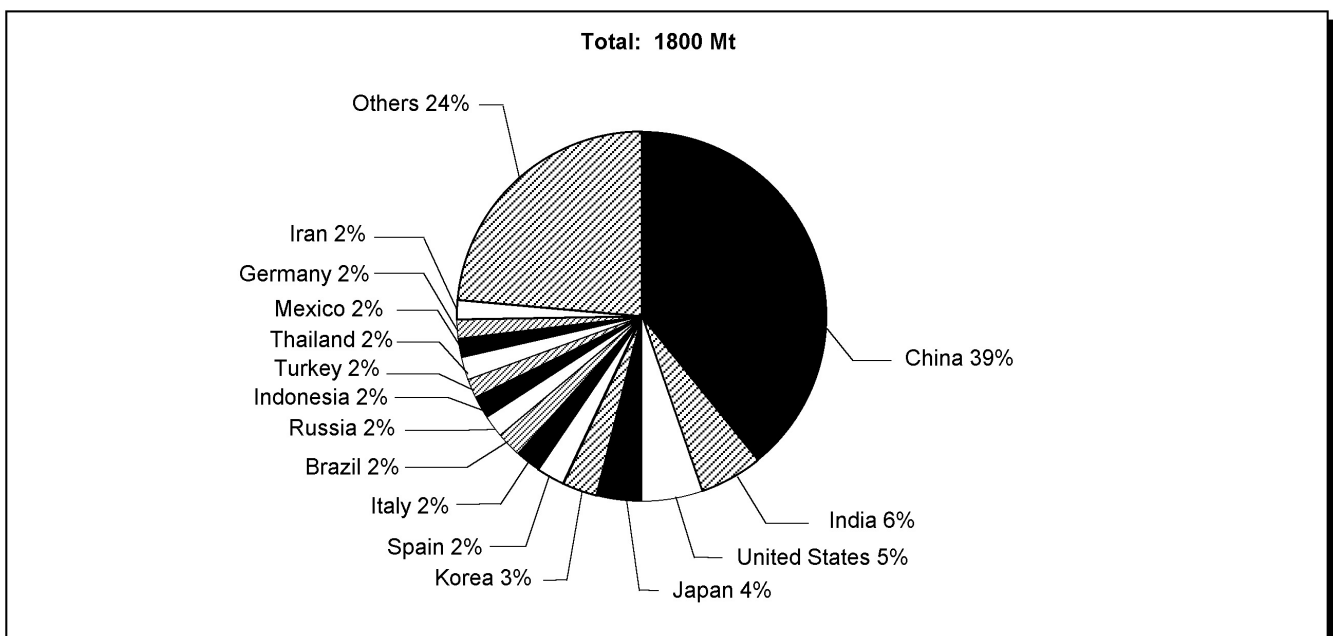
1. Lafarge Canada Inc., Brookfield, N.S.
2. Lafarge Canada Inc., Saint-Constant, Que.
3. Ciment Québec Inc., Saint-Basile, Que.
4. St. Lawrence Cement Inc., Joliette, Que.
5. Lafarge Canada Inc., Woodstock, Ont.
6. Lafarge Canada Inc., Bath, Ont.
7. Federal White Cement Ltd., Woodstock, Ont.
8. Essroc Canada Inc., Picton, Ont.
9. St. Lawrence Cement Inc., Mississauga, Ont.
10. St. Marys Cement (Canada) Inc., Bowmanville, Ont.
11. St. Marys Cement (Canada) Inc., St. Marys, Ont.
12. Lafarge Canada Inc., Exshaw, Alta.
13. Lehigh Inland Cement Limited, Edmonton, Alta.
14. Lafarge Canada Inc., Kamloops, B.C.
15. Lafarge Canada Inc., Richmond, B.C.
16. Lehigh Northwest Cement Limited, Delta, B.C.

Figure 2
Canadian Cement Production, 1980-2003 (e)



Source: Natural Resources Canada.
 (e) Estimated.

Figure 3
World Cement Production, 2002



Source: U.S. Geological Survey.

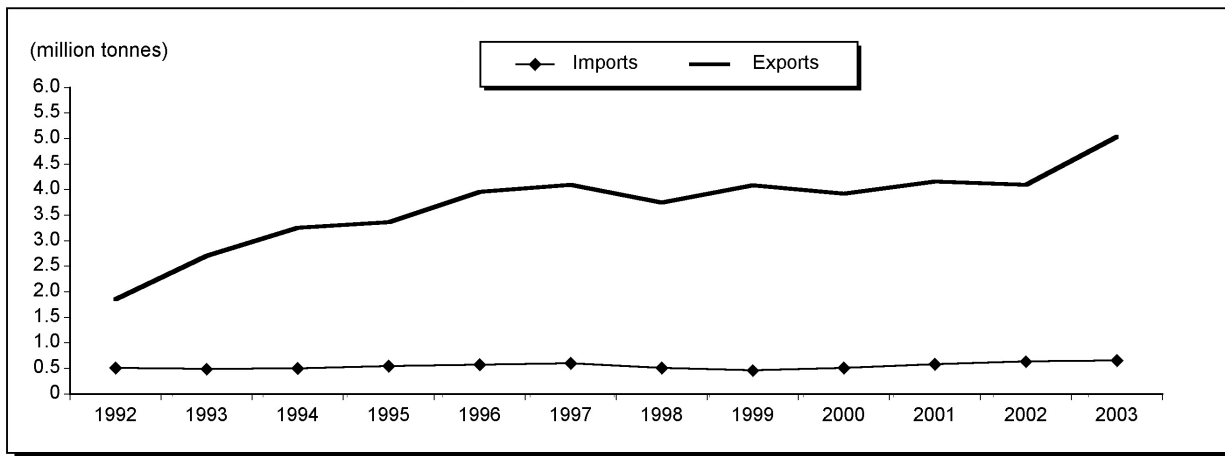
WORLD OVERVIEW

World cement production in 2002 was 1800 Mt, and is estimated at 1860 Mt for 2003, according to U.S. Geological Survey (USGS) reports (Table 6, Figure 3). The top five producing countries are: China (705 Mt, 39% of total), India (100 Mt, 6%), the United States (91.3 Mt, 5%), Japan (71.8 Mt, 4%) and South Korea (55.5 Mt, 3%). The United States produced about 87 Mt of portland cement and 4.5 Mt of masonry cement in 2003 from 116 plants (USGS). Clinker capacity in the United States is estimated at 101 Mt/y.

USE AND TRADE

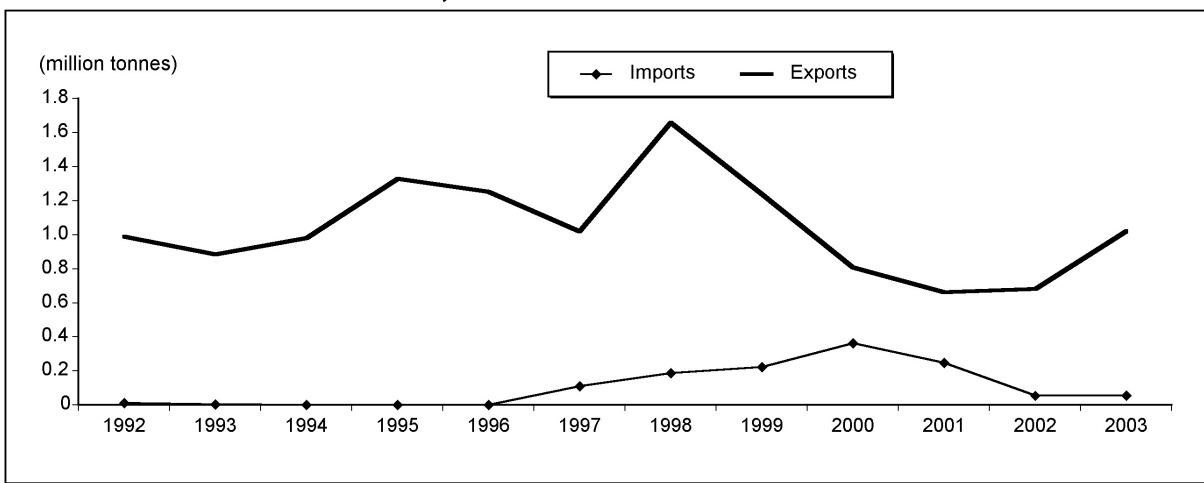
Portland cement is used in the manufacture of concrete as a raw material for numerous building and engineering construction applications, including buildings, roads and bridges. Since 1998 there has been a 34% increase in portland cement exports from Canada (Table 1, Figure 4). Virtually all cement exports (historically about 4 Mt/y) are destined for the United States. However, in 2003, exports jumped significantly to 5 Mt, an increase of 25%. Also, clinker exports rose from 681 000 t in 2002 to an estimated 1.02 Mt in 2003, an increase of 50%. Clinker

Figure 4
Canadian Portland Cement Trade, 1992-2003



Source: Natural Resources Canada.

Figure 5
Canadian Cement Clinker Trade, 1992-2003



Source: Natural Resources Canada.

exports have been increasing slowly since 2001 (Figure 5). These increases are attributable to the growth in the U.S. economy, which has a positive impact on the construction sector, and to lower-than-average imports from Asia. Cement exports from Canada are destined for the north-eastern Great Lakes and Pacific northwest regions. Total imports of clinker remained unchanged from 2002; however, imports from Turkey were largely replaced by those from Venezuela.

TECHNOLOGY NEWS

The World Business Council for Sustainable Development (WBCSD), along with 10 global cement companies, have released the Agenda for Action as part of its Cement Sustainability Initiative. The Agenda focuses on such common industry issues as protocols for monitoring and reporting CO₂ emissions, developing guidelines for fuel use, setting targets for greenhouse gas emission reductions, and setting guidelines for local environmental impacts. This initiative will run for five years and a full report will be submitted to the WBCSD in 2007. Five of the seven companies operating in Canada are participating members.

St. Lawrence Cement Inc. announced in 2003 that its net direct emissions for two plants in Canada have been reduced by 19% during the period 1990-2002, representing a reduction of almost 800 000 t of CO₂ equivalent. These reductions have been achieved through improvements to energy efficiency, the use of alternative fuels, and increased use of supplementary cementitious materials (SCM) such as fly ash and ground granulated blast furnace slag (GGBFS). The company produces more than 2.5 Mt of portland cement per year. It was recently recognized by Natural Resources Canada's Office of Energy Efficiency for its efforts to voluntarily reduce greenhouse gas emissions.

The benefits of using SCM in cement manufacture or as a partial replacement for portland cement in concrete have been known for years and SCM have been used in the Canadian construction industry for over 30 years. When used with portland cement, these cementitious materials contribute to the hardening properties of the concrete. SCM include fly ash, GGBFS and silica fume. These additives tend to improve workability, reduce water requirements, and make concrete that has enhanced strength, durability and resistance to chemical attack. These by-products cost less than portland cement and require significantly less energy for their use. Producing 1 t of portland cement generates 0.97 t of CO₂, which can be broken down as follows: 540 kg related to process emissions, 340 kg related to fossil fuel use, and 90 kg related to electricity generation. Thus, replacing 1 t of cement by the equivalent amount of SCM reduces CO₂ emissions by almost 1 t. Table 4 contains Canadian

production and use data for coal combustion products, including fly ash.

In Canada, as elsewhere, the availability of SCM is regional in nature. For example, fly ash is most abundant in Ontario, Alberta and Saskatchewan, whereas silica fume is only produced in Quebec and blast furnace slag is only produced in Ontario. These products are very transportation sensitive and do not present a viable economic alternative to portland cement in all cases. Currently, about 23% of useable fly ash, 91% of GGBFS and 100% of silica fume produced in Canada is used as SCM, according to a CANMET study. Data from the American Coal Ash Association show that 34.8% of fly ash, 38.8% of bottom ash and 68.2% of flue gas-derived gypsum was utilized in the United States in 2002. Primary uses include cement raw feed and concrete, structural fill, waste stabilization and wallboard manufacture.

The use of ground granulated blast furnace slag continues to grow with a 5.4% increase in U.S. consumption, according to the Slag Cement Association. In 2003, the Association reported shipments of 3.1 Mt for use in cement and concrete products. This amount of slag used translates into a reduction of 4.6 Mt of raw materials needed and 2.7 Mt less CO₂ released into the atmosphere. GGBFS is used both as a component in blended cement and as a direct replacement for portland cement in concrete (in amounts up to 40%). Slag cement shipments in the United States have increased 78% since 1996. The majority of the growth in the use of GGBFS has been as a replacement for cement in concrete manufacture.

An example of recent building projects that have utilized SCM is the Mountain Equipment Co-op store in Montréal. The building, constructed in 2002, is the first retail building in Quebec to comply with Natural Resources Canada's C2000 Green Building Standard. A blended cement made by Lafarge Canada Inc. was used that contained 20-25% blast furnace slag and 4-6% silica fume.

Natural Resources Canada, through CANMET, in partnership with CIDA (the Canadian International Development Agency), is embarking on a program aimed at enhancing the capacity of concrete manufacturers in India to use high volumes of fly ash (HVFA) in concrete construction applications. Depending on the application, up to 70% fly ash may be used in concrete. India ranks second in the world in terms of cement production (100 Mt). Due to a large proportion of energy needs being supplied from coal-fired power plants, India produces about 100 Mt of fly ash annually. The HVFA technology utilizes proper mixture proportioning and judicious selection of materials and chemical admixtures to minimize the amount of ordinary portland cement required to produce high-quality concrete for different types of applications. This project will strengthen India's ability to reduce greenhouse gas emissions and promote sustainable development in a growing economy.

PRICES

The average value for portland cement in 2003 was \$103/t, based on total production figures. The actual realized price for cement f.o.b. plant varies from region to region and depends on the type of cement produced. These prices are negotiated between the cement companies and their customers and are not published. The U.S. Geological Survey reports that the average mill net value of portland cement in 2003 was an estimated US\$76/short ton (st).

OUTLOOK

Based on the continued strength in the Canadian and U.S. economies and low interest rates, cement shipments are projected to increase by 2.5% to about 14.5 Mt in 2004. According to Statistics Canada, housing starts increased by 6.5% overall in 2003 to 218 400 units. British Columbia and Quebec led the way with increases of 21% and 18.4%, respectively. Alberta saw a decline of 3.7% in housing starts. By way of comparison, housing starts were about 152 000 in 2000 and 163 000 in 2001. Canada Mortgage and Housing Corporation (CMHC) is forecasting a 6.6% drop in housing starts for 2004, down to an expected 203 900 units. This drop in residential construction may be offset slightly by increases in industrial and commercial construction and civil engineering projects. An increase in interest rates, forecast for later in 2004, would slow the pace of residential construction and ease the demand for cement.

The continued demand for raw materials in China has caused a dramatic increase in ocean shipping rates that is affecting the import of cement to North America from Asia. Rates from Europe have increased from \$10/st to \$30/st while shipping rates from Asia to North America have tripled from \$15/st to over \$45/st since 2002 (Portland Cement Association). This has translated into a domestic shortage of cement in parts of the United States and is expected to result in continued higher-than-average exports from Canada, at least in the short term. Demand for cement in parts of the United States is forecast to exceed supply in 2004, according to the Portland Cement Association. Shortages are expected in the midwest, southeast and west regions and are being compounded by lower-than-normal inventories. Most plants are running at or slightly over their rated capacities. Demand for raw materials in China may drop off in 2004 and this will ease shipping rates.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 64. (2) Information in this review was current as of June 2004. (3) This and other reviews, including previous editions, are available on the Internet at www.nrcan.gc.ca/mms/cmy/com_e.html.

NOTE TO READERS

The intent of this document is to provide general information and to elicit discussion. It is not intended as a reference, guide or suggestion to be used in trading, investment, or other commercial activities. The author and Natural Resources Canada make no warranty of any kind with respect to the content and accept no liability, either incidental, consequential, financial or otherwise, arising from the use of this document.

TARIFFS

Item No.	Description	Canada			United States
		MFN	GPT	USA	Canada
25.23	Portland cement, aluminous cement, slag cement, supersulphate cement and similar hydraulic cements, whether or not coloured or in the form of clinkers				
2523.10	Cement clinkers	Free	Free	Free	Free
2523.21	Portland cement: White cement, whether or not artificially coloured	Free	Free	Free	Free
2523.29	Other	Free	Free	Free	Free
2523.30	Aluminous cement	Free	Free	Free	Free
2523.90	Other hydraulic cements	Free	Free	Free	Free
68.10	Articles of cement, of concrete or of artificial stone, whether or not reinforced Tiles, flagstones, bricks and similar articles:				
6810.11	Building blocks and bricks	3%	Free	Free	Free
6810.19	Other	5%	Free	Free	Free
6810.91	Prefabricated structural components for building or civil engineering	5%	Free	Free	Free
6810.99	Other				
6810.99.10	Pipes	5%	Free	Free	Free
6810.99.90	Other	5%	Free	Free	Free

Sources: Canadian *Customs Tariff*, effective January 2004, Canada Border Services Agency; *Harmonized Tariff Schedule of the United States*, 2004.

TABLE 1. CANADA, CEMENT PRODUCTION AND TRADE, 2001-03

Item No.	2001		2002		2003		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
PRODUCTION (1) (all forms)							
Nova Scotia	x	x	x	x	x	x	
Quebec	2 888 331	286 667	3 062 347	303 334	3 081 507	326 703	
Ontario	5 695 905	545 348	6 267 145	613 484	6 270 348	613 779	
Alberta	x	x	x	x	x	x	
British Columbia	2 111 380	232 156	2 153 000	239 364	2 457 911	264 944	
Total	12 985 521	1 348 311	13 709 934	1 437 349	14 062 962	1 495 862	
IMPORTS (2)							
2523.10	Cement clinker						
	Turkey	245 399	8 679	44 610	1 784	18 915	1 414
	Venezuela	—	—	—	—	23 134	1 349
	United States	39	2	9 293	377	5 729	259
	Brazil	—	—	—	—	6 776	106
	Cyprus	1 500	95	424	16	—	—
	Total	246 938	8 776	54 327	2 177	54 554	3 128
2523.21	Portland cement, white, whether or not artificially coloured						
	United States	10 257	1 474	11 928	1 332	9 408	1 474
	Denmark	3 165	469	128	42	120	37
	United Arab Emirates	—	—	—	—	228	32
	Germany	56	17	—	—	83	12
	Mexico	20	6	—	—	32	4
	Other countries	385	58	301	62	9	1
	Total	13 883	2 024	12 357	1 436	9 880	1 560
2523.29	Portland cement, n.e.s.						
	United States	554 710	47 038	603 703	50 748	606 750	46 383
	Thailand	—	—	3 464	369	43 931	4 794
	France	654	53	387	22	629	40
	Croatia	654	64	1 131	90	267	29
	South Africa	20	2	242	25	236	23
	Mexico	12 586	1 324	1	—	241	20
	United Kingdom	1 013	65	705	56	180	15
	Other countries	13212	1346	22216	2162	132	11
	Total	582 849	49 892	631 851	53 472	652 366	51 315
2523.30	Aluminous cement						
	United States	12 581	7 700	9 670	6 485	11 086	7 513
	Croatia	1 689	1 014	2 531	1 657	2 387	1 599
	Netherlands	—	—	—	—	439	279
	United Kingdom	—	—	—	—	120	60
	France	—	—	—	—	—	—
	Other countries	1	...	5	1	10	5
	Total	14 271	8 714	12 206	8 143	14 042	9 456
2523.90	Hydraulic cement, n.e.s.						
	United States	69 585	7 706	70 691	8 419	82 762	10 324
	United Kingdom	3 029	703	3 301	527	1 909	448
	Thailand	274	29	1 887	213	1 862	298
	Croatia	1 270	254	1 864	414	1 454	277
	Japan	13	4	118	29	1 355	275
	Germany	521	154	99	30	456	136
	Denmark	1	0	282	57	234	70
	France	164	27	645	65	165	49
	Mexico	51	16	50	16	75	29
	Costa Rica	—	—	43	12	83	22
	Italy	1	—	—	—	29	8
	China	20 588	2 189	10 446	1 140	311	5
	South Africa	—	—	166	58	50	3
	Turkey	41 825	3 150	35 000	1 927	—	—
	Other countries	13450	1389	120	18	14	—
	Total	150 772	15 621	124 712	12 925	90 759	11 944
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	n.a.	2 914	n.a.	2 937	n.a.	3 895
	Other countries	—	438	n.a.	45	—	94
	Total	n.a.	3 352	n.a.	2 982	n.a.	3 989

TABLE 1 (cont'd)

Item No.	2001		2002		2003		
	(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)	
IMPORTS (cont'd)							
6810.19	Tiles, flagstones and similar articles of cement/concrete or artificial stone						
	United States	n.a.	19 216	n.a.	20 827	n.a.	22 442
	Italy	n.a.	1 434	n.a.	1 322	n.a.	1 183
	Israel	n.a.	0	n.a.	44	n.a.	443
	Spain	n.a.	140	n.a.	425	n.a.	417
	Mexico	n.a.	704	n.a.	534	n.a.	260
	Czech Republic	n.a.	1	n.a.	171	n.a.	239
	Portugal	n.a.	133	n.a.	197	n.a.	233
	China	n.a.	52	n.a.	183	n.a.	224
	Germany	n.a.	—	n.a.	38	n.a.	200
	Other countries	n.a.	60	n.a.	142	n.a.	23
	Total	n.a.	21 740	n.a.	23 883	n.a.	25 664
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	n.a.	4 566	n.a.	4 745	n.a.	3 904
	Netherlands	n.a.	52	n.a.	101	n.a.	76
	Other countries	n.a.	1	n.a.	563	n.a.	35
	Total	n.a.	4 619	n.a.	5 409	n.a.	4 015
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	n.a.	17 436	n.a.	15 423	n.a.	18 457
	China	n.a.	6 429	n.a.	6 533	n.a.	7 339
	Germany	n.a.	148	n.a.	738	n.a.	1 981
	Mexico	n.a.	649	n.a.	1 747	n.a.	1 908
	Belgium	n.a.	632	n.a.	1	n.a.	977
	Spain	n.a.	299	n.a.	253	n.a.	923
	Hong Kong	n.a.	11	n.a.	116	n.a.	327
	United Kingdom	n.a.	392	n.a.	90	n.a.	310
	Italy	n.a.	115	n.a.	56	n.a.	254
	Philippines	n.a.	77	n.a.	138	n.a.	171
	Vietnam	n.a.	11	n.a.	32	n.a.	119
	Other countries	n.a.	276	n.a.	283	n.a.	298
	Total	n.a.	26 475	n.a.	25 410	n.a.	33 064
	Total imports	n.a.	140 642	n.a.	137 150	n.a.	144 394
		(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)
EXPORTS							
2523.10	Cement clinker						
	United States	660 913	55 591	680 487	60 290	1 020 089	71 843
	Saint Kitts and Nevis	—	—	—	—	20	1
	Vietnam	—	—	60	4	—	—
	Total	660 913	55 591	680 547	60 294	1 020 109	71 844
2523.21	Portland cement, white, whether or not artificially coloured						
	United States	212 937	40 667	219 387	44 306	243 175	43 204
	Saint Kitts and Nevis	—	—	—	—	362	37
	Barbados	—	—	—	—	113	21
	Japan	—	—	18	11	—	—
	Total	212 937	40 667	219 405	44 317	243 650	43 262
2523.29	Portland cement, n.e.s.						
	United States	4 160 240	349 589	4 093 040	358 212	5 034 172	358 648
	Saint Pierre and Miquelon	—	—	—	—	1 293	184
	China	—	—	269	55	583	95
	Other countries	28	17	226	77	203	88
	Total	4 160 268	349 606	4 093 559	358 349	5 036 636	359 057
2523.30	Aluminous cement						
	Saint Pierre and Miquelon	—	—	—	—	50	1

TABLE 1 (cont'd)

Item No.	2001		2002		2003		
	(tonnes)	(\$000)	(tonnes)	(\$000)	(tonnes)	(\$000)	
EXPORTS (cont'd)							
2523.90	Hydraulic cement, n.e.s.						
	United States	87 759	9 042	131 862	18 919	72 591	10 135
	Jamaica	57	41	150	131	189	198
	Russia	–	–	43	34	128	89
	Czech Republic	5	4	164	114	174	79
	China	2	2	132	98	63	31
	Romania	–	–	78	55	58	26
	United Kingdom	15	16	1 150	15	56	23
	Germany	–	–	–	–	80	21
	Egypt	–	–	1	24	17	21
	Taiwan	–	–	–	–	18	16
	Japan	55	39	52	47	18	12
	Poland	–	–	108	69	28	12
	Australia	9	5	7	8	22	11
	Italy	102	27	–	–	5	10
	Other countries	669	240	1669	464	73	28
	Total	88 684	9 416	135 396	19 978	73 520	10 712
		(n.a.)	(\$000)	(n.a.)	(\$000)	(n.a.)	(\$000)
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	n.a.	63 897	n.a.	74 237	n.a.	85 174
	Japan	n.a.	25	n.a.	183	n.a.	284
	South Africa	n.a.	245	n.a.	13	n.a.	65
	Other countries	–	328	n.a.	20	–	72
	Total	n.a.	64 495	n.a.	74 453	n.a.	85 595
6810.19	Tiles, flagstones and similar articles of cement/concrete or artificial stone						
	United States	n.a.	56 234	n.a.	59 121	n.a.	27 918
	Japan	n.a.	299	n.a.	47	n.a.	491
	Italy	n.a.	87	–	–	n.a.	260
	Greece	–	–	n.a.	79	n.a.	163
	Ireland	–	–	n.a.	26	n.a.	130
	Bermuda	–	–	n.a.	38	n.a.	89
	Russia	–	–	n.a.	35	n.a.	35
	Other countries	n.a.	1939	–	608	–	117
	Total	n.a.	58 559	n.a.	59 954	n.a.	29 203
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	n.a.	129 746	n.a.	119 768	n.a.	99 042
	Sierra Leone	–	–	n.a.	24	n.a.	207
	Japan	n.a.	11	n.a.	165	n.a.	106
	United Kingdom	n.a.	2 806	n.a.	37	n.a.	97
	Bahamas	–	–	–	–	n.a.	48
	Bermuda	n.a.	285	n.a.	32	n.a.	34
	France	n.a.	30	n.a.	5	n.a.	29
	Other countries	–	356	n.a.	151	–	58
	Total	n.a.	133 234	n.a.	120 182	n.a.	99 621
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	n.a.	69 335	n.a.	80 951	n.a.	78 414
	Italy	n.a.	14	n.a.	7	n.a.	263
	France	n.a.	226	n.a.	180	n.a.	221
	Greece	–	–	–	–	n.a.	219
	Other countries	–	1209	n.a.	244	–	303
	Total	n.a.	70 784	n.a.	81 382	n.a.	79 420
	Total exports	n.a.	782 352	n.a.	818 909	n.a.	778 715

Sources: Natural Resources Canada; Statistics Canada.

– Nil; . . . Amount too small to be expressed; n.a. Not applicable; n.e.s. Not elsewhere specified; x Confidential.

(1) Producers' shipments plus quantities used by producers. (2) Includes re-imports.

Note: Numbers may not add to totals due to rounding.

TABLE 2. CEMENT PLANTS, GRINDING AND CLINKER CAPACITIES, 2002

Company	Plant	Kiln Type	Fuel	No. of Kilns	Grinding Capacity	Clinker Capacity
					(000 t/y)	
ATLANTIC REGION						
Lafarge Canada Inc.	Brookfield, N.S.	D	C,OA	2	621	486
Subtotal, Atlantic region				2	621	486
QUEBEC						
Lafarge Canada Inc.	Saint-Constant	D	KA,GA	2	1 157	956
Ciment Québec Inc. (50% Essroc Group; 50% private)	Saint-Basile	Dc	C,OGA	1	1 571	854
St. Lawrence Cement Inc. (Holcim (AG) (1))	Joliette	D	CK,A	4	1 475	900
Subtotal, Quebec region				7	4 203	2 710
ONTARIO						
Lafarge Canada Inc.	Woodstock	W	CK,G	2	814	547
	Bath	D	CK,G	1	1 176	1 010
Federal White Cement Ltd.	Woodstock	Dx	OG, K	2	544	929
ESSROC Canada Inc. (Italcementi Group)	Picton	D,Dx	CK,G	2	792	1 116
St. Lawrence Cement Inc. (Holcim AG)	Mississauga	W,Dc	CA	3	2 009	(a) 1 883
St. Marys Cement (Canada) Inc. (Votorantim Cimentos)	Bowmanville	Dc	CK	1	1 377	1 966
	St. Marys	Dx	K,C	1	685	653
Subtotal, Ontario region				12	7 397	8 104
PRAIRIE REGION						
Lafarge Canada Inc.	Exshaw, Alta.	D,Dc	CG	2	1 422	1 297
Lehigh Inland Cement Limited (Heidelberg Cement Group)	Edmonton, Alta.	Dc	G	1	1 380	992
Subtotal, Prairie region				3	2 802	2 289
BRITISH COLUMBIA						
Lafarge Canada Inc.	Kamloops	D	CK,G	1	324	209
	Richmond	Dc	C,G	1	1 319	1 059
Lehigh Northwest Cement Limited (Heidelberg Cement Group)	Delta	Dx	C,GA	1	1 356	1 116
Subtotal, B.C. region				3	2 999	2 384
Total Canada (7 companies, based on ownership)				27	18 022	15 973

Source: Portland Cement Association; Market and Economic Research Department.

(a) Two kilns inactive.

Fuel: C Coal; O Oil; G Gas; K Coke, A Waste.

Kiln type: W Wet; D Dry; X Preheater; C Precaliner.

TABLE 3. CANADA, CEMENT PLANTS, KILNS AND CAPACITY UTILIZATION, 1980-2003

	Clinker-Producing Plants	Kilns (a)	Approximate Cement Grinding Capacity	Portland and Masonry Cement Production (1)	Clinker Exports (2)	Approximate Total Production (3)	Capacity Utilization
	(no.)	(no.)	(t/y)	(tonnes)	(tonnes)	(tonnes)	(%)
1980	23	47	16 363 000	10 274 000	726 087	11 000 087	67
1981	23	48	16 771 000	10 145 000	524 006	10 669 006	64
1982	23	48	16 771 000	8 418 000	290 329	8 708 329	50
1983	23	49	17 900 000	7 870 878	404 793	8 275 671	46
1984	23	49	17 900 000	9 387 466	440 297	9 827 763	55
1985	23	49	17 900 000	10 192 442	676 596	10 869 038	61
1986	23	49	17 900 000	10 611 223	324 000	10 935 223	61
1987	20	40	16 600 000	12 603 164	767 338	13 370 502	81
1988	20	40	15 506 000	12 349 873	331 796	12 681 669	82
1989	20	38	15 546 000	12 590 637	178 491	12 769 128	82
1990	20	38	16 439 000	11 745 152	460 075	12 205 227	74
1991	20	34	16 262 000	9 372 219	544 870	9 917 089	61
1992	18	34	16 800 000	8 593 399	988 348	9 581 747	57
1993	18	34	16 800 000	9 393 581	882 935	10 276 516	61
1994	18	34	(r) 17 021 000	10 584 414	981 024	11 565 438	68
1995	18	34	(r) 16 157 000	10 440 329	1 329 548	11 769 877	73
1996	18	32	16 252 000	11 587 365	1 252 863	12 840 228	79
1997	17	30	15 856 000	11 736 272	1 019 308	12 755 580	80
1998	17	28	15 837 000	12 124 058	1 657 808	13 781 866	87
1999	17	27	16 269 000	12 634 440	1 236 860	13 871 300	85
2000	16	27	17 605 000	12 611 954	805 870	13 417 824	76
2001	16	27	16 190 000	12 985 521	660 913	13 646 434	84
2002	16	27	16 190 000	13 059 527	680 547	13 740 074	85
2003 (e)	16	27	18 022 000	13 346 769	1 020 109	14 366 878	80

Sources: Statistics Canada; Portland Cement Association.

(e) Estimated; (r) Revised.

(a) May include up to three inactive kilns beginning in 1992.

(1) Producers' shipments and amounts used by producers, including cement ground from imported clinker. (2) Based on Trade of Canada harmonized system code HS 2523.10. (3) Producers' shipments plus clinker exports.

TABLE 4. CANADA, PRODUCTION (1) AND USE (2) OF COAL COMBUSTION PRODUCTS (CCPs), 2003

	Fly Ash	Bottom Ash	FGD Gypsum	Other (3)	Total CCPs
	(000 tonnes)				
PRODUCTION					
Produced	4 685	1 980	x	x	7 239
Disposed/stored	3 696	x	–	x	5 679
Removed from disposal	x	–	–	–	x
USE (DOMESTIC)					
Cement	403	x	x	–	523
Concrete/grout	531	–	–	–	531
Mining applications	x	x	–	–	96
Roadbase/subbase	x	x	–	–	42
Wallboard	–	–	x	–	x
Other (4)	x	x	–	–	112
Total use	1 149	x	x	–	1 673
Individual use percentage	25	8	100	–	23

Sources: Compiled by Natural Resources Canada in cooperation with the Canadian Electricity Association and Canadian Industries Recycling Coal Ash (CIRCA).

– Nil; x Confidential.

(1) Reported production of coal combustion products (CCPs) may include both dry and ponded categories. (2) Use (domestic), as reported, includes amounts imported (assumed HS codes 2621.00 relating to fly ash and HS 2520.10 relating to gypsum). (3) Cfb (circulating fluidized bed) fly ash and bottom ash. (4) Includes waste stabilization and specialty uses such as mineral filler and flowable fill.

TABLE 5. CANADA, VALUE OF CONSTRUCTION BY TYPE, 1996-2003

	1996	1997	1998	1999	2000	2001	2002	2003
	(\$ billions)							
BUILDING CONSTRUCTION								
Residential investment	32.3	36.5	36.0	38.8	40.8	43.6	55.1	61.4
Non-residential building investment	19.6	22.5	22.4	24.2	25.3	26.3	24.8	27.4
Total building construction	51.9	59.0	58.4	63.0	66.1	69.9	79.9	88.8
ENGINEERING CONSTRUCTION								
Mining and oil and gas extraction	13.9	18.2	16.7	15.4	19.3	21.1	19.1	19.4
Transportation and warehousing	2.0	2.2	5.0	5.0	4.1	3.4	3.2	2.7
Other engineering	15.2	14.7	14.5	16.6	18.3	18.9	19.1	20.2
Total engineering construction	31.1	35.1	36.2	37.0	41.7	43.4	41.4	42.3
Total all components	83.0	94.1	94.6	100.0	107.8	113.3	121.3	131.1

Sources: Natural Resources Canada; Statistics Canada, CANSIM II (Table 026-0013 – Residential Values, by Type of Investment and Related Table 031-0002 – Flows and Stocks of Fixed Non-Residential Capital, by North American Industry Classification System). (More information can be obtained on the Internet at the CANSIM II site at www.statcan.ca/english/ads/cansimII.)

Notes: Numbers may not add to totals due to rounding. Residential construction includes value of new construction, renovations and acquisition costs.

TABLE 6. WORLD PRODUCTION OF CEMENT, 2001-03

	2001	2002	2003 (e)
	(000 tonnes)		
Canada	12 986	13 700	14 100
Brazil	39 500	39 500	40 000
China	626 500	705 000	750 000
Egypt	24 500	23 000	26 000
France	19 840	20 000	20 000
Germany	28 034	30 000	28 000
India	100 000	100 000	110 000
Indonesia	31 100	33 000	34 000
Iran	26 650	30 000	31 000
Italy	39 804	40 000	40 000
Japan	76 550	71 800	72 000
Mexico	29 966	31 100	31 500
Russia	35 100	37 700	40 000
South Korea	52 012	55 500	56 000
Spain	40 512	42 500	40 000
Thailand	27 913	31 700	35 000
Turkey	30 120	32 600	33 000
United States	90 450	91 300	92 600
Other countries	439 611	371 600	366 800
Total world	1 700 158	1 800 000	1 860 000

Sources: Natural Resources Canada; U.S. Geological Survey.
(e) Estimated.