Cement

Oliver Vagt

The author recently retired from the Minerals and Metals Sector, Natural Resources Canada. Telephone: Doug Panagapko at (613) 992-2667 E-mail: dpanagap@nrcan.gc.ca

Shipments of cement in 2002 were estimated to be 13.2 Mt valued at $1.39 billion, based on preliminary data. This compares to shipments of 13.0 Mt valued at $1.35 billion in 2001, based on final data (Table 1). Demand for cement produced in most regions remained firm because of an increase of about 7% in gross expenditures on construction as well as stable exports.

CANADIAN INDUSTRY

The Canadian cement industry is diversified and primarily integrated with the construction aggregates and concrete products sectors. Information on the aggregates sector is included in a separate chapter entitled *Mineral Aggregates.*

Clinker-producing and finish-grinding capacities of cement plants are listed in Table 2. Reported kiln capacity in 2001 was about 15.8 Mt with about 15.1 Mt active, according to the most recent figures available. Primary stage clinker production mainly from limestone/shales 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. The overall output of the cement industry has been best represented by total cement shipments plus clinker exports, as shown in Table 3. The average kiln capacity increased to 580 000 t/y in 2000; the average kiln age based on clinker capacity is reported to be about 20 years, according to the Portland Cement Association.

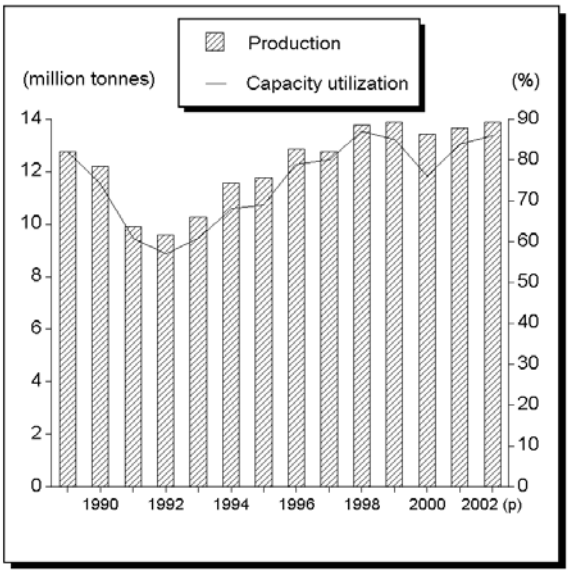
In the Atlantic region, the Lafarge Canada Inc. (Lafarge) plant in Nova Scotia is the only cement producer in the region following the closure in 2000 of the North Star Cement Limited plant in Corner Brook, Newfoundland.

In Quebec, three clinker-producing plants account for about 17% of Canada's output. St. Lawrence Cement Inc. (SLC), Lafarge, and Ciment Québec Inc. share markets about equally. (SLC continued with a permitting process to build a new 2-Mt/y cement plant near Greenport, New York.)

In Ontario, clinker-producing plants account for about 51% of Canadian capacity. The clinker/cement plants located in Bowmanville and St. Marys continued to operate under the name of St. Marys Cement (Canada) Inc., owned by Votorantim Cimentos, one of the largest industrial conglomerates in Brazil and its leading producer of cement. The former Blue Circle Inc. plant in Detroit, Michigan, operates as St. Marys Cement (U.S.) Inc.

Western Canada's clinker-producing capacity accounts for about 29% of Canada's total clinker capacity. Both the Inland Cement Limited plant and the Tilbury Cement plant currently operate under the names Lehigh Inland Cement and Lehigh Northwest Cement, respectively.

Figure 1
Canadian Cement Production, 1989-2002



Sources: Statistics Canada; Portland Cement Association.
(p) Preliminary.
Note: Cement production includes clinker exports.

WORLD DEVELOPMENTS

World cement production in 2001 was 1700 Mt, according to the United States Geological Survey (USGS). China is the world's largest producer (627 Mt), followed by India (100 Mt), the United States (90 Mt) and Japan (77 Mt).

U.S. anti-dumping duties against grey Portland cement and clinker from Mexico remained in effect in 2002.

USE AND TRADE

Cross-border trade of both cement and clinker varies considerably from year to year depending on construction activity. From 2000 to 2002, average annual exports of finished cement to the United States were 4.4 Mt, accounting for about one third of total Canadian production (producers' shipments plus quantities used by producers), as defined in Table 1. Exports are mainly destined for the southern Great Lakes and the U.S. Pacific northwestern regions. Similarly, Canada's imports of cement amounted to 0.6-0.8 Mt and related mainly to the equivalent regions.

Low-cost marine transportation has influenced world trade considerably. Total U.S. imports of cement (excluding clinker) were about 23 Mt in 2002, or 21% of apparent use. Asian sources, including China, Thailand and South Korea combined, have surpassed Canada as the major source of imports of cement and clinker, particularly since 1998, according to the USGS.

The importance of supplementary cementing materials (SCMs) for a range of uses is well recognized. About 1.0 Mt of fly ash, accounting for about 21% of reported production, were used in 2002, according to a recent survey by Natural Resources Canada (NRCan) in cooperation with the Canadian Electricity Association and the Association of Canadian Industries Recycling Coal Ash (CIRCA), as shown in Table 4. However, fly ash and other SCMs, important for their pozzolanic characteristics and other properties, are not differentiated in the international system of harmonized codes, hence, their recognition internationally tends to be diminished. (Also, timely official data relating to the total use of these materials as inputs to the hydraulic cement industry [SIC code 3521, and the equivalent NAICS code 327310], as well as to the concrete products industry [SIC codes 3541, 3542 and 3549, and their equivalent codes 327330 and 327390], are not readily available.)

TECHNOLOGY

Energy conservation programs by the Canadian cement industry have reduced the average energy consumption per unit of production by about 28% since 1974. Although the number of kilns has decreased, their individual capacities have increased and the more efficient dry-process plants now account for more than 95% of total active clinker capacity. The fuel mix has changed considerably away from natural gas and petroleum products toward coal and/or coke. In 2001, of 16 clinker-producing plants, 12 reported using coal and/or coke as their primary fuel. Seven plants reported using waste as an alternative or supplemental fuel, according to the Cement Association of Canada (CAC), formerly the Canadian Portland Cement Association (CPCA). In 2001, the Canadian cement industry consumed, on average, 4454 megajoules per tonne of clinker production. The types of fuel consumed, including waste fuels, are highlighted in Table 2.

Suitable waste materials are an attractive alternative fuel because the pyro-processing of clinker accounts for more than 80% of total energy needs, or 30-40% of total production costs. In the context of sustainable development of non-renewable fossil fuels, it is apparent that improved waste management involving combustion technology is leading to greater conservation.

Under the umbrella of the Working Group on Cement of the World Business Council for Sustainable Development (WGC-WBCSD), 10 major international cement groups have agreed upon a methodology for monitoring and reporting CO_2 emissions from clinker/cement processing. This initiative has been encouraged by guidelines issued by the Intergovernmental Panel on Climate Change (IPCC) concerning national greenhouse gas (GHG) inventories as these concern limitation or reduction commitments under the Kyoto Protocol. The major cement groups operate in most of the world's cement markets, and key projects include: (1) publication of individual performance data and targets for CO_2 emissions by 2006; (2) guidelines for the use of fuels and raw materials, including acceptable industrial by-products and wastes; and (3) establishing common reporting procedures along with a sharing of best practices.

NRCan continued to seek ideas, advice and financial support for the new International Centre for Sustainable Development of Cement and Concrete (ICON). Although this centre draws on some current initiatives and the expertise of the Canada Centre for Mineral and Energy Technology (CANMET), it is dependent upon new partnerships with industry, academic institutions and other governments for strengthening global efforts relevant to the sustainable development of cement and concrete.

An awareness of the importance of high-volume fly ash concrete is growing; for example, the Greater Vancouver Regional District has established a new web site for EcoSmart™ concrete (high-volume fly ash concrete) in order to provide a forum for information about the benefits, costs and challenges associated with this type of concrete (www.ecosmart.ca/index.cfm?section=home). The EcoSmart Concrete Project also involves studying promising new techniques in intergrinding (blended cement) and

precast (pre-manufactured) concrete. Some of these technical initiatives involve collaboration with CANMET and the Electric Power Research Institute (EPRI) of Palo Alto, California.

In 2003, and 2004, the Committee for the Organization of CANMET/ACI Conferences and the National Research Council's Institute for Research in Construction, as well as others, are planning four international conferences relating to cement and concrete. These are: (1) the Sixth CANMET/ACI International Conference on Durability of Concrete to be held in Thessaloniki, Greece, June 1-7, 2003; (2) the Sixth CANMET/ACI International Conference on Recent Advances in Concrete Technology to be held in Bucharest, Romania, June 8-11, 2003; (3) the Seventh CANMET/ACI International Conference on Superplasticizers and Other Chemical Admixtures in Concrete to be held in Berlin, Germany, October 20-24, 2003; and (4) the Eighth CANMET/ACI International Conference on Fly Ash, Silica Fume, Slag and Natural Pozzolans in Concrete to be held in Las Vegas, United States, May 23-29, 2004.

Research efforts to develop new superplasticizers for use in conjunction with SCMs for high-performance concrete have increased in recent years. As a result of this, a publication entitled *Superplasticizers: Properties and Applications in Concrete*, by Ramachandran, Malhotra, Jolicoeur and Spiratos, was compiled to integrate the chemistry and applications concerned. This publication, which includes 14 chapters and more than 400 pages, can be obtained from NRCan's CANMET Materials Technology Laboratory by contacting Alan Bowles by telephone at (613) 995-8814 or by e-mail at abowles@nrcan.gc.ca.

NRCan, mainly in collaboration with the Canadian Industry Program for Energy Conservation (CIPEC), continued to develop long-term strategies related to major energy-consuming sectors.

OUTLOOK

Cement shipments in 2003 are expected to remain about the same as in 2002 based on continued strength in the housing sector, relatively low interest rates, and stable exports to the United States. Expenditures continued under the Infrastructure Canada Program involving federal, provincial/territorial and municipal governments. This program is expected to contribute about $6 billion relating to both building and engineering infrastructure during the six-year period up to and including 2005. In the longer term, considerable additional investment is expected to be associated with the 2010 Winter Olympics in British Columbia.

Other planned or possible major projects include: the Voisey's Bay nickel mine and processing plant as well as offshore oil field developments in Newfoundland and Labrador; additional oil sands developments in Alberta; hydro-electric power projects in Manitoba and British Columbia; additional airport expansions and nuclear power plant overhauls; and a high-speed rail link between Québec City and Windsor, Ontario.

Housing starts were about 205 000 in 2002, according to the Canada Mortgage and Housing Corporation. By way of comparison, housing starts were about 152 000 in 2000 and 163 000 in 2001. (Additional information relating to residential construction can be obtained on the Internet at www.cmhc-schl.gc.ca.) Non-residential construction, mainly based on gains in institutional building permits, is expected to be greater in 2003.

Energy management in the cement industry will continue to concentrate on gains in efficiency based on timely switching among the available choices of common fuels. However, most longer-term cost savings are expected to result from the partial substitution of fossil fuels by waste-derived fuels. For example, in selected regions, in the case of Refuse Derived Fuel (RDF), about 70% (by volume) of municipal solid waste from post-recycled curbside garbage could be extracted for use by the cement industry. This would reduce by about two thirds the volume of material for disposal as landfill. Under certain circumstances using RDF, reductions in requirements for traditional fuels have been predicted to be as high as 20-25%.

World production and use of cement in 2002 was estimated to be 1.72 billion t, according to the USGS. These amounts are forecast to be about 1.9 billion t and 2.1 billion t in 2005 and 2010, respectively, according to a report by Ocean Shipping Consultants Ltd. Of the overall forecasted 500-Mt increase, accepting the 1999 base-year amount of 1.6 billion t by the USGS, Asia is expected to account for more than 60%, Africa and the Middle East for 13%, and Central and South America for about 10%.

The use of supplementary cementing materials incorporating fly ash, silica fume or other pozzolanic materials such as ground, granulated slags as a partial replacement for energy-intensive Portland cement is expected to become more important in modern cement and concrete practices. An estimated 35-40 Mt of these products are currently used as a raw material or as partial replacement for Portland cement in North America and western Europe.

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 February 1, 2003. (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

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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
	Portland cement:				
2523.21	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 2003, Canada Customs and Revenue Agency; *Harmonized Tariff Schedule of the United States*, 2003.

TABLE 1. CANADA, CEMENT PRODUCTION AND TRADE, 2000-02

Item No.		2000		2001		2002 (p)	
		(tonnes)	($000)	(tonnes)	($000)	(tonnes)	($000)
PRODUCTION (1) (all forms)							
	Newfoundland and Labrador	x	x	–	–	–	–
	Nova Scotia	x	x	x	x	x	x
	Quebec	2 830 381	240 549	2 888 331	286 668	3 062 875	293 503
	Ontario	5 344 406	507 182	5 695 905	545 348	5 615 395	552 438
	Alberta	x	x	x	x	x	x
	British Columbia	1 919 187	201 443	2 111 380	232 156	2 210 416	247 581
	Total	12 611 954	1 258 697	12 985 521	1 348 313	13 201 488	1 387 497
IMPORTS (2)							
2523.10	Cement clinker						
	Turkey	163 339	6 848	245 399	8 679	44 610	1 784
	United States	624	25	39	2	9 293	377
	Cyprus	–	–	1 500	95	424	16
	Mexico	5 539	247	–	–	–	–
	Spain	62 522	2 868	–	–	–	–
	Switzerland	34 629	2 088	–	–	–	–
	United Arab Emirates	95 951	5 086	–	–	–	–
	Total	362 604	17 162	246 938	8 776	54 327	2 177
2523.21	Portland cement, white, whether or not artificially coloured						
	United States	(r) 14 298	3 098	10 092	1 447	11 929	1 334
	Turkey	13	2	50	10	250	51
	Denmark	5 157	715	3 165	469	128	42
	Mexico	1 141	216	20	6	–	–
	Other countries	68	(r) 12	391	65	51	11
	Total	(r) 20 677	(r) 4 043	13 718	1 997	12 358	1 438
2523.29	Portland cement, n.e.s.						
	United States	506 007	42 171	554 710	47 038	603 481	50 725
	China	–	–	2	...	15 275	1 577
	Peru	–	–	–	–	6 613	549
	Thailand	1	...	–	–	3 464	369
	Croatia	–	–	654	64	1 131	90
	United Kingdom	570	55	1 013	65	705	56
	South Africa	–	–	20	2	242	25
	France	2	...	654	53	387	22
	Mexico	593	54	12 586	1 324	1	...
	Venezuela	–	–	13 097	1 338	–	–
	Other countries	144	12	113	8	330	36
	Total	507 317	42 292	582 849	49 892	631 629	53 449
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
	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	56 784	6 368	69 585	7 706	70 687	8 444
	Turkey	–	–	41 825	3 150	35 000	1 927
	China	19 927	2 071	20 588	2 189	10 446	1 140
	United Kingdom	3 098	597	3 029	703	3 301	527
	Croatia	692	131	1 270	254	1 864	414
	Thailand	–	–	274	29	1 887	213
	South Africa	199	44	–	–	166	58
	Denmark	–	–	1	...	282	57
	Germany	161	43	521	154	99	30
	Japan	356	108	13	4	118	29
	Belgium	17 867	1 987	11 851	1 149	3	...
	Other countries	(r) 830	175	1 704	269	350	73
	Total	(r) 99 914	11 524	150 661	15 607	124 203	12 912
		(n.a.)	**($000)**	**(n.a.)**	**($000)**	**(n.a.)**	**($000)**
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	..	(r) 2 929	..	2 914	..	2 949
	Mexico	..	6	–	–	..	23
	Canada	–	–	..	7	..	13
	Brazil	..	219	..	372	..	4
	Other countries	..	42	..	59	..	5
	Total	..	(r) 3 196	..	3 352	..	2 994

TABLE 1 (cont'd)

Item No.		2000		2001		2002 (p)	
		(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	..	17 020	..	19 216	..	20 822
	Italy	..	1 105	..	1 434	..	1 322
	Mexico	..	24	..	704	..	534
	Spain	..	(r) 178	..	140	..	425
	Portugal	..	139	..	133	..	197
	China	..	41	..	52	..	183
	Czech Republic	–	–	..	1	..	171
	Other countries	..	128	..	60	..	246
	Total	..	(r) 18 635	..	21 740	..	23 900
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	..	2 507	..	4 566	..	4 745
	Malaysia	–	–	–	–	..	559
	Netherlands	–	–	..	52	..	101
	Other countries	..	1	..	1	..	4
	Total	..	2 508	..	4 619	..	5 409
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	..	19 840	..	17 436	..	15 477
	China	..	(r) 6 094	..	6 431	..	6 554
	Mexico	..	(r) 935	..	649	..	1 747
	Germany	..	208	..	148	..	738
	Spain	..	54	..	299	..	253
	Philippines	..	(r) 87	..	77	..	138
	Hong Kong	..	28	..	11	..	116
	United Kingdom	..	788	..	392	..	90
	Other countries	..	1 721	..	1 034	..	373
	Total	..	(r) 29 755	..	26 477	..	25 486
		(tonnes)	**($000)**	**(tonnes)**	**($000)**	**(tonnes)**	**($000)**
EXPORTS							
2523.10	Cement clinker						
	United States	805 870	64 224	660 913	55 591	680 487	60 290
	Vietnam	–	–	–	–	60	4
	Total	805 870	64 224	660 913	55 591	680 547	60 294
2523.21	Portland cement, white, whether or not artificially coloured						
	United States	180 730	32 480	212 937	40 667	219 387	44 306
	Other countries	29	42	–	–	18	11
	Total	180 759	32 522	212 937	40 667	219 405	44 317
2523.29	Portland cement, n.e.s.						
	United States	3 915 840	310 692	4 160 240	349 589	4 093 040	358 212
	Other countries	30	30	28	17	519	137
	Total	3 915 870	310 722	4 160 268	349 606	4 093 559	358 349
2523.30	Aluminous cement	–	–	–	–	–	–
2523.90	Hydraulic cement, n.e.s.						
	United States	4 404	2 074	87 759	9 042	131 862	18 919
	Hong Kong	20	37	365	96	460	144
	Jamaica	427	217	57	41	150	131
	Czech Republic	16	4	5	4	164	114
	China	20	7	2	2	132	98
	Ukraine	–	–	–	–	102	70
	Poland	–	–	–	–	108	69
	South Korea	–	–	–	–	114	63
	Dominican Republic	–	–	–	–	22	60
	Romania	–	–	–	–	78	55
	Japan	16	9	55	39	52	47
	Singapore	23	23	136	59	17	41
	United Kingdom	1	3	15	16	1 150	15
	Other countries	263	140	290	117	980	152
	Total	5 190	2 514	88 684	9 416	135 391	19 978

TABLE 1 (cont'd)

Item No.		2000		2001		2002 (p)	
		(n.a.)	($000)	(n.a.)	($000)	(n.a.)	($000)
EXPORTS (cont'd)							
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	..	64 997	..	63 897	..	74 237
	Japan	..	102	..	25	..	183
	South Africa	–	–	..	245	..	13
	Other countries	..	353	..	328	..	20
	Total	..	65 452	..	64 495	..	74 453
6810.19	Tiles, flagstones and similar articles of cement/concrete or artificial stone						
	United States	..	55 021	..	56 234	..	59 121
	South Korea	..	16	–	–	..	167
	Switzerland	–	–	–	–	..	115
	Cuba	..	119	..	209	..	85
	Greece	–	–	–	–	..	79
	United Kingdom	–	–	..	54	..	71
	France	..	34	..	128	..	61
	Japan	..	606	..	299	..	47
	Belgium	..	131	..	90	..	44
	Turkey	..	1 871	..	1 074	–	–
	Other countries	..	18	..	471	..	164
	Total	..	57 816	..	58 559	..	59 954
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	..	96 852	..	129 746	..	119 768
	Japan	..	16	..	11	..	165
	Venezuela	..	192	–	–	..	125
	United Kingdom	..	802	..	2 806	..	37
	Bermuda	..	44	..	285	..	32
	France	..	252	..	30	..	5
	Other countries	..	225	..	356	..	50
	Total	..	98 383	..	133 234	..	120 182
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	..	71 139	..	69 335	..	80 951
	France	..	515	..	226	..	180
	Cuba	..	1 208	..	430	..	94
	Japan	..	83	..	129	..	59
	South Korea	..	99	..	112	..	55
	Norway	–	–	..	82	..	22
	Bahamas	–	–	–	–	..	14
	Italy	..	79	..	14	..	7
	Belgium	..	279	–	–	–	–
	Bermuda	..	223	..	211	–	–
	Other countries	..	377	..	245	–	–
	Total	..	74 002	..	70 784	..	81 382

Sources: Natural Resources Canada; Statistics Canada.
– Nil; .. Not available; ... Amount too small to be expressed; n.a. Not applicable; n.e.s. Not elsewhere specified; (p) Preliminary (r) Revised; 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, APPROXIMATE ANNUAL GRINDING CAPACITY, END OF 2001

Company	Plant	Wet (W) Dry (D) Preheater (x) Precalciner (c)	Fuel (Coal, Oil, Gas, Waste)	No. of Kilns	Grinding Capacity	Clinker Capacity
					(000 t/y)	
ATLANTIC REGION						
Lafarge Canada Inc.	Brookfield, N.S.	D	C,Wa	2	306	(a) 481
Subtotal, Atlantic region				2	306	481
QUEBEC						
Lafarge Canada Inc.	St. Constant	D	Wa,C,O,G	2	991	970
Ciment Québec Inc. (50% Essroc Gp.; 50% private)	St. Basile	Dc	C,O,G,Wa	1	1 571	821
St. Lawrence Cement Inc. (Holcim (AG) (1)	Joliette	D	C,Wa	4	1 475	900
Subtotal, Quebec region				7	4 037	2 691
ONTARIO						
Lafarge Canada Inc.	Woodstock	W	C,G	2	616	544
	Bath	Dx	C,G	1	1 030	977
Federal White Cement Ltd.	Woodstock	Dx	O,C,G	2	544	929
Essroc Canada Inc. (Italcimenti)	Picton	D,Dx	C,G	2	792	1 116
St. Lawrence Cement Inc. (Holcim AG) (1)	Mississauga	W,Dc	C,Wa	3	2 009	(b) 1 883
St. Marys Cement (Canada) Inc.	Bowmanville	Dc	C	1	1 143	1 972
(Votorantim Cimentos)	St. Marys	Dx	C,Wa	1	820	732
Subtotal, Ontario region				12	6 954	8 153
PRAIRIE REGION						
Lafarge Canada Inc.	Exshaw, Alta.	D,Dc	G	2	1 348	1 199
Lehigh Inland Cement Limited (Heidelberg Cement Group)	Edmonton, Alta.	Dc	G	1	1 380	961
Subtotal, Prairie region				3	2 728	2 160
BRITISH COLUMBIA						
Lafarge Canada Inc.	Kamloops	D	C,G	1	169	209
	Richmond	Dc	C,G	1	896	975
Lehigh Northwest Cement Limited (Heidelberg Cement Group)	Delta	Dx	C,O,G,Wa	1	1 100	1 168
Subtotal, B.C. region				3	2 165	2 352
Total Canada (7 companies, based on ownership)				27	16 190	15 837

Source: Market and Economic Research Department, Portland Cement Association.
(a) One kiln inactive. (b) Two kilns inactive.
(1) Name changed in 2001 from Holderbank Financiere Glaris (Switzerland) AG.
Note: Total active kiln capacity including white cement is approximately 15.1 Mt/y.

TABLE 3. CANADA, CEMENT PLANTS, KILNS AND CAPACITY UTILIZATION, 1980-2002

	Clinker-Producing Plants	Kilns (a)	Approximate Cement Grinding Capacity	Portland and Masonry Cement Production (1)	Clinker Exports (2)	Approximate Total Production (3)	Capacity Utilization
			(t/y)	(t)	(t)	(t)	(%)
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	69
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 (p)	16	27	16 190 000	13 201 488	680 547	13 882 035	86

Sources: Statistics Canada; Portland Cement Association.
(p) Preliminary; (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 H.S. 2523.10. (3) Producers' shipments plus clinker exports.

TABLE 4. CANADA, PRODUCTION AND USE OF COAL COMBUSTION PRODUCTS (CCPs), 2002[1,2]

	Fly Ash	Bottom Ash	FGD Gypsum	Other (3)	Total CCPs
			(000 tonnes)		
PRODUCTION					
Produced	4 744	1 886	354	133	7 116
Disposed/stored	3 851	1 664	–	133	5 648
Removed from disposal	10	3	–	–	13
USE (DOMESTIC)					
Cement	382	161	–	–	543
Concrete/grout	423	–	–	–	423
Mining applications	115	–	–	–	115
Roadbase/subbase	8	23	–	–	31
Wallboard	–	–	504	–	504
Other (4)	90	52	–	–	142
Total use	1 017	236	504	–	1 757
Individual use percentage	21	13	142	–	n.a.
Cumulative use percentage	21	19	25	25	25

Sources: Compiled by Natural Resources Canada in cooperation with the Canadian Electricity Association and Canadian Industries Recycling Coal Ash (CIRCA).
– Nil; n.a. Not applicable; FGD Flue-gas desulphurization.
(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, 1996-2002

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

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 AND 2002[(e)]

	2001	2002 (e)
	(000 tonnes)	
Canada	12 986	13 200
Brazil	39 500	40 000
China	626 500	640 000
Germany	28 034	28 000
India	100 000	100 000
Indonesia	31 100	32 000
Italy	39 804	39 000
Japan	76 550	75 000
South Korea	52 012	53 000
Mexico	29 966	30 000
Russia	35 100	39 000
Spain	40 512	40 000
Thailand	27 913	28 000
Turkey	30 120	31 000
United States	90 450	90 600
Other countries	439 611	442 000
Total world	1 700 158	1 720 800

Sources: Natural Resources Canada; U.S. Geological Survey, January 2002.
(e) Estimated.