Cement

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Shipments of cement in 2000 were estimated to be 12.61 Mt valued at $1.26 billion, based on preliminary data. This compares to shipments of 12.63 Mt valued at $1.23 billion in 1999, based on final data (Table 1). Demand for cement in most regions remained firm, largely based on an increase of about 10% in gross expenditures on construction, which included a moderate increase in housing starts.

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."

The clinker-producing and finish-grinding capacities of cement plants are listed in Table 2. The reported kiln capacity in 1999 was about 14.8 Mt with about 14.3 Mt active, according to the most recent figures available. Clinker production is more indicative of ultimate cement production capacity because clinker can be stockpiled for later use or sale. The overall output of the cement industry is best represented by total cement shipments plus clinker exports, as shown in Table 3. The average kiln capacity has increased from about 300 000 t/y in 1980 to about 550 000 t/y in 1999; the average kiln age based on clinker capacity is reported to be about 20 years, according to the Portland Cement Association.

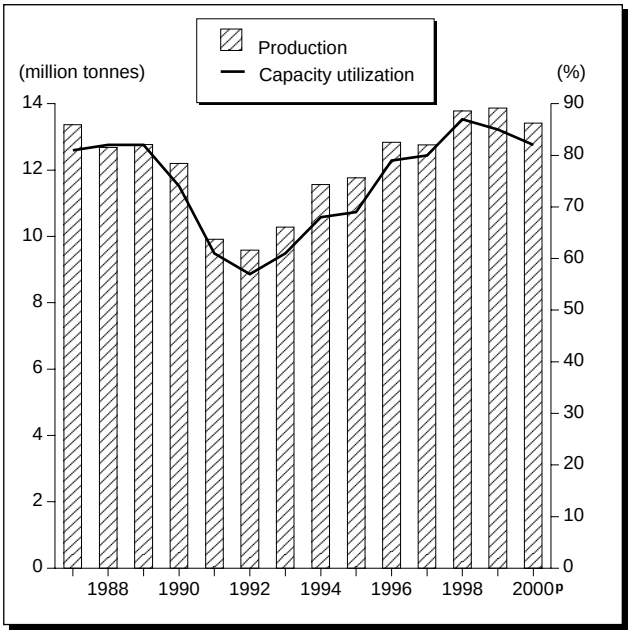
Newfoundland Cement Company Limited closed the North Star Cement Limited plant in Corner Brook, Newfoundland, in August 2000. The plant and distribution facilities were sold to St. Lawrence Cement (SLC), based in Montreal. It is expected that the plant will be dismantled. A Lafarge Canada Inc. (Lafarge) plant in Nova Scotia is now the only cement producer in Atlantic Canada.

In Quebec, three clinker-producing plants account for about 18% of Canada's output. SLC, Lafarge and Ciment Québec Inc. are the only producers of clinker and cement in this region. These three companies share markets about equally.

In Ontario, clinker-producing plants account for nearly 50% of Canadian capacity. Blue Circle Canada Inc., SLC and Lafarge are the largest producers. (SLC continued with a permitting process to build a new 2-Mt/y cement plant near Greenport, New York.)

In western Canada, this region's clinker-producing capacity accounts for about 30% of Canada's total clinker capacity. Changes in plant capacities are highlighted in Table 2, and relatively recent developments in this region are described in the "Cement" chapter of the 1998 *Canadian Minerals Yearbook*.

Figure 1
Canadian Cement Production, 1987-2000



Sources: Statistics Canada; Portland Cement Association.
P Preliminary.
Note: Cement production includes clinker exports.

Lafarge completed a $400 million merger with The Warren Paving and Materials Group Ltd., Canada's largest privately held supplier of construction aggregate (crushed stone, and sand and gravel) and a leading supplier of asphalt and paving services with sales of about $600 million in 2000. As part of an agreement reached with the Competition Bureau of Canada, Lafarge will divest certain assets in Alberta and the Fraser Valley of British Columbia.

WORLD DEVELOPMENTS

Multinational companies with widespread production and distribution networks continued to become more dominant in world cement markets.

The European Commission authorized, in March 2000, the acquisition of Blue Circle Industries plc, of England, by Lafarge SA, of France. Authorizations followed in Canada in April, contingent upon certain follow-up divestment in Canada, as mentioned, and then in the United States in June, again contingent on certain divestment.

World cement production in 1999 was 1600 Mt, according to estimates by the U.S. Geological Survey (USGS). China is the world's largest producer (573 Mt) followed by India (90 Mt), the United States (88 Mt) and Japan (80 Mt).

U.S. antidumping duties against grey Portland cement and clinker from Japan and Mexico remained in effect in 2000.

USE AND TRADE

Cross-border trade of both cement and clinker with the United States varies considerably from year to year depending on construction activity. Annual exports of cement to the United States amount to 3-4 Mt and account for about one third of total Canadian production (shipments), as defined in Table 1. Exports are mainly destined for the southern Great Lakes region and the northwestern Pacific region. Similarly, Canada's imports of cement amount to about 0.5 Mt and relate mainly to the equivalent cross-border regions.

Low-cost marine transportation has influenced world trade considerably. Total U.S. imports of cement (excluding clinker) for use were about 24 Mt in 2000, or 21% of apparent use. Asian sources (China, Korea and Thailand) have been major suppliers since 1998, according to the USGS.

The importance of supplementary cementing materials (SCMs) for a range of uses is increasingly being recognized. For example, about 1.1 Mt of fly ash, accounting for about 20% of production, were used in 2000, according to a recent NRCan-coordinated survey in cooperation with the Canadian Electricity Association (Table 4). International trade is also important for these products, particularly for fly ash used in blended cements and as a partial replacement for Portland cement in concrete products. In either case, these uses result in relatively lower unit monetary costs and in lower environmental costs associated with the relevant final products.

TECHNOLOGY

Energy conservation programs by the Canadian cement industry have reduced the energy consumption per unit of production by about 26% 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 clinker capacity. The fuel mix has changed considerably away from natural gas and petroleum products toward coal and/or coke. In 1999, of 17 clinker-producing plants, 11 reported using coal and/or coke as their primary fuel. Eight plants reported using waste as an alternative or supplemental fuel, according to the Canadian Portland Cement Association (CPCA). Waste was used at one plant as a primary fuel. In 1999, the Canadian cement industry consumed, on average, 4507 megajoules per tonne of production. The types of fuel consumed, including waste fuels, are highlighted in Table 2.

Suitable waste materials are an attractive alternative fuel because pyro-processing 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.

Natural Resources Canada (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. Considering advanced concrete programs that contribute to infrastructure durability, waste reduction and energy saving, a demonstration project involving roller compacted concrete (RCC), which includes high volumes of fly ash (50% or more), was placed at two sites in the Edmonton area in August 2000.

The use of high-volume, fly-ash concrete is growing; for example, the Greater Vancouver Regional District has established a new web site for EcoSmart™ con-

crete (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. 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 June 2000, the Committee for the Organization of CANMET/ACI Conferences, the National Research Council's Institute for Research in Construction, and others sponsored the Fifth CANMET/ACI International Conference on Durability of Concrete, in Barcelona, Spain, as well as the Sixth CANMET/ACI International Conference on Superplasticizers and Other Chemical Admixtures in Concrete, in October, in Nice, France. In 2001 this committee will sponsor three international conferences: the Seventh CANMET/ACI International Conference on Fly Ash, Silica Fume, Slag and Natural Pozzolans in Concrete, to be held July 22-27, 2001, in Madras, India; the Fifth CANMET/ACI/ International Conference on Recent Advances in Concrete Technology, July 29-August 1, 2001, in Singapore; and the Three-Day International Symposium on Sustainable Development and Concrete Technology, September 16-19, 2001, in San Francisco.

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 the Materials Technology Laboratory (MTL) of NRCan's CANMET 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, including cement and lime.

OUTLOOK

Cement shipments in 2001 are expected to be marginally higher based mainly on relatively low interest rates and an increase of about 4% in the value of construction to nearly $125 billion, according to the Canadian Construction Association. Also, the Infrastructure Canada Program, involving federal, provincial, territorial and municipal governments, will contribute about $6 billion across Canada during the six years until 2005/06, much of this related to engineering infrastructure.

Housing starts were about 152 000 in 2000, according to the Canada Mortgage and Housing Corporation. By way of comparison, housing starts were 137 000 in 1998 and 150 000 in 1999. With real economic growth in both Canada and the United States forecast to continue, the outlook remains positive for the office and industrial building sectors. (Additional information relating to residential construction can be obtained on the Internet at http://www.cmhc-schl.gc.ca/cmhc.html.)

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 2000 was 1.7 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 forecast 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 blast furnace slags, as a partial substitute for Portland cement, is expected to become more important in modern cement and concrete practices.

Notes: (1) For definitions and valuation of mineral production, shipments and trade, please refer to Chapter 65. (2) Information in this review was current as of February 1, 2001. (3) This and other reviews, including previous editions, are available on the Internet at http://www.nrcan.gc.ca/mms/cmy/index_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: *Customs Tariff*, effective January 2001, Canada Customs and Revenue Agency; *Harmonized Tariff Schedule of the United States*, 2001.

TABLE 1. CANADA, CEMENT PRODUCTION AND TRADE, 1998-2000

Item No.		1998		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)	(tonnes)	($000)
PRODUCTION[1] (all forms)							
	Newfoundland	x	x	x	x	x	x
	Nova Scotia	x	x	x	x	x	x
	Quebec	2 700 103	221 344	2 842 667	237 306	2 830 381	240 549
	Ontario	5 190 592	460 179	5 548 561	511 200	5 344 406	507 182
	Alberta	x	x	x	x	x	x
	British Columbia	1 728 277	172 015	1 643 184	168 090	1 919 187	201 443
	Total	12 124 058	1 147 757	12 634 440	1 232 151	12 611 954	1 258 697
IMPORTS[2]							
2523.10	Cement clinker						
	Turkey	–	–	–	–	163 339	6 848
	United Arab Emirates	–	–	–	–	95 951	5 086
	Spain	–	–	23 693	1 126	62 522	2 868
	Switzerland	–	–	–	–	34 629	2 088
	Mexico	78 802	3 711	7 991	355	5 539	247
	United States	288	24	331	14	624	25
	Lebanon	10 995	479	190 365	8 841	–	–
	Thailand	76 507	4 743	–	–	–	–
	Bermuda	20 811	1 018	–	–	–	–
	Total	187 403	9 975	222 380	10 336	362 604	17 162
2523.21	Portland cement, white, whether or not artificially coloured						
	United States	13 157	2 529	13 403	2 716	14 059	3 049
	Denmark	132	36	3 059	421	5 157	715
	Mexico	2 690	493	38 784	3 736	1 141	216
	Bermuda	–	–	19 380	877	–	–
	Other countries	597	96	6	1	81	14
	Total	16 576	3 154	74 632	7 751	20 438	3 994
2523.29	Portland cement, n.e.s.						
	United States	495 375	39 944	455 956	37 001	505 985	42 177
	United Kingdom	43	5	–	–	570	55
	Mexico	753	75	578	45	593	54
	France	2 123	170	244	25	2	. . .
	Croatia	–	–	781	61	–	–
	Lebanon	5 450	597	–	–	–	–
	Colombia	2 757	300	–	–	–	–
	Other countries	174	10	58	4	145	12
	Total	506 675	41 101	457 617	37 136	507 295	42 298
2523.30	Aluminous cement						
	United States	13 602	8 086	13 662	7 999	12 581	7 700
	Croatia	–	–	185	91	1 689	1 014
	France	270	156	3	3	–	–
	Other countries	3	1	43	22	1	. . .
	Total	13 875	8 243	13 893	8 115	14 271	8 714
2523.90	Hydraulic cement, n.e.s.						
	United States	45 607	5 872	57 737	6 844	56 766	6 366
	China	634	72	14 374	1 515	19 916	2 071
	Belgium	9 770	2 279	5	1	17 867	1 987
	United Kingdom	3 636	715	2 360	494	3 098	597
	Croatia	–	–	148	35	692	131
	Japan	334	92	693	159	356	108
	France	210	52	564	110	444	77
	Other countries	1 104	147	159	31	742	185
	Total	61 295	9 229	76 040	9 189	99 881	11 522
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	. .	2 801	. .	3 632	. .	2 931
	Brazil	. .	61	. .	126	. .	219
	Other countries	. .	50	. .	38	. .	48
	Total	. .	2 912	. .	3 796	. .	3 198

TABLE 1 (cont'd)

Item No.		1998		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)	(tonnes)	($000)
IMPORTS (cont'd)							
6810.19	Tiles, flagstones and similar articles of cement/concrete or artificial stone						
	United States	..	17 620	..	15 117	..	17 043
	Italy	..	1 356	..	978	..	1 105
	Spain	..	128	..	109	..	401
	Portugal	..	132	..	91	..	139
	China	..	16	..	15	..	41
	Mexico	..	14	..	29	..	24
	Netherlands	..	...	..	63	..	22
	Israel	..	41	..	...	..	22
	Other countries	..	354	..	113	..	84
	Total	..	19 661	..	16 515	..	18 881
6810.20	Pipes of cement or concrete	–	–	–	–	–	–
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	..	6 909	..	3 177	..	2 507
	United Kingdom	..	899	..	503	–	–
	Other countries	..	116	..	14	..	1
	Total	..	7 924	..	3 694	..	2 508
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	..	16 695	..	17 065	..	19 746
	China	..	3 985r	..	3 854	..	5 976
	Mexico	..	333	..	607	..	933
	United Kingdom	..	1 103	..	742	..	801
	Belgium	..	...	–	–	..	687
	Malaysia	..	8r	..	480	..	348
	South Korea	..	9	..	150	..	226
	Germany	..	100	..	71	..	183
	Italy	..	87	..	222	..	163
	Indonesia	..	8	..	6	..	75
	Philippines	..	220r	..	264	..	64
	Hong Kong	..	215	..	187	..	28
	Other countries	..	96r	..	214	..	277
	Total	..	22 859r	..	23 862	..	29 507
EXPORTS							
2523.10	Cement clinker						
	United States	1 657 808	93 004	1 236 860	87 794	805 870	64 224
	Total	1 657 808	93 004	1 236 860	87 794	805 870	64 224
2523.21	Portland cement, white, whether or not artificially coloured						
	United States	481 690	51 239	179 837	32 251	180 730	32 480
	Other countries	197	50	106	34	29	42
	Total	481 887	51 289	179 943	32 285	180 759	32 522
2523.29	Portland cement, n.e.s.						
	United States	3 745 080	258 042	4 083 662	313 797	3 915 926	310 706
	Saint Pierre and Miquelon	361	63	–	–	11	15
	Iceland	–	–	200	23	–	–
	South Korea	–	–	316	24	–	–
	Other countries	20	12	52	13	19	15
	Total	3 745 461	258 117	4 084 230	313 857	3 915 956	310 736
2523.30	Aluminous cement	–	–	–	–	–	–
2523.90	Hydraulic cement, n.e.s.						
	United States	72 106	12 533	22 742	3 594	4 404	2 074
	Jamaica	–	–	74	62	427	217
	Peru	–	–	2	3	41	68
	Germany	–	–	–	–	160	41
	Chile	123	71	105	68	–	–
	Other countries	183	154	71	40	157	114
	Total	72 412	12 758	22 994	3 767	5 189	2 514

TABLE 1 (cont'd)

Item No.		1998		1999		2000p	
		(tonnes)	($000)	(tonnes)	($000)	(tonnes)	($000)
EXPORTS (cont'd)							
6810.11	Building blocks and bricks of cement, concrete or artificial stone						
	United States	. .	35 964	. .	53 908	. .	64 993
	Ukraine	. .	156	. .	73	. .	217
	Japan	. .	178	. .	234	. .	98
	France	–	–	–	–	. .	74
	Taiwan	. .	257	–	–	–	–
	Other countries	. .	89	. .	120	. .	62
	Total	. .	36 644	. .	54 335	. .	65 444
6810.19	Tiles, flagstones and similar articles of cement/concrete or artificial stone						
	United States	. .	23 226	. .	33 415	. .	55 053
	Turkey	–	–	. .	2 501	. .	1 871
	Japan	. .	2 484	. .	1 888	. .	606
	Belgium	–	–	–	–	. .	131
	Cuba	–	–	. .	11	. .	119
	Australia	–	–	. .	1 275	–	–
	Other countries	. .	36	. .	99	. .	68
	Total	. .	25 746	. .	39 189	. .	57 848
6810.20	Pipes of cement or concrete	–	–	–	–	–	–
6810.91	Prefabricated structural components of buildings, etc., of cement/concrete, etc.						
	United States	. .	68 593	. .	115 800	. .	96 851
	United Kingdom	. .	84	–	–	. .	790
	France	–	–	. .	207	. .	252
	Venezuela	–	–	–	–	. .	192
	Australia	–	–	–	–	. .	179
	Guatemala	. .	538	–	–	–	–
	Other countries	. .	151	. .	121	. .	106
	Total	. .	69 366	. .	116 128	. .	98 370
6810.99	Articles of cement, of concrete or of artificial stone, n.e.s.						
	United States	. .	45 217	. .	48 593	. .	71 158
	Cuba	. .	35	–	–	. .	1 208
	France	. .	37	. .	528	. .	515
	Belgium	–	–	. .	16	. .	279
	United Kingdom	. .	1 975	. .	1 726	. .	275
	Bermuda	. .	34	–	–	. .	223
	South Korea	–	–	–	–	. .	99
	Japan	. .	63	. .	43	. .	83
	Italy	. .	250	–	–	. .	79
	Honduras	. .	177	–	–	–	–
	Other countries	. .	230	. .	50	. .	102
	Total	. .	48 018	. .	50 956	. .	74 021

Sources: Natural Resources Canada; Statistics Canada.
– Nil; **. .** Not available or not applicable; **. . .** Amount too small to be expressed; 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 1999

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	536	485
North Star Cement Limited	Corner Brook, Nfld.	Dx	O,Wa	1	250	146
Subtotal, Atlantic region				3	786	631
QUEBEC						
Lafarge Canada Inc.	St. Constant	D	Wa,C,O,G	2	1 129	950
Ciment Québec Inc.	St. Basile	Dx	C,O,G,Wa	1	995	759
St. Lawrence Cement Inc.	Joliette	D	C,Wa	4	1 475	900
Subtotal, Quebec region				7	3 599	2 609
ONTARIO						
Lafarge Canada Inc.	Woodstock	W	C,G	2	775	525
	Bath	Dc	C	1	1 090	987
Federal White Cement Ltd.	Woodstock	Dx	O,G	1	450	230
ESSROC Canada Inc.	Picton	D,Dx	C,G	2	746	1 156
St. Lawrence Cement Inc.	Mississauga	W,Dc	C,O,Wa	3	2 009	1 759[a]
Blue Circle Canada Inc.	Bowmanville	Dc	C	1	1 305	1 744
	St. Marys	Dx	C,G,Wa	1	685	738
Subtotal, Ontario region				11	7 060	7 123
PRAIRIE REGION						
Lafarge Canada Inc.	Exshaw, Alta.	D,Dc	G	2	1 519	1 209
Inland Cement Limited (Cimenteries CBR/Heidelberger)	Edmonton, Alta.	Dc	G	1	1 380	961
Subtotal, Prairie region				3	2 899	2 170
BRITISH COLUMBIA						
Lafarge Canada Inc.	Kamloops	D	C,G	1	259	194
	Richmond	Dc	C,G	1	616	939
Tilbury Cement Limited (Cimenteries CBR/Heidelberger)	Delta	Dx	C,G,Wa	1	1 050	1 148
Subtotal, B.C. region				3	1 925	2 281
Total Canada (9 companies)				27	16 269	14 814

Source: Market and Economic Research Department, Portland Cement Association.
[a] Two kilns inactive.
Note: Total active kiln capacity including white cement is approximately 14.3 Mt/y.

TABLE 3. CANADA, CEMENT PLANTS, KILNS AND CAPACITY UTILIZATION, 1980-2000

	Clinker-Producing Plants	Kilns	Approximate Cement Grinding Capacity	Portland and Masonry Cement Production[1]	Clinker Exports	Approximate Total Production[2]	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[a]	16 800 000	8 593 399	988 348	9 581 747	57
1993	18	34[a]	16 800 000	9 393 581	882 935	10 276 516	61
1994	18	34[a]	17 021 000[r]	10 584 414	981 024	11 565 438	68
1995	18	34[a]	16 157 000[r]	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[p]	17	27	16 300 000	12 612 000	806 000	13 418 000	82

Sources: Statistics Canada; Portland Cement Association.
[p] Preliminary; [r] Revised.
[a] Includes inactive kilns.
[1] Producers' shipments and amounts used by producers. [2] Cement shipments/production plus clinker exports.

TABLE 4. CANADA, PRODUCTION AND USE OF COAL COMBUSTION PRODUCTS (CCPs), 2000[1,2]

	Fly Ash	Bottom Ash	FGD Gypsum	Other[3]	Total CCPs
			(000 tonnes)		
PRODUCTION					
Produced	5 030	1 558	421	128	7 137
Removed from disposal	–	138	–	–	138
Disposed/stored	3 985	1 472	–	124	5 582
USE (DOMESTIC)					
Cement	491	143	–	–	634
Concrete/grout	400	–	–	–	400
Mining applications	136	–	–	–	136
Roadbase/subbase	20	49	–	–	69
Wallboard	–	–	570	–	570
Other[4]	46	5	–	–	51
Total use	1 094	196	570	–	1860
Individual use percentage	22%	13%	135%	–	n.a.
Cumulative use percentage	22%	20%	27%	26%	26%

Sources: Natural Resources Canada; Canadian Electricity Association.
– Nil; n.a. Not applicable; FGD Flue-gas desulphurization.
[1] Production of coal combustion products (CCPs) includes both dry and ponded categories. [2] Use (domestic) includes amounts imported (assumed HS codes 2621.00 relating to fly ash, and 2520.10 relating to gypsum). [3] Cfb (circulating fluidized bed) fly ash and bottom ash. [4] Relates to uses such as waste stabilization, oil well reclamation/cementing agent, microspheres and roofing tiles.

TABLE 5. CANADA, VALUE OF CONSTRUCTION BY TYPE, 1996-2000

	1996	1997	1998	1999	2000
			($ millions)		
BUILDING CONSTRUCTION					
Residential investment	32.3	36.5	36.0	38.8	40.8
Non-residential building investment	19.6	22.5	22.4	24.2	25.3
Total building construction	51.9	59.0	58.4	63.0	66.1
ENGINEERING CONSTRUCTION					
Mining and oil and gas extraction	13.9	18.2	16.7	15.4	19.3
Transportation and warehousing	2.0	2.2	5.0	5.0	4.1
Other engineering	15.2	14.7	14.5	16.6	18.3
Total engineering construction	31.1	35.1	36.2	37.0	41.7
Total components	83.0	94.1	94.6	100.0	107.8

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 http://www.statcan.ca/english/CANSIM.)
Notes: Numbers may not add to totals due to rounding. Expenditures include value of new construction and major renovation work purchased.

TABLE 6. WORLD PRODUCTION OF CEMENT, 1999 AND 2000e

	1999	2000e
	(000 tonnes)	
Canada	12 634	12 600
Brazil	40 270	41 500
China	573 000	576 000
Germany	38 099	37 000
India	90 000	95 000
Italy	36 000	35 000
Japan	80 120	77 500
South Korea	48 157	50 000
Russia	28 400	30 000
Spain	30 800	30 000
Thailand	34 500	38 000
Turkey	34 403	33 000
United States	87 777	92 300
Other countries	475 589	556 400
Total world	1 609 749	1 704 300

Sources: Natural Resources Canada; U.S. Geological Survey, January 2001.
e Estimated.