Coal

Frank Mourits

The author is with the Minerals and Metals Sector, Natural Resources Canada.
Telephone: (613) 996-7857
E-mail: fmourits@nrcan.gc.ca

Coal is an organically derived material. It is formed from the remains of decayed plant material compacted into a solid through millions of years of pressure and heat. Coal is the world's most abundant and widely distributed fossil fuel. About 4.6 billion metric tonnes (t) are mined annually in more than 40 countries. Coal is used primarily for the generation of electricity and production of steel. More than 40% of the world's electricity is generated from coal and about 70% of the world's steel is produced with coal. Coal is also used as an energy source in industrial processes (such as cement manufacture and pulp and paper) and to produce a wide range of products (such as tars and chemicals). In some developing countries, coal is still used as a residential heating fuel.

CANADIAN DEVELOPMENTS

In 1998, Canada was the world's fifth largest coal exporter and the ninth largest coal producer.

Production

In 1998, declining demand in export markets and production problems in Nova Scotia led to the first decline in coal production since 1992, according to preliminary estimates. Compared to 1997, production fell by 4.2%, or 3.3 Mt, to 75.4 Mt. The value of coal production declined 6.6% to $1.8 billion as lower demand in export markets drove coal prices downward. About 62% of the production was thermal coal and 38% was metallurgical coal.

Production occurs to meet domestic demand for thermal coal, which is used primarily for the generation of electricity, and to meet export demand, which primarily comprises metallurgical coal. Nearly all (97%) of Canada's coal is produced in the three westernmost provinces: the most production takes place in Alberta (48%), followed by British Columbia (33%) and Saskatchewan (16%). The remainder comes from Nova Scotia and New Brunswick.

British Columbia's coal production, all bituminous, decreased in 1998 by 3.1 Mt to 24.8 Mt. With virtually all of British Columbia's production exported, the decrease is a direct reflection of the lower demand in Asian export markets. Ninety-three percent of British Columbia's coal is metallurgical.

Alberta remained Canada's largest coal-producing province in 1998. Its production is estimated to be essentially unchanged at 36.4 Mt, consisting of 25.3 Mt of subbituminous coal (down 0.5 Mt from 1997) and 11.1 Mt of bituminous coal (up 0.5 Mt from 1997). About 85% of Alberta's production is thermal coal.

Saskatchewan was again the country's third largest coal-producing province. Its production, all lignite, was also up slightly to 11.8 Mt. All of Saskatchewan's coal is used for thermal purposes.

Nova Scotia's bituminous coal production was down 0.5 Mt to 2.1 Mt due to lower production by the Cape Breton Development Corporation (DEVCO), a federal Crown corporation. All of the coal produced in Nova Scotia in 1998 was thermal.

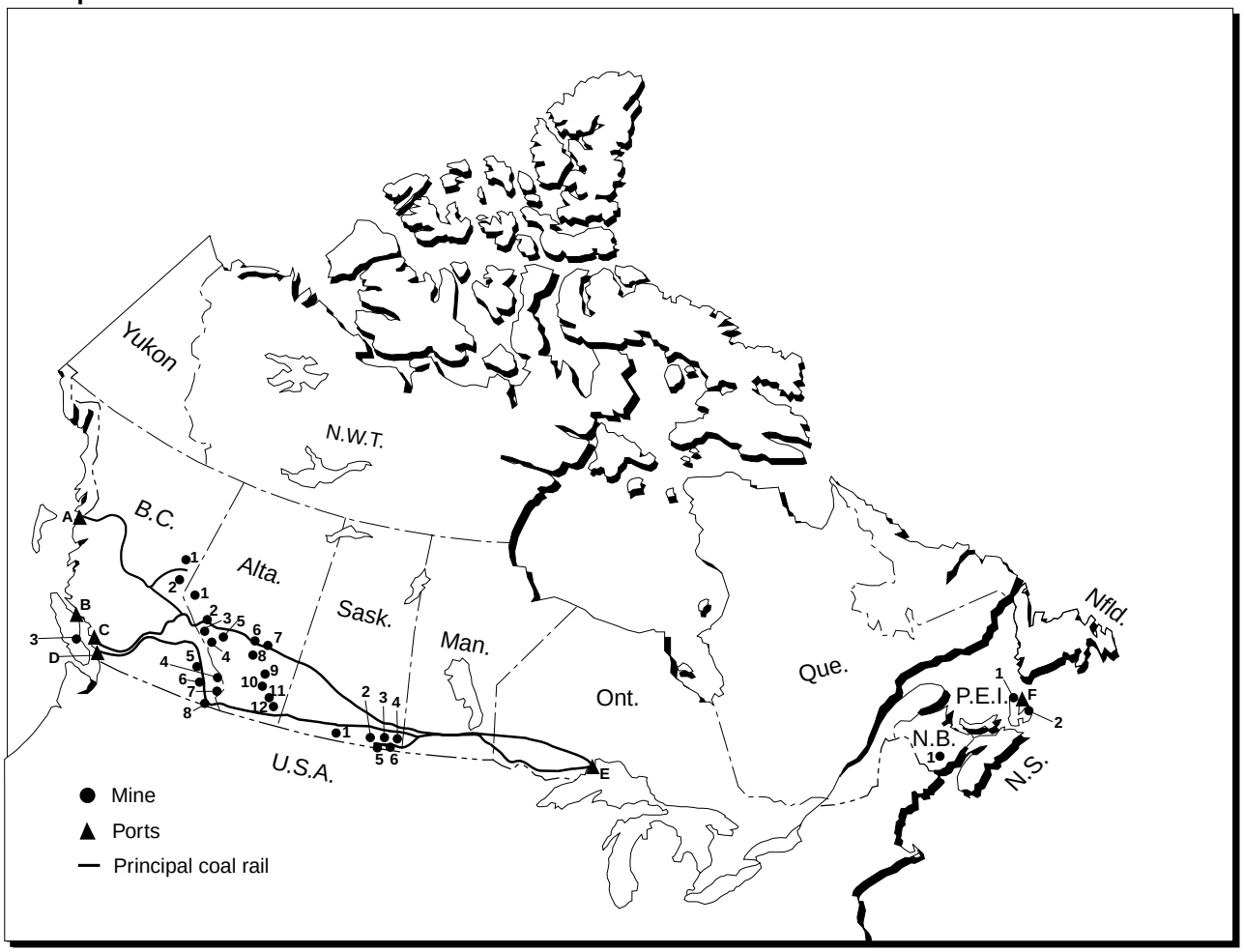
New Brunswick's bituminous coal production increased 0.1 Mt to 0.3 Mt. N.B. Coal Limited, the only coal producer in the province, is owned by, and sells exclusively to, the provincial electric utility, New Brunswick Power Corporation.

In 1998, there were 24 mines in operation in Canada, 20 of which were surface (strip or open-pit) mines, three were underground mines, and one was a combination of both. Most of the thermal coal produced for provincial electric utilities comes from mine-mouth operations, and nearly all of these are surface mines, which generally have lower production costs than underground mines.

Consumption

Canadian coal consumption in 1998 is estimated at 58.8 Mt, an increase of 3.1 Mt over 1997. This

Figure 1
Principal Canadian Coal Mines and Ports



● MINES

British Columbia
1. Bullmoose
2. Quintette
3. Quinsam
4. Fording River
5. Greenhills
6. Elkview
7. Line Creek
8. Coal Mountain

Alberta
1. Smoky River
2. Obed
3. Gregg River
4. Luscar
5. Coal Valley
6. Highvale
7. Whitewood
8. Genesee
9. Paintearth
10. Vesta
11. Sheerness
12. Montgomery

Saskatchewan
1. Poplar River
2. Utility
3. Boundary Dam
4. Costello
5. Shand
6. Bienfait

New Brunswick
1. Minto

Nova Scotia
1. Prince
2. Phalen

▲ PORTS

British Columbia
A. Ridley Island
B. Texada Island Facility
C. Neptune
D. Roberts Bank

Ontario
E. Thunder Bay

Nova Scotia
F. International Pier

increase is due to higher consumption of coal to generate electricity. In 1998, an estimated 52.7 Mt of coal was consumed for electricity generation, about 4.1 Mt was used in steelmaking, and about 2.1 Mt was used by other industries, mainly cement.

British Columbia used about 0.2 Mt of bituminous coal for general industrial purposes.

Alberta, the largest coal-consuming province, used about 26.0 Mt of coal to generate electricity, slightly less than in the previous year. With the exception of about 0.6 Mt of Alberta bituminous coal, all of the coal consumed was subbituminous coal from Alberta.

In Saskatchewan, coal consumption by the electric utility was an estimated 9.8 Mt, similar to the previous year. All of the coal used by the utility comes from provincial lignite mines. About 0.2 Mt of local lignite was also used by industrial consumers.

While Manitoba does not produce coal, it consumes a small amount of coal for electricity generation and general industrial uses. Consumption in 1998 was 0.7 Mt, up slightly from 1997. More than 0.5 Mt was used for the generation of electricity with the rest being used by general industry.

Ontario was Canada's second largest coal consumer, using coal for electricity generation, steelmaking and general industrial purposes. Ontario's 1998 consumption of coal for the generation of electricity jumped by 3.3 Mt to 12.3 Mt. The higher coal use made up for the loss of nuclear power generation due to the temporary shut-down of seven units. About 80% of the coal consumed by the utility came from the United States; the rest was Canadian. The Canadian portion consisted of bituminous coal from Alberta and lignite from Saskatchewan.

Coal consumption by the steel industry in Ontario in 1998 is estimated to be 4.1 Mt, somewhat below the 1997 level of 4.5 Mt. All of the coal used by the steel industry is imported from the United States. Coal use by Ontario's industrial sector was up slightly from 1997 at less than 0.7 Mt.

While Quebec does not produce coal, it consumes a small amount for general industrial uses. The province's 1998 consumption was up slightly at 0.8 Mt. All of the coal consumed in Quebec (about half bituminous, half anthracite) is imported from the United States.

In New Brunswick, coal consumption in 1998 is estimated to be 1.4 Mt, up slightly from 1997 and all for the generation of electricity. Most of the coal was imported from the United States, Colombia and Venezuela, with a smaller amount being supplied by the one New Brunswick mine.

Nova Scotia's 1998 coal consumption was an estimated 2.6 Mt, down 0.4 Mt from 1997. Nearly all of this coal was used to generate electricity, with a tiny amount for general industrial use. Nova Scotia Power Inc., the provincial utility, bought over 80% of its coal from DEVCO and imported the remainder from the United States.

Exports

The downturn in the economies of Japan and other Asian countries in 1998 and an oversupply of coal on world markets led to reduced demand for Canadian export coal. Exports fell 5.5% to 34.2 Mt in 1998. Canadian coal was sold to 22 countries. About 83% of Canada's exports were metallurgical coal.

The single largest buyer of this coal was Japan. In 1998, Canadian coal exports to Japan were down by 1.7 Mt to 16.7 Mt. With a market share of about 13%, Canada was again Japan's second largest coal supplier after Australia. About 85% of Canadian coal exports to Japan were metallurgical coal.

In 1998, Canadian coal exports to South Korea, Canada's second largest market, were up about 0.2 Mt to 6.2 Mt. With a market share of more than 12%, Canada was South Korea's third largest coal supplier after Australia and China. About 64% of Canadian coal exports to South Korea were metallurgical coal.

Canada's next largest coal markets of at least 1 Mt were the United Kingdom (1.4 Mt), Taiwan (1.1 Mt) and Brazil (1.1 Mt).

With a 72% share of Canada's total exports, British Columbia remained the single largest exporting province, although its exports were down 2.8 Mt to approximately 24.5 Mt in 1998. About 94% of British Columbia's exports were metallurgical coal.

Alberta's coal exports were up 0.5 Mt to 9.7 Mt. About 54% of Alberta's exports were metallurgical coal.

Imports

Canada's 1998 coal imports were 18.7 Mt, up a very significant 39%, or 5.2 Mt above the 1997 level. Almost 98% of all imports came from the United States, with the remainder coming from Colombia, South Africa, China, Venezuela and Russia.

The electric power industry imported about 12.1 Mt. Ontario Power Generation, the single largest importer of coal, bought about 9.9 Mt of U.S. coal in 1998, up 3 Mt from the previous year. New Brunswick Power bought about 1.1 Mt, while Nova Scotia Power Inc. imported about 0.5 Mt and Manitoba Hydro imported about 0.5 Mt.

Metallurgical coal imports by the Ontario steel industry were estimated at 4.6 Mt in 1998, slightly higher than the 1997 level of 4.3 Mt. All of this coal came from the United States.

The remaining imports, all from the United States, went to industrial users located primarily in Quebec and Ontario.

Developments in the Canadian Coal Industry

The Canadian coal industry is undergoing major restructuring. In 1998, the largest producer, Manalta Coal, was acquired by the second largest producer, Luscar Ltd. The merged company (which kept the name Luscar) has a production capacity of about 41 Mt/y, which makes it the sixth largest producer in North America. Luscar Ltd. (with a 55% share of Canadian production), Fording Coal Ltd. (the second largest producer, with a 27% share) and Teck Corporation (third largest, with an 11% share) together account for about 93% of Canada's total coal production. Luscar Ltd. and Teck Corporation are public companies, while Fording is a wholly owned subsidiary of Canadian Pacific Ltd, a public company.

Four smaller producers account for the remaining 7%. These producers comprise: a federal Crown corporation (Cape Breton Development Corporation or DEVCO, operating the Prince and Phalen mines in Nova Scotia); a provincial Crown corporation (New Brunswick Coal, a wholly owned subsidiary of New Brunswick Power Corporation); a public company (Hillsborough Resources Limited, parent company of Quinsam Coal Corp. in British Columbia); and a privately owned company (Smoky River Coal Limited in Alberta). In early 1999, the federal government initiated a process to close the Phalen mine by the end of 2000 and sell the remaining DEVCO operations. Both Hillsborough Resources and Smoky River Coal encountered financial difficulties during the course of 1998.

The Smoky River mine suffered a major setback in 1998 after the failure of an expansion based on a new underground longwall. Smoky River returned to conventional surface mine operations, but financial problems forced the company to seek court protection from creditors. New management is now in place and Smoky River is confident that its restructuring plan will be acceptable to the creditors and the court. These plans must be filed and approved by the fall of 1999.

Deteriorating thermal coal export markets led to financial difficulties for the Quinsam mine on Vancouver Island. It requested court protection from its creditors. Restructuring plans must be filed and approved by the court before the end of 1999.

In June 1997, a joint federal-provincial environmental assessment panel determined that the proposed Cheviot open-pit mine near Hinton, Alberta, met all regulatory requirements, subject to a number of conditions. The Alberta Energy and Utilities Board approved the project and the Province of Alberta issued a mine development permit in August 1997. In August 1998, the Department of Fisheries and Oceans (DFO) issued a fisheries authorization for the project.

Environmental groups challenged the environmental assessment process through the legal process beginning in September 1997. In early April 1999, a judge of the Federal Court of Appeals found that the Canadian environmental assessment process had not been respected in four instances, and thereby rescinded the Fisheries authorization. By mid-1999, the Canadian Environmental Assessment Agency and the Province of Alberta had agreed to reconvene the joint federal-provincial assessment panel using the original terms of reference.

The Cheviot mine will be owned and operated by Cardinal River Coals Ltd. (CRC), a joint venture of Luscar Ltd. of Edmonton and Consol of Canada Inc. Production, all to be exported, would be about 3.5 Mt/y of metallurgical coal over an estimated mine life of 20 years. The work force would number about 500. The Cheviot mine will replace production from the existing Luscar mine some 20 km away where reserves are expected to be depleted in two to five years.

Pine Valley Coal Ltd. received approval under the B.C. *Environmental Assessment Act* and has various other permits in place for its proposed Willow Creek project, 45 km west of Chetwynd in central British Columbia. Pine Valley Coal is the operator for this joint venture of B.C. Rail, Globaltex Industries Inc. and Mitsui Matsushima Co. Ltd. The proposed open-pit mine would produce 0.9 Mt/y of coking and thermal coal for export over an estimated mine life of 15 years, with the potential to be extended. The work force would number about 100-120. At the time of writing (mid-1999), Pine Valley Coal was trying to find buyers for the proposed mine's output. Globaltex Industries Inc. is a Vancouver-based junior resource company listed on the Vancouver Stock Exchange.

Luscar is currently undertaking a review of the Telkwa coal property it acquired as a result of its acquisition of Manalta Coal. The proposed Telkwa mine is located approximately 6 km southwest of Telkwa in central British Columbia. Manalta Coal had already initiated the regulatory review process for the project. If Luscar decides to continue moving the project forward, a Final Report required under the B.C. *Environmental Assessment Act* could be submitted during the course of 1999.

The proposed open-pit mine would produce about 1-1.5 Mt/y of thermal and metallurgical coal for export over an estimated mine life of 25 years. The work force would number about 120-140. Production could start two years after completion of the regulatory process and coal sales arrangements.

EMERGING CLEAN COAL TECHNOLOGIES

Environmental challenges (see following section) are the main issue facing continued or increased coal utilization. On the coal combustion side, emissions of sulphur dioxide and nitrogen oxides have traditionally been the main concern. Proven technologies, such as flue gas desulphurization, low NO_x burners and fluidized bed combustion, are available — albeit at a cost — to reduce these emissions.

Recently, the issue of greenhouse gas emissions and climate change has emerged to be a more formidable and challenging one. Coal is at a disadvantage as it produces more carbon dioxide per unit of energy generated than other fossil fuels such as oil and natural gas. However, a number of new coal conversion technologies are being developed that could increase both the competitiveness and environmental acceptability of coal through increased thermal efficiency and reduced emissions of carbon dioxide, sulphur dioxide and nitrogen oxides. The challenge will be to commercialize these clean coal technologies so that coal can continue to be an attractive and low-cost fuel.

One group of clean coal technologies aims to increase the amount of electrical energy extracted from a unit of coal. The key here is higher overall conversion efficiency, which will reduce the emission of carbon dioxide. Technologies in this category include various advanced pulverized coal (PC) combustion technologies (subcritical, supercritical and ultra-supercritical), fluidized bed combustion (FBC) technologies (circulating and pressurized), and coal gasification combined cycle (CGCC) technologies. Efficiencies range from 40 to 50%, compared to 33-35% for a conventional PC unit.

Although not a coal conversion technology in itself, the possibility of capturing the carbon dioxide emitted by coal-burning plants and using and/or storing it in geological formations (sequestration) has started to receive significant attention. Efforts are currently under way to explore the feasibility of various schemes of this nature in western Canada.

A newly emerging group of technologies is set to produce a relatively pure stream of carbon dioxide at the tail end of a coal conversion plant. This stream can then be captured (and disposed of) at a much lower cost than the diluted carbon dioxide stream emitted by the first group of technologies. Technologies in this category are very new and still at various stages of research and development. They include the combustion of coal in a CO_2/O_2 recycle system and anaerobic, calcium oxide-assisted coal-to-hydrogen conversion.

THE ENVIRONMENT

Environmental protection is being addressed at all stages of the coal chain. At the mining stage, environmental assessments are an integral part of the provincial mine permitting process. In certain instances, mining projects also trigger a federal environmental review under the *Canadian Environmental Assessment Act*.

Environmental assessments ensure that activities associated with coal mining, including the removal of vegetation, relocation of overburden, construction of roads, blasting, mine operation and reclamation of previously mined areas, are carried out in a manner that minimizes any negative effect on the environment. Several Canadian coal mining companies have been recognized for their successful environmental mine management programs.

At the coal utilization stage, air emissions are a concern. Coal accounts for about 20% of sulphur dioxide (SO_2), 15% of nitrogen oxide (NO_x) and 20% of carbon dioxide (CO_2) emissions in Canada. Coal is also a source of heavy metals emissions.

In response to public concern about the environment, Canada is continually improving its domestic environmental guidelines and has participated in the development of a number of international agreements that affect coal and other fossil fuels. Specifically, Canada has signed several international protocols with commitments to reduce emissions of sulphur dioxide (1985 Helsinki and 1994 Oslo Protocols), nitrogen oxide (1988 Sofia Protocol) and carbon dioxide (1997 Kyoto Protocol). Canada also made a commitment, under the 1994 Canada-U.S. Air Quality Agreement, to limit sulphur dioxide emissions to 2.3 Mt/y in the seven easternmost provinces. By the year 2000, the cap under this agreement will be 3.2 Mt/y Canada-wide. Federal-provincial agreements to meet the 1994 target for eastern Canada have required coal-burning utilities in Ontario, New Brunswick and Nova Scotia to make large capital investments to reduce sulphur dioxide emissions.

A July 1998 report by Environment Canada showed that, in 1997, eastern Canadian coal-burning utilities, including Nova Scotia Power Inc., New Brunswick Power Corporation and Ontario Hydro, were all below their sulphur dioxide emission limits. However, acid deposition continued to be a concern. In October 1997, a multi-stakeholder Acidifying Emissions Task Group submitted a report, *Towards a*

National Acid Rain Strategy, with the key finding that in 2010, with full implementation of existing Canadian and U.S. programs to control sulphur dioxide emissions, 800 000 km^2 in southeastern Canada would continue to receive levels of acid rain harmful to aquatic systems. In response, a *Canada-Wide Acid Rain Strategy for Post-2000*, signed by Ministers in the fall of 1998, is establishing Canada's next-step targets and schedules for sulphur dioxide emissions in Ontario, Quebec, New Brunswick and Nova Scotia.

As for nitrogen oxide emissions, these are below the target established by the Sofia Protocol. In 1995, Environment Canada established a working group to develop guidelines for nitrogen oxide emissions from coal-fired utility boilers to be constructed after the year 2000. A technical background report was completed in 1996 and work is still ongoing.

New, Canada-wide air quality standards are currently (1999) under development. The federal government is also preparing Phase 3 of its smog management plan, which will likely target the mining industry for reductions in emissions of ozone precursors (nitrogen oxide and volatile organic compounds), sulphur dioxide and particulate matter.

With respect to heavy metals, the element that is of most concern from a health and environment perspective is mercury, with somewhat lesser attention focused on cadmium and lead. International concern is addressed through the United Nations Economic Commission for Europe, which finalized negotiation, in early 1998, of a protocol under the Convention on Long-Range Transboundary Air Pollution to address the transboundary impacts of heavy metals emissions. Canada ratified the Heavy Metal and Persistent Organics Pollutants Protocols in June 1998. Signatories will be required to adopt common emissions regulations and to apply Best Available Techniques (BAT) to reduce emissions from new and existing major emission sources. It was agreed that there is no proven BAT for controlling mercury emissions from coal-fired generating stations.

Canada is also actively engaged in the control of mercury emissions on a North American scale through its participation in the drafting of the Phase 2 Regional Action Plan on Mercury, scheduled for approval in early 2000. This plan will form the framework for mercury emissions and products management by the three NAFTA countries.

The burning of coal and other fossil fuels generates carbon dioxide, which may have an effect on global climate patterns. In December 1997, at the United Nations Framework Convention on Climate Change in Kyoto (Japan), Canada together with 150 other nations signed an international agreement that commits Canada to reduce its greenhouse gas emissions by 6% from 1990 levels by the years 2008-2012. Work on a national strategy to achieve these reductions was initiated in early 1998. A federal/provincial Climate Change Secretariat was created with the mandate to develop, implement, coordinate and fund this national strategy.

The main path for Canadians to have input into the development of this national strategy was through a set of stakeholder committees called Issue Tables, which were set up during 1998. These committees, comprising representatives from governments, industry, academia and many other fields, provided expert and detailed input into the analysis, identification and assessment of greenhouse gas reduction and adaptative options. An Electricity Industry Issue Table was established in mid-1998. Its final report is due by the fall of 1999. This report and its options for emissions reduction, together with the reports from 15 other Issue Tables, will be considered by federal and provincial energy and environment ministers in March 2000.

In addition to air emissions, coal-fired electrical generating stations produce large volumes of fly ash, bottom ash and other waste products. Fly ash is a powder-like substance, while bottom ash is a coarser product. Fly ash utilization in the manufacture of cement is increasing and this results in significant environmental benefits, including reduced landfill costs for the utility as well as reductions in emissions of carbon dioxide, particulates, organic compounds and sulphur dioxide for the cement manufacturer. Since each tonne of cement produced releases one tonne of carbon dioxide, replacement of up to 25% of cement in concrete by fly ash (as is already commonplace in Canada) can result in a significant reduction of carbon dioxide emissions while improving the quality of the concrete. About 23 000 t of fly ash was contained in the cement used to build the new Confederation Bridge linking Prince Edward Island and New Brunswick. Other major uses for coal ash include road construction and backfill for mines. Flue gas desulphurization units produce large volumes of gypsum by-product. This material is increasingly being sold to wallboard manufacturers and again results in reduced landfill costs for the utility.

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 October 31, 1999.

TABLE 1. COAL SUPPLY AND DEMAND, 1982-98

	Production	Imports	Total Supply	Exports	Domestic Consumption	Total Demand	Stock Changes and Adjustment
				(000 tonnes)			
1982	42 811	15 775	58 586	16 004	41 353	57 357	1 229
1983	44 780	14 667	59 447	17 011	43 649	60 660	(1 213)
1984	57 402	18 359	75 761	25 138	48 699	73 837	1 924
1985	60 854	14 620	75 474	27 378	48 666	76 044	(570)
1986	57 812	13 312	71 124	25 904	44 532	70 436	688
1987	61 211	14 345	75 556	26 741	50 140	76 881	(1 325)
1988	70 644	17 418	88 062	31 725	54 466	86 191	1 871
1989	70 529	14 521	85 050	32 827	53 795	86 622	(1 572)
1990	68 331	14 113	82 444	31 009	49 036	80 045	2 399
1991	71 138	12 417	83 555	34 112	50 173	84 285	(730)
1992	65 610	12 834	78 444	28 097	51 683	79 780	(1 336)
1993	69 027	8 392	77 419	28 313	48 979	77 292	127
1994	72 823	9 176	81 999	31 746	52 348	84 094	(2 095)
1995	75 036	9 684	84 719	33 992	52 773	86 766	(2 046)
1996	75 809	11 692	87 501	34 459	53 511	87 971	(470)
1997	78 651	13 480	92 131	36 182	55 734	91 916	215
1998	75 380	18 675	94 054	34 179	58 846	93 025	1 029

Sources: Natural Resources Canada; Statistics Canada.

TABLE 2. COAL DISPOSITION FROM MINES, 1998

	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Canada
			(000 tonnes)			
DELIVERIES TO:						
Newfoundland	–	–	–	–	–	–
Prince Edward Island	–	–	–	–	–	–
Nova Scotia	2 112	–	–	–	–	2 112
New Brunswick	–	272	–	–	–	272
Quebec	–	–	–	–	–	–
Ontario	–	–	1 824	544	27	2 395
Manitoba	–	–	111	–	42	154
Saskatchewan	–	–	9 855	–	–	9 855
Alberta	–	–	–	26 024	–	26 024
British Columbia	–	–	–	10	321	331
Total Canada	2 112	272	11 790	26 578	390	41 142
Total ports	–	–	–	9 785	23 871	33 656
United States	–	–	–	24	558	582
Total	2 112	272	11 790	36 387	24 818	75 380

Sources: Natural Resources Canada; Statistics Canada.
– Nil.
Note: Numbers may not add to totals due to rounding.

TABLE 3. COAL SUPPLY BY RANK, 1980-98

	Production				Imports				
	Bituminous	Sub-bituminous	Lignite	Total	Anthracite	Bituminous	Sub-bituminous	Total	Total Supply
	(million tonnes)								
1980	20.2	10.5	6.0	36.7	0.3	15.5	–	15.8	52.5
1981	21.7	11.6	6.8	40.1	0.4	14.4	–	14.8	54.9
1982	20.3	13.0	9.5	42.8	0.3	15.5	–	15.8	58.6
1983	22.5	14.5	7.8	44.8	0.3	14.4	–	14.7	59.4
1984	32.1	15.4	9.9	57.4	0.3	18.1	–	18.4	75.8
1985	34.4	16.8	9.7	60.9	0.1	14.5	–	14.6	75.5
1986	32.3	17.3	8.2	57.8	0.4	12.9	–	13.3	71.1
1987	32.7	18.5	10.0	61.2	0.1	14.2	–	14.3	75.6
1988	38.6	19.9	12.1	70.6	0.5	16.9	–	17.4	88.1
1989	38.8	20.9	10.8	70.5	0.2	14.3	–	14.5	85.1
1990	37.6	21.3	9.4	68.3	0.3	13.8	–	14.1	82.4
1991	39.9	22.2	9.0	71.1	0.2	12.2	–	12.4	83.6
1992	32.6	23.0	10.0	65.6	0.2	12.6	–	12.8	78.4
1993	35.3	23.7	10.0	69.0	0.3	8.1	–	8.4	77.4
1994	36.6	25.5	10.7	72.8	0.3	8.9	–	9.2	82.0
1995	38.6	25.6	10.8	75.0	0.4	9.3	–	9.7	84.7
1996	40.0	25.0	10.9	75.8	0.5	11.2	–	11.7	87.5
1997	41.2	25.8	11.7	78.7	0.4	13.0	–	13.5	92.1
1998	38.3	25.3	11.8	75.4	0.6	15.9	2.2	18.7	94.1

Sources: Natural Resources Canada; Statistics Canada.
– Nil.

TABLE 4. COAL PRODUCTION BY RANK AND VALUE, 1994-98

	1994		1995		1996		1997		1998	
	(000 t)	($000)	(000 t)	($000)	(000 t)	($000)	(000 t)	($000)	(000 t)	($000)
DOMESTIC[1]										
Bituminous										
Nova Scotia	3 509	217 000	2 460	161 178	3 110	183 718	2 680	. .	2 112	. .
New Brunswick	332	28 000	263	24 410	273	24 032	173	. .	272	. .
Alberta	10 196	319 000	11 615	337 985	11 164	349 836	10 561	. .	11 102	. .
British Columbia	22 608	894 000	24 350	967 073	25 422	1 026 577	27 802	. .	24 818	. .
Subtotal	35 645	1 458 000	38 688	1 490 645	39 969	1 584 163	41 216	. .	38 304	. .
Subbituminous										
Alberta	25 494	228 000	25 608	232 033	24 986	231 736	25 783	. .	25 285	. .
Lignite										
Saskatchewan	10 685	104 000	10 740	116 200	10 854	116 092	11 653	. .	11 790	. .
Total domestic	72 824	1 790 000	75 036	1 838 879	75 809	1 931 990	78 651	. .	75 380	. .
IMPORTED[2]										
Bituminous and anthracite	9 176	642 000	9 684	697 000	11 692	825 000	13 480	. .	18 675	. .
Total supply	82 000	2 432 000	84 719	2 535 879	87 501	2 756 990	92 131	. .	94 054	. .

Sources: Natural Resources Canada; Statistics Canada.
. . Not available. [1] F.o.b. mines. [2] Value at U.S. port of exit.

TABLE 5. EXPORTS OF CANADIAN COAL BY TYPE AND DESTINATION, 1998

Country	Metallurgical	Thermal	Total
		(000 tonnes)	
Japan	14 254	2 486	16 740
South Korea	3 977	2 199	6 176
United Kingdom	1 144	280	1 424
Taiwan	1 141	–	1 141
Brazil	1 009	127	1 136
United States	890	108	998
Italy	958	–	958
Germany	899	–	899
Belgium-Luxembourg	473	342	815
Turkey	584	–	584
Chile	264	287	551
France	548	–	548
Netherlands	510	–	510
Spain	298	–	298
Mexico	251	–	251
India	237		237
Portugal	229	–	229
Egypt	225	–	225
Pakistan	216	–	216
Romania	129	–	129
Sweden	110	–	110
Australia	2	1	3
Total	28 348	5 831	34 179

Sources: Natural Resources Canada; Statistics Canada.
– Nil.
Note: Numbers may not add to totals due to rounding.

TABLE 6. COAL CONSUMED BY THERMAL POWER STATIONS, 1972-98

	Nova Scotia	New Brunswick	Ontario	Manitoba	Saskat-chewan	Alberta	Total Canada
				(000 tonnes)			
1972	663	281	7 599	410	2 145	4 113	15 211
1973	585	193	6 615	386	2 806	4 474	15 059
1974	606	292	6 721	132	2 902	4 771	15 424
1975	571	248	6 834	323	3 251	5 345	16 572
1976	730	207	7 612	979	3 521	5 996	19 045
1977	572	198	8 795	1 113	4 304	7 461	22 443
1978	771	151	9 097	341	4 585	8 029	22 974
1979	644	198	9 901	73	4 956	9 181	24 953
1980	1 052	315	10 779	240	4 972	10 424	27 782
1981	1 126	515	11 460	332	4 935	11 445	29 813
1982	1 300	548	12 484	184	5 897	13 242	33 655
1983	1 400	564	13 025	109	6 625	14 492	36 215
1984	2 974	610	13 413	163	7 925	16 123	41 208
1985	2 235	521	10 985	253	8 290	18 112	40 396
1986	2 137	469	9 172	111	6 786	17 719	36 394
1987	2 077	526	12 016	457	7 672	19 077	41 825
1988	2 266	678	13 079	780	8 637	20 538	46 055
1989	2 141	705	12 809	327	8 534	21 410	45 839
1990	2 184	496	10 362	298	7 462	21 340	42 142
1991	2 290	426	10 850	232	7 548	22 480	43 826
1992	2 344	471	10 022	233	8 419	23 752	45 241
1993	2 416	506	7 004	178	8 428	24 194	42 726
1994	2 672	1 208	5 170	164	8 502	28 207	45 923
1995	2 578	1 304	6 707	117	9 597	26 201	46 504
1996	2 864	1 370	6 984	176	9 719	25 794	46 906
1997	2 986	1 327	9 012	106	9 820	26 258	49 508
1998	2 597	1 433	12 342	546	9 795	25 963	52 677

Sources: Natural Resources Canada; Statistics Canada.

TABLE 7. COAL DEMAND, 1989-98

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
	(000 tonnes)									
THERMAL ELECTRIC										
Canadian	37 447	35 858	36 413	38 612	38 470	42 017	41 289	41 260	41 469	40 601
Imported	8 392	6 284	7 413	6 629	4 256	3 906	5 215	5 646	8 036	12 075
Total	45 839	42 142	43 826	45 241	42 726	45 923	46 504	46 906	49 505	52 677
METALLURGICAL										
Canadian	–	–	–	–	–	227	288	101	–	–
Imported	5 918	4 996	4 906	4 886	4 665	4 552	3 901	4 345	4 490	4 119
Total	5 918	4 996	4 906	4 886	4 665	4 779	4 189	4 446	4 490	4 119
GENERAL INDUSTRY										
Canadian	608	465	461	602	664	541	769	770	578	539
Imported	1 430	1 433	980	954	924	1 105	1 312	1 389	1 162	1 512
Total	2 038	1 898	1 441	1 556	1 588	1 646	2 080	2 160	1 739	2 051
EXPORTS										
Canadian	32 827	31 009	34 112	28 097	28 313	31 746	33 992	34 459	36 182	34 179
TOTAL										
Canadian	70 882	67 332	70 986	67 311	67 447	74 531	76 338	76 591	78 228	75 319
Imported	15 740	12 713	13 299	12 469	9 845	9 563	10 428	11 380	13 688	17 706
Total demand	86 622	80 045	84 285	79 780	77 292	84 094	86 766	87 971	91 916	93 025

Sources: Natural Resources Canada; Statistics Canada.
– Nil.
Note: Numbers may not add to totals due to rounding.