

Coal Resources

Abstract

Canada has about 1% of the world's coal resources. Ninety-seven per cent of Canada's coal is found in the Western Provinces, although it is also found in Ontario, Nova Scotia and New Brunswick. There are coal resources in Northern Canada, but they are not well explored. Coal is used to generate electricity (thermal or steam coal) and to make steel (metallurgical or coking coal, used to produce the coke that, in turn, serves as a heat source and reducing agent in the steel manufacturing process). Depicted on the map are the major coal deposits in Canada, categorized by rank, and the locations of major coal fields and coal mines, major coal transportation routes and major coal-powered electrical generating stations.

Coal is classified, based on the pressure and temperature (metamorphism) to which it has been subjected, into four types or ranks. These are, from lowest to highest metamorphism, lignite, sub-bituminous, bituminous and anthracite. Colour and hardness increase with rank. Anthracite and bituminous are hard and referred to as 'black coals', compared to sub-bituminous and lignite, which are soft and referred to as 'brown coals'. There are no anthracite coal mines in Canada. Bituminous coal is used for both metallurgical and thermal purposes, and sub-bituminous and lignite are used only for thermal purposes. The coal fields on the map are areas in which coal deposits of possible economic value occur in relatively close proximity. More than 90% of Canada's coal resources are found in the Western Canada Sedimentary Basin, one of the country's seven major basins of sedimentary rock, deposited during the past 500 million years, that possess fossil fuels (coal, oil or natural gas).

Anthracite is the highest ranked coal as it has the highest carbon content and is the hardest. Deposits are found in remote areas of northwestern British Columbia and in the Yukon. Bituminous coal has slightly less carbon content than anthracite, is generally low in moisture and contains small amounts of hydrogen and oxygen. Bituminous coal is divided into high, medium and low ranks based on volatility, which is a measure of the amount of liquid and gas that can be distilled from the coal. Low-volatile bituminous is the highest ranked bituminous coal. Bituminous coal is found in Alberta, British Columbia, Nova Scotia, New Brunswick and Newfoundland. Sub-bituminous coal has a higher moisture content and is softer than bituminous, and displays properties of both lignite and bituminous coals. This type is mined only in Alberta. Lignite is the lowest ranked of all coals. It is brownish black in colour and has a high moisture content relative to the other types. Lignite is found in southern Saskatchewan, southeastern Alberta and southwestern Manitoba.

More than 90% of Canada's coal resources are found in the Western Canada Sedimentary Basin, which extends from the Canadian Shield to the Rocky Mountains through Manitoba, Saskatchewan, Alberta and northeastern British Columbia. The

resources are distributed as follows: 45% are sub-bituminous deposits in Alberta, 14% are lignite in Saskatchewan, and the remaining 41% are bituminous and semianthracite. The coal in this region is Late Jurassic to Tertiary in age, younger than the coal found in Atlantic Canada, which is Late Carboniferous (Figure 1). Coal resources are also found in the foothills and mountains along the border between Alberta and British Columbia. Resources found along the coastline of Vancouver Island, in the Queen Charlotte Islands and on the coastal mainland of southwestern British Columbia are late Mesozoic and Tertiary age. There are also significant coal resources in the Yukon, Northwest Territories and the Arctic Archipelago that are Devonian to Tertiary in age.

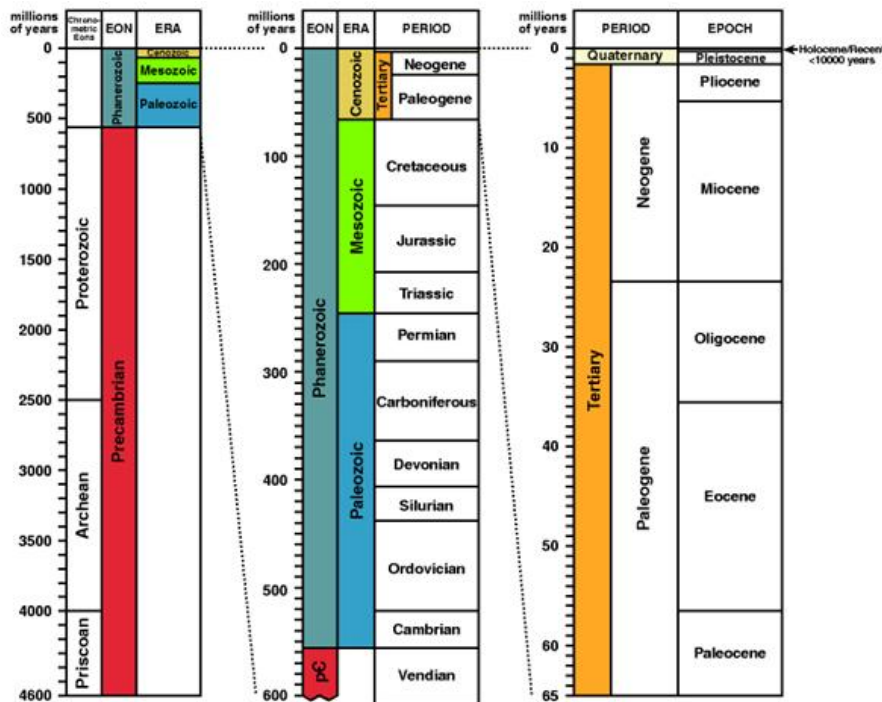


Figure 1. Geological Time Scale

Source: Copyright © 1996 by macrae@geo.ucalgary.ca

The first coal mine was established in 1639 at Grand Lake (now New Brunswick). Coal supplied 50% of Canada's energy needs prior to the first large-scale commercial production of oil and gas in Leduc, Alberta in 1947, but now only supplies only 12% of our energy needs. In 2007, 5844 people were employed in coal mining, producing approximately 70 million tonnes of coal. About 60% of the production was thermal coal and 40% was metallurgical (coking) coal. At the end of 2007 there were 22 coal mines in operation, including 18 large-scale mines in Western Canada. The eight mines in British Columbia produce bituminous coal for both thermal and metallurgical

uses. There are nine mines in Alberta, four producing bituminous coal for thermal use and five producing sub-bituminous coal. The three mines in Saskatchewan produce lignite for thermal use.

In 2007, there were 20 coal-fired generating stations. Coal-fired power generation is an important source of electricity in a number of Canadian provinces (Table 1), accounting for just over 50% of the electricity generated in Nova Scotia and Alberta, and 46% in Saskatchewan.

Table 1. Coal-fired Power Generation, 2006

Province or Territory	Total (Megawatts)	Coal (Megawatts)	Percentage of Total Capacity
Canada	123792	16272	13
British Columbia	14828	0	0
Alberta	11736	6217	53
Saskatchewan	3879	1800	46
Manitoba	5629	98	2
Ontario	32521	6329	19
Quebec	40219	0	0
New Brunswick	4549	541	12
Nova Scotia	2463	1288	52
Prince Edward Island	171	0	0
Newfoundland and Labrador	7494	0	0
Nunavut	54	0	0
Northwest Territories	142	0	0
Yukon	108	0	0

Source : Statistics Canada / National Energy Board

There are three coal export terminals in British Columbia, two in Vancouver and one in Prince Rupert. Westshore, located in Vancouver, is the busiest coal export terminal in North America. The other two export terminals are Neptune (North Vancouver) and Ridley (Prince Rupert). The three major coal import terminals in Canada are at Thunder Bay, Nanticoke (both in Ontario) and Sydney, Nova Scotia. Logistec Corporation operates the coal import facility at Sydney, which services the Lingan generating station. The Port of Nanticoke handles coal for the Nanticoke generating station, situated on the shore of Lake Erie and the largest coal-fired power plant in North America. Canadian National Railway Company (CN) transports coal from mines in northern British Columbia and west of Edmonton to all three export terminals. Canadian Pacific Railway (CP Rail) services coal mines in the southern British Columbia owned by the Elk Valley Corporation and mines in southern Saskatchewan.

In 2007, Canada exported approximately 25.4 million tonnes of coal valued at \$2.9 billion (Figure 2). While Canada is a mid-size world coal producer, it is a significant exporter of metallurgical coal, which accounts for about 90% of Canada's coal exports. Asia is the largest export market for Canadian coal. Canada also exports to

Europe, the United States and Latin America. Canada imported approximately 19.0 million tonnes of coal in 2007, of which about 80 per cent was thermal coal for electricity generation in Ontario, Nova Scotia and New Brunswick. Most of the imports were from the United States, with smaller volumes from Colombia, Venezuela and Russia.

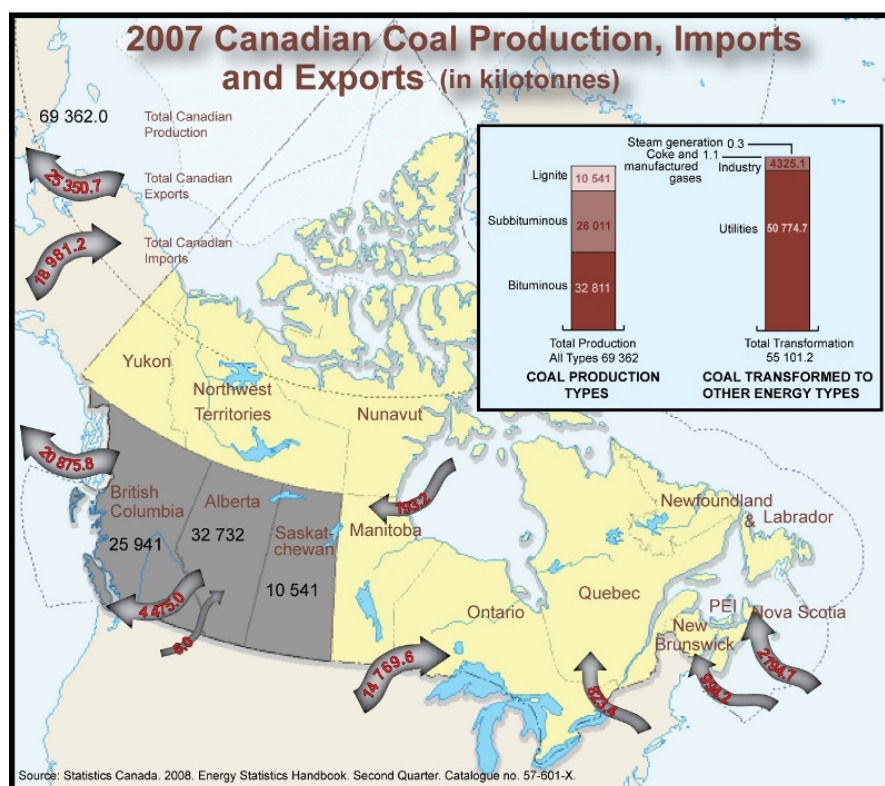


Figure 2. 2007 Canadian Coal Production, Imports and Exports

Source: Statistics Canada. 2008. Energy Statistics Handbook. Second Quarter. Catalogue No. 57-601-X.

Map Sources

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Natural Resources Canada. Minerals and Metals Sector
<http://www.nrcan-rncan.gc.ca/mms-smm/index-eng.htm>

Provincial/Territorial Government

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<http://www.energy.gov.ab.ca/coal/coal.asp>

British Columbia. Energy, Mines and Petroleum Resources. Coal in British Columbia
<http://www.energy.gov.ab.ca/coal/coal.asp>

Saskatchewan Energy and Resources. Coal

<http://www.ir.gov.sk.ca/Default.aspx?DN=3549,3541,3538,3385,2936,Documents>

Other

Canadian Coal Association

<http://www.coal.ca/content/>

Centre for Energy

<http://www.centreforenergy.com/AboutEnergy/>

