

Copper

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1998 production:	\$1.69 billion
World rank (mine production):	Third
Exports (concentrate and unwrought):	\$1.83 billion

Canada	1998	1999 ^e	2000 ^f
	(000 tonnes)		
Copper mine production	692	625	677
Refined copper production	562	556	608
Refined consumption	246	264	288

^e Estimated; ^f Forecast.

Copper's properties, particularly its high electrical and thermal conductivity, good tensile strength, elevated melting point, non-magnetic properties and resistance to corrosion, make it and its alloys very attractive for electrical transmission, water tubing, castings and heat exchangers. Copper is the most efficient conductor of electrical power, signals and heat of all the industrial metals. In Canada, more than half of the refined copper consumed annually is used for electrical applications, mostly as wire.

ANNUAL AVERAGE SETTLEMENT PRICES, LONDON METAL EXCHANGE

1995	1996	1997	1998	1999 ^e
(US\$/t)				
2 930	2 294	2 276	1 654	1 570

^e Estimated.

CANADIAN OVERVIEW

- Low copper prices forced the joint owners of the Highland Valley copper mine to suspend production on May 15, 1999, following unsuccessful attempts to secure a new labour agreement with the United Steelworkers of America that would have included wage concessions required to keep the mine profitable. At the time of closure, copper prices were at US65¢/lb, below the mine's estimated cash production cost of US68¢/lb. On August 30, 1999, employees ratified a collective bargaining agreement and labour-related terms of an economic plan prepared by the British Columbia Job Protection Commission that included discounts on wages, electricity and other supplies, allowing the mine to re-open. Highland Valley is owned by Cominco Ltd. (50%), Rio Algom Ltd. (33.6%), Teck Corporation (13.9%) and Highmont Mining Co. (2.5%).
- In mid-April, Royal Oak Mines Inc., the owner of the Kemess copper-gold mine in north-central British Columbia, was forced into receivership after a lengthy struggle against the combined effects of low metal prices and a high debt load. In October, Northgate Exploration Ltd. reached an agreement with the court-appointed interim receivers, PricewaterhouseCoopers, to purchase the mine. The mine reached commercial production levels in October 1998 and is expected to produce an average of approximately 7800 kg/y of gold and 27 000 t/y of copper over a mine life of approximately 16 years.
- Production at Boliden Limited's Myra Falls underground zinc-copper mine on Vancouver Island resumed at the end of March 1999 after a three-month shut-down to carry out rehabilitation and development work to address challenging ground conditions in the Battle zone. The mine produced 15 500 t of copper in concentrate in 1998.
- Hudson Bay Mining & Smelting (HBMS) announced plans to develop its new 777 deposit near Flin Flon, with production expected to begin in 2003. Production from 777 will replace output from other mining operations in the area that are scheduled to close due to the exhaustion of ore reserves. The deposit is estimated to contain a

resource of about 14.5 Mt grading 2.9% copper and 5.0% zinc, plus gold and silver.

WORLD OVERVIEW

- In the United States, Broken Hill Proprietary Co. (BHP) announced in June that it would close its Robinson and San Manuel mine operations and its 340 000-t/y San Manuel smelter and refinery. Phelps Dodge also announced in June the temporary closure of its Hidalgo smelter and the smaller of two concentrators at its Morenci, Arizona, mining complex. In July, Asarco announced that it would reduce production at its Mission mine by about 25 000 t/y.
- In September, Phelps Dodge agreed to purchase Cyprus Amax for US\$1.8 billion. Phelps Dodge's actions were prompted by an announcement in July by Asarco and Cyprus that they intended to merge. Phelps Dodge had originally bid to take over the merged Cyprus/Asarco; however, Asarco backed out of the deal in October and accepted an improved offer by Grupo Mexico to purchase its assets for US\$1.18 billion. As a result of these mergers, Phelps Dodge will rank as the world's second-largest copper producer behind the Chilean state-owned producer Codelco (Corporacion Nacional del Cobre de Chile) and followed by Grupo Mexico.
- In January, commercial production began at the US\$1.76 billion Collahuasi copper mine in Northern Chile owned by Falconbridge (44%), Minorco SA (44%) and a consortium of Japanese companies (12%) that includes Mitsui and Co., Ltd., Nippon Mining & Metals, and Mitsui Mining & Smelting Co. Ltd. The mine expects to produce close to 440 000 t of copper in concentrate and 50 000 t of copper cathode in 1999.
- Production at the US\$1.3 billion Los Pelambres mine, located 200 km north of Santiago, Chile, began in November. The 246 000-t/y mine is a joint venture between Anaconda Chile S.A. (60%) and a Japanese consortium (40%) that includes Nippon Mining, Marubeni, Mitsui, Mitsubishi Material Corp., and Mitsubishi Corp.
- The Batu Hijau copper-gold mine in Indonesia also began production in November. The mine is expected to produce an average of about 270 000 t/y of copper and 14 900 kg/y of gold in the first five years of the mine life. The project is owned by Newmont Mining Corporation (45%), Sumitomo Corporation (35%) and P.T. Pukuafu Indah (20%).

CONSUMPTION OUTLOOK

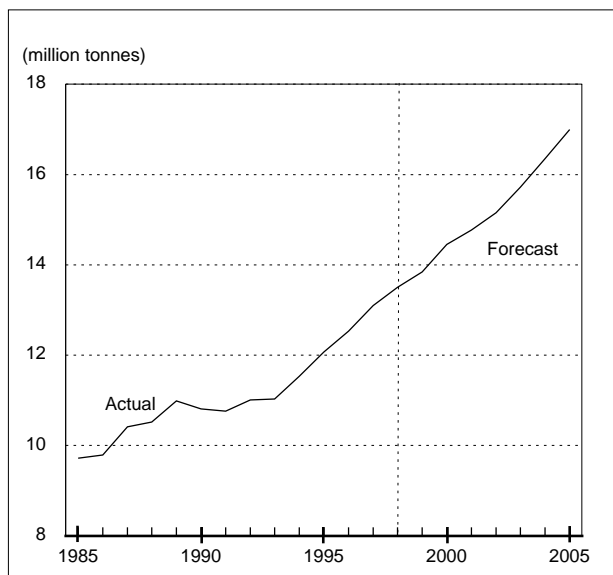
World refined copper consumption is expected to rise by 2.5% to 13.8 Mt in 1999 from 13.5 Mt in 1998. Higher-than-expected demand in Asia, particularly from South Korea and Taiwan, will offset the continuing contraction in Europe. Demand growth in the United States of 3.4%, while still positive, has slowed. World consumption is forecast to rise 4.4% in 2000 to 14.4 Mt on the strength of a recovery in demand in Europe and continuing steady growth in Asia and the United States. For the period 2001-05, copper consumption is expected to grow at an average annual rate of about 3.3%.

The largest increases in copper consumption will occur in the construction, transportation, and electrical and electronics industries. China and India are expected to account for a significant portion of this growth.

A number of promising new markets for copper could provide significant growth opportunities. These include certain roofing applications, fire suppression systems, natural gas systems, solar power generation, data communications, and the storage of spent nuclear fuel.

While aluminum has largely replaced copper in original-equipment automotive radiators, new fabrication techniques such as no-flux brazing could allow copper to regain a significant share of this important market. In addition, the expected increase in the

Figure 1
World Copper Consumption, 1985-2005



Source: Natural Resources Canada.

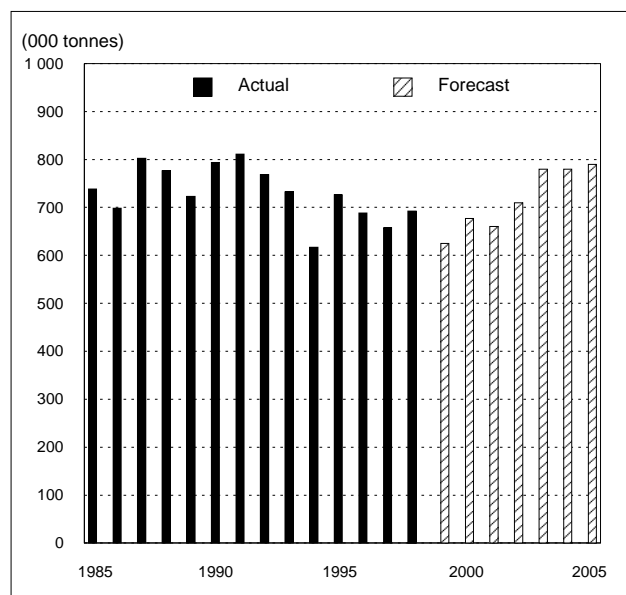
number of electrical circuits in automobiles could provide a significant boost for copper demand. In recent years, there has been a noticeable increase in the intensity of copper use in residential applications in North America. Part of this change is attributable to the construction of larger houses and the growth of home-based offices.

CANADIAN PRODUCTION OUTLOOK

Canadian copper mine production decreased in 1999 due to the temporary closure of the Highland Valley and Myra Falls mines in British Columbia and the permanent closure of the Gaspé mine in Quebec.

Mine output in 2000 is expected to recover to pre-1999 levels based on steady output from HBMS and full production at the Kemess, Myra Falls and Highland Valley mines. In the longer term, Canadian copper mine production should recover to annual output levels approaching 800 000 t. Possible new projects include the Wolverine prospect in the Yukon; the Red Chris, Prosperity and Tulsequah Chief projects in British Columbia; and the Voisey's Bay project in Labrador.

Figure 2
Canadian Mine Production of Copper, 1985-2005



Source: Natural Resources Canada.

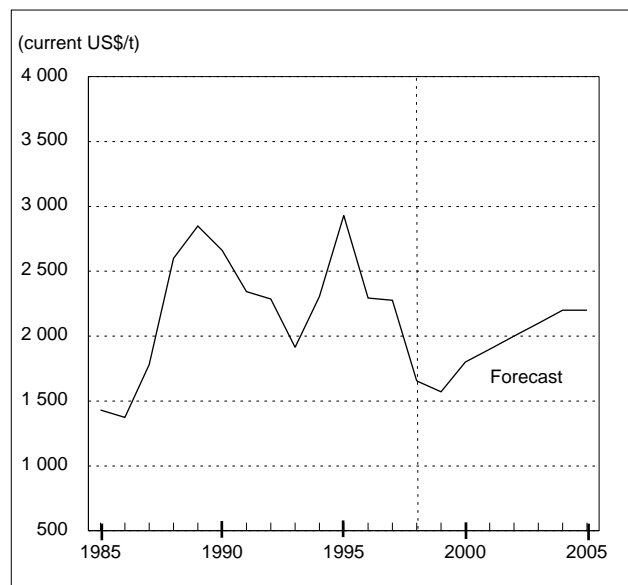
PRICE OUTLOOK

The combined effect of production cuts and growth in all of the major consuming regions should result in a more balanced metal market in 2000. A copper metal

surplus of between 250 000 and 300 000 t is forecast in 1999, while the metal balance is expected to range between +100 000 t and -100 000 t in 2000.

The recovery in copper prices that began in mid-1999 is forecast to continue into 2000; however, any significant increases above the US\$1900/t level (US86¢/lb) could trigger mine re-openings and producer forward hedge selling, thereby limiting upside potential. In 2000, copper is expected to trade within a range of US\$1750 and \$1850/t (US79¢ and 84¢/lb). For the period 2001-05, prices are expected to trade in a range between US\$1800 and \$2200/t (US\$0.82 and \$1.00/lb).

Figure 3
Copper Prices, 1985-2005
Annual LME Settlement



Source: Natural Resources Canada.

Note: Information in this article was current as of November 19, 1999.

NOTE TO READERS

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