

Copper

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1999 production:	\$1.69 billion
World rank (mine production):	Fourth
Exports (concentrate and unwrought):	\$1.83 billion

Canada	1999	2000 ^e	2001 ^f
	(000 tonnes)		
Copper mine production	614	640	630
Refined copper production	549	557	608
Refined consumption	264	278	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

1996	1997	1998	1999	2000 ^e
(US\$/t)				
2 294	2 276	1 654	1 572	1 827

^e Estimated.

CANADIAN OVERVIEW

- In March 2000, Cambior Inc. announced the sale of its Bouchard-Hebert and Langlois mining operations, located in northwestern Quebec, to Breakwater Resources Ltd. for US\$48 million. Both mines produce zinc and copper concentrates containing silver and gold. In 1999, the Bouchard-Hebert mine produced 7200 t and the Langlois mine produced 1000 t of copper in concentrate.
- In June, Inco Limited announced it will proceed with a plan to develop a high-grade nickel deposit at its McCreedy East mine at a cost of \$46 million. The project will enable the mine to increase its production rate by 60% from 2700 t/d to 4350 t/d by late 2004. Copper-in-concentrate production will rise from 37 200 t/y to 41 800 t/y.
- In July, Falconbridge announced it will proceed with a \$640 million project to extend the depth of its Kidd Creek mine in Timmins, Ontario, by 1000 m to a total depth of 2700 m. At the new depth, the Kidd Creek mine will be the world's deepest base-metal mine. Stage 1 of the project, set to begin in 2004, will increase the mine's depth to 2700 m and give access to an estimated 15.7 Mt of ore at an average grade of 5.74% zinc, 2.82% copper and 58 g/t silver. Stage 2, to begin in 2009, will give access to a further 10.5 Mt grading 5.27% zinc, 2.2% copper and 97 g/t silver.
- A strike by workers at Falconbridge's copper-nickel smelter in Sudbury, which began on August 1, forced the company to close the smelter for a period of 14 days and declare a partial force majeure on copper shipments from its Nikkelverk smelter/refinery in Norway. Production was restarted on August 17. During the third and fourth quarters, the smelter was operated by management staff and other employees at about 50% capacity. As of late November, the labour dispute had not yet been resolved and the partial force majeure on copper deliveries from the Nikkelverk refinery was still in force.
- A series of explosions in the main smelting furnace at Hudson Bay Mining and Smelting Co. Limited's Flin Flon, Manitoba, metallurgical

complex on August 8 forced the company to shut down copper smelting operations and declare force majeure on copper shipments for a period of almost three months. The explosion was triggered when water being used to cool the furnace in preparation for rebricking came into contact with molten metal. One worker was killed and thirteen others were injured. Force majeure was lifted on November 27. The rated capacity of the smelter is 90 000 t/y of copper.

- In October 2000, Cominco Engineering Services signed a memorandum of understanding with Gibraltar Mines Limited, owned by Taseko Mines Limited, to commence a \$3 million study to investigate the feasibility of constructing a 35 000-t/y copper refinery at the Gibraltar mine site near William Lake, British Columbia. The refinery would use Cominco's hydro-metallurgical technology to leach copper concentrate. The study will be completed in early 2001.

WORLD OVERVIEW

- The Corporacion Nacional del Cobre de Chile (Codelco-Chile) announced in January that it will expand production at the El Teniente Division by 140 000 t/y to 490 000 t/y by 2004.
- In February, Noranda Inc. announced plans to proceed with a US\$170 million, two-stage expansion of its Altonorte smelter in northern Chile. The first stage will involve a technology upgrade of some equipment by the end of 2001. The second stage comprises an expansion from 160 000 to 290 000 t/y of anode and blister and will be completed in early 2003.
- In Japan, Sumitomo Metal Mining announced plans in April to raise copper production from 230 000 t/y to 400 000 t/y by 2005.
- In November 2000, Cambior announced the sale of its La Granja copper project in Peru to Billiton for approximately \$35 million.
- Government-owned Zambia Consolidated Copper Mines (ZCCM) completed the privatization process of Zambia's largest and most promising mining and metallurgical assets. The sale was made under two separate agreements. The first was the sale of ZCCM's Mufulira Division and part of the Nkana Division to a new company called Mopani Copper Mines, formed by a consortium comprising Canadian-based First Quantum Minerals (44%), Swiss-based Glencore (46%) and ZCCM (10%). The second transaction was the sale of the Konkola Division, including the Konkola Deep project, the Nchanga Division and the Nam-pundwe pyrite mine, to a newly formed company

called Konkola Copper Mines, owned 65% by Anglo American plc's subsidiary Zambian Consolidated Investments, 20% by ZCCM, and 15% by the World Bank's Commonwealth Development Corp. and International Finance Corporation (IFC) (7.5% each).

- In September, Furukawa announced that it expects production at the newly commissioned Port Kembla smelter to total only 30 000 t for the fiscal year ending March 31, 2001. The smelter has a production capacity of 120 000 t/y.

CONSUMPTION OUTLOOK

World refined copper consumption is expected to grow by 6.3% to 15.1 Mt in 2000 from 14.2 Mt in 1999. Growth in demand was strong in all major geographic regions with the exception of the NAFTA region (Canada, Mexico and the United States), which recorded only modest demand growth of 1.1%. Countries set to record the strongest growth in 2000 include China (20%), Thailand (17%) and Germany (15%).

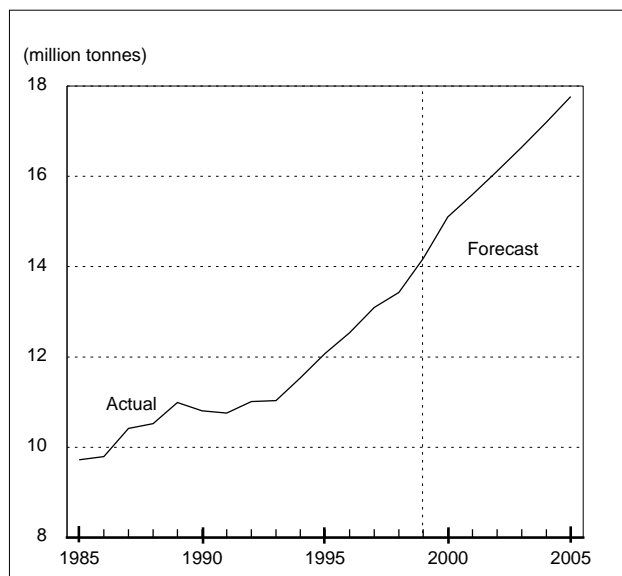
World consumption is forecast to rise by a more modest 3.2% in 2001 to 15.6 Mt based on slower demand growth in Western Europe and Asia while, in North America, continuing strong demand in Mexico (10%) will be offset by a comparatively smaller forecast increase in consumption in the United States (2.2%). Based on consumption growth rates seen during the 1990s, copper consumption is expected to grow at an average annual rate of about 3.3% between 2002 and 2005.

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. There is continuing strong growth in demand for air conditioning in countries with hot climates, particularly across Asia, Mexico and the United States.

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 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

Figure 1
World Copper Consumption, 1985-2005



Source: Natural Resources Canada.

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 and home entertainment.

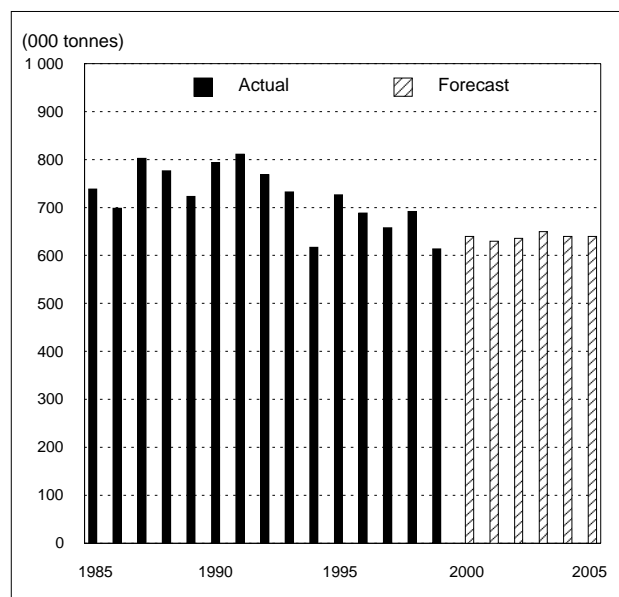
CANADIAN PRODUCTION OUTLOOK

Canadian copper mine production (recoverable copper in concentrate) is expected to total approximately 640 000 t in 2000 which, although it represents a substantial increase from the 1999 production total of 614 000 t, still falls below 1998 output of 692 000 t. Mine output in 1999 was low due to the temporary closure of the Highland Valley and Myra Falls mines and the permanent closure of the Gaspé mine in October 1999. Estimated mine production in 2001 is currently forecast at 630 000 t, slightly below the 2000 forecast level, as net reductions in output from existing mines are anticipated and no new mines are scheduled to come on stream until 2002.

Refined copper production is forecast to grow by 1.5% to 557 000 t in 2000, and by a further 9.2% to 608 000 t in 2001. The rise in production is a result of increased capacity at Noranda's CCR refinery and Falconbridge's Kidd Creek refinery.

Canadian refined copper consumption is expected to increase by 5.3% to 278 000 t in 2000 and by a further 3.6% to 288 000 t in 2001. The expected rise in demand stems from several factors. There is growing demand for power cable and building wire coming from the oil & gas and pulp & paper industries.

Figure 2
Canadian Mine Production of Copper, 1985-2005



Source: Natural Resources Canada.

Demand for use in new housing construction is also strong. In addition, Alcatel Canada Wire is set to complete the last stage of a planned expansion at its Montréal-Est rod plant by July 2000, which will lift its capacity from 200 000 t/y to 250 000 t/y.

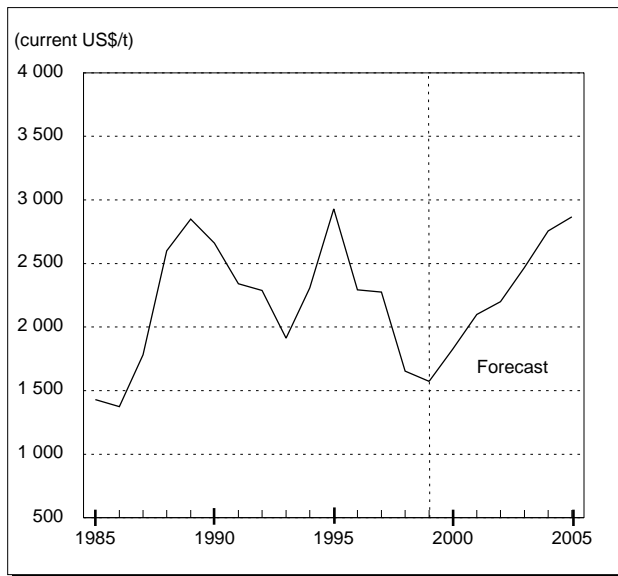
PRICE OUTLOOK

World refined copper demand will outstrip supply in 2000, resulting in a reversal of the metal surplus that has persisted in the copper market over the past four years. Having begun the year at an all-time high of 790 000 t, LME stocks had declined 49% to 377 050 t, or 4.9 weeks of consumption, by the end of October. A copper metal deficit of 340 000 t is forecast in 2000, based on an estimated increase of 2.1% in world refined production and 6.4% in world refined consumption.

Demand in 2001 will soften compared to 2000. Although growth in refined production is expected to be higher in 2001 than 2000, there is a general consensus that there are not enough new mine projects coming on stream over the next three years to meet demand growth. This should result in a continued metal deficit through to 2003 and a continuing recovery in prices. In 2001, a metal deficit of 250 000 t is forecast, based on an estimated increase of 5.2% in world refined production and 2.7% in world refined consumption.

In 2001, the price of LME-grade copper is expected to average US\$2100/t (US95¢/lb). For the period 2002-05, prices are expected to trade in a range between US\$2205 and \$2866/t (US\$1.00 and \$1.30/lb).

Figure 3
Copper Prices, 1985-2005
Annual LME Settlement



Source: Natural Resources Canada.

Note: Information in this article was current as of November 30, 2000.

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