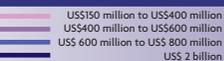


Thousand metric tons, situation in 2003.



Trade flows of copper in value, 2002.



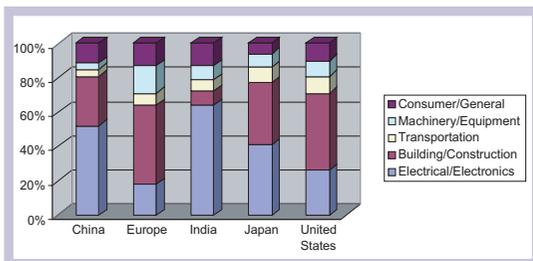
Production, consumption and trade of copper.

Copper's chemical, physical and aesthetic properties make it a material of choice in a wide range of applications. Copper is durable, ductile, corrosion-resistant, malleable and an excellent conductor of heat and electricity. Since 1990, world copper use has grown at an average annual rate of about 3%.

Transformation's process

In nature, copper is usually found in association with sulphur. An increasing share of copper is produced from acid leaching of oxidized ores. Copper deposits often also contain other base metals such as lead and zinc, or precious metals such as gold and silver. Vein deposits, where the copper is concentrated in relatively narrow slices or strings in the surrounding rock, once formed the basis of copper mining, but in the last few decades, porphyry copper ores, where the ore mineral is more evenly dispersed in the rock, have assumed greater importance.

Copper usage by end use sector (% , estimated)



Source: International Copper Study Group.

After the ore is extracted, it is processed to form a concentrate containing 18% to 45% copper. Alternatively, copper can be leached out of the rock or ore. Minerals can be processed into metal by two methods: leaching and electrowinning, or smelting and refining. Leaching and electrowinning is used primarily with oxidized ores. Smelting and refining, where ores and concentrates are charged into smelting furnaces to separate the copper from other materials and to form blister (97%–99%) copper, is a more traditional but continually evolving process. Blister copper is transformed into refined copper by electrolytic means or by fire refining. A large portion of copper used – about 40% – comes from recycled materials.



Copper is mainly mined in large open-pit mines. The Bingham Canyon mine in Utah, the United States, shown in the picture, has been in operation since 1906 and is the world's largest excavation.

Environmental issues

Copper mining and processing present environmental challenges. In addition to issues common to all mining operations, sulphide minerals in the copper ore can damage surface and ground water if they escape from operations or if closed mines are infiltrated by ground water. Smelting of copper concentrate can cause sulphides to be released into the air. Technologies for dealing with these problems have evolved considerably in recent years.

Trade and prices

The most important copper products in international trade are concentrate (28% of world trade in terms of volume), blister copper (5%), refined copper (about 48%) and scrap (an estimated 19% of world trade). In addition to refined copper, trade in semi-fabricated products has increased rapidly in the past couple of decades.

In the nineteenth century, price variations during the three months that it took to ship copper from Chile, the main supplier of copper at the time, to England, the main centre of consumption, caused concern for traders. Thus, they began fixing prices for delivery three months in the future and eventually established the London Metal Exchange (LME), the first modern commodity exchange, to handle this trade in an organized manner. Today, the LME copper price is generally used as a basis for contracts. Other major exchanges include the New York Mercantile Exchange's COMEX Division and the Shanghai Metals Exchange. Price fluctuations are still important, both in the short and long term, and the need for mechanisms to deal with such variations remains.

Copper is an important source of foreign exchange earnings for several developing countries, including Chile, Kazakhstan, Mongolia, Papua New Guinea, Peru and Zambia. In recent decades, Chile has emerged as the world's largest copper mining country, accounting for 36% of mined production. Today, Asia is the fastest-growing region in terms of demand. Rapidly industrializing countries in East Asia, particularly China, represent an increasing share of global copper use. China's share of world use increased from 10.5% in 1998 to 19.5% in 2003.

Industry

The 10 largest copper mining companies account for close to 60% of world production. Most of them operate mines in several countries.

The world's 10 largest copper mining companies, 2002

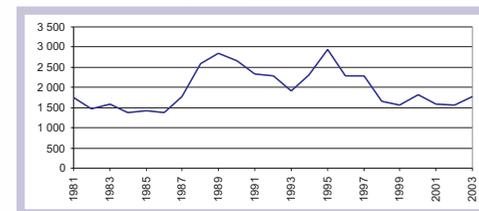
Company	Country	Controlled production (thousand metric tons)	Share of world output (per cent)
Corporación Nacional del Cobre de Chile	Chile	1,630.9	12.1
Phelps Dodge Corp.	United States	969.4	7.2
Grupo México SA de CV	Mexico	847.6	6.3
BHP Billiton Ltd.	Australia	831.9	6.2
Rio Tinto plc	United Kingdom	759.2	5.6
Freeport McMoran Copper & Gold Inc.	United States	716.4	5.3
Anglo American plc	United Kingdom	714.7	5.3
KGHM Polska Miedz SA	Poland	505.0	3.7
Noranda Inc.	Canada	475.3	3.5
Antofagasta plc	United Kingdom	438.7	3.3
Total, 10 largest		7 888.9	58.5

Source: Raw Materials Group, Stockholm, 2003.

International cooperation

The International Copper Study Group (ICSG), established in 1992, is an intergovernmental organization dedicated to increasing transparency in the copper market, conducting studies and promoting international cooperation on issues related to copper. The ICSG produces statistics on copper production, usage and trade, price series, and information on copper mines and plants. It also produces supply and demand forecasts. The ICSG follows economic and regulatory issues (mostly environmental and health ones) of interest to the copper sector, and it sponsors market studies.

Annual average London Metal Exchange Grade A cash prices, 1981–2003 (US\$/metric ton)



To learn more

International Copper Study Group
www.icsg.org

Comisión Chilena del Cobre (Chilean Copper Commission)
www.cochilco.cl

Copper Development Association (United Kingdom)
www.cda.org.uk

US Geological Survey
http://minerals.usgs.gov/minerals/pubs/commodity/gold