



## **COMMODITY PROFILE- COPPER**

Copper, also known as Cu, is one of the oldest elements. It is reddish with a bright metallic lustre colored solid. Copper occurs naturally in the Earth's crust in a variety of forms. It can be found in sulfide deposits, carbonate deposits, in silicate deposits and as pure "Native" copper. From these, copper is obtained by smelting, leaching, and electrolysis. 80% of copper cathodes outputs are refined from the sulfide concentrate, though the copper content is only 2-3%.

It is well known as the red metal because of its colour, and equally well accepted as a green metal. Green because copper is durable, easily re-melted or re-refined, and economic to recycle. Its availability comes in bars, beads, sheets, wire, rods, plates and powder.

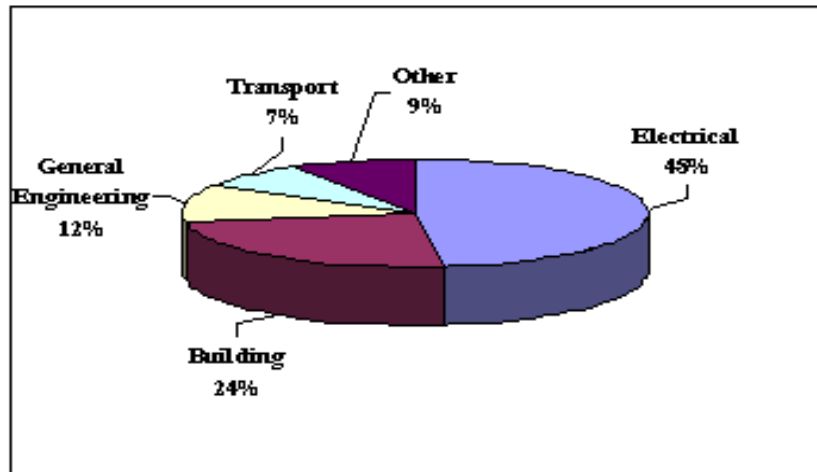
### **Properties & Uses**

As a metal, it has many unique and beneficial properties in the world today. Copper's chemical, physical and aesthetic properties make it a material of choice in a wide range of domestic, industrial and high technology applications. The reason copper is so widely used is because it's flexible and manageable.

Copper is second to silver in its conductivity of electricity and heat. Copper is ductile, corrosion resistant, malleable and an excellent conductor of heat and electricity. Along with being an attractive metal, copper is a very durable one. This is the reason that it is used for coins, eating utensils, and ornamental objects. Alloyed with other metals, such as zinc (to form brass), aluminum or tin (to form bronzes), or nickel, for example, it can acquire new characteristics for use in highly specialized applications. In fact, society's infrastructure is based, in part, on copper.

One of its main industrial usages is for the production of cable, wire and electrical products for both the electrical and building industries. The construction industry also accounts for copper's second largest usage in such areas as pipes for plumbing, heating and ventilating as well as building wire and sheet metal facings.

**Fig. 1: Copper Uses in different Industries (%)**



Copper uses account for 48% in electrical products, 24% building industries, 12% in general engineering and 7% in transportation materials.

### **Types of Copper Production**

Depending on the source of material used, copper production is divided into two groupings:

- i) Primary production-** from concentrates and precipitates, e.g. matte or cement copper (precipitated copper).
- ii) Secondary production-** from scrap materials e.g. old scrap (tubes, sheets, plates, cables, automobile radiators and other scrap from castings, electronic scrap, Cu-Fe-materials, catalysts etc.), new scrap (turnings and other scrap from first and second processing stage) and residues e.g. flue dust, slag, ashes, drosses.

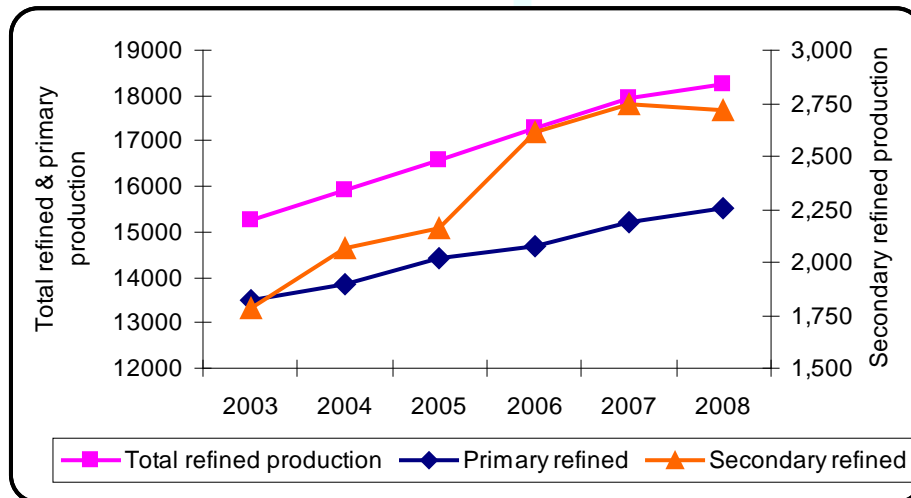
## Global Scenario

Although copper is not the largest base-metal market (aluminum is way bigger), nor the most valuable of the primary base metals (nickel is worth several times more per pound), it is still arguably the most important base metal. Its role and importance can be seen in terms of metal of choice for investors and speculators.

### World Copper Production

The world mine production was at 13,757 thousand metric tonnes in the 2003 and increased to 15,464 thousand metric tonnes by 2007. The world refined production (includes both primary and secondary refined production of copper) was at 15,273 thousand metric tonnes in the 2003 and peaked to 17,945 thousand metric tonnes by 2007. In 2008, it increased to 18,244 thousand metric tones. Chile remains by far the largest mine producer of copper in the world. However, China is the biggest producer of refined copper in the world closely followed by Chile.

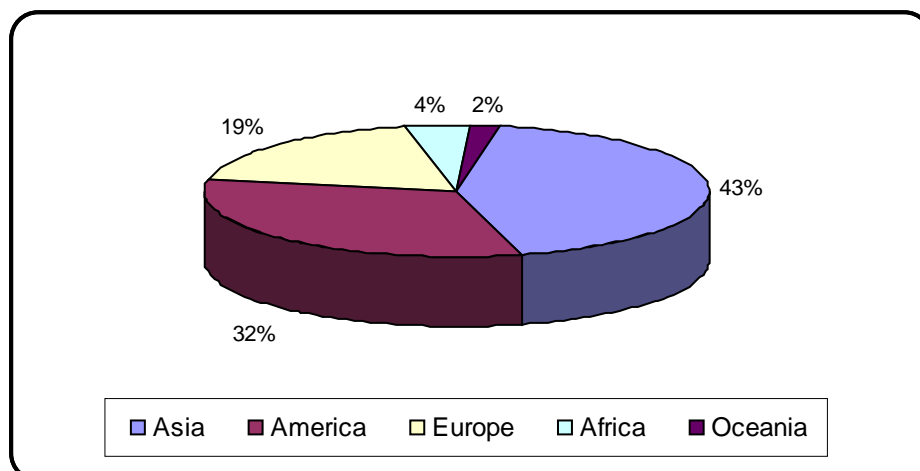
Fig. 2: World Copper Production (in '000 tons)



Source: ICSG

Global copper production is rising over the years. Out of the total refined production, primary refined output constitute major portion with the share of about 85%. The rest to the tune of 15% will be secondary refined production.

**Fig. 3: Region-wise World Copper Production**



Source: WBMS

Major copper producing regions in the world such as Asia, America and Europe have a share of 43%, 32% and 19% respectively.

**Table 1: Major Copper Producing Countries ('000 tons)**

Year	2001	2002	2003	2004	2005
<b>Chile</b>	3201	2979	3251	3776	3736
<b>Indonesia</b>	1081	1172	1006	840	1065
<b>Australia</b>	769	787	763	796	876
<b>Peru</b>	591	687	660	869	844
<b>China</b>	587	568	610	742	740
<b>Russian Federation</b>	600	695	675	675	700
<b>United States</b>	714	601	525	576	586
<b>Canada</b>	634	603	557	566	567
<b>Poland</b>	474	503	495	531	523

Source: United States Geological Survey (USGS)

Chile, Indonesia and Australia are the major copper producing countries across the globe. An average Chile, Indonesia and Australia produce 3389 thousand tons, 1033 thousand tons and 798 thousand tons respectively from 2001 to 2005.

**Table 2: Global Copper Recyclables Use from 2000 to 2005 ('000 tons)**

	2000	2001	2002	2003	2004	2005
Americas	1,563	1,352	1,344	1,242	1,313	1,373
Asia	2,867	2,765	2,828	3,154	3,518	3,676
Middle East	143	172	208	215	190	184

Europe	3,189	2,752	2,652	2,452	2,582	2,459
Africa and Oceania	121	101	91	73	70	75
<b>World Total</b>	<b>7,744</b>	<b>6,975</b>	<b>6,921</b>	<b>6,926</b>	<b>7,488</b>	<b>7,591</b>
Total scrap use year-on-year	-10%	-1%	0%	8%	1%	
Secondary refined production	2,090	1,846	1,862	1,759	2,037	2,130
Cu content of direct melt	5,654	5,129	5,059	5,167	5,451	5,461
Refined usage	15,148	14,927	15,192	15,668	16,786	16,664
Total copper usage	20,802	20,056	20,251	20,836	22,237	22,125
<b>Recycling Input Rate (RIR)</b>	<b>37.20%</b>	<b>34.80%</b>	<b>34.20%</b>	<b>33.20%</b>	<b>33.70%</b>	<b>34.30%</b>

Source: ICSG

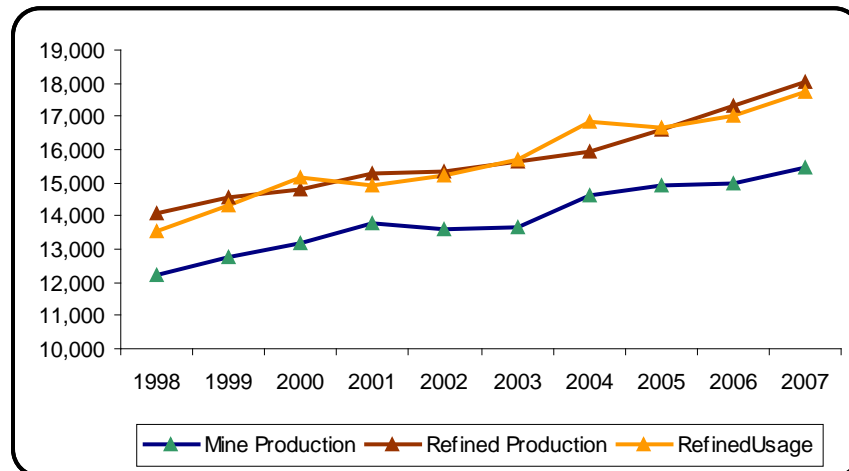
Most copper ore across the world is mined or extracted as copper sulfides from large open pit mines in porphyry copper deposits that contain 0.4 to 1.0% copper. As copper does not degrade, it can contain its chemical and physical properties even in recycled form. Recycling is a very useful method through which one can preserve the content of certain material in absolute form. Through scientific use of recycling, it is possible to extend the use of resources.

### World Copper Consumption

The demand for copper increased about 6.5 per cent to 18.175 million tonnes in 2007. As far as region-wise consumption of copper is concerned, Asia is leading almost from 1980s in the consumption of this commodity. Asia consumes over half of the world copper at approx. 52 per cent followed by Europe and America at around 28 and 18 per cent respectively. The major consuming countries are China, Europe, Japan, Russia, India and Brazil. China is the single largest consumer with about 25% of the total global demand.

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**Fig. 4: World Copper Production and Usage from 1998-2007**



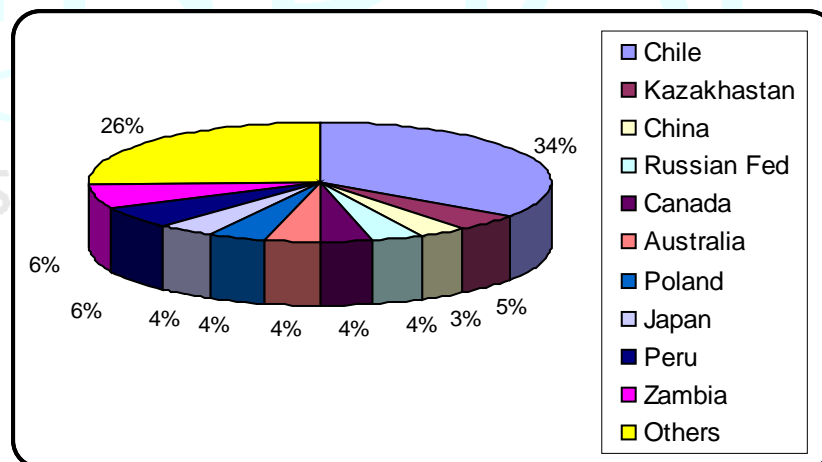
Source: ICSG

During the period between 1998 and 2007, refined copper production and also usage have witnessed strong growth. Both are moving together and not much mismatch has been witnessed between supply and demand during the period.

### Major Exporters

Global trade in copper has seen a steady growth over the years. In the world exports of copper concentrates, Chile plays a dominating role. Since 2003-04, the Chile's exports have grown steadily and have reached to 2,171 kilo tonnes by 2006-07. Other major exporters of copper concentrates include Indonesia, Peru, Australia, U.S, Canada, Papua New Guinea and Portugal.

**Fig. 5: Major Exporters of Refined Copper in 2006 ('000 tons)**



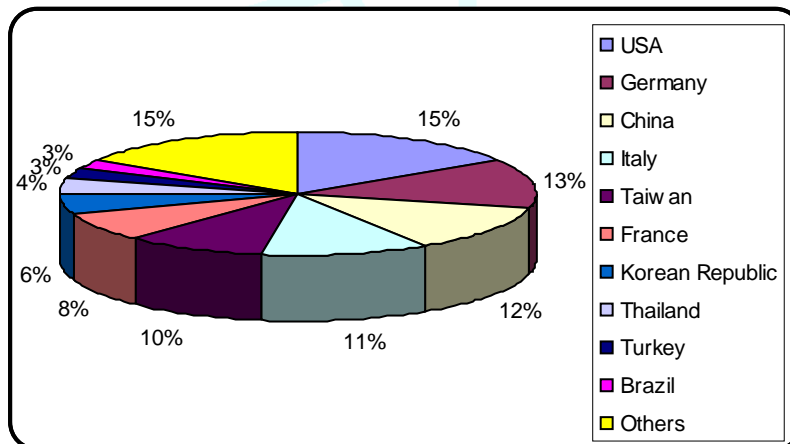
Source: ICSG

Chile also has a dominating role in exports of refined copper in the world, followed by other countries like Zambia, Peru, Kazakhstan, Japan and Poland. Among copper exporting countries, Chile account about 34% share, where as all other exporting countries have lesser than 10% share in the total global exports. With this, Chile copper supply prospects hold the key in driving global copper market.

### Major Importers

In import of copper concentrates, Japan is world's largest importer, followed by China & Korea. In 2006-07, the Japanese imports amounted to 1,32,700 tonnes while the Chinese and Korean imports were in tune of 90,800 and 36,400 tonnes respectively. Other significant importers of copper concentrates are Germany, Spain and Finland.

**Fig. 6: Major Importers of Refined Copper in 2006 ('000 tons)**



Source: ICSG

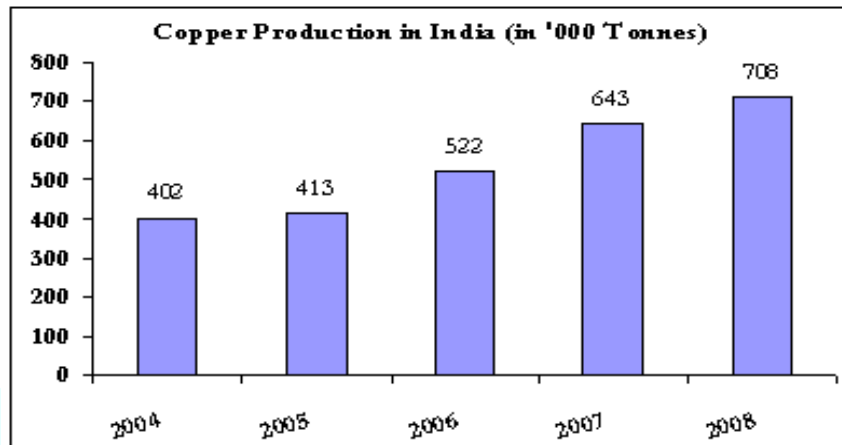
Refined copper is also traded in the world. Although the US is one among the major producers of copper after Chile, the country is the largest importer of copper with a share of 15% in global total imports. Germany, China, Italy and Taiwan are the other major importers of copper with a share of 13%, 12%, 11% and 10% respectively. USA and China are the largest importer of refined copper. USA imported 1,07,600 tonnes of refined copper in 2006-07 while Chinese imports plummeted to 82,700 kilo tonnes in 2006-07.

## Domestic Scenario

India has become one of the major players in the global copper industry mainly in recent years with its robust growth in demand. India accounts for 3 percent of the global copper output.

On the demand front, India accounted for 2.5% of world's refined copper consumption in 2006-07 (Investment commission of India). The demand in the country is increasing over the years. Gallop in copper prices in mid-2008 followed by surge in demand had been mainly attributed to strong demand growth in India and China.

**Fig. 7: Copper Production in India**



Source: ICSG

Indian Copper production has shown an increment in the last few years. The annual production of copper is approx. 708,000 tons in 2008, higher in comparison to the previous year.

### Copper Uses in India

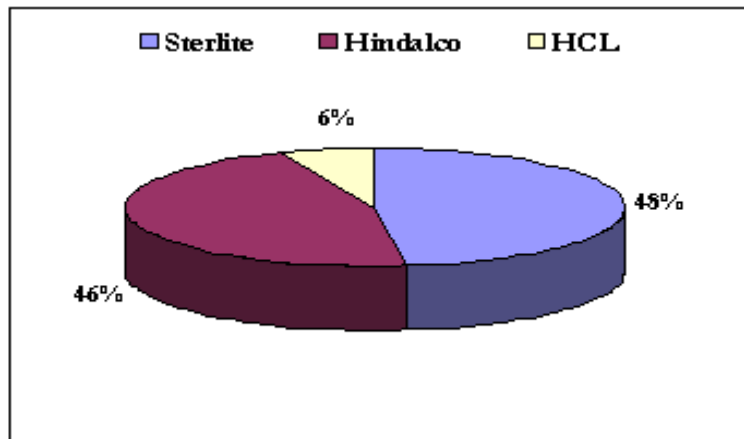
In India, copper cathodes are largely used in the manufacture of copper rods for the wire and cable industry, and copper tubes for consumer durable goods. They are also used for making alloys such as brass, bronze and alloy steel, and find application in diverse areas like defense and construction. Copper cathodes have following major applications:-

- i) Cast copper rods

- ii) Copper Wire Bars, Bus bars, Billets and Ingots
- iii) Copper based alloys and downstream products
- iv) Copper tubes, strips and foils

## Major Players in Indian Copper Industry

Fig. 8: Major Copper Companies' Share (%)



Sterlite Industries, Hindalco and Hindustan Copper Ltd. (HCL) are the top three producers of the copper in the domestic market. Sterlite and Hindalco garner more than 90% of the output.

### Copper Smelter and Refinery plant in India

- ❖ Sterlite has a copper smelter & refinery plant and copper rod plant at Tuticorin in South India and a refinery and two copper rod plants at Silvassa in Western India.
- ❖ Hindalco's division for copper business is in the coastal town of Dahej in the Bharuch district of Gujarat. Dahej plant is India's largest copper smelting and refining plant.
- ❖ India's three richest Copper belts: Malanjkhand in Madhya Pradesh, Singhbhum in Jharkhand and Khetri/Arawalli in Rajasthan. Other copper belt is Taloja Copper project in Maharashtra. HCL has full control on these copper belts.

### Copper Consumption in India

The domestic demand of copper is around 5.5 lakh tonnes. Typically, almost over 30 per cent of copper is consumed in Telecom and 26 per cent in Electrical sectors in India, 9 per

cent in building and construction and 9 per cent in engineering, 8 per cent in transport and 6 per cent in consumer durables.

The domestic demand for copper in India is expected to continue to grow in double digit over the next 4-5 years. In 2007, the demand in Indian market grew by 15% and the demand is expected to increase significantly in coming years on account of fast growth witnessed in real estate and automotive industry. India currently faces a supply shortage of copper ores, considering an annual refining capacity of around one million tonnes and a mining production of only around 35,000 tonnes of metal. The rapid demand for copper in electrification & infrastructure programs will significantly boost its consumption in India.

### **Copper Imports in India**

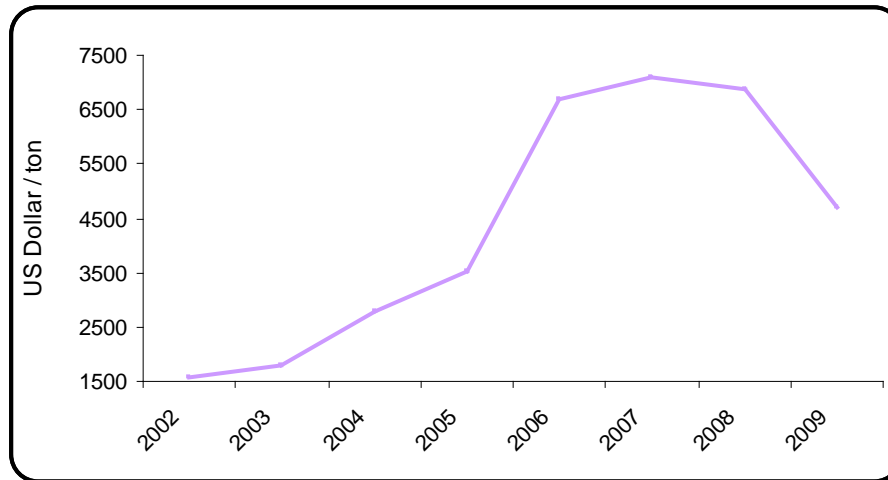
India is largely dependent in import of raw material to manufacture copper and involved in importing copper ores and extracts copper out of them. However, small quantities of copper that are produced in India are extracted from the copper mines situated at Khetri and Malanjkhand in the country. The aggregate copper ore deposits in India are around 350 million tonnes.

India imported 2,707,370.25 tonnes of copper ore and concentrates in 2006-07, a substantial increase in imports in comparison to previous year's 1,072,903.75 tonnes of copper ore and concentrates. The increase in imports is mainly attributed to growing smelting and refining activities in the country. **The major suppliers of ores and concentrates are Chile, Indonesia and Australia.**

### **Copper Prices**

Copper prices (annual average) have ruled at significantly higher levels during 2006 till 2008. After recording historical higher levels in mid 2008, prices have witnessed sharp decline due to subdued demand on global economic slowdown. Prices are witnessing recovery in recent months.

**Fig. 9: LME – Copper prices**



**Source:** LME

**Note:** Three months forward LME daily avg. prices and Jan to Sept Avg. prices for 2009

### **Factors influencing Copper Prices**

- World economic growth
- Demand from countries particularly China and India
- Demand growth rate – electronics and telecom industry
- LME, COMEX and Shanghai Copper inventories
- Freight rates
- US Dollar movements against other major currencies such as EUR, GBP.
- Government regulation on imports and duties
- Interference of government and various associations

### **References**

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- ICSG
- [www.basemetals.com](http://www.basemetals.com)
- United States Geological Survey (USGS)