

Cu

International Copper  
Association India



# COPPER

in India



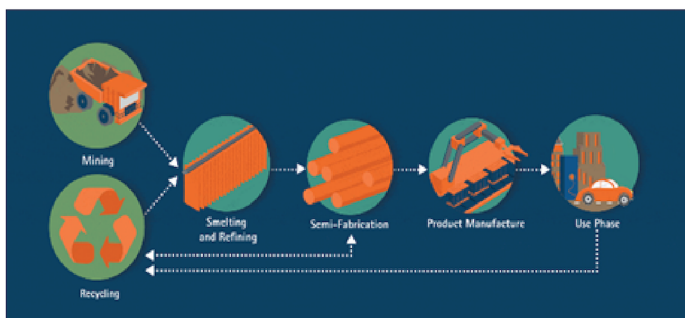
# Abstract

Copper is an important contributor to the national economies of mature, newly developed and developing countries. From its original home in the earth's crust, copper passes through several stages to reach a long life in essential products like electronics, appliances, electrical grids, vehicles and clean energy technologies.

The copper industry includes copper mines, smelters, refiners, recycling facilities (mostly direct melt in the current Indian scenario), and fabricators of semi-finished products made from copper and copper alloys, such as tubes, wire rods and bars.

Fabricated products made of copper cathode, ETP copper rods and FRHC / other remelted scrap-based rods are further used in consumer electronics, cables, motors, transformers, housing wire, railways, defence, power infrastructure, energy generation, renewable energy and IC/EV automotive.

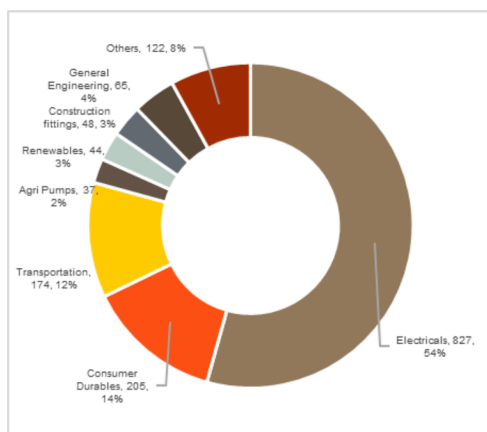
**Nearly one million people work** directly for the **Indian copper industry**, from mining to fabrication. At least **one more million people are employed** indirectly.



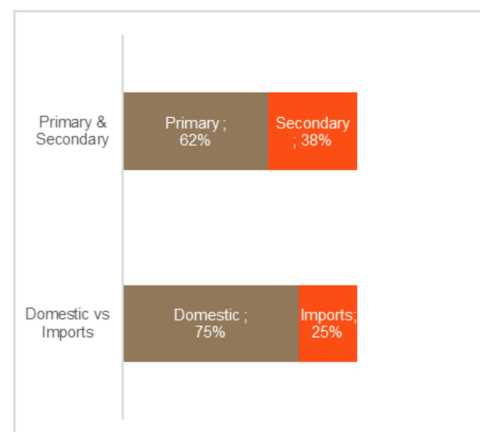
**Figure 1 – Copper production and usage**



**Figure 2 – Copper physical properties**



**Figure 3 – Copper demand in India – 1,522 KT**



**Figure 4 – Domestic vs imported Cu & primary vs secondary Cu**

## Copper mining in India

India has limited mining resources and current domestic resources can suffice only 5 % of the total requirement. Hence India is importing Copper concentrate of 26-32 % purity, and world resources are concentrated in 10 countries across the globe.

Copper Concentrate	Metal in content	Key players/regions	Employment
Domestic	25 KT	Hindustan Copper Ltd	1,349
Imports (including Cu concentrate, Anode & Blisters)	563 KT	Chile, Indonesia, Africa	NA

Table 1 – Copper raw material by source

## Refined copper production process

Two different production routes exist (pyrometallurgical and hydrometallurgical), depending on the characteristics of the raw material— sulphide or oxide ores. Production from secondary sources is fed by copper scrap. After initial treatment, which usually includes sorting and shredding, the copper scrap enters the pyrometallurgical production process at different stages. The three production routes to refined copper are shown in Figure 5.

Copper refining is concentrated in 20 countries in the world and India is fortunate to have 1 million tonnes of smelting and refining capacity, which will be 1.5 million tonnes by 2024, with the coming up of Kutch Copper Ltd (Adani Group)

Smelting converts copper concentrate(26-32%) to copper anodes (99.4-99.6 %).

Refining converts Copper anode, blister and scrap (99.4-99.6%) to 99.99% Copper\*.

\*: Not all scrap can be treated through refinery. Smelting is important for scrap with higher impurities

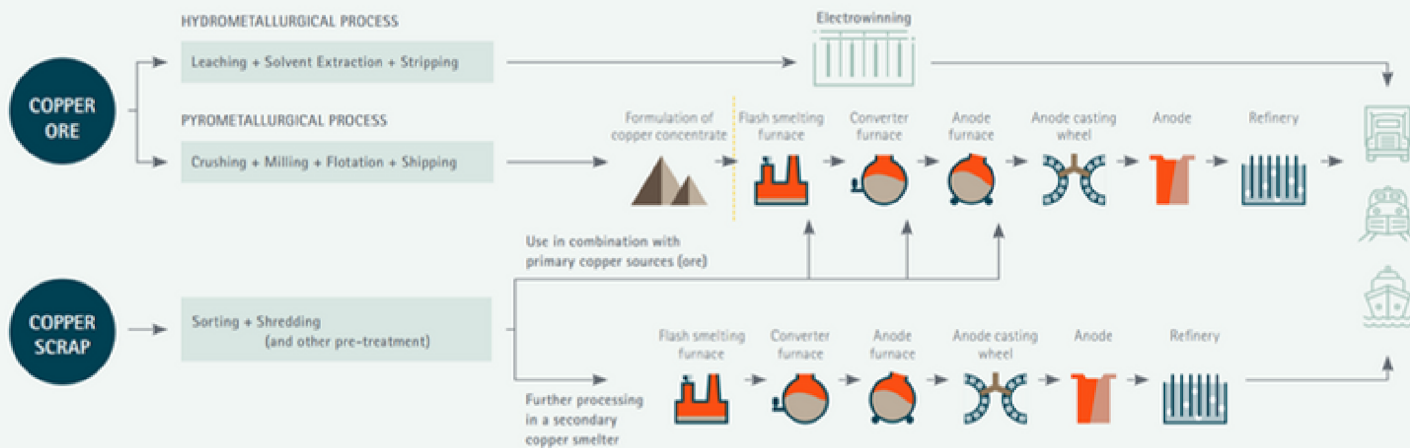


Figure 5: The Three Production Processes of Refined Copper



Casting converts: Copper Cathodes to ETP Copper rods(99.99%)

Source	Players	Employment (direct & indirect)	Supply in FY23
Domestic	Hindustan Copper Ltd	20,000+	563 kt
	Hindalco Industries Ltd		
	Vedanta Ltd		
Net Imports	NA	NA	165 kt

**Table 2 – Supply of refined copper (cathode) by players and job creation**

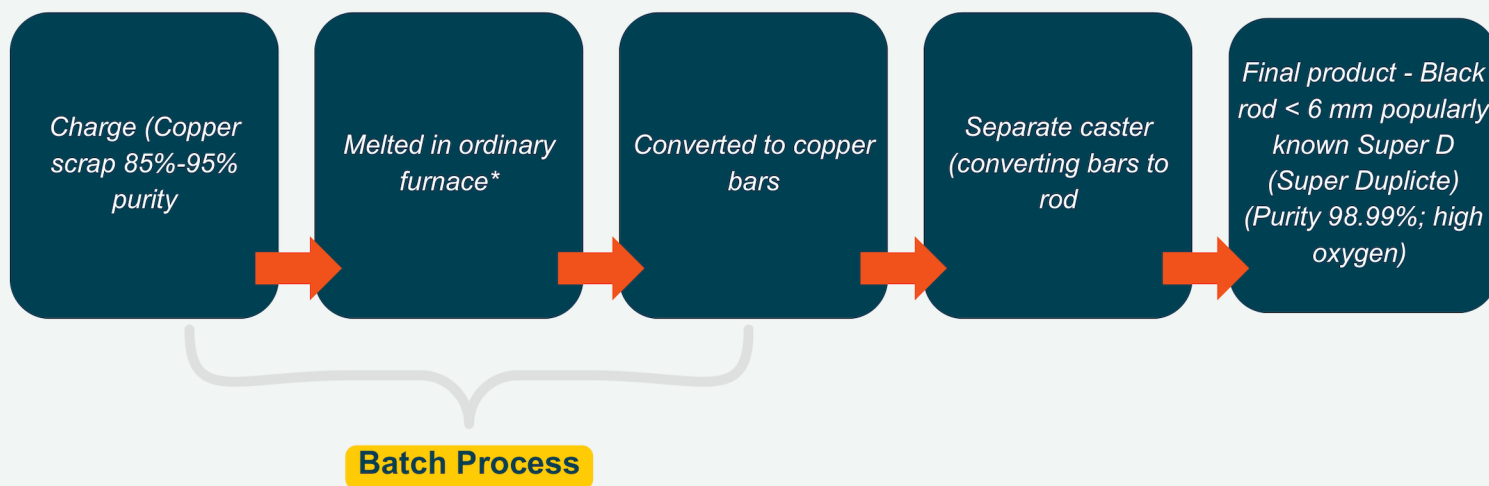
### Copper recycling - remelting

Copper’s infinite recyclability is a major advantage. About 83 per cent of copper is used in an unalloyed form, facilitating the recycling process. Even for alloyed copper or copper-containing other materials, recycling without downgrading its quality is still possible and efficient. This means the unwanted elements can be removed to recover the copper in its pure state, ready to be re-used in any kind of application.

More than 80 % consumption of copper is in the electrical & electronics segment and hence Copper recycling, rightly, should involve, the process of removing the impurities from copper scrap, largely done through electro-refining, a pyro or hydrometallurgical process. However, if the impurities level is very high (low-quality copper scrap), smelting of copper scrap is also necessary.

As of today, in India, direct melting of scrap is carried out where the purity of copper scrap varies due to the use of multifarious scrap. By reducing some of the impurities through traditional methods, copper rods or billets are being manufactured, the purity of which ranges from 98-99.9%.

**Figure 6 – Traditional process**



**Figure 7 – Scrap based re-melted copper, made through Chinese plants**



\*No facility to capture emissions

While making alloys, direct melting is a common practice where the alloying agents are balanced to get the desired chemical composition of a copper alloy.

As per ICA India's estimates, most of the copper and alloy scrap is directly melted.

Production in FY23	Used by	Quantity	Players
Scrap used: 574 kt (Domestic EoL: 400 kt Net Imports: 174 kt)	Remelters for copper and alloys for other applications	260 kt	Registered: 221 Unregistered: 800
	Fire rod manufacturers for electrical application	314 kt	

**Table 3 – Supply of secondary copper by players and job creation**

**Data Source:** Study on Primary & Secondary Copper Market in India 2016, & Copper demand in India Annual Study FY23, AGR

### Semi-fabrication, product manufacturing and use phase (from refined Copper Cathodes (99.99 %) and remelted scrap)

During semi-fabrication, copper and scrap are converted into wire/rod, tubes, sheets and strips for use down the value. These semis are then transformed into finished products that can be used directly by consumers and businesses. Today, in India, semis made from refined cathode (through smelting) and remelted copper(through scrap), are majorly used for electrical applications.

Copper rods end use – Housing wire, cables, consumer electronics, motors, transformers, automotive, railways and other electrical and electronics products						
Product Type	Made from	Purity	Standard referred	Manufacturers	Installed Capacity	Supply FY23
ETP copper rods	Refined copper cathode	99.99%	IS12444	HCL, Hindalco, Vedanta,	1,000 kt	545 kt
				Net Imports	NA	65 kt
Copper rods	Direct melt of copper scrap	98.5%–99.5%	IS 12444 & IS 613	Matod, Rajnandini, JMW etc	More than 350 kt	313 kt

**Table 4 - Copper Rods – types, sources, end-use, BIS standards and key suppliers in FY23**

Copper & alloy tubes & pipes end use – Heat exchanger & connecting tubes for air conditioners (inner grooved & plain), gas, medical, industrial piping & plumbing plain tubes)					
Product Type	Made from	Standard referred	Manufactured by	Installed Capacity	Supply FY23
Copper & alloy tubes & pipes	Cathode and scrap	Inner grooved - ASTM 75B & JIS H3300	Mehta tubes, Mercure Metals, Global copper, Mandev Tubes, ABC Tubes etc	85 kt	Domestic: 65 kt (plain tubes)
		Plain tubes – IS 10773			Net Imports: 77 kt

**Table 5 - Copper & alloy tubes & pipes – types, sources, end-use, BIS standards and key suppliers in FY23**

**Rolled products electricals end use – Consumer electronics, sockets, switchgear, railways, etc**  
**Rolled products general engineering end use - Utensils, defence, household accessories, HVAC etc**

Product Type	Made from	Standard referred	Manufactured by	Installed Capacity	Supply FY23
Copper & alloy rolled products	Refined Cathode: 50% Scrap: 50%	<ul style="list-style-type: none"> <li>• IS 1897 for electrical purpose</li> <li>• IS 14811 for general engineering purpose</li> <li>• IS 3331 for radiator cores</li> <li>• IS 2768 for bullet envelope</li> <li>• IS 410 brass sheet, strips for general purpose</li> <li>• IS 422 brass sheets &amp; strips for utensils</li> </ul>	Agarwal Metals, Rashtriya Metal, Bhagyanagar Metal etc	More than 300 kt	Domestic : 270 kt Net Imports : 24 kt

**Table 6 – Copper & alloy rolled products – types, sources, end-use, BIS standards and key suppliers in FY23**

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**Table 7 – Castings and powder – types, sources, end-use, BIS standards and key suppliers in FY23**



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