

## Copper Industry

5<sup>th</sup> July 2017 | Industry Research

### Overview:

*Copper is one of the oldest metals ever used and has been one of the important materials in the development of civilization. Copper is an important non-ferrous base metal having wide industrial applications.*

*Today it has become a major industrial metal, ranking 3<sup>rd</sup> after iron and aluminum in terms of quantities consumed.*

*Compared with the global markets India has limited copper ore reserves constituting to about 2% of the World Copper Reserves. India is the net exporter of refined copper and ranks 7<sup>th</sup> in global refined copper production and 5<sup>th</sup> in copper smelter production globally.*

*There are three major players which dominate the copper industry in the Indian Markets. Hindustan Copper Limited (HCL) in Public Sector, Hindalco Limited and Vedanta Industries Limited in Private Sector.*

#### Contact:

##### **Madan Sabnavis**

Chief Economist  
madan.sabnavis@careratings.com  
91-022-6754 3489

##### **Urvisha H Jagasheth**

Research Analyst  
urvisha.jagasheth@careratings.com  
91-022-6754 3492

Guided by:

##### **Hitesh Avachat**

hitesh.avachat@careratings.com

##### **Mradul Mishra (Media Contact)**

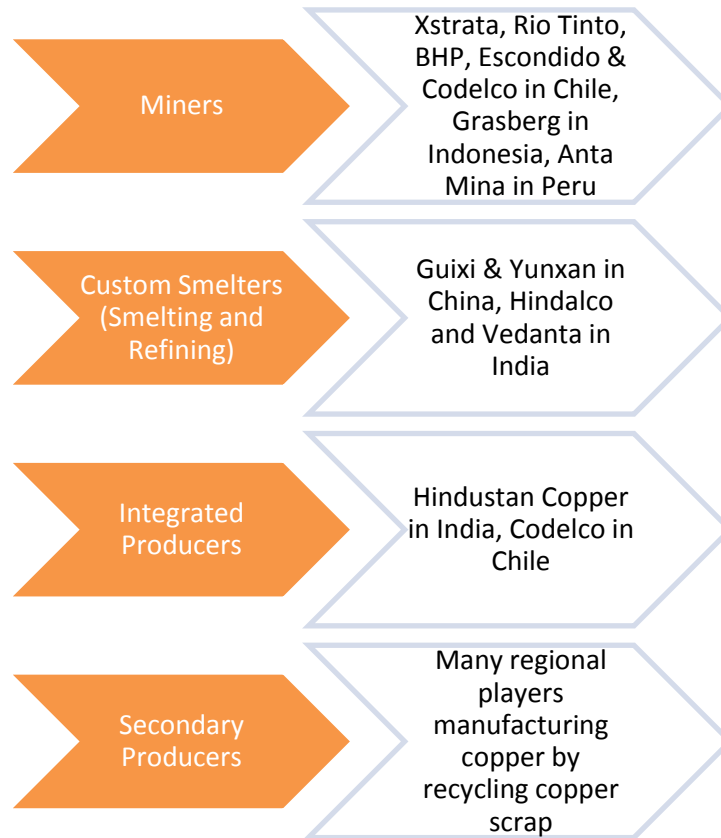
mradul.mishra@careratings.com  
91-022-6754 3515

**Disclaimer:** This report is prepared by the Economics Division of Credit Analysis & Research Limited [CARE Ratings]. CARE Ratings has taken utmost care to ensure accuracy and objectivity while developing this report based on information available in public domain. However, neither the accuracy nor completeness of information contained in this report is guaranteed. CARE Ratings is not responsible for any errors or omissions in analysis/inferences/views or for results obtained from the use of information contained in this report and especially states that CARE Ratings has no financial liability whatsoever to the user of this report.

**Structure of the Global Copper Industry**

The Global copper industry can be classified into four categories

**Chart 1: Industry Segmentation**



**Process of Manufacturing Copper**

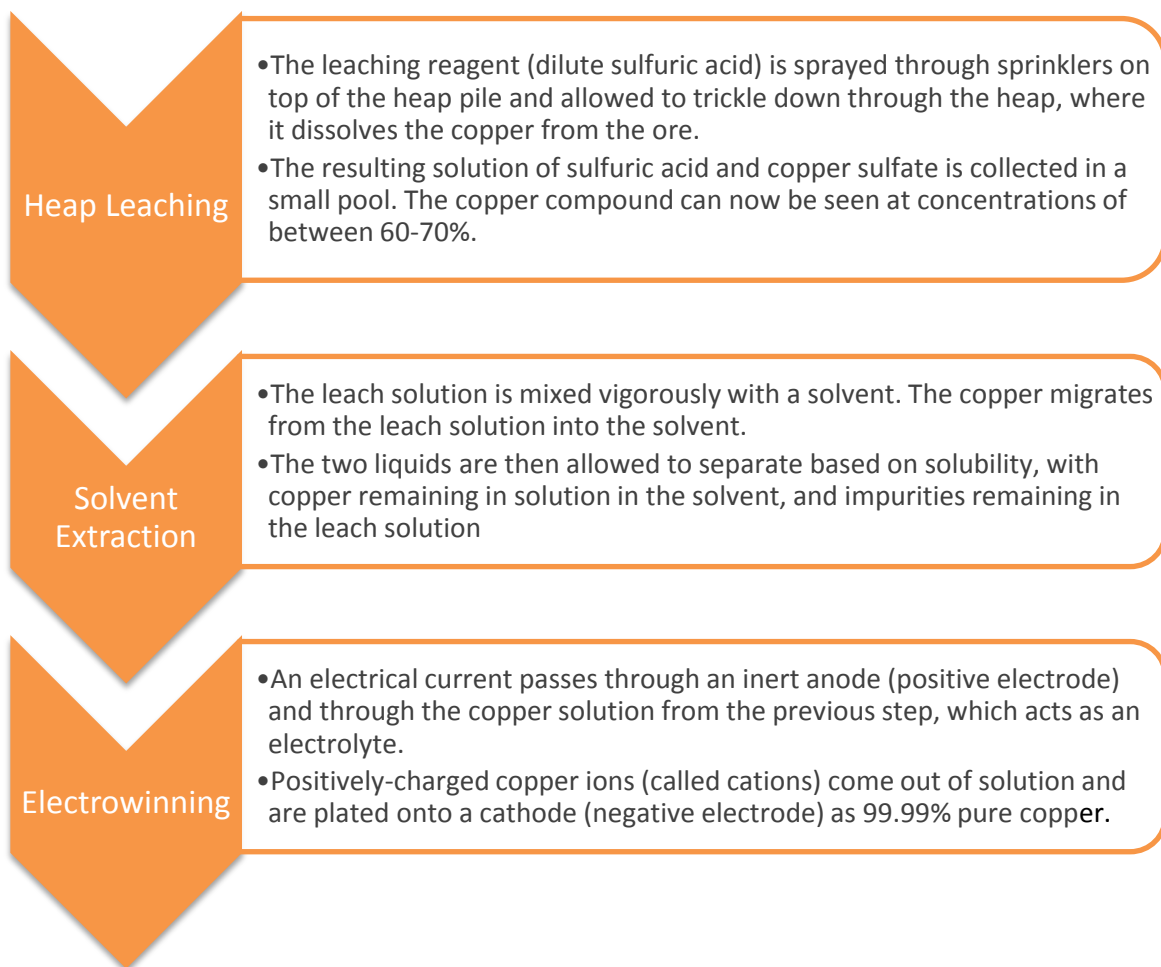
Copper is never found as a whole. When it is mined, Copper ore typically contains less than 1% of Copper. Mined Copper ore has to go through a variety of physical and chemical processes to become market ready. Market ready refined copper, refers to copper cathodes which is 99.99% pure copper. The most common types of ore are copper oxide and copper sulfide.

The first few steps in copper processing are common to both the Copper ores. After mining, the first major step in getting copper ready for market is concentration. The copper is concentrated by slurring the ground ore with water and chemical reagents. The copper is then removed with a skimmer. At the end of this step, copper concentrations are typically between 24 and 40%.

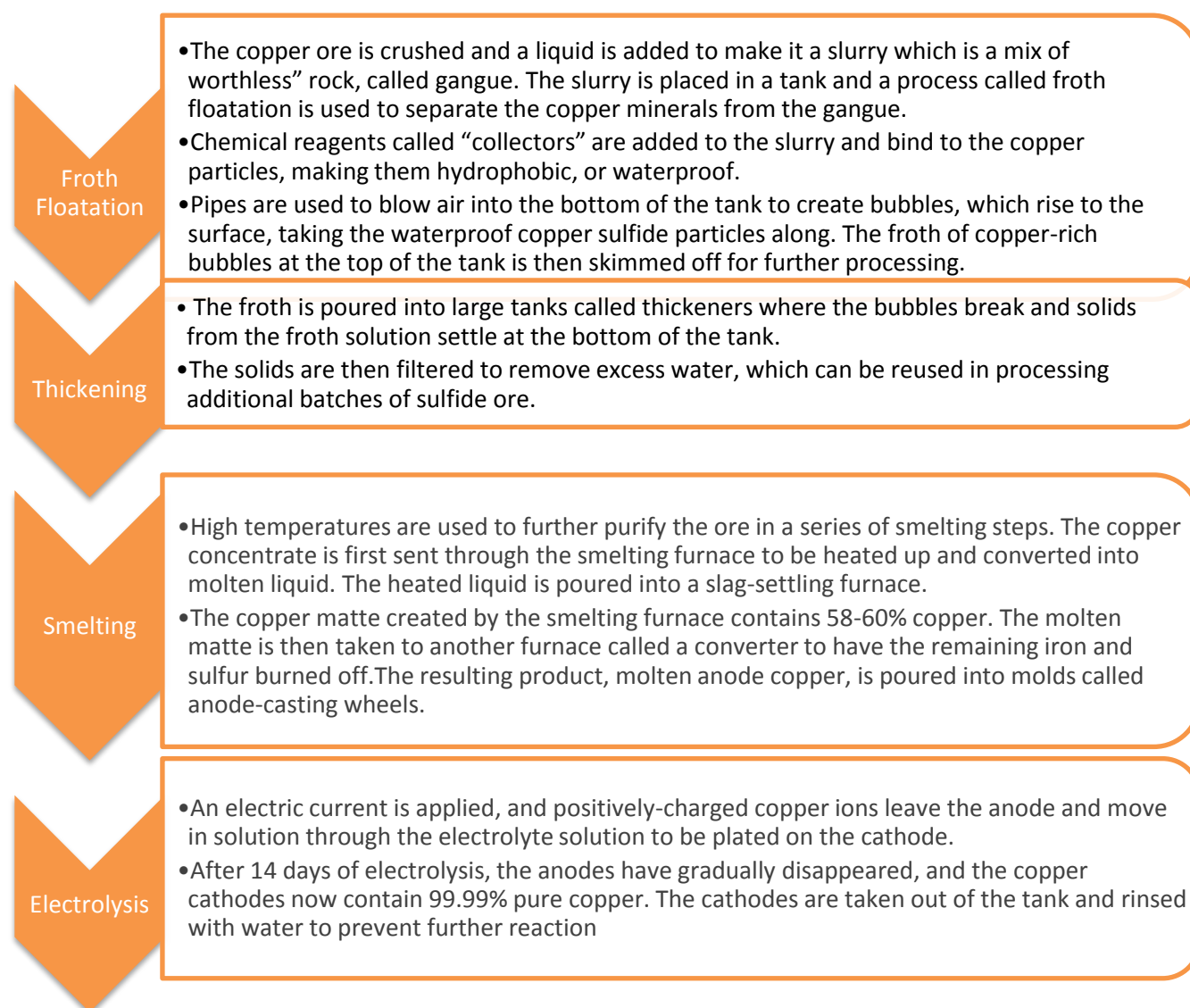
After the concentration is complete, the next phase involves creating market-ready copper. That typically takes place at a refining plant/smelter. Through copper refining, unwanted material is progressively removed and copper is concentrated up to 99.99% purity, the standard for Grade A copper.

Now the copper ore is processed according to the content the ore contains. If the copper ore is rich in sulfides it is processed through Pyrometallurgy and if the copper ore is rich in oxides it is process through Hydrometallurgy. Pyrometallurgy uses the application of heat to separate the copper ore from the sulfides whereas Hydrometallurgy uses water to extract the copper from the ore. Since each mine site is unique in its mineral composition, concentration, and quantities, the most economical and profitable processing of ore must be determined by the mine planners.

**Chart 2: Process of Copper refining through Hydrometallurgy**



**Chart 3: Process of Copper refining through Pyrometallurgy**



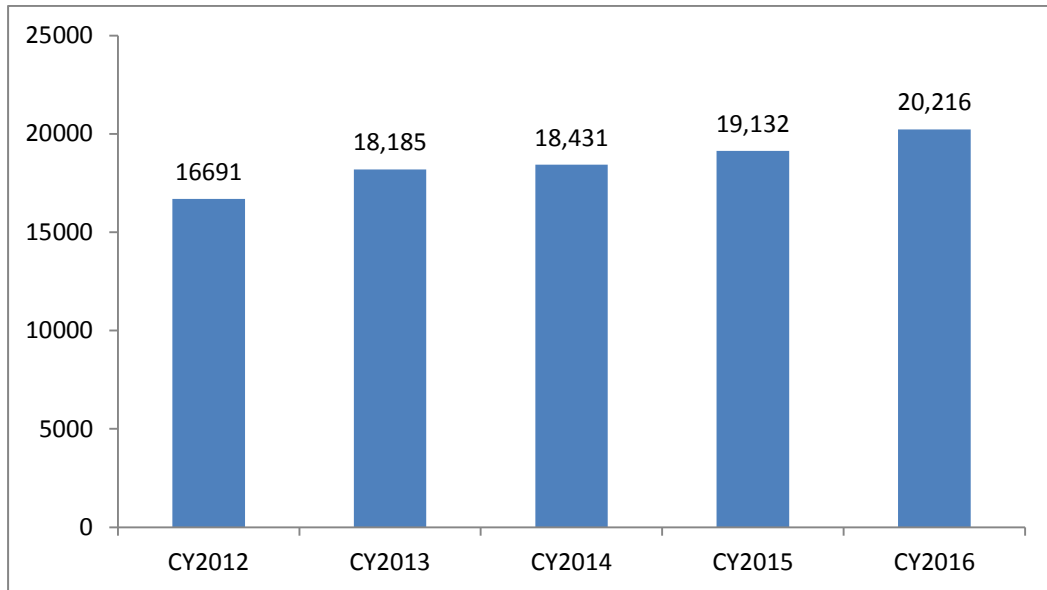
The finished copper cathodes can then be made into wires, plates, tubes, and other copper products. Downstream sector of copper includes value-added products such as sheet, strip, foil, wire rod, wire, etc.

**Production**

**Mined Copper Production**

Globally Chile ranks 1<sup>st</sup> in world mined copper production followed by China and Peru. Chile contributes to the world’s 1/3 mined copper production. Global mined copper production increased at a CAGR of 4.9% from 16,691 000’MT in CY12 to 20,216 000’MT in CY16. *Copper production grew by 5.6% y-o-y in CY16 compared with 3.8% in CY15 and 1.4% in CY14.*

**Chart 4: World Mine Production (in 000'MT)**

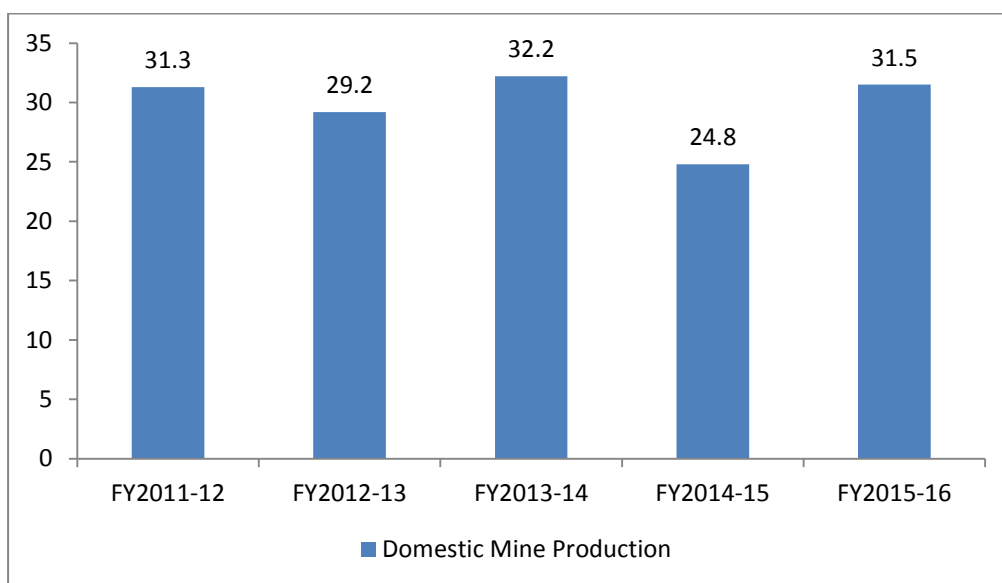


Source: International Copper Study Group (ICSG)

There has been a steady rise in the production of mined copper ore from CY 2012 to CY 2016. In the first quarter of CY 2017 world mine production has been 1,637 000'MT in January, 1,439 000'MT in February and 1,560 000'MT in March. *World mine production is estimated to have declined by around 3.5% in the first quarter of 2017, due to a decline in production in Chile.*

India has limited copper mines which are mainly concentrated in the states of Rajasthan, Madhya Pradesh, Bihar and Jharkhand. Largest resources of copper ore are in the state of Rajasthan. Hindustan Copper holds all the operating copper mining leases in India, making it the sole copper miner in India.

**Chart 5: Domestic Mine Production (000'MT)**



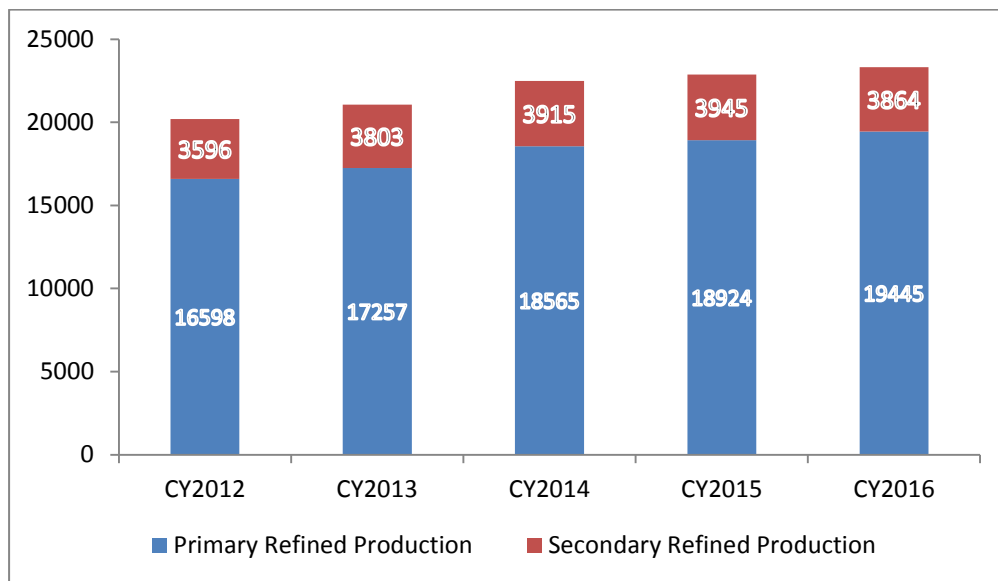
Source: Hindustan Copper Annual Reports

India contributes to only 0.2% of the world mined copper. FY 2014-15 reported a drop in the production numbers as there was a steep fall in the LME Copper Prices (LME Copper was 7104 USD/MT for the FY 2013-14 where as it was 6554 USD/MT for the FY 2014-15 recording a 8% fall in prices). Another reason which attributed to a fall in mined copper ore production is because there was a 21% fall in the Malanjkand mine which contributes to about 65% of the copper ore production.

**Refined Copper Production**

Primary Refined copper production is referred to as; refined copper derived from mine production through either Pyrometallurgy or Hydrometallurgy processes. It is the refined copper obtained through the raw material itself. Secondary Refined Copper production is when we derive refined copper through the same processes used for the production of primary copper but the raw material used is Copper Scrap. Copper scrap derives from either metals discarded in semis fabrication or finished product manufacturing processes (“new scrap”) or obsolete end-of-life products (“old scrap”).

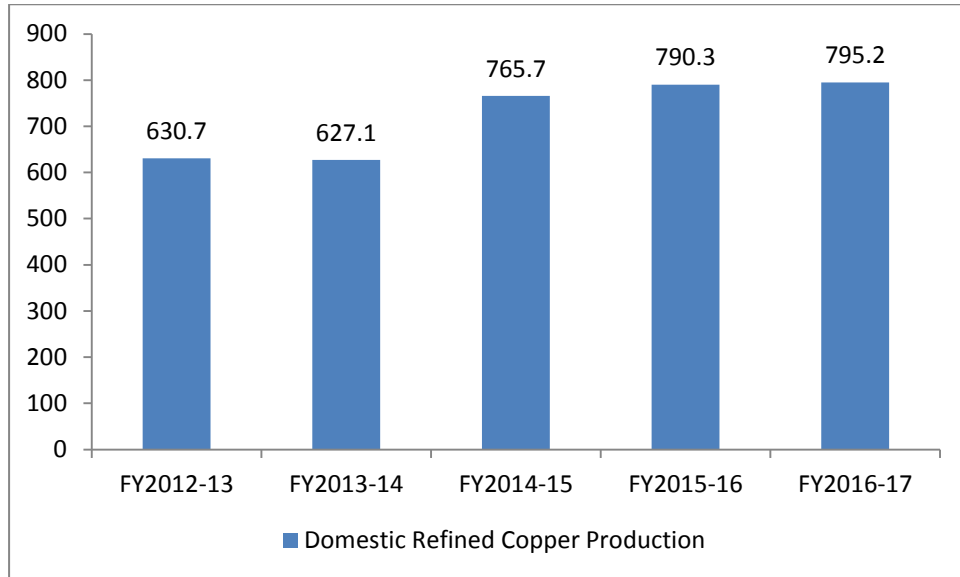
**Chart 6: World Copper Refined Production (Primary and Secondary) (000’MT)**



Source: International Copper Study Group (ICSG)

In 2015, China accounted for over a third of world copper refined production, followed by Chile (12%), Japan (6%) and the United States (5%). *Global refined copper production is growing at a CAGR of 3.65% from CY 2012 to CY 2016.* World Copper Production (primary and secondary) in the first quarter of CY 2017 (January- March), is recorded at 5768 000’MT which is more than 0.22% q-o-q of CY2016.

**Chart 8: Domestic Refined Copper Production (000' MT)**



Source: CMIE

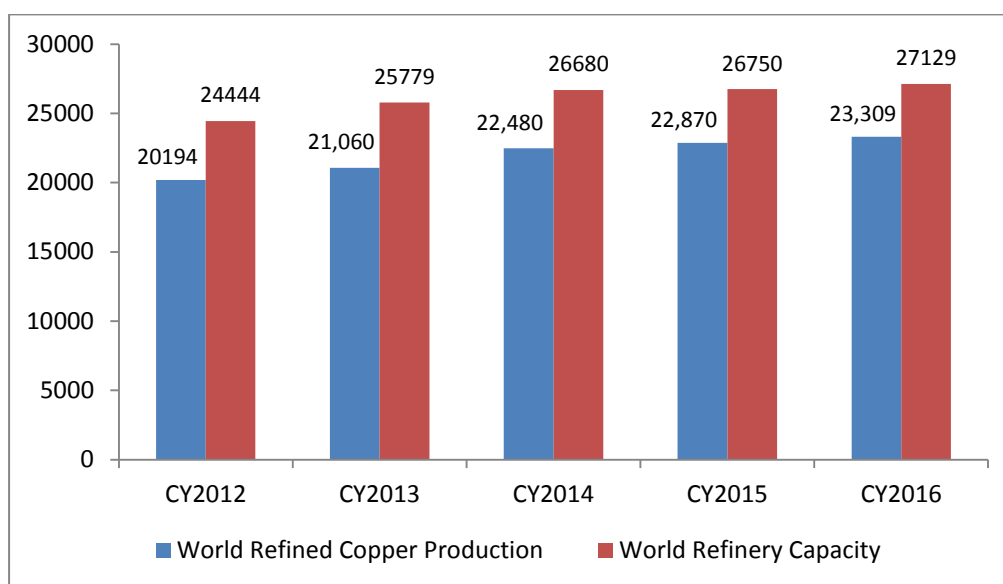
Domestic production of refined copper has been growing at a robust *CAGR* of 6% recording a level of production of 630.7 000' MT in FY 2012-13 to the highest level of production of 795.2 000' MT in FY 2016-17. Hindalco and Vedanta primarily dominate the Indian refined copper production.

There has been a steady rise in the production of refined copper from FY 2014-15 onwards. Since FY 2014-15 Copper production is on a rise. Production grew by 1% y-o-y in FY 2016-17 compared with 3% in FY 2015-16 and 22% in FY 2014-15. FY 2013-14 recorded a dip in production due to the slowdown in Chinese Demand. This affected our production as China used to import 88% of the Indian refined copper.

### Copper Refining Capacity

World Refinery Capacity grew at a *CAGR* of 2.64% from 24,444 000' MT in CY2012 to 27,129 000' MT in CY2016. Refineries worldwide are showing a capacity utilization rate of 81% to 85% over the years.

**Chart 7: World Refined Copper Production and Refining Capacity (000'MT)**



Source: International Copper Study Group (ICSG)

In India, Copper companies will buy the copper ore (called concentrates) from the overseas markets or they will import it from the mines they have ownership in foreign countries. These companies have set up their smelting and refining plants in India, which refines the copper concentrates to make it a pure metal (Copper Cathodes).

**Table 1: Custom Smelter Capacity (in terms of 000'MT)**

Sr. No	Company	Location	Smelting and Refining Capacity
1	Hindalco	Dahej	500
2	Vedanta	Tuticorin	400
3	Hindustan Copper	Various Locations*	99.5

Source: International Copper Study Group (ICSG) Factbook 2016

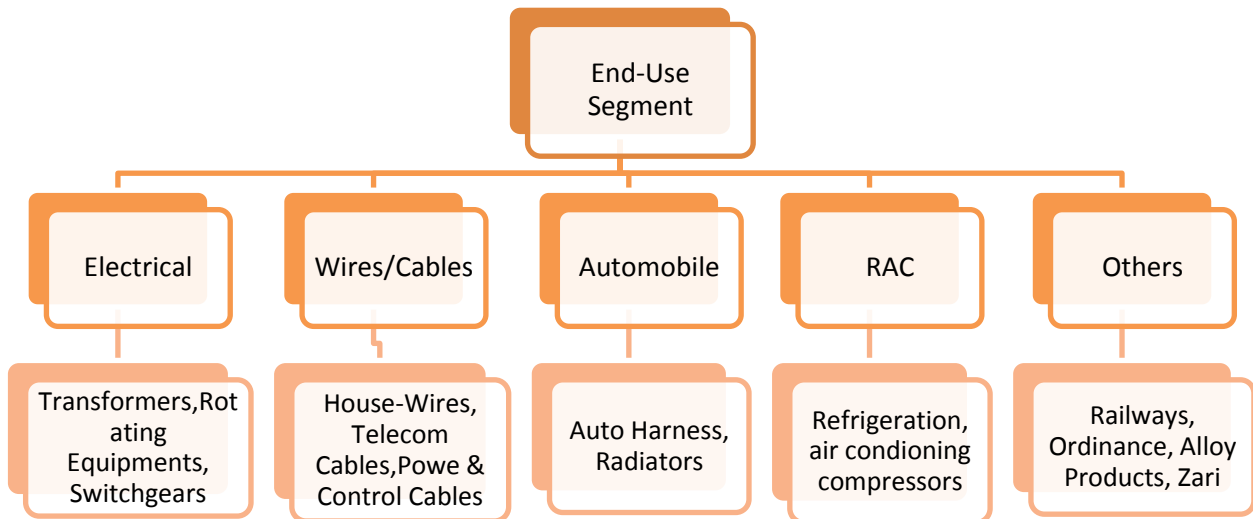
\*Hindustan Copper Limited (HCL) is a vertically integrated company. The mines owned by HCL have the Smelting facilities located right next to their mines (Khetri Copper Complex which is in Rajasthan and Indian Copper Complex which is located in Jharkand).Gujarat Copper Project (formerly known as Jhagadia Copper Limited, acquired by HCL),is into smelting and refining of secondary copper

**Consumption**

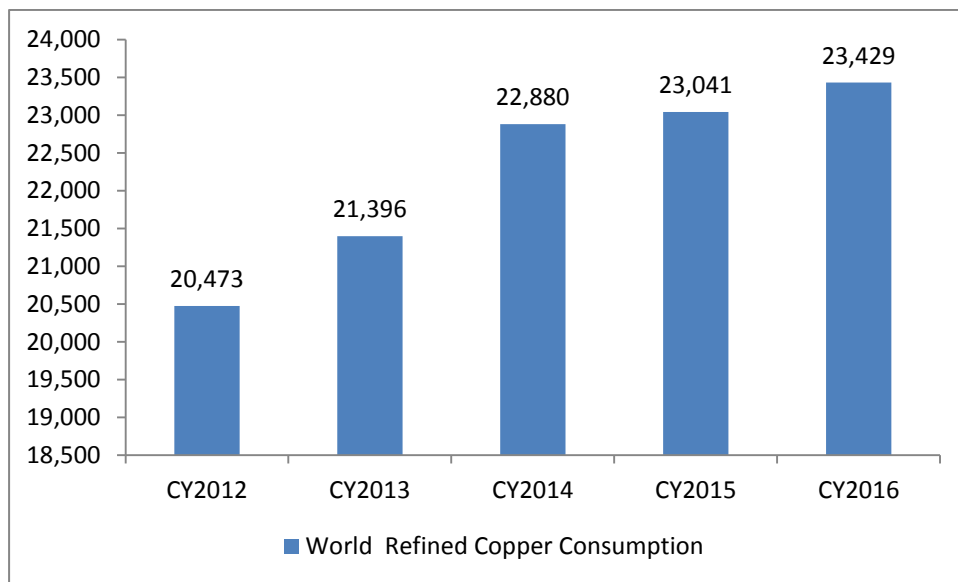
Copper is a malleable and ductile metallic element that is an excellent conductor of heat and electricity as well as being corrosion resistant and antimicrobial. Copper and copper alloy are transformed by downstream industries for use in end use products such as **automobiles, appliances, electronics, wires and cables** and a whole range of other copper-dependent products.



**Chart 8: Copper Consumption in end use segments**



**Chart 9: World Refined Copper Consumption (in 000'MT)**

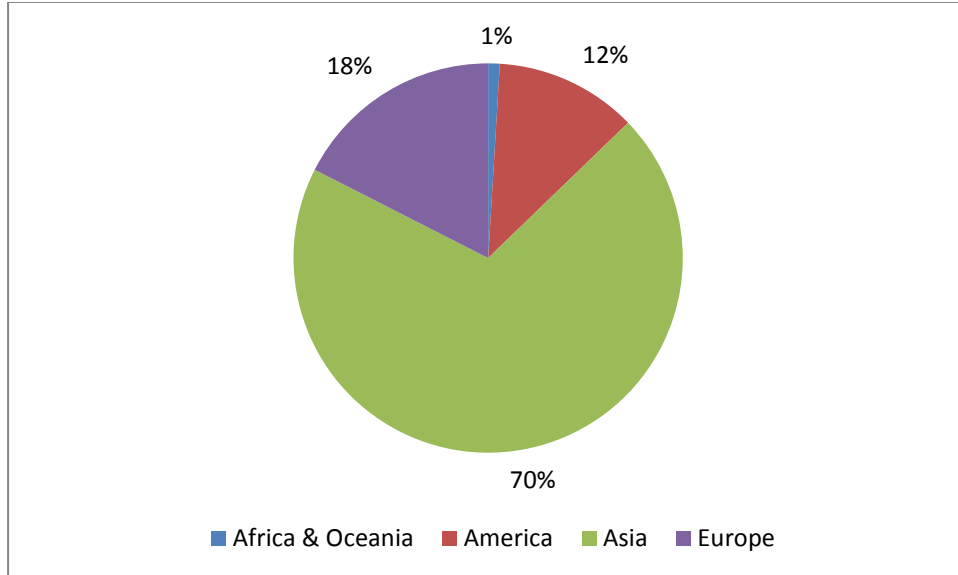


Source: International Copper Study Group (ICSG)

China ranks first in refined copper consumption worldwide accounting for 45% copper usage. *Copper usage has increased by a CAGR of 3.43% from CY2012 to CY2016.* Copper consumption has increased by 388 000'MT in absolute terms from CY 2015 to CY 2016. This increase is mainly attributable to the increase in demand from the Chinese Economy. Copper is seen as a key

barometer for the health of China’s economy, due to its use in wiring, cables and construction. It has also been observed there has been a 7%-8% of inventory as a percent of the world refined copper production over the years.

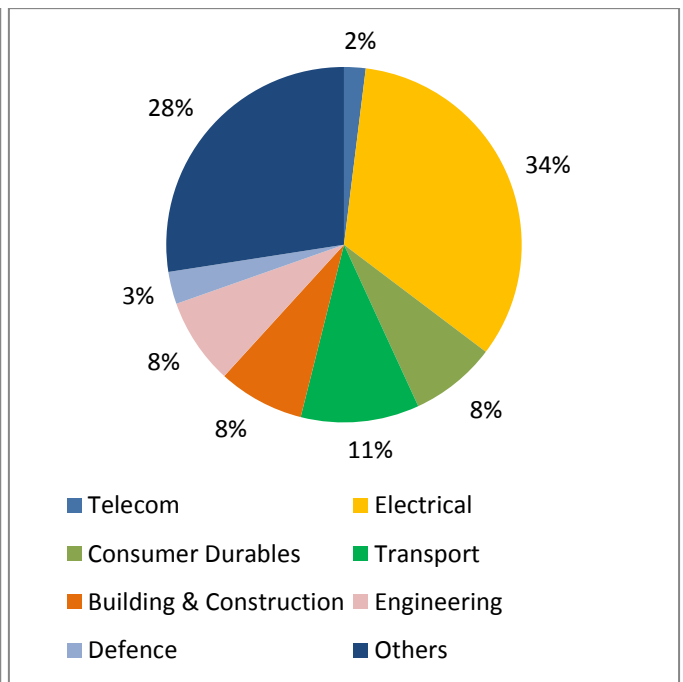
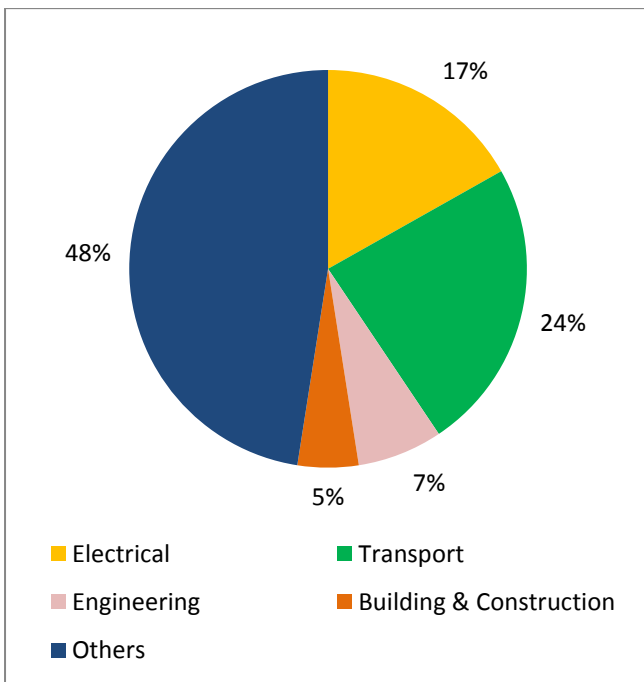
**Chart 10: Trends in Refined Copper Consumption by Region for the CY 2016**



Source: International Copper Study Group (ICSG)

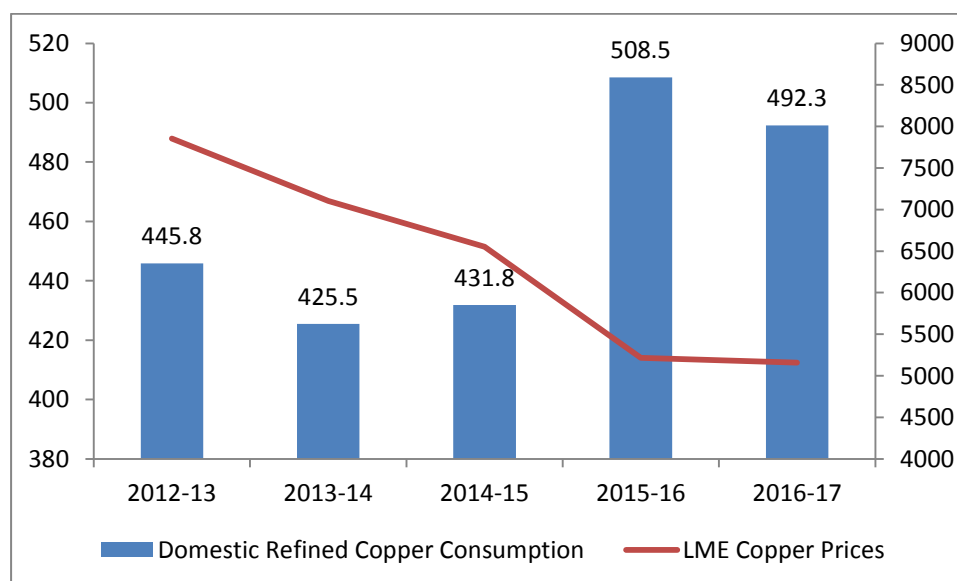
**Chart 11: Sector Wise Consumption of Copper Worldwide.**

**Chart 12: Sector-Wise Consumption of Copper in India**



Source: Ministry of Mines

**Chart 13: Domestic Refined Copper Consumption (000'MT)**



Source: CMIE

Region Wise Asia accounts for the largest consumers of copper. India’s copper consumption is concentrated in the Electrical industry in contrast with the rest of the world which is concentrated in Building and Construction.

Consumption of refined copper in the Indian economy has been recorded at a CAGR of 2.51% from FY2012-13 to FY 2016-17. There was a surge in consumption during FY 2015-16, as there was reported drop in LME Copper prices which led to the increase in demand for copper.

We see the demand for copper in the electrical segment to grow due to the demand via the infrastructure sector. The proposed affordable Housing for all program will be the drivers of consumption for copper in the Building and construction sector. Telecom industry is adopting to the use of optic fiber cables which use copper in its wiring. Defense Production policy 2011 encourages indigenous manufacture of defense equipment in the private sector. Capacity creation in in sectors such as power, mining, oil and gas refinery, steel, automotive and consumer durables are driving the demand in the engineering sector.

**Copper Trade**

India has emerged as an importer of copper ore/ copper concentrates due to the lack of copper mines present in the country. Companies import copper concentrates and after it has passed through the various refining and smelting processes we get Grade A Copper (99.99%) purity which is known as copper cathodes. Due to the increase in copper supply and demand for copper India has emerged as a Net exporter of Refined Copper.

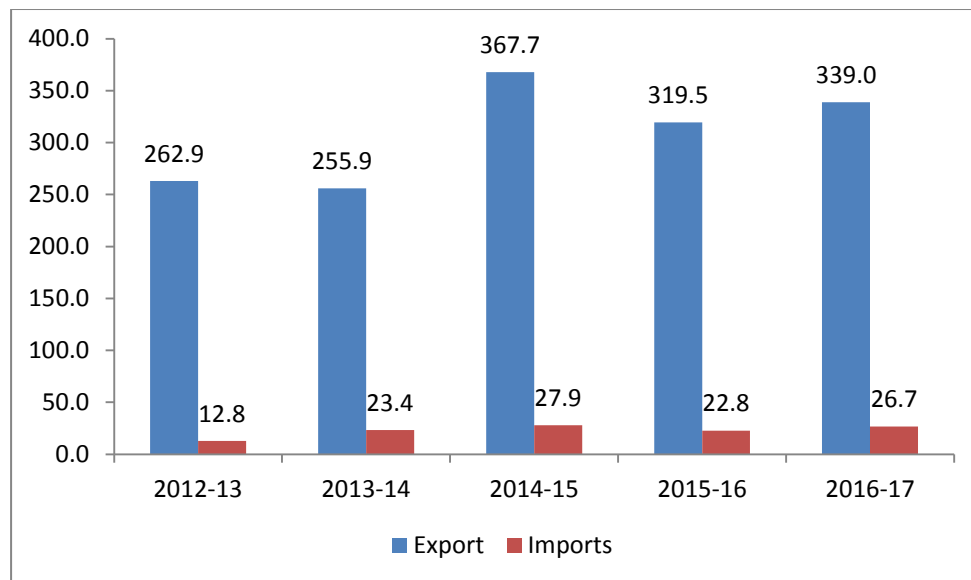
India majorly exports to China, Singapore, Taiwan, Malaysia, South Korea, Oman, Indonesia and Saudi Arabia. During FY 2012-13 China imported 88% of India’s refined copper exports vis-à-vis to now China only imports 37% of India’s refined copper exports for the FY2016-17.

Presently the tax rates for Copper and Copper Products is 19%-21%. The Basic Custom Duty charged on Copper and Copper Products at present is 5%, the Countervailing Duty (CVD) is 12% and the Special Countervailing Duty (CVDs) is 4%.

The proposed rates of GST for Copper and Copper products are falling in the 18% tax slab with the exception of copper items used for utensils, kitchen appliances and other household products. Those products will fall in the tax bracket of 12%. Copper products which do not fall in the mentioned 18% tax slab will be taxed at the rate of 28%. Items like copper chains and copper brass.

Globally Chile is the major exporter of mined copper and China is a major importer of copper: Mined and Refined. As China is a manufacturing country, the demand for copper supersedes their domestic production.

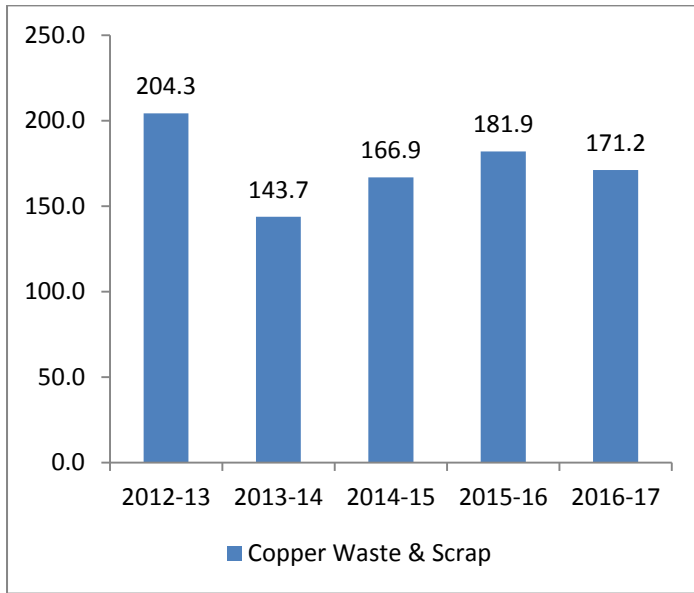
**Chart 14: Trends of Exports and Imports of Copper Cathodes (000'MT)**



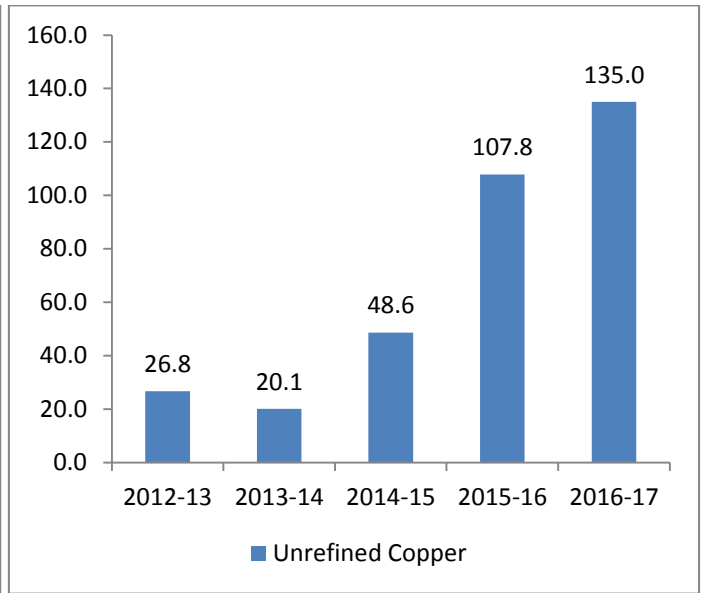
Source: DGFT

Over the years from FY 2012-13 to FY 2016-17 exports of Copper Cathodes have grown at a CAGR of 6.56%. Imports of Copper Cathodes are quite negligible in comparison. From FY 2015-16 to FY 2016-17 there has been a y-o-y increase in exports by 6.09%.

**Chart 15: Imports of Copper Waste and Scrap (000'MT)**



**Chart 16: Imports of Unrefined Copper (000'MT)**

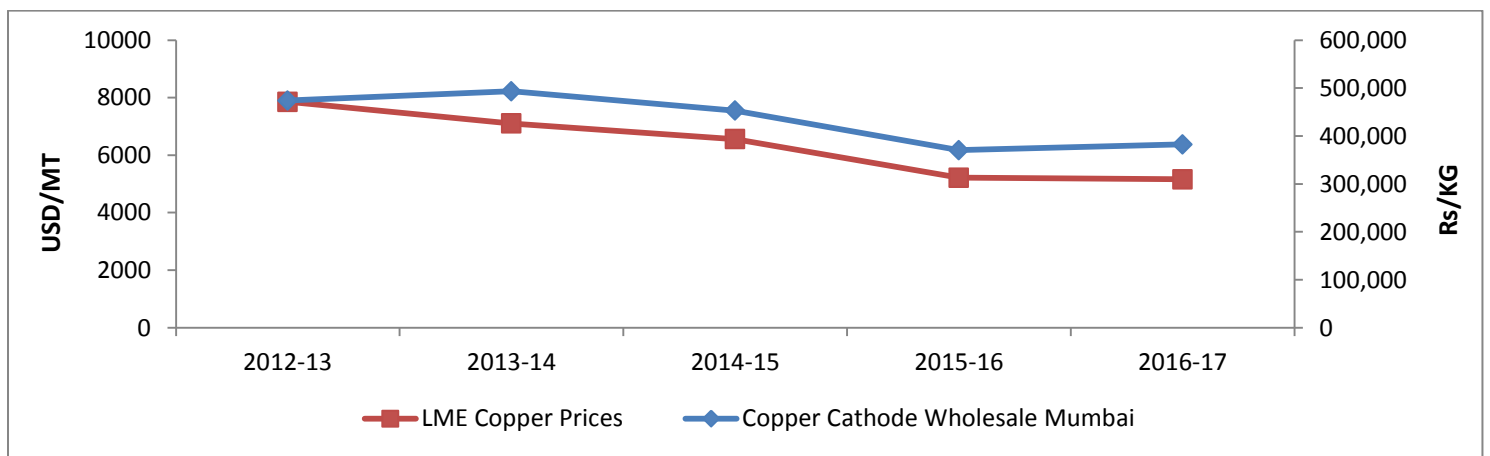


Source: DGFT

India has been depending on Copper Waste and Scrap consistently which is further used in the refining and smelting process this also puts less pressure on the environment and leads to sustainable development. Copper is among the few materials that do not degrade or lose their chemical or physical properties in the recycling process. However, recycled copper alone cannot meet society's needs, so we also rely on copper produced from the processing of mineral ores. Since FY 2015-16 there has been a substantial increase in the imports of unrefined copper. From FY 2015-16 to FY 2016-17 there has been a y-o-y increase in imports of unrefined copper by 25.20%. This could be related to the rise in domestic consumption of refined copper as well.

**International and Domestic Copper Prices**

**Chart 17: International and Domestic Copper Prices (USD/MT and Rs/KG)**



Source: LME and CMIE

Copper prices have declined from FY 2014-15 onwards due to the decline and slowdown in the Chinese economy. China being the number one producer and consumer of refined copper has a direct impact on copper prices. LME only trades in Copper Cathodes which are 99.99% pure Grade A copper. USA accounts for 8% usage of refined copper worldwide and ranks second in consumption after China. FY 2017-18 prices of copper has risen more than the levels maintained in FY2016-17 as Chinese economy and US economy has shown signs of a positive outlook.

Demand – Supply dynamics, Macro Economic factors, Stock Movements at designated exchange warehouses, relevant periodic data, estimates and facts published by various agencies affect the prices of Copper worldwide. LME daily publishes inventory levels of copper which has a direct impact on the prices of copper and on the stock prices of copper producing companies.

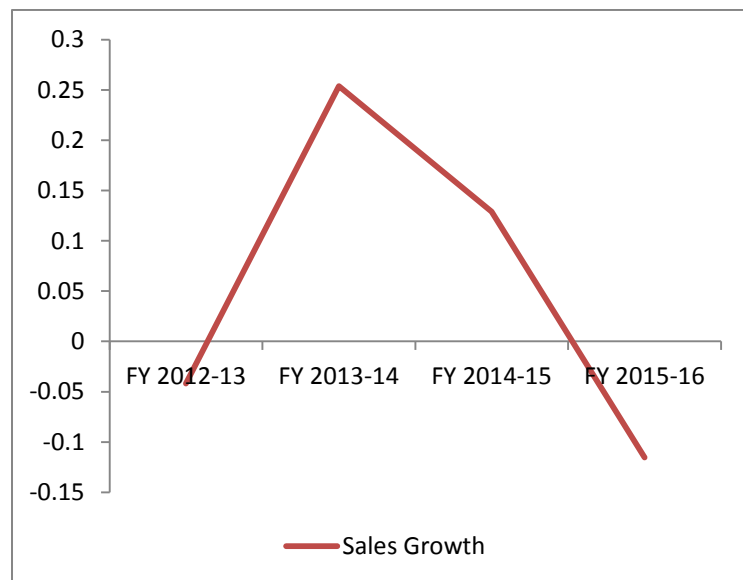
Prices of Copper in India are fixed on the basis of 1) Prices of LME copper and 2) USD/INR rates. Prices of Copper are also influenced by the economic growth of the major copper consuming countries like China, USA, Japan and Germany. Growth and development of the infrastructure, telecom, real estate and electrical industry directly affect the prices of Copper.

**Financials of Copper Companies**

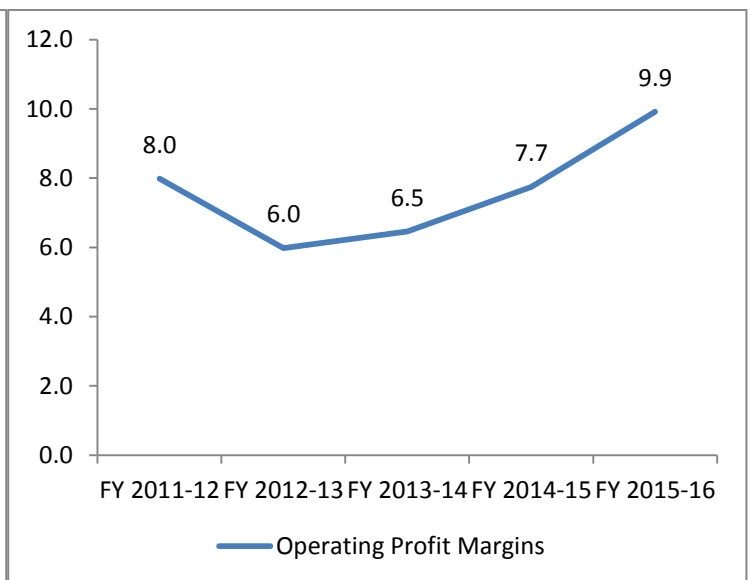
To understand the financial performance of the copper industry we have analyzed the sales growth and operating margins of the three major players which dominate the Indian Copper market. We have considered the segmented sales and operating profits of Vedanta and Hindalco Copper division and the standalone financial statements for Hindustan Copper.

The profitability of Indian Copper Companies largely depends on the TC/RC margins. Treatment Charges and Refinery Charges are the charges levied by the companies when the copper ore goes through the smelting and refining process.

**Chart 18: Sales Growth Rate**



**Chart 19: Operating Profit Margin (in %)**



Source: Company Annual Reports

Sales growth is on the decline from FY 2013-14 onwards as there has been a fall in LME copper prices. Operating profits largely depends on the TC/RC margins. Higher TC/C margins are favorable to companies as it increases their profitability. FY 2014-15 onwards there has been an increase in the production of refined copper in the domestic markets which has led to an improvement in the operating profit margins of the companies.

### **Conclusion/Outlook:**

*CARE estimates the production of domestic refined copper to remain stable at the current levels. The domestic customs smelter are operating at a steady utilization rate of around 80%, which is in tandem to the utilization rate of custom smelters in the global markets as well.*

- *While the domestic demand continues to remain stable, it only accounts for 60% of the overall refined copper produced domestically.*
- *Globally as well, the demand for copper is likely to increase at a CAGR of around 2% during the next 2-3 years, which is unlikely to result into increased domestic copper production. India exports around 40% of its refined copper production.*

*Demand for the domestic copper market is dependent largely on the electrical (34%), building & construction (8%), automobiles (11%) and the consumer durables segment (8%). CARE estimates domestic demand of refined copper to increase at a CAGR of around 4.2% reaching at the levels of 560.25 000' MT by 2020.*

- *CARE expects, while the demand from the building & construction segment is likely to remain subdued, the demand from the automobile segment is likely to support the domestic demand for copper.*
- *Furthermore, CARE expects aluminum to continue replacing copper demand from the electrical and the consumer durable segment, which is likely to cap the demand for copper from these sectors.*
- *The Make in India Initiative and the PM's Affordable Housing for all program, increase in capex activities especially in the railways and defense sector is likely to further support the domestic demand for the metal.*

*CARE expects global copper prices to hover around US\$ 5,500-5,900 per tonne during the short to medium term period. LME Copper prices to remain suppressed till there is a pick up Chinese Demand for refined copper.*

- *The global supply for copper continues to adjust itself with the changing trend in the demand outlook for copper.*
- *While the Chinese demand remains uncertain and has shown some signs of weakness, CARE expects, improvement in demand from US, Japan and India is likely to support the global demand for copper.*

*CARE expects TC/RC margins are likely to remain under pressure owing to the supply side disruptions from the major mining areas. The recent TC/RC contracts for China and Japan has indicated pressure on the TC/RC margins, thereby indicating lower profitability for the domestic copper smelters in the short term period*

**CORPORATE OFFICE**


**CARE RATINGS LIMITED**

**(Formerly CREDIT ANALYSIS AND RESEARCH LIMITED )**

Corporate Office: 4th Floor, Godrej Coliseum, Somaiya Hospital Road,  
Off Eastern Express Highway, Sion (East), Mumbai - 400 022.

Tel: +91-22-6754 3456 | Fax: +91-22-6754 3457

E-mail: [care@careratings.com](mailto:care@careratings.com) | Website: [www.careratings.com](http://www.careratings.com)

Follow us on  [/company/CARE Ratings](https://www.linkedin.com/company/CARE-Ratings)  
 [/company/CARE Ratings](https://www.youtube.com/channel/UC...)