



COPPER MINING IN INDIA - GS III MAINS

Q. Discuss the prospects of copper mining in India and enumerate the need of copper mining for a developing country like India. (10 marks, 150 words)

News: *India to send Delegation for Copper Mining Opportunities in Zambia*

What's in the news?

- The Ministry of Mines has proposed sending an Indian industry delegation to copper-rich Zambia to discuss potential copper exploration and mining projects in the African country.

Key takeaways:

- **Zambia holds about 6% of the world's copper reserves and was the eighth-largest copper producer in 2022.**
- The second meeting of the Joint Working Group (JWG), set up under a memorandum of understanding between India and Zambia, is scheduled to take place in Zambia.

Prospects and Need of the Meeting:

- The meeting aims to facilitate collaboration between the Indian public and private sectors and the Zambian mining industry.
- India currently has a limited presence in Zambia's copper mining sector, with Vedanta recently regaining control of Konkola Copper Mines.
- The growing domestic demand for copper in India, particularly for clean energy technologies and the country's reliance on copper imports make the acquisition of overseas copper mining blocks attractive.
- Other international companies, like Canada's First Quantum Minerals and China's CNMC, are also significant players in Zambia's copper industry.

Copper:

- Copper is a chemical element with a distinctive reddish-brown colour.
- It is an excellent conductor of electricity and heat.

Copper Mining:

- Copper is found in various ores in the Earth's crust. **Common copper minerals include chalcopyrite, bornite, chalcocite, and malachite.**
- Copper mining involves several stages, from the discovery of copper deposits to the extraction and processing of the metal.
- There are various mining methods used for extracting copper and the choice depends on factors such as the depth of the deposit, the type of ore, and economic considerations.



Types of Mining Involved:

1. Open-Pit Mining:

- Used for shallow deposits. Large pits are excavated, and ore is extracted from the surface.
- It accounts for **80% of all copper mining operations in the world.**

2. Underground Mining:

- Used for deeper deposits.
- **Shafts or tunnels** are dug to reach the ore underground.

Global Stats:

- **Chile is the top copper producer** in the world, with 27% of global copper production.
- Chile is followed by another South American country, Peru, responsible for 10% of global production.

Copper Mining in India:

- There are approximately 700 copper mines in operation globally, of which 127 are in India.
- **However, India is poor in terms of copper reserves & production.**
- India has **low-grade copper ore** (less than 1% metal content) compared to the international average of 2.5%.
- **Madhya Pradesh is the leading producer of copper in India.** It accounts for producing 53% of copper in this country.
- Rajasthan accounts for 43% and Jharkhand accounts for 4% of copper production in India.

Mine	State
1. Malanjkhand Mine	Madhya Pradesh
2. Khetri Mine	Rajasthan
3. Kolihan Mine	Rajasthan
4. Surda Mine	Jharkhand
5. Banwas Mine	Rajasthan

Copper demand in India:

- As per International Copper Association India, domestic copper demand grew by 16 percent in FY 2023-24, while demand for copper in clean energy technologies grew by 32 percent.
- At the same time, net imports of copper cathode, which is the basic product of copper production, grew by 180 percent in the same financial year as India is not self-sufficient in copper due to low domestic reserves.



Applications of Copper:

1. Electrical Conductors:

- Copper is widely used in electrical wiring and components due to its excellent conductivity.

2. Piping and Tubing:

- It is commonly used in plumbing for pipes and tubing.

3. Alloys:

- Copper is alloyed with other metals to create alloys such as brass (copper and zinc) and bronze (copper and tin), both of which have various industrial and artistic applications.

4. Electronics:

- Copper is used in electronic devices, printed circuit boards, and other electronic components.

5. Roofing and Architecture:

- Copper is used in roofing materials and architectural applications due to its corrosion resistance and aesthetic appeal.

Issues of Copper Industries in India:

1. Pollution from Copper Smelters:

- Copper smelting plants separate elemental copper from copper concentrates through multiple sulphide oxidizing stages.
- Emissions from primary copper smelters are principally particulate matter and sulphur oxides (SO_x).
- Copper and iron oxides are the primary constituents of the particulate matter, but other oxides, such as arsenic, antimony, cadmium, lead, mercury, and zinc, may also be present, along with metallic sulphates and sulphuric acid mist.

2. Technical Challenges:

- The lack of modern techniques for copper mineral exploration and extraction hampers the progress of the sector along with inefficient machinery.

3. Administrative Issues:

- Ambiguities in the political approaches of the Centre and States in copper mine auction and regulation further exacerbate the problem.

4. Environmental issues:

- Failure to meet environmental compliances has led to the closure of several copper mines.

The availability of mineral resources is crucial to India's national economy. Copper, one of the most **important nonferrous metals**, has a wide range of industrial applications and its demand is growing in India, where copper inventories and production, while not comparable to those in developed countries, have grown at a rapid pace in recent years. Copper consumption is expected to rise in the future, as industrial production is expected to increase. As a result, copper has promising future demand prospects.