



# Securing India's Copper Supply

Challenges and the way forward

IISD REPORT



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### Securing India's Copper Supply: Challenges and the way forward

June 2024

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## Summary

This policy brief emphasizes the need for India to develop a comprehensive copper strategy. We recommend the following policy options to secure India's copper supply:

1. **Secure and diversify India's primary copper supply:** Diversify and forge strategic partnerships with key copper ore and concentrate supplier countries, such as Chile, Peru, Australia, the Democratic Republic of the Congo, and Zambia, amid rising geopolitical risks while supporting exploration and sustainable mining domestically.
2. **Evaluate the need for trade reforms to promote the extent of domestic value addition:** Urgently conduct a full assessment of the impact of India's trade agreements with its major trade partners for copper products, including the need to extend countervailing duties that are set to expire starting in 2025. Also, assess the costs and benefits of reducing the custom duty on copper ore and concentrate to support the domestic smelting and refining industry and encourage domestic value addition.
3. **Incentivize the domestic copper smelting, refining, and fabrication industry to meet circularity goals:** Incentivize domestic copper smelters, refiners, and fabricators through capital or production-linked incentives while linking incentives to targets on material efficiency, recently issued copper quality standards, and circularity to better utilize scrap available in the country.
4. **Rationalize the Goods and Services Tax structure for copper scrap:** Rationalize the Goods and Services Tax structure on copper scrap by lowering the rate or bringing it under the Reverse Charge Mechanism to incentivize tax compliance within the recycling industry and support the formalization of the unorganized scrap sector.



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## 1.0 Introduction

India is undergoing an economic growth sprint, aligning with a remarkable stride in infrastructure enhancement. This progression necessitates a copper strategy, given the metal's critical role in industrialization, especially electrification—a key driver of the global energy transition. Copper's significance is increasing worldwide, underpinning not only energy transition objectives but also infrastructural expansion in emerging and developing economies.

India's burgeoning infrastructure—spanning from building construction to expanding transportation networks and power grids—is predicated upon a steady supply of copper. Copper is also the lifeblood of new clean energy technologies such as electric vehicles (EVs), electrical motors, wind turbines, solar panels, and battery storage, all of which are indispensable to the economic, industrial, and sustainable growth that India envisions for itself.

Historically, copper has been colloquially termed “Dr. Copper” since its pricing trends serve as the global economy's pulse and are often used by analysts as a beacon that signals economic headwinds or tailwinds (Focus Economics, 2023; Inspirante Trading Solutions Pte Ltd, 2022). Copper prices in the domestic futures market have gained more than 23% in 2024, and a similar trend is observed in international markets with London Metal Exchange prices (futures rose to USD 10,000 per tonne in May 2024 for the first time in 2 years) (Moneycontrol, 2024; V, 2024). Despite the recent increase in copper prices that prompted a global 12% increase in exploration budgets in 2023, the industry faces a conundrum (S&P Global, 2024). The heightened expenditure has not (yet) culminated in major new production. Instead, the industry's lens remains fixed on maintaining or expanding production at aged, established deposits, with Latin America's Chile and Peru as the stalwarts, accounting for a substantial 43% of global copper finds since 1990 (DeCoff, 2022). Multiple geopolitical, technical, socio-economic, and processing challenges exist across the copper supply chain (discussed in later sections). Market analysts are also now expecting a tighter supply market for copper in the near term—and, as a result, higher prices—not only because of strong demand but also because of uncertain supply (Bloomberg News, 2024; Meredith, 2024).

Emerging economies, like India, that are highly dependent on imports for their primary copper supply are very sensitive to these market price trends. Further, a potential copper supply deficit in the long term threatens to dampen India's ambitious clean energy goals and economic development. Recognizing these potential supply risks in the future and copper's economic importance, the Committee on Identification of Critical Minerals formed by the Government of India's Ministry of Mines included copper in its list of 30 critical minerals for India in June 2023 (Ministry of Mines, 2023a). Subsequently, in August 2023, the government also introduced a new mineral concession, namely an exploration licence for 29 critical and deep-seated minerals, including copper, through the Mines and Minerals (Development and Regulation) (MMDR) Amendment Act, 2023 to boost exploration and domestic production (Ministry of Commerce & Industry, 2024; The Mines and Minerals [Development and Regulation] Amendment Act, 2023). This move aims to encourage competition and attract junior mining companies in the country (Press Information Bureau, 2023b).



This backdrop sets the stage for India to deliberate and forge a comprehensive copper strategy within its overall critical mineral policy. With the intent of providing a starting point for this strategy, in this policy brief, we focus on the rationale, objectives, and actions needed to secure India's copper supply. Such a blueprint is not a mere choice but a necessity if India is to ensure its infrastructural and economic ambitions are not throttled by the vagaries of supply and the whims of international markets.

### **Box 1. Why copper matters for India's energy transition.**

India has set an ambitious goal of achieving about 50% cumulative electric power installed capacity from non-fossil sources by 2030 (Press Information Bureau, 2022). It is also a member of the 30 by 30 campaign to drive sales of zero-emission vehicles (International Energy Agency [IEA], 2017). These two transformations will be critical drivers of future copper demand in the country due to the higher copper intensity of these technologies compared to traditional automotive and power technologies. By 2050, India, Vietnam, and Mexico are expected to supplant Germany, Japan, and South Korea as the top five copper-consuming countries globally, and India is forecasted to become the world's second-largest copper-consuming economy (S&P Global, 2022). However, its per-capita usage will remain lower than that of China, Vietnam, and Mexico (S&P Global, 2022).

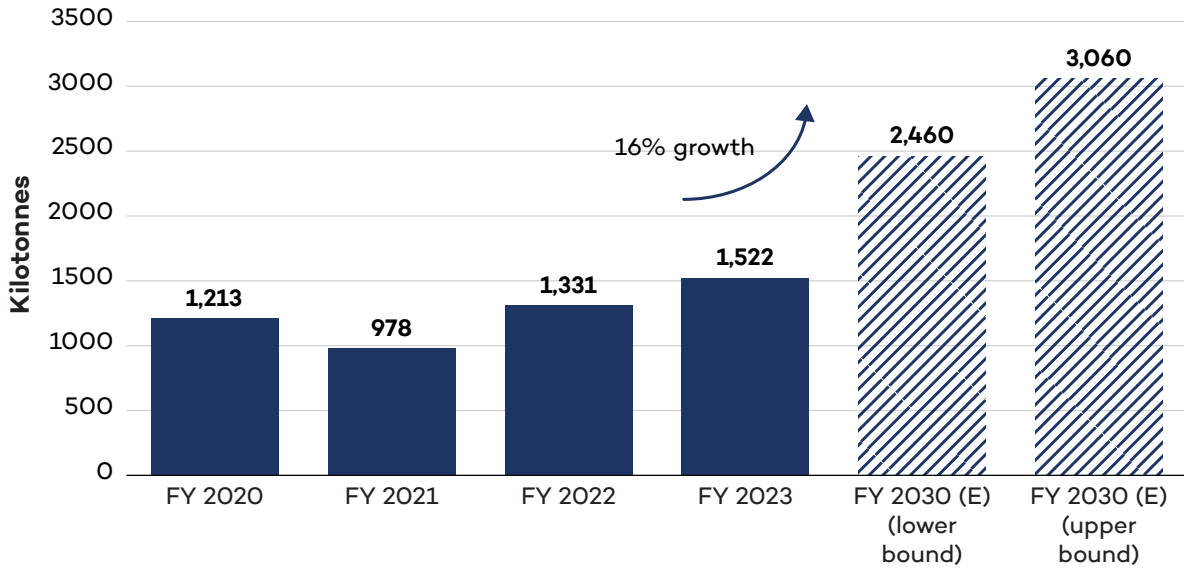
In fiscal year (FY)<sup>1</sup> 2022/2023, India's apparent copper demand was 1,522 kt, a 16% growth from 1,311 kt in the previous year (International Copper Association, 2023a) (see Figure 1). All traditional copper-consuming sectors, except agriculture, witnessed double-digit growth, driven by increased capital expenditure and private consumption, signalling a strong post-pandemic recovery. Copper demand grew at the fastest pace (34%) in the transportation sector, driven by automobiles and railway modernization, followed by the industrial (14%) and infrastructure products (14%) sectors. Consumer durables, such as room air conditioners, laptops, and phones, also continue to exhibit strong demand growth (13%). This trend is expected to continue to 2030, with the copper demand in the building construction sector expected to grow at the fastest rates of around 10%–13% annually.

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<sup>1</sup> The FY in India starts April 1 and closes on March 31.

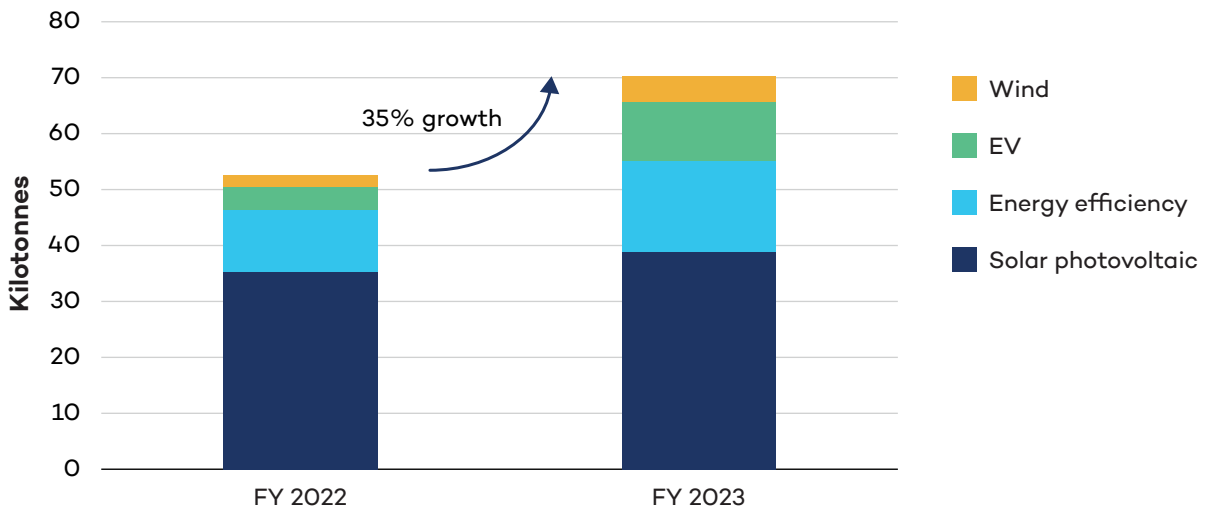


**Figure 1.** Copper demand in India (kt)



Source: Data from industry consultations and International Copper Association, 2023a.

**Figure 2.** Copper demand in clean energy technologies (kt)



Note: Copper demand includes the usage of primary and secondary copper, as well as copper and copper alloys. Copper and brass scrap are adjusted for copper content and include copper in finished goods based on an analysis of more than 300 Harmonized System (HS) codes. Copper demand includes after-market winding wire used for rewinding.

Source: Data from industry consultations and International Copper Association, 2023a.





There are also new growth drivers emerging from the clean energy transition, such as the increased use of EVs, solar pump sets, solar and wind energy, and energy-efficiency appliances that are now emerging as strong demand sectors for copper (see Figure 2). Building an EV currently requires about 2.5–4 times more copper than conventional internal combustion engine cars (Hindustan Copper Limited, 2023; S&P Global, 2022). Copper is present in internal wiring (harnesses), capacitors (battery packs), and electric motors (e-motors). Besides e-motors and batteries, electrifying transport will also require higher levels of copper for charging infrastructure and grid development. Estimates show that chargers themselves will represent about 3% of the copper required for an EV (S&P Global, 2022). In FY 2023, copper demand from these sectors collectively grew at 35% in India, emerging as one of the fastest growth drivers for copper demand in India.



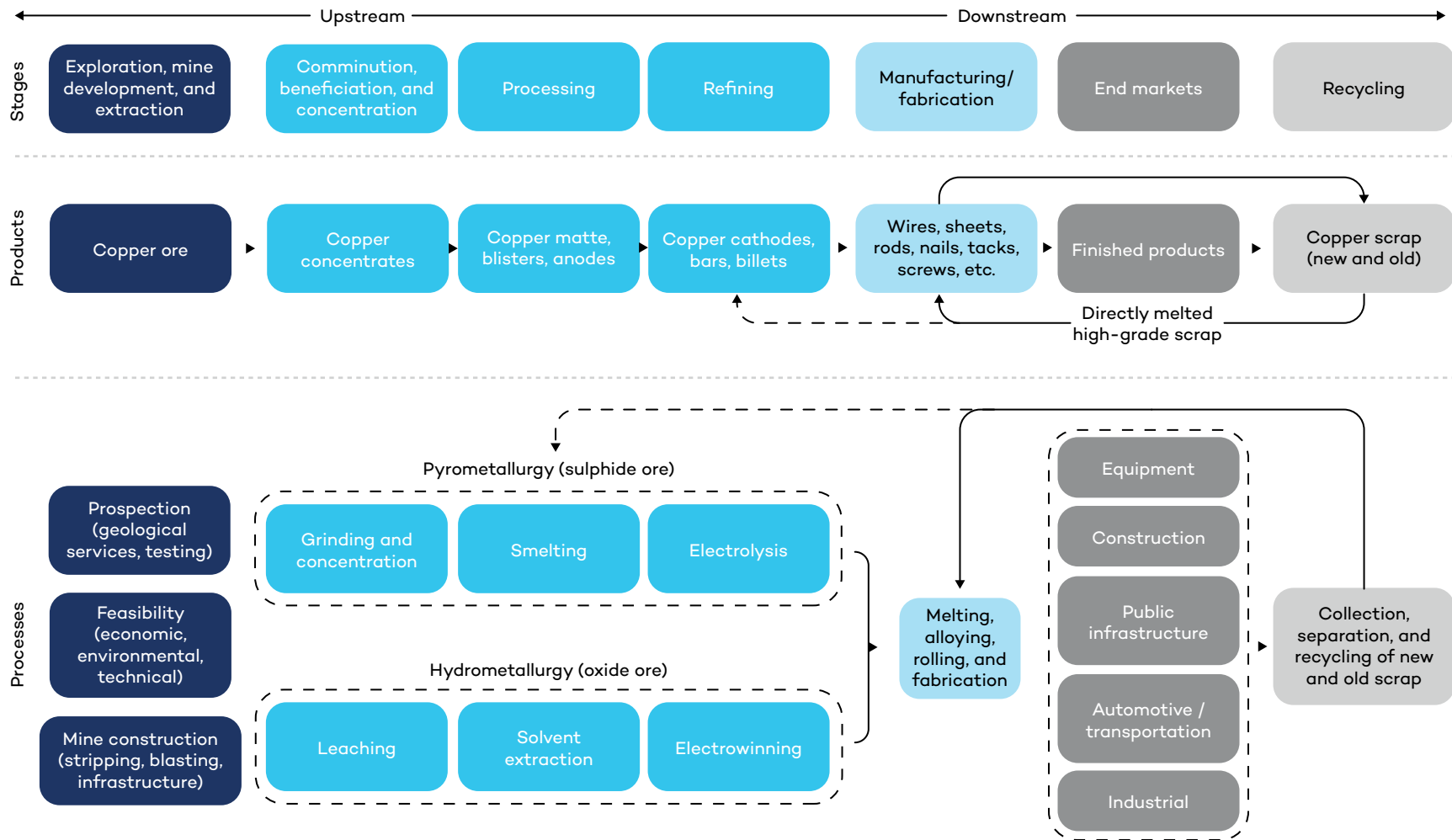
## 2.0 The Copper Value Chain

Before copper ends up in our equipment, buildings, cars, electronic devices, etc., it has to be mined, refined, or recycled (see Figure 3). The primary supply of copper is extracted from two types of ores: (i) sulphide ores that are costlier to mine and process, thus requiring higher copper grade to be operated at a profit; and (ii) oxide ores that are closer to the surface and less costly to mine and process, thus allowing for lower-grade deposits to be profitably mined. Most copper production occurs in South America, with Chile leading as the top producer of copper ores and concentrates. China holds the top spot in terms of production of refined copper and consumption (Pistilli, 2024; Shanghai Metals Market, 2024) (see the Section 3.3 for more details). The refined copper is sent to fabricators who melt it or alloy it to produce semi-finished products such as wire, rod, tube, sheet, plate, strip, castings, or powder. The downstream industries then transform the semis into finished products, such as cables, connectors, electric motors, transformers, and photovoltaic panels (International Copper Association, 2023b).

In addition to the processing of copper ores, new and old copper scrap or copper alloys can also be melted, re-purified, and recycled into new components. Between 2018 and 2020, recycling catered to nearly 25%–30% of global copper demand (International Copper Association, 2020; Loibl & Tercero Espinoza, 2021).



**Figure 3.** A simplified representation of the different stages in the value chain of copper



Source: Authors' representation based on Bamber et al., 2022.



## 3.0 Global Copper Supply Dynamics

Copper production exhibits a wider geographic spread compared to other essential minerals critical for the energy transition. With nearly 250 operational mines in 40 countries, production reached 22 million tonnes (Mt) in 2022, marking a growth of over 30% from a decade earlier (IEA, 2021b). In 2022, the foremost producers—Chile, Peru, the Democratic Republic of the Congo (DRC), and China—contributed 24%, 11%, 11%, and 9% to global copper output, respectively (U.S. Geological Survey, 2023). The DRC's recent surge in copper production led it to surpass Peru as the second-largest global copper producer in 2023 (Aquino, 2023a; Aquino & Njini, 2024). Chile, maintaining its position as the top producer, also harbours one fifth of the world's economically viable copper reserves, with Australia and Peru each possessing about 10% of the worldwide reserves (U.S. Geological Survey, 2023).

Over the past decade, copper production expanded to meet the escalating demand fuelled by economic development in emerging and developing nations, as well as copper's use in the energy transition. However, contrary to the previous decade, the coming decade projects an inability of copper supply to meet the growing demand. S&P Global projects that copper demand will double from 25 Mt in 2021 to approximately 49 Mt in 2035, with energy transition technologies driving half of this increase (S&P Global, 2022). McKinsey forecasts that global electrification will push annual copper demand to 36.6 Mt by 2031, up from the current demand of about 25 Mt. However, supply is anticipated to reach approximately 30.1 Mt, indicating a potential gap of 6.5 Mt by the onset of the next decade (McKinsey & Company, 2023). At a sectoral level, the IEA predicts a 45% surge in copper demand for the energy sector alone by 2030, leading to a nearly overall (including non-energy) 20% deficit in supply, equivalent to 6 Mt, under its Net Zero Emissions scenario.<sup>2</sup> In an even less mineral-intensive scenario, a copper supply shortfall of around 5% is anticipated (IEA, 2023).

Therefore, within a macro outlook, a structural copper supply deficit is anticipated in the coming decade (Bloomberg Intelligence, 2023; Shanghai Metals Market, 2024). In the short term (2024–2025), the global copper supply remains vulnerable to additional supply risks due to political, technical, environmental, and socio-economic factors (discussed in subsequent sections). These risks have quickly shifted even the short-term scenario from a balanced to a deficit scenario, as witnessed in the first half of 2024, and are leading to disruptions in the copper supply chain (Shanghai Metals Market, 2024).

### 3.1 Political Challenges

Geopolitics has been a key factor contributing to the shortfall in global copper supply. Over half of the 20 Mt of copper produced in 2020 originated from countries classified as “unstable” or “extremely unstable” (Lin, 2023). The impact of politics on global supply was evident in 2022 and 2023.

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<sup>2</sup> IEA's Net Zero Emissions scenario is a normative scenario providing a pathway to stabilize global average temperatures at 1.5°C above pre-industrial levels. The scenario achieves net-zero CO<sub>2</sub> emissions globally in the energy sector by 2050 without relying on emissions reductions from outside the energy sector. In this IEA scenario, advanced economies reach net-zero emissions before developing economies do.



In late 2022 and early 2023, Peru, then the world's second-largest copper producer, experienced significant political turbulence. Peru has had six presidents in the last 6 years, and the constant political crisis has hurt investment in new or greenfield copper sites (Aquino, 2023c). Nationwide demonstrations, road blockages, and worker strikes against the government and large copper mining operations have led to multiple disruptions and production shutdowns (Daniels & Dempsey, 2023). These worker strikes often highlight concerns about poor working conditions at mine sites and eroding political trust (International Renewable Energy Agency, 2024). As a result, Glencore's Antapaccay mine and MMG's Las Bamba mine—which combine to represent 2.5% of global copper output—were either shut down or restricted by protestor roadblocks (Lin, 2023). Since then, the government has been making efforts to unlock investments and streamline processes for regulatory approvals through its *Plan Unidos*. Consequently, 2024 is unlikely to be as bad as the period from late 2022 to early 2023, but transnational mining firms are still wary about investing in new projects given the higher political risk in Peru (Aquino, 2023b; Flannery, 2024). Most investments unlocked thus far are either expansions or medium-sized ventures (Aquino, 2023c).

In other regions, political instability and social unrest demonstrated its capacity to disrupt supply. For instance, BHP successfully averted strikes at the world's largest copper mine, Escondida in Chile, by securing a last-minute agreement with the local union (Reuters, 2023). Similarly, in the DRC, China's CMOC Group faced export limitations from its copper-cobalt mine from July 2022 to April 2023 due to a dispute over royalty payments with the state-owned mining corporation, Gécamines (Tang & Chen, 2023). Panama's government issued a directive for First Quantum Minerals Ltd. to cease all activities at its USD 10 billion copper mine, Cobre Panama, which accounted for about 1% of global copper output (Hilaire & Moreno, 2024). This order followed prolonged protests and political negotiations that culminated in the country's Supreme Court invalidating the legislation underpinning the mine's licence.

The IEA states that the lead time for a single copper mine can be nearly 17 years to go from discovery to production (IEA, 2021a). When coupled with rising geopolitical challenges, this poses a significant question about the ability of suppliers to ramp up should demand exponentially increase.

## 3.2 Non-Political Challenges

Short- and medium-term non-political issues, such as aging infrastructure, declining ore quality, water stress, and other environmental concerns, also contribute to the pressure on copper supply. About half of the global copper production is currently concentrated in high water-stress areas (International Renewable Energy Agency, 2024). In 2023, Chile, the world leader in copper production and reserves, experienced a 6% reduction in output partly due to these reasons (U.S. Geological Survey, 2024). Chile's state-run copper producer Codelco's production fell by 8.4% in 2023 from the previous year—its lowest level in a quarter of a century—due to operational problems and project hold-ups (Cambero, 2024; Codelco, 2024). At the close of 2023, Anglo American also reported a 16% decrease in its operations in Chile, driven by the lower-grade and harder ore at Los Bronces (Anglo American, 2024).



The diminishing ore grades necessitate escalated investment to sustain production levels. The Chilean Copper Commission estimates that the copper sector will need over USD 70 billion in investment between 2022 and 2030, with half of this sum allocated to either replacing or expanding existing projects (Selman et al., 2023). In May 2023, Chile also came out with a new mining royalty law that can increase taxes on the sale of copper in a range of 8% to 26% of operating mining margin effective January 1, 2024, compared to the prior range of 5% to 14% (Butler, 2024). This law is making some large miners re-evaluate their investment plans in Chile. Due to these political and non-political dynamics, the impending copper supply deficit has been accelerated.

### 3.3 The Processing Challenge

Copper ore requires processing before it becomes concentrated enough to be usable. Currently, about 80% of the world's primary copper production involves copper sulphide (i.e., pyrometallurgy or smelter route), with the remainder coming from copper oxide (Schlesinger et al., 2022). In 2023, China refined 44% of global copper (U.S. Geological Survey, 2024), and in the coming years, it is poised to continue to expand its dominance in copper sulphide processing, holding the majority of planned capacity additions for copper processing (Bloomberg News, 2023a; Luk & Zhang, 2023).

Mining companies pay smelters treatment charges/refining charges (TCs/RCs) to have their semi-processed ore—or concentrate—turned into copper cathodes. TCs/RCs are thus a major source of revenue for smelters. Each year, major copper miners and smelters negotiate TCs for their long-term contracts in annual discussions, and typically, the first settlement between a major miner and a smelter becomes the benchmark TC for the year ahead. In November 2023, a benchmark agreement between Chilean miner Antofagasta and Chinese smelter Jinchuan was settled at USD 80 per tonne, 9% lower than the USD 88 per tonne in 2022 and the first drop in TCs in 3 years (Bloomberg News, 2023b; MacKenzie, 2024). In addition to the annual benchmark for long-term supply, there are also spot TCs that fluctuate based on short-term supply and demand dynamics. Given the recent concentrate supply tightening and expanding smelter capacity in China, spot TCs have plunged to near-zero levels (Figure 4).

Falling spot TCs put pressure on the margins of smelter companies relying on external concentrate supplies. In such a supply-tightening scenario, new smelters coming up in countries such as India, Indonesia, and the Copper Belt of Africa can witness eroding margins and may need to prioritize tonnage over profitability to continue operations (Arora, 2024; Bloomberg News, 2023a).



**Figure 4.** Copper processing fees plunge toward zero



Source: Hunter & Cang, 2024.

BMO Capital Markets, which initially predicted a substantial surplus of refined copper for 2024, now anticipates a slight deficit. Goldman Sachs, consistently more optimistic about copper, now expects a deficit in refined metal for 2024, projecting it to exceed half a million tonnes. Likewise, Jefferies now foresees a considerable deficit in 2024 (Biesheuvel, 2023).



## 4.0 India's Current Copper Supply Dynamics

Like most countries, India is not self-sufficient in meeting its domestic copper demand. The latest dynamic stock-and-flow diagram of India developed by Fraunhofer ISI for the International Copper Association reveals that, at present, India has a large import dependence (>50%) on the supply of primary and secondary raw materials for the production of semi-finished (semis) and finished goods (see Figure 5) (Tercero Espinoza et al., 2024). The primary route (brown bar) supplies less than half (~46%) of the copper needed by the Indian industry to produce semis, with the rest coming from secondary sources (~54%), that is, the recycling of new and old scrap (green bar). Interestingly, most copper used in India is smelted or melted in India (see Section 4.2 on processing).

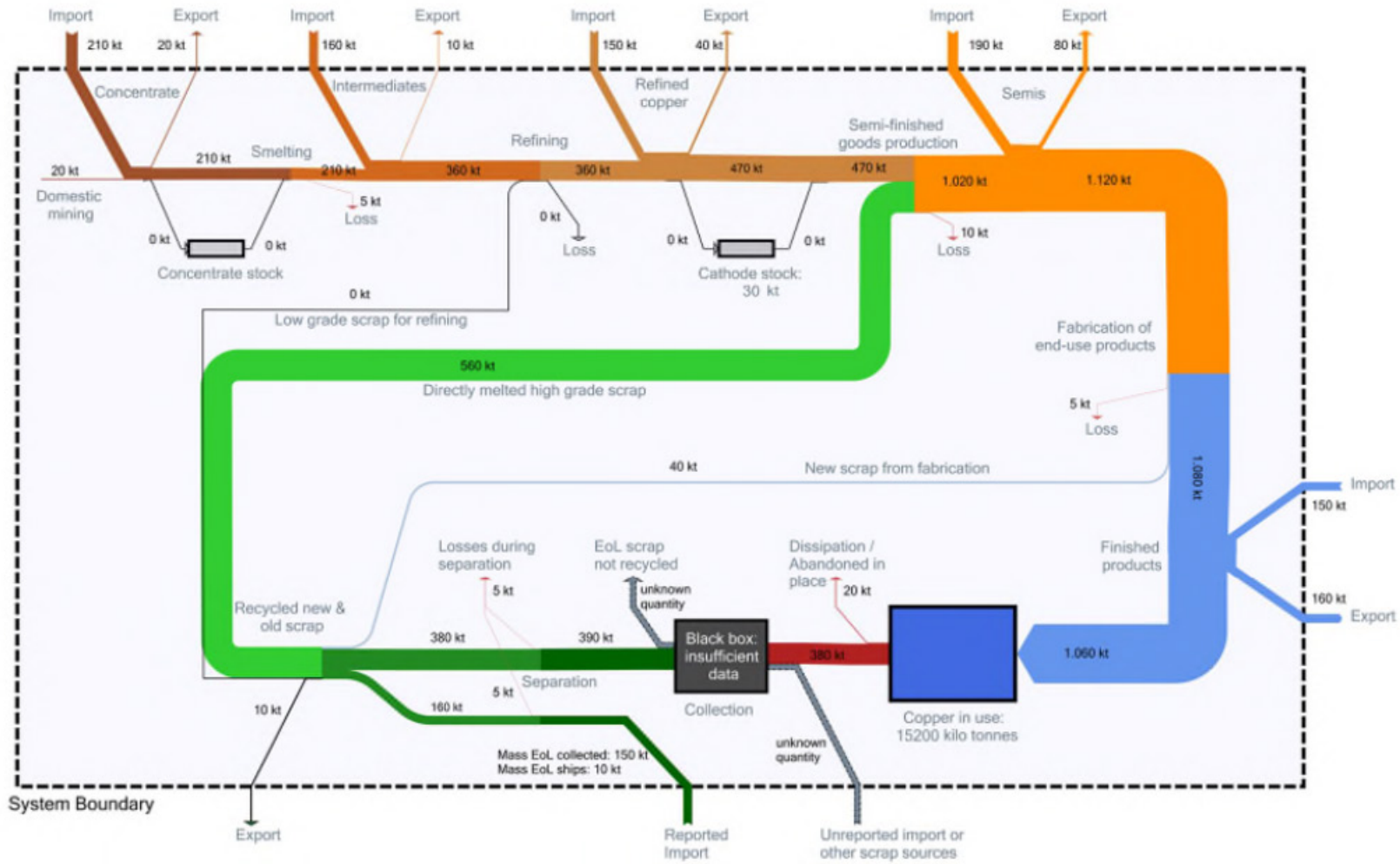
The salient features of India's copper supply are the following:

- The primary copper supply in the country is met through two sources: copper ore mined from indigenous mines and imported concentrates. Domestic mining plays only a minor role in supply.
- India essentially depends on imported copper concentrates and intermediates for its domestic refining production. Imports are supplemented to an extent by imported copper cathodes, which makes India's primary copper supply vulnerable to the global copper supply chain challenges discussed earlier.
- Since 2018, India has witnessed a much larger import of concentrate and has also become a net importer of copper cathodes (from being a net exporter before the closure of the Tuticorin smelter).
- Recycling depends almost exclusively ( $\geq 99\%$ ) on directly remelting copper and brass scrap and plays a significant role in meeting the supply requirements for semis production in India. The contribution of secondary input (scrap) to smelting and refining is minimal, making India an outlier among other regions/countries for which comparable stock and flow models have been studied.





Figure 5. Stock-and-flow model of copper in India, 2021



Note: A complete quantification of scrap imports has not been possible to date due to data constraints. The amount of scrap shown here is thus a lower bound for scrap imports into India.

Source: Tercero Espinoza et al., 2024; reproduced with permission.



## 4.1 Mining

Indigenous mining activity is limited to the public sector with Hindustan Copper Limited (HCL), a state-owned enterprise responsible for all the copper ore and concentrates produced domestically. HCL currently holds the mining lease for more than 80% of the country's copper reserves (Hindustan Copper Limited, 2023). Being the only vertically integrated copper-producing company in the country, the production of copper ore from its five mines was being used for in-house consumption till 2019. However, post-pandemic, the company has phased out the production of copper cathodes due to rising input prices and pivoted toward selling copper concentrates to private players through a combination of long-term contracts and open tenders (Hindalco Industries Limited, n.d.).

In FY 2023, total copper ore production in India was around 3.3 Mt, a reduction of 7% from FY 2022. The equivalent metal in concentrate production for this was 24,760 tonnes, which caters to only 5% of the country's requirement of refined copper production in FY 2023 (Hindustan Copper Limited, 2023; Ministry of Mines, 2022). The company plans to increase its mining capacity to 12.2 Mt per annum in phase 1 and to 20.2 Mt per annum in phase 2 through the expansion of existing mines, reopening of closed mines, and opening of new mines by investing INR 3,434 crore (USD 414 million) for phase 1 and INR 2,066 crore (USD 249 million) for phase 2 over the next decade (Hindustan Copper Limited, 2023). Currently, the remaining requirement for copper concentrate for private smelters in the country is met through imports (see Section 5 for details on India's trade partners).

Recognizing this domestic supply constraint, the Government of India is making consistent efforts to encourage both copper mining and exploration by recently amending the Mines and Minerals (Development and Regulation) (MMDR) Act, 2023. Under its first-ever auction of critical and strategic mineral blocks in November 2023, the Government of India invited bids for the mining lease of Dudhiasol East Nickel and Copper Block in Odisha (Ministry of Mines, 2024b). However, it was later annulled due to limited participation (Ministry of Mines, 2024a). By creating a new "exploration licence" for copper (among other critical and deep-seated minerals), the Government of India is also encouraging state governments to boost exploration and attract junior miners. States like Karnataka, Maharashtra, and Madhya Pradesh have already come out with bids for these exploration licences (Press Information Bureau, 2024). However, there have also been concerns about some of these licences being in forested areas and near wildlife sanctuaries (Pinjarkar, 2023). Given these potential ecological conflicts and an average lead time of approximately 17 years needed to develop a copper mine, India will need to continue to rely mainly on imports for ore and concentrates in the near to medium term, given its rising demand (S&P Global Market Intelligence, 2024).

## 4.2 Processing

India's total installed capacity for smelting and refining copper is nearly 10.28 lakh tonnes (~1 Mt) (Indian Bureau of Mines, 2023), with refined copper production at around 5.5 lakh tonnes (~0.5 Mt) in FY 2023, a 15% increase from FY 2022 (Ministry of Mines, 2023b). This makes India the 10th largest copper refiner in the world (Ministry of Mines, 2023b). The domestic refined copper production catered to approximately 94% of the copper availability



for downstream production in FY 2023, making it an important part of India's copper value chain (Indian Bureau of Mines, 2023). To make up for the remaining shortfall, India also imports a small share of refined copper, mainly from Japan (see Section 5 for details on India's trade partners). Three major players dominate the Indian copper smelting, refining, and fabrication industry (see Table 1), along with some smaller manufacturing units.

Hindalco currently meets more than half of the country's primary copper requirements and is also one of the largest suppliers of copper to the Indian Railways (Hindalco Industries Limited, 2023). In FY 2022, Hindalco also acquired Polycab's Continuous Cast Rod unit, Ryker (now Asoj), which can produce 225,000 tonnes of copper rods (Hindalco Industries Limited, 2023). This acquisition has positioned Hindalco among the world's top three copper rod players outside of China.

Kutch Copper Limited, promoted by Adani Enterprises Limited, is installing a custom copper smelter refinery complex with a capacity of 1 Mt in the Mundra Special Economic Zone. It is expected to achieve full scale by FY 2029 through a phased process. The project received financial closure with a consortium of banks led by the State Bank of India for INR 6,071 crore (USD 723 million) (Adani Enterprises Limited, 2023). The primary smelter will be sourcing copper concentrate from reputed miners the world over and will be producing copper cathodes (as the main product) and copper rods, among other value-added products.

**Table 1.** India's copper smelting and refining industry

#	Company	Capacity (tonnes)	Type of copper producer
1	HCL <sup>a</sup>	68,500	CPSE (integrated producer)
2	Hindalco	5,00,000	Private (Port-based custom smelter)
3	Sterlite Copper <sup>b</sup>	4,60,000	Private (Port-based custom smelter)
	<b>Total</b>	<b>10,28,500</b>	
<b>Under development</b>			
4	Kutch Copper Limited	10,00,000 <sup>c</sup>	Private (Port-based custom smelter)

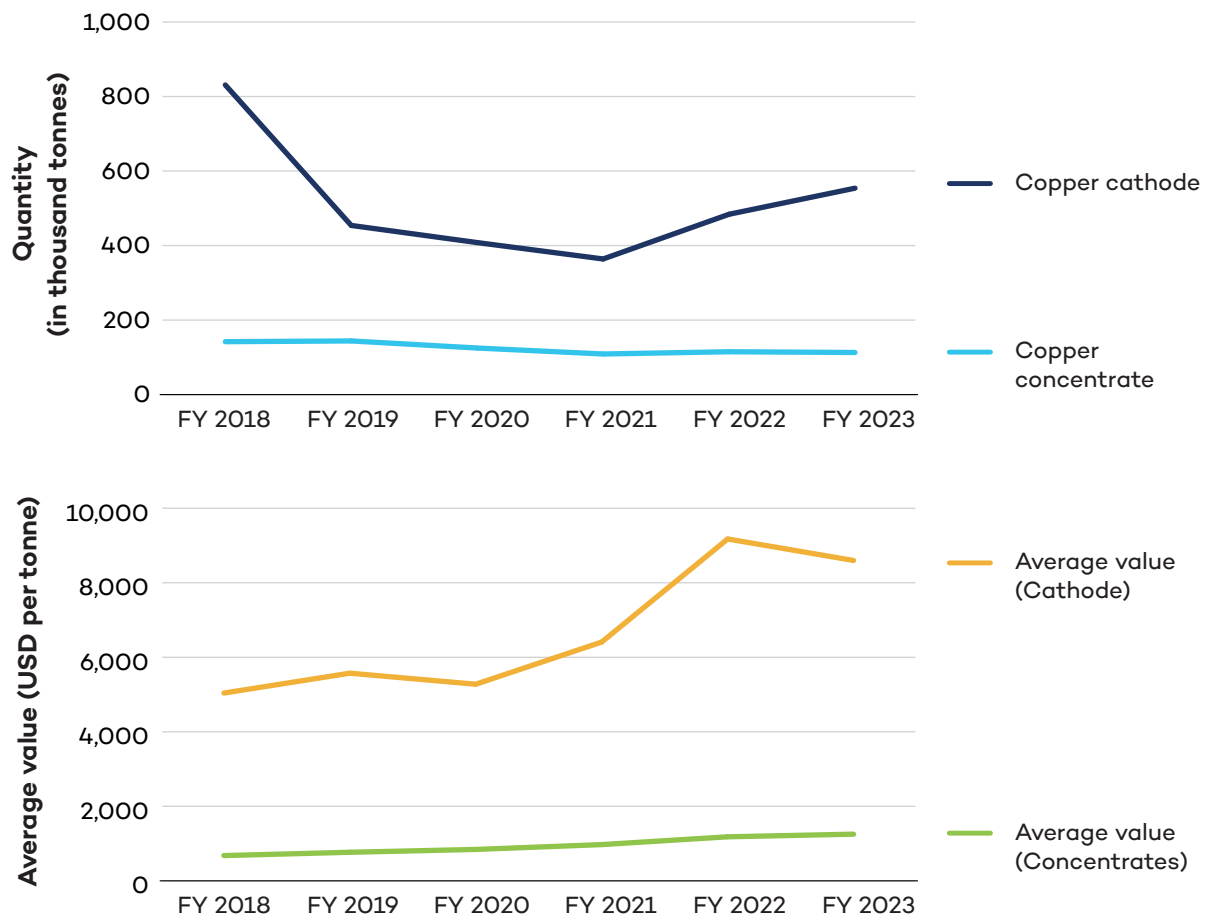
Notes: (a) HCL is presently focusing on the direct sale of copper concentrate; (b) Sterlite's Tuticorin smelter, with 4,00,000 tonnes of capacity, is currently not operational; the production of copper rods is coming from its Dadra & Nagar Haveli plants; (c) the first unit of Phase 1 was commissioned in March 2024.

Source: Indian Bureau of Mines, 2023.

Despite these recent developments, it is important to note that since 2018, India has become a net importer of copper cathodes (from being a net exporter before the closure of the Sterlite's Tuticorin smelter due to environmental concerns) (see Figure 6 and Section 5 on trade for more details).



**Figure 6.** Changes in India's domestic copper supply over the years



Note: 1 USD = 83 INR

Source: Authors' analysis.



## Box 2. The rising importance of environmental, social, and governance (ESG) risks in the copper supply chain

Copper is an important metal in the transition to sustainable energy. To ensure that it helps meet larger sustainability goals, it is essential that copper is also produced and sourced responsibly. Copper extraction and processing are typically marred by several environmental concerns, such as acid mine drainage, generation of waste and tailings, biodiversity loss, deforestation, air pollution, and high energy and water intensity (Institutional Shareholder Services, 2022; University of Arizona, n.d.). Around half of the world's copper production is currently concentrated in high or extremely high water-stress areas (IEA, 2021b), and local communities around the world are increasingly seeking legal action regarding water misuse and pollution (most recently, in the case of Escondida copper mine in Chile) (Institutional Shareholder Services, 2022). The Transition Minerals Tracker also shows that copper extraction and mining was linked to a high number of allegations of environmental and human rights abuses, and mining companies are seeing rising cases of Indigenous Peoples taking legal action through national and international mechanisms (Business & Human Rights Resource Centre, 2024, pp. 16–20). Further, the majority of current production comes from regions with low governance scores or high emissions intensity (IEA, 2021b).

Given these concerns, which are expected to rise further given declining ore grade, countries such as India, which are looking for strategic investments to secure their primary copper supplies, must ensure that they identify and assess ESG risks while forging partnerships and making investment decisions. Similarly, domestic copper miners and refiners need to ensure that they adopt and embed leading ESG industry standards, guidance, and tools in their supply chain. For instance, the Initiative for Responsible Mining Assurance, Responsible Minerals Assurance Process, International Council on Mining and Metals mining principles, and The Copper Mark (Heinz et al., 2022). Of relevance is the ongoing initiative to harmonize The Copper Mark, International Council on Mining and Metals, Mining Association of Canada, and the World Gold Council standards (Consolidated Mining Standard Initiative, 2023).

## 4.3 Recycling

As discussed previously, secondary sources (i.e., recycled new and old scrap) play an important role (~54%) in meeting India's copper requirements. The collection of scrap in India is mainly done through the informal sector, and as a result, there is limited data on domestically available quantity and scrap value. Old and new scrap is generated from various sources, such as used electric motors, cable wires, household utensils and cutlery, ship breaking, electric motors, radiators, turning shavings, copper smelters, and the fabrication industry (Indian Bureau of Mines, 2011).

As per the licences granted by the Central Pollution Control Board in 2010 (the latest year for which official records are available), there were 35 copper reprocessing units operating in different states with a combined capacity of 2.42 lakh tonnes per annum (0.2 Mt per annum) (Indian Bureau of Mines, 2011). In addition, there are 132 units with a combined capacity



of 5.17 lakh tonnes per annum (0.5 Mt per annum), which recover copper along with other metals, but only 40% of the units were in operation, and capacity utilization was about 50%, despite imports (Indian Bureau of Mines, 2011).

Recycling of new scrap in India mostly tends to happen in-house within manufacturing facilities with their own furnaces to remelt scrap. Studies show that this characteristic has been observed in China before but distinguishes India from other regions/countries, such as the European Union, North America, and Japan, where manufacturers do not reprocess their own scrap (Tercero Espinoza et al., 2024).

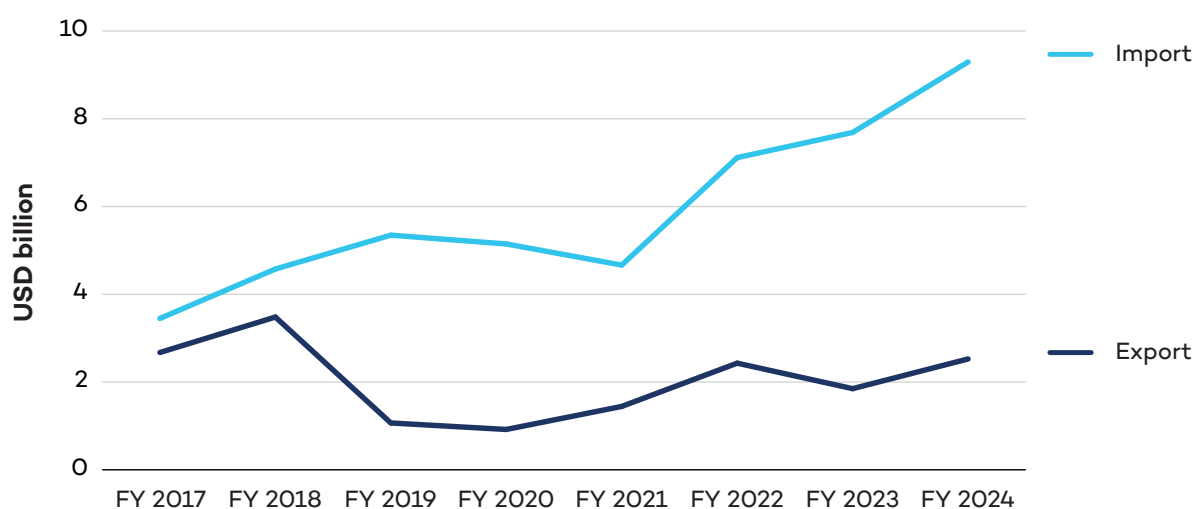
India has high collection efficiency of end-of-life (old) copper scrap, and there is minimal copper loss during the direct remelting process of copper scrap for semis production, leading to high recycling rates (the proportion of end-of-life copper scrap that gets recycled and reintroduced into the system) (Business Standard, 2024). However, end-of-life (old) scrap tends to be more heterogeneous, often with contaminants, and its higher rate of re-entry into the system may explain why this scrap is instead directly remelted for semis production instead of being back fed as feedstock for smelting and refining. In contrast, in countries like China, the European Union, and Japan, secondary material (scrap) comprises 15%–35% of feedstock for their smelters and refiners (Tercero Espinoza et al., 2024). This leads to minimal contributions of secondary material in meeting the feedstock requirements of domestic smelters and refiners; it also explains the limited presence of secondary smelters in the country.



## 5.0 India's Current Copper Trade Balance

Today, India imports large amounts of copper products that are used in its economy, in addition to large amounts of raw copper ores and concentrates that are then smelted in India. In FY 2024, India had a trade deficit of USD 6.8 billion with its trade partners for copper and its products (Figure 7). Imports for copper and its products have increased by 21% (in value terms) in FY 2024 (Ministry of Commerce, 2024).

**Figure 7.** India's current trade balance for copper and products

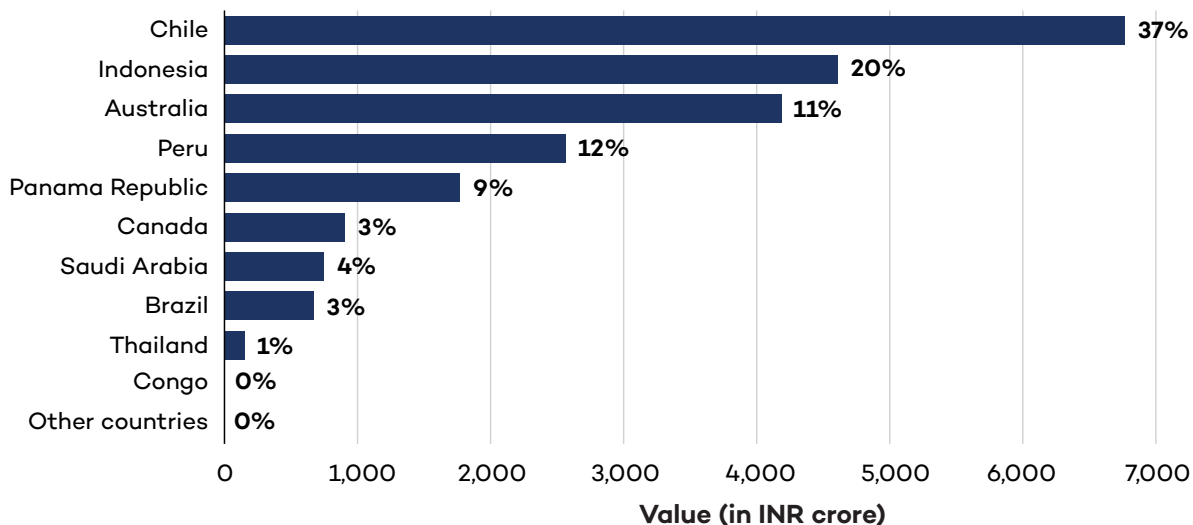


Source: Ministry of Commerce, 2024.

In FY 2023, India imported mostly raw copper ores and concentrates, at a value of about USD 3.3 billion (INR 27,374 crore), a 22% growth in value terms from FY 2022. The value of raw copper ore and concentrates is higher than the import of lithium, manganese, nickel, and silicon combined. The top trade partners for copper ores and concentrates imports were Chile and Indonesia (see Figure 8). While the trade partners are stable trade partners for India, two thirds of India's copper ore and concentrate imports are exposed to countries in which the politics of resource nationalism and domestic political challenges can threaten its copper supply, such as Indonesia and Panama. Indonesia, a Free Trade Agreement partner of India, has already announced a partial copper concentrate export ban in June 2023, with a complete ban expected from June 2024 (Reuters, 2024a; Somwanshi, 2024). When combined with the closure of Panama's Cobre Panama mine (discussed earlier), this move can threaten a major part of India's primary copper supply once fully implemented. In third, fourth, and fifth places are Australia, Peru, and Panama.



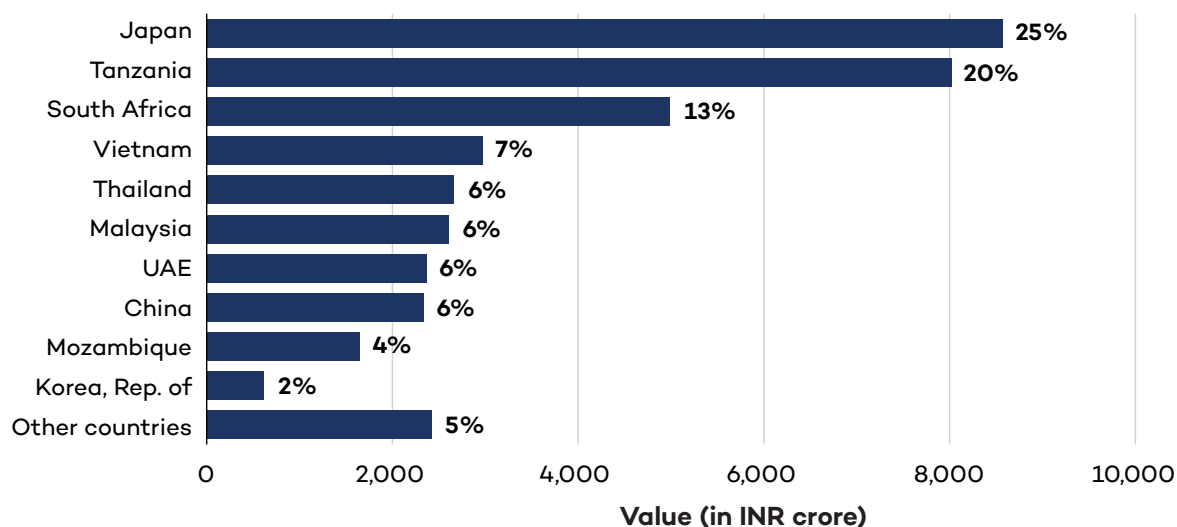
**Figure 8.** Import volume (%) and value of copper ore and concentrates into India from top 10 countries, 2022



Source: Indian Bureau of Mines, 2024 (HS code: 260300).

In terms of copper products, India's import bill was relatively lower for refined copper products like copper anodes and cathodes but highest for downstream products like copper and alloys. This again shows that India's processing and refining sector has played an important role in meeting the needs of downstream product manufacturers, although not fully sufficiently since 2018. Around 86% of this imported refined copper (both in quantity and value terms) came from only one country—Japan.

**Figure 9.** Import volume (%) and value of copper and alloys into India from the top 10 countries in 2022



Source: Indian Bureau of Mines, 2024.

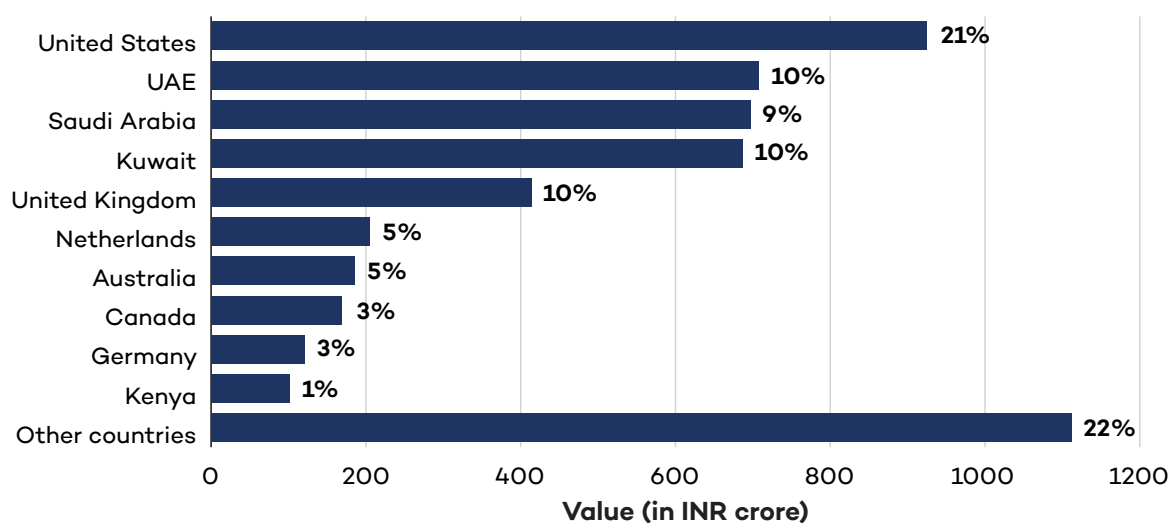




The trading partners for downstream products like copper and its alloys were more diversified, with Japan, Tanzania, South Africa, Vietnam, and Thailand together accounting for almost 70% of imports by volume (see Figure 9).

India also imported copper waste and scrap. The most important trading partners were the United States, the United Arab Emirates (UAE), Saudi Arabia, Kuwait, and the United Kingdom.

**Figure 10.** Import volume and value of copper scrap into India from top 10 countries, 2022



Source: Indian Bureau of Mines, 2024.



## 6.0 India's Options to Secure Copper Supply

Given the rising demand and global supply shortage expected both in the near term (2024) and long term (beyond 2030), India needs to prepare a detailed action plan for sourcing as a part of its overall copper strategy to ensure that the rising copper demand in the country is adequately met. This provides a roadmap to attract further investments and secure supply.

### 6.1 Secure and Diversify India's Primary Copper Supply by Identifying Strategic Partners Overseas While Promoting Domestic Exploration and Mining

Currently, India has a limited geopolitical presence in the copper mining sector when compared to countries like China, Japan, and the United States. Most of its presence is led by the private smelter industry that sources ores and concentrates from their mines abroad, which exposes the Indian copper industry to geopolitical risks. For instance, in 2019, Vedanta Resources (parent company of Sterlite Copper) lost control of Konkola Copper Mines (KCM) in Zambia after a disagreement with the Government of Zambia. The mine holds copper ore reserves and resources of 16 Mt of contained copper and a high ore grade of approximately 2.3%, much higher than the global average of 0.4% (Mining Review Africa, 2023; Moneycontrol, 2023). The Zambian government owns a 20% stake in KCM, and in September 2023, it returned control to Vedanta Resources with a pledge to invest more than USD 1.2 billion to increase output and repay outstanding debts (Mfula & Njini, 2023).

India, therefore, needs to work closely with the private sector to identify strategic partnerships to secure its copper ore and concentrate supply from overseas. The current geopolitical situation—in light of the supply of copper ore and concentrates tightening from Indonesia and Panama in 2024—leaves India with limited options, mainly Chile, Peru, the DRC, Zambia, and Australia, for securing its primary supply (Press Trust of India, 2022a; Richardson, 2023). However, even Chile has long-term commitments (up to 90% of its production) with countries like Japan, China, and others that have invested in its copper mines. In Africa, new international investors are rapidly moving to acquire new copper assets, such as the recent acquisition of Mopani Copper Mines by UAE's International Holding Company (Reuters, 2024b).

India could further deepen ties with Australia (already the third-largest trade partner for copper ore and concentrate imports, as shown in Figure 8), given that India recently signed the India-Australia Economic Cooperation and Trade Agreement, which eliminates custom duty on copper ore and concentrate imports from Australia. It is important to note here that among all major copper producers, Australia also has the highest country ESG ratings (Institutional Shareholder Services, 2022).

In terms of domestic exploration and mining, India's total resources of copper ore are estimated at 1.66 billion tonnes for a metal content of 12.2 Mt. Of this, only 10% are



categorized as reserves (Indian Bureau of Mines, 2024). This shows that domestic exploration efforts can be further strengthened and improved. India may need to design more policy instruments to incentivize junior exploration companies, as is done in Australia and Canada, beyond the current incentive of 25% of the approved project cost being provided from the National Mineral Exploration Trust of the Government of India under the newly created exploration licence (Kumar, 2023). Chadha et al. (2023) suggest that instead of the new exploration licences introduced recently by the Government of India, the government should instead consider extending the existing composite licence regime to include specific components of the new exploration licence. This would create better incentives for exploration by the private sector, given the riskier nature of investments and long gestation periods from exploration to production (Chadha et al., 2023).

## 6.2 Evaluate the Need for Trade Reforms to Promote the Extent of Domestic Value Addition

With rising demand but a lack of domestically available copper concentrate, India's smelter, refining, and fabricating industry could find itself in a tight spot. This situation is further exacerbated by the unintended consequences of certain trade agreements, such as the Free Trade Agreement with the Association of Southeast Asian Nations and the Comprehensive Economic Partnership Agreement with Japan, Korea, and UAE, where copper semis can come to India at zero or near-zero duties, thus creating an inverted duty structure for copper products (Federation of Indian Chamber of Commerce and Industry, 2018). Cognizant of this, there have been multiple anti-dumping and countervailing duty investigations, sometimes initiated by the industry but also undertaken *suo moto* by the Ministry of Commerce and Industry over the past 5–6 years, recommending the need for anti-subsidy and countervailing duties for 5 years on select downstream copper products, such as wires, tubes, pipes, and certain copper alloys (Directorate General of Trade Remedies, 2019, 2021, 2022). Two out of three recommendations have now been accepted by the Ministry of Finance, but these are up for renewal starting in January 2025 (Ministry of Finance, 2020). In parallel, industry bodies such as Assocham and the PHD Chamber of Commerce and Industry have also been requesting that the government remove the present custom duty on copper concentrate from 2.5% to zero to attract investments (Press Trust of India, 2022a, 2022b).

The government should, therefore, urgently conduct a full assessment of the impact of its trade agreements and duty structure with India's major trade partners for copper products to ensure a level playing field for the domestic copper industry and encourage domestic value addition.

## 6.3 Incentivize the Domestic Copper Smelting, Refining and Fabrication Industry to Boost Innovation While Linking It to Circularity Goals

Currently, there are no capital or production-linked incentives for setting up copper smelters, refiners, and fabricators in India. With high import dependency for copper concentrates and existing trade barriers, the Indian copper industry is at a disadvantage when compared to



other major copper smelting/refining regions, particularly China, given the capital-intensive nature of the industry and high cost of capital. There is a need in the future to bring in copper smelters, refiners, and fabricators under India's production-linked incentive schemes to attract further investment. Such a scheme should be linked to targets on material efficiency, recently issued copper quality standards, and circularity to better utilize scrap available in the country while promoting innovation and reducing their ecological footprint (Press Information Bureau, 2023a).

## **6.4 Rationalize the Goods and Services Tax Structure for Copper Scrap to Improve Circularity and Promote Measures That Help Formalize the Scrap Industry**

As discussed previously, India is highly dependent on copper scrap (~54%) to meet its requirements. Scrap in India is mainly collected through the unorganized or informal sector, following a pyramid structure comprised of small-scale collectors of scrap, small traders, big traders, and industries. There is also a lack of data on operational reprocessing units and their utilization rates, with the last such official field survey dated in 2011. To better understand the needs and issues of the recycling industry, the government should conduct periodic field surveys that can clarify the opportunities available to increase supply from these secondary sources and introduce circular economy models.

The Goods and Services Tax (GST) rate on copper scrap is also high, at 18%, and is leading to operational difficulties and legal disputes (Dhoot, 2023). In the last few years, there have been several instances of tax fraud and non-compliance by informal sector scrap dealers who often fail to deposit GST dues collected from larger buyers (Dhoot, 2023; Kothari, 2024; TNN, 2023).

The GST rate on copper scrap can be lowered to incentivize circularity. In one of its assessments, the Material Recycling Association of India estimated that lowering GST from 18% to 5% on copper scrap will not lead to any loss of revenue for the government, as it may incentivize more recyclers to start paying GST (Naik, 2022). Alternatively, the government can consider bringing GST on copper scrap under the Reverse Charge Mechanism that shifts the tax liability to the buyer instead of the supplier to curb tax evasion (Dhoot, 2023).

Further, as discussed earlier, India's existing primary smelters are not designed to utilize copper scrap. Indian recyclers melt the copper for reuse in manufacturing semis, but it does not make its way back to the smelter route, as the process is often undertaken in Japan, China, Korea, and the European Union. GST rationalization will be critical for planning or promoting secondary smelters in the country that are technically designed to utilize copper scrap that is available locally in the country. Organizing the copper recycling sector through taxation reforms and incentivizing formalization will be key to this process.



## 7.0 Conclusion

To summarize, this policy brief explores select policy options for India to serve as a starting point to secure its copper supply. Since the copper supply chain can involve multiple stakeholders, these options may warrant interministerial deliberations and considerations. Table 2 lists the key stakeholders needed to fully evaluate these policy options for India.

**Table 2.** Recommendations and key stakeholders

#	Recommendations	Key stakeholders
1.	Secure and diversify India's primary copper supply by identifying strategic partners, such as Chile, Peru, the DRC, Zambia, and Australia, while promoting domestic exploration and mining.	Ministry of Mines, Ministry of External Affairs, Khanij Bidesh India Ltd.
2.	Conduct a full assessment of the impact of India's trade agreements with its major trade partners for copper products, including the need to extend countervailing duties set to expire starting in 2025. Also, fully assess the costs and benefits of reducing the custom duty on copper ore and concentrate to support the domestic smelting and refining industry and encourage domestic value addition.	Ministry of Finance, Ministry of Commerce and Industry (Directorate General of Trade Remedies), Ministry of External Affairs
3.	Consider incentivizing the domestic copper smelting, refining, and fabrication industry through capital or production-linked incentives to attract further investment. Such incentives should be linked to targets on material efficiency, recently issued copper quality standards, and circularity to better utilize scrap available in the country while promoting innovation and reducing their ecological footprint.	Ministry of Finance, Ministry of Commerce and Industry (Department for Promotion of Industry and Internal Trade)
4.	Rationalize the GST structure for copper scrap to improve circularity and promote measures that help formalize the scrap industry. Also, conduct periodic field surveys on operational reprocessing units and their current utilization rates.	Ministry of Finance, GST Council, Ministry of Environment, Forests and Climate Change, Central Pollution Control Board



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