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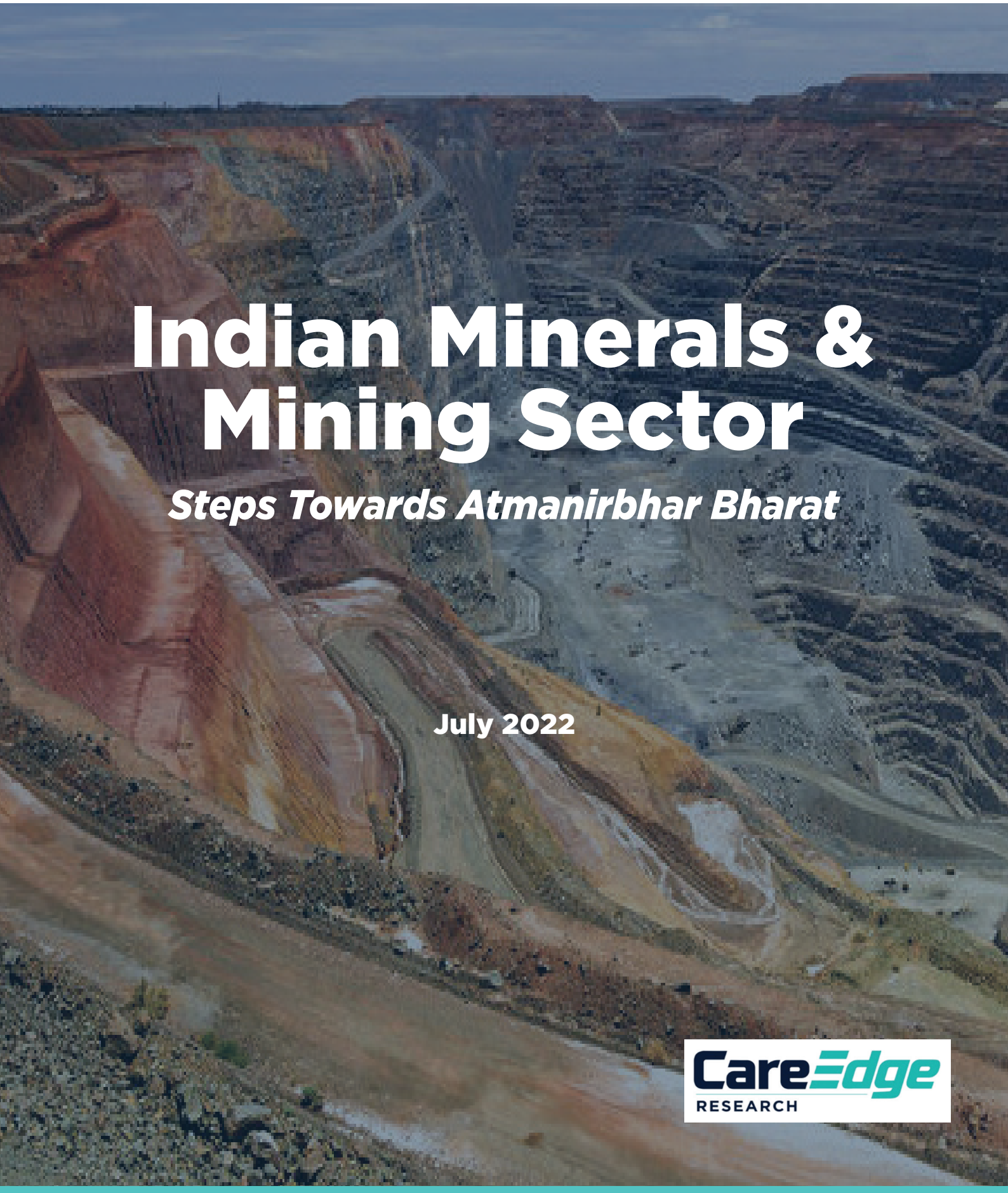

Indian Minerals & Mining Sector

Steps Towards Atmanirbhar Bharat

July 2022

CareEdge RESEARCH

THE ASSOCIATED CHAMBERS OF COMMERCE AND INDUSTRY OF INDIA

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FOREWORD

Mining is a major economic activity in India, that accounted for 2.5% of the country's GDP in FY22. India produces 95 minerals, including metallic, non-metallic, atomic and minor minerals. India is ranked as one of the leading global producers of valuable minerals such as iron ore, chromite, coal, and bauxite. The mining sector in India was highly regulated earlier, and the legal framework has undergone significant changes in the past few years, resulting in a more transparent and efficient regime operating now.

The introduction of the MMDR Act empowers the central government to issue directions to the states, ensuring the sustainable development and exploitation of minerals to achieve the full potential of the sector. It also facilitates revenue enhancement to the state, stepping up exploration & auction of resources, and resolving long-pending issues that have slowed the sector's growth.

The Indian government, led by the vision of Atmanirbhar Bharat, has also taken various steps to increase the exploration of minerals, which has led to the availability of more blocks for auction. Exploration activities have expanded not only for traditional minerals but also for deep-seated, critical minerals and minerals which we were imported. These minerals have specialised use in various industries and modern applications, such as aerospace, automobiles, defence, and nuclear energy. They would also play a vital role in nurturing the domestic manufacturing capacity to support the government's low-carbon plans

I hope the ASSOCHAM Conference on the 'Indian Mineral Reforms' provides an opportunity for all stakeholders to come together and deliberate the evolution of various implementable solutions for the mineral sector that can play a vital role in furthering the country's growth agenda.

Deepak Sood
Secretary General
ASSOCHAM

FOREWORD

Indian economy has been on a strong recovery trajectory in the post pandemic scenario which has now gotten disrupted by the inflationary concerns for various commodities coupled with geopolitical tensions on account of Russia-Ukraine conflict. The escalation of the geopolitical situation has resulted in a surge in the international crude oil and other commodity prices. Also, the resulting tightening of global financial conditions, persistent supply-side disruptions and significantly weaker demand with weak consumer sentiments now pose downside risks to the economic outlook. In this global scenario, it becomes imperative for India to be self-reliant to the extent possible in order to safeguard its growth prospects over the medium to long term.

Minerals are vital raw materials for many basic industries and are major components for growth and industrial development. Rapid development and manufacturing potential could lead to a significant increase in domestic minerals and metals demand. Despite being well endowed in most of the minerals and growing demand, the sector staggers back in supply due to low exploration, funding and many policy hurdles leading to an increase in imports over the years. India is 100 per cent import dependence on certain minerals which are used in aerospace, automobiles, cameras, defence, entertainment systems, laptops, medical imaging, nuclear energy, and smartphones. Also, India is dependent on China for the import of lithium which is mainly used for making of Li-ion cells, a fundamental component of batteries used in electric vehicles.

Government has been trying to address these issues and have taken various steps to reduce import dependency and make the sector 'Atmanirbhar'. The recent amendments to MMDR Act, commercialisation of coal blocks are some of the steps that will help increase the sector's self-sufficiency in the long term. However, despite these opportunities and amendments, the sector has been facing several challenges pertaining to land availability and cost, high tax rates, regulatory uncertainty, and environmental concerns. However, we expect these challenges to be ironed out by the Government in the near future through progressive policy initiatives, encouraging private sector participation, and taking steps to promote sustainable practices.

We are privileged to be the Knowledge Partner for ASSOCHAM's Conference, 'Indian Mineral Reforms – Step Towards Atmanirbhar Mining'. This background paper provides an analysis of the sector including the structure, growth potential, end user industry demand, challenges, and suggestions for a sustainable growth going forward.

Tushar Shah
Co-CEO
Care Advisory Research & Training Ltd.

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1. Introduction

India's large land mass has one of the finest geologies, mineralisation, and exploration potentials for both bulk and non-bulk commodities. India's rich mineral wealth forms the backbone of the country, and the core of its industrial, economic, and commercial growth.

The mining industry is one of the core industries in India. Mining industry provides basic raw materials to many major industries such as power, steel, cement, capital goods and petroleum as well as the service sector which requires computing gadgets made of quartz, lithium, lead, zinc, silver, etc.

In India, mining has around 1.2x-1.4x multiplier effect on industrial production. As per Central Government's estimates, the national mining sector provides direct employment to more than a million people, thereby contributing to livelihood creation.

The metals and mining sector is critical for economic growth in a developing country like India. The sectoral share of mining and quarrying in Gross Value Added (GVA) is estimated to be around 2.2% in FY22. This has declined over the years from a high of 3.1% in FY17.

India's mining sector is still underdeveloped as compared with other developing economies like China and Brazil. It has huge untapped potential and Government's persistent efforts and initiatives are likely to help develop it further.

As the GDP of a country increases with rapid urbanization and industrialization, its mineral consumption also grows at a rapid pace. India holds an advantage in terms of cost of production, being among the lowest cost producer of steel and aluminium, due to ample mineral availability and access to cheaper manpower.

2. Indian Minerals & Mining Sector

- Import Dependency and Need for Atmanirbharta -

India is well endowed in minerals and produces as many as 95 minerals, which include 4 fuel, 10 metallic, 23 non-metallic, 3 atomic and 55 minor minerals (including building and other materials) mined through 1,300 mines.

- **Largely Self-sufficient Minerals:** India continued to be largely self-sufficient in minerals which constitute primary mineral raw materials that are supplied to industries, such as iron & steel, aluminium, cement, various types of refractories, china clay-based ceramics, glass, etc.
- **Near to Self-sufficient Minerals:** India is self-sufficient or near to self-sufficient in bauxite, chromite, limestone, iron ore and sillimanite.
- **Minerals in Deficit:** India is deficient in coal, copper concentrate, kyanite, magnesite, rock phosphate, manganese ore, etc. which are imported to meet the demand for either blending with locally available mineral raw materials and/or for manufacturing special qualities of mineral-based products.

Table 1: Contribution and Rank of India in World Production of Principal Minerals & Metals, 2019

Mineral	Contribution in world production (%)	India's rank in order of quantum of world production	Order of self-sufficiency* (%)
Mineral Fuels			
Coal & lignite	10	2nd	n.a
Metallic Minerals			
Bauxite	6	5th	100
Chromite	10	3rd	100
Iron ore	8	4th	100
Manganese ore	5	7th	51
Industrial Minerals			
Magnesite	0.3	17th	75
Apatite & rock phosphate	0.6	16th	15
Metals			
Aluminium	6	3rd	100
Copper (refined)	2	13th	39
Steel (crude/liquid)	6	2nd	n.a
Lead (refined)	5	4th	52
Zinc (slab)	4	4th	89

*Note: Order of self-sufficiency is based on FY20.
n.a: Not available
Source: Ministry of Mines, Government of India

Table 2: Major minerals found in the country along with their proven reserves

Mineral	Unit	Proved reserves
Limestone	000' tonnes	94,38,939
Iron Ore (Haematite)	000' tonnes	40,53,032
Iron Ore (Magnetite)	000' tonnes	30,352
Bauxite	000' tonnes	4,34,043
Dolomite	000' tonnes	4,31,750
Magnesite	000' tonnes	77,867
Chromite	000' tonnes	64,465
Manganese	000' tonnes	62,982
Apatite & rock phosphate	000' tonnes	43,832
Graphite	000' tonnes	4,229
Kyanite	000' tonnes	639
Mica	000' tonnes	82
Source: Ministry of Mines, Government of India		

India being well-endowed in minerals, the sector still has a huge opportunity for the development as the country needs to explore its untapped potential. Moreover, various initiatives by the Government through Atmanirbhar Bharat mission and formation of National Mineral Exploration Trust (NMET), has led to the country's Obvious Geological Potential (OGP) of explored area increasing from 5.71 lakhs sq.km to 6.88 lakhs sq km, a growth of around 30% since 2014.

Mining being an essential industry, was allowed to remain operational during the pandemic. However, due to limited end-use demand, the sector witnessed a moderation in total volumes of minerals produced in FY21 as well as FY22E. As demand for most minerals was impacted due to a slowdown in industrial and economic activities on account of restriction levied during the pandemic. Besides, state-specific lockdowns, shortage of labour and logistical issues posed challenges to the mining sector.

Post the gradual opening-up of the economy and with the lifting of lockdown restrictions, the mining volumes recovered through FY22. The strong demand from the consumer sector (power, infrastructure, automobile etc.) in domestic and international markets provided support to the growth thereby encouraging companies to take up capacity expansion.

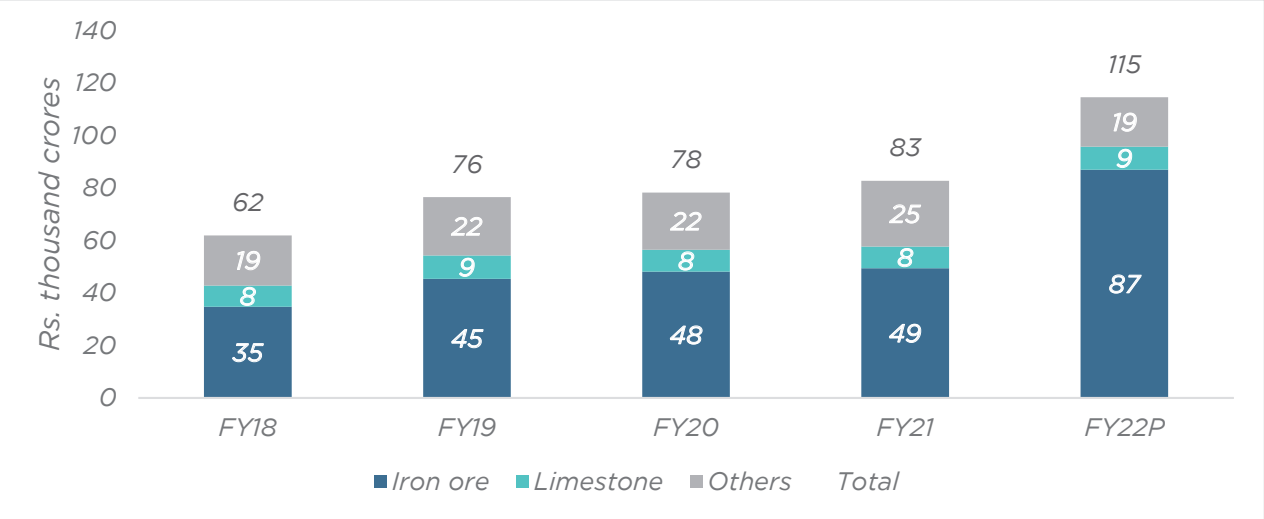
Table 3: Production, import and export of major minerals

Mineral	Unit	Production (FY22E)	Export (FY21P)	Import (FY21P)
Limestone	Million Tonnes	358	4	23
Iron ore	Million Tonnes	217	58	1
Manganese ore	Tonnes	23,74,813	82,363	40,58,590
Bauxite	Tonnes	1,82,23,885	2,40,841	30,34,041
Copper Conc.	Tonnes	1,03,925	82,463	4,15,136
Magnesite	Tonnes	92,877	5,477	3,64,577
Fluorspar	Tonnes	n.a	474	2,20,573
Chromite	Tonnes	33,16,804	2872	1,56,211
Salt (other than common salt)	Tonnes	n.a	82,60,913	98,042
Graphite (Natural)	Tonnes	n.a	716	40,153
Wollastonite	Tonnes	97,085	13,716	24,049
Lead Conc.	Tonnes	3,22,852	9	5,473
Zinc Conc.	Tonnes	13,30,312	399	9530
Sillimanite	Tonnes	3,340	4,998	606
Garnet (Abrasive)	Tonnes	4,604	76,799	345

n.a: Not available, E: Estimate, P: Provisional
Source: Ministry of Mines, Government of India

The production of minerals is expected to increase going-forward as the amendments done in Mines and Mineral (Development and Regulation) Act (MMDR Act) during 2021 has opened several opportunities for smaller players (including MSMEs) to improve their business with the relaxed norms on exploration. It has also resolved legacy issues and freed up 500 potential mineral blocks for auctions and also reduced minimum area requirement for the grant of mining licenses from 5 hectare to 2 hectares.

Chart 1: Trends in Value of Mineral Production

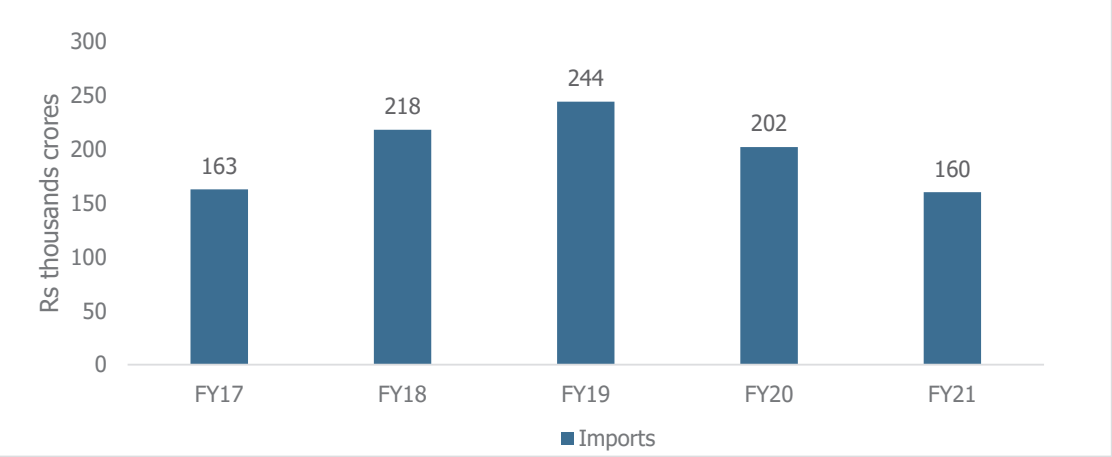


Note: Mineral Production Value does not include 'Minor Minerals' and 'Diamond'; P: Provisional
Source: Ministry of Mines, Government of India; CareEdge Research

While volumes remained subdued in FY21, production in value terms registered a single-digit growth of around 6% on a y-o-y basis on account of increased international commodity prices (for various key commodities) due to a strong global pent-up demand during the second half of FY21. Further, the prices continued to remain high in FY22 and helped registering a value growth of around 40% on a y-o-y basis due to continued strong demand momentum from various end-user industries across commodities.

CareEdge Research expects that the minerals production (in value terms) will moderate during FY23 due to softening of the international prices across various commodities.

Chart 2: Trends in Value of Mineral Imports



Note: We have excluded imports of diamonds, natural gas and petroleum products from the overall import figure for our analysis.
Source: Ministry of Mines, Government of India; CareEdge Research

On the other hand, in value terms, imports continued to show consecutive de-growth of 21% in FY21 after a degrowth of 17% in FY20. The degrowth in FY21 was largely on account of lower domestic consumption due to the pandemic.

India has been largely dependent on imports for some of the minerals which are critical raw materials for sectors like automobiles, defence, electronic gadgets etc. India's imports of minerals (excluding diamonds, natural gas and petroleum products) constitute around 5% of the overall import bill for India and there is need to reduce this dependency and become self-reliant in this aspect.

'Atmanirbhar Bharat Abhiyaan' to help reduce India's import dependency

Despite being well endowed in most of the minerals and growing demand, the sector staggers back in supply due to low exploration, funding and many policy hurdles leading to an increase in imports over the years. India is 100 per cent import dependence on copper ores and concentrates, platinum alloys, nickel ores, tungsten ores & concentrates and few critical minerals such as beryllium, germanium, rare earth (heavy and light), rhenium, tantalum, etc. which are used in aerospace, automobiles, cameras, defence, entertainment systems, laptops, medical imaging, nuclear energy, and smartphones.

Also, India is dependent on China for the import of lithium which is mainly used for making of Li-ion cells, a fundamental component of batteries used in electric vehicles.

India's import dependency on a majority of these minerals is enormously high. Moreover, the concentration of these minerals is acutely inclined towards few countries, with China as a major supplier.

Further, Rock Phosphate is the key raw material for various fertilisers and India is 90% import dependent. Volatility in international prices affects domestic prices of fertilisers and hinders the progress and development of agriculture sector in the country.

Government of India intends to make India self-sufficient in production of fertilisers through domestic supply of raw materials. As per the plan, existing 30 lakh million tonnes of Phosphorite deposits are expected to commercially exploited in Rajasthan, central part of peninsular India, Hirapur (MP), Lalitpur (UP), Mussoorie syncline, Cuddapah basin (AP) and also to expediate the exploration in the potential potassic ore resources in Rajasthan's Satipura, Bharusari & Lakhasar and Uttar Pradesh, Madhya Pradesh, Rajasthan, Gujarat, Andhra Pradesh & Karnataka. This plan will reduce the country's dependency on import of costlier and important raw material and can be made available at the affordable rate to farmers.

In order to tackle the ever-rising import dependency, the Government has taken various initiatives. 'Make in India' program is aiming to make India a global manufacturing hub for twenty-seven different sectors including electric vehicles, electrical machinery, electronic systems, and renewable energy technologies, for which critical and strategic minerals are essential. For this, the critical and strategic minerals having significant importance, including lithium, cobalt, and other rare earth elements, are identified which are also susceptible to disruptions in supply as India is deficient in these minerals.

The government has also recently, opened coal mining (which is currently dominated by government-owned companies) to the private sector. Small mines, which were mostly in the private sector for captive purposes, continued to be operated manually either as proprietary or partnership ventures. The minerals which were primarily mined by the public/ joint sector are Copper ore and concentrate, Diamond, Fluorite (graded), Selenite, and Sulphur.

3. Growth Potential for Various Minerals

The mining sector in India has huge growth potential. The growth in mining also has a strong correlation with the growth in the overall manufacturing sector. Mining activity is expected to grow in the range of 6-7% over the next five years. The insatiable demand for metallic minerals which form almost 88% of the total value of mineral production is expected to support the growth of the domestic mining industry. The growth in mining sector is driven by the demand from infrastructure, building and construction, automotive, power and capital goods sectors. Growth in the industrial sector is expected to keep the demand of metallic minerals intact. The enormous pace at which the infrastructure development is happening in the country reveals multiple opportunities for growth in the mining sector.

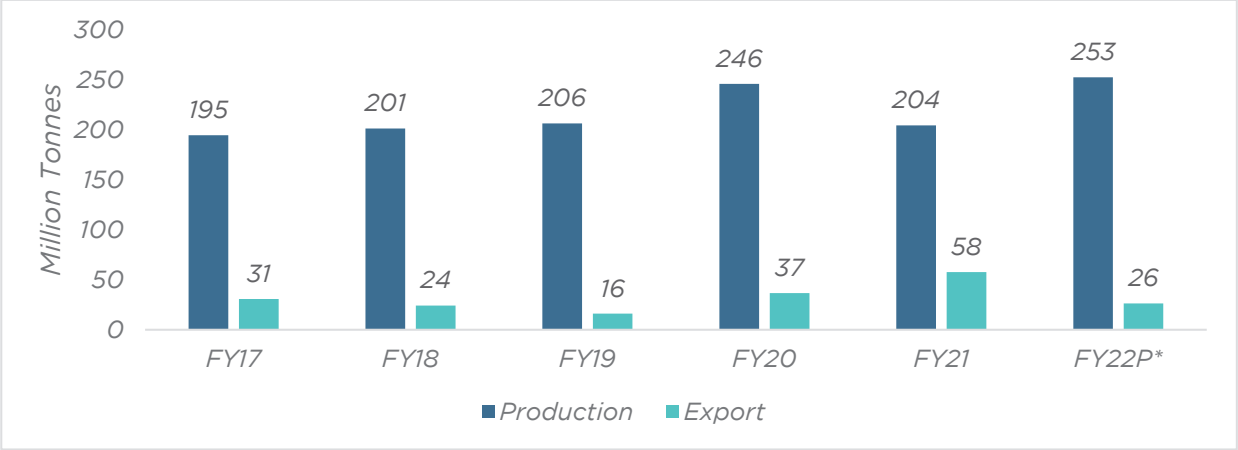
Following is a coverage on the major minerals.

a. Iron ore

India is largely self-sufficient in iron ore. Iron-ore is mainly used in the steel industry. The production of the iron ore consisting of Lumps, Fines and Concentrates declined by 17% in FY21 mainly due to pandemic and slower-than-expected operationalization of the auctioned iron ore leases. However, in FY22 production has recovered and witnessed a growth of 24% led by rising steel demand and the Government's focus on boosting infrastructural activities.

The iron ore prices were at an all-time high in FY22 due to strong demand from domestic as well as export markets. However, it witnessed a decline from May-2022 mainly due to decreased demand from steel industry on account of export duty imposed on steel and steel products. Also, export duty on iron-ore has been raised to 15% which will increase supply in domestic market thereby restricting any further rise in domestic prices.

Chart 3: Trend in Production & Exports of Iron Ore



* Production for FY22 is provisional

Source: CMIE; Ministry of Mines, Government of India; CareEdge Research

During FY22, exports of iron ore from India declined sharply by 54% to 26 million tonnes from 58 million tonnes in FY21, led by a significant fall of 58% in iron ore outbound shipments to China. Imports into China declined to 21 million tonnes which accounted for 82% of total India's iron ore exports. Hence, CareEdge Research expects iron ore demand from China to be lower going forward.

b. Coal

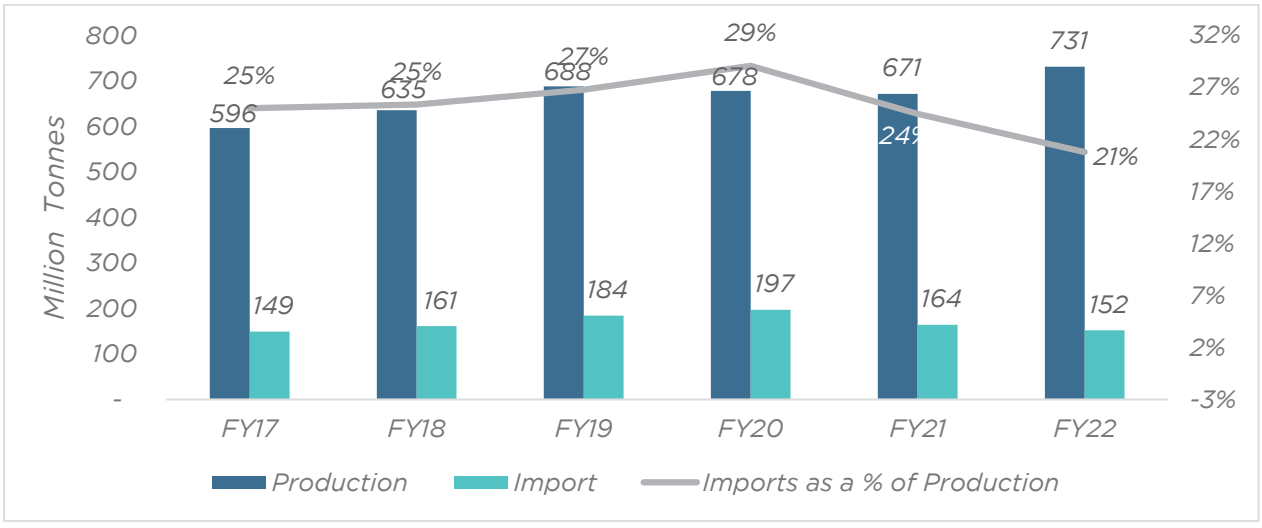
Thermal Coal

In 2016, India overtook the US to become the world's second-largest producer of thermal coal after China. The production of thermal coal, however, continues to remain substantially lower than the consumption demand leading to import dependence. With the development of new greenfield coal mines and growth in captive mining as well as increased private sector participation, it is expected that the production of coal would go up. In spite of sufficient coal reserves, India has faced challenges around land acquisition, complicated approval processes, and inadequate transport (evacuation) infrastructure which hinders availability of domestic coal.

Therefore, to bridge the demand and supply gap as well as to provide high quality coal (high gross calorific value low-ash coal) for use in various industries the country resorts to import of coal, especially low-ash coal. The recent high coal offtake is driven by the increased demand for energy and electricity with the post-pandemic opening up of the economy.

The domestic coal production (this includes thermal and coking coal) reached 777 million tonnes in FY22, a 9% growth against the production of 716 million tonnes in FY21. Q1FY23, coal production has hit 205 million tonnes, a 32% rise over the corresponding period in FY22, which was impacted by the lockdowns induced on account of the second wave of the global Covid-19 pandemic. The growth in production have been substantial over the years which has helped reduce country's import dependence as visible through imports as a % of overall production, which has come down to almost 20% in FY22 from nearly 30% in FY20.

Chart 4: Production and Import of Thermal Coal in India

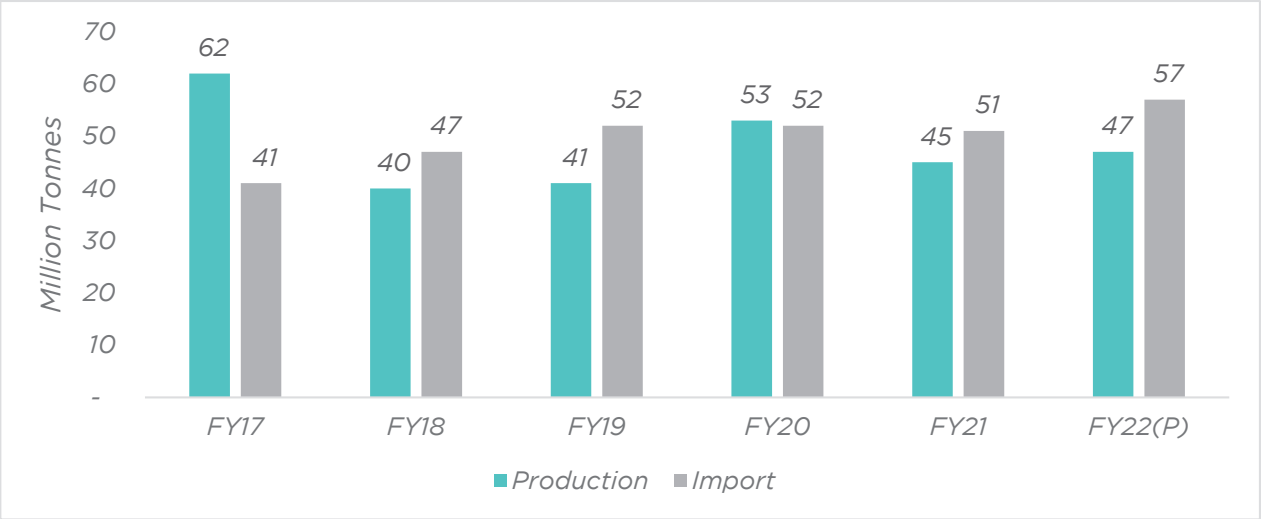


Source: Ministry of Coal, Government of India; CMIE, CareEdge Research

Coking Coal

Domestic supply of coking coal has not been able to keep pace with demand due to insufficient availability of coking coal in the domestic market. As a result, imports have risen over the years. Around 70%-74% of total demand for coking coal have been met through imports in FY22.

Chart 5: Production and Import of Coking Coal in India



Source: Ministry of Coal, Government of India; CMIE, CareEdge Research

During FY22, the import of coal increased sharply by 18% and the country imported 57 million tonnes of coal. This was mainly due to strong demand from the domestic and export markets. Due to a major proportion of coal being used by the power sector, 10% of export duty was charged on coal export by the government to reduce the exports, which supported the Government to cap the rising coal prices and cater to the domestic demand. As per the Import Policy 1993-94, coal has been put under Open General License (OGL) and therefore consumers are free to import coal based on their requirements. Superior quality non-coking coal is imported mainly by coastal power plants (set up to operate based on imported coal with low ash content) and other industrial users viz., paper, sponge iron, cement and captive power plants, on consideration of transport logistics, commercial prudence, export entitlements and inadequate availability of such superior coal from domestic / indigenous sources.

Coal Outlook

The coal industry in FY22 witnessed many interruptions due to demand-supply mismatches, rake shortages and high international coal prices. The demand for both thermal and coking coal is expected to remain strong as economic activities have started showing signs of recovery since Q4FY22.

Additionally, there was a sharp increase in power demand in the last few months due to a heat wave in most parts of the country, which led to domestic coal production not keeping pace with the demand from power plants - resulting in shortage of coal at the power plants. Measures taken by the government to resolve these

issues - including introduction of new norms to keep adequate coal stock at the power plants has helped avoid a repeat of the recent power crisis when a significant capacity of generating station had to be shut down due to coal availability issues.

On the other hand, the Government is continuing to take measures to ramp up power generation from renewable energy sources (like solar, wind) to meet the medium and long-term demand for power in the country. The transition to renewable energy sources will also help India meet its climate change targets and phase down the demand for coal over the long term. Switching to the green sources will also help India to curb its expected growth in emissions from its dependency on fossil fuels, and begin the shift to a net zero economy.

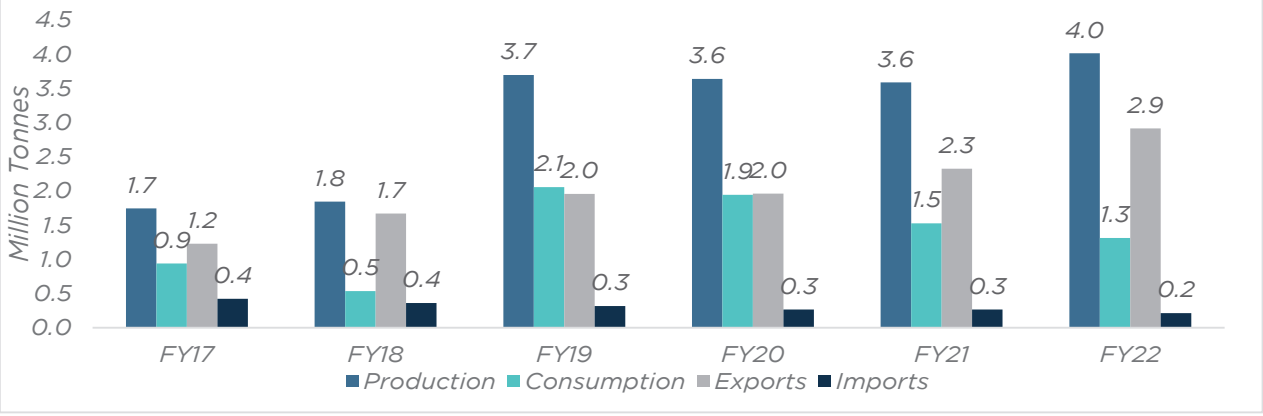
Going forward, CareEdge Research estimates domestic coal production to cross 850 million tonnes during FY23. This considers the domestic coal production of 205 million tonnes in Q1 of FY23 (a strong 32% y-o-y growth over Q1 of FY22). However, the monsoon season holds the likelihood of coal mines being flooded in certain regions, and will likely hamper domestic coal production as well as transportation, thereby impacting the volumes for Q2FY23. This is expected to revive in the remaining part of the year supported as second half generally contributes around 60% to the total coal production.

c. Aluminium

India is endowed with large deposits of high-quality bauxite ore, resources for power generation (coal) and a formidable pool of manpower – both skilled and unskilled. Indian aluminium industry is forging ahead with rapid expansion in both primary metal and downstream sectors. Aluminium consumption in India is driven by its use in power (48%), automobiles (15%), construction (13%), packaging (8%), industrial (7%) and consumer durables (7%) sectors. Development of smart cities, rural electrification, focus on building renewable energy projects and growth in the transportation segment have augmented the consumption of aluminium.

During FY22, the production of aluminium increased by 11% to 4 million tonnes from 3.6 million tonnes in FY21. The production of aluminium was not much affected by any external factors like Covid-19 pandemic and geo-political tension. In addition, during FY22 the consumption showed a de-growth of 16% to 1.3 million tonnes as compared to 1.5 million tonnes in FY21. This was because demand from end-use sector (automobile) was affected.

Chart 6: Production, Consumption, Exports & Imports of Aluminium in India



Source: CMIE, CareEdge Research

In terms of exports, the shipments increased by 25%in FY22 to 2.9 million tonnes from 2.3 million tonnes in FY21. The growth in exports is because China (the major producer) capped the output of aluminium in order to limit carbon emissions thereby increasing imports. This, in turn, further pushed up the prices by 52% to USD 2,769 per tonne in FY22 from USD 1,802 per tonne in FY21.

However, the market has witnessed a sharp correction in the prices over the last few weeks, mainly due to the ramp-up of primary aluminium production in China with the reduction in curbs of power consumption leading to a strong supply. China being one of the strong consumers of aluminium, the market is witnessing lower demand from China and other countries for industrial material due to global uncertainty amidst geopolitical tensions surrounding Russia and Ukraine.

Aluminium Outlook

Aluminium industry is one of the leading segments of the Indian economy and is expected to play a significant role in the country's future growth. Apart from its potentially large growing market, India is endowed with large deposits of high-quality bauxite ore, resources for power generation (coal) and formidable pool of manpower – both skilled and unskilled. Indian aluminium industry is forging ahead with rapid expansion in both primary metal and downstream sectors.

The demand for aluminium is expected to move upward with shifting demand of consumers towards electric vehicles. Also, the recyclable nature of the metal puts up with goal of reducing carbon emission of many countries. The demand for aluminium will be supported from sectors like aviation, construction, renewable energy production, consumer goods, defence etc.

d. Copper

Copper is majorly used in sectors like telecommunications and electricals. It is also used in other sectors like automobiles (primarily electric vehicle), consumer durables, building and construction, renewable energy and engineering goods.

Copper and aluminium primarily finds application in wires and cables. Copper is typically preferred due to its higher electrical conductivity, corrosion resistance and tensile strength. However, in terms of costs as well as usage intensity copper is three times heavier than aluminium. Hence, aluminium is often used for overhead lines, with copper utilized for under-ground cables.

India meets more than 95% of its demand for copper ores or concentrates through imports due to non-availability of copper domestically.

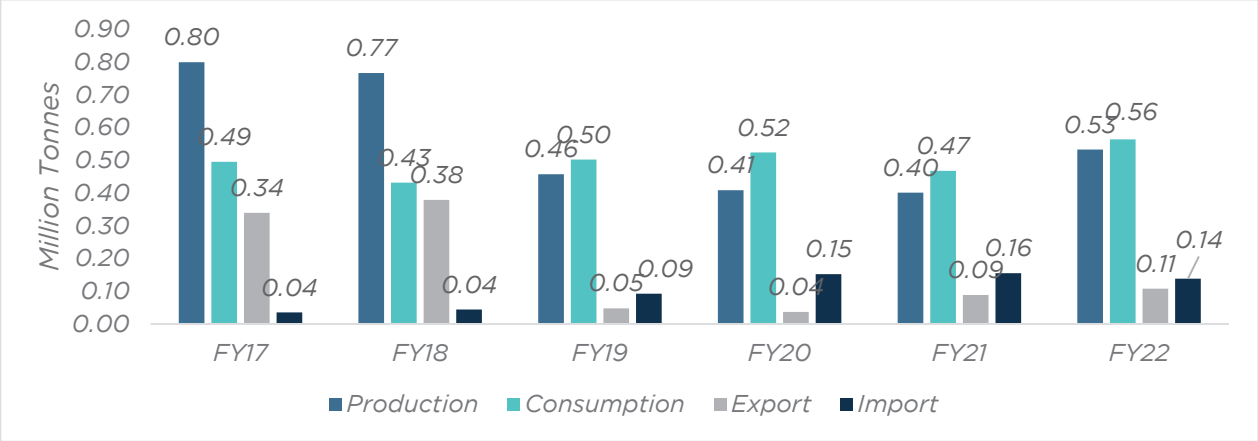
The demand for copper will increase as the demand for electric vehicle develops. Production of electric vehicles requires substantial amount of copper. It is used in batteries, motors and charging infrastructure. An average electric vehicle requires around 80kg of copper whereas an internal combustion engine vehicle requires around 20 kgs of copper. With new reforms coming up by Government of India which includes battery swapping policy to promote EVs will lead to increasing demand of copper.

Also, with increased focus towards renewable energy, copper requirement will be huge compared to conventional thermal power plants in terms of tonnage of copper per unit of installed power. The copper usage intensity is four to six times higher for a renewable energy plant as compared to a conventional power plant.

In addition, the Production Linked Incentive scheme provides the push towards domestic manufacturing in line with government's vision of developing domestic ecosystem to reach 280 GW of installed solar capacity by 2030. This will also boost the demand for copper. Further, as part of Atmanirbhar Bharat, the initiatives like Kavach and Broad-Gauge route which focusses on electrification will also lead to demand for copper.

During FY22, the production and consumption of copper increased by 34% and 21% to 0.5 million tonnes and 0.4 million tonnes, respectively, as compared to same period in previous year. The exports too increased by 22% to 0.1 million tonnes during the year. The surge in production and consumption was majorly because of easing lockdown and economic recovery in India. In addition, economic revival of countries like China, USA, Japan and Germany also led the growth in international demand. Further, an increase in demand for electric vehicles also supported the consumption of copper.

Chart 7: Production, Consumption, Exports & Imports of Copper



Source: CMIE, CareEdge Research

India has largely remained net exporter of copper but the shutdown of the Tuticorin plant caused India to become the net importer of copper since FY19. The imports surged by 50% in the past 4 years from 92 thousand tonnes in FY19 to 139 thousand tonnes in FY22. During FY22, the imports decreased by 11% to 0.13 million tonnes. This was because of increasing prices of the metal amidst geo political tensions and also lockdown like situation impacting the copper demand from India.

Copper Outlook

As Indian economy moves towards normalcy, the demand from sectors like construction and electrical is about to rise. The demand will also be significantly driven by adoption of electric vehicles as well as Governments continued high impetus on renewable energy going forward for transition towards a cleaner environment.

e. Lead

Lead is a highly corrosion-resistant, ductile, and malleable blue-gray metal. Recycle lead accounts for more than 85% of total lead production in India, lead has the highest recycling rate of around 98% globally. The

lead consumption is mainly driven by sectors like automotive, infrastructure, telecom, etc. Around 80% of lead produced is used for manufacturing lead-acid batteries while the remaining is consumed in pigments and compounds, rolled and extruded products, alloys, cable sheathing, and other industries. The demand for lead is largely dependent on the auto sector.

During FY22, the production of lead decreased by 10.7% to 191 thousand tonnes as compared to 214 thousand tonnes in FY21. The production of lead for the months of April-May 2022 was at 34 thousand tonnes and has remained in line as compared to the same period in the previous year.

The prices of lead came under pressure in March 2021 quarter. The price fell to USD 1,965 per tonne in March 2021 from USD 2,016 per tonne in December 2020. The prices picked up from April 2021 and averaged at USD 2,282 per tonne in March 2022, the main reason was on account of an increase in demand for lead-acid batteries post-lockdown as vehicles returned to roads. Further, the prices of lead started falling in May 2022 mainly because of low global demand due to ongoing geopolitical tensions.

Lead Outlook

The demand for lead continues to remain stable. The demand would be driven mainly by sectors like automotive, telecom, and power sector (solar, wind, and invertors). Besides, the Lead Acid Battery industry is expected to experience sustained demand as they also find usage in Electric Vehicle applications such as starting, lighting, and ignition SLI battery.

4. Challenges Faced by the Sector

The following challenges have restricted the mining sector to realise its full potential:

- **High capital intensity:** Mining is an industry with high capital intensity. The operating costs itself is also high due to energy, fuel and various other consumables. Hence, due to prevailing challenges, private players are reluctant to infuse such huge capital due to high risks.
- **Lack of technological advancements and technically trained manpower:** India still has a long way to go in terms of advancements in technological usage in mining. The key factors impeding technology adoption in India are geo-technical difficulties, higher costs etc. Further, surface mining is dominant in India. Due to lack of technological advancements, underground mining is generally restricted to a depth of around 100 meters as compared to 300 meters in countries such as Australia. However, technology upgradation measures are underway to overcome challenges e.g. the Ministry of Mines (Government of India) has started a Mining Surveillance System (MSS), a pan-India surveillance network using satellite technology, to check illegal mining. Further shortage of technically skilled labor is the most pressing concern in the mining industry. Also, lack of training and usage of outdated equipment's poses a safety risk. Hence, adoption of latest technology and equipment would boost productivity as well as volume coupled with lower environmental impact.
- **High tax rates:** Mining is one of the most taxed industries world-wide with levies like royalty, Goods & Service Tax (GST) and additional obligations in form of Green Cess, Contributions to District Mineral Foundations and National Mineral Exploration Trust. Incidence of various such statutory taxes and obligations on mining companies act as a dampener for future investments into the sector.
- **Regulatory issues:** Lack of coordination and different interpretation of laws by the Central Government and the respective State Government results in delays and confusion for the mining operators. Consequently, companies do not have clarity on their capital investments. Most processes including licenses, clearances (environmental clearance, forest clearance), consent requirements (pollution control board), approvals, lead to significantly higher than expected time and cost overruns for the mining players.
- **Availability of land and increasing cost of land acquisition:** The country has multiple regulations which need to be complied with by miners before mine development and operation. Further, Government's push and increased demand for minerals has led to increased extent of conflicts with local communities across various mine areas through-out the country. Increased land cost further adds to the challenges plaguing the sector.
- **Environmental Issues:** Mining sector has been facing a lot of pressure from all sections to reduce its carbon footprint. The expected expansion of mining will have inevitable impacts on the environment. A key issue faced environmentally also includes the use of the mine sites once it is no longer used by the mining company. Hence, a balanced approach needs to be adopted while protecting the needs of forests, environment and ecology.

- **Social License to Operate (SLO):** Displacement and resettlement of farmers from mining areas has caused conflict where comparable land could not be purchased. SLO is the term used to describe company engagement with stakeholders and issues in communities. It has generally been used to describe the informal acceptance or approval that a local community extends to mining operation or development. Local community involvement in decision making can promote regional growth and ensure responsible and environmentally sustainable mining activities.

5. Reforms in Mining Sector

The liberalization of India's economy in 1991 opened up the minerals sector to private sector investments. PSUs like Hindustan Zinc Limited and Bharat Aluminium Company Limited were disinvested through private sector investments and many coal blocks were allocated for private sector captive development.

MMDR Act, 1957 – The Mines and Minerals (Development and Regulation) Act, 1957 regulates the mining sector in India and mandates the requirement for granting leases for mining operations. However, India's mineral exploration came to a near-complete halt after 2010 when the Hon'ble Supreme Court declared the blocks allocated to private sector lease holders for coal as illegal; soon thereafter, the Shah Commission and the Supreme Court stopped much of the mining activities in the state of Karnataka and Goa, while partially halting mining in the states of Odisha and Jharkhand.

The MMDR Act 1957, which laid down the legal framework for the development and regulation of mines and all minerals, had restrictive mining provisions. India's mining sector was under the constraints of captive mining and end-use restrictions for decades, with coal blocks allocated on first-cum-first-serve basis. This system of allocation of mineral concession was discretionary and decision making was not transparent. The process of renewal of mining leases was acting as an obstacle in attracting large scale investment in the mining sector. The allocation of mineral concession was not generating any revenue to the Government other than royalty.

Consequently, there was slowdown in grant of new concessions and the renewal of existing ones. As a result, the mining sector started registering a decline in production affecting the downstream manufacturing sector which largely depends on the raw material provided by the mining sector.

As a result, despite having the world's 4th largest reserve for coal, 5th largest for Mica and Bauxite, and 7th largest reserves for Iron Ore and Manganese, India continue to rely majorly on imports to fulfill its needs.

Between 2010 to 2015, none of the states issued exploration licences (RP and PL) to any company till the introduction of the new MMDR Act 2015.

The MMDR 2015 (Amendment) Act was brought in to address the major concerns of Supreme Court in terms of lack of transparency, fairness, and objectivity to mineral asset dispensation process.

The government has carried out a series of major reforms in the mining sector starting from 2015.

The Act was comprehensively amended in 2015 to bring several reforms in the mineral sector, notably -

- Mandating auction of mineral concessions to improve transparency;
- Establishing District Mineral Foundation and National Mineral Exploration Trust; and
- Stringent penalty for illegal mining.

The Act was further amended in the years 2016 and 2020 to allow transfer of leases for non-auctioned captive mines and to deal with the emergent issue of expiry of leases on 31st March, 2020, respectively.

To remedy the basic structural defects of the mining sector and infuse greater ease of doing business, the

Mines and Minerals (Development and Regulation) (MMDR) Amendment Ordinance, 2015 was promulgated on 12th January, 2015, which was replaced by the MMDR Amendment Act, 2015.

MMDR Amendment Act, 2015–Initiatives

- E-Auction was made mandatory for the grant of mineral concession to ensure transparent method of allotments of mineral wealth.
- Need for renewals and prior approvals was removed for ease of doing business and removing discretions.
- Provided for establishing District Mineral Foundation Trust for the welfare of mining affected areas by using contributions from the mining companies.
- National Mineral Exploration Trust was established for regional and detailed mineral exploration in the country.
- Penal provisions were made more stringent to deter illegal mining activities like provision for higher penalties upto Rs. 5 Lakhs per hectare of the area and imprisonment upto 5 years. Further, provision was made for constitution of special courts by the State Governments for fast-track trial of cases of illegal mining.

The amendments in the MMDR Act in 2015 brought the mining industry under a transparent auction regime. Another significant reform brought by the 2015 amendment was establishing the District Mineral Foundation (DMF) for the welfare of mining-affected areas through contributions from the mining leaseholders.

MMDR Act was further amended through **MMDR Amendment Act, 2016** to provide for transfer of captive mining leases granted other than through auction in order to facilitate legitimate business transactions. The amendment also redefined 'leased area' in order to expand its scope. The differentiation between captive and non-captive mines resulted in sub-optimal mining and also created an environmental hazard. The recent mineral reforms have amended the relevant provisions of the MMDR Act to end this distinction. Allowing the lessee to utilize or sell minerals in the open market as per their requirement will help in increasing production and efficiency in the mining industry.

The reform aims to free up the unutilized mineral blocks with the government companies, which are non-developed. With this amendment, many mineral blocks will be de-reserved and auctioned by the State Governments.

In 2020, mining leases of 334 mines were expiring on 31st March, out of which 46 were working non-captive mines. While some of the States initiated action to auction these blocks, mines allocated through auction could have started mining operations only after obtaining as many as 23 clearances from different Government agencies. This was causing inordinate delay in commencement of mining operations and subsequent production of the minerals. To sustain supply of minerals, the Act was further amended through the Mineral Laws (Amendment) Act, 2020.

MMDR Act, 1957 has been amended through the **Mineral Laws (Amendment) Act, 2020** to maintain sustained mineral production in the country. It was carried out keeping in mind the fact that a large number of working mining leases were going to expire in March, 2020 under the provisions of the MMDR Act. The

Amendment was an important step to ensure that there is no shortage of mineral availability in the country. It facilitated seamless transfer of all valid rights, approvals, clearances, licenses and the like for a period of two years to a new lessee in case of minerals other than coal, lignite and atomic minerals.

Salient Features of the Mineral Laws (Amendment) Act, 2020

- To ensure continuity in mining operations, this Act allowed State Governments to auction the mining lease before the expiry.
- The Amendment Act, now provides that the approvals, licenses and clearances given to the previous bidder shall be extended to the successful bidder in the auction for two years. During these two years, the new lessee can continue the mining activities but has to obtain all the approvals and statutory clearances within these two years.

Another very significant reform brought through the 2021 amendment is ending the legacy issues under section 10(A)(2)(b) of the MMDR Act. This step will place around 500 blocks into the auction regime which are stuck due to pending cases under this section.

The global demand for minerals has increased steadily over the last few decades and is likely to grow in response to the exploding demand for the latest technology. Securing the supply of the minerals, to satisfy exponential demand for consumer products, civil engineering, defense, transport, and energy infrastructure among others in a sustainable fashion, has become a major challenge. There is an urgent need to take up exploration in the hitherto unexplored or lesser-explored areas of the country to increase the mineral production in the country for meeting the ever-increasing demand for minerals.

Therefore, to boost exploration, the government established the **NMET** in 2015, an autonomous body and allowed accredited private agencies to take up exploration activities. The functioning of NMET as an autonomous body will bring a significant increase in exploration in India and make the functioning faster and more vibrant. This will also help to accomplish our Obvious Geological Potential and meet international standards in exploration.

Another very vital amendment under the 2021 mining reforms is the formation of a new group of minerals called Surficial minerals - consisting of Limestone, Iron Ore, Bauxite, and Coal & Lignite. For this set of minerals, the exploration norms have been further rationalized by bringing the requirements down to G3 level for Mining Lease and G4 level for Composite Lease, making the auction regime easier and facilitating more blocks into the auction. The non-operational mines are already in the process of re-allocation by the concerned states, and the mines with PSUs that have not started production to date are also being auctioned by the State Governments. The amendments have facilitated bringing a large number of blocks into auction and we have seen an exemplary performance of the mining sector in the current year.

A major amendment was carried out in 2021 in the Act through the MMDR (Amendment) Act, 2021. The objectives of the MMDR Amendment Act, 2021 are:

- Fully harnessing the potential of the mineral sector,
- Increasing employment and investment in the mining sector including coal,
- Increasing the revenue to the States,

- Increasing the production and time bound operationalization of mines,
- Maintaining continuity in mining operations after change of lessee,
- Increasing the pace of exploration and auction of mineral resources, and Resolving long pending issues that have slowed the growth of the sector.

Auction Status

- The MMDR Amendment Act, 2015 instituted the system of e-auction for grant of mineral concessions for major minerals with a view to bring in greater transparency and removal of discretion in allotment. 128 mineral blocks across 9 States, namely Rajasthan, Odisha, Madhya Pradesh, Chhattisgarh, Karnataka, Jharkhand, Andhra Pradesh, Gujarat and Maharashtra have been successfully auctioned till 31st Jan 2022.
- During the year FY22 exploration for various minerals has been carried out by MECL in 20 blocks on behalf of National Mineral Exploration Trust (NMET). Out of these, Geological Report of 9 blocks has been submitted and work is in progress in remaining 11 blocks. A total of 35.15 million tonnes of mineral resources has been added to National Mineral Inventory.
- The total indicative value of assets considered for monetization is estimated at Rs 28,747 crore over FY 2022-25. About Rs. 22,625 crores of the assets are expected to be tendered out during FY 2022. However, the actual capex will be phased out across the next three years.

Table 4: List of Successful auction since 2015 till January 2022

Year wise /State-wise Auction Summary								
Year Mineral	**FY16**	**FY17**	**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**Total**
Andhra Pradesh		1	2	2			3	8
Chattishgarh	3		2			2	2	9
Gaujarat			3			4	3	10
Jharkhand	2	1	1	3				7
Karnataka		7		7	4	1	5	24
Madhya Pradesh		1		5	2	5	3	16
Maharastra			2	1	10		4	17
Odhisha	1	2	2		25	1	9	40
Rajasthan		3	2	1	2		6	14
Tamilnadu								0
Telangana								0
Total	**6**	**15**	**14**	**19**	**43**	**13**	**35**	**145**
Source: Ministry of Mines, Government of India								

The number of successful auctions that took place over the years from FY16-FY22 were 146.
During FY22, the minerals that topped the list of successful auctions were limestone followed by iron ore.

Table 5: List of Successful auction since FY16 to FY22 (Mineral-wise)

Year/Mineral	FY16	FY17	FY18	FY19	FY20	FY21	FY22	Total
Limestone	4	5	10	5	4	9	15	52
Iron Ore	1	7	2	9	17	1	11	48
Gold	1	1	1	1	0	2		6
Manganese	0	1	0	1	3	0	3	8
Diamond	0	1	0	0	1	0		2
Bauxite	0	0	1	0	5	1	4	11
Graphite	0	0	0	3	2	0		5
Iron Ore & Manganese	0	0	0	0	6	0	1	7
Chromite	0	0	0	0	3	0		3
Copper	0	0	0	0	2	0		2
Kyanite	0	0	0	0	0	0	1	1
Rock Phosphate	0	0	0	0	0	0	1	1
Total	**6**	**15**	**14**	**19**	**43**	**13**	**36**	**146**

Note: 2 Iron Ore Block auctioned in 2019-20 in Odisha was Forfeited. The same are re-auctioned in September, 2021. Therefore, in total 146 mineral blocks were auctioned but in actual, the net figure is 144.
Source: Ministry of Mines, Government of India

6. Key Suggestions

India is deficient in many important minerals and needs capacity building in geosciences, technology in mining sector as well as acquisition of mining assets abroad by public and private sector to ensure the seamless supply of minerals. India needs to create a globally competitive business environment, which would enable the best explorers and mining companies, in India and abroad, to consider high-risk investments in the mineral exploration potential of India.

- **Single-window clearances:** Create an integrated single window clearance process including environment clearance, forest clearance, mining lease etc thereby increasing efficiency and effectiveness of clearance process and cutting down additional time for co-ordination and multiple application delays.
- **Rationalise taxes and royalties:** In India, the combined cascading effect of taxes on mining is estimate at around 60% while the global average for the same is around 35 – 40%. This makes the taxation rates in India as very high compared to other mineral-rich countries. This discourages investments in mining as well as mineral processing. While rates of royalty should be rationalised by benchmarking the same with other mining jurisdictions, various State Governments could potentially offer concessional rates of royalty to encourage mining investments.
- **Environmental, Social & Governance and decarbonization:** In mining, the players have since long grappled related to the matters of environment. However, ESG has brought several prospects together including Environment, Social and Governance. Many of the companies have started taking the steps to control their carbon emissions. Incorporating ESG-based themes can potentially enable the industry to raise long-term low-cost capital and will help facilitate working with communities, regulators and NGOs. This, in turn, will aid the players to reduce energy bills, water conservation and carbon emission thus improving the performance. Also, this will enhance the industry's regulatory as well as community relations.
- **More focus on labour safety:** Mining being one of the difficult industries to work for labourers, the companies running the mines should take into consideration labour safety. The mining companies should deploy technological advancements and shift to automation to the extent possible. Proper safety gears should be provided by the mining companies to labourers to avoid hearing damage and prevent exposure to dangerous gases.
- **Boosting exploration investment:** Geological Survey of India, which is accountable for the generation of the baseline geological survey data has identified 6.88 lakh square km area as Obvious Geological Potential (OGP) for mineralisation. However, if the Himalayan belt, the Deccan Plateau, and the broad areas of Peninsular Gneisses and the coastal belts, which have been left out of the OGP are included, as each of the geological domains have significant exploration potential, India's OGP area would increase to around 20 lakh square km area.
    - ► India has over 20 billion tonnes of high-grade iron ore resource established, out of which GSI has explored and established only about 2.5 billion tonnes of resource.

- India has over 600 million tonnes of manganese Geological Resource reported and over three billion tonnes of bauxite.
- GSI considers only about 300,000 km area as diamond potential area in India, while international explorers have considered more than a million km area as diamond potential area of India.
- Additionally, the bulk commodities also have significant low-grade ore potential, which could become available for commercial extraction in the future with improved mining and processing technologies and lowering of energy costs.

India should aim at creating a world-class services and products sector for the exploration and mining industry, for both the Indian and global mining sector.

- **Encourage acquisition of international mines:** Government should facilitate/ encourage the acquisition of international mineral assets, as India has its own limitations with respect to overall availability and accessibility of various important minerals that are scarce or deficit in the Indian sub-continent.

7. Conclusion

The Indian minerals & mining sector has witnessed subdued growth in the past few years. Its contribution to GVA has declined from more than 3% in FY17 to around 2% in FY22. The sector has attracted low levels of foreign investment, with FDI inflow in the sector at around 1 to 2% of the total FDI inflow into India through FY22.

To make Government's vision of "Make in India" and "Atmanirbhar Bharat Abhiyan" a reality, it is imperative to support the mining sector, for which, huge investment is required to explore and harness the country's rich resource potential and increase the domestic production of various minerals.

Since, lot of raw material used in industries are mined, availability of high-quality raw material will ensure sustained growth of the manufacturing sector. The growth of the domestic mining industry will benefit the domestic downstream industries such as power generation, steel and aluminium, which in turn will enable growth of manufacturing (e.g., automobiles, capital goods etc) and infrastructure (e.g., roads, railways, construction etc). Going forward, demand potential will be huge for minerals in view of the rapid urbanization and growth in the country's manufacturing sector. Also, the development of domestic mining industry will also propel growth of many remote mineral rich districts of India by creating jobs, livelihood and an entire ecosystem. The mining industry through its multiplier effect can potentially propel the economy to a higher growth trajectory by creating additional employment as well as generating addition fiscal contributions.

Atmanirbharta in mining is critical as it will reduce dependency on imports for critical raw materials by bringing substantial improvements in our mining practices and exploration activities. Massive investment is required in exploration and up-gradation of the technological ecosystem. Emphasis should be given on exploration to continuously augment the resource/reserve base of the country and harness existing resources through scientific and sustainable mining including beneficiation.

The recent announcements focused on enhancing domestic production, incentivizing exploration and bringing more investments through unrestricted transfer of mineral concessions etc. are a welcome recognition of the mining industry's role in "Atmanirbhar Bharat".

The Coal Blocks Allocation (Amendment) Rules, 2020 includes the provisions related to private participation for exploration, composite licensing, revenue sharing mechanism, bidding irrespective of end use, upfront payment with a ceiling as the only eligibility condition incentive and reward additional production ahead of schedule which will help development of coal mining. However, a similar regime for other minerals for maximization of production and revenue needs to be implemented.

The auction of mineral blocks with pre-embedded clearances is another significant reform taken by the government. This is going to attract huge investments in the mining and metals sector which has the potential

to make the nation self-reliant, reduce import bills and create livelihood opportunities in the mineral-rich hinterlands of India.

With the Government's consistent efforts towards the development of the sector and the private sector participation, the mining sector is poised to make significant growth in the years to come. Growth of the Indian metals and mining industry has been historically driven by domestic consumption. Going forward, both domestic demand augmentation and exports are likely to be important levers for growth of the industry and its contribution to GDP growth.

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About ASSOCHAM

The Knowledge Architect of Corporate India

The Associated Chambers of Commerce & Industry of India (ASSOCHAM) is the country's oldest apex chamber. It brings in actionable insights to strengthen the Indian ecosystem, leveraging its network of more than 4,50,000 members, of which MSMEs represent a large segment. With a strong presence in states, and key cities globally, ASSOCHAM also has more than 400 associations, federations, and regional chambers in its fold.

Aligned with the vision of creating a New India, ASSOCHAM works as a conduit between the industry and the Government. The Chamber is an agile and forward-looking institution, leading various initiatives to enhance the global competitiveness of the Indian industry, while strengthening the domestic ecosystem.

With more than 100 national and regional sector councils, ASSOCHAM is an impactful representative of the Indian industry. These Councils are led by well-known industry leaders, academicians, economists and independent professionals. The Chamber focuses on aligning critical needs and interests of the industry with the growth aspirations of the nation.

ASSOCHAM is driving four strategic priorities – Sustainability, Empowerment, Entrepreneurship and Digitisation. The Chamber believes that affirmative action in these areas would help drive an inclusive and sustainable socio-economic growth for the country.

ASSOCHAM is working hand in hand with the government, regulators, and national and international think tanks to contribute to the policy making process and share vital feedback on implementation of decisions of far-reaching consequences. In line with its focus on being future-ready, the Chamber is building a strong network of knowledge architects. Thus, ASSOCHAM is all set to redefine the dynamics of growth and development in the technology-driven 'Knowledge-Based Economy. The Chamber aims to empower stakeholders in the Indian economy by inculcating knowledge that will be the catalyst of growth in the dynamic global environment.

The Chamber also supports civil society through citizenship programmes, to drive inclusive development. ASSOCHAM's member network leads initiatives in various segments such as empowerment, healthcare, education and skilling, hygiene, affirmative action, road safety, livelihood, life skills, sustainability, to name a few.

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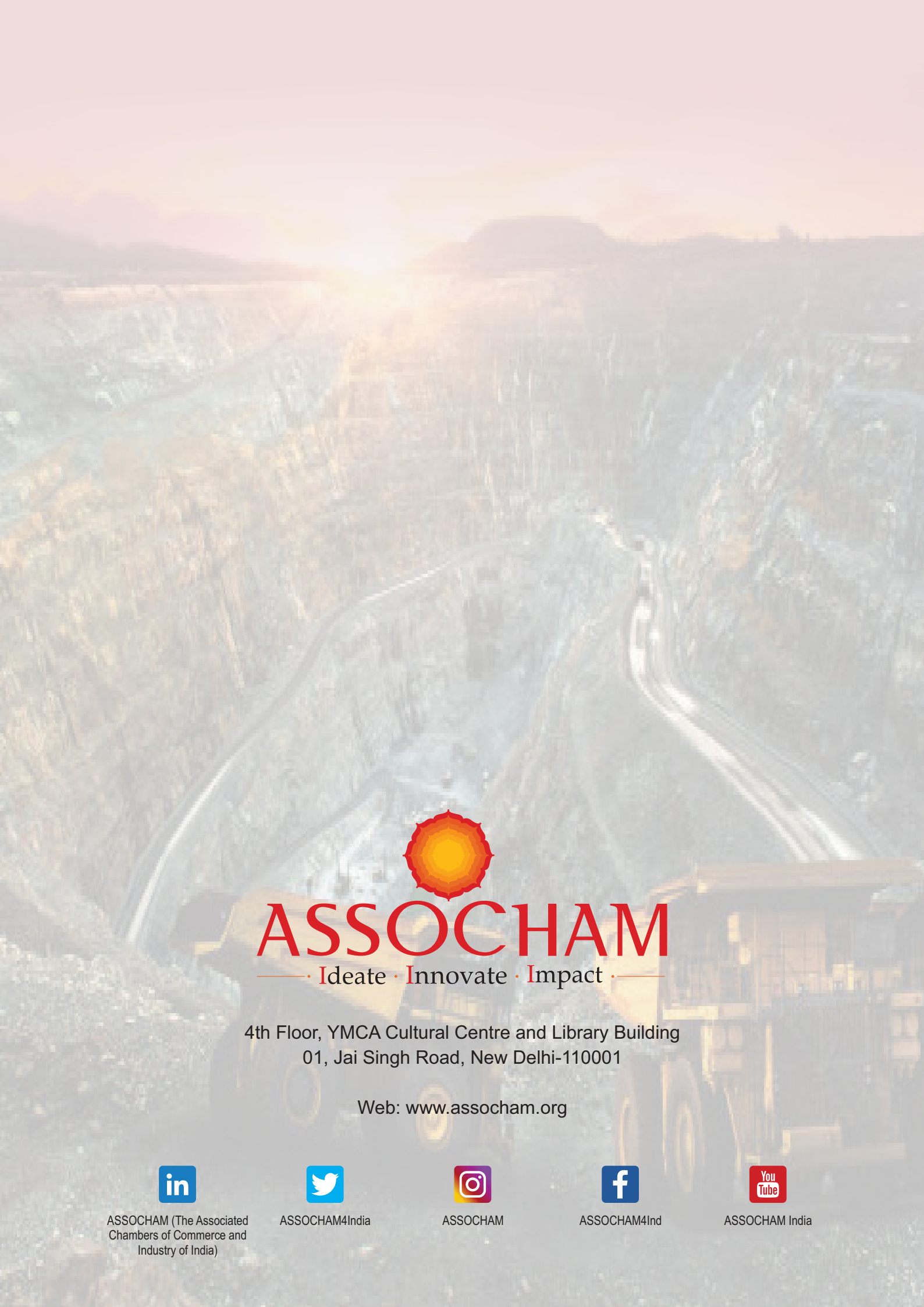

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