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(Part- I : GENERAL REVIEWS)

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INDIAN MINERAL INDUSTRY & NATIONAL ECONOMY

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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NATIONAL ECONOMY

The year 2020 threw at the world a bedlam of novel COVID-19 virus, threatening all that was taken for granted–mobility, safety, and a normal life itself. This, in turn, posed the most formidable economic challenge to India and to the world unbeknown in a century. Bereft of a cure or a vaccine, public health policy became central to tackling this all-pervasive crisis. The imperative of flattening the disease curve was entwined with the livelihood cost of an imminent recession, which emanated from the restrictions in economic activities from the lockdown required to contain the pandemic. This inherent trade-off led to the policy dilemma of "lives versus livelihoods".

Governments and central banks across the world deployed a range of policy tools to support their economies, such as, lowering key policy rates, quantitative easing measures, loan guarantees, cash transfers and fiscal stimulus measures. India recognised the disruptive impact of the pandemic and charted its own unique path amidst dismal projections by several international institutions of the spread in the country given its huge population, high population density and an overburdened health infrastructure.

The Indian economy, after subdued growth in 2019, had begun to regain momentum from January 2020 onwards, only to be stalled by the once-in-a-century black swan COVID-19 outbreak. The economy witnessed a sharp contraction of 23.9 per cent in Q1: FY 2020-21 and 7.5 per cent in Q2: FY 2020-21 due to the stringent lockdown imposed during March-April, 2020. Since then, several high frequency indicators have demonstrated a V-shaped recovery. The fundamentals of the economy remain strong as gradual scaling back of lockdowns along with the astute support of Atmanirbhar Bharat Mission have placed the economy firmly on the path of revival.

The spread and intensity of COVID-19 induced twin economic shock which can be broadly captured through impact on output/Gross Value Added (GVA) and employment. In terms of GVA shock, non-essential activities are likely to endure a combined shock directly proportional to their respective GVA contribution, given that they could not operate during lockdown. Essential activities are likely to undergo a dampened shock, primarily arising from the indirect impact of restricted activities in non-essential sectors.

Global output is expected to witness the sharpest contraction in a century, contracting in the range of 3.5 to 4.3 per cent in 2020 as per the estimates provided by International Monitary Fund (IMF) and World Bank. The cumulative loss to global Gross Domestic Product (GDP) over 2020 and 2021 is estimated at around USD 9 trillion – greater than the economies of Japan and Germany combined.

There has been rapid recovery in India's economic activity from the COVID-19 pandemic induced unprecedented lows of the first quarter of FY 2020-21 on the back of extraordinary fiscal and monetary support provided by the Government and Reserve Bank of India (RBI). Overall movement of high frequency indicators over Q1, Q2 and Q3 indicated speedy pickup in Q2 and growing convergence to pre-pandemic levels in Q3. As India's mobility and pandemic trends aligned and improved concomitantly, indicators like E-way bills, rail freight, GST collections and power consumption not only reached pre-pandemic levels but also surpassed previous year levels.

A palpable V-shaped recovery in industrial production was observed over the year. Manufacturing rebounded and industrial value started to normalise. Headwinds, however, lingered on. The index of eight core industries, which make up around 40 per cent of the index, registered a growth of (-) 2.6 per cent in November, 2020 as compared to a growth of 0.7 per cent in November, 2019 and (-) 0.9 per cent in October, 2020. Consequently, Index of Industrial Production (IIP), after registering positive growth in October 2020 slipped back into contractionary zone in November, 2020. Purchasing Managers' Index (PMI) Manufacturing, however, continued to remain in expansionary zone in December 2020. Resuscitating steel consumption reinforced acceleration in Construction sector, propping up employment as economy unlocked. The housing market, a key forward linkage sector for steel consumption, saw gradual resurgence from its Q1: 2020-21 trough.

Electricity sector retained its momentum with power consumption registering positive Year-over-year (YoY) growth since September, 2020.

The external sector provided an effective cushion to India during these uncertain times. Amid domestic and global demand and supply disruptions, India's merchandise exports fell by 21.1 per cent in the first half of 2020-21 with the contraction being more severe for imports at 38.8 per cent. Exports, however, revived gradually as the rate of contraction eased to 5.0 per cent in Q3:2020-21, with non-oil exports increasing by 2.3 per cent during the quarter. With the gradual unlocking of the economy, the decline in imports has also moderated to 8.3 per cent during Q3: 2020-21. While trade deficit narrowed to US$ 26.2 billion in April–September 2020-21 from US$ 88.9 billion a year ago, it stood at US$ 31.2 billion during the third quarter of the year, lower than US$ 37.0 billion in the same quarter last year. India recorded a current account surplus of 3.1 per cent of GDP in the first half of the year largely supported by strong services exports. While prospects of external demand normalisation are underway, its pace is contingent on the global COVID-19 outlook and successful rollout of vaccinations across the world.

India remained a preferred investment destination in FY 2020-21. Foreign Direct Investment (FDI) poured in amidst global asset shifts towards equities and prospects of quicker recovery in emerging economies. Net Foreign portfolio investment (FPI) inflows recorded an all-time monthly high of US$ 9.8 billion in November 2020. During April–December 2020, equities witnessed inflow of at USD 30.0 billion, five times its previous year value - India was the only country among emerging markets to receive equity Foreign Institutional Investment (FII) inflows in 2020.

National Statistical Office (NSO) has estimated a contraction of real GDP by 7.7 per cent in 2020-21 as compared to a growth of 4.2 per cent in 2019-20. This is the fourth contraction in India's GDP since 1960-61. The contraction in 1965-66 and 1971-72 coincided with wars and droughts while the year 1979-80 was associated with a severe drought and political instability. A common factor in all these years was a steep fall in agricultural output. The year 2020-21, on the contrary, has been bestowed with abundant monsoons leading to the Agricultural sector emerging as the silver lining of the economy. The contraction this year reflects the 'once in a century crisis' unleashed by the pandemic and associated public health measures.

Government Consumption and Net Exports have cushioned the contraction in GDP while Gross Capital Formation (GCF) and Private Consumption have contributed to the contraction in GDP in 2020-21. Government final consumption expenditure has sustained the growth of GDP in 2020-21 with its share increasing to 14.0 per cent from 12.0 per cent in 2019-20. The share of private consumption has almost remained the same indicating the adverse impact of the pandemic and restrained personal consumption in contact-sensitive sectors. Gross Investment has contributed most to the contraction in GDP in 2020-21 with its share in GDP pegged at 26.7 per cent, lowest in the 2000s. Net Exports have cushioned the fall in GDP in 2020-21 largely due to a sharper contraction in imports than in exports.

The advance estimates for FY:2020-21 released by NSO manifest that the economy is expected to stage a resilient V-shaped recovery in H2:2020-21. As per quarterly estimates released by NSO, the economy has shown a decline of 15.7 per cent by H1: FY 2020-21. A decline of real GDP by 7.7 per cent for the whole FY:2020-21 indicates a modest decline of 0.1 per cent in GDP growth in second half of the year. It also indicates a 23.9 per cent growth in H2: FY 2020-21 over H1: FY2020-21. Faster normalisation of business activities amid gradual lifting of restrictions, higher festive and pent-up demand and policy support are expected to translate into a faster-than-anticipated economic recovery over the second half. This is supported by a strong rebound seen in several high frequency indicators in Q3: FY 2020-21.

Net Exports (Exports–Imports) turned positive in the first half of the year with a larger contraction in imports of 29.1 per cent as compared to contraction in exports of 10.7 per cent. With gradual recovery of economic activity, both imports and exports have picked up and net exports is expected to re-enter the negative territory in the second half. Exports are expected to decline by 5.8 per cent and imports by 11.3 per cent in the second half of the year.

On the supply side, Gross Value Added (GVA) growth is pegged at -7.2 per cent in 2020-21 as against 3.9 per cent in 2019-20. Only Agriculture contributed to positive growth while Service and Industry

contributed to the contraction in GDP. Agriculture is set to cushion the shock of the Covid-19 pandemic on the Indian economy in 2020-21 with a growth of 3.4 per cent–resulting in an increase in its share in GDP to 19.9 per cent in 2020-21 from 17.8 per cent in 2019-20.

The global economy, including India, has seen set back in time by the pandemic–induced crisis. In five years before 2020-21, Indian economy grew at an average growth of 6.7 per cent. In the year 2021-22, a sharp recovery of real GDP growth of 10–12 per cent is expected based on a low base effect and inherent strengths of the economy. It is assumed that the economy will grow at its trend growth rate of 6.5 per cent in 2022-23 and 7.0 per cent in 2023-24 aided by the structural reforms. If two scenarios of 12 per cent growth and 10 per cent growth in 2021-22 are envisaged, India would be 91.5 per cent and 90 per cent below the trend level of output respectively by 2023-24.

After an estimated 7.7 per cent pandemic-driven contraction in 2020-21, India's real GDP is projected to record a growth of 11.0 per cent in 2021-22 and nominal GDP by 15.4 per cent. These conservative estimates reflect upside potential that can manifest due to the continued normalisation in economic activities as the rollout of Covid-19 vaccines gathers traction. This will further be supported by supply-side push from reforms and easing of regulations, push to infrastructural investments, boost to Manufacturing sector through the Productivity Linked Incentive Schemes, recovery of pent-up demand for Services sector, increase in discretionary consumption subsequent to roll-out of the vaccine and pick up in credit given adequate liquidity and low interest rates. This path would entail a growth in real GDP by 2.4 per cent over the absolute level of 2019-20 –implying that the economy would take two years to reach and go past the pre-pandemic level . These projections are in line with IMF estimate of real GDP growth of 11.5 per cent in 2021-22 for India and 6.8 per cent in 2022-23. India is expected to emerge as the fastest growing economy in the next two years as per IMF.

India's Merchandise Trade

During Q1: FY 2020-21, India's exports and imports saw a sharp contraction in line with the contraction in global trade. The decline in imports outweighed that of exports–leading to smaller trade deficit of US$ 9.8 billion as compared to US$ 49.2 billion in Q1 last year. India registered a trade surplus in the month of June, 2020 after a gap of 18 years. With the unlocking of the economy from June onwards, a gradual revival in India's merchandise trade got underway

Exports

Total exports during April–December, 2020-21 amounted to US$ 200.8 billion contracted by (-) 15.7 per cent as compared with (-) 2.4 per cent during the same period of the previous year. Petroleum, Oil and Lubricants (POL) exports, which constitute about 10–15 per cent of the total exports, have contributed negatively to export performance during the period under review. The fall in POL exports was largely driven by the softening of international crude oil prices, which plunged in Q1: FY 2020-21 by (-) 54.0 per cent and remained muted by (-) 28.7 per cent by Q3: FY 2020-21 as compared to last year. On the other hand, Non-POL exports, which contributed significantly to the shrinkage of exports in Q1 of 2020-21, turned positive and helped in improving export performance in Q3. Within Non-POL exports, agriculture & allied products, drugs & pharmaceutical and ores & minerals proved resilient and recorded expansion. However, key commodities, such as, organic and inorganic chemicals, electronic goods, textiles & allied products, engineering products, gems and jewellery pulled export growth down.

Insofar as the top export destinations are concerned, USA continues to be the largest export market for India in April–November, 2020, while China has occupied the 2nd position, moving up from 3rd spot in April–November, 2019. Exports to China in April–November, 2020 constitute around 7.8 per cent *vis-à-vis* 5.4 per cent in April–November, 2019. Malaysia is a new entrant among the top 10 export destinations, as compared to last year, while Nepal no longer occupies position among the top 10 destinations.

Imports

The total imports during April-December, 2020 amounted to US$ 258.3 billion contracted by (-) 29.1 per cent, as compared with (-) 7.2 per cent during the

same period last year. The sharp decline in POL imports that constitute about a quarter of total merchandise imports pulled down the overall import growth. During this period, the value of POL imports plummeted by (-) 44.5 per cent to US$ 53.7 billion, contributed by shrinkage in the volume of POL imports by (-) 16.7 per cent, and drop in the price of crude oil (Indian basket) by (-) 30.2 per cent. While the total merchandise imports contracted sharply in Q1 of 2020-21 by (-) 52.9 per cent, the pace of contraction eased in Q2 and Q3 to (-) 23.2 per cent and (-) 8.3 per cent, respectively. This recovery in imports was contributed by accelerating positive growth in gold and silver imports and narrowing contraction in non-POL, non-gold & silver imports. Gold & silver imports, constituting about 7-9 per cent of India's imports, witnessed a sharp growth of 33.0 per cent in Q3 of 2020-21 to US$ 10.0 billion–primarily due to the simultaneous rise in international gold and silver prices on account of demand for bullion as safe haven. Fertilizers, vegetable oil, drugs & pharmaceuticals and computer hardware & peripherals have contributed positively to the growth of non-POL, non-Gold & Silver imports, while capital goods contributed most to its weakness.

Among the top 10 countries for import origin, China continues to be the largest import source for India in April–November, 2020, with share of imports rising to 17.7 per cent, up from 14.5 per cent in April–November, 2019. While Switzerland does not appear to be among the top 10 import sources, Germany is the new addition in the list accounting for 3.7 per cent share of total imports.

Trade Deficit

The trade deficit during April–December, 2020-21 was US$ 57.5 billion as compared to US$ 125.9 billion in the corresponding period last year. India's merchandise trade balance for major countries for the period of 2020-21 (April–November) as compared to 2019-20 (April–November) shows that India had the most favourable trade balance with USA followed by Bangladesh and Nepal. The highest trade deficit is with China followed by Iraq and Saudi Arabia during April–November, 2020-21 and April–November, 2019-20.

Trade Related Logistics

The COVID-19 pandemic has underscored the need for a resilient Logistics sector that can respond to emergencies and supply chain disruptions. Despite the sector being plagued by some structural issues, such as, highly fragmented ownership; few large players; lack of consolidation in operations; sub-optimal modal share with freight movement highly skewed towards Road sector; lack of an integrated approach by user sectors (multiple line ministries and agencies); absence of consistent policies and regulations; etc., India has made remarkable progress in Logistics sector.

India's rank has improved significantly in trading across borders parameter of 'Ease of Doing Business' index from 146 in 2018 to 68 in 2020. The parameter assesses the time and cost associated with the logistical process of exporting and importing goods. The Logistics Performance Index (LPI), released by the World Bank, assesses relative logistics efficiency of countries. On this index, India was ranked 44 out of 160 countries in 2018 *vis-à-vis* rank of 54 in 2014. India is among nine countries having area above ten-lakh square kilometre out of 24 countries analysed by LPI in 2018, with a score above three. India performs above average after controlling for the level of development and was better than some of its BRICS peers.

The National Logistics Policy is in an advanced stage of roll-out with a vision to develop a modern, efficient and resilient logistics services sector that builds on dynamic processes, technology and professional manpower to seamlessly integrate multiple modes of transportation and inventory management to provide more reliable, cost effective, greener, safer and equitable logistics solutions. It is estimated that Logistics sector employs 12 million workforce, involved mainly in land transportation, warehousing (storage and packaging), supply chain and courier and express services. In order to impart right set of skills, a curriculum on logistics and supply chain is being developed for Classes 9 and 10 at the school level. Courses will be introduced in Industrial Training Institutes (ITIs) and polytechnics under Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Deen Dayal Upadhyay Grameen Kaushalya Yojana

(DDU-GKY) and State Skill missions.

Foregin Direct Investment (FDI)

During April–October, 2020, net FDI flows recorded an inflow of US $ 27.5 billion, 14.8 per cent higher as compared to first seven months of 2019-20, an endorsement of India's status as a preferred investment destination amongst the global investors .As far as sector-wise FDI is concerned, computer software and hardware attracted the highest FDI equity inflows of US$ 17.6 billion in April–September, 2020 *vis-à-vis* US$ 4.0 billion in April-September, 2019. Singapore continues to be the top investing country, in terms of FDI equity inflows, while US has taken second position, as against being at 4th spot during corresponding period a year ago.

As per DIPP report statement on sector-wise FDI equity inflous during the year 2020-21, FDI in Mining Sector was ₹ 12,525.09 million.

MINING INDUSTRY

The index of mineral production (excluding atomic and minor minerals)(withbase year 2011-12=100) for 2019-20 at 109.6 displayed a growth of 1.6% as compared to the previous year. The total value of mineral production (excluding atomic minerals, and fuel minerals) was at ₹ 1,50,826 crore during 2019-20.

The value of production of metallic minerals in 2019-20 at ₹ 66,084 crores increased by about 2.9% over the previous year mainly due to higher production reported in gold, lead & zinc ore, iron ore (total) and manganese ore. Among the principal metallic minerals, iron ore contributed ₹ 48,107 crore or 72%, lead (concentrate) & zinc (concentrate) together ₹ 7,830 crore or 12%, chromite ₹ 3,332 crore or about 5%, manganese ore ₹ 1,941 crore or about 3%, silver ₹ 1,804 crore or 2.7%, bauxite ₹ 1,578 crore or 2.4% and the remaining value was from copper (concentrate), gold, silver and tin concentrates in the total value of metallic minerals. (Table-1).

In metallic ores, production increased in respect of gold ore (4%), manganese ore (3%), and iron ore (19%) during the year 2019-20 as compared to the previous year.

The value of production of non-metallic minerals at ₹ 8,882 crores during 2019-20 decreased by 8.8% as compared to the previous year. Limestone with a contribution of 94% of the total value of non-metallic minerals, retained its leading position in 2019-20 in the group. The other important non-metallic minerals in terms of value, were marl (12%) and fluorite graded (21.87%).

Table – 1 : Indian Mineral Industry : Value of Production*
2017-18 to 2019-20

(In ₹ crore)

Sector	2017-18 (R)	2018-19 (R)	2019-20 (P)
Total : All Minerals	**129194**	**146126**	**150826**
Metallic minerals	50975	64212	66084
Non-metallic minerals	8855	9740	8881
Minor minerals	69363	72174	75860

** Excluding the minerals declared as prescribed substances under the Atomic Energy Act,1962; fuel minerals.*

Reporting Mines

Reporting mine is defined as "A mine reporting production or reporting 'nil' production during a year but engaged in developmental work such, as, overburden removal, underground driving, winzing, sinking work, exploration by pitting, trenching or drilling as evident from the MCDR returns".

There were 1,303 reporting mines (excluding atomic, fuel and minor minerals) in India located in all States and Union Territories during 2019-20. Among them, 567 belong to metallic minerals and 736 to non-metallic minerals (Table-2). There were 146 mines in the Public Sector and the remaining 1,157 mines were under Private Sector.

Table – 2 : Number of Reporting Mines 2018-19 and 2019-20

Sector		2018-19#	2019-20# (P)
All Minerals		**1364**	**1303**
I	(i) Public sector	145	146
	(ii) Private sector	1219	1157
II	(i) Metallic minerals	597	567
	(ii) Non-metallic minerals	767	736

Note: *#: Excluding atomic, fuel and minor minerals.*

Role of Public Sector

The Public Sector has played an important role in the overall mineral production in 2019-20. The entire production of copper ore & conc. and gold ore among metallic minerals and diamond, fluorite salt (rock) selenite and sulphur in respect of non-metallic minerals was reported by the Public Sector during 2019-20.

Gross Value Added from Mining & Quarrying Sector

The Ministry of Statistics & Programme Implementation has released the new series of national accounts, revising the base year from 2004-05 to 2011-12 in the year 2015. The industry-wise estimates are now presented as Gross Value Added (GVA) at basic prices. Certain changes have been made in this series including for Mining & Quarrying industry. During 2019-20 Mining and Quarrying Industry accounted for about 2.1 % of the GVA at current prices. The GVA at current and constant prices for the period from 2017-18 to 2019-20 is reflected in Tables-3 & 4 respectively.

Employment

The average daily employment of labour engaged in Mining Sector (excluding fuel minerals, atomic and minor minerals) was 1,11,946 in 2019-20. Out of this, 35,218 or 31% were in Public Sector and 76,728 or 69% in Private Sector. Metallic minerals accounted for 80% and non-metallic minerals 20% of the total labour force during the year.

India's ranking in 2019 in world production was– steel (crude/liquid) 2nd, Aluminium (primary) & chromite 3rd, Iron ore & lead (refined) 4th, Zinc (slab) & Bauxite 5th. The statistics on indigenous and world production of principal minerals and metals are detailed in Table-5.

Table-3 : Gross Value Added at Basic Price, 2017-18 to 2019-20 (At Current Prices) (29.05.2020)

(in ₹ crore)

Industry	2017-18 (NS)	2018-19(NS)	2019-20 (PE)	% Change in 2018-19 over the previous year
GVA (All)	**1,55,13,122**	**1,71,39,962**	**1,83,43,237**	**7.0**
Mining & Quarrying	3,57,788	3,89,322	3,93,102	1.0

Source : CSO. *NS : New Series Estimates* *PE : Provisional Estimates*

Table-4 : Gross Value Added at Basic Price, 2017-18 to 2019-20 (At 2011-12 prices)

(in ₹ crore)

Industry	2017-18 (NS)	2018-19 (NS)	2019-20 (PE)	% Change in 2019-20 over the previous year
GVA (All)	**1,20,74,413**	**1,28,03,128**	**1,33,01,120**	**3.9**
Mining & Quarrying	3,66,496	3,45,069	3,55,680	3.1

Source : CSO. *NS: New Series Estimates.* *PE: Provisional Estimates.*

Table-5: Contribution and Rank of India in World Production of Principal Minerals & Metals, 2019

Sector	Unit of Commodity	Production quantity		Contribution (Percentage)	India's rank in World order [$]
		World	India*		
Metallic Minerals					
Bauxite	'000 tonnes	347100	21824	6.29	5th
Chromite	'000 tonnes	38600	3929	10.18	3rd
Iron ore	million tonnes	3040	246	8.09	4th
Manganese ore	'000 tonnes	56600	2904	5.13	7th
Industrial Minerals**					
Magnesite	'000 tonnes	29700	98	0.33	17th
Apatite & Rock phosphate	'000 tonnes	226000	1400	0.62	16th
Metals					
Aluminium (primary)	'000 tonnes	62900	3635	5.78	3rd
Copper (refined)	'000 tonnes	24100	408	1.69	13th
Steel (crude/liquid)	million tonnes	1854	109.13	5.89	2nd
Lead (refined)[e##]	'000 tonnes	12500	599[#]	4.79	4th
Zinc (slab)	'000 tonnes	13500	516	3.82	5th

Source: *World mineral production data compiled from World Mineral Production, 2015-2019; British Geological Survey.*

** Figures relate to 2019-20 except lead (refined).*

Note: *Data in respect of World Mineral Production is on calendar year basis, however, the data on India's production is based on financial year, except lead refined (calender year).*

*** As per Government of India Notification S.O. 423(E) dated 10th February, 2015, following minerals have been declared as minor minerals: i) barytes ii) dolomite iii) felspar iv) fireclay v) quartz/silica sand and vi) talc/steatite/soapstone & pyrophyllite, hence these are not included in the table due to non-availability of production data.*

$: India's rank based on production mentioned in World Mineral Production 2015-19, British Geological Survey.

 # : Figures as published in World Mineral Production, 2015-19. However, the production of lead (primary) during 2019-20 was 132 thousand tonnes.

##: Figure relates to both primary and secondary refined lead and include the lead content of antimonial lead.

e: Estimated

POLICY

National Mineral Policy

National Mineral Policy, 2019, has been approved by the Union Cabinet, on 28th February 2019.

The aim of National Mineral Policy, 2019, is to have a more effective, meaningful and implementable policy that brings in further transparency, better regulation and enforcement, balanced social and economic growth as well as sustainable mining practices.

The National Mineral Policy, 2019, includes provisions which aim to boost the Mining Sector, such as,

• introduction of Right of First Refusal for RP/PL holders,

• encouraging the Private Sector to take up exploration,

• auctioning of virgin areas for composite RP-cum- PL-cum-ML on revenue share basis,

• encouragement of merger and acquisition of mining entities,

• transfer of mining leases and creation of dedicated mineral corridors to boost Private Sector mining areas,

• proposes to grant status of industry to mining activity to boost financing of mining for Private Sector and for acquisitions of mineral assets in other countries by Private Sector,

• proposes to auction mineral blocks with prembedded clearances to give fillip to auction process,

• propose to make efforts to harmonise taxes, levies & royalty with world benchmarks to help Private Sector.

The NMP-2019 will ensure more effective regulation. It will lead to sustainable Mining Sector development in future while addressing the issues of project-affected persons especially those residing in tribal areas.

Star Rating of Mines

Ministry of Mines, in its endeavour for taking up exhaustive and universal implementation of the Sustainable Development Framework (SDF) in mining, has evolved a system of Star Rating of Mines.

The Ministry of Mines instituted the Sustainable Development Framework (SDF) for taking up mining activity, encompassing inclusive growth, without adversely affecting the social, economic and environmental well-being, at present and also in future generation. It has been instituted as a two-tier system providing self-evaluation templates to be filled in by the mine operator followed by validation through Indian Bureau of Mines.

The evaluation templates for Star Rating was notified vide Notification dated 23.05.2016 for major minerals.

Based on the performance of the mining lease, 1 to 5 star rating would be awarded. The prospect of getting higher Star Rating is expected to drive miners to quickly adopt sustainable mining practices. In recently notified Mineral Conservation & Development Rule, 2017, Star Rating for mines has been included as statutory provision for achieving of minimum 3 stars.

A web enabled online system for evaluation of measures has been developed and launched on 18th August, 2016 as a vital step for ensuring compliance of environmental protection and social responsibility by the Mining Sector. A template for star rating of minor minerals is also being prepared.

During the year 2017-18, a total of 57 mines have been rated as five star. During the year 2019-20, till 31st December 2020, a total of 863 online templates for the assessment year 2018-19 have been filed by the lessees. Field verification of these leases for final evaluation is under progress.

LEGISLATIVE FRAMEWORK

Recent Reforms in Mineral Sector

(i)The enactment of MMDR Amendment Act, 2015 to amend the MMDR Act, 1957 has ushered in the regime of transparent and non-discretionary grant of mineral concessions and has brought several reforms, notably, mandating auction of mineral concessions to improve transparency, establishing District Mineral Foundation and National Mineral Exploration Trust and stringent penalty for illegal mining. In compliance with the various provisions under MMDR Amendment Act, 2015, various Rules were made thereunder which further were amended as and when required by industry so as to boost the Mineral Sector of the country.

(ii) To ensure supply of raw material (i.e. minerals) in the country, the MMDR Act, 1957 was amended

through Mineral Laws Amendment Act, 2020 vide Notification published in the Official Gazette dated 13.03.2020. This amendment provides for seamless transfer of all valid rights, approvals, etc. to the new lessee to enable commencement of mining operations immediately after auction of mineral blocks to ensure uninterrupted supply of minerals to the downstream industries. The said amendment Act also gives power to the State Government to auction the mining lease before the expiry. The new provisions will also augment the exploration of the deep-seated minerals and minerals of national interest by allowing Non-Exclusive Reconnaissance Permits (NERP) holders to apply for composite licence or Mining Lease (PL-cum-ML). In compliance with the said amendment Act, the Rules made thereunder were also amended.

(iii) Further, Mines and Minerals (Development and Regulation) (MMDR) Act, 1957 has been amended through the Mines and Minerals (Development and Regulation) Amendment Act, 2021 vide Notification published in the Official Gazette dated 28.03.2021 for augmenting mineral production, improving ease of doing business in the country and increasing contribution of mineral production to Gross Domestic Product (GDP). The said Amendment Act provides the following provisions for–

(a) Removing the distinction between captive and merchant mines. It allows all captive mines to sell up to 50% of the minerals produced during the year after meeting the requirement of attached plant. All future auctions will be without any end-use restrictions.

(b) Resolving pending cases under Section 10A(2)(b) by bringing them under new auction regime.

(c) Substituting 'mining operations' with 'production and dispatch'. Since the interpretation of the term mining operations is generic, it is difficult to cancel non-producing leases.

(d) Re-allocation of non-producing blocks of the Government companies as some of the mining blocks reserved for Government companies are not brought into production for many years.

(e) Statutory clearances to be valid even after expiry or termination of mining lease and would be transferred to next lessee of the mine.

(f) Lessee who is not interested in mining due to its financial condition or any other reason may transfer its mine to an interested mining party for operationalisation of mines.

(g) Central Government may issue directions regarding composition and utilisation of funds by District Mineral Foundation (DMF).

(h) Empowered Central Government to conduct auction in cases where the States face challenges in conduct of auction or fail to conduct auction in prescribed time. Auction of mineral concessions by the Central Government in case of difficulties faced by State Governments.

(i) Simplification of exploration regime.

(j) Incentivising the lease holders for starting of mining operation and dispatch prior to the scheduled date of mining operations mentioned in the tender document.

(k) Allowing transfer of letter of intent for grant of mining lease or composite licence in case of auctioned mines.

(iv) The Minerals (Evidence of Mineral Contents) Amendment Rules, 2021, was also amended by Notification of G.S.R. 421(E) dated 18.06.2021 to boost exploration activities and auction of mineral blocks.

Recently, in order to implement the amendments made in the said Act, the Ministry of Mines has published the Minerals (Other than Atomic and Hydro Carbons Energy Mineral) Concession (Fourth Amendment) Rules, 2016; Mineral Conservation and Development (Amendment) Rules, 2021; and Mineral (Auction) Third Amendment Rules, 2021 vide Notification G.S.R. 775(E) dated 02/11/2021; G.S.R. 780(E) dated 03/11/2021; and G.S.R. 776(E) dated 02/11/2021, respectively. The Government has also published the draft amendment vide F. No. M.VI- 16/97/ 2020-Mines VI dated 07.10.2021 seeking to amend Minerals (Evidence of Mineral Contents) Rules, 2015 for facilitating identification of mineral blocks for auction for grant of Composite Licence.

Further, the norms for auction of mineral blocks, as mining lease, has been relaxed from G2 to G3 level of exploration and the auction of composite licence has been allowed to be taken at G4 stage of exploration as compared to the G3 level, thus, facilitating availability of more auctionable blocks in the State.

(v) Hon'ble Prime Minister launched a campaign Aatma Nirbhar Bharat, where, Mineral Sector has to play a vital role. About 500 mineral blocks would be offered through an open and transparent auction process. Joint Auction of Bauxite and Coal mineral blocks to enhance Aluminum Industry's competitiveness will be introduced to help Aluminium Industry reduce electricity costs.

(vi) A order dated 16th Sept, 2019 has been issued by Ministry of Mines under Section 20A of MMDR Act, 1957 to allow M/s SAIL to sell in a year up to a quantity equivalent to max. 25% of total mineral production of previous year and to allow sale of sub-grade mineral stack lying at the mine pit heads of captive mines of M/s SAIL. Recently, the Government has also granted permission to NINL to sell up to 25% of its annual iron ore production as per the MDPA executed by the company for a period of one year or till the completion of disinvestment of the company, whichever is earlier.

Auction of Mineral Blocks

As per information available on website of Ministry of Mines as on 09.03.2022, a total of 145 mineral blocks have been auctioned successfully across 11 States.

Measures taken to Control Illegal Mining

Illegal mining means any reconnaissance or prospecting or mining operation undertaken by any person or a company in any area without holding a reconnaissance permit or a prospecting licence or, as the case may be, a mining lease as required under Sub-section (1) of Section 4 of the MMDR Act. Section 23C of Mines and Minerals (Development and Regulation) Act 1957, empowers the State governments to frame rules to prevent illegal mining and the State Government may by notification in the official gazette, make such rules for preventing illegal mining, transportation and storage of minerals and for the purposes connected therewith in the State.

There is a three-pronged strategy for prevention of illegal mining viz. constitution of task force by the State government at State and District Level, framing of rules under Section 23C of the MMDR Act, 1957 and furnishing of quarterly returns on illegal mining for review to the Central Government. The details of States who have constituted task force at State level, framed Rules under Section 23C of the MMDR Act, 1957 and have furnished quarterly returns on illegal mining to IBM are as follows:

Twenty-two State Governments have constituted the task force. The function of the task force is to review the action taken by member departments for checking the illegal mining activities in their respective jurisdiction.

Twenty-one State Governments have framed the rules under Section 23C of MM (D&R) Act, 1957 to curb illegal mining.

The State government submits quarterly returns on prevention of illegal mining to IBM. These returns contain details, such as, number of cases detected and action taken thereon etc. IBM on receipt of the returns from the various State governments, consolidates the information and sends it to the Ministry at the end of each quarter.

The Mineral Conservation and Development Rules, 2017 (MCDR) provides measures to ensure systematic & scientific mining. Rule 45 of the MCDR provides for the mining companies to submit periodic reports on the extraction and disposal of the mined material. Rule 45 of MCDR also facilitates end-to-end national-scale accounting of all minerals produced in the country from the pit head to its end-use, reducing the scope for illegal mining, royalty evasion, etc. The amended Rule 45 now makes it mandatory for all miners, traders, stockist, exporters and end-users of minerals to register and report on the production, trade and utilisation of minerals to the State Government(s) and Indian Bureau of Mines.

Space Technology for Checking Illegal Mining

Indian Bureau of Mines (IBM) has entered into an MoU with National Remote Sensing Centre (NRSC), for a pilot project “Sudoor Drishti” to demonstrate the feasibility of using High Resolution Satellite Imagery and Digital Elevation Model (DEM) in monitoring mining activities / changes over selected group of mines.

As a part of Pilot Project in Tandur area, Andhra Pradesh, volume changes in a cluster of mines (6) studied for 2007-2015 period, it was observed that overall volume change is 10 to 11% only.

Regarding setting up of Remote Sensing Laboratories,it is confirmed that two remote sensing labs have been established one at Nagpur and other at Hyderabadand both these are fully operational.Transfer of legacy data of Multi-Mineral Leasehold Map, which was earlier on Auto cad system, is being carried out on GIS platform and all Reconnaissance Permit and Prospecting Licences are being digitised on GIS platform along with Integration of regional geology, forest map and mine lease boundary maps.

An MoU has been signed between IBM and MOIL for pilot study of MOIL leases in Maharashtra state

Application of Drone Technology in mining

Furthering the efforts to utilise new technology, the Ministry of Mines has explored applicability of the unmanned Aerial Vehicles (UAV) Technology or commonly referred to as 'UAVs' for the Mining Sector.

Government of India, Ministry of Mines has amended Mineral Conservation and Development Rules (MCDR), 2017 in the year 2021 requiring submission of digital images by the lessee/ preferred bidders to the IBM. The provisions of rule 34A of MCDR are as follows:

"Rule 34A —(1) Every lessee having—

(a) an annual excavation plan of one million tonne or more in a particular year; or

(b) leased area of fifty hectare or more, shall carry out a drone survey of the leased area and upto hundred metres outside the lease boundary in the month of april or may every year and submit the processed output [digital elevation model (DEM) and Orthomozaic] images obtained from such survey or any other format as may be specified by Indian Bureau of Mines to the Controller General, Indian Bureau of Mines on or before 1st day of july every year:

(2) Every lessee, other than those covered under sub-rule (1), shall submit soft copy of high resolution Georeferenced Orthorectified Satellite images of the leased area and upto hundred metres outside the lease boundary taken in the month of april to june of every year, to the Controller General, Indian Bureau of Mines on or before 1st day of july of the that year in the standards formats such as GEOTIFF along with metadata, or any other format as may be specified by Indian Bureau of Mines in this regard: Provided that the lessee who has submitted images under sub-rule (3) shall not be required to submit the images under this sub-rule for the year in which images are submitted under sub-rule (3).

(3) Every lessee shall carry out a drones survey of his leased area and upto hundred metres outside the lease boundary within six months before submission of any mining plan document or modification thereto to the Indian Bureau of Mines for approval and shall submit processed output [digital elevation model (DEM) and Orthomozaic] images obtained from such survey to the concerned Regional Controller of Mines and the Controller General, Indian Bureau of Mines along with the application for approval or modification of mining plan:

Provided that the lessee who has submitted the images under sub-rule (1) on or before the 1st day of july falling immediately before submission of mining plan document, shall not be required to submit the same under sub-rule (3).

(4) All preferred bidders who are issued with a letter of intent for grant of a mining lease shall carry out a drone survey of the mining block granted through auction and upto hundred metres outside the block boundary and submit the processed output [digital elevation model (DEM) and Orthomozaic] images obtained from such survey along with the mining plan to the Regional Controller and the Controller General, Indian Bureau of Mines.

(5) The standard operating procedure for carrying out the drone survey and form of the data to be submitted shall be specified by Indian Bureau of Mines from time to time:

Provided that the Indian Bureau of Mines may prescribe any alternate mechanism for survey and submission of data or images other than the mechanism specified in sub-rules (1) to (4), in case of any restriction on use of drones under any law for the time being in force regulating the use of drones".

UAV technology can be extensively applied in the Mining Sector, i.e for

(i) Carrying out overall survey of mine for monitoring the mining and allied activities in and around the mining area.

(ii) Lease boundary demarcation using the Ground Control Points (GCPs) and geo-referencing of the leases, monitoring of illegal mining activities etc.

(iii) Volumetric estimation of excavation, reclamation and periodical stock .

(iv) Piles monitoring change detection analysis over a period of time using previously surveyed data.

(v) Monitoring of land use and environmental impact in and around mining area.

(vi) Virtual inspection of minesa for regulatory purpose.

(vii) Preparation of contour survey and survey map for filing to various regulatory agencies as well as internal use of the industry.

The advantages of UAV Survey are

(i) UAV Survey in mining can improve the overall efficiency of large mine site and quarry management by providing accurate and comprehensive data detailing site conditions in a very short time.

(ii) The data accuracy and authenticity is better than the traditional survey.

(iii) High resolution (cm level) data of UAV provides high accuracy and more precise volumetric measurements than traditional surveying methods.

(iv) Stock piles of irregular shape and exhibiting craters can be easily surveyed with great precision than using traditional methods.

(v) UAV survey is faster, has less human intervention in mine and facilitates easily repeatable mining surveys at low cost.

(vi) Changes between two surveys can be tracked and highlighted automatically.

(vii) UAV aerial images can be used to generate point clouds, digital surface models, digital terrain models and a 3D reconstruction of a mining site, including its stockpiles.

(viii) Helps in creating a digital data base which can be used and retrieved at ease and compared.

(ix) Data generated over a period of time can be stored in digital platform and the time series data can be compared. The data can be used for systematic and scientific mine closure planning, monitoring of reclamation, rehabilitation activities in lease area. Keeping the above advantages of UAV Survey in view, it has been proposed that UAV Surveys be carried out periodically for each working mine along with the non-working mines and the data be submitted to IBM for periodic evaluation for the various purposes as mentioned above.

IBM organised several meetings with all stakeholders for finalision of modalities and guidelines for application of drones in mine regulation. This step is a wayforword initiated by IBM for effective E-governance through satellite and remote sensing applications, as enshrined in NMP, 2019.

It was proposed to carry out a POC of drone survey in four mines–status of Survey

is as follows:

(1.) Dongri Buzurg Manganese ore Mine of M/s MOIL Ltd.,Maharashtra : 1st UAV Survey completed during September 2020 and based on the raw and processed output data it was proposed to take-up 2nd UAV Survey during March 2021. This 2nd Survey got postponed due to Covid and DGPS survey data is awaited.

(2.) Maratha-I Limestone mine of M/s Ambuja Cements Ltd, Maharashtra :Drone survey proposed to be carried out from 25th March 2021 was postponed due to Covid.

(3.)Sonadiah Limestone Mine of M/s NuvacoVisatas Corp. Ltd, Chhattisgarh: The 1st Survey in December 2020 was carried out and received the raw images and

processed output data. IBM prepared a draft report on the UAV survey conducted.

(4.) Rawan–Jhipan Limestone Mine of M/s Ultratech Ltd, Chhattisgarh: M/s Ultratech Ltd has informed that they conducted a UAV survey in Rawan–Jhipan Limestone Mine in February 2020 through a DGCA approved authorised Drone agency as per the SOP of IBM and submitted the survey data and processed data to IBM Based on the assessment of data by IBM and on receipt of affirmation

The data received from M/s Ultratech to be as per the SOP. M/s Ultratech was issued a go-ahead to takeup the second pilot study of UAV Survey Rawan-Jhipan mine during that last week of January 2021. Accordingly, M/s Ultratech has carried out the 2nd pilot study of UAV Survey during 29th January 2021 to 2nd February 2021. The output data was subsequently processed and, IBM prepared a draft report on the UAV survey conducted. satellite imageries (for the year 2010, 2014 and 2018) procured from NRSC.

Mining Surveillance System (MSS)

MSS Project using satellite remote sensing technology together with information technology has been developed and rolled out for major & minor minerals to curb cases of illegal mining.In the initial phase, a total of 296 triggers across the country covering a total area of 3,994.87 hectares wherein, 48 unauthorised mining have been detected after inspection of the triggers by the State Government officials. The training of all the States for its adoption of the MSS for minor minerals has also been done. A total of 164 Officers from States participated in the training.

In the second phase, 52 major mineral triggers have been detected from the 3,280 plotted leases (Working Mines 1,689 plotted out of 1,694 and Non-Working Mines 1,596 plotted out of 2,129) across the country, out of which 45 have been verified by the State Governments and in 5 cases unauthorised mining activities have been identified.

Similarly, in respect of minor minerals, data, 130 triggers have been generated, out of which 104 have been verified and in 9 cases unauthorised mining activities have been identified.

District Mineral Foundation / Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY)

District Mineral Foundation (DMF) established by contributions from the mining companies, came into force specially for addressing the long-time grievance of the neglected civil society consisting of people affected by mining activities. Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) scheme formulated for the welfare and development of the mining affected areas and people under DMF was also launched. About ₹ 40,279.58 crore have been collected till July, 2020. Under the PMKKKY, 1,76,636 projects have been sanctioned, 48,615 projects are ongoing and 32,258 projects are yet to start in the mining affected districts. Till July, 2020, funds to the tune of ₹ 16,741.36 crore have been utilised and about ₹ 37,226.56 crore have been allocated. A portal for monitoring of PMKKKY implementation has been launched on 20.3.2018 at the 3rd National Conclave on Mines & Minerals. Districtwise portal was made live on 27th August, 2018. The National PMKKKY portal will also function as DMF portal for each district. It captures the details from the collection and accrual of funds, to its utilisation and monitoring, for implementation of projects.

Mining Tenement System (MTS)

The Mining Plan, Star Rating and OAS modules are under testing. The SRS V3.1 of Phase II Modules, i.e., Grant and Execution of Concession, Inspection Module, GIS Module, IBM existing databases, ML WMIMP, NMI, MCP and Final Mine Closure Plan modules are under examination.

Constitution of Study Group on Revision of Rates of Royalty and Dead Rent for Minerals (Other Than Coal, Lignite, Sand for Stowing, and Minor Minerals)

Ministry of Mines has constituted a Study Group for revision of rates of royalty and dead rent for minerals (other than coal, lignite, sand for stowing and minor minerals) under the Chairmanship of Additional Secretary, Ministry of Mines, vide Order No. 9/1/2018-M.V dated 09.02.2018.

Terms of reference of the Study Group were as under:

a) To review the existing rates of royalty for minerals (other than coal, lignite, sand for stowing, and minor minerals) given in the Second Schedule to the MMDR Act, 1957 and to recommend the revision of rates of royalty;

b) To consider and recommend policies relevant to administration of royalty regime; and

c) To suggest appropriate revision in the existing rates of dead rent as stated in the Third Schedule to the MMDR Act, 1957.

Memorandum of Understanding (MoU) Signed in 2020-21

In the interest of developing bilateral cooperation with countries having rich mineral resources and access to the latest technologies in the exploration and development of minerals, the Central Government has entered into bilateral agreements with the Governments of a number of countries viz. Afghanistan, Australia, Bangladesh, Bolivia, Brazil, Chile, China, Colombia, Finland, Morocco, Malawi, Mali, Mozambique, Peru, United Kingdom, Zambia and Zimbabwe. Moreover, the Ministry of Mines is constantly endeavouring to seek greater engagements overseas in order to ensure mineral security for the Country.

MoU with Australia

An MoU was signed between the Ministry of Mines and Department of Industry, Science, Energy and Resources for Australia on cooperation in the field of mining and processing of critical and strategic minerals for an initial period of five years and exchanged during the India-Australia Leaders' Virtual Summit between Hon'ble Prime Minister of India and Hon'ble Prime Minister of Australia through video conference held on 04th June, 2020.

India's Make in India initiative is aiming to make India a global manufacturing hub for twenty-five 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 others rare earth elements, are identified which are also susceptible to disruptions in supply as India is deficient in these minerals.

MoU with Finland

An MoU was signed on 3rd December, 2020 between Geological Survey of India, Ministry of Mines and Geological Survey of Finland (Geologian Tutkimuskeskus), Ministry of Employment and the Economy, Government of Finland, for cooperation in the fields of Geology and Mineral Resources, as Finnish side has expertise in multi-thematic data integration and analysis using spatial platform with special emphasis on 3/4D modelling for mineral prognostication, hazard management, environmental impact assessment, and any other areas of socio-economic significance, and developing Decision Support System (DSS), which can be used with minimal knowledge of GIS based modelling.

MoU with Argentina

An MoU between Ministry of Mines and the Secretariat of Mining of the Ministry of Productive Development of the Argentine Republic on cooperation in the field of Mineral Resources is under consideration, which is likely to be signed by March, 2021.

Bilateral Meetings

There were a number of bilateral meetings held during the year 2020-21 with various countries to further the cooperation and collaboration in the fields of Mining, Geology and Mineral Resources, including the critical and strategic minerals.

A meeting between Hon'ble Minister of Coal, Mines and Parliamentary Affairs, Government of India and Hon'ble Australia's Minister for Resources, Water and NorthernAustralia, Government of Australia, was held through video conferencing on 11.09.2020.

First meeting of Joint Working Group (**JWG**) under the MoU between the Ministry of Mines and the Ministry of Mines & Minerals Development, the Government of Zambia on cooperation in the fields of Geology and Mineral Resources was held through video conferencing on 23.09.2020.

First meeting of Joint Working Group (JWG) under MoU on cooperation in the field of mining and processing of Critical and Strategic Minerals between India and Australia was held on 26.11.2020 through video conference. During this meeting, various areas w.r.t. cooperation in the fields of critical and strategic minerals were deliberated, which may go long way to benefit India's resource security agenda through the route of direct investments in Australia or as collaborations for knowledge and technology transfers.

An MoU between the Geological Survey of India (GSI), Ministry of Mines and the Geological Survey of Brazil –CPRM (GSB–CPRM), Ministry of Mines and Energy of the Federative Republic of Brazil for cooperation in field of Geology and Mineral Resources was signed on 25.01.2021. First meeting of the Joint Working Group under the MoU was held on 12.11.2020 through video conferencing.

A meeting was chaired by the, Hon'ble Minister of Coal, Mines and Parliamentary Affairs with the, Ambassador of India to Argentina on 9th December, 2020 regarding cooperation on Lithium with Argentina.

Khanij Bidesh India Limited (KABIL)

A Company named 'Khanij Bidesh India Ltd (KABIL)' was formed during the year for exploring overseas mineral assets, particularly, strategic and critical minerals, with an objective of ensuring mineral security of the nation. A Joint Venture Company of NALCO, HCL and MECL with equity participation of 40:30:30 has been created with a mandate to identify, explore, acquire, develop, mine, process, and sale of critical & strategic minerals and other minerals overseas for mineral security and commercial use so as to ensure mineral security of the country through supply side assurance of Energy Minerals.

It is planned that through these MoUs the shared information dockets entailing prospective mineral acreages will be jointly evaluated such that due diligence – technical, commercial, regulatory, statutory etc. can be carried out for investment decisions and after the approval process definitive agreement will be signed for commercial negotiation and acquisition of participating interest or equity in the projects by KABIL.

The details of Legislative Framework are provided in the Review on "Mineral Policy and Legislation" under "General Review".

EXPLORATION & DEVELOPMENT

GSI, DGMs of various States, Public Sector companies like NMDC, MECL, MOIL, etc., continued their efforts in respect of surveying, mapping and exploration of new deposits and re-assessment of old deposits/mines during 2019-20. The ONGC and OIL, the two National Oil Companies (NOC) and a few private and joint venture companies were engaged in exploration and production activities of

oil and natural gas, including coal-bed Methane in the country. The details of exploration carried out and discoveries found during the year 2019-20 are described in "General Review" on “Exploration & Development”. However, the exploration conducted by various organisations during 2019-20 is highlighted below:

Geological Survey of India (GSI)

GSI is vested with the responsibility of maintaining broad-based and uniform national approach to data generation in respect of mineral resources. With the near exhaustion of resources to the proximity of surface, it has become imperative to have multidisciplinary approach to mineral exploration which comprises large-scale and detailed geological mapping aided by interpretative analysis of aerogeophysical and remotely sensed data, ground geophysical survey, geochemical prospecting and surface & sub-surface exploration through pitting, trenching & drilling. GSI’s activities in mineral exploration as well as baseline surveys have increased manifold in order to sustain the momentum of national economic development and to meet the increasing demands of various stakeholders. As per recent development towards Policy shift, GSI has been entrusted G2 level of investigations for M-IIA Items that were included in FS 2015-16. GSI also did engage in the task of upgrading the level of investigation in different important exploration items along with identification of resource potential of G3 level, for auctioning as per the recent policies of the Government. GSI has completed National Geochemical Mapping (NGCM) in the accessible part of the Obvious Geological Potential (OGP) areas of the country.

GSI pursued its most fundamental and basic mapping programme of systematic geological mapping in 2019-20 and had completed 17,467.5 sq. km large-scale mapping, 273.4 sq. km detailed mapping and 1,32,805.7 m drilling as against previous year's achievement of 9,330.6 sq. km large-scale mapping, 166.8 sq. km detailed mapping and 1,29,710 m drilling. Out of the total mappable areas of 3.146 million sq km of the country, 31,19,080 sq. km have been covered so far by systematic mapping bringing the total coverage to 99.15%.

Mineralwise total resources augmented by GSI during 2017-18 are listed below:

(i) A total of 353.024 million tonnes of iron ore resources were estimated.

(ii) A total of 5.203 million tonnes of manganese ore resources were estimated.

(iii) Estimated gold ore resource of 1.48 million tonnes.

(iv) Estimated a total of about 1.257 million tonnes of lead-zinc ore resources.

(v) Estimated about 0.039 million tonnes of PGE resources.

(vi) A total of 0.7 million tonnes of silver ore resources were estimated.

(vii) Estimated a total of 22.24 million tonnes of copper ore resources.

(viii) Estimated a total of about 1.19 million tonnes of REE resources.

(ix) Estimated a total of about 20.83 million tonnes gallium resources.

(x) Estimated a total of about 7.294 million tonnes graphite resources.

(xi) Estimated a total of 28.50 million tonnes of bauxite resources.

(xii) Estimated 2,818.71 million tonnes of limestone resources.

(xiii) Estimated a total of 34.03 million tonnes of and alusite resources.

(xiv) Estimated a total of 147.72 million tonnes of potash resources.

MECL

MECL continued its core activities of regional and detailed mineral exploration involving exploratory drilling along with associated geological activities.

The highlights of exploration carried out by MECL during 2019-20 are summarised as below:

i) The Company has carried out about 6.39 lakh metre of exploratory drilling for various minerals, out of which 5.95 lakh metre were through departmental resources and about 0.44 lakh metre through outsourcing.

ii) A total of 223.42 sq.km area have been covered with detailed geological mapping for various minerals in different parts of the country. Besides, 3.84 lakh metre of borehole geophysical logging also were carried out.

iii) In laboratories, a total of 1,18,216 samples were analysed for chemical analysis and 867 samples for microscopic and petrographic studies.

iv) A total of 35 geological reports of mineral exploration, geophysical survey, environmental & remote sensing studies for different minerals were submitted which led to addition of 4,454 million tonnes of mineral resources during the year 2019-20.

v) The mineral-wise details of reserves/resources estimated by MECL are as under:

- Bauxite - A total of 5.61 million tonnes of bauxite ore reserves/resources were established in Gumla & Lohardage districts in Jharkhand.
- Coal - A total of 2,122.91 million tonnes of coal reserves/resources were established in Mand Raigarh, Tatapani & Ramkola in Chhattisgarh.
- Copper - A total of 77.78 million tonnes of copper ore reserves/resources were estimated in East Singhbhum district in Jharkhand and Mayurbhanj district in Odisha.
- Lignite - A total of 366.48 million tonnes of lignite reserves/resources were established in Tamil Nadu.
- Limestone - A total of 1,809.46 million tonnes of limestone reserves/resources were estimated in Bilaspur district in Chhattisgarh, Kalaburagi district in Karnataka as well as Satna & Neemuch districts in Madhya Pradesh.
- Magnesite - About 10.05 million tonnes of magnesite reserves/resources were established in Udaipur & Rajasmundra districts in Rajasthan.
- Manganese - A total of 0.96 million tonnes of manganese ore reserves/resources were established in Bolangir district, Odisha.
- Nickel - About 60.35 million tonnes of nickel ore reserves/resources were established in Namakkal and Tiruchirapalli districts, Tamil Nadu.

Oil and Natural Gas Corporation Ltd (ONGC)

During the year 2019-20, ONGC has made 12 discoveries (8 onland and 5 offshore). It has monetised 5 discoveries during the year.

During 2019-20, cumulative of 462.4 LKM of 2D seismic and 2449.6 SKM of 3D seismic have been acquired and 106 exploratory wells have been drilled amounting to a drilling meterase of about 340 thousand m.

Oil India Ltd (OIL)

Oil India Ltd carried out 2D & 3D seismic survey to identify new prospects in the Petroleum Mining Lease (PML) areas and NELP Blocks. It has drilled 25 exploratory wells in nomination areas in Assam & Rajasthan and continued exploratory efforts in other blocks. During the year, OIL made 2 oil & gas discoveries.

Indian Bureau of Mines (IBM)

IBM plays the role of National Repository of mineral data through maintaining a data bank of mines and minerals by developing advanced IT-based Mineral Information System. IBM also carries out mining research project on need-based aspects of mining; and conducts mineral beneficiation studies, including mineralogical testing and chemical analysis; and preparation of mineral maps. Indian Bureau of Mines (IBM), as a facilitator to the Mineral Industry, performs multifarious functions, such as, providing technical consultancy services for conducting feasibility studies, environment impact assessments, environment management plans, etc. as a storehouse of data.

A Remote sensing centre has been set up at IBM in 2018. Multi-mineral leasehold maps are updated on ARC-GIS platform. During 2019-20, the geological layer for Goa, Andhra Pradesh, Jharkhand, Maharashtra, Karnataka were completed. Forest layer of Goa has been completed. Attachment of mine data has also been, completed for Goa, Maharashtra, Andhra Pradesh, Gujarat, Karnataka, Jharkhand, Telangana, Rajasthan, Madhya Pradesh, Odisha and Chhattisgarh activity of plotting of PL and RP areas on ARCGIS platform is also under process. Vectorisation of 346 toposheets and plotting of 2,444 mining leases were completed.

Mineral beneficiation studies were carried out by IBM to encourage value addition, conservation and development of mineral resources. During 2019-20, 47.75 ore dressing investigations, 24,633 chemical analyses, 2,811 mineralogical examinations and 3 in-plant studies were completed.

The Project on Mining Surveillance System (MSS) was undertaken by Indian Bureau of Mines, Ministry of Mines, and BISAG (Bhaskaracharya Institute for Space Applications and Geo-informatics) of Ministry of Electronics and Information Technology (MEITY) to develop a system for detection of incidence of illegal mining by use of space technology and Surveillance of area up to 500 m outside the lease boundary to check instances of

illegal mining. The deterrence effect of 'Eyes watching from the Sky' would be extremely useful in curbing instances of illegal mining. A total of 52 major mineral triggers in second phase have been detected from the 3,280 plotted leases across the country, out of which 45 have been verified by the State Governments and in 5 cases unauthorised mining activities have been identified. Similarly in respect of minor minerals, so for, 130 triggers have been generated, out of which 104 have been verified and in 9 cases unauthorised mining activities have been identified.

IBM undertakes preparation of National Inventory of mineral resources on a quinquennial basis. Under this programme, implementation of UNFC system was adopted in 2002 replacing the earlier resource classification based on Indian system. The last National Mineral Inventory (NMI) was updated as on 01.04.2015 for 71 minerals. The preparatory work towards updating of National Mineral Inventory (NMI) as on 01.04.2020 for 46 major minerals is under progress.

Other Agencies

During 2019-20, a total of 7,205 m exploratory core drilling involving 36 boreholes in 9 maganese ore mines were carried out by MOIL. Among these mines, two mines viz, Dongri buzurg & Chikla manganese mines are situated in district Bhandara and seven mines viz, Kandri, Munsar, Gumgaon, Parsoda, Beldongri, New Satuk and Old Satuk are situated in district Nagpur, Maharashtra state. Four mines viz, Tirodi, Sitapatore Sukli, Ukwa and Bharweli mines are in district Balaghat, Madhya Pradesh. The reported reserves/resources of manganese ore as on 1.4.2020 of all the 12 mines of MOIL were estimated at 90.00 million tonnes. Ukwa (13.71 million tonnes), Bharweli (24.59 million tonnes), Tirodi (0.68 million tonnes), Sitapatore & Sukli (0.12 million tonnes & 0.14 million tonnes), Chikla (4.62 million tonnes), Dongri Buzurg (18.46 million tonnes), Kandri (12.04 million tonnes), Munsar (5.55 million tonnes), Parsoda (0.48 million tonnes), Beldongri (0.25 million tonnes), Old Satuk (0.50 million tonnes), New Satuk (0.02 million tonnes) and Gumgaon (8.94 million tonnes). A total of 20 samples were analysed from Kandri mine.

During 2019-20, HZL carried out about 100 km underground exploration and 60 km of surface exploration across all its properties. As on 31.03.2020 the total ore resources of all mines owned by HZL in the country stand at 403.00 million tonnes with a total metal content of 32 million tonnes.

RESEARCH & DEVELOPMENT

The Science and Technology (S&T) programmes of the Ministry of Mines, Government of India, cover the disciplines of Geology, Exploration, Mining, Beneficiation & Mineral Processing, Rock Mechanics, Ground Control & Non-ferrous Metallurgy and Environmental issues related to Mining & Metallurgy.

During the 19th PERC meeting held on 06-07th August 2019 at JNARDDC, Nagpur, a total of 130 project proposals, as received under S&T Program Scheme of Ministry of Mines for the year 2019-20, were screened. After screening, 30 proposals covering five areas, namely (i) Geosciences and Exploration; (ii) Mining; (iii) Mineral Processing & recovery from waste; (iv) Metal Extraction (Metallurgical processes); and (v) Alloys, specialty materials and product; were shortlisted for further presentation by the respective Principal Investigators (PIs). In addition to the above, three projects as recommended by the 18th PERC for resubmission, 14 completed projects and 4 ongoing projects were also reviewed by the committee. Based on the detailed review and evaluation, the PERC recommended 11 (Eleven) Project Proposals with or without changes to SSAG. The PERC also recommended for acceptance of 13 final reports and reviewed 4 ongoing projects.

The Research & Development (R&D) work in the field of Ores & Minerals is being carried out by IBM, JNARDDC, CSIR & allied laboratories, other research organisations relating to mineral/metal and various mining & mineral-based industries. As per available information, details of some of the R&D work conducted or completed by various organisations during 2019-20 are furnished below. However, the research & development details are covered in the Review on "Research & Development" under "General Review".

Indian Bureau of Mines (IBM)

Important R&D activities regarding ore dressing carried out by Mineral Processing Division, IBM during the year 2019-20 are summarised below:

1. Research & Development – Ore Preparation & Processes

1.1 Copper Ore: Bench Scale Beneficiation Studies on copper - bearing sample from Gangas block, Rajsamund district, Rajasthan.

1.2 Iron Ore: Bench - scale beneficiation studies on an iron ore sample from Jumka, Pathariposi Block, Sundargarh district, Odisha.

1.3 Limestone: Bench-scale beneficiation studies on F-Block Jasper - bearing Limestone sample.

1.4 Manganese Ore: Bench - scale beneficiation studies on a manganese ore sample from Devada Blocks, Garividi Manganese Belt, Vizianagaram district, Andhra Pradesh.

2. Research & Development for Recovery and Utilisation of Wastes

2.1 Low - grade Iron Ore: Beneficiation studies on a low grade iron ore dump sample from Village Chaballi , Kadapa district, Andhra Pradesh.

2.2 Low - grade Banded Magnetite Quartzite Ore: Bench-scale beneficiation studies on a low-grade Banded Magnetite Quartzite (BMQ) ore sample from Sanjeevarayakote, Ballari district, Karnataka.

2.3 Rock Phosphate Tailings:

Bench scale beneficiation studies on plant tailings sample from Jhamarkotra Mines, Rajasthan.

Jawaharlal Nehru Aluminium Research Development & Design Center (JNARDDC)

1. Completed Projects

1.1 Nano Processing of Industrial Rejects for use as additives in Mix-designs for improved pozzolanic reaction efficiency, in association with VNIT, Nagpur (S&T- Mines).

1.2 Utilisation of PLK (Partially Lateritised Khondalite) as a potential and value-added filler material with specific reference to white ceramics and pigments: NALCO and CVRCE, Odisha.

1.3 Development of inline automated anode butt monitoring system to measure anode butt parameters, NALCO, Bhubaneswar.

1.4 Development of Wi-Fi enabled sensor arrangement for online measurement of anode current distribution of aluminium electrolysis cell, NALCO, Bhubaneswar.

1.5 Utilisation and development of process for recovery of strategic rare earths from industrial waste – Bauxite Residue at lab scale in association with HINDALCO (Dept. of Science & Technology & Industry partner- HINDALCO).

1.6 Technological characterisation of bauxite sample for establishing the mass balance of the process design of the expansion study at Vedanta Ltd, Lanjigarh, Kalahandi, Odisha.

1.7 Technical feasibility study for extraction of alumina as AlF^3 from low-grade bauxite, International Bauxite, Alumina & Aluminum Society (IBAAS), Nagpur.

2. Ongoing Projects 2019-20

2.1 Fabrication of Advanced Ceramic Nano coatings for Automotive Applications with Christ University (Sponsored by Ministry of Mines).

2.2 Techno-economic Survey of Aluminium Scrap Recycling in India with Metal Recycling Association of India (Sponsored by Ministry of Mines).

2.3 To study the fire retardancy of nano-ATH in polymers with Central Institute of Plastics & Engineering Technology, Bhubaneswar (Sponsored by Ministry of Mines).

2.4 Bench-scale study on extraction of pure silica and smelter grade Aluminium Fluoride from Coal Fly Ash (Sponsored by Ministry of Mines).

2.5 Optimisation of digestion efficiency in Bayer process by ascertaining the ideal size fraction of bauxite feed (Sponsored by Ministry of Mines).

2.6 Utilisation of aluminium dross to achieve zero waste – A bench-scale study project (Sponsored by Ministry of Mines).

2.7 Production and certification of certified reference materials (CRMs) for the analysis of aluminium alloy (Sponsored by Ministry of Mines).

2.8 Development of ceramic proppant from low-grade materials (Partially Lateritised Khondalite -(PLK), Fly ash, etc.)–Phase-II Scale up studies (Sponsored by NALCO, Bhubaneswar).

2.9 An innovative and viable process for recovery of iron values from red mud and processing of non-iron material for developing value-added products– Complete Utilisation of red mud, Sponsored by NALCO, Bhubaneswar.

2.10 Development of a process technology at lab-scale for low cost production of 3N (99.9%) pure alumina,

Sponsored by Dept of Science and Technology, New Delhi.

National Institute of Rock Mechanics (NIRM)

During the current reporting period, i.e., 2019-20, three S&T projects were completed by the Institute. The Institute has also completed 83 industry projects between 1st January to 31st December, 2019.

National Institute of Miners' Health (NIMH)

The Clientele/sponsored projects undertaken by the Institute during the year 2019-20 are listed below-

(i) Dust, Noise and vibration studies at NALCO Damanjodi.

(ii) Workplace monitoring studies at NMDC–Kirandul, Bacheli and Panna.

(iii) Workplace monitoring studies at Sadera (RCCPL).

(iv) Workplace monitoring studies at ACC–Gagal, Kymore.

(v) Workplace monitoring studies at Ambuja solan and Bhatapara.

(vi) Periodical Medical Examination of employees of Gujarat Mineral Development Corporation.

(vii) Initial and Periodical Medical Examination of contract workers of Panchpatmali Bauxite Mines, Damanjodi, NALCO.

The Institute has completed one S & T project (Sponsored by Ministry of Mines), titled *"Postural risk analysis of Mining equipment operators and its relation to Musculoskeletal Disorders"*.

CSIR–Central Glass & Ceramic Research Institute (CGCRI)

1. R&D on magnesite for refractory application

2. R&D on sillimanite beach sand for refractory application

CSIR–Central Electrochemical Research Institute (CECRI)

1. Research & Development: Minerals and mineral; based products in construction activities, substitution etc.

* Research & Development - Recovery of marine chemicals and by-products, viz, salt, potash, bromine, iodine, gypsum and magnesium chemicals.

* Research & Development - Metallurgy and Mineral Processing.

1. Extraction of Neodymium Metal by Molten Salt Electrolytic Process (Sponsored: Indian Rare Earths Ltd.).

2. Electro-hydrolysis of low grade manganese ore to gamma MnO_2 (Sponsored: TATA Steel Limited).

3. Effect of impurities on zinc electroplating: Comparison of Special High Grade (99.995%) and Electroplating Grade (99.997%) Zinc raw material (Sponsored: Hindustan Zinc Limited).

CSIR–National Metallurgical Laboratory (NML)

The R&D work carried out by CSIR–NML in Mineral Processing during 2019-20 is below:

1. Technological process flow-sheet for beneficiation & extraction of tungsten from gold ore tailings.

2. Technology for dry beneficiation of thermal coal.

3. Pilot-scale beneficiation of low-grade limestone for cement making.

4. Plant performance audit of Lawa Gold ore concentrator.

5. Advanced gravity concentration of chromite ore beneficiation plant tailing.

6. Flotation studies on low-grade rock phosphate sample from Jordan.

7. Reduction of reactive Silica in Bauxite for use in Alumina production.

8. Processing of Limestone and Clay Samples for White Cement.

9. Beneficiation of waste dump Manganese ore fines for production of Ferro-alloys.

10. Beneficiation of low grade Dolomite ore.

Hindustan Copper Ltd (HCL)

HCL has undertaken the following R&D projects:

(1.) ICC R&D activity was carried out and established an experiment for Extraction and Recovery of Copper metal from ESP dust by Leaching and Electro wining.

(2.) NABL accreditation for laboratory at ICC & TCP is under progress.

Manganese Ore India Ltd (MOIL)

Significant R&D projects are listed below:

1. Mine Environment

1.1 Ventilation

1.2 Sustainable Development Framework

2. Mines Safety

2.1 Mining subsidence

2.2 Rock Mechanics

3. Mineral Conservation

4. Mining Technology

4.1 Rock Mechanics

4.2 Underground Mechanisation

4.3 Alternative to river sand

5. Mineral Beneficiation

6. Modern Radar Technology

7. Metallurgical Studies

8. In house R & D in Cement Concrete

National Mineral Development Corporation Ltd (NMDC)

1. Projects of NMDC Mines/Projects

(i) Physical and metallurgical characterisation of iron ore samples received from Bailadila sector.

(ii) Physical and metallurgical characterisation of pellet samples of NMDC Pellet Plant.

(iii) Various samples received for characterization and chemical analysis from Investigation department.

(iv) Characterization of coking coal sample.

Tata Steel Ltd

1. Projects under Research and Development Project title Benefits

1.1 Implementation of second stage hydro-cyclone trials at Ores, Mines & Quarries (OMQ) to recover the iron values from online slime

1.2 Wollastonite flux trials at iron ore pellet plant, to improve the pellet strength and productivity

1.3 Process for rapid heating of non-coking coal to coke through microwave energy

1.4 Cyanide removal from steel industry effluents

1.5 Value from Waste

1.6 Online Laser Profile Measurement at H Blast Furnace

2. Process Improvement

2.1 Mining & Beneficiation

2.2 Agglomeration

2.3 Blast Furnaces

2.4 Ferro alloys

2.5 Process Visualisation & Diagnostics

2.6 Process Energy & Emission

2.7 Characterisation and Specialty support

(i) Higher value-added downstream product from coal tar

(ii) Manufacturing of sustainable and green construction materials from LD slag

(iii) Comprehensive collaborative study on utilisation of LD slag in Portland Slag Cement is completed.

2.8 Raw Material Holding System

2.9 Coke Plant

Hindustan Zinc Ltd (HZL)

Specific areas in which R&D has been carried out by the HZL in FY 2020 are listed below:

(1.) Testing of alternate reagents like silver promoter, graphite depressant, cyanide replacement and strong frothers on various ores.

(2.) Minor metal mapping of Mine tailings.

(3.) Exploring chloride-based leaching for low-grade bulk concentrates and smelter residues.

(4.) Evaluating techniques to address graphite challenges arising in ores.

(5.) Studied the impact of lead re-grinding on lead/silver recovery.

(6.) Development of a novel process to recover metal values from Rampura Agucha Mine tailings.

(7.) Studied the effect of pH on galena and silver-bearing minerals recovery on flotation of Rampura Agucha ore.

(8.) Mineralogical characterisation of various HZL ore samples to predict mesh of grind and its implications for processing.

(9.) Explored germanium potential in various streams and collaborating with institutes for germanium recovery.

(10.) Jarosite moisture reduction and sustainable usage in construction sector.

(11.) Zinc hydro-smelter circuit study to improve copper recovery in cemented cake.

(12.) Explored control leaching and solvent extraction to generate enriched cobalt cake from purification cake.

(13.) A sustainable anode mud leaching process has been developed to maintain optimum manganese level at zinc hydro smelter and recover lead-silver values.

(14.) Developed process to generate zinc sulphate crystals from zinc dross.

The benefits derived as result of above R&D are highlighted below:

- Trials of new silver promoter resulted in improved Silver recovery at Zawar. Trials in progress at SK mines.
- Mineralogical characterisation and liberation assessment helped in identifying reasons for misplacement and metal loses in tailings, thereby suggesting opportunities for improvement.
- Enhanced mine to metal recovery by exploring unconventional leaching technologies for smelter residues and low-grade concentrate.
- Improvement in Lead recovery by 2% and reduction in Zinc misplacement in lead concentrate by lead middlings regrinding.
- Improved realisation from by-products by grade enhancement.
- Tapping minor metal potential in existing streams.
- Enhanced realisation from value-added products.
- Sustainable usage of Jarosite and other wastes.

FOREIGN TRADE

India's Trade

India’s overall exports (merchandise and services combined) passed the half trillion-dollar mark during 2019-20 but remained lower than 2018-19. India’s overall exports in 2019-20 were US$ 526.6 billion as against US$ 538.1 billion in 2018-19, registering a negative growth of (-) 2.1 percent. For the period April-December 2020 (E) exports were estimated at US$ 348.5 billion as against US$ 398.9 billion during April-December 2019, registering a negative growth of (-) 12.6 percent. Overall imports in 2019-20 were US$ 603 billion, exhibiting a negative growth of (-) 5.8 percent over the same period last year. For the period April-December 2020 (E) imports were estimated at US$ 343.3 billion as against US$ 463.0 billion during April-December 2019, registering a negative growth of (-) 25.9 per cent. Overall trade deficit in 2019-20 was US$ 76.4 billion, which was lower than the deficit of US$ 102.1 billion in 2018-19. Overall trade surplus for the period April-December 2020(E) is estimated at US$ 5.2 billion as against the deficit of US$ 64.1 billion during April-December 2019.

As per the World Trade Statistics Review 2020, India's ranking amongst the leading exporters in the world merchandise trade improved from 30 in 2004 to 18 in 2019 with a share of 1.70%. Similarly, India's ranking amongst the leading importer in world merchandise trade was 10 in 2019 as compared to 23 in 2004 with a share of 2.5 per cent.

Exports

The total exports (including re-exports) of all merchandise in 2018-19 and 2019-20 was ₹ 23,07,726 crore and ₹ 22,19,854 crore, respectively. During the year 2019-20, the value of exports (including re-exports) of ores and minerals at ₹ 1,89,683 crore accounted for about 8.54% of the total value of all merchandise exported from India. The value of exports of ores & minerals which increased from ₹ 1,99,469 crore in 2017-18 to ₹ 2,19,168 crore in 2018-19 declined to ₹ 1,89,683 crore in 2019-20. The value of mineral exports showed a decrease of 13.45% in 2019-20 as compared to that of the previous year.

Diamond (total) continued to be the largest constituent item with a share of 73.83% in the total value of mineral exports in 2019-20. Next in the order of share were iron ore with the contribution of 9.81% followed by granite 5.39%, alumina 1.63 % and copper ore & concentrate 1.08%. The individual share of remaining minerals in the total value of exports of ores and minerals from India during the year under review was less than one per cent.

The value of exports of ores & minerals (including re-exports) showed a mixed trend for most of the minerals in 2019-20 as compared to that of the previous year. A significant increase was also noticed in some cases. The exports value of minerals which have shown significant growth are iron ore 100.91%, building & monumental stones 45.22%, copper ore & conc. 22.99% and Abrasive (natural) 13.63%. On the other hand, the exports value recorded significant decline in the cases of bauxite 53.33%, natural gas 42.08%, coal (excl. lignite) 37.58%, chromite 35.12%, alumina 34.23%, garnet (abrasive) 29.67%, emerald (cut & uncut) 24.49%, titanium ore & conc. 23.92%, sandstone 23.11% and Mica 20.82% as compared to that in the previous year.

The value of exports of metals & alloys at ₹ 1,66,099 crore in the year 2019-20 registered a decrease of 4.70% as compared to that of ₹ 1,74,287 crore in the previous year. The contribution of metals & alloys in the total value of India’s exports was only 7.48% during the year under review.

Iron & steel with a share of 61.41% continued to hold the top position in the value of metals/alloys exported from India in 2019-20. Aluminium and alloys including scrap is in the second place and accounted for 21.74% value. Ferroalloys and copper & alloys (including brass & bronze) occupied the third & fourth place with a contribution of 7.11% and 3.64%, respectively. The contributions of zinc & alloys including scrap and lead & alloys including scrap were 2.43% and 1.59%, respectively. The individual share of other remaining metals and alloys was less than one per cent.

As compared to previous year, the value of exports for different important metals had shown a mixed trend in 2019-20. The export value of gold (non monetary & monetary) increased by 298.43%, nickel & alloys incl. scrap 40.52%, other metals & alloys 11.44%, pig & cast iron (incl. speigeliesen) 6.81% and tin & alloys incl. scrap 3.15%. However the export values of precious metals clad with precious metal (38.34%), tungsten & alloys incl. scrap (30.62%), antimony alloys & scrap (25.38%), platinum alloys & related metals (23.47%), ferroalloys (21.07%) and silver (16.9%) showed significant negative growth during 2019-20 as compared to that of the previous year.

Imports

The value of imports of ores & minerals in 2019-20 accounted for 34.26% of the total value of all merchandise imported into India. During 2019-20, the total value of imports of ores and minerals at ₹ 11,51,530 crore registered a decrease of 11.37% as compared to ₹ 12,99,186 crore in the year 2018-19.

Petroleum (crude) continued to be the largest constituent item with a share of 63.23% in the total value of minerals imported in 2019-20. Next in order of importance was coal (excl lignite) with a share of 13.26% followed by diamond with a share of 12.92% and natural gas with 5.95%. The combined share of these four minerals was 95.36% in 2019-20 as against 93.99% in the previous year.

The value of imports of some ores & minerals has marginally increased as in the case of limestone 2.09% and asbestos 1.46% during the year 2019-20 as compared to that in the previous year. However, the value of imports in some cases significantly declined as in iron ore (84.09%), alumina (51.6%), coke (49.43%), sulphur (excl. sublimed, precipited & colloidal) (45.86%), emerald (cut & uncut) (33.31%), copper ore & conc. (28.64%), molybdenum ore & conc. (27.91%) and bauxite (19.05%) during the year under review that of over the previous year.

The value of imports of metals & alloys at ₹ 4,16,727 crore showed a decrease of 12.79% in 2019-20 as compared to ₹ 4,77,843 crore in the previous year. The share of metals & alloys in the total value of all merchandise imported in to India was about 12.39 % in 2019-20.

Gold non-monetary & monetary (total) with a share of 47.81% continued to occupy the top position in the total value of imports of metals and alloys in 2019-20. Iron & steel is placed in the second position and accounted for share of 24.33%, copper & alloys including brass & bronze occupied the third place with a share of 8.67% and aluminium & alloys including scrap occupied the fourth place with a share of 7.46%. Next in the order were silver with 4.6% followed by ferro- alloys, nickel & alloys incl.scrap, lead & alloys incl. scrap, zinc & alloys including scrap, with 1.52%, 1.33%, 1.2% and 1.11% respectively. The individual share of remaining metals was less than one per cent of the total value of metals & alloys.

VALUE-ADDED EXPORT TRADE

India's foreign trade includes exports of minerals, both in the raw form and semi processed & processed forms like mineral based primary manufactured products.

Ores and minerals contributed significantly to India's exports trade in 2019-20 with a share of about 8.54% (i.e., ₹ 18,96,831 crore) in the total value of all merchandise. The contribution of minerals in exports in raw/unprocessed forms was about ₹ 2,92,637 crore and in semi-processed/processed forms was about ₹ 16,04,194 crore. The manufactured mineral-based commodities (final stage of transformation) contributed about ₹ 42,51,969 crore to the total value of exports of all merchandise. The value-added semi-processed/ processed minerals figuring in India's foreign trade included cut & polished diamond/ emerald, pulverised barytes, steatite, felspar (cut), garnet, calcined magnesite, magnesia (fused), magnesite (dead-burnt), magnesium oxide, slate (worked), processed mica & manufactured mica products, coke, cut & polished dimension stones, alumina, etc. The manufactured

mineral-based commodities included metals & alloys and products thereof, cement, firebricks & other refractory materials, clay-bonded graphite crucibles & silicon carbide crucibles, manganese dioxide, asbestos-cement products, inorganic chemicals like lime & fluorine chemicals, refined borax & borates, elemental phosphorus & phosphoric acid, titanium dioxide, petroleum products, phosphatic & potash fertilizers, etc. Table-6 provides data on contribution of various value-added minerals and mineral-based products to India's exports during 2017-18 to 2019-20.

INFRASTRUCTURE

Infrastructure

Investment in infrastructure is necessary for growth. To achieve the GDP of $5 trillion by 2024-25, India needs to spend about $1.4 trillion (₹ 100 lakh crore) over these years on infrastructure. The challenge is to step-up annual infrastructure investment so that lack of infrastructure does not become a binding constraint to the growth of the Indian economy.

Inadequate transport infrastructure leads to bottlenecks both in the supply of raw materials as well as movement of finished goods to the market place. The price that farmers get for their produce is depressed if there is no connectivity through good quality rural roads, which in turn keeps rural incomes depressed negating the fruits of high overall growth performance. For all these reasons, provision of adequate infrastructure is essential for growth and for making growth inclusive. India recently launched the National Infrastructure Pipeline for the period FY 2020-2025. Government of India launched National Infrastructure Pipeline (NIP) for FY 2019-20 to FY 2024-25, to facilitate implementation of world class infrastructure projects. This first of its kind initiative will boost the economy, generate better employment oppurtunities, and drive the competitiveness of the Indian economy. It is jointly funded by the Central Government, State Government and the Private Sector.

The NIP has projected total infrastructure investment of ₹ 111 lakh crore ($1.5 trillion) during the period FY 2020 to 2025 in India. Energy (24 per cent), Roads (19 per cent), Urban (16 per cent) and Railways (13 per cent) amount to over 70 per cent of the projected capital expenditure during the said period. As per the NIP, Central Government (39 per cent) and State Government (39 per cent) are expected to have equal share in funding of the projects followed by the Private Sector (22 per cent). It is expected that Private Sector share may increase to 30 per cent by 2025. Out of the total expected capital expenditure of ₹ 102 lakh crore, projects worth ₹ 42.7 lakh crore (42 per cent) are under implementation, projects worth ₹ 32.7 lakh crore (32 per cent) are in conceptualisation stage and rest are under development. Hence about two-third of the pipeline is already firmed up. It is also expected that projects of certain States would be added to the pipeline in due course.

Coal

Coal production (provisional) at 730.874 million tonnes in 2019-20 was higher by 0.30% from that of 728.70 million tonnes in 2018-19. In 2019-20, out of the total production of coal, 7.24% (52.93 million tonnes) was of coking coal and the remaining 92.76% (677.94 million tonnes) was of non-coking coal. Of the 707.17 million tonnes, despatches of raw coal in 2019-20 were lower by around 3.5% as compared to that in the previous year. About 98.5% despatches were to Electricity Sector, 1.7% to the Steel Industry, 1.5% to the Sponge Iron Industry and 1.2% to the Cement Industry. The remaining 6.5% was made for the priority sectors including chemical steel (boilers), textile & rayons, bricks and others.

Electricity

Electricity is essential for powering economic activity and is also required in leisure time. The Power Sector has witnessed substantial transformation from both the demand and supply-side. As a result, lndia has been ranked at 87th position in the Energy Transition Index, 2021 published by the World Economic Forum (WEF).

The installed capacity has increased from 3,56,100 MW in March 2019 to 3,73,436 MW as on October, 2020. The total generation of energy (including imports and renewable sources of energy) was 1,017.8 BU (up to December, 2020). During the year 2020-21 (up to December, 2020), peak shortage was 0.4% and the energy shortage was 0.3% as compared to 0.7% and 0.5% , respectively in the previous year.

Access to electricity is necessary for making growth inclusive and for promoting ease of living. Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya) was launched on September 25, 2017 with an outlay of ₹ 16,320 crores to achieve universal household electrification by providing last mile connectivity by 31.03.2019. The country has already accomplished two major landmarks in rural electrification area:

(i) 100 per cent village electrification under Deen Dayal Upadhyaya Gram Joyti Yojana, and

(ii) Universal household electrification under 'Pradhan Mantri Sahaj Bijli Har Ghar Yojana'.

Transport

Railways

Indian Railways (IR) with over 68,000 route km is the third largest network in the world under single management. During the year 2019-20, Indian Railways carried 120 crore tonnes of freight and 810 crore passengers making it the world's largest passenger carrier and 4th largest freight carrier. Revenue Earning Freight loading by IR during 2019-20 was 12,084 lakh tonnes, registering a decrease of 1.1 per cent. Passengers traffic was 80,857 lakh in 2019-20 as compared to 84,350 lakh in 2018-19 registering a decrease of 4.20 per cent over the previous year. During 2019-20, consequential train accidents decreased from 59 to 55 in comparison to the corresponding period of the previous year. Indian Railways cover over 8,700 stations and carry around 230 lakh passengers daily with clientele of varied socio-economic backgrounds. The union budget 2020-21 made an announcement to Kisan Rail Services to to provide better market opportunity by transporting perishables and agri-production.

Aviation

India is the third largest domestic market for civil aviation in the world. It is expected to become the third largest overall (including domestic and international traffic) by the year FY25.

India's domestic traffic has more than doubled from around 61 million in FY14 to around 137 million in FY20, a growth of over 14% per annum.

Ports and Shipping

Shipping is essential to both commodity and services trade of any country. Around 95 per cent of India's trade by volume and 68 per cent in terms of value is transported by sea. As on 30th September, 2019, India had a fleet strength of 1,419 ships. Despite one of the largest merchant shipping fleet among developing countries, India's share in total world dead weight tonnage (DWT) is only 0.9 per cent as on January 1, 2019 according to Institute of Shipping Economics and Logistics.

Ports Sector: The Major Ports in the country have an installed capacity of 1,534.91 MTPA and handled traffic of 704.92 MT during 2019-20. While increasing the capacity of major ports, Ministry of Shipping has been striving to improve the operational efficiencies through mechanisation, digitisation and process simplification. As a result key efficiency parameters have improved considerably. The Average Turnaround Time in 2019-20 improved to 61.75 hrs as against 95 hrs in 2018-19. The Average Output Per Ship Berthday has increased from 12,458 tonnes in 2015-16 to 16,433 tonnes in 2019-20.

Roads

Road transport is the dominant mode of transportation in terms of its contribution to Gross Value Added (GVA) and traffic share. The share of Transport Sector in the GVA for FY 19 was about 4.6 per cent of which the share of Road Transport is the largest at 67 per cent.

India had a road network of about 63.86 lakh km. The pace at which roads have been constructed has grown significantly from 12 km per day in 2015-16 to 30 km per day in 2019-20. The total investment in the Roads and Highway sector has gone up more than three times in the five year period of 2015-16 to 2019-20.

PERFORMANCE OF SELECTED MINERAL-BASED INDUSTRIES

Steel

Globally, India is the second largest producer of crude steel in the world after China. During 2019-20, crude steel production stood at 109.137 million tonnes, witnessing a decline of 1.6 per cent over the corresponding period of 2019-20 at 110.921 million tonnes with utilisation capacity of 77.00 per cent. India is the third largest consumer of the finished steel after China and USA. The total export of finished steel with highest volume of 8.355 million tonnes during 2019-20 registered a growth of 31.4% over 2018-19.

Cement

As per DIPP Annual Report, 2020-21, production of cement during 2019-20 was 334.37 million tonnes as against 337.32 million tonnes in 2018-19 and registered a decrease of about 1 per cent. The induction of advanced technology has

helped the industry immensely to improve its efficiency by conserving energy, fuel and addressing the environmental concerns. Cement Industry has been undergoing a transition with modernisation and upgradation of technology particularly with a view to conserve energy. India exports cement including white cement and other cement clinker. The exports of cement (total) decreased to 2.84 million tonnes in 2019-20 from 5.82 million tonnes in 2018-19.

Petroleum Oil and Refineries

Crude oil production & condensate in 2019-20 at 32.16 million tonnes registered a nominal decrease of 5.9% as compared to that in 2018-19. The production of natural gas (utilised) was at 31,184 million cubic metres in 2019-20, 5.14% lower than 32,873 million cubic metres achieved in 2018-19. The total refining capacity in the country was about 249.36 MMTPA as on 1.4.2019. Production of petroleum products (including LPG production from natural gas) was 262.94 million tonnes in 2019-20 as compared to 262.36 million tonnes in 2018-19.

SELF-RELIANCE IN MINERALS & MINERAL-BASED PRODUCTS

India continued to be wholly or 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. India is self-sufficient in iron ore, bauxite, sillimanite, chromite and limestone.

India is deficient in kyanite, magnesite, rock phosphate, manganese ore, etc. which were imported to meet the demand for either blending with locally available mineral raw materials and/or for manufacturing special qualities of mineral-based products. To meet the increasing demand of uncut diamonds, emerald and other precious & semi-precious stones by the domestic Cutting and Polishing Industry, India is dependent on imports of raw uncut stones for their value-added re-exports. The degree of self-sufficiency in respect of various principal minerals and metals in 2019-20 is furnished in Table-7.

Table – 6 : Contribution of Value-added (Processed) Minerals & Mineral-based Products in India's Export* Trade, 2017-18 to 2019-20

Sl. No.	Commodity group	Value of exports (` million)			Contribution (percentage)		
		2017-18	2018-19 (R)	2019-20 (P)	2017-18	2018-19	2019-20 (P)
1.	All Merchandise	19565145	23077261	22198541	100.00	100.00	100.00
2.	Ores & Minerals	1994690	2191682	1896831	10.20	9.50	8.54
	2.1 Raw/Unprocessed form	208483	223388	292637	1.06	0.97	1.32
	2.2. Semi-processed/ processed forms (preliminary and intermediate stages of processing)	1786207	1968294	1604194	9.13	8.53	7.23
3.	Manufactured Mineral-based Commodities (final stage of transformation)	4216562	4481240	4251969	21.55	19.42	19.15
	3.1 Metals/Alloys	1903345	1742868	1660988	9.73	7.55	7.48
	3.2 Others	2313217	2738372	2590982	11.82	11.87	11.67

Figures rounded off.
** Including re-exports.*

Table-7: Degree of Self-sufficiency in Principal Minerals & Metals, 2019-20 (P)

Sl. No.	Commodity	Demand/Domestic Consumption ('000 tonnes)	Supply/Domestic supply ('000 tonnes)	Order of self-sufficiency (%)
Minerals				
1.	Bauxite	24025	21824	91
2.	Chromite	2719	3929	100
3.	Iron ore	180685	246081	100
4.	Kyanite	7.7	3.50	45
5.	Limestone	328620	359332	100
6.	Magnesite	179.9	98	54
7.	Manganese ore*	6874	2904	42
8.	Rock phosphate (including apatite)*	9100	1400	15
9.	Sillimanite	23.4	13	56
Metals*				
10.	Aluminium (primary)	3416	3635	100
11.	Copper (cathode)	943	408	43
12.	Lead (primary)	306[3/]	132	43
13.	Zinc	553[4/]	516	93

***Source: Production**: MCDR Returns for production data.*

** : Apparent demand (production+ import-export)*

***Note:** As per Government of India Notification S.O. 423(E) dated 10th February, 2015, the following minerals have been declared as minor minerals: i) barytes ii) dolomite iii) felspar iv) fireclay v) quartz/silica sand vi) talc/steatite/ soapstone & vii) pyrophyllite, these have not been included in the table due to non-availability of production data for the year 2019-20.*

Even in cases where almost entire domestic demand is satisfied by domestic supplies, some quantities of certain special quality/ types of minerals and metals/ferroalloys are imported to meet the requirement in certain specific end-uses.

1/ Excludes production of limestone as a minor mineral, calcite & chalk and includes limeshell, limekankar & marl.

2/ Based on production of copper cathode and imports & exports of copper & alloys.

3/ Based on production of lead (primary), and imports & exports of lead & alloys.

4/ Based on production of zinc (ingots) and imports & exports of zinc & alloys.

$ The reported consumption of manganese ore was, 2616 thousand tonnes during the year 2019-20.