Indian Minerals Yearbook 2021

(Part- I : GENERAL REVIEWS)

60th Edition

INDIAN MINERAL INDUSTRY & NATIONAL ECONOMY

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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NATIONAL ECONOMY

The last two years have been difficult for the world economy on account of the COVID-19 pandemic. Repeated waves of infection, supply-chain disruptions and more recently, inflation have created particularly challenging times for policy-making. Faced with these challenges, the Government of India's immediate response was a bouquet of safety-nets to cushion the impact on vulnerable sections of society and the business sector. It next pushed through a significant increase in capital expenditure on infrastructure to build back medium-term demand as well as aggressively implemented supply-side measures to prepare the economy for a sustained long-term expansion. Advance estimates suggest that the Indian economy is expected to witness real GDP expansion of 9.2 per cent in 2021-22 after contracting in 2020-21. This implies that overall economic activity has recovered past the pre-pandemic levels. Almost all indicators show that the economic impact of the "second wave" in Q1 was much smaller than that experienced during the full lockdown phase in 2020-21 even though the health impact was more severe. Agriculture and allied sectors have been the least impacted by the pandemic and the sector is expected to grow by 3.9 per cent in 2021-22 after growing 3.6 per cent in the previous year. Advance estimates suggest that the GVA of Industry (including mining and construction) will rise by 11.8 per cent in 2021-22 after contracting by 7 per cent in 2020-21. The Services sector has been the hardest hit by the pandemic, especially segments that involve human contact. This sector is estimated to grow by 8.2 per cent this financial year following last year's 8.4 per cent contraction. Total Consumption is estimated to have grown by 7.0 per cent in 2021-22 with significant contributions from government spending. Similarly, Gross Fixed Capital Formation exceeded pre-pandemic levels on the back of ramped up public expenditure on infrastructure. Exports of both goods and services have been exceptionally strong so far in 2021-22, but imports also recovered strongly with recovery in domestic demand as well as higher international commodity prices. Overall, macro-economic stability indicators suggest that the Indian economy is well placed to take on the challenges of 2022-23. One of the reasons that the Indian economy is in a good position is its unique response strategy. Rather than pre-commit to a rigid response, Government of India opted to use safety-nets for vulnerable sections on one hand while responding iteratively based on Bayesian-updating of information. Another distinguishing feature of India's response has been an emphasis on supply-side reforms rather than a total reliance on demand management. These supply-side reforms include deregulation of numerous sectors, simplification of processes, removal of legacy issues like 'retrospective tax', privatisation, production-linked incentives and so on. Even the sharp increase in capital spending by the Government can be seen both as demand and supply enhancing response as it creates infrastructure capacity for future growth.

Despite all the disruptions caused by the global pandemic, India's balance of payments remained in surplus throughout the last two years. This allowed the Reserve Bank of India to keep accumulating foreign exchange reserves, which stands at US$ 634 billion on 31st December 2021. This is equivalent to 13.2 months of imports and higher than the country's external debt. As of end-November 2021, India was the fourth largest foreign exchange reserves holder in the world after China, Japan, and Switzerland. A sizeable accretion in reserves led to an improvement in external vulnerability indicators such as foreign exchange reserves to total external debt, short-term debt to foreign exchange reserves, etc.

India's salient external sector sustainability indicators are strong and much improved as compared to what they were during the global financial crisis or taper episode of 2013. For instance, the import cover and foreign exchange reserves are more than double now. The combination of high foreign exchange reserves, sustained foreign direct investment, and rising export earnings will provide a good buffer against any liquidity tapering/monetary policy normalisation in 2022-23.

The fiscal support given to the economy as well as the health response caused the fiscal deficit and government debt to rise in 2020-21. However, there has been a strong rebound in government revenues in 2021-22 so far. The revenue receipts of the central government during April- November 2021 have gone up by 67.2 per cent (YoY), as against an estimated growth of 9.6 per cent in the 2021-22 Budget Estimates. The tax collections have been buoyant for both direct and indirect taxes. The gross monthly GST collections have crossed ₹ 1 lakh crore consistently since July 2021.

Inflation has reappeared as a global issue in both advanced and emerging economies. The surge in energy prices, non-food commodities, input prices, disruption of global supply chains, and rising freight costs stoked global inflation during the year. In India, Consumer Price Index (CPI) inflation moderated to 5.2 per cent in 2021-22 (April-December) from 6.6 per cent in the corresponding period of 2020-21. It was 5.6 per cent (YoY) in December 2021, which is within the targeted tolerance band. The decline in retail inflation in 2021-22 was led by easing of food inflation. Wholesale Price Inflation (WPI), however, has been running in double-digits. The inflation in 'fuel and power' group of WPI was above 20 per cent reflecting higher international petroleum prices. Although the high WPI inflation is partly due to base effects that will even out, India does need to be wary of imported inflation,especially from elevated global energy prices.

Overall, macro-economic stability indicators suggest that the Indian economy is wellplaced to take on the challenges of 2022-23.

The Indian economy is estimated to grow by 9.2 per cent in real terms in 2021-22 (as per the First Advance Estimates), after a contraction of 7.3 per cent in 2020-21. Growth in 2022-23 will be supported by widespread vaccine coverage, gains from supply-side reforms and easing of regulations, robust export growth, and availability of fiscal space to ramp up capital spending. The year ahead is also well poised for a pick-up in private sector investment with the financial system in a good position to provide support to the revival of the economy. Thus, India's GDP is projected to grow in real terms by 8.0-8.5 per cent in 2022-23. This projection is based on the assumption that there will be no further debilitating pandemic related economic disruption, monsoon will be normal, withdrawal of global liquidity by major central banks will be broadly orderly, oil prices will be in the range of US$70-$75/bbl, and global supply chain disruptions will steadily ease over the course of the year. The above projection is comparable with the World Bank's and Asian Development Bank's latest forecasts of real GDP growth of 8.7 per cent and 7.5 per cent respectively for 2022-23. As per the IMF's latest World Economic Outlook (WEO) growth projections released on 25th January, 2022, India's real GDP is projected to grow at 9 per cent in both 2021-22 and 2022-23 and at 7.1 per cent in 2023-24. This projects India as the fastest growing major economy in the world in all these three years.

India's Merchandise Trade

India's exports of both goods and services have been exceptionally strong so far in 2021-22. Merchandise exports have been above US$ 30 billion for eight consecutive months in 2021-22, despite a rise in trade costs arising from global supply constraints such as fewer operational shipping vessels, exogenous events such as blockage of Suez Canal and COVID-19 outbreak in port city of China etc. Concurrently, net services exports have also risen sharply, driven by professional and management consulting services, audio visual and related services, freight transport services, telecommunications, computer and information services. From a demand perspective, India's total exports are expected to grow by 16.5 per cent in 2021-22 surpassing pre-pandemic levels. Imports also recovered strongly with revival of domestic demand and continuous rise in price of imported crude and metals. Imports are expected to grow by 29.4 per cent in 2021-22 surpassing corresponding pre-pandemic levels.

Exports

Following the global trend, India's merchandise exports recovered strongly from the pandemic-induced collapse and registered positive growth in the current financial year. During 2021-22 (April-December), the merchandise exports recorded growth of 49.7 per cent to US$ 301.4 billion, compared to corresponding period of last year and 26.5 per cent over 2019-20 (April-December), exceeding the pre-pandemic levels. Out of an ambitious export target of US$ 400 billion set for 2021-22, India has already attained more than 75 per cent of it by exporting goods worth US$ 301.4 billion, which is actually higher than the export target of US$ 300 billion set for the April-December period of 2021-22.

This shows that India is well on track as far as attaining the export target is concerned. Sharp recovery in key markets; increased consumer spending; pent up savings and disposable income due to announcement of fiscal stimulus by major economies; global commodity price rise and an aggressive export push by the government have bolstered exports in 2021-22. After bottoming out in Q1: FY 21, there was an impressive rebound in merchandise exports, with strong y-o-y and sequential growth, crossing a milestone of US$ 100 billion in Q2 and Q3 of 2021-22. This is remarkable in view of moderation in global trade growth, elevated shipping rates and persistent problem of container shortages.

The rise in exports is contributed by high growth in petroleum, oil and lubricants (POL) exports (constituting about 15 per cent of total exports) as well as non-POL exports, indicating the broad-based nature of expansion. This is reflected in the fact that more than 85 per cent of major export commodity groups recorded positive growth during April-December, 2021 over April-December, 2020. Driven by robust demand for engineering goods, gems & jewellery, and chemicals, the non-POL exports stood at US$ 257.5 billion during 2021-22 (April-December), registering a growth of 40.1 per cent over corresponding period of last year and 24.9 percent over 2019-20 (April-December).

United States of America (USA) remained the top export destination in April-November, 2021 followed by United Arab Emirates (UAE) and China. Belgium has replaced Malaysia and entered into the top ten leading export destinations during April-November 2021, with more than a billion dollars' worth of pearls, precious and semi-precious stones, and iron and steel shipped to the country.

Imports

As the pandemic ebbed, India witnessed revival in domestic demand resulting in strong import growth. The merchandise imports grew at the rate of 68.9 per cent to US$ 443.8 billion in April-December, 2021 over the corresponding period of last year and 21.9 per cent over April- December, 2019, crossing the pre-pandemic levels. Like in the case of merchandise exports, imports also showed secular rise since Q1: FY 21 and reached about US$ 166 billion in Q3: FY 22, crossing the pre-COVID levels.

The expansion recorded in merchandise imports in April-December, 2021 is accounted by the positive growth in all the three components i.e. gold & silver imports (accounting for 9.1 per cent share in total imports), POL imports (26.6 per cent share) and non-POL, non-Gold & silver imports (64.3 per cent share), with latter contributing the maximum indicating acceleration in domestic activity. It is observed that more than 93 per cent of major import commodities have registered positive growth in April-December, 2021 compared to last year, indicating a broad-based recovery in the economy. Owing to significant rise in crude oil prices, POL imports rose by 119.2 percent to US$118.3 billion in April-December, 2021 over corresponding a year earlier and by 22.3 per cent compared to April-December, 2019. The crude oil price (Indian basket) surpassed the pre-COVID level and was as high as US$ 82.1 per barrel in October 2021. On the other hand, the volume of POL imports rose higher than last year, but remained below the pre-pandemic levels. Gold and silver imports more than doubled to US$ 40.0 billion, as against US$ 17.5 billion in corresponding period a year earlier and surpassed the pre-pandemic level of US$ 25.4 billion recorded in April-December, 2019. Non-POL, non-gold & silver imports were US$ 285.5 billion in April-December, 2021, witnessing a positive growth of 49.3 percent compared to corresponding period of last year and 17.9 percent over April-December, 2019. Electronic goods; pearls, precious & semi-precious stones; and coal, coke & briquettes, etc., contributed maximum in the non-POL, non-gold & silver import growth in the said period. Among major import commodities, crude petroleum imports more than doubled to US$ 73.3 billion in April-November, 2021 compared to last year and continues to be the highest imported commodity. Gold imports registered sharp rise to US$ 33.2 billion (8.7 per cent share), from US$ 12.3 billion (5.6 per cent share) in corresponding period a year earlier, returning to second position. This is due to significant increase in volume of gold imports that have more than tripled compared to last year and surpassed the pre-pandemic levels, on account of strong festive and export demand, favoured by drop in international gold prices. Industrial machinery for dairy and Iron & Steel do not figure in the list of top ten import commodities in current year, unlike in April-November, 2019.

Among the top ten countries for import origin, China, UAE and USA were the top import sources for India in April-November, 2021, with China's share reducing to 15.5 per cent from 17.7 per cent in corresponding period a year earlier – reflecting increased diversification of India's import sources. Switzerland, which was ousted last year from top ten sources of India's import, bounced back at sixth position with a share of 4.7 per cent in April-November, 2021. Indonesia – second biggest source of crude palm oil – remains to be one of top ten suppliers of India, with a share of 2.9 percent in total imports during same period.

Trade Deficit

Owing to the recovery of global demand with a revival in domestic activity as well as in many trading partners, both the merchandise exports as well as imports rebounded strongly and surpassed pre-pandemic levels leading to an increase in merchandise trade deficit. It stood at US$ 142.4 billion in April-December, 2021 compared to deficit of US$ 61.4 billion in corresponding period of last year and US$ 125.9 billion in April-December, 2019. The merchandise trade deficit widened after bottoming out in Q1: FY 21.

India had the most favourable trade balance with USA followed by Bangladesh and Nepal.

Trade Related Logistics

An efficient, competitive and resilient logistics ecosystem is pivotal to boost exports. Despite multiple challenges, India has made substantial progress in trade-related logistics, reflected in leading global indices. India scored 90.3 per cent in 2021 in United Nations Economic and Social Commission for Asia Pacific's (UNESCAP) latest Global Survey on Digital and Sustainable Trade Facilitation, a remarkable jump from its score of 78.5 per cent in 2019, on account of improvement in scores of five key indicators. The Survey notes that India is the best performing country when compared to South and South West Asia region (63.1 per cent) and Asia Pacific region (65.9 per cent). India witnessed consistent and significant increase in its overall trade facilitation score since 2015, supported by continuous improvement in each of the five indicators. Transparency index got 100 per cent score in 2021, while paperless trade and formalities got 96 per cent.

India's rank has improved significantly in 'Ease of Doing Business' index at 63 as per the latest data published by the World Bank. The Logistics Performance Index 2023 (LPI), released by the World Bank, assesses relative logistics efficiency of countries. On this index, India was ranked 38 out of 139 countries in 2023 *vis-à-vis* rank of 44 in 2018.

Pradhan Mantri Gati Shakti National Master Plan (NMP)

Approved in October 2021, PM Gati Shakti NMP aims to provide multimodal connectivity to various economic zones and integrate the infrastructure linkages holistically for seamless movement of people, goods & services to improve logistics efficiency. Gati Shakti will bring 16 Ministries together for integrated planning and coordinated implementation of infrastructure connectivity projects like Bharatmala, Sagarmala, inland waterways, UDAN etc. It will also leverage technology extensively including spatial planning tools with ISRO imagery developed by BiSAG-N (Bhaskaracharya National Institute for Space Applications and Geoinformatics). Economic zones like textile clusters, pharmaceutical clusters, electronic parks, etc. will be covered to make Indian businesses more competitive globally by cutting down the logistics costs and ensure proper linkages for local industry & consumers. This will boost economic growth, attract foreign investment and create multiple employment opportunities.

Other Initiatives to improve logistics ecosystem

Government has taken various steps in last few years to improve logistics efficiency through infrastructure enhancement and process reforms. Some of them include introduction of FASTag, Turant Customs, mandatory RFID (Radio Frequency Identification) tagging at all EXIM bound containers, E-San chit, Indian Customs Enquiry for Trade Assistance and Knowledge (ICETRAK), ICEDASH (Indian Customs EDI Dashboard), Secured Logistics Document Exchange (SLDE), Import Clearance System, GHG Calculator etc. In order to ease maritime trade, efforts are being undertaken on development of port-specific master plans and a coordination mechanism for implementation of the same, upgradation of select Land Customs Stations (LCS)

to Integrated Check Posts (ICPs), promoting Free Trade Warehousing Zones, etc.

Foregin Direct Investment (FDI)

Measures taken by the Government to put in place an enabling investor friendly FDI Policy has resulted in increased FDI inflows setting up new records. FDI inflows in India stood at US $ 45.14 billion in 2014-15 and have continuously increased since then. India registered its highest ever annual FDI inflow of US$ 81.97 billion (provisional) in 2020-21 reflecting a growth of 10 per cent as compared to the previous year. The increase has been on the back of growth of 20 per cent in 2019-20. In the year 2021-22, FDI inflow grew by 4 per cent in the first six months to reach US$ 42.86 billion as compared to US$ 41.37 billion for the same period of last year.

As per DPIIT report statement on sector-wise FDI equity inflows during the year 2021-22, FDI in Mining Sector was ₹ 26,08.53 Crore.

MINING INDUSTRY

The index of mineral production (excluding atomic and minor minerals) (with base year 2011-12=100) for 2020-21 at 101 displayed a decrease of 7.8% as compared to the previous year.

The value of production of metallic minerals in 2020-21 at ₹ 69,534 crore increased by about 1.8% over that of the previous year mainly due to higher production reported in lead concentrate zinc concentrate, tin concentrate and silver. Among the principal metallic minerals, iron ore contributed ₹ 49,396 crore or 71%, lead (concentrate) & zinc (concentrate) together ₹ 8,709 crore or 13%, silver ₹ 4,266 crore or 6%, chromite ₹ 2,291 crore or about 3%, manganese ore ₹ 1,942 crore or about 3%, bauxite ₹ 1,667 crore or 2.4% and the remaining value was from copper (concentrates), gold, and tin concentrates in the total value of metallic minerals.

The value of production of non-metallic minerals at ₹ 8,926 crore during 2020-21 decreased by 6% as compared to the previous year (Table-1).

Table – 1 : Indian Mineral Industry : Value of Production*
2018-19 to 2020-21

(In ₹ crore)

Sector	2018-19 (R)	2019-20 (R)	2020-21 (P)
Total : All Minerals	**146126**	**165877**	**15757**
Metallic minerals	64212	68298	69534
Non-metallic minerals	9740	9503	8926
Minor minerals	72174	88075	79109

** 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 1,323 reporting mines (excluding fuel minerals, atomic fuel and minor minerals) in India located in all States and UTs during 2020-21. Among them, 589 belong to metallic minerals and 734 to Non-metallic minerals. There were 156 mines in Public Sector and the rest of 1,167 mines were in Private Sector (Tables-2).

Table – 2 : Number of Reporting Mines# 2019-20 and 2020-21

Sector		2019-20	2020-21 (P)
All Minerals		**1303**	**1323**
I	(i) Public sector	146	156
	(ii) Private sector	1157	1167
II	(i) Metallic minerals	567	589
	(ii) Non-metallic minerals	736	734

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

Role of Public Sector

The Public Sector has played significant role in the overall mineral production in 2020-21.

The entire production of copper ore & conc., among metallic minerals and diamond, fluorite, Salt(rock) & selenite in respect of non-metallic minerals was reported from the Public Sector. By and large, the entire production of gold (primary) and phosphorite came from Public Sector during 2020-21. More than 50% of the production of bauxite and tin concentrate was in the Public Sector during this year.

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 2020-21, Mining and Quarrying Industry accounted for about 1.6 % of the GVA at current prices. The GVA at current and constant prices for the period from 2018-19 to 2020-21 is furnished in Tables-3 & 4.

Employment

The average daily employment of labour engaged in Mining Sector (excluding fuel minerals, atomic and minor minerals) was 99,335 in 2020-21. Out of this, 33,373 or 34% were in Public Sector and 65,962 or 66% in Private Sector. Metallic minerals accounted for 79% and Non-metallic minerals 21% of the total labour force during the year.

As per World Mineral Production, 2016-20, British Geological Survey, India's ranking in 2020 in world production in term of quantity was 2nd in Steel (crude/liquid) followed by 3rd in Zinc (slabs) and aluminium (primary); 4th in chromite and iron ore; 5th in Manganese ore; 6th in Bauxite; 7th in copper (refined); 15th in apatite & rock phosphate; and 17th in mangnesite. The statistics on indigenous and world production of principal minerals and metals are given in Table-5.

Table - 3 : Gross Value Added at Basic Price, 2018-19 to 2020-21 (At 2011-12 prices)

(in ₹ crore)

Industry	2018-19 (NS)	2019-20 (NS)	2020-21 (PE)	% Change in 2020-21 over the previous year
GVA (All)	**1,27,44,203**	**1,32,71,471**	**1,24,53,430**	-6.2
Mining & Quarrying	3,30,521	3,22,116	2,94,644	**-8.5**

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

Table - 4 : Gross Value Added at Basic Price, 2018-19 to 2020-21

(At current prices) (31.05.2021) (in ₹ crore)

Industry	2018-19 (NS)	2019-20 (NS)	2020-21 (PE)	% Change in 2020-21 over the previous year
GVA (All)	**1,7161213**	**1,8461,343**	**1,79,15,167**	**-3.0**
Mining & Quarrying	3,77,171	3,55,833	2,92,120	**-17.9**

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

Table-5: Contribution and Rank of India in World Production of Principal Minerals & Metals, 2020

Sector	Unit of Commodity	Production quantity		Contribution (Percentage)	India's rank in World order $
		World	India*		
Metallic Minerals					
Bauxite	'000 tonnes	368600	20368	5.53	6th
Chromite	'000 tonnes	31000	2863	9.24	4th
Iron ore	million tonnes	3016	204	6.76	4th
Manganese ore	'000 tonnes	49600	2688	5.42	5th
Industrial Minerals**					
Magnesite	'000 tonnes	28300	78	0.28	17th
Apatite & Rock phosphate	'000 tonnes	221000	1455	0.66	15th
Metals					
Aluminium (primary)	'000 tonnes	65400	3619	5.53	3rd
Copper (refined)	'000 tonnes	24900[1/]	364#	1.46	7th
Steel (crude/liquid)	million tonnes	1857	104	5.60	2nd
Lead (refined)	'000 tonnes	12500[2/]	214#@	1.71	3rd
Zinc (slab)	'000 tonnes	13800	715	5.18	3rd

***Source:** World Mineral Production, 2016-2020, British Geological Survey for World mineral production and MCDR returns & individual plants for production with respect to India.*

** Figures relate to 2020-21.*

*** Minerals declared as minor minerals vide Government of India Notification S.O. 423(E) dated 10th February, 2015 are not included due to non-availability of production with respect to India.*

$: India's rank based on production mentioned in World Mineral Production 2016-20, British Geological Survey.

1/ Figures relate to both primary and secondary refined copper, whether electrolytic or fire refined. Metal recovered from secondary materials by remelting alone is excluded.

2/ Figures relate to both primary and secondary refined lead and include the lead content of antimonial lead.

#: production of copper (refined) and lead refined during 2020 was 697 and 818 thousand tonnes, respectively, as per World Mineral Production, 2016-2020 which includes both primary and secondary production.

@: Production of lead (primary).

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.

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 2020-21, till, a total of 967 online templates for the assessment have been filed by the lessees. Out of these, 491 cases have been validated. After validation 45 leases fall under five star, 212 leases under four star 195 falls under three star and 39 falls under 2 star and below.

LEGISLATIVE FRAMEWORK

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

• Fully harnessing the potential of the mineral sector,

• Increasing employment and investment in the mining sector including coal,

• Increasing the revenue to the States,

• Increasing the production and time bound operationalisation of mines,

• Maintaining continuity in mining operations after change of lessee,

• Increasing the pace of exploration and auction of mineral resources, and

• Resolving long pending issues that have slowed the growth of the sector.

Some of the major reforms brought in the MMDR Amendment Act, 2021 are as under:

(i) Removed the distinction between captive and merchant mines by providing for auction of mines in future without restriction of captive use of minerals and allowing existing captive mines including captive coal mines to sell up to fifty per cent. of the minerals produced after meeting the requirement of linked plants to ensure optimal mining of mineral resources and specify the additional amount to be charged on such sale [Section 8A(7A) and Section 10B(6)].

(ii) Provided for payment of additional amount to the State Government on extension of mining lease of Government companies and specify such amount to create level playing field between the auctioned mines and the mines of a Government company [Section 8A(8)].

(iii) Provided that all the valid rights, approvals, clearances, licences and the like granted to a lessee in respect of a mine shall continue to be valid on expiry or termination of lease and such clearances shall be transferred and vested to the successful bidder of the Mining Lease selected through auction under the Act. This will ensure continuity in mining operations even with change of lessee, conservation of mineral and avoid repetitive and redundant process of obtaining clearances again for the same mine [Section 8B(1)].

(iv) Central Government has been empowered to issue directions regarding composition and utilisation of Fund by the District Mineral Foundations [Section 9B(3)].

(v) Restrictions on transfer of mineral concessions for non-auctioned mines has been removed to attract fresh investment and new technology in the sector [Omission of Section 12A(6)].

(vi) Pending cases of non-auctioned concession holders which have not resulted in grant of mining leases despite passage of a considerable time of more than five years have been closed/lapsed. The existence of these cases was anachronistic and antagonistic to the auction regime. The closure of the pending cases would facilitate the Government to put to auction a large number of mineral blocks in the interest of nation resulting in early operationalisation of such blocks and additional revenue to the State Governments [Section 10A(2)(b)].

(vii) Central Government has been empowered to conduct auction in cases where the State Governments face difficulty in conducting auction or fails to notify the area or conduct auction [Section 10B(3), Section 10B(4) and Section 11(5)].

(viii) Provision introduced to grant short term mining lease to Government companies in situations where the auction of mines pursuant to sub-section (4) of section 8A has failed [Section 8B(1)].

(ix) The expression "without any lawful authority" occurring in section 21 of the Act has been clarified to limit its scope to the violations of the said Act and the rules made thereunder [Section 21(6)].

(x) Simplification of exploration regime - (i) National Mineral Exploration Trust (NMET) shall be an autonomous body; (ii) Private entities may be notified under Section 4(1) of the MMDR Act for conducting exploration; (iii) Enable funding of eligible private exploration agencies from NMET; (iv) Provision for seamless PL-cum-ML (composite licence).[Section 9C(1), Section 4(1), Section 9C(5) and Section 3(a)].

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.

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 subrule (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 wayforward 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.

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 mineral, 130 triggers have been generated, out of which 104 have been verified and in 9 cases unauthorised mining activities have been identified.

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 using time series satellite imageries (for the year 2010, 2014 and 2018) procured from NRSC.

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 ₹56,369 crore have been collected till 30.11. 2021. Under the PMKKKY, 2,15,082 projects have been sanctioned. Till 31.11.2021, funds to the tune of ₹ 28,072.91 crore have been utilised and about ₹ 50602.59 crore have been allocated.

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.

Memorandum of Understanding (MoU) Signed in 2021-22

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. Moreover, the Ministry of Mines is constantly endeavouring to seek greater engagements overseas in order to ensure mineral security for the Country.

MoU with FIU

MoU between Geological Survey of India, Ministry of Mines, the Government of the Republic of India and the Florida International University Board of Trustees on behalf of its Department of Earth and Environment, College of Arts, Sciences and Education, United States of America on cooperation in the field of Geology under the Research Project Title "Study of Post-collisional Magmatism in the India-Asia Collision Zone (Ladakh Granitoids, Indus Ophiolite Belt) and Integrative Geological and Geochronological studies of the Mishmi Techtonic Belt, North Eastern India (Arunachal Pradesh) was signed on 6th October, 2021.

MoU with ROSGEO

An MoU between Joint stock company Rosgeologia (ROSGEO) a legal entity incorporated under the laws of the Russian Federation and Geological Survey of India (GSI), Ministry of Mines, the Government of the republic of India on cooperation in the field of geoscience was signed on 1st December, 2021.

In addition to the above MoUs, the proposal of signing another two MoUs namely Memorandum of Understanding between Ministry of Mines, the Government of the Republic of India and the Ministry of Mines & Geology, the Government of the Republic of Cote D'Ivoire on cooperation in the field of Geology and Mineral Resources; and (ii) Memorandum of Understanding between the Ministry of Mines of the Government of the Republic of India and the Secretariat of Mining Policy of the Ministry of Productive Development of the Argentine Republican for cooperation in the field of Mineral Resources, have been approved by the Cabinet on 07.04.2021 and 03.06.2021 respectively and are in the process of being signed in near future.

Bilateral Meetings

There are a number of bilateral meetings held during the year 2021-22 with various countries to further the cooperation and collaboration in the fields of Mining, Geology and Mineral Resources, including the critical and strategic minerals.

The second meeting of the Joint Committee under the MoU on cooperation in the field of Mining and Geology between India and Morocco was held on 2nd February, 2021 through video conference. Both the sides agreed to cooperate in the area of exchange of information on Geology and Mining. Both the sides also noted that strengthening of India-Morocco cooperation in the fields of Geology, Mining, and Downstream Industry and collaboration would be mutually beneficial.

A meeting with Australian High Commissioner in India was held on the 13th July 2021 with Secretary, Ministry of Mines on virtual platform. The various key issues like India's mining outlook, Impact of COVID-19 on the mining sector, Potential areas of collaboration, and Australia-India critical minerals cooperation and how Australia could assist India in meeting its critical minerals demand etc. were discussed in the meeting.

A delegation led by H.E Mr. Hugo Javier Gobbi, Ambassador, Embassy of the Argentine Republic in India assisted by Ms. Denise Perguica Bozic, Head of Commercial Department, Embassy of the Argentine Republic, met with Secretary, Ministry of Mines, Government of India on 18/08/2021 to discuss the issues related to critical and strategic minerals.

Pursuant to the aforesaid meeting, a visit of Government of Indian Delegation led by secretary (Mines) to Argentina took place during 29th August to 4th September, 2021 to evaluate the potential lithium projects for acquisition by Khanij Bidesh India Ltd. (KABIL). The delegation visited the province of CATAMARCA. CAMYEN, the state-owned enterprise of CATAMARCA province has assured that they will collaborate with KABIL to ensure preferential allocation of prospective Lithium bearing mineral acreages located within the province.

The visiting delegation also had extensive interaction with M/s YPF. Both YPF and KABIL outlined a broad contour of activities that need to be taken up with utmost priority as the acquisition process entailing engagement with target companies need to be started expeditiously.

The 2nd meeting of Joint Working Group of India-Australia under the Memorandum of Understanding for cooperation in the field of mining & processing of Critical & Strategic Minerals was held on 10th September 2021 through virtual mode.

It was decided in the meeting that on the basis of the list of Lithium and Cobalt projects submitted by Australian side during 2nd JWG, more discussions will

be held between CMFO and KABIL on the possible investment opportunities with more specific details of investment or participating interests of Government of Australia in such projects. Aus Trade is to organise a virtual event for showcasing investment opportunities in Australia to key Indian Industry Representatives.

Mr. Sanjiva Desilva, Counselor, Department of Industry, science, Energy and Resources of Government, Australian High Commission, New Delhi of Australia met with Shri Satendra Singh, JS (SS) and Dr. Ranjit Rath, CEO, KABIL on 16th November, 2021 to review the progress of the draft MoU proposed to be signed between Critical Minerals Facilitation Office (CMFO), Australia and KABIL for an initial investment commitment towards the due diligence process for selection of mineral asset for investment out of the shortlisted projects.

The 3rd meeting of Joint Working Group (JWG) between India and Mozambique under the Memorandum of Understanding on cooperation in the field of Mineral Resources was held on 10.12.2021 through Virtual platform.

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.

In this context, engagement of KABIL is underway with select source countries such as Argentina, Bolivia, Chile and Australia etc. which are endowed with the cited critical & strategic minerals. The primary interface has been the respective Embassies & Missions of India in those countries for sharing of information with respect to prospective mineral acreages primarily with state owned organisations for taking up due diligence and investment decisions.

Despite the COVID 19 pandemic, global health crisis and associated constraints, KABIL has been able to secure engagement with Argentina & has signed MoUs for sharing of information with a Non-Disclosure Agreement with the following state-owned organisations of Argentina:

a. M/s. YPF, an energy major & federal owned enterprise.
b. M/s. JEMSE, a state-owned enterprise of JUJUY province.
c. M/s. CAMYEN, a state-owned enterprise of CATAMARCA province.

As of engagement with Australia, during the apex level discussion between the Premier of Australia and Hon'ble Prime Minister of India held on 3rd June 2020, a MoU has been signed between Government of India and the Government of Australia through Ministry of Mines and Critical Minerals Facilitation Office (CMFO) respectively for co-operation in the field of mining and processing of Critical and Strategic Minerals.

The follow up discussions are underway between CMFO & KABIL for signing an MoU to take up due diligence of select projects for possible joint investments. The draft MoU is under exchange between the two participants for an investment commitment of USD 3 Million by each KABIL & CMFO.

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 2020-21 is highlighted below:

MECL

MECL continued its core activities of regional and detailed mineral exploration involving exploratory drilling along with associated geological activities. During the year 2020-21, a total of 10100 million tonnes of mineral resources have been established. Cumulatively, since inception in 1972, (up to March-21) a total of 185290 million tonnes of resources for various minerals have been added to National Mineral Inventory. The mineral wise break up of resources established during 2020-21 and since inception are given below.

Salient features of mineral resources estimated during 2020-21

• Coal: A total of 8,940.69 million tonnes of coal resources were established during 2020-21 in Balrampur, Korba, Raigarh, Jarekeela & Thanarghat in Chattisgarh and Recherla & Chintalpdi in Andhra Pardesh and Umaria in Madhya Pradesh.

• Lignite: 431.22 million tonnes of lignite resources were established in the state of Tamil Nadu.

• Iron Ore : 74.33 million tonnes of iron ore resources were established in Gumla district Jharkhand, Tiffin's Barytes, Dist. Bellari, Karnataka and Sundargarh district Odisha.

• Limestone: 561.29 million tonnes of limestone resources were established in Unjini & Ariyalur districts in Tamil Nadu and Satna in Madhya Pradesh.

• Potash : 87.19 million tonnes of Potash resources were established in Bikaner district, Rajasthan.

• Bauxite : 2.82 million tonnes of bauxite ore resources were established in Kabirdhan district, Chhattisgarh.

• Manganese : 2.68 million tonnes of manganese ore resources were established in Bolangir, Odisha.

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. All the maps viz lease boundaries, Geological layer and toposheet layer has been integrated for the state of Goa & Maharashtra. During 2020-21, the vectorisation of 134 toposheets and plotting of 869 mining leases were completed.

Mineral beneficiation studies were carried out by IBM to encourage value addition, conservation and development of mineral resources. During 2020-21, 48 Ore dressing investigations, 14,608 chemical analyses, 2290 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.

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 20th PERC meeting held on 23-25th Nov. 2020, a total of 383 project proposals, as received under S&T Program Scheme of Ministry of Mines. After screening, 102 proposals covering five areas,

(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). Based on the detailed review and evaluation, the PERC recommended 28 Project Proposals with or without changes to SSAG.

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 2020-21 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 2020-21 are summarised below:

A. Mineral Processing Division, IBM

1. COPPER ORE

1.1 Bench scale Beneficiation Studies on Copper bearing Sample (G-2 level exploration) from Northern part of Toda Ramliyas block, Sikar, Rajasthan

1.2 Bench-scale Beneficiation Studies on Copper bearing Sample (G-2 level exploration) from RJBN (Lode I), Bokri North Block of Jhunjhunu, Rajasthan

1.3 Bench-scale Beneficiation Studies on Copper bearing Sample (G-2 level exploration) from RJBN (Lode II), Bokri North Block of Jhunjhunu, Rajasthan

1.4 Bench-scale Beneficiation studies on a Copper Ore Sample (G-2 level exploration) from Lingsurur taluk, Raichur district, Karnataka

2. IRON ORE (BHQ)

2.1 Pilot scale Beneficiation Studies on an Iron Ore Banded Hamatite Quartzite (BHQ) Sample (Mine Reject) from Dongarbor iron ore mines, Rajnandgaon, Chhattisgarh for Industry

3. IRON ORE

3.1 Beneficiation Studies on a Composite Iron Ore Sample from Belgaum, Karnataka for Industry

3.2 Bench-scale Beneficiation Studies on a drill core Iron Ore Sample from Alaghat West Block (G-2 Stage exploration), Sundargarh District, Odisha

4. MANGANESE ORE

4.1 Bench-scale Beneficiation Studies on a Manganese Ore sample (G-2 level exploration) from Cheepurupalli, Viziangaram District, Andhra Pradesh.

5. COPPER - GOLD ORE

5.1 Bench-scale Beneficiation Studies on Copper-Gold Ore Sample (G-2 level exploration) from Mundiyawas Block, Alwar district, Rajasthan

6. GRAPHITE ORE

6.1 Bench-scale Beneficiation Studies on a Low-grade Graphite Ore (G-2 level exploration) Sample from Golighat Block, Betul district, Madhya Pradesh

Jawaharlal Nehru Aluminium Research Development & Design Center (JNARDDC)

1. Completed Projects

1.1 To study the fire retardancy of nano-ATH in polymers with CIPET, Bhubaneswar (Central Institute of Plastics & Engineering Technology) (S&T- Mines):

1.2 Optimisation of digestion efficiency in Bayer process by ascertaining the ideal size fraction of bauxite feed (S&T- Mines):

1.3 Development of a process technology (at lab scale) for low-cost production of 3N (99.9%) pure alumina (Ministry of Science and Technology –DST, New Delhi):

2. Ongoing Projects 2020-21

2.1 Fabrication of Advanced Ceramic Nanocoatings 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 Utilisation of Aluminium Dross to Achieve Zero Waste — A Rench-scale Study Project (Sponsored by Ministry of Mines):

2.4 Bench-scale study on Extraction of Pure Silica and smelter-grade Aluminium Fluoride from Coal Fly Ash (CFA) (Sponsored by Ministry of Mines):

2.5 Development of Process for 4N High Pure Alumina (HPA) and Substrate Making for its Validation in LED Applications (Sponsored by

NALCO, Bhubaneswar, Odisha, Jointly with IIT, Bhubaneswar & Anna University):

2.6 TPN:59025 Instrument for Real Time Measurement of Anode Current Distribution of Aluminium Electrolysis Cell (Sponsored by Dept of Science and Technology, New Delhi):

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 Odisha):

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, Odisha, Jointly with IIMT, Bhubaneswar & Eesavyasa Tech, Pvt Ltd. Telangana):

2.10 TPN:59031 Instrument for Instantaneous and Onsite Measurement of Aluminium Electrolysis Bath Parameters (Sponsored by Dept of Science and Technology, New Delhi):

2.11 Technology Development for Holistic Utilisation of Red Mud for Extraction of Metallic Value & Residue Utilisation (Sponsored by NALCO, HINDALCO & VEDANTA and S&T (Mines) under the aegis of NITI Aayog, Jointly with NML, Jamshedpur & IMMT, Bhubaneshwar):

National Institute of Rock Mechanics (NIRM)

During the current reporting period, i.e., 2020, the institute received 36 new projects from the industry and completed 41 industry projects.

CSIR–Central Electrochemical Research Institute (CECRI)

1. R&D (Ore Preparation and Processes)

2. R&D in building Materials (Minerals and Mineral-based Products in Construction Activities, Substitution etc.)

3. R&D work on Recovery of Marine Chemicals and By-products, viz, Salt, Potash, Bromine, Iodine, Gypsum and Magnesium Chemicals:

4. R&D Projects on Metallurgy and Mineral *Processing*

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

4.2 Electro-hydrolysis of low-grade manganese ore to gamma MnO_2 (Sponsored by Tata Steel Ltd)

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

CSIR–National Metallurgical Laboratory (NML)

The R&D work carried out by CSIR–NML in Mineral Processing during 2020-21 is below:

(i) Mission Mode Project on Strategic Minerals — Production of Lithium Salt from Ores

(ii) Dry Beneficiation of Limestone Samples for Removal of Iron-bearing and other Magnetic Impurities.

(iii) Continuous Pilot-Scale Reverse Flotation of Iron Ore

(iv) Pilot-scale Study on Hydrocyclone

(v) Advanced Gravity Concentration of Chromite Beneficiation Plant Tailing

(vi) Processing of Low-Grade Dolomite Ore

(vii) Studies on Beneficiation of Bauxite Sample for Reduction of Reactive Silica

(viii) Beneficiation Studies on Low-Grade Manganese Ore Samples:

Hindustan Copper Ltd (HCL)

HCL has undertaken the following R&D projects:

(i) R&D Project on Study of Bond work index (BWI), flotation optimisation studies, settling & filtration studies and magnetite recovery studies from the plant tailings for selling up of Copper Concentrator plant under Rakha Copper Project at ICC has been done in collaboration with CSIR – Institute of Minerals and Materials Technology, Bhubaneswar.

(ii) Line study of Mosabani concentrator plant at ICC has been done.

(iii) Introduction of rice husk for mixing with ANFO (explosives) for Deep Hole Blasting (Production Blasting) at KCC.

(iv) Study for implementation of advanced technology for SO_2 gas recovery through amine based absorption route in existing SO_2 plant at ICC.

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

4.4 Space technology - Remote Sensing

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) Characterisation of coking coal sample.

Tata Steel Ltd

1. Projects under Research and Development Project title Benefits

A. Projects under Research and Development

1. Jamshedpur

1.1 Seam Specific Reagent for Lower Seam Coals of West Bokaro:

1.2 Reduction of Alumina in Iron Ore from Wet Processing Plant of Noamundi using Dispersant:

1.3 Smart Lance System for LD vessel:

1.4 Calcium Ferrite for Dephosphorisation of Steel:

B. Process Improvements

1. Raw Materials Division

1.1 Mining

1.2 Ore Beneficiation Technology

(i) Stickiness Index to Predict Iron Ore Fines Flowability:

(ii) Identification of enablers to reduce Alumina in Dispatch Fines at Noamundi:

(iii) Identification of Enablers to Reduce the K_2O and SiO_2 from Gomardih Dolomite:

1.3 Coal Beneficiation Technology

(ii) Intermediate Size (0.5mm-0.25mm) beneficiation Circuit-Reflux Classier Stabilisation at New Jamadoba Coal Preparation Plant

2. Kalinganagar

2.1 Raw Material Handling System and Logistics

2.2 Sinter Plant

2.3 Coke Plant

Hindustan Zinc Ltd (HZL)

Specific areas in which R&D has been carried out by the HZL in 2020-21 are listed below:

(i) Individual Ore Characterisation at Zawar for improved metallurgical performance.

(ii) Feasibility study for Derrick Screen to replace existing cyclones to improve classification efficiency.

(iii) Feasibility study for Lead circuit re-grind and effect of pH on lead flotation to improve Lead Silver Recovery and concentrate grade at RAM which confirms that use of Lead re-grind at RAM and Derrick Screen at Zawar will improve Lead/ Silver Recovery by 2–3%.

(iv) Geo-Metallurgy Study on advance Drill Core samples for Metallurgical characterisation at SKM and RAM which improved Metallurgical performance by Geo-Metallurgical assessment of core samples to predict recovery and grades and optimise circuit parameters. For instance - Dilute Nigrosine for high graphite in SKM, use of SMBS to deal with high pyritic ore, etc.

(v) RDM Mesh of grind (MOG) study to determine optimum grinding size to improve metal recovery.

namely (i) Geosciences and Exploration; (ii) Mining; New grinding circuit designing as per MOG study at Rajpura Mines for recovery enhancement.

(vi) Grinding circuit audit and Loss Matrix analysis across all Milling sites to optimise circuit performance and improve process control.

(vii) Automated mill Quality Dashboard for continuous monitoring and analytics for data based actionable.

(viii) Establishing impact of impurities in copper sulphate on zinc flotation performance at mills. Thus, improved inhouse copper sulphate quality by process control at DSC ancillary.

(ix) Integration and stabilisation of commercialised project for sodium sulphate crystal generation from DSC smelter effluent.

(x) Process developed and integrated with existing plant for Raw Zinc oxide inventory dilution at CLZS Hydro-II plant, contributing ~2 500 tonne Zn & ~700 tonne Pb.

(xi) Cu Matte Plant manganese bearing stream utilisation at Zinc smelter Debari for maintaining Mn level in electrolyte.

(xii) Process audit and control to manage Cu levels in purification section at Zinc smelter Debari thereby reducing usage of fresh copper sulphate crystals.

(xiii) Field trials for usage of Jarosite in concrete.

(xiv) Collaborative project for metal recovery from Zinc smelter residues by chloride and nitric based leaching.

(xv) Generation of Zn VAP – fertilizer grade Zinc sulphate and Zinc dust from residue & secondaries.

(xvi) Mapping of minor metals at Mills, Identifying opportunities for minor metal extraction at HZL.

(xvii) COP reduction initiatives by alternate reagents, process controls and optimisation.

FOREIGN TRADE

India's Trade

India’s overall exports in 2020-21 (P) were US$ 497.90 billion as against US$ 526.55 billion in 2019-20, registering a negative growth of (-) 5.44 per cent. For the period April-December 2021* exports were estimated at US$ 479.07 billion as against US$ 351.47 billion during April-December 2020, registering a positiv growth of 36.31 per cent. As compared to April-December 2019, exports during April-December 2021* exhibited a positive growth of 20.25 per cent.

Overall (Merchandise and Services combined) exports to GDP ratio showed a declining trend over last few years. In 2020-21 the ratio stood at 18.7 per cent.

Overall imports in 2020-21 (P) were US$ 511.96 billion, exhibiting a negative growth of (-) 15.09 per cent over the same period last year. For the period April-December 2021* imports were estimated at US$ 547.12 billion as against US$ 347.76 billion during April-December 2020, registering a positive growth of 57.33 per cent. As compared to April-December 2019, imports during April-December 2021* exhibited a positive growth of 18.57 per cent.

Overall trade deficit in 2020-21 (P) was US$ 14.06 billion, which was lower than the deficit of US$ 76.43 billion in 2019-20.

Overall trade deficit for the period April-December 2021* estimated at US$ 68.06 billion as against the surplus of US$ 3.70 billion during April-December 2020. In comparison to April-December 2019, overall trade deficit during April-December 2021* increased by 8.00 per cent.

As per the World Trade Statistics Review 2021, India's ranking amongst the leading exporters in the world merchandise trade improved from 30 in 2004 to 18 in 2020 with a share of 1.60%. Similarly, India's ranking amongst the leading importer in world merchandise trade was 14 in 2020 as compared to 23 in 2004 with a share of 2.1 per cent.

Exports

The total exports (including re-exports) of all merchandise in 2019-20 and 2020-21 was ₹ 22,19,854 crore and ₹ 21,59,043 crore, respectively. During the year 2020-21 the value of exports (including re-exports) of ores and minerals is ₹ 196654 crores. The export value which had decreased from ₹ 219168 crores in 2018-19 to ₹ 189683 crore in 2019-20 increased to ₹ 196654 crores in 2020-21. The value of mineral exports showed an increase of 3.67% in 2020-21 as compared to that in the previous year.

Diamond continued to be the largest constituent item with a share of 63.98 % in the total value of mineral exports in 2020-21. Next in order of share was iron ore with contribution of 18.44 % followed by granite 5.76%, Limestone 2.18% and Alumina 1.44%.

The value of exports of ores & minerals (including

re-exports) showed a mixed trend for most of the minerals in 2020-21 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 94.08%, building & monumental stones 54.20%. On the other hand, the exports value recorded significant decline in the cases of Abrasive (Natural) 75.98%, Copper ore 62.04%, bauxite 33.05%, natural gas 70.11%, coal (excl. lignite) 3.25%, chromite 91.71%, alumina 8.4%, emerald (cut & uncut) 69.42% as compared to that in the previous year.

The value of exports (including re-exports) of metals & alloys stands at ₹ 207222 crore in the year 2020-21. The export value which had decreased from ₹ 174287 crore in 2018-19 to ₹ 166099 crore in 2019-20 increased to ₹ 207222 crore in 2020-21. The value of metal exports showed an increase of 24.76% in 2020-21 as compared to the previous year.

In terms of value of exports, Iron & Steel has the largest share of 59.12%, followed by Aluminum and Alloys Incl. Scrap 20.64%, Ferro Alloys 6.16% and Copper & Alloys (Incl Brass & Bronze) 4.93%.

As compared to previous year, the value of exports for different important metals had shown a mixed trend in 2020-21. The export value of silver registered a huge spike of 4889.50% similar hike in export value was noticed in gold (Non monetary & monetary) which increased by 229.04%, platinum 110.21%, precious metals 197.17%, copper & alloys 68.63%, pig & cast iron (Incl. speigeliesen) 180.84% and tin & alloys incl. scrap 5.87%. However, the export values showed significant negative growth during 2020-21 as compared to that of the previous year in the cases of cobalt alloys (65.32%), Mo & Scrap (49.20%), Hg-(40.90%), Ni & Alloys (36.51%), Ti & Alloys (18.76%) and W& Alloys (4.03%).

Imports

During the year 2020-21 the value of imports (including re-imports) of ores and minerals is ₹ 791320 crores. The import value which decreased from ₹ 1299186 crore in 2018-19 to ₹ 1151530 crore in 2019-20 decreased to ₹ 791320 crores in 2020-21. The value of mineral imports showed a decrease of 31.28% in 2020-21 as compared to that in the previous year.

Petroleum (crude) continued to be the largest constituent item with a share of 55.56 % in the total value of mineral imports in 2020-21. Next in order of share was Diamond with the contribution of 16.22 % followed by Coal (Except Lignite) 14.67% and Natural Gas 7.37%.

The value of imports (including re-imports) of metals & alloys stands at₹435611 crores in the year 2020-21. The import value which decreased from ₹477843 crores in 2018-19 to ₹ 416727 crore in 2019-20 increased to ₹ 435611 crores in 2020-21. The value of metal imports showed an increase of 4.53% as compared to the previous year.

In terms of value of imports, Gold (Non-monetary & monetary : total) has the largest share of 58.38%, Iron & steel 18.97%, Copper & Alloys (Incl Brass & Bronze) 7.84%, Aluminum and Alloys Incl. Scrap 6.87% , and Silver 1.37%.

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 2020-21 with a share of about 9.10% (i.e., ₹ 19,66,539 million) in the total value of all merchandise. The contribution of minerals in exports in raw/unprocessed forms was about ₹ 4,72,525 million and in semi-processed/processed forms was about ₹ 14,94,014 million. The manufactured mineral-based commodities (final stage of transformation) contributed about ₹ 36,94,502 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 2018-19 to 2020-21.

INFRASTRUCTURE

Infrastructure

In order to achieve the GDP of $5 trillion by 2024-25, India needs to spend about $1.4 trillion over these years on infrastructure. During FYs 2008-17, India invested about US$1.1 trillion on infrastructure. However, the challenge is to step up infrastructure investment substantially.

Keeping this objective in view, National Infrastructure Pipeline (NIP) was launched with projected infrastructure investment of around Rs. 111 lakh crore (US$ 1.5 trillions) during FY 2020-2025 to provide world-class infrastructure across the country, and improve the quality of life for all citizens. It also envisages to improve project preparation and attract investment, both domestic and foreign in infrastructure. NIP was launched with 6,835 projects, which has expanded to over 9,000 projects covering 34 infrastructure sub-sectors. During the fiscals 2020 to 2025, sectors such as energy (24percent), roads (19 percent), urban (16percent), and railways (13percent) amount to around 70percent of the projected capital expenditure in infrastructure in India. Sector wise break-up of the pipeline for the period 2019-20 to 2024-25 is given in figure 23. NIP has involved all the stakeholders for a coordinated approach to infrastructure creation in India to boost short-term as well as the potential GDP growth.

NITI Aayog has developed the 'National Monetisation Pipeline (NMP Volumes 1&2)' in consultation with infrastructure line ministries. Asset monetisation, entails a limited period license/ lease of an asset, owned by the government or a public authority, to a private sector entity for an upfront or periodic consideration. The private sector entity is expected to operate and maintain the asset based on the terms of the contract/concession, generating returns through higher operating efficiencies and enhanced user experience. Funds, so received by the public authority, are reinvested in new infrastructure, or deployed for other public purposes. Such contracts include provision for transfer of asset back to the authority at the end of the period.

A robust asset pipeline has been prepared to provide a comprehensive view to investors and developers of the investment avenues in infrastructure. The pipeline includes selection of de-risked and brownfield assets with stable revenue generation profile (or long rights) which will make for an attractive investment option. Total indicative value of NMP for core assets of the Central Government has been estimated at Rs 6.0 lakh crore over 4-year period (5.4 percent of total infrastructure investment envisaged under NIP).

Coal

Coal production (provisional) at 716.083 million tonnes in 2020-21 was decreased by 0.30% from that of 730.87 million tonnes in 2019-20. In 2020-21, out of the total production of coal, 6.25% (44.78 million tonnes) was of coking coal and the remaining 93.75% (671.29 million tonnes) was of non-coking coal. Despatches of raw coal in 2020-21 were lower by around 2.3% as compared to that in the previous year. About 84.1% despatches were to Electricity Sector, 1.3% to the Steel Industry, 1.4% to the Sponge Iron Industry and 0.98% 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. During the year 2020-21 the total generation of energy (including imports and renewable sources of energy) was 1234.298 BU (up to January, 2022). During the year 2021-22 (up

to December, 2021), peak shortage was 1.2% and the energy shortage was 0.4% as compared to 0.7% and 0.5%, respectively in the previous year.

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 2020-21, Indian Railways carried 1230.9 million tonnes of freight and 1250 million passengers making it the world's largest passenger carrier and 4th largest freight carrier.

Civil Aviation

India is one of the fastest growing 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 December, 2020, India had a fleet strength of 1,429 ships.

The Major Ports in the country have an installed capacity of 1,534.91 MTPA and handled traffic of 672.68 MT during 2020-21. 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 2020-21 improved to 55.99 hrs as against 62.11 hrs in 2019-20. The Average Output Per Ship Berthday has increased from 12,458 tonnes in 2015-16 to 19,171 tonnes in 2020-21.

Roads

Road transport is one of the most cost effective and convenient modes of transportation in India both for freight and passengers as it has high penetration level with door-to-door delivery. Importance of road infrastructure is widely recognised as a potent means of socio-economic integration and is vital for the economic development of the country. The road network of the country consists of National Highways (NH), State-Highways (SH), District Roads, Rural Roads, Urban Roads and Project Roads of over 63.71(Provisional) lakh km of roads as on 31 March 2019, which is the second-largest in the world, after the United States with 66.45lakh kms of roads. There has been a consistent increase in the construction of National Highways/roads since 2013-14 with 13,327 kms of roads constructed in 2020-21 as compared to 10,237 kms in 2019-20, indicating an increase of 30.2 per cent over the previous year. In 2021-22 (till September), 3,824 kms of road network were constructed. The extent of road construction per day increased substantially in 2020-21 to 36.5 kms per day from 28 kms per day in 2019-20, a rise by 30.4 percent as compared to the previous year. The significant upturn in road construction in 2020-21 is due to the increase in public expenditure by 29.5 percent as compared to the previous year —a reflection of the impetus given by the Government of India to a critical sector that generates employment and supports infrastructure during a pandemic year. In addition to action taken to increase the network of national highways, the govt has taken measures to address village level road network through the Gram Sadak Yojana.

PERFORMANCE OF SELECTED MINERAL-BASED INDUSTRIES

Steel

Globally, India is the second largest producer of crude steel in the world after China. During 2020-21, crude steel production stood at 103.545 million tonnes, witnessing a decline of 5.6 per cent over the corresponding period of 2019-20 at 109.13 million tonnes. India is the third largest consumer of the finished steel after China and USA. The total export of finished steel with highest volume of 10.78 million tonnes during 2020-21 registered a growth of 29.1% over 2019-20.

Cement

As per DIPP Annual Report, production of cement during 2020-21 was 299.94 million tonnes as against 334.37 million tonnes in 2019-20 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 2.80 million

tonnes in 2020-21 from 2.84 million tonnes in 2019-20.

Petroleum Oil and Refineries

Crude oil production & condensate in 2020-21 at 30.49 million tonnes registered a nominal decrease of 5.20% as compared to that in 2019-20. The production of natural gas (utilised) was at 28,673 million cubic metres in 2020-21, 8 % lower than 31,184 million cubic metres achieved in 2019-20. The total refining capacity in the country was about 249.36 MMTPA in 2020-21. Production of petroleum products (including LPG production from natural gas) was 233.51 million tonnes in 2020-21 as compared to 262.36 million tonnes in 2019-20.

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 or near to self sufficient in bauxite, chromite, iron ore, kyanite, limestone, sillimanite, etc. which are imported mainly for either blending with locally available mineral raw materials and/ or to meet special requirement for manufacturing special qualities of mineral based products. India is deficient in magnesite, manganese ore, rock phosphate, etc. which were imported to meet the domestic demand. 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 2020-21 is furnished in Table-7.

Table – 6 : Contribution of Value-added (Processed) Minerals & Mineral-based Products in India's Export* Trade, 2018-19 to 2020-21

Sl. No.	Commodity group	Value of exports (₹ million)			Contribution (percentage)		
		2018-19	2019-20 (R)	2020-21 (P)	2018-19	2019-20	2020-21 (P)
1.	All Merchandise	23077261	22198541	21590432	100.00	100.00	100.00
2.	Ores & Minerals	2191682	1896831	1966539	9.50	8.54	9.10
	2.1 Raw/Unprocessed form	223388	292637	472525	0.97	1.32	2.18
2.2.	Semi-processed/ processed forms (preliminary and intermediate stages of processing)	1968294	1604194	1494014	8.53	7.23	6.91
3.	Manufactured Mineral-based Commodities (final stage of transformation)	4481240	4251969	3694502	19.42	19.15	17.11
	3.1 Metals/Alloys	1742868	1660988	2072220	7.55	7.48	9.59
	3.2 Others	2738372	2590982	1622282	11.87	11.67	7.51

Figures rounded off.

**** Including re-exports.***

Table-7: Degree of Self-sufficiency in Principal Minerals & Metals, 2020-21 (P)

Sl. No.	Commodity	Demand/Domestic Consumption ('000 tonnes)	Supply/Domestic supply ('000 tonnes)	Order of self-sufficiency (%)
Minerals*				
1	Bauxite	23162	20369	88
2	Chromite	3017	2864	95
3	Iron ore	147524	204481	100
4	Kyanite	5.9	4.9	83
5	Limestone	368439	349170[1/]	95
6	Magnesite	437	78	18
7	Manganese ore	6664	2688	40
8	Rock phosphate (including apatite)	9236	1456	16
9	Sillimanite	6.7	11.1	100
Metals				
10	Aluminium (primary)	2944	3619	100
11	Copper (refined)	720[2/]	364	50
12	Lead (primary)	284[3/]	214	76
13	Zinc	555[4/]	715	100

Source: *MCDR Returns for production and DGCI&S for export & import.*

Apparent consumption = production+ import-export

**: Minerals declared as minor mineral vide Government of India Notification S.O. 423(E) dated 10th February, 2015, are not included due to non-availability of production for the year 2020-21.*

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.

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