



## **DEVELOPMENT OF HIGH VALUE MINERALS/METALS AND PRECIOUS STONES**

(updated as on 20-03-2018)

### **MINERAL REGIME IN ACTION**

Indian mineral regime can be divided in three distinct categories:

- i. 95% of the bulk minerals like limestone, bauxite and almost 20% iron ore are captive to industries for which these are raw materials. The balance quantity is extracted by a large number of concessionaires spread all over the country.
- ii. In other cases, the ownership of mineral concessions is mostly with individuals, partnership firms or private limited and some public limited companies, both private and Government.
- iii. The minerals/metals with which India is vitally concerned now and will be in future such as gold, lead/zinc, copper, nickel, PGMs, diamond, REEs are not yet fully developed or their potential not realized because of:
  - Lack of state-of-the-art exploration technologies;
  - High risk and size of the capital required not available in India so far; and
  - Most of the deposits so far are thus chance discoveries.

This category of minerals / metals will require latest and state-of-the-art technology for exploration as well as exploitation, which requires huge investment.

### **NEED FOR FRESH THRUST**

2. The total mineral potential area in India covers 5.75 lakh sq. kms. of which only 75,000 sq. kms. area has been explored in detail so far but not at depth. India has high resources of iron ore, limestone, bauxite and coal, mica, barites, chromite, kaolin and manganese for which it finds a place amongst the top ten countries globally. The minerals/metals with which India is vitally concerned now and will be in future such as gold, copper, nickel, PGMs, diamond, etc. have not yet been fully explored and developed or their potential realized.



3. There is therefore urgent need to explore minerals/metals in which this country is deficient e.g. gold, copper, nickel, platinum group of minerals as well as diamond and depend entirely on imports. In the other minerals/metals such as lead/zinc etc. although we may be self-sufficient now but, looking to our growing requirements, will have to import in future. These are the minerals for whose exploration least attention seems to have been given. GSI has on doubt has done regional exploration but to exploit a deposit and to analyse its economic viability, one has to go for detailed exploration and analysis of the ore to choose appropriate technology.

4. Despite the huge resources, there has been abysmally low exploration activity and minimal private sector participation particularly in exploration of strategic and deep seated mineral deposits requiring state-of-the-art technologies and risk capital. Because of lack of exploration, the incremental growth in mineral commodities in the country has been negligible. The business of mineral exploration and mining are dictated by the fluctuating market prices of mineral commodities and ever changing costs of inputs, services and innovations in technology.

5. In India, except MECL, there is no agency which can undertake this work. Central or State PSUs do not have the required technology to explore these deep-seated minerals. Even MECL is not adequately equipped to undertake this work. Out of various detailed explorations done by it and more than 75 reports brought out, not a single report has found acceptability of any entrepreneur. This only indicates confidence level in MECL. The Working Group set up by the Ministry of Mines has come out with some solutions to encourage an entrepreneur to pay initially only 5 to 10% of the cost of detailed survey and pay balance over a period of time if the project sees the light of the day.

6. Mineral exploration is a highly competitive and specialized job. The expertise and the technology to explore and extract is available in private companies, a large number of what are popularly known as *junior exploration companies*. Their exploration expertise in most cases is linked to a particular mineral or group of minerals. For exploration job, they bank on venture capital or hedge funds. No mineral-rich country that has developed its mining industry has done so on the basis of government exploration in the last more than 30 years. The government in these countries create favourable conditions and provide necessary data to the private sector to explore. Mineral rich countries such as US, Canada, Australia, Brazil, South Africa,



Chile, Mexico etc. do not want 'to spend' tax payers' money on the risky venture like exploration<sup>1</sup>. These countries therefore encourage the private companies to undertake detailed exploration by providing various incentives and security of tenure besides priority in grant of concessions as well as freedom to sell / transfer the concessions.

7. An idea of the exploration expenditure incurred by various junior companies world-wide in the last eight years can be had from the following table:

Year	Companies involved	Amount spent (US\$ billion)	%age increase / decrease over last year
2006	1624	7.1	45.5
2007	1821	9.9	40.0
2008	1912	12.6	26.0
2009	1846	7.32	(-) 42.0
2010	2089	10.68	45.45
2011	2400	10.68	61.52
2012	3500	21.50	19.00
2013	3500	14.43	(-) 29.70
2014	2700	10.74	(-) 26.00
2015	3500	9.20	(-) 19.00
2016	1580	6.89	(-) 21.00
2017	1535	8.4	15.06

Source: Metals Economic Group, Canada (For 2006-15)  
S&P Global Market Intelligence (For 2016 and 2017)

8. The exploration expenditure is dependent on the market conditions for a mineral / metal and swing in favour of one, whose demand and price is more attractive, than the one whose demand and consequently price is comparatively less attractive. This will be clear from the following table :

(US\$ billion)						
Year	Gold	Base Metals (copper, nickel, lead/zinc)	Diamond	PGM (platinum group of metals)	Other Minerals	Total
2006	3.21 (45%)	2.28 (32%)	0.86 (12%)	0.21 (3%)	0.57 (8%)	<b>7.13</b> <b>(100%)</b>
2007	4.10 (41%)	3.60 (36%)	1.00 (10%)	0.30 (3%)	1.00 (10%)	<b>9.99</b> <b>(100%)</b>
2008	4.91 (39%)	5.04 (40%)	1.008 (8%)	0.378 (3%)	1.26 (10%)	<b>12.6</b> <b>(100%)</b>
2009	3.51 (48%)	2.64 (36%)	0.36 (5%)	0.15 (2%)	0.66 (9%)	<b>7.32</b> <b>(100%)</b>
2010	5.45	3.52	0.32	0.21	1.18	<b>10.68</b>

<sup>1</sup> The exploration work is extremely risky : if during aerial survey, 1000 anomalies are observed, it may be that only 100 anomalies are worth ground prospecting and it may again be that only one out of these 100 turns out to be worth economic exploitation. The Governments do not therefore prefer to spend the tax payers' money on exploration because it does not want the tax payers' money to be invested in risky and hazardous ventures like exploration.



Year	Gold	Base Metals (copper, nickel lead/zinc)	Diamond	PGM (platinum group of metals)	Other Minerals	Total
	(51%)	(33%)	(3%)	(2%)	(11%)	(100%)
2011	8.28 (48%)	5.35 (31%)	0.52 (3%)	0.26 (1.5%)	2.85 (16.5%)	17.25 (100%)
2012	9.65 (47%)	6.57 (32%)	0.62 (3%)	0.31 (1.5%)	3.39 (16.5%)	20.53 (100%)
2013	6.64 (46%)	4.76 (33%)	0.58 (4%)	0.14 (1%)	2.31 (16%)	14.43 (100%)
2014	4.62 (43%)	3.76 (35%)	0.54 (5%)	0.21 (2%)	1.61 (15%)	10.74 (100%)
2015	4.14 (45%)	3.13 (34%)	0.46 (5%)	0.14 (1.5%)	1.33 (14.5%)	9.20 (100%)
2016	3.30 (48%)	2.13 (31%)	0.28 (4%)	0.068 (1%)	0.83 (12%)	6.89 (100%)
2017	4.05 (51%)	2.38 (30%)	0.25 (3%)	0.080 (1%)	1.19 (15%)	7.95 (100%)

Source: Metals Economic Group, Canada (For 2006-10)  
S&P Global Market Intelligence (For 2011-17)

9. And, finally, which country has spent how much on exploration in last five years :

(US\$ billion)

Country	2012		2013		2014		2015		2016		2017	
	Amount	% Age	Amount	% Age	Amount	% Age	Amount	% Age	Amount	% Age	Amount	% Age
Canada	3.29	16	1.88	13	1.51	14	1.28	14	0.97	14	1.11	14
Australia	2.46	12	1.88	13	1.30	12	1.09	12	0.90	13	1.08	13
US	1.64	8	1.01	7	0.75	7	0.74	8	0.49	7	0.64	8
Russia	0.62	3	0.72	5	0.54	5	0.46	5	0.35	5	0.32	4
Mexico	1.23	6	0.87	6	0.75	7	0.54	6	0.42	6	0.48	6
Peru	1.03	5	0.72	5	0.54	5	0.54	6	0.42	6	0.56	7
Chile	1.03	5	0.87	6	0.75	7	0.69	7	0.42	6	0.64	8
South Africa	0.00	-	0.43	3	0.30	3	0.35	4	0.28	4	0.16	2
China	0.81	4	0.57	4	0.70	6	0.54	6	0.42	6	0.40	5
Brazil	0.62	3	0.04	3	0.30	3	0.27	3	0.28	4	0.24	3
Argentina	0.62	3	-	-	-	-	-	-	-	-	0.16	2
DRC	-	-	-	-	0.30	3	0.13	2	0.14	2	-	-
Other countries	7.18	35	5.44	35	3.00	28	2.57	27	1.88	27	2.16	28
<b>Total</b>	<b>20.53</b>	<b>100</b>	<b>14.43</b>	<b>100</b>	<b>10.74</b>	<b>100</b>	<b>9.20</b>	<b>100</b>	<b>6.95</b>	<b>100</b>	<b>7.95</b>	<b>100</b>

Source: Metals Economic Group, Canada (For 2011-15)  
S&P Global Market Intelligence (For 2016-2017)



10. The above table indicates that India, despite being clubbed among mineral-rich countries, hardly spends anything on exploration. The amount mostly commonly mentioned is around US\$ 5 million annually. This makes India as one of the least explored countries in the world. Since exploration was not encouraged, there was hardly any private investment in the mining sector despite the fact that since February 2000, the mining sector was opened up for 100% foreign direct investment. This therefore emphasizes the need to find out ways and means to attract private investment in exploration because government agencies have not been able to find resources which could prove economically viable for investment. The opportunity loss to India in commodities like iron ore, diamond, gold, coal and bauxite compared to Australia as a consequence of less exploration is given at **Annexure**. If we are unable to discover these strategic minerals, either due to lack of exploration activity or any of these minerals is simply not available in the country, efforts will have to be made to have linkages with the friendly countries which have them either by way of trade agreements or acquiring assets.

11. In the strategy paper prepared by McKinsey for the Ministry of Mines for “Unlocking the Potential of Indian Minerals Sector” (Nov. 2011), it has been observed that the Indian mining sector has the potential to:

- add US\$ 210 billion to US\$ 250 billion (Rs. 945 thousand crore to 1,125 thousand crore) to GDP by 2025, a growth of 10 to 12 per cent per annum. This includes US\$ 60 billion to US\$ 80 billion (Rs. 270 thousand crore to 360 thousand crore) direct and US\$ 150 billion to US\$ 170 billion (Rs. 675 thousand crore to 765 thousand crore) indirect contribution.
- create 2 million to 2.5 million direct jobs by 2025, and an additional 11 million to 13 million jobs through indirect employment opportunities created in other sectors, thereby contributing 3 per cent to total employment.
- contribute US\$ 55 billion to US\$ 70 billion (Rs. 275 thousand crore to 315 thousand crore) of revenue to the Central and State governments through corporate taxes, royalty and export duty collections by 2025 – around 50 per cent of the current combined fiscal deficit of the Central and the State governments.



## **GEOLOGICAL SETTINGS AND NATIONAL MINERAL POLICY, 2008**

12. Geologically, India has more or less the same prospectivity as other resource-rich countries such as South Africa, Australia, Canada, Brazil, Chile, etc. Why is it that India continues to be under-explored and under-exploited? Is it the lack of policy initiative or apathy of State and/or Central governments? And if there is already a policy at the Central level, is it the will or desire of Central and/or State governments not to implement this policy at ground level? Or the policy itself is flawed?

13. Following acceptance of the recommendations of High Powered Committee (popularly known as Hoda Committee) set up by Planning Commission under the Chairmanship of Mr. Anwarul Hoda, the National Mineral Policy (NMP) for non-fuel and non-coal minerals was revised in March, 2008. Apart from emphasizing that “*India is a federal structure with a single economic space*” (para 2.6), NMP 2008 has the following important enunciations that are desirable for inviting FDI and alongwith it the state-of-the-art technologies, not available in India:

*“In order to make the regulatory environment conducive to private investment the procedures for grant of mineral concessions of all types, such as Reconnaissance Permits, Prospecting Licenses and Mining Leases, shall be transparent and seamless and security of tenure shall be guaranteed to the concessionaires. The first-in-time principle in the case of sole applicants and the selection criteria in the case of multiple applicants will be appropriately elaborated. Prospecting and mining shall be recognized as independent activities with transferability of concessions playing a key role in mineral sector development. (para 3.3)”*

*“.....In mining activities, there shall be arm’s length distance between State agencies (Public Sector Undertakings) that mine and those that regulate. There shall be transparency and fair play in the reservation of ore bodies to State agencies on such areas where private players are not holding or have not applied for exploration or mining, unless security considerations or specific public interests are involved. (para 4.1)”*

*“.....the private sector would in future be the main source of investment in reconnaissance and exploration and government agencies will expend public funds primarily in areas where private sector investments are not forthcoming despite the desirability of programmes due to reasons such as high uncertainties.(para 5.2)”*

14. How then, despite such lofty enunciations in NMP 2008, hardly any FDI has percolated in this country? In fact, the initial euphoria is gradually giving way to nonchalance in so far as foreign companies are concerned. Many of them, who had



opened their offices in India, have wound them up. The delays taking place in State governments and the passing of Mines and Minerals (Development and Regulation) Amendment Bill, 2015 by Parliament which provided for high fiscal levies, provision for auction and other stipulations were negative factors for the multi-national and other exploration companies to have second thought on investment in Indian mining sector. Such regulatory uncertainties and delays in clearance of licences are forcing the foreign investors to withdraw from the country.

## **BENEFITS**

15. There will be enormous benefits if exploration is opened up for private junior exploration companies. The areas where exploitation of mineral resources is taking place (e.g. iron ore, bauxite, limestone, dolomite, manganese ore, chrome ore, etc.) are widely known and have already been developed over the course of time. These mineral-bearing areas are already reaping the fruits of economic growth. The minerals/metals being talked about are high value, scarce and deficient. There are the minerals/metals where junior exploration companies are interested. These are in areas which have not been adequately explored and are in the interior. There will be a number of benefits if private investment is encouraged:

- remote/tribal areas will be opened up, creating opportunities for large scale employment.
- dormant resources will be exploited for nation's benefit.
- since the metal content in the ores is low (low tenor ores), value addition will be near the mines (one can not transport vast material excavated from the mines).
- dependence on imports will be reduced and if sufficient quantity and quality is found, imports may dry up.
- new state-of-the-art technology will be imported and applied.
- there will be large inflow of capital (FDI).
- there will be revenue generation for State and Central governments.



## **CONDITIONS FOR ATTRACTING PRIVATE INVESTMENT**

16. Many authorities have identified various conditions in a country for attracting foreign private investment in exploration and mining. However, almost all are reconciled on following important aspects:

- Geological prospectivity
- Political stability
- Legal system
- Mineral regime

17. While everybody agrees and seems to be satisfied with the first three aspects (albeit not all are happy with the working of legal system which is extremely slow and painful), the mineral regime calls for a serious look. In order to attract private investment, the most important requirements are:

- priority to the first applicant
- seamlessness from reconnaissance permit (RP) to prospecting licence (PL) and then to mining lease (ML) provided the licensee has not breached the conditions of his licence
- security of tenure
- easy transferability (sale) of RP, PL and ML
- time-bound decisions

## **AUCTION BY COMPETITIVE BIDDING**

18. The Parliament has recently enacted Mines and Minerals (Development and Regulation) Amendment Bill 2015 providing for auction of notified minerals and prospecting-cum-mining lease. While auction may be feasible for surficial deposits like iron ore, bauxite, limestone, etc which are in abundance, only time will bear out its relevance for deep-seated minerals under discussion in this paper.

19. One auctions a commodity when one is sure what one is auctioning and the bidder should know what he is being offered in terms of quantity and quality of the product. Since exploration is highly capital intensive it is not possible to explore the entire deposit initially at one go as it would render any industry based on the mineral uneconomic / unviable. How can one auction or anybody bid for reconnaissance or prospecting over an area when no one knows what it contains? Same is the case for mining lease since nobody knows what coal/lignite deposit under auction is worth in terms of quantity and quality.





20. The resource availability is thus a dynamic concept and one can not estimate at a given time the exact quantity of a mineral deposit. If one can not estimate exact quantity and its quality, auction becomes a farce and questionable. The whole concept is therefore fraught with serious consequences. For argument sake, if somebody bids for any deposit based on certain assumptions and if the reserves / resources work out near the estimation, the bidder will be comfortable. But if these falls below the estimation, he will be in a serious economic problem because his industry based on certain assumptions have now gone awry. However, if the resources / reserves come out more than the estimates, the government will lose.

21. No mineral resource rich country in the world takes recourse to auction of its natural resources for various reasons :

- a company would like to recover the cost as fast as it can
- selective mining leaving low grade minerals in the ground
- no serious exploration
- huge wastage of resources
- will increase the cost of final product making it uncompetitive vis-à-vis imports
- may result in cartelisation and monopolistic practices

22. The Hon'ble Supreme Court in its judgement delivered on 27<sup>th</sup> September, 2012 on a special Presidential Reference No. 1 of 2012 has this to observe on auction :

*“These drawbacks include cartelisation, “winners curse” (the phenomenon by which a bidder bids a higher, unrealistic and unexecutable price just to suppress the competition; or where a bidder, in case of multiple auctions, bids for all the resources and end up winning licenses for exploitation of more resources than he can pragmatically execute), etc.”*

23. In the scenario in which India is today, no FDI is possible in mineral resource sector. Unless the attitude of Central and State governments changes to attract private capital, which also brings with it technology, there is no likelihood of resource development. Overdependence on public sector will render mineral resources remaining untapped, causing serious situation at a time when there is need to fall back upon them.



## **RESOURCE DEVELOPMENT A DESIDERATION**

24. There is a misconception that mining destroys forests (since most of our minerals are found in them) and environment. Further local population does not benefit from resource development as minerals once extracted are dispatched outside, either within the country or abroad, for manufacturing industries. Moreover, mining companies bring technical people from outside and employ locals only for unskilled and semi-skilled jobs. This perception is generally true if we see our past records: except few enlightened companies like TATAs, most of mining companies, even public sector, did not adequately look after local people to the extent they should have.

25. However, if we look at the mining policy as it worked at ground level by the State governments, the policies of almost all State Governments were to give preference to public sector or captive mines, dividing a deposit into small leases on political considerations and, in the case of minor minerals, auction of deposits and lease it out for a few years. These policies have played havoc with resource development of this country and creating doubts and distrust among local communities against mining industry. This feeling in local communities is genuine but we have to seek ways and means to overcome it.

26. There is a need for complete overhaul of the dispensation at Central and State levels. The Ministries at the Centre and Departments at the State level are manned and headed by people who have little idea and hardly any long term horizon about the trickle-down benefits of the development of the resource industry. This applies even to the technical and scientific people who work in these departments. The establishment at the Centre and State level have to be manned by people who know the significance of resource sector in terms of economic development, socio-economic benefits, infrastructure development, skill development of local people and its benefits in terms of environment and forest issues. These officers will have to ensure that the local community gets due benefits in terms of skill development, employment which will lead to socio-economic development on a sustainable basis. After grant, there should be stiff monitoring by a competent and honest Regulator.

27. Adverting to the apprehension about damage to forest and environment, it is no doubt true that mining initially affects forest and environment as any disturbance on ground does affect both these vital ingredients of human and animal life. But let us



also see how non-exploration of mineral resources for the country's benefit will affect these two vital ingredients of human life :

- About 60% of India's GDP is contributed by service sector. Services sector, no doubt vital for economic growth, looks after/covers only elite class which forms only a tiny section of Indian society. On the other hand, manufacturing sector contributes only 16% of India's GDP (as against 38% in China). It is only manufacturing sector which provides jobs to all sections of society — unskilled, skilled, technical, scientists, researchers, professionals etc. — on a regular / sustained basis and brings prosperity permanently. Development of mineral resources will feed manufacturing sector on a sustainable basis.
- Unless there is wide spectrum of growth engulfing all sections of society, which manufacturing can provide, people who are left aside like tribals and the people in remote areas, there will be dissatisfaction and animosity against the mining industry.
- It has been world-wide experience that the growth of population is basically in countries which do not provide enough opportunities to keep people engaged in some constructive work.
- If development of raw materials and manufacturing sectors does not take place because of misplaced notions, the growth in population will damage forestry and environment which can not be contained easily.

28. The development of mineral resource will benefit the country in various ways :

- development of mineral resources for the benefit of the country, leading to more manufacturing and industrialization of the country;
- lead to more economic development and provide employment in remote and tribal areas, thereby bring about socio-economic change;
- protect environment from burgeoning population since people will be busy / engaged in productive work. In the absence of any productive avocation, people resort to activities which are many times not in consonance with law and order; and
- on an average, an individual consumes 2 cubic meters of wood each year whereas people residing in forest areas consume 200 cubic meters per person per year (since these people do not have any access to fuel like gas / kerosene in remote areas). There will be no doubt impacts on forest at initial stage of mining but mining can be done in such a way that there is least destruction. This can be done if the area under mining is large enough so that the area brought under mining in a particular year can be afforested before



new area is opened up. It has already been experienced in some cases in India and abroad where rehabilitation of forest, consisting of trees of local varieties, is better and more dense than it was when the mining lease was granted. This will ultimately help in regeneration of forests.

## CONCLUSION

29. Nani Palkivala once observed : *“we are not poor by nature but poor by policy”*. For too long, this country has suffered from policy-deficit. Now since the new Government has taken over, it is expected by everybody that firm and expeditious policy decisions will be taken up in the national interest. In peroration, FIMI would seek Government of India’s policy initiatives with regard to:-

- need for one umbrella Ministry for resources
- integration and simplification of procedures to curtail delays to the minimum in grant of exploration and mining concessions, and environment and forest clearances
- promotion of transparency
- regulatory regime
- recalibration of exploration
- examination of the feasibility of contract mining in Indian context
- promotion of risk capital markets
- privatization of public sector
- mining taxation reforms
- create conditions for private investment – domestic and foreign
- no forest clearance at the time of renewal of mining lease
- need for checking the role of NGOs

30. Once policy decisions on above areas are clear and sincerely implemented, this country can transform itself in one decade as a hub of mining activity providing employment in tribal and remote areas and bringing about socio-economic transformation.

### Incremental growth in some mineral commodities in India vis.a.vis Australia

The table below depicts the growth of mineral commodities (exploration) in India vis.a.vis Australia during 1980 to 2010.

RESERVES	INDIA		AUSTRALIA	
	1980	2010	1980	2010
<b>Iron Ore (hematite) (million tonnes)</b>	11470	17882	15000	40000
<b>Diamond (million carat)</b>	0	2.6	0	270
<b>Gold (metric tonnes)</b>	56.1	326.7	400	9800
<b>Coal (billion tonnes)</b>	111 (inferred)	276 (inferred)	29 (Proved)	75 (Proved)
<b>Bauxite (million tonnes)</b>	2489	2636	3000	8700

#### Opportunity Loss to India

With the exception of coal, no other commodity has seen significant mineral exploration in India. The opportunity cost lost as a consequence is significant. As an example, had India between 1980 and 2010, followed a proportional growth path as Australia, then in value terms, the tangible opportunity lost works out to:

- For iron ore : approximate 20 billion tonnes equating to about US\$ one trillion (at mine gate price of US\$ 50)
- For gold : 500 tonnes equating to about US\$ 25 billion (at a price of US\$ 1400/ounce)
- For bauxite : 4 billion tonnes equating to about US\$ 80 billion (at a mine gate price of US\$ 20)