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Beyond License to Operate

India Mining: Solving the Sustainability Conundrum

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Executive Summary

The global economy is going through a profound change. Most people are aware that the emerging economies are growing at a much faster pace than the developed economies. However, not as many people appreciate the implications of this. Over the next ten years, the combined GDP of China and India is expected to grow from around US\$ 7.5 trillion to roughly US\$ 25 trillion. The resultant explosive growth in per capita income in the emerging markets will add almost 2 billion people to the consuming or middle class, thereby leading to an unprecedented increase in global consumption. Nominal private consumption in Asia alone is expected to triple from approximately US\$ 7 trillion in 2010 to more than US\$ 21 trillion by 2020.

The two megatrends playing out in the aforementioned scenario — global population growth and rising affluence in the populous emerging economies — will exponentially add to the existing global demand for natural resources. Growing demand for natural resources provides an opportunity for India, blessed with relatively abundant mineral wealth, to significantly grow its mining sector. Mining projects, however, directly involve dealing with land, forest, water, biodiversity and the local communities. Dealing effectively with social, environmental and political challenges arising from social and environmental impacts of mining is not merely good corporate governance but a necessary pre-condition or ‘license to operate’ in the mining sector.

Over the last few years, there has been an increased awareness and emphasis on sustainability in India. Various committee reports, surveys and comparison with global best practices have highlighted an urgent need to ramp up efforts on sustainability initiatives. There are a

multitude of factors that have constrained wider adoption of sustainable mining practices in India.

Some of the key factors hindering wider adoption of sustainable practices in mining in India and thereby hindering growth of mining are the gaps in current regulatory and institutional set-up. For example, the current land acquisition provisions are extremely cumbersome and time consuming. Land acquisition and associated rehabilitation and resettlement requires expertise, especially, given the state of land records in the country and complexities involved in relocating a large population to a place with similar economic and social infrastructure. Most mining companies in India currently do not have the required expertise or wherewithal.

Further, geophysical mapping of only ~3 percent and geochemical mapping of only ~4 percent of India’s hard rock area has been completed. To compound the issue, this is not integrated with the data on biodiversity, local community, social infrastructure and land ownership. These are as critical inputs for initiating sustainable mining operations as the geological inputs. Thus, there is a need for a body with scope much broader than that of the current Geological Survey of India.

Getting all clearances and approvals for sustainability in India is a long drawn process. There is no single institution that takes a holistic view of all sustainability aspects or facilitates a forum for engaging all key stakeholders. For example, in the state of South Australia, all the requisite clearances for setting up a mine are routed through PIRSA (Primary Industries and Resources of South Australia). PIRSA, acting as a nodal agency, reviews the entire sustainability plan holistically and also coordinates with relevant agencies for approvals. In Papua New

Guinea, the mining companies have to enter into a formal agreement with a ‘development forum’ representing the interests of the local community. There are several such prevalent examples of community involvement and benefit sharing globally.

Given these institutional bottlenecks to the wider adoption of sustainability in India, there is an urgent need to set up following bodies / institutions:

- ◆ **Centre for Geo-Social-Land Ownership Mapping:** To develop and maintain a comprehensive record of mineral resources mapped with environmental and social aspects including land ownership.
- ◆ **State Sustainability Councils (SSCs):** A multi-stakeholder council in each state, that acts as a nodal agency for holistic review of the sustainability plan developed for a mining project and coordinates with other Government departments for approvals.
- ◆ **Local Development Councils (LDCs):** Make it mandatory to set up a Local Development Council for each major mining project, where LDC acts as a structured forum for engagement with local community and other stakeholders and for proactively planning and executing various aspects related to sustainable mining and community development.
- ◆ **Land and Community Development Corporations (LCDCs):** Corporations providing professional services to mining companies with respect to land acquisition, rehabilitation and resettlement.
- ◆ **Independent Professional Certification agencies:** Recognized professional experts who assess and certify various sustainability aspects at different stages of mining activity.

It is also possible for the mining industry to proactively bridge some of these institutional gaps on its own. There are no regulatory barriers to doing so. For example, it is possible to proactively initiate the setting up of LDCs. Alcoa, in Brazil, has engaged with the local community to develop a multi-stakeholder decision making council, set up a local development fund and has agreed to a set of indicators and metrics to measure its sustainability performance. Such proactive action, is required in India, even if government initiates action to set up various institutions since policy making can be a time consuming process.

Mining companies need to move beyond viewing sustainability as a ‘social license to operate’. Leading mining companies globally, view sustainability as a ‘source of competitive advantage’ — as a source for newer greener businesses (like green energy, waste recycling, etc.), opportunity for efficiency improvements (like energy saving, water conservation, waste reduction, etc.) and a pool of intangible benefits (like brand, innovation, talent management, etc.). If sustainability initiatives have to evolve and gain further prominence within the mining industry, the companies need to think differently and give it due importance on their management agendas. This is only possible if companies are able to perceive direct benefits of sustainability, beyond the ‘social license to operate’.

Thus, sustainability is not a constraint to mining growth. The lack of appropriate institutional set-up to foster sustainable mining practices, industry passiveness and limited view of sustainability as only a ‘licence to operate’ are the real constraints to growth of mining. Given the nature of mining business, growth cannot happen without sustainability. They are two sides of the same coin.



Substantial Growth Potential in Mining

Sustainability the Key

Two key megatrends are rapidly changing the consumption pattern of the world. The world population has been steadily increasing and has now reached 7 billion. Driven by a booming economy and increase in per capita incomes in the emerging economies, an additional almost 2 billion people are expected to enter the consumption class over the next 10 years.

The twin megatrends of rising population and rising affluence are expected to dramatically increase global consumption, especially in emerging markets, and thus add significantly to the global demand for natural resources.

With a relatively abundant mineral wealth, India has an opportunity to significantly grow its mineral and industrial sectors (including steel, aluminium, etc.) by catering to the increasing domestic and global demand.

However, the growth of India's mining sector is likely to be constrained if the social, political and environmental are not sustainably addressed. In order to grow rapidly, unlocking the sustainability conundrum is the key. Against this background, this report attempts to define a way forward for the minerals and mining sector in India.

This chapter, discusses the importance and the potential for growth of mining in India, highlighting various challenges and importance of sustainability. The next few chapters highlight the need for sustainability, various challenges hindering wider adoption of sustainable practices in India and the various best practices seen globally to tackle these challenges. The last chapter of this report lays out various recommendations, for the key stakeholders viz. government, mining companies and

NGOs, that need to be implemented for ensuring that the sustainability challenges are addressed and the growth potential in mining is realized.

Setting the Context: Growth in Mining Critical for Development of India

Core contributor and driver of GDP growth

Mining is one of the core sectors driving growth in an economy. Not only does it contribute to GDP, it also acts as a catalyst for the growth of other basic industries like power, steel, cement, etc., which, in turn, are critical for overall development of the economy.

Infact, there is a strong correlation between mining growth and growth in industrial production. The mining and quarrying sector has demonstrated a growth of 5.8 percent per annum in 2010–2011 and of about 5.0 percent per annum over past five years, at constant prices¹. At the same time, both industrial production and GDP grew with a CAGR of 8.4 percent. Our analysis shows that every one percent increment in the growth rate of mining and quarrying results in 1.2–1.4 percent increment in the growth rate of industrial production and correspondingly, an approximate increment of 0.3 percent in the growth rate of India's GDP². In other words, if mining grows by 6 percent in 2011–2012 instead of 5 percent, an additional amount of ~Rs. 14,500 Crores at constant prices or ~Rs. 25,000 Crores at nominal prices (i.e. over and above the sector's current contribution and historic growth) will get added to GDP. Given the

1. RBI data on components of GDP at constant prices.

2. Based on regression analysis of the GDP components: industry (y) with mining and quarrying sector (x) from 1993–1994 to 2010–2011 at constant prices till 2003–2004 with 1999–2000 as the base year, and then onwards with 2004–2005 as the base year.

abundance of mineral wealth in India (as will be discussed in the later sections of this chapter), the Ministry of Mines, Government of India, has targeted significantly higher share of GDP from mining. It aims to increase share of mining and quarrying in GDP from current 2.3 percent of GDP to 7–8 percent of GDP over next 20 years³. This requires mining to grow at ~12–15 percent per annum — a 7–10 percent jump in growth rate. This as discussed above, can result in a 2–3 percent increment in GDP growth rate.

Critical for upliftment of backward regions

Unlocking growth in mining implies significant social and economic development in mineral rich states, most of which are relatively underdeveloped and below the country average on a host of social and economic indicators.

At present, nearly half of India's total mineral production (including oil and gas) in value terms is contributed by seven key mining states, namely Orissa (9.6 percent), Andhra Pradesh (9.0 percent), Rajasthan (7.9 percent), Chhattisgarh (7.8 percent), Jharkhand (6.5 percent), Madhya Pradesh (4.8 percent) and Karnataka (3.6 percent)³. If considered without oil and gas, the share of these seven states in current mineral production would be about 67 percent of India's total production by value. These seven states also account for a majority of the reserves for key minerals of India, and therefore, will remain the primary mining states in the long-term for the country. Mining is a key contributor to the GDP of these seven states, especially to that of Jharkhand, Chhattisgarh, Orissa and Madhya Pradesh (as shown in Exhibit 1.1).

As seen in Exhibit 1.2, many of these states are below the India average on a variety of socio-economic indicators. Jharkhand, Chhattisgarh, Orissa and Madhya Pradesh, the key mining states, have low per capita health expenditure, low literacy and a substantial proportion of population below poverty line.

Given the relative backwardness of these states and significant contribution of mining to the state GDP, growth in mining could play a critical role in the social and economic development of the people of these states. There are various direct and indirect ways in which growth in mining could aid in social and economic upliftment of people. For example,

- ◇ Mining contributes revenue to the state kitty by way of royalty. Growth in mining also implies growth in royalty contribution to the state.
- ◇ In addition, growth in mining can lead to additional jobs. As of 2007, approximately 5,50,000 people⁴ were directly employed in mining. If the mining growth happens in accordance with the objective set by the Ministry of Mines, Government of India, then it will lead to an additional one million jobs in mining by 2020; implying a 200 percent growth in direct employment in 10 years⁵. Further, growth in mining activity also drives growth in related service sectors in and around mining areas, for example, construction, transportation, healthcare, schools, etc. This further results in additional indirect job opportunities.
- ◇ Most mining companies, given the nature of their business (operations in backward / remote regions and need for social 'license to operate'), invest substantially in helping local community by building schools, healthcare facilities, etc. For example, companies such as Vedanta Group, Tata Steel and Jindal Steel and Power Limited have built mobile hospitals, IT and vocational training institutes, support structures for teachers and students, as shown in Exhibit 1.3.

Potential and Opportunity for Significant Growth of Mining in India

India is amongst the world's richest and most diverse nations in terms of mineral deposits. We are geologically very well endowed, and mine approximately 90 minerals⁶ annually across fuels, ferrous, base metals, precious metals and non-metals.

India occupies a dominant position in the production of many minerals across the globe. As seen in Exhibit 1.4, with regard to production of key minerals viz. coal, limestone and iron-ore, India ranks 3rd, 3rd and 4th respectively in the world⁷.

3. Ministry of Mines, Government of India.

4. Selected state wise average daily number of workers employed by category in mines in India (2007), Indiastat.

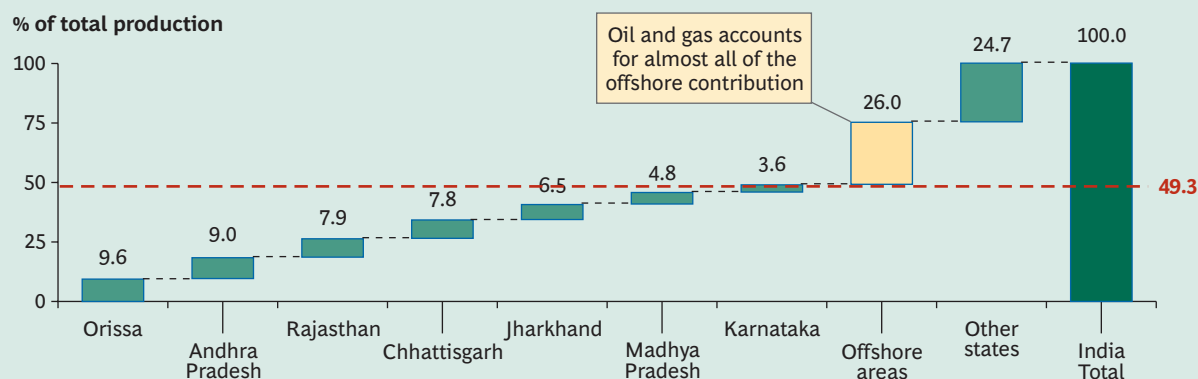
5. BCG analysis.

6. Ministry of Mines, Government of India.

7. Statistics for year 2010; Ministry of Mines, Government of India; U.S. Geological Survey; Goldman Sachs; Morgan Stanley Metals Playbook.

Exhibit 1.1. Seven key mining states have majority share in current mineral production as well as total reserves

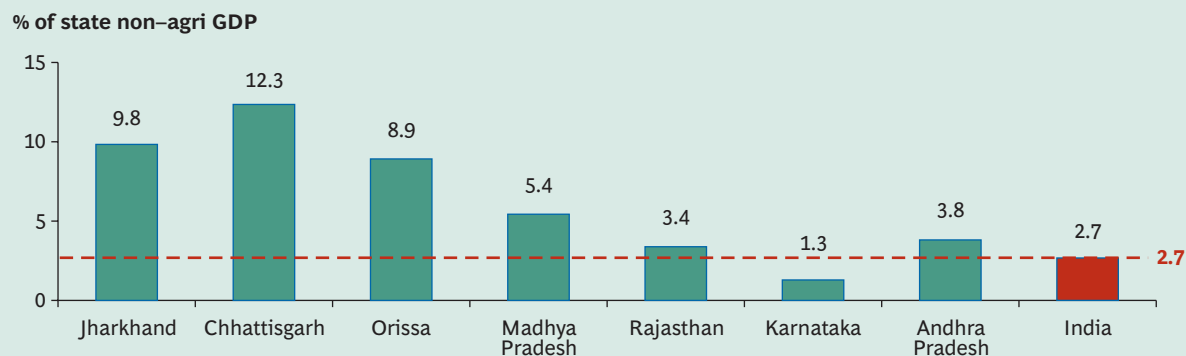
Share of key mining states in India's mineral production, by value (2010–2011)



Share of key mining states in India's mineral reserves, by volume (2006)

State	Coal	Iron ore	Bauxite	Manganese	Lead and Zinc	Chromite
Jharkhand	29%	14%	–	–	–	–
Orissa	24%	17%	51%	35%	–	98%
Chhattisgarh	16%	10%	–	–	–	–
Madhya Pradesh	18%	–	–	10%	–	–
Andhra Pradesh	7%	7%	21%	–	1%	–
Rajasthan	–	–	–	–	90%	–
Karnataka	–	41%	–	29%	–	1%
Total	~84%	~89%	~72%	~74%	~91%	~99%

Contribution of mining and quarrying industry in state non-agriculture GDP (2010)



Sources: Ministry of Mines, Government of India; Ministry of Coal, Government of India; Indian Bureau of Mines; Centre for Monitoring Indian Economy.

Notes: State GDP is defined as total state gross domestic product at factor cost (GSDPfc); state non-agri GDP is defined as: total GSDPfc minus GSDPfc from agricultural activities.

Exhibit 1.2. Seven key mining states, accounting for a third of India's population, are relatively backward than rest of India



Source: Indiatat.

Exhibit 1.3. Illustrations of local community development initiatives undertaken by mining companies in India

	Tata Steel	Jindal Steel and Power Limited	Sesa Goa (Vedanta Group)
Education	- Youth / adult literacy programmes - Child education centres - School camps for tribal children	- OP Jindal knowledge park - Schools for intermediate education - Scholarships for needy students	- Sesa Technical Schools (STS) for young children - Vedanta Computer Education Programme in Goan schools
Health and hygiene	- Immunization camps - Awareness camps about several diseases and family planning - Cataract operation camps	- Regular and integrated health camps - Annual camps for cataract operations	10 community medical centres in Goa, Karnataka, Orissa and Jharkhand - Medical and awareness camps
Employability enhancement	- Programmes on agricultural improvement and irrigation - Vocational trainings - Rural enterprises and Self Help Groups (SHGs)	- IT Certification training for village and tribal girls - Vocational training on tailoring and embroidery - OP Jindal Institute of Technology and Skills in Angul and Patratu	'Alternative Livelihood Opportunity Project' in Chitradurga - Income generation programmes for women SHGs
Community development	'Tejaswini' initiative for women empowerment - Gramshree Mela for rural craftsmen - Self sustainability ventures for tribal upliftment	- Renovation of old age homes - Kitchen gardens in Patratu - Camps for disabled people - Programme for animal husbandry in Raigarh, Patratu and Angul	- Sesa Community Development Foundation (SCDF) working in several villages of Karnataka, Goa and Orissa - Social infrastructure development

Sources: Company web sites (Tata Steel and Jindal Steel and Power Limited); annual sustainability reports (Sesa Goa).

Exhibit 1.4. India's production rank across key minerals

Mineral	Key application industries	Total production ('000 tonnes)	India's rank in global production
Coal	Power, Steel, Cement	5,37,000	3rd
Limestone	Cement, Iron and Steel, Chemicals	2,40,000	3rd
Iron ore	Iron and Steel	2,60,000	4th
Bauxite	Transportation, Packaging, Construction	18,000	4th
Barite	Oil and Gas, Paints, Plastics	1,000	2nd
Chromite	Steel, Dye and Pigment, Preservative, Refractory applications	3,800	2nd
Zinc metal	Iron and Steel (galvanization), Communication equipment (as alloys)	750	4th
Manganese ore	Iron and Steel, Packaging (as alloy with aluminium)	1,100	5th
Lead metal	Paints	95	6th
Copper	Electronics, Architecture (roofing, etc.), Alloys	161	10th
Aluminium	Transportation, Packaging, Construction	1,400	7th

Sources: Ministry of Mines, Government of India; U.S. Geological Survey; Goldman Sachs; Morgan Stanley Metals Playbook.

Note: Statistics for year 2010.

Notwithstanding India's status as a leading producer of key minerals in the world, India has significant potential to further grow its mining industry. This potential is apparent from both — the demand for minerals and the availability of natural resources in India.

Demand side potential

- ◇ Countries typically go through a mineral consumption curve where per capita consumption of minerals accelerates during the industrialization period (developing phase) and gradually stabilizes or declines later (developed phase). A relative comparison of India, as shown in Exhibit 1.5, with various countries suggests that India is still at an early stage on the mineral consumption curve. Even amongst the BRIC (Brazil, Russia, India and China) nations, India is the least developed in terms of per capita mineral consumption. As India's per capita GDP increases, its mineral consumption will grow at a rapid pace in line with the growth witnessed in other emerging markets like China and Brazil. Projections based on the mineral consumption intensity show that demand for a variety of minerals will increase at a much faster pace than the historical growth rates (as shown in Exhibit 1.6).
- ◇ Further, to assess the domestic growth potential for mining sector in India, one can also look at the future growth potential of its key consumer industries, for example, steel, cement, etc. The Planning Commission, in its 12th five year plan, has set a target of 9–9.5 percent⁸ for the GDP growth rate. This implies a huge spurt in sectors like construction and power generation (as shown in Exhibit 1.7), which in turn will lead to substantial capacity addition in the steel, cement and thermal power sectors. These industries, being key consumers of minerals like coal, iron ore, limestone and copper, will drive significant growth in consumption demand of minerals in India.
- ◇ In addition to domestic demand growth, the Indian mining industries is also likely to see accelerated growth in exports demand. The key minerals exported from India are iron ore, alumina, and chromite. According to industry analysts' forecasts, the global demand for these minerals is expected to accelerate in the future. For example, as shown in Exhibit 1.8, the demand for seaborne iron ore is expected to grow at the rate of 10 percent per annum from current rate of

8 percent per annum⁹, while that for aluminium will grow at 10 percent per annum from the current rate of 6 percent per annum¹⁰. The global demand of ferrochrome, an alloy containing chromite, is expected to grow at a CAGR of 7 percent as against current CAGR of 3 percent¹¹.

Thus, there are substantial demand side drivers for growth of India's mining industry.

Supply side potential

In global rankings of mineral reserves, India occupies a dominant position for key minerals, for example, coal and iron ore. At ~113 billion tonnes India has the world's 4th largest coal reserves, which is equivalent to ~12 percent of global reserves. India also possesses the 7th largest reserves of iron ore, 3rd largest reserves of chromite and 5th largest reserves of manganese ore in the world¹². In other words, at the current consumption rank, India has proven reserves for ~175–200 years for coal, and ~40–50 years for iron ore and limestone (as shown in Exhibit 1.9).

In addition to the internationally recognized proven and probable 'reserves', India has significant quantity of mineral 'resources' which are still under various stages of exploration. A quick look across key minerals (as shown in Exhibit 1.10) highlights the fact that the unproven 'resources' are more than twice the proven reserves¹³. With appropriate investments in infrastructure and technology used in exploration, there is significant potential for further increase in realizable mineral wealth.

Three Key Challenges to Growth Faced by Industry

As discussed in the previous section, there is enormous potential for growth of mining in India. This is driven by both the positive demand scenario and substantial existing 'reserves' and potential 'resources'. However,

8. Planning Commission, Government of India.

9. Morgan Stanley, 2011.

10. HARBOR Intelligence, 2011.

11. Heinz Pariser, 2009.

12. Ministry of Mines, Government of India; U.S. Geological Survey; Goldman Sachs; Morgan Stanley Metals Playbook.

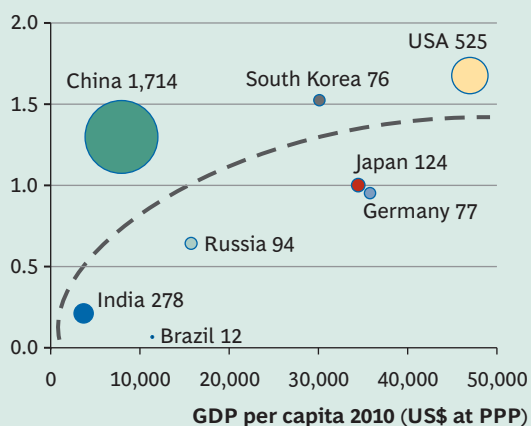
13. Ministry of Mines, Government of India.

Exhibit 1.5. Intensity of mineral consumption expected to accelerate

India currently very low on per capita mineral consumption

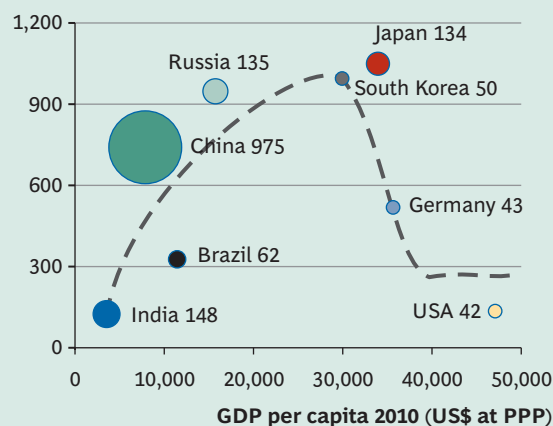
Coal

Coal consumption per capita 2010
(Tonnes oil equivalent)



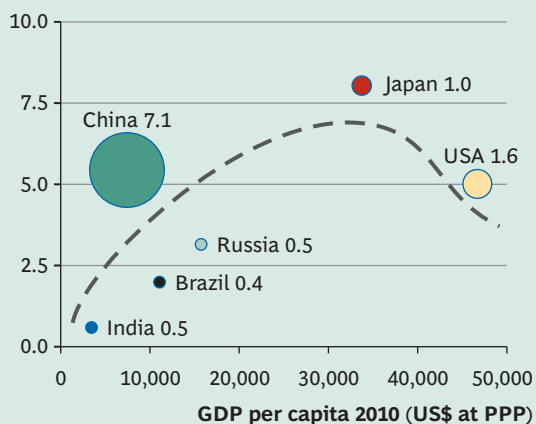
Iron ore

Iron ore consumption per capita 2010 (Kg)



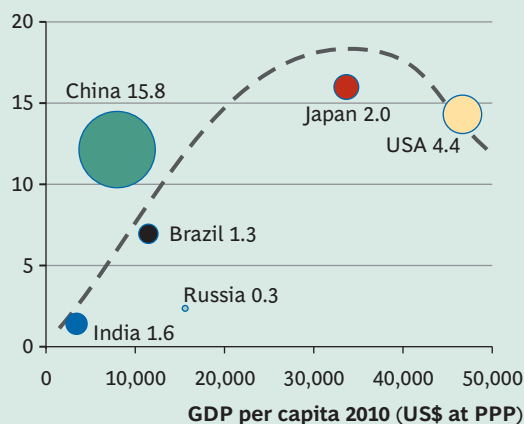
Copper

Copper consumption per capita 2010 (Kg)



Aluminium

Aluminium consumption per capita 2010 (Kg)

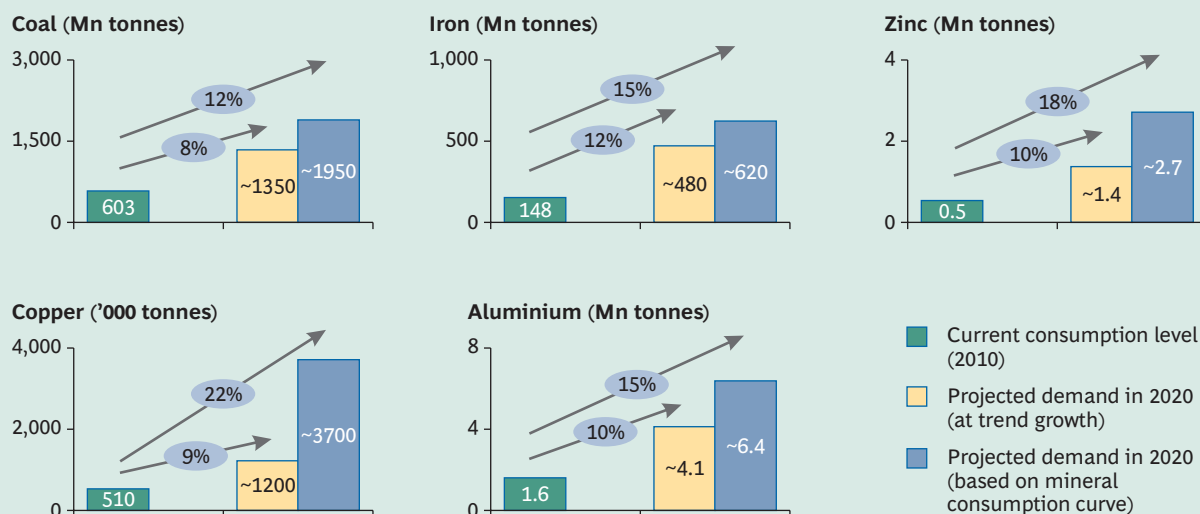


○ Total consumption in 2010 (Million tonnes; Mtoe for coal)

Sources: Economist Intelligence Unit; Goldman Sachs; JP Morgan; BP Statistical Review of World Energy June 2011; BCG analysis.

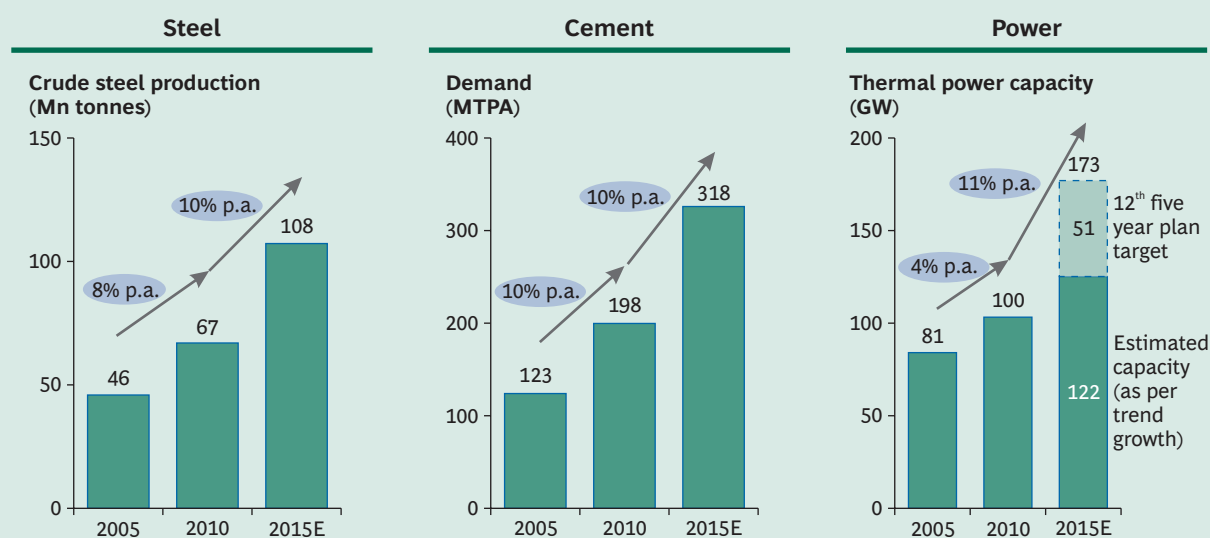
Exhibit 1.6. Demand for key minerals in India expected to grow significantly

Significant potential for rise in mineral demand by 2020



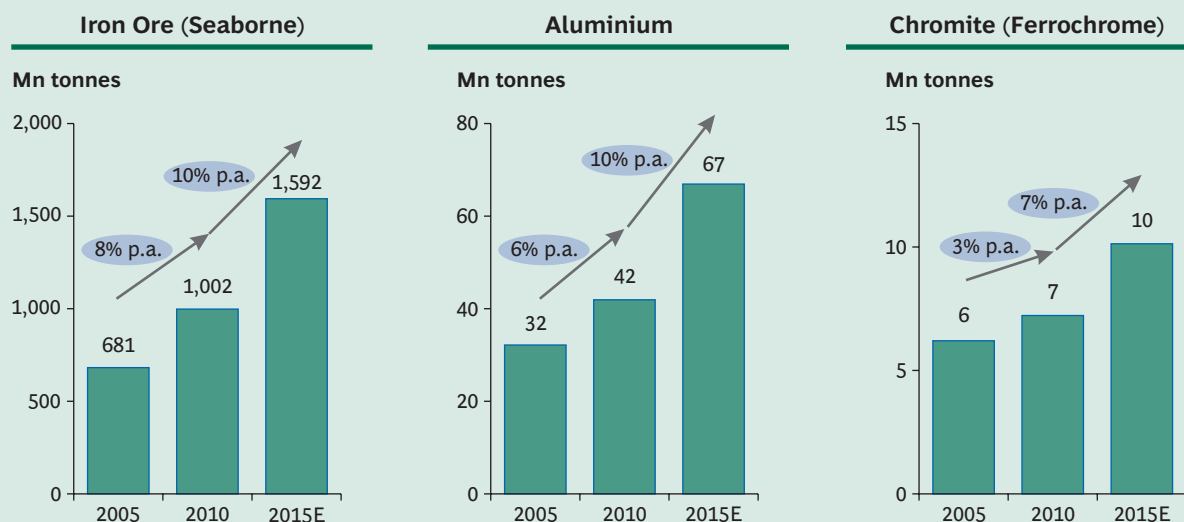
Sources: Economist Intelligence Unit; Goldman Sachs; JP Morgan; BP Statistical Review of World Energy June 2011; BCG analysis.

Exhibit 1.7. Going forward, growth in key mineral consuming industries likely to drive domestic demand for minerals



Sources: Morgan Stanley; Cement Manufacturers' Association; Economist Intelligence Unit; Ministry of Power; Planning Commission, Government of India.

Exhibit 1.8. Global demand of key export minerals of India is expected to increase significantly



Sources: Morgan Stanley, 2011; HARBOR Intelligence, 2011; Heinz Pariser, 2009.

Exhibit 1.9. India's position in reserves of key minerals

Mineral	Current reserves (mn tonnes)	India's rank in reserves	Reserve life (years)
Coal	1,13,000	4th	187
Limestone	12,715	–	55
Iron ore	7,000	7th	47
Bauxite	900	6th	66
Barite	34	2nd	30
Chromite	66	3rd	24
Zinc metal	11	7th	8
Manganese ore	138	5th	47
Lead metal	3	7th	26
Copper	4	–	9
Aluminium	2.3	5th	–

Sources: Ministry of Mines, Government of India; U.S. Geological Survey; Goldman Sachs; Morgan Stanley Metals Playbook.

Note: Statistics for year 2010.

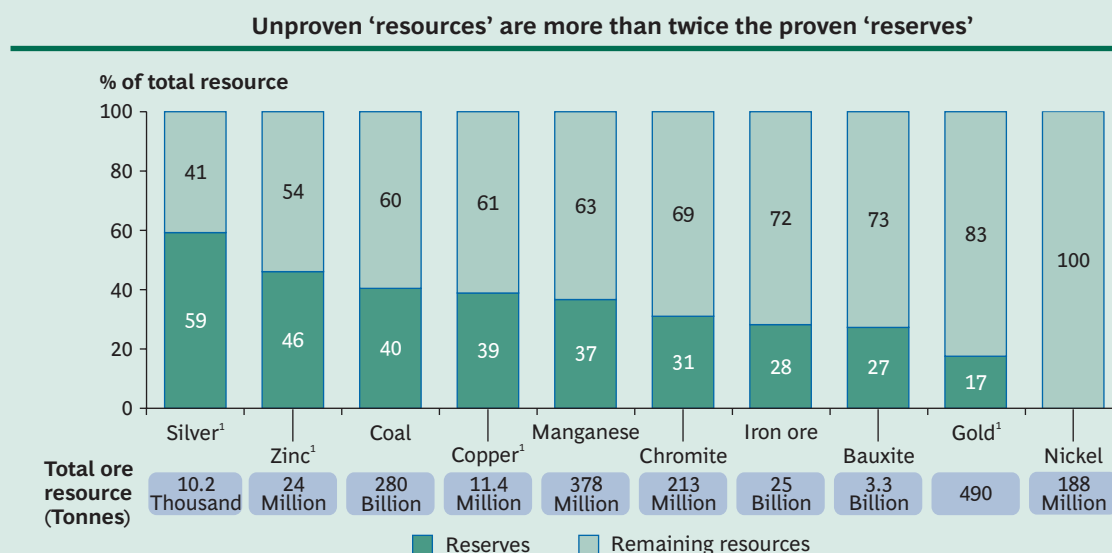
historically, mining sector has struggled to exploit this potential due to three key reasons:

Regulatory challenges

There are a set of regulatory and administrative challenges in India which restrict the growth of mining in India. To illustrate:

- ◇ The current regulatory provisions make it difficult, if not impossible, to transfer mining leases.
- ◇ There is no guarantee of obtaining mining lease even if a successful exploration is done by a company. The mining licenses are typically awarded on a first come first serve basis.
- ◇ Getting all approvals for mining is a long drawn process with multiple agencies involved. Further, there are substantial delays in disposal of various applications for clearances.
- ◇ There are limited incentives for private sector to invest in improvement of technology and equipment in mining projects.

Exhibit 1.10. Significant mineral potential still untapped in India



Source: Ministry of Mines, Government of India.

¹Figure based on metal content of the resource.

These challenges have limited the overall investment in mining and exploration activities in India. This is demonstrated by the fact that despite being one of the few sectors in India which allows 100 percent Foreign Direct Investment (FDI) (with the exception of atomic and fuel minerals), the actual inflow of foreign investment in the mining sector in India is quite low¹⁴. Further, as shown in Exhibit 1.11, India's spend on mineral exploration is less than 0.5 percent¹⁵ of the global spending on exploration in 2010 — much below its fair share given the size of our landmass and our potential mineral wealth. Even this exploration activity has largely been limited to public sector enterprises (GSI, MECL, State directorates).

Inadequate infrastructure facilities

The inadequacy of infrastructure is related to the absence of proper transportation and logistics facilities. Many of our mining areas are in remote locations and cannot be properly developed unless the supporting infrastructure is set up. For example, the railway connectivity in most key mining states is poor and has inadequate capacity for volumes to be transported which adds to the overall supply chain cost. Further, there is inadequate capacity at

ports for handling minerals and the rail / road connectivity to some ports is very poor. A set of other challenges faced by the port facilities in India are shown in Exhibit 1.12.

Sustainability

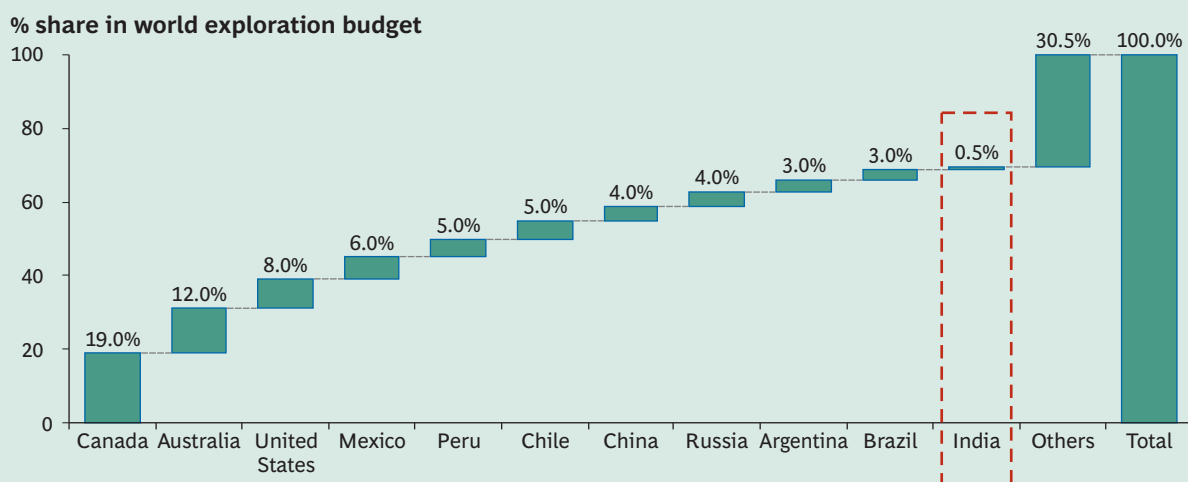
Mining activity in any area impacts the environment and social set-up in that area. Therefore, to ensure that the adverse impacts are minimized and the benefits from mining to the community so impacted are optimized becomes a critical aspect of any mining activity. In other words, it becomes important to carry out mining in a sustainable way.

The importance of sustainability in mining, in India, can be illustrated by the fact that a large percentage of mining proposals fail to get environmental / forest clearance from the Ministry of Environment and Forests, Government of India. For example, out of 2,842 mining

14. Percentage of FDI in mining sector is 0.62 percent of the total FDI inflows in India over last 11 years (Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India).

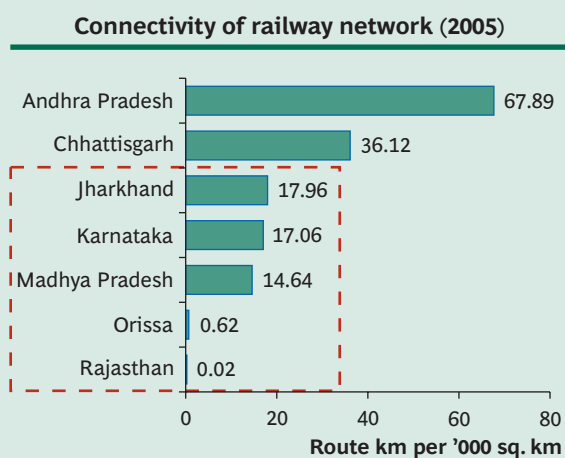
15. Mining India: Sustainability for growth, Ernst & Young.

Exhibit 1.11. India's share in global exploration budget in 2010 was less than 0.5 percent



Source: Mining India: Sustainability for growth, Ernst & Young.

Exhibit 1.12. Infrastructural challenges to growth of mining in India



Challenges with port facilities

- Capacity constraint for capital dredging
- Existing ports unable to meet the expected 10% growth in traffic at ports
- High dwell time of cargo in Indian ports due to manual workflow with low level of IT penetration
- Lack of public investment in capacity building
- Slow evacuation of cargo from ports because of limited hinterland connectivity by rail / road

Sources: Indiatat; 11th five year plan, Planning Commission, Government of India.

projects proposed for forest clearances in last 17 years, only 1,723 projects, which constitute about 60 percent of the total, have been issued forest clearance by the central government. The remaining 40 percent projects are either still pending or have been rejected / closed on grounds of sustainability. Further, obtaining the clearance is a long process, which is illustrated by the fact that out of the total pending projects, almost 70 percent have been pending for more than one year¹⁶ (as shown in Exhibit 1.13).

In addition to the environment and forest clearances, mining projects also have to comply with several requirements aimed at the welfare of the local community. Obtaining these approvals and clearances is a tedious process as it involves multiple agencies and local governing bodies. Over and above these regulations, the mining companies also need to take the local communities along, to ensure that they have the support of the 'local' side for their projects. As a result, not all projects go through. Several of them are impacted with challenges by way of opposition from local communities / NGOs, difficulties in land acquisition, denial of clearances from the governing bodies, etc. A few instances of some of the major projects¹⁷ that have been impacted in recent past are as follows:

- ◇ Pohang Steel Company (POSCO's) US\$ 11 billion investment plan for mining and steel production: strong opposition from local people over land acquisition, deforestation and destruction of ecosystems.
- ◇ Vedanta's proposed US\$ 1.7 billion bauxite mining project in Orissa: opposition by local community and eventual withdrawal of the forest clearance.
- ◇ Utkal alumina project, which was a US\$ 1 billion joint venture between M/s. Hindalco (India) and Alcan (Canada) to mine and refine bauxite: delayed by more than a decade due to challenges in land acquisition.
- ◇ Uranium Corporation of India Ltd., UCIL's two mining projects worth US\$ 200 million and US\$ 225 million in Meghalaya and Andhra Pradesh respectively: opposition from local communities and organizations on the grounds of likely effects of radiations on human health and environment.

Steps Being Taken to Resolve Regulatory and Infrastructural Challenges

All the challenges described above are widely known and have been constraining the mining growth in India for quite some time. However, off late, the Government of India is taking a set of initiatives to overcome the regulatory and infrastructural challenges described above.

Regulatory changes underway

Based on the recommendations of the Hoda Committee, New Mineral Policy, 2008 has been formed and draft Mines and Minerals (Development and Regulation) Bill, 2011 has been proposed by the government. Several provisions to accelerate the growth and development of the mining sector have been proposed. These provisions aim to overcome some of the regulatory challenges highlighted earlier.

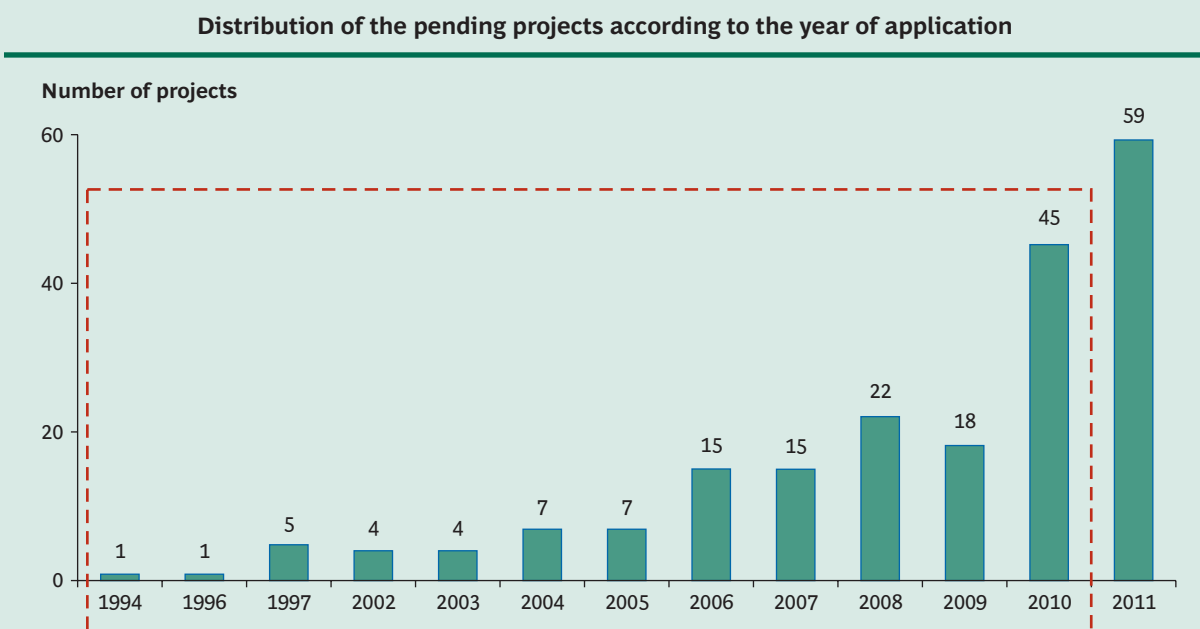
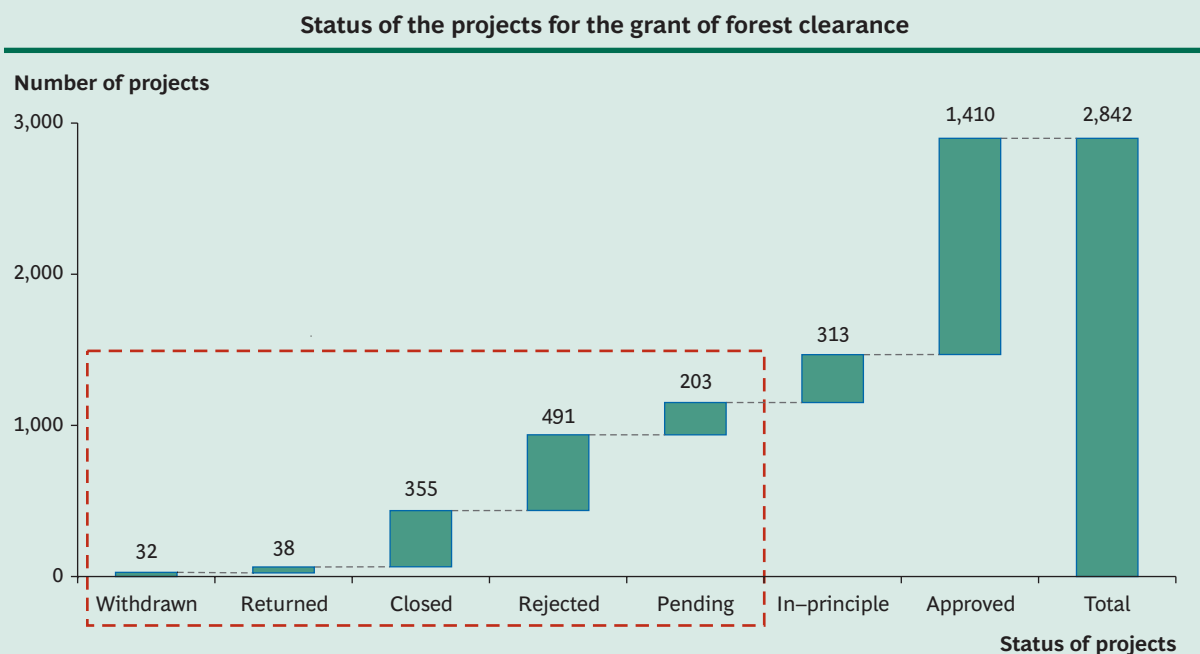
For example, in the draft Mines and Minerals (Development and Regulation) Bill, 2011, some of the key provisions, to encourage mining industry, are:

- ◇ Competitive bids for prospecting license over an area where reconnaissance has been completed.
- ◇ Time bound disposal of applications for licenses.
- ◇ Provisions for transfer of mining leases with greater ease.
- ◇ Preferential grant of the mining lease if successful prospecting is already done.
- ◇ Disclosure of information relating to the various mineral resources on the website.
- ◇ New concession instrument for technology and investment intensive exploration for deep deposits called High Technology Reconnaissance cum Exploration licence (HTREL).
- ◇ Setting-up of National Mining Tribunal and special courts to review decisions and delays in mining leases and to prevent illegal mining.

16. Ministry of Environment and Forests, Government of India.

17. Press search.

Exhibit 1.13. Only 60 percent mining projects proposed in last 17 years have been able to get forest clearances



Source: Web site of Ministry of Environment and Forests, Government of India.

National Mineral Policy, 2008 provides for several amendments to facilitate growth in mining industry, for example:

- ◇ Adoption of mineral specific strategy instead of an aggregated approach for mineral development.
- ◇ Maintenance of database in digitised form by Indian Bureau of Mines in coordination with Geological Survey of India.
- ◇ Close linkages between the mineral processing units and the production and marketing agencies of mineral-based end products.

Though some of these regulations will take time to formalise and may face some bureaucratic hiccups, the steps are in right direction and will lead to better prospects for mining in near future.

Infrastructure development underway

The current 11th five year plan has several objectives and strategic plans to augment the infrastructural facilities in the country. It aims at 100 percent rural connectivity with all-weather roads to habitations with a population of 1000 plus. In addition to increase in capacity and technology upgradation in the railway sector, the Planning Commission has prepared a separate strategy for investing in mineral routes in the country. It is envisaged that the entire 6,973 kilometer of iron-ore route will be upgraded for running 25 tonne axle load trains¹⁸. With regards to the port facilities, the following strategic actions were proposed in the 11th five year plan¹⁸:

- ◇ Capacity augmentation from 504.75 million tonnes in 2006–2007 to 1016.55 million tonnes in 2011–2012 to meet the overall traffic demand.
- ◇ Increase in the capacity of capital dredging at ports and a more liberal dredging policy for capacity creation.
- ◇ Development of more ports, especially on the eastern coast of the country.
- ◇ Encouragement to private investment in capacity augmentation.
- ◇ Improved rail / road connectivity of ports.

All these are helpful steps for encouraging the exports of minerals from the country. Further, one of the major objectives laid out in the 12th five year plan is to augment the capacity of various modes of transport and set up an infrastructure comparable with best in the world. In the area of road transport, the completion of construction of both Eastern and Western Freight Corridors would be expedited. The 12th five year plan also aims at developing capacity of high density rail corridors. Thus, there is intent on the part of the government to ease the infrastructure constraints. Steps are being taken; there may be delays but things are expected to improve.

However, Sustainability Challenge is Likely to Increase

Though the regulatory and infrastructural challenges are likely to ease over coming years, the sustainability challenge is likely to increase if not addressed early. The increasing importance of sustainability is also evidenced by the fact that the government is taking conscious measures to promote sustainable practices, for example:

- ◇ The National Minerals Policy, 2008, proposed by the Ministry of Mines, Government of India, has added the following perspectives to the definition of sustainability with regard to Indian mining projects:
 - Development of health, education, drinking water, roads and other related facilities and infrastructure for the social and economic well-being of the local community at the mining sites.
 - Prevention and mitigation of adverse environmental effects due to mining projects; and repairing and re-vegetation of the affected forest areas and land covered by trees — by laying out environmental management plan by the mining companies before the lease is granted.
 - Rehabilitation of the displaced and affected section of community as per the provisions of the Resettlement and Rehabilitation Policy.
 - Rehabilitation of the dependent community at the time of closure of the mine.

18. Planning Commission, Government of India.

- Adoption of mining methods to increase the safety of workers involved and reduction in the number of accidents.
- ◇ A Sustainable Development Framework (SDF) has been proposed by the Ministry of Mines, Government of India, in December 2010. The framework focuses on the major issues in context of laws and regulations related to the mining sector; and recommends a set of principles / practices to address the challenges of sustainability.
- ◇ The draft Mines and Minerals (Development and Regulation) Bill (MMDR), 2011, has brought out several clauses related to sustainable development of the mining industry, for example:
 - It requires the mining companies to deposit 26 percent¹⁹ of their profits from coal, and in the case of other mining activities, an amount equivalent to the royalties to the newly formed district-level Mineral Foundations. These funds will be used for benefit of the affected community and development of the local infrastructure.
 - Requirement to submit a conceptual mine closure plan at the time of new lease or renewal of license, progressive plan every five years and a final closure plan a year before the final closure. It has also brought out the concept of guarantee at the outset of the project in this regard.
- ◇ The Land Acquisition Act (1894) is also being modified currently in accordance with the Resettlement and Rehabilitation Policy. The proposed version of the Act lists down livelihoods, habitats, cultural and natural resources as critical parameters to be considered and addressed during the acquisition of the land. The bill provides for a higher compensation to the affected local community.

Conclusion

To conclude, India has huge potential for growth in mining. Though there have been several regulatory and infrastructural challenges in the past, there are a set of actions underway which will help overcome these challenges in near future. However, the challenge of sustainability is likely to increase manifold. Wide adoption of sustainable mining practices is critical for long term growth of Indian mining sector. Mining companies in future will have to do much more on the sustainability front, both as a part of regulatory compliance and as a competitive lever. The growth of mining will primarily depend on how the core sustainability issues are managed.

19. Draft Mines and Minerals (Development and Regulation) Bill, 2011, Ministry of Mines, Government of India.

Sustainability

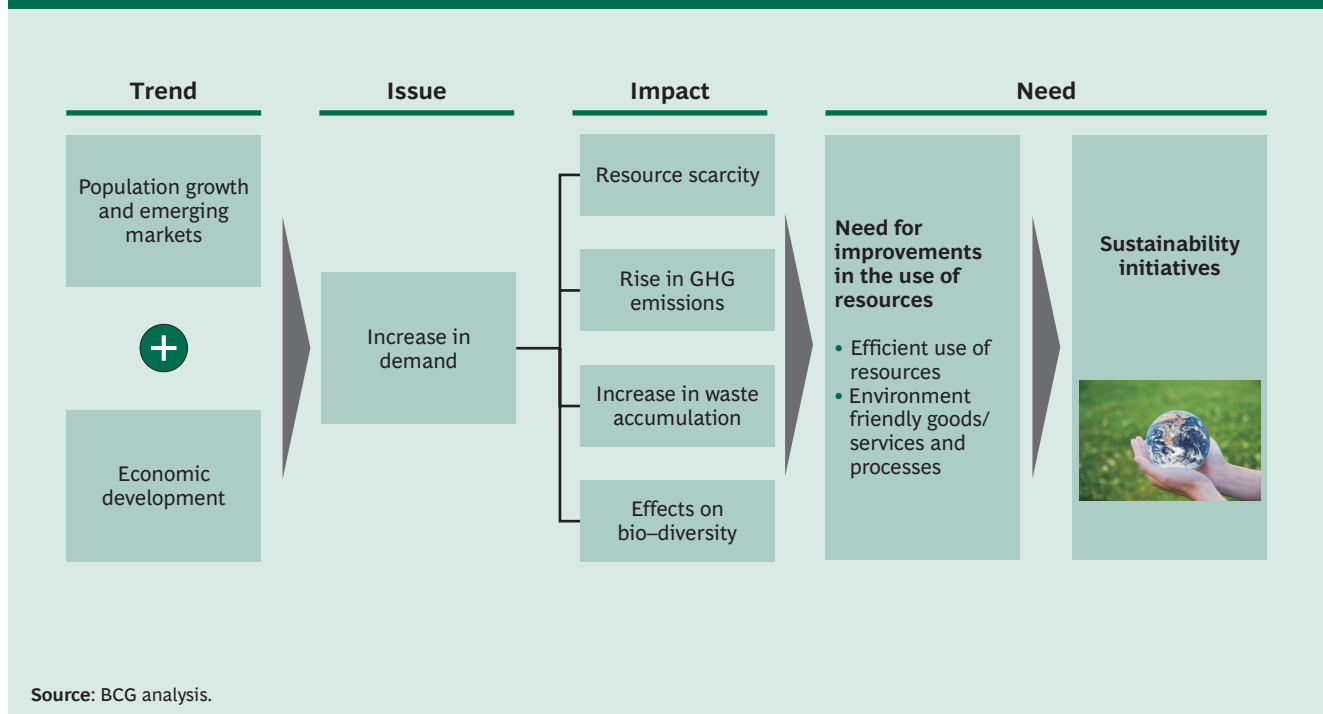
An Important Aspect to Address

Need for Sustainability Driven by Megatrends

As mentioned in the previous chapter, two key megatrends viz. the rapidly rising population and increasing economic development are driving the enormous growth in demand for natural resources and hence the urgent need for sustainable mining practices (as shown in Exhibit 2.1). With the rise of population and significant improvement in standard of living, there is an unprecedented increase in demand for most commodities,

both in the developing and the developed world. This increase in demand puts a pressure on supply of natural resources that are limited and take much longer to regenerate than the rate of their consumption. This leads to their depletion. Similarly, increasing level of industrial activity and energy consumption is leading to an increase in greenhouse gas emissions. The expansive demand also results in extensive waste which creates a challenge for disposal. Many a times, this waste is non-biodegradable and toxic thereby aggravating the situation further. There is also an increase in deforestation

Exhibit 2.1. Key population and economic megatrends are shaping the sustainability challenges



to gain access to additional resources and this in turn affects the biodiversity of these regions.

Key Elements of Sustainability in Mining Context

While sustainability related challenges are relevant for almost all industries, sustainability is a much more critical element in the context of mining industry. This is because mining projects directly involve dealing with land, forests, biodiversity and the local community. Their environmental and social footprints are simply far larger than the projects in other industries. Covering vast areas, their operations leave profound environmental marks on surrounding terrain. Furthermore, their presence affects communities, both existing ones and those that grow up around local mines. Dealing effectively with the social, environmental and political pressures arising from their impacts is what gives mining companies their licence to operate and are as important as advanced technologies and engineering equipments.

Sustainability challenges in mining context broadly cover ten key aspects namely water, waste, energy, emissions, biodiversity, land, local community development, health and safety, talent and supply chain management.

biodiversity, land, local communities, health and safety, talent and supply chain management (as shown in Exhibit 2.2). All these key elements put together form the core of sustainability.

It is important to understand the impact of mining on all these key elements to realize the importance of sustainability in real terms (as shown in Exhibit 2.3).

Water

Water resource is one of the most impacted elements by the mining industry. Given the huge quantity of water needed for mining operations, it becomes critical to plan for, at the beginning of the project, the water usage and the quality of water returned from the mining operations. Further, most key mining states are already facing acute shortage of safe drinking water. For example, in Jharkhand, only ~40 percent¹ households have access to safe drinking water. Moreover, the ground water resources in India are expected to deplete by almost 85 percent from 2010 to 2050².

1. State wise distribution of households having safe drinking water facilities in India (2001), Indiastat.

2. Central Water Commission.

Exhibit 2.2. Sustainability in mining industry governed by ten key aspects



Source: BCG analysis.

Exhibit 2.3. Key sustainability challenges faced by the mining companies

Main challenges		Description of the problem
1	 Water	- Most key mining states face shortage of safe drinking water - Indian groundwater resources expected to deplete by 85% from 2010 by 2050 - Planning in mining operations needs to be done in advance for - The quantity of water needed for mining operations - The quality of water returned after use
2	 Waste	- According to CSE¹, mining waste in India amounts to ~1,800 million tonnes - Huge expenditure required on treatment and disposal of waste generated - Residue management is critical and implies - Minimizing waste generated (e.g., to mine 5 gms of gold, ~1 ton needs to be removed) - Planning how to deal with waste generated
3	 Energy	- Huge amount of energy needed to carry out mining operations - More than 75% of energy in India is generated from coal and oil - Low availability of per-capita energy in key mining states (~150 kWh per person per annum in Jharkhand as against India average of ~600 kWh per person per annum)
4	 Emissions	- Mining results in high levels of emission of Green House Gases (GHG) and fugitive dusts 31 of the 88 critically / severely polluted clusters lie in the seven key mining states - Emission levels of GHGs expected to become 3–4 times the present levels by 2030
5	 Biodiversity	- Mining activities impact forest, animal / vegetal ecosystems, local species, etc. - Large overlap between the key mining regions and forest cover in India
6	 Land	- Mining activities destroy previous landscape and transform it completely - After the lifecycle of the mine, land recovery and mine closure are very critical 45% of the geographical area of India has already suffered land degradation
7	 Local community development	- Mining has significant impact on communities where they operate and are under obligation to leave a positive legacy - Mining is required to minimize negative impact on community and affected area - Key mining states in India are relatively poorer, with heavy dependence on mining for employment and deployment
8	 Health and safety	If safety is not ensured, mines can be hazardous environments with possibility of fire, explosion, etc. Hence, mining companies are under obligation to ensure safe working environment
9	 Talent	Mining leads to loss of land and livelihood for the local community. Hence, mining companies obliged to get involved in local skill development, talent building and provide avenues for alternate livelihood
10	 Supply chain management	- Frequently mining companies outsource activities in countries where they operate - Need to ensure that suppliers adhere to standards similar to that of mining companies - From a more social perspective, mining companies are under obligation to develop local suppliers as a part of their initiatives to help local communities

Sources: Water resources institute-eAtlas, 2003; Water for Mining, Global Water Intelligence, 2011; National Mineral Resources Information System for Mineral Raw Materials (SURIS Information System); Mineral Process Design to improve energy utilization, Dr. Pascoe and Prof Hylke, University of Exeter; Life support for mines: reducing energy bills and CO₂ emissions, Dean Millar, University of Exeter; Recruitment and Retention Challenges in the Mining Industry, by Robert Schultz and Marc Grimm, mining.com, July 2008.

Waste

Mining operations result in the generation of significant volume of solid waste. For example, it is believed that to mine 5 grams of gold, 1 tonne of waste has to be removed. This indicates an immediate need for adopting techniques that result in minimum waste generation and planning in advance on how to deal with the waste generated. Infact, according to a report by the Centre for Science and Environment, the mining waste generated in India equals to ~1,800 million tonnes³ per annum (2005–2006) which is almost 30 times⁴ the municipal waste generated in India. This is further expected to increase with an increase in mining activities.

Energy

Energy availability in most key mining states is lower than India average. For example, in Jharkhand, the per capita energy availability was just ~160 kwh per person per annum, as compared to the all India average energy availability of ~600 kwh per person per annum⁵.

There is need for mining and metals sector to optimize its energy consumption and thereby help conservation. As an example from the metals sector, in 2009–2010, as compared to the world average energy consumption of 4.2 giga calories per tonne of crude steel (G.cal/tcs), the consumption in Indian steel sector was about 6.2 G.cal/tcs⁶. This difference implies that the steel industry consumed a total of 156 million G.cal more than global average. This energy, if saved, could broadly cater to the energy needs of 7–8 million households in India⁷.

Emissions

Mining industry results in high levels of greenhouse gas emissions, directly from the mining operations and indirectly from the vehicles used in transportation of minerals. Further, the fugitive dust released from the minerals also adds to the pollution levels. Already 31 of the 88 critically and severely polluted clusters in India lie in the 7 key mining states⁸.

Emissions are also a key challenge for India, given that the greenhouse gas emission levels are expected to increase by almost 3 times in the next 20 years⁹.

Bio-diversity

Mining projects require large areas of land. In India, there is a large overlap between the forest cover and the key mining regions. Hence, increase in mining operations is

likely to further impact forests and related eco-systems, bio-diversity, etc.

Land

Mining activities result in deterioration of land resources. Given that more than 45 percent¹⁰ of the geographical area of the country already suffers land degradation, the growth in mining industry will only exert excessive pressure on remaining land resources. Further, land recovery and mine closure are critical elements of any mining activity.

Local community development

The development of the local community is one of the prime objectives of sustainable mining. With the key mining states already relatively poor than the rest of the country and heavily dependent on mining and quarrying activities as a source of livelihood, it becomes an imperative for the mining companies to take initiatives for the development of the local community.

Health and safety

If adequate security steps are not taken, mines prove unsafe as there are chances of fire, explosion, etc. Also the working environment can be hazardous due to the harmful effects of fugitive dust. Mines need to ensure adherence to the highest standards of health and safety.

Talent

Mining projects cause displacement of the local community, resulting in loss of livelihoods for many. Hence, it becomes an obligation on the part of the mining company to engage in talent building and help the local community to identify alternate avenues for livelihood. Further, the state of literacy and vocational talent is

3. Centre for Science and Environment.

4. BCG analysis.

5. State wise per capita energy requirement and availability in India (2009), Indiastat.

6. Address by Mr. A Sai Prathap, Minister of State, to CII in November 2009.

7. Based on IEA 2006 estimates of per capita primary energy consumption of 15.9 million Btu (or 4 G.cal) annually; average household size for India taken as 5.

8. Central Pollution Control Board, Ministry of Environment and Forests, Government of India.

9. Ministry of Environment and Forests, Government of India.

10. National Bureau of Soil Survey and Land Use Planning, 2005.

Exhibit 2.4. Illustration: Mining projects that got penalized on sustainability grounds



Iron Mountain (1963... till now)

- Mining carried out from 1860s until 1963
- Extremely acidic mine drainage containing large amounts of toxic metals
- For cleaning and maintenance operations financial settlement worth US\$ 950 million with Aventis



Baia Mare (2000)

- Burst of 1,00,000 m³ contaminated water over farmland and into rivers
- Polluted waters killed large numbers of fish; 62 species of fish, of which 20 were protected species, were affected
- Aurul S.A. was fined 3.7 million euros



Ok Tedi (2002)

- Discharge of 80 million tons of contaminated residues into Ok Tedi River in Papua New Guinea
- 50,000 people living downstream of the mine affected
- Until mine closure in 2012, 2/3 of the profits to go into a long-term fund to contribute to the region's economy



Copiapó (2010)

- Gold and copper mine near Copiapó, Chile
- 33 miners were trapped 700 meters underground for 3 months
- US\$ 20 million spent as the cost of the rescue
- Various lawsuits and investigations resulting from the accident are still pending



Caudalosa Chica (2010)

- Collapse of tailing dams at Caudalosa Chica mine, Peru spreading toxic waste into the Opamayo river
- Pollution got spread along 70 km and impacted fishery in 3 rivers
- Caudalosa Chica mine was fined US\$ 13 million



Khasi Hills (2011)

- Limestone mining started in October 2006
- Oppositions from the NGOs and activists that limestone was being mined in forest areas without MoEF clearances and that it would hurt the existing ecosystem
- Project halted for 5 months resulting in huge losses to the company

Sources: US Environmental Protection Agency; Greenpeace; Press search.

already low in the key mining states than the rest of the country accentuating the social obligation.

Supply chain management

Many a times, mining companies outsource their activities to local suppliers as a part of their initiative to develop local mining communities. In that case, it becomes important for the suppliers to maintain sustainability standards represented by their client's name. The mining companies thus need to embed the principles across all elements of their supply chain.

Several Operating Risks for Mining Companies, if Sustainability not Adequately Addressed

The fact that all the above elements are critical for a mining company to manage and to successfully carry out its operations is also evident from many instances that have occurred in the past where mining companies have either been forced to suspend their operations, pay huge penalties, or are obliged by law to undo the damage done. Exhibit 2.4 illustrates some such examples.

Conclusion

To conclude, importance of sustainability to the global society and especially to mining sector cannot be underestimated. In the context of mining sector, the concept of sustainability can be associated with ten key environmental and social aspects. It is very critical for a country and especially the mining industry to address issues with respect to each of these ten elements.



Current State of Sustainable Practices in India

As discussed in the earlier chapters, widespread adoption of sustainability principles and practices is a necessary precondition for long term growth of mining in India. Hence, before we layout the sustainability roadmap for mining in India, it becomes imperative to assess the state of sustainability in India.

The importance of adopting sustainable practices in mining in India is well recognized. A peek into this, is provided by the December 2006 Report of the High Level Committee on National Mineral Policy, chaired by Shri Anwarul Hoda, the then Member (Industry), Planning Commission. To quote from the report of the Committee:

“There is unanimity on the imperative for maintaining the environment, restoring ecological balance, and preserving and adding to the forest wealth of the nation. Almost 20 percent of all mineral occurrences in the country are in forest areas, and in the bulk mineral-rich states of Chhattisgarh, Jharkhand, and Orissa, the percentage of minerals occurring in forest areas rises to 40 percent. Nevertheless, if the mineral wealth of the nation is to be exploited in the interest of overall development, then conservation has to be pursued consistently with the needs of development. It was clear from the presentations to the Committee that the industry recognized that mining intervention should not only ensure the least damage to the environmental and ecological balance but also proactively add to the natural capital by such measures as regeneration of flora and fauna along with all other depleted resources such as water and soil in areas affected by the intervention...”

However, the report also highlights that though regulations in India have provisions for encouraging sustainable mining practices; the extent of adoption of

these practices is not adequate, when compared to the global standards on sustainability. To quote verbatim:

“In India, at present, the specificity of the issue of sustainable development in the mining sector is not fully reflected in the two statutes, viz. FCA¹ and EPA². The focus provided by ICMM³ on the mining sector-specific issues in the context of sustainable development and the vast potential for action in this regard is missing. This has led to a lack of appreciation of the potential for advancing mining within the framework of sustainable development, on the one hand, and the absence of conservation and environmental measures outside the two statutes, on the other. A close look at the issues arising out of the two statutes reveals that the preoccupation is mainly with two concerns, namely, compensation for diversion in various forms, including compensating afforestation, and the need for EIA⁴ studies prior to grant of environmental clearances. While the importance of the regulatory aspect of sustainable development cannot be underplayed, it is necessary to recognize that the global level dialogue currently underway has taken the entire issue of sustainable development in mining to a much higher level... In the presentations before the Committee, it was stated that some of the miners in India have been contributing to local communities through the creation of social infrastructure facilities such as schools and hospitals... However, these are unorganized ad hoc initiatives that are voluntary in nature and for which there is no accountability to outside agencies. The ICMM model calls for a commitment not only to the ten principles of the SDF but also to a reporting initiative where the mining majors submit regular reports in respect of prescribed standards and seek certification of adherence...”

1. Forest (Conservation) Act, 1980.

2. Environment (Protection) Act, 1986.

3. International Council of Mining and Metals.

4. Environment Impact Assessment Notification, 2006.

Further, in order to assess the nature of environmental regulations and their adherence / effectiveness in a country, a research group at Harvard Business School has developed an Environmental Regulatory Regime Index (ERRI). The ERRI ranks various countries on the basis of their regulatory stringency, structure, subsidies and enforcement effectiveness. According to this, with an absolute value of -0.759 , India stands 55th in the global ranking⁵ as shown in Exhibit 3.1.

Thus, though the importance of sustainability in India is well understood and there are a set of activities undertaken by various stakeholders; there is still substantial scope for improvement. In order to identify the actions for these improvements, it is imperative to understand the reasons that have been withholding India from achieving best in class sustainability performance.

Reasons for India's Current Level of Performance on Sustainability

As part of this report as well as a part of The Boston Consulting Group's (BCG) other interactions and initiatives in this space (for example, Responsible Mining

Development Initiative in which it is coordinating with World Economic Forum (WEF)), a set of reasons for the current relatively low performance on sustainability front were discussed. The reasons have been grouped into five key buckets and are discussed as under.

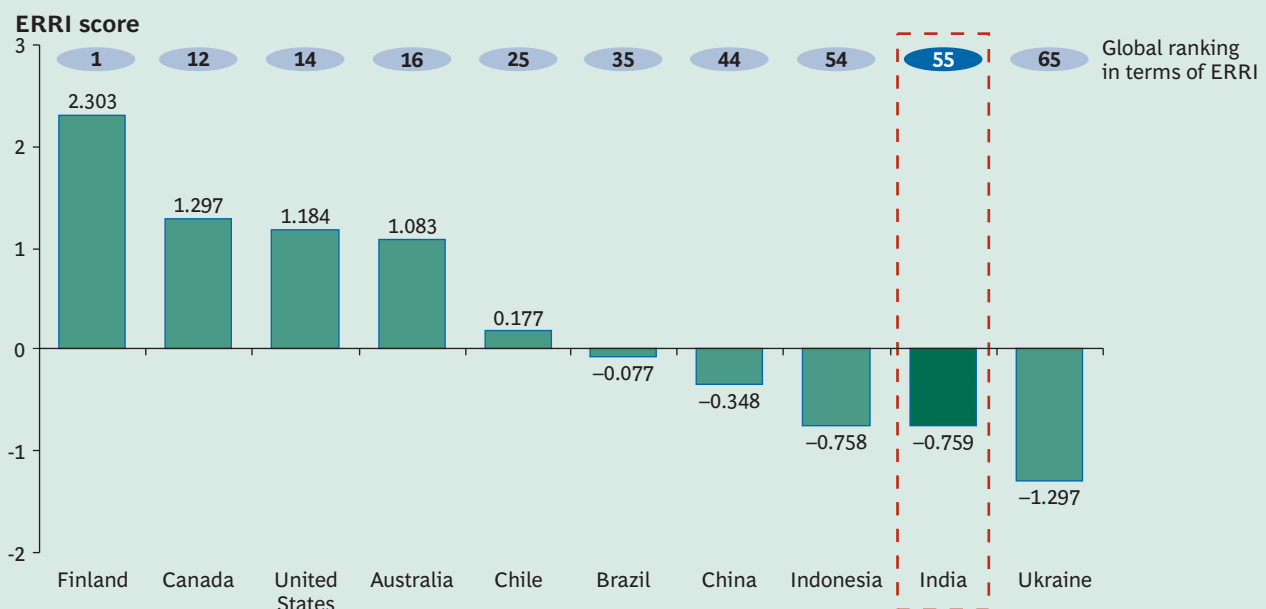
Regulatory gaps

India at present has many laws and regulations focused on sustainability, like:

- ◇ Forest (Conservation) Act, 1980.
- ◇ Environment (Protection) Act, 1986 and Environment Impact Assessment Notification, 2006.
- ◇ Land Acquisition Act, 1894.
- ◇ National Policy on Rehabilitation and Resettlement, 2007.
- ◇ Mines and Minerals (Development and Regulation) Act, 1957.

5. Institute of Strategy and Competitiveness, Harvard Business School.

Exhibit 3.1. India ranks 55th in terms of Environmental Regulatory Regime Index (ERRI)



Source: Institute of Strategy and Competitiveness, Harvard Business School.

Note: ERRI is an index cumulative of various parameters like regulatory stringency, structure, subsidies and enforcement subindices.

However, there are still many gaps in these laws. For example:

- ◇ There is inadequate focus (by way of incentives, ratings or evaluation) on improving sustainability performance on various metrics like energy efficiency, water usage, waste management, etc. to make mining activities in the country best in class.
- ◇ Further, no appropriate land acquisition provisions exist. At present, the land acquisition process for larger projects is managed by the government. However, there is no escaping for corporates from engaging with the local community and thus there is a need for a formal platform facilitating the same. Further, the process is not fully efficient because of delays, corruption, lack of appropriate involvement of local community, etc. These challenges on land acquisition, rehabilitation and resettlement front are only likely to increase with the introduction of new Land Acquisition, Rehabilitation and Resettlement Bill, 2011.
- ◇ There is inadequate definition of sustainability requirements for key events like mine closure, etc.

Poor institutional set-up: Lack of institutions with appropriate expertise, bandwidth and mandate to drive various sustainability initiatives

Insufficient geological, social and land ownership mapping exists

Currently, not all the mineral resources in the country have been mapped. Out of 1.82 million square kilometers of hard rock area (excluding Deccan Trap), geophysical mapping of only 56,000 square kilometers (~3 percent) and geochemical mapping of 73,000 square kilometers (~4 percent) has been completed⁶. This is also based on outdated techniques and historical findings. Further, appropriate bio-diversity mapping does not exist.

Also, the land records are not appropriately maintained or digitized. The existing social infrastructure is also not mapped adequately. There are still challenges in identifying the actual owners of land at the time of acquisition. There is no institution / corporation that focuses on integrated geo-social-land-ownership mapping in India. Hence, given a project proposal, government does not have adequate information to

assess the impact on local surroundings; neither do companies have adequate inputs and information available to prepare their sustainability plans and to assess their feasibility.

No holistic view of sustainability

At present there are several clearances and permissions that need to be obtained from various government ministries and local bodies. There are a set of environment regulations — FCA, EIA, etc. required with the application for mining lease. A set of permissions are also required from the local governing bodies (for example, electricity, water, railways, etc.) and communities before setting up the operations. All these are in addition to the permissions required from the Ministry of Mines, Central Pollution Control Board, Indian Bureau of Mines, etc. Exhibit 3.2 illustrates the various permissions required for initiating coal mining in India.

However, there is no single window clearance for the multitude of permissions; nor is there an agency to guide the applicants in this matter. Every government department, through its relevant regulation(s), emphasizes only on a subset of sustainability issue while other issues tend to get sidelined. Thus, an integrated negotiation process which involves weighing all pros and cons related to sustainable development in totality while granting the clearances is absent.

Absence of appropriate forum for engaging all key stakeholders

- ◇ Currently, there is no common forum where all stakeholders come together for a dialogue to address the sustainability concerns while preparing the mining plans.
- ◇ The key stakeholders typically engage in bilateral discussions rather than multilateral discussions, thus making it difficult to take a balanced view. It becomes difficult to get everyone on the same page.
- ◇ Infact, a key challenge currently being faced is to appropriately involve the local community and ensure that they benefit from the mining activities, for example:

6. Draft report of Preparation of Sustainable Development Framework (SDF) for Indian Mining Sector, 2010, Ministry of Mines, Government of India.

Exhibit 3.2. Multiple approvals needed for operationalizing a coal block

Approval category	Specific approval / clearance	Authority / agency involved
Mining lease	✓ For explored block: Purchase of Geological Report (GR); For unexplored block: application for PL ¹ and GR preparation	• CMPDIL² • Directorate general of civil aviation and ministry of defence (if aerial reconnaissance needed for unexplored block)
	✓ Mine plan	• CMPDIL² • Coal controller
	✓ Mine safety	• Directorate general of mine safety
	✓ Mine technology and conservation measures, and coal categorization	• Coal controller
	✓ Mining lease	• State Government (mining department) • Ministry of coal (Gol)
Environment	✓ Environment Impact Assessment (EIA) / Environmental Mitigation Plan (EMP)	• State pollution control board • State environment impact assessment authority • State water resource and water supply department • District administration (for site clearances) • Coal controller • Ministry of Environment & Forests (MoEF)
Forest clearance	✓ Forest clearance and valuing compensatory afforestation	• Committee to advise Gol (MoEF) • Office of Chief Conservation of Forests (regional office of MoEF) • State forest department and district authority • Department of forest (MoEF) • State revenue department
	✓ For mines located in forest areas, permissions required even for geological investigations that require drilling (in case of unexplored mines)	• MoEF
Land acquisition	✓ Land acquisition	• Ministry of Coal, under the provisions of the coal bearing areas (Acquisition and Development) Act, 1957 • For land needed for other requirements like permanent infrastructure, offices, residences, land to be acquired under The Land Acquisition Act (LA Act), 1894
Infrastructure	✓ Permissions for electricity, water, railways, road, etc	• Appropriate departments of state governments and ministries of central government

Sources: Ministry of Coal, Government of India; expert / stakeholder discussions.

¹Prospecting Licence.

²Central Mine Planning and Design Institute.

- Land acquisition, for larger projects, is managed by the government. There is a limited constructive interaction between the mining company proposing the project and the local communities about the critical issues surrounding rehabilitation and resettlement.
- Further, the royalty from mining activities directly goes to the state government without any explicit obligation on the state government to spend that royalty directly for the benefit of the communities impacted by mining. Thus, the local community has limited say in determining how the monetary benefit from the local mining project is invested in the socio-economic upliftment of the community.

Challenges in coordination between various stakeholders

A sustainable mining plan, in order to be successful, requires effective cooperation between three of its key stakeholders viz. the government, the mining company and the local community or the NGOs. Any such process of cooperation and interaction will involve matching of expectations across the stakeholders which can be very

difficult. It is here that the process of sustainability has broken down in the past. Exhibit 3.3 shows the differing priorities and expectations of the key stakeholders.

Lack of proactive approach by industry to bridge the gaps

As discussed earlier, there are a set of regulatory and institutional gaps which blunt the effectiveness of the various positive intents for sustainable development. For example, there is inadequate involvement of local community in decision making / local development or provisions for land acquisition, rehabilitation and resettlement.

These gaps can be plugged by, proactively, setting up some institutions or forums (especially for critical projects) like *Local Development Council* — a multi-stakeholder council, that has representatives from the mining company, local community / NGOs and select government departments. The council could provide a forum for the stakeholders to engage on issues of sustainable development, monitor performance against the sustainability plan and also manage the funds generated by way of mining company's contribution to local development.

Exhibit 3.3. Roles and interfaces of different stakeholders



- Protection of rights and impact of mine on livelihood / environment
- Play a key role during decision making phase

- Provide infrastructure (e.g. rail connectivity), economic aid (FTA / exchange rate management for exports, tax breaks) and develop downstream industries
- Set policies for operations across areas like human rights, health and safety, conservation of environment, social development
- Monitor companies to ensure adherence to policies

Source: BCG analysis.

There are no regulatory constraints which prohibit non-government stakeholders from setting up such forums to bridge at least some of the institutional gaps. Mining industry / NGOs can be more proactive in extending their current set of activities and leveraging global best practices in this regard.

Further, disclosures by companies with respect to their sustainable activities are not adequate, given the largely discretionary nature of current Corporate Social Responsibility reporting in India. Globally, the standards for sustainability reporting are much evolved, comprehensive and cover all the ten key aspects of sustainability. Very few companies in India have proactively adopted these global standards of reporting.

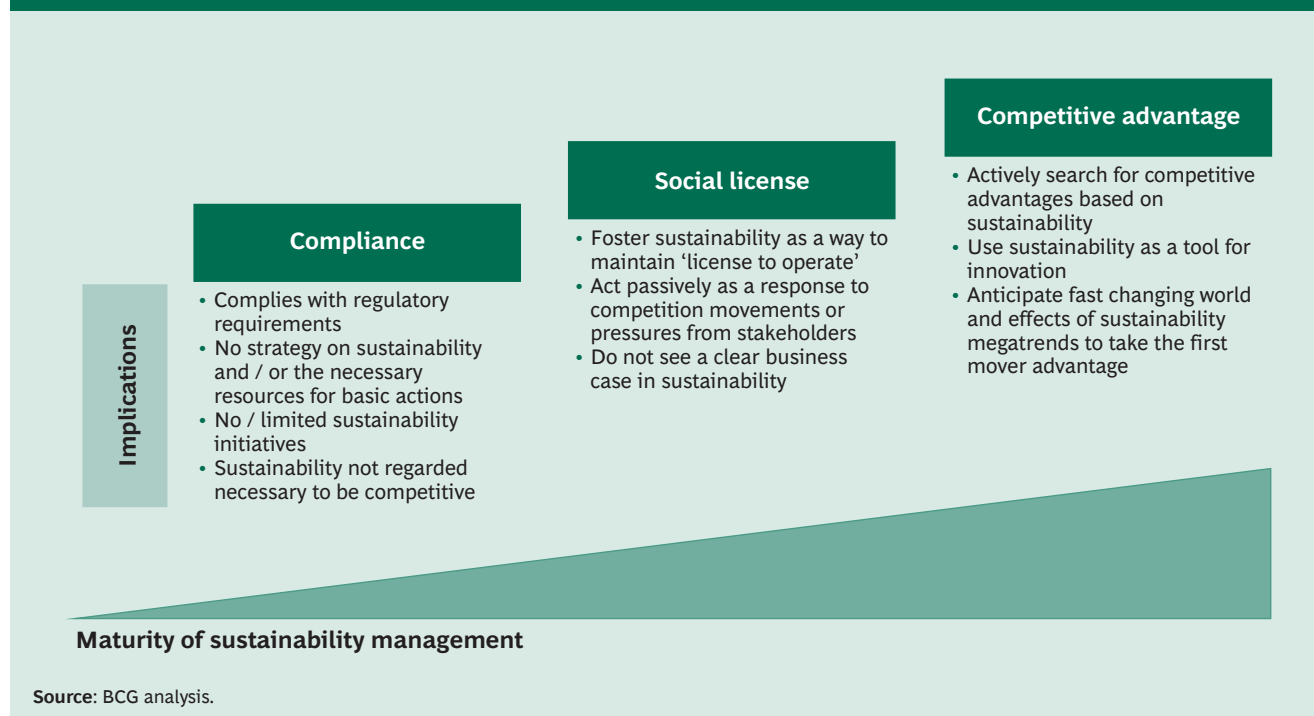
Mining industry taking limited view on elements of sustainability

In the Indian context, sustainability is an evolving concept. Over the past few years, Indian companies have taken several sustainability initiatives. However, as compared to the global players the concept is yet to evolve and mature further. As discussed in Exhibit 3.4 below, there are typically three stages of adoption of

sustainability by an organization. An organization in the first stage is typically focused on 'compliance'. In the later stage of maturity, the organization realizes the importance of sustainability as a 'social license' to operate and starts adhering to sustainable practices. However, still it is more of a passive initiative rather than a proactive one. It is considered more of a cost centre rather than a means to achieve sustainable competitive advantage. The highest level of maturity is reached when the organization realizes the 'competitive advantages' of sustainability and it becomes an important part of the strategic agenda at the senior most levels of management.

There are two broad types of players in the Indian mining industry: the small scale unorganized miners and the large-scale corporates. For the unorganized miners who are mostly merchant miners, concepts of brand image and corporate social responsibility have significantly lesser role to play in their mode of work. Sustainability gets a lower priority in their business. Therefore most of them are still at the compliance stage. On the other hand, majority of large organized players invest in sustainability. However, our view is that it is considered more of a social responsibility than a means to have business edge over

Exhibit 3.4. Sustainability journey: From 'Compliance' to Source of 'Competitive Advantage'



others. Sustainability is considered to be a ‘social license to operate’. The primary focus of sustainability initiatives is on community welfare programs like polio camps, hand pump installation, etc. Most of these initiatives are a set of distinct activities, rather than strategized long term engagements aimed at accomplishing an objective which benefits both the society and the company’s competitive position. Also, the scope of these activities is therefore limited and does not span all the key aspects of sustainability as discussed in Chapter 2 (refer Exhibit 2.2).

As a corollary to above, often, the activities are done in effect but not in spirit. For example, while many companies take responsibility of afforestation, often the focus is on planting more trees rather than restoring the original biodiversity of the region.

Further, since sustainability initiatives do not form a core part of corporate strategy; the emphasis on execution is not high. It is quite often viewed as a set of activities that need to be done, given the defined budget and need for social license. Limited attempts are made to develop an appropriate business case and apply same degree of stringency as will be applied to any other operating department. This leads to inadequate focus and coherence in business activities. Since there is inadequate focus and coherence, the results of sustainability activities do not give a sense of attainment delivering adequate benefits. Since, the results do not give a sense of attainment; a business case is not developed and the vicious circle continues.

Inadequate transparency and gaps in execution

There is one more reason why the already existing laws have not been able to generate adequate impact. The execution and compliance machinery in India for these laws is not yet efficient enough. There are several gaps in their execution at different levels. Some of the reasons for this are:

- ◇ Shortage of qualified manpower.
- ◇ No constructive use of penalty mechanism, for example, on mine closure, etc.
- ◇ Set of discretionary provisions, for example, the new proposed MMDR Bill provides for inviting of bids to

allocate mining leases. However, it leaves the determination of weightages, for various criteria for evaluating such bids, at the discretion of the state government.

- ◇ Limited reviews on the sustainability agenda.
- ◇ Inadequate coordination between state and central governments.

The challenges with compliance and enforcement are illustrated in Exhibit 3.5, which shows the compliance levels with pollution requirements in few states.

Further, there are no appropriate standards defined for sustainability reporting in India, though companies are required to report their Corporate Social Responsibility (CSR) activities. The nature, coverage and template for a formal reporting are not defined. Therefore, not all the key aspects of sustainability are adequately covered by all the companies. This makes it difficult for various stakeholders to gain a proper perspective of sustainable development by a company and its relative performance as compared to other companies.

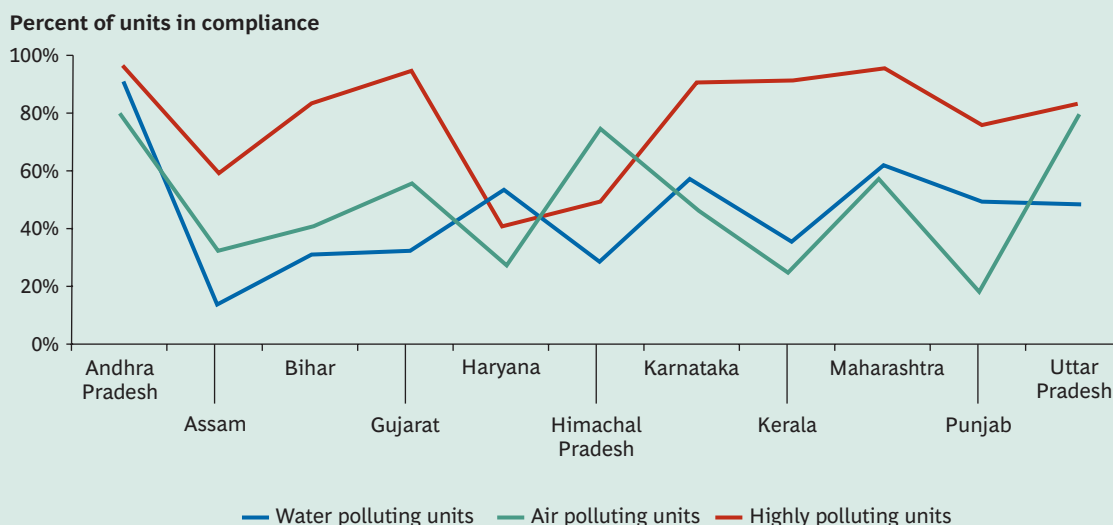
In addition, as discussed earlier, various stakeholders do realize the importance of sustainability. However, while the mining industry does undertake a set of initiatives on the sustainability front, there is limited collaboration with other stakeholders. Stakeholders are biased with their own starting points which leads to lack of trust and transparency. For example, NGOs / local communities do not always trust the various sustainability reports / activities of a mining company. There is no independent review of a company’s sustainability activities by a third party that is unbiased and does not have a stake in the issue.

These Challenges are not Unique to India

The World Economic Forum (WEF) launched the Responsible Mineral Development Initiative (RMDI) in 2009 to explore, identify and analyze the most pressing and relevant issues in mineral development process and seek consensus on ‘good practice’ guidance.

The Boston Consulting Group is partnering with WEF on the following two key questions of RMDI:

Exhibit 3.5. Illustration: Low level of compliance with pollution requirements in India (few sample states)



Source: Planning Commission, 2005.

Note: Compliance data for 2003.

Exhibit 3.6. Main challenges identified during the RMDI

Key challenges...	... and their associated effects
Limited capacity of government and civil society: expertise and institutional	Weak formulation of mining policy, regulatory uncertainty, bureaucratic red tape, insufficient monitoring
Insufficient understanding of nature, scope and timing of benefits / costs to be derived from mineral development	- Lengthy and complex negotiation processes - Perception of deceit and subsequent resistance of civil society
Limited stakeholders inclusion from decision processes around mineral development	- Difficulty of building social acceptance of mineral development - Cycle of mistrust among stakeholders
Insufficient coordination and exchange among stakeholders to integrate mining activities into country's broader development efforts	- Disconnect of mining operations from local economy - Lack of adequate programs for infrastructure, employment and local supply chain development
Compliance and monitoring components often neglected and inadequately explored	- Unclear accountability of stakeholders - Difficulty in foreseeing and preventing conflict
Opaque negotiation and development processes, and insufficient information published	Missed opportunities for constructive participation

Source: Stakeholder consultations (250 interviews in 13 countries, 2010), WEF-BCG RMDI initiative.

What limits the mining investment, especially in less developed countries?

- ◇ Analyze the root causes to not being able to develop mineral resources.
- ◇ Identify key challenges around mineral development.

What can be done to improve the investor environment?

- ◇ Identify possible solutions to address recognized challenges, focusing on improving the process, i.e. rather the 'how' than the 'what'.
- ◇ Showcase practical examples for applications on the basis of case studies and on-going initiatives.

As a part of the initiative, interviews were conducted with different stakeholders across 13 countries. The findings have been summarized in Exhibit 3.6. It can be observed that the challenges faced worldwide are quite similar to those currently being faced in India.

Conclusion

To conclude, though various stakeholders in India recognize the need and importance for sustainable mining development in India; there is still a long way to go for India to achieve best in class performance. In the subsequent chapters we will highlight learnings from global best practices on adoption of sustainability policies / practices and layout the sustainability agenda for the Indian mining industry.

Overview of Global Best Practices on Sustainability

The importance of sustainability is increasing across all countries and the governments world over are promoting sustainability through various means, including legislation. Exhibit 4.1 highlights sustainability related regulations enacted in select countries in the last ten years.

Further, in recent years, the topic of sustainability in mining has gained an increased weightage on the agenda of global mining companies. This is evident from the

BCG–MIT sustainability survey¹ of mining companies conducted last year. Exhibit 4.2 shows the significant increase in commitment to sustainability in terms of management attention and investment within a relatively short time span of one year.

Also, as is evident from Exhibit 4.3, most mining companies see sustainability driving change in their

1. A survey driven by the ‘Sustainability Initiative’; a collaboration between BCG and MIT Sloan Management Review.

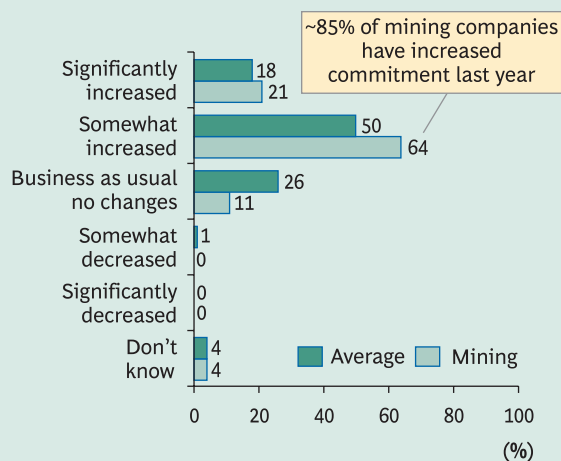
Exhibit 4.1. Illustrative list of recent global legislations to promote sustainability

Year	Country	Name of the act	Description
2002	Canada	Metal Mining Effluent Regulations	Specifies guidelines to implement Environmental Effects Monitoring (EEM) programs to determine whether mine effluent affects fish, fish habitat or the usability of fishery resources
2002	South Africa	Mineral and Petroleum Resources Development, Act 28	Provision for equitable access to and sustainable development of the nation’s mineral and petroleum resources; and for matters connected therewith
2002	Peru	Mining and Energy Sectors Regulation	Ensures delivery of clear information to local stakeholders regarding the mining project and expectations.
2003	France	Nouvelles Regulations Economiques	Requires disclosure of information related to corporate governance, social and community impacts, environmental management, and workplace practices
2004	Tanzania	Environment Management Act	Defines legal and institutional framework for sustainable management of environment; outlines principles for sustainability management, impact and risk assessments
2007	Chile	Minerals and Mining Act	Provisions with respect to ownership and control, administration and incentives for sustainable mining
2008	Zambia	Mines and Minerals Development Act	Lays guidelines for issuing and renewing of licenses for large and small-scale mining by emphasizing on sustainability
2010	Malaysia	Green Building Index and Income Tax Act	Defines incentives in form of tax rebates for sustainable practices like waste recycling, efficient water management and innovation

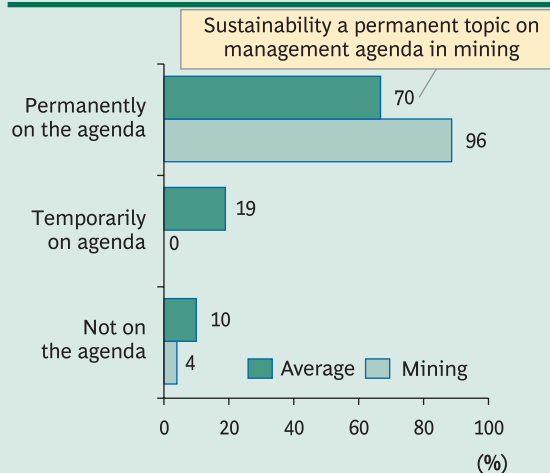
Sources: Mining: The regulation of exploration and extraction in 31 jurisdiction worldwide, 2010; Press search.

Exhibit 4.2. Importance of sustainability has increased in the agenda of the mining companies

Q: How has your organization's commitment to sustainability, in terms of management attention and investment, changed in the past year?



Q: What do you believe is the status of sustainability on the agenda of your organization's top management?

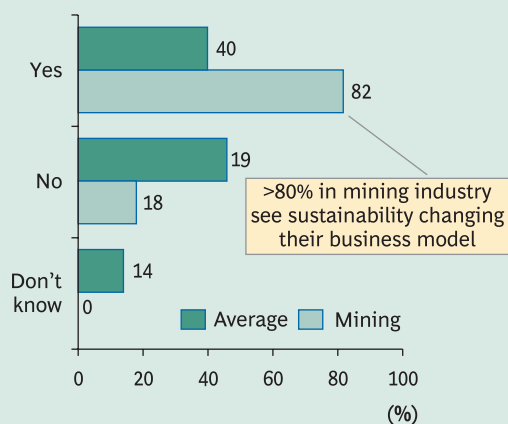


Source: 2011 BCG-MIT Sustainability and Innovation Survey.

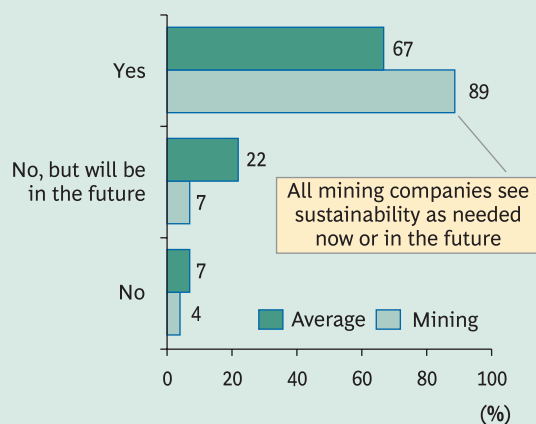
Notes: Commercial-specific survey data only — does not include academic, governmental or non-profit categories; responses: 2866 (2011), 2123 (2010), 1849 (2009).

Exhibit 4.3. Sustainability: Changing business models for competitive advantage

Q: Has your organization's business model changed as a result of sustainability?



Q: Is pursuing sustainability-related strategies necessary to be competitive?



Source: 2011 BCG-MIT Sustainability and Innovation Survey.

Notes: Commercial-specific survey data only — does not include academic, governmental or non-profit categories; 2866 responses.

business models and view sustainability related strategies as being necessary to compete in the future.

In the following sections, we discuss the levers and mechanisms by which governments, NGOs and mining companies are addressing sustainability challenges identified in the previous chapter.

Strengthening Regulations to Promote Sustainable Practices

One of the most common levers to address sustainability challenges is through legislation. Among other things, the focus of the sustainability regulations is to:

- ◇ Promote greater engagement between mining companies and local communities.
- ◇ Encourage investments in initiatives driving sustainability through tax exemptions and other incentives.

Following examples highlight regulations introduced by select developing countries to promote sustainability in mining:

Sustainability initiatives to boost Mongolian mining industry

Mongolia is a mineral rich country with roughly 6000 mineral deposits, 15 of which are strategically significant². But these remained largely unutilized because of an environment of mistrust between mining industry and civil society. This mistrust was primarily because of lack of clarity about the social benefits of mining.

In order to address these issues, the constitution emphasized upon the following measures:

- ◇ Creation of a multi-stakeholder forum to bring together representatives from government, civil society, industry, and academia to build a framework of trust and alliance for a common end goal of sustainable mining.
- ◇ The ‘Declaration on Responsible Mining’ was framed based on definition of responsible mining and eight key principles were identified to address issues of mining as a part of the ‘Responsible Mining Development Initiative’ (RMDI).

- ◇ Creation of an independent ‘Responsible Mining Initiative’ (RMI), which is a non-profit, non-governmental organization comprising of representatives of government, civil society, industry, and academia, with the goal of advancing and developing a responsible mining sector in Mongolia.
- ◇ Launch of the ‘Mongolian Extractive Industries Transparencies Initiative’ to ensure transparency in mining.
- ◇ The Ministry of Mineral Resources and Energy implemented the ‘Sustainable Artisanal Mining Project’ to adopt environment friendly technologies and best practices in the micro-mining sector to provide onsite trainings, and to develop legal regulations, etc.

As a result of the above measures pushed through legislation, several pilot projects based on principles of ‘Declaration of Responsible Mining’ have been run and many of these projects are ongoing. The Mongolia mining sector has come a long way. As of 2009, the contribution of mining industry to Mongolia’s GDP was more than 20 percent and accounted for more than half of the total exports and foreign direct investment of the country².

Green incentives to promote sustainability in Malaysia

Further several governments are providing incentives to promote sustainability rather than limiting their roles to compliance. For example, in Malaysia:

- ◇ The government, with the objective of providing incentives to companies that invest in green initiatives like solar power plant, hydroelectric plant or technology innovations, introduced the National Green Technology Policy, with a total funding of RM 1.5 billion. This provides tax rebates or discounts to all those Malaysian companies that produce or use green technology. This includes a 2 percent interest rate discount that is borne by the Government. 60 percent of the financing amount is also guaranteed via Credit Guarantee Corporation Malaysia Berhad (CGC) whilst the participating financial institutions bear the remaining 40 percent financing risk³.

2. Report on ‘Investment Environment of Mongolia’ by the Foreign Investment and Foreign Trade Agency (FIFTA), Mongolia.

◇ The Government also provides tax benefits to companies that take specific actions to drive sustainability practices. For example:

- An organization implementing processes to manage the recycling of its waste is eligible to claim its 6-year capital allowance within a 2-year period.
- A company that invests in energy conservation initiatives like water recycling plant is entitled to avail fiscal benefits in the form of income tax rebates.
- A company that provides child care facilities for young children is eligible for a tax deduction on the amount spent on the child care facility. Also setting-up and managing a school for physically disabled children enables a company to qualify for a tax exemption.

Papua new Guinea: Actively Engaging Local Community in Decision Making and Benefit Sharing

The maximum impact of any mining project is on the local community. Hence, it is critical to ensure that people, who are impacted, are involved in the related decisions and also derive direct benefits from the mining activities.

In Papua New Guinea (PNG), the mining projects are mandated to provide services and benefits to all stakeholders in the affected area through an agreement. This is done through a ‘Development Forum’, which is a multi-stakeholder body that engages in negotiating and determining how various stakeholders will share the benefits derived from the mining project. It is one of the oldest model of profit sharing with the local communities and includes provisions for community infrastructure development and sharing of project’s financial benefits.

The ‘Development Forum’ in PNG has a firm legal basis. The PNG Mining Act mentions that owners of private land will receive at least 20 percent of the total royalty paid for mining leases on the land. Mining companies pay the landowners directly and pay the balance to the State. The share of the state is then spent in the area and province where the mine is located. For example, in the

Tolukuma gold mine royalties are divided between the provincial government and the landowners at 20 percent and 80 percent respectively. The landowners’ share is further split among the three clans (16 percent each), landowners association (8 percent) and a future generation’s trust fund (24 percent)⁴.

State of South Australia (Australia): Taking a Holistic View of Sustainability, Through Creation of a Single Window Agency

The South Australian government, in order to take care of all sustainability issues holistically, has set up a body called PIRSA (Primary Industries and Resources of South Australia). PIRSA acts as a single window body to take care of all issues in setting up a mine starting from receiving application for the lease, evaluation, granting of permissions, periodic monitoring and renewal.

PIRSA works towards the achievement of the goals of South Australia’s Strategic Plan for exploration and resource development under the umbrella of the sustainability principle. The principle incorporates the ‘Triple Bottom Line’ approach which is a sustainability accounting framework that incorporates three dimensions of performance on sustainability viz. social, environmental and financial, measured by a list of specified parameters.

Granting of approval is a two-stage process which involves obtaining a mining lease followed by obtaining approval for mining. Post a tenement, a ‘Mining and Rehabilitation Program’ (MARF) is required to be approved under the Mining Act before mining may commence, and is reviewed by PIRSA during the life of the mining operation to assess adherence to sustainability.

As seen from this example, PIRSA is a single point of contact and coordinates with all involved government departments. In this way it is able to holistically review the overall sustainability plan.

3. Green Technology Financing Scheme, www.gtfs.my, accessed March 2010.

4. Mines and Minerals Development and Regulation Bill 2011; Centre for Techno-Economic Mineral Policy Options, November 2011.

Alcoa Model for Mining and Social Development: Engaging with Various Stakeholders without Necessarily Waiting for a Regulatory ‘Push’

This example illustrates how it is possible for companies to take proactive steps to engage with various stakeholders even without necessarily being obligated to do so by regulations.

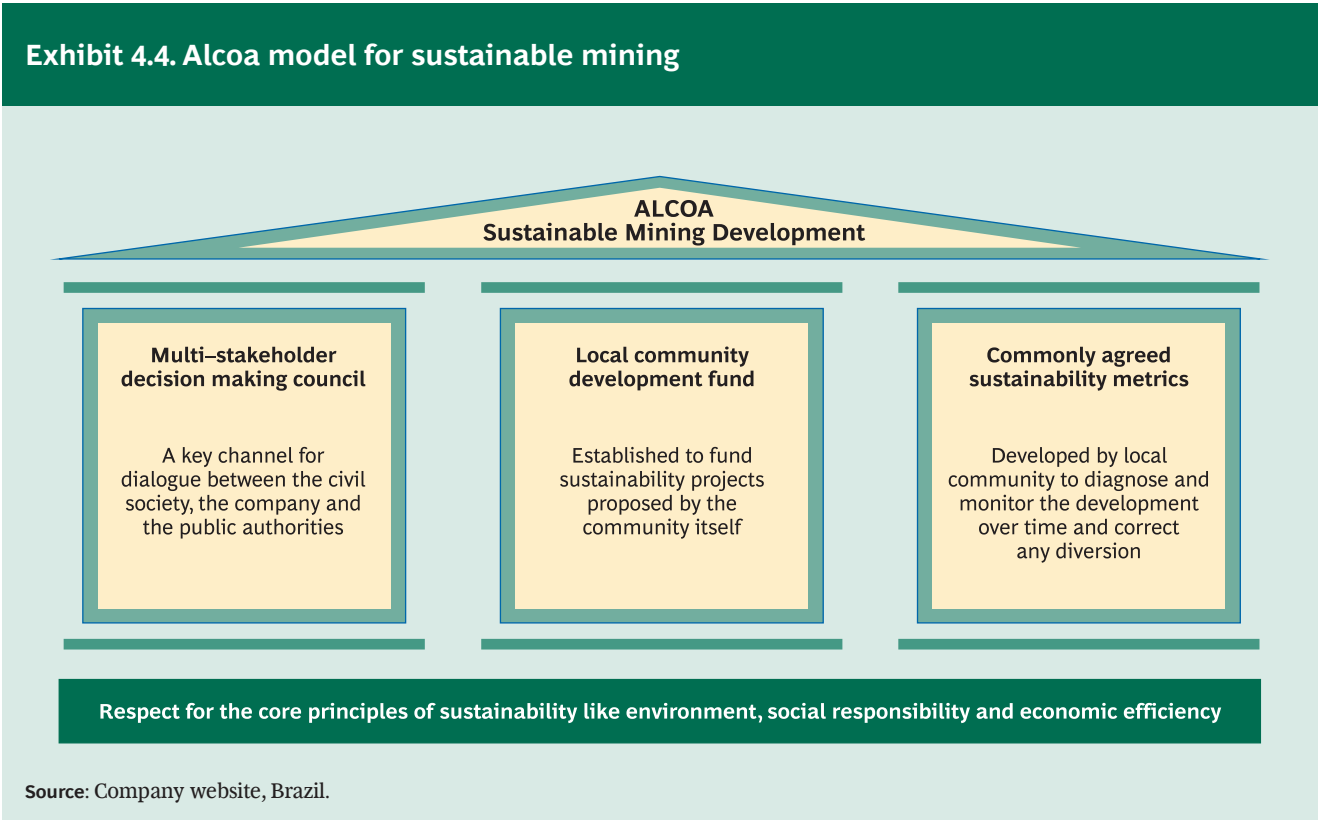
Alcoa’s approach to sustainable development at Juruti, known as the ‘Sustainable Juruti Program’ is a proposed model for mining and local development in the Amazon. It is based on three sustainability principles: respect for the environment, social responsibility, and economic success. The project aims at achieving sustainable development through mining and is based on three key pillars as illustrated in Exhibit 4.4.

- Multi-stakeholder council: The Sustainable Juruti Council (CONJUS), established in February 2008, serves as the key channel for dialogue between the civil society, the company and the public authorities. It brings together three representatives from the private

sector, three representatives from government institutions and nine representatives from civil society. The primarily role of this council is to guide and monitor the overall sustainability agenda of Juruti, collaborate with the private companies and government sector on such issues and to provide a forum for discussion and collective action towards sustainable development.

- Development fund: The Sustainable Juruti Fund (FUNJUS) has been established to allocate resources to be invested in sustainable initiatives proposed by the community itself. Launched on an interim basis, the fund is independently administered with initial allocation of resources from Alcoa. The Company has allocated US\$ 2 million, of which US\$ 0.5 million will be used in this experimental phase, lasting approximately two years. Some development initiatives have been taken in this regard⁵:
 - Construction of the Juruti Community Hospital and construction, refurbishment or expansion of various

5. Company website, Brazil.



health facilities throughout the region.

- Construction of 16 classrooms in eight municipal schools and an elementary school in the Maracana district.
- Construction of a legal complex, including the municipality's first courthouse and offices for court employees, as part of an agreement with the State Superior Court and the Juruti Municipal Administration.
- Creation of three deep water wells to provide fresh and clean water to city residents.

❖ **Metrics and Indicators:** A system of sustainability indicators and metrics has been developed by the community itself to diagnose and monitor the development over time and correct any diversion. The indicators were selected with inputs from over 600 community members, through town hall meetings and online consultation. These metrics cover and track sustainability aspects such as climate, air, noise, water, biodiversity conservation, environmental education,

medical facilities, etc. They help in better understanding of the sustainability targets and gaps as defined by the local community.

Multilateral Dialogue and Collaboration Across Stakeholders — Select Examples

One of the key challenges in developing mining projects is that all the three key stakeholders viz. the mining company, the government and the local community have their own views and stand on priorities and required actions. This results into stakeholder standoffs. However, a lot more can be achieved by a collaborative and constructive approach.

Exhibit 4.5 illustrates how the government and the mining companies are working together towards a common goal of benefitting the local community through sustainable mining.

In addition, as illustrated in Exhibit 4.6, the mining companies are also collaborating with the NGOs in addressing the local issues on sustainability.

Exhibit 4.5. Illustration of collaboration between government and mining companies for sustainable development

Initiative	Stakeholders	Description	Impact
A community development program in mines of Madagascar	 Government of Madagascar  RioTinto	• Nationals are trained to work as employees or suppliers in mining • Local governments are trained to become efficient in managing fiscal resources • Mine forestry committees have been established to improve biodiversity and land use planning • Short-term and some long-term trainings have been provided by the companies in mines	• 12,000 domestic jobs were created during construction of two mines • 5,000 full time jobs are expected at the two operations during exploitation • As per the proposed foundation to ensure income beyond closure of limonite mines, a regional cutting school and a jewellery making school were opened
A collaborative programme at Grasberg mine	 Government of Indonesia  Freeport-McMoran Copper & Gold	• Objective of the program is to develop the local human resource and their skills for vast operations • A training institute was opened where the course curriculum consists of 20% theoretical and 80% practical learning • Apprentices on job were recruited from the institute to hone their technical skills • Medical services and support for health initiatives were provided through partnerships with the health bureau	• Significantly contributed to low cost mining of copper in the region • For the first time, mining in a higher ore grade at the Grasberg open pit was done • In the second quarter of 2009, Freeport produced 403 Mlb of copper and 7,78,000 oz of gold, compared with 222 Mlb and 2,21,000 oz in the same period of 2008 • As many as 1,350 apprentices were recruited in support of underground expansion

Source: Press search.

Exhibit 4.6. Illustration of collaboration between NGOs and mining companies for sustainable development

Initiative	Stakeholders	Description	Impact
Diamond Development Initiative (DDI)	  	- DDI focuses on understanding and addressing the challenges faced by artisanal diamond mining communities which are usually extremely poor, marginalized and prone to conflict situations - It aims to create projects and initiatives that will have a direct impact on the communities involved as well as create constructive dialogue between all the stakeholders	- A number of educational programs for the artisanal miners have been initiated - Women empowerment programs and agricultural development programs started - A project in collaboration with “ONE SKY” started to develop capacity of society post diamond mining
Corporate community leadership program	 	- Objective of the program is to ensure sustainable development through active participation of the local community - Increase management understanding and awareness of community development by ensuring active participation	- An education program has been launched and is based on three key components: - Field exposures - De-briefing sessions - Input sessions - The two pilot CCLPs have enabled a total of 26 BHP Billiton employees to gain practical experience in examining complex social and environmental issues in a developing community

Source: Press search.

Companies Improving Coverage of Sustainability Initiatives to Cover a Broader Set of Activities

Many leading mining companies of the world have started going beyond the historical or traditional definition of sustainability. They are taking steps to overcome the broader sustainability challenges of managing environment, energy shortage, water scarcity and other adverse affects of mining. There are several innovative approaches and technologies which are being developed to meet the sustainability challenges.

In addition to adopting sustainable mining practices, these initiatives are also helping the mining companies gain efficiency, explore new business opportunities, and build brand reputation.

Exhibit 4.7 highlights selected initiatives taken by global mining companies on areas like water management, wastage reduction or reuse and leveraging alternative or green source of energy.

Global mining companies are bringing in innovative techniques targeted at reducing emissions and are also introducing measures for restoring and preserving the biodiversity of a region as illustrated in Exhibit 4.8.

Even the scope of social welfare initiatives undertaken by the companies is expanding. Companies are incorporating activities to promote talent development, local community monitoring and supply chain effectiveness. Exhibit 4.9 lists some of the social welfare issues being addressed by mining companies globally.

Compliance, Reporting and Execution Mechanisms are Being Evolved

Expansive reporting on sustainability

Globally, mining companies are reporting much more on sustainability. Given the need for transparency and importance of sustainability, leading mining companies globally are voluntarily reporting and adhering to several standards of sustainability. Exhibit 4.10 illustrates the point.

Exhibit 4.7. Illustrations of initiatives to ensure effective water usage, waste management and energy usage

Element	Company	Initiative	Impact
Water		Desalination plant at Moranbah North mine in Queensland operational in March 2010	Producing 2 million litres of potable water every day for surrounding environment as well as operations
		Processing plants for water recycling across their mines in Australia, Chile and South Africa	Use of recycled water used for dust suppression rose by 11% in 2010 as compared to 2009
Waste		Freeport-McMoran operates 12 active and 57 inactive tailings storage facilities	Post mine closure, the deposition is used for maintaining biodiversity
		End-of-life household appliances, electronic items recycled to source new metal	Reduction in quantum of metal mined to slow depletion of natural resources
Energy		Initiatives like optimising drying, mill production boiler efficiency improvement etc.	Energy intensity reduction of 5% from 2007 to 2010
		Xstrata Technology (XT) markets technology for an energy efficient large scale grinding machine e.g. IsaMill™	This technology has been successfully implemented into some of the world's largest mining operations
		Solar plant in Chile, installed power of 2.69 GWh will start running at the end of 2011	The plant will satisfy the consumption of electric energy for 2,000 houses
		- A third hydroelectric power plant in Karebbe - Vale started palm oil production from 2011, a raw material for biodiesel	- Hydroelectric power production to rise by 33% annually - Vale will become self-sufficient in its use of B20 in its Brazilian operations

Sources: Companies' sustainability reports; Press search.

Exhibit 4.8. Illustration of following initiatives to reduce emissions and manage biodiversity

Element	Company	Initiative	Impact
Emissions		Ventilation air methane project, a power plant that uses 20% of the extremely dilute methane in the mine ventilation air	Achieved reduction in GHG emissions of 250,000 tonnes of CO₂e (equivalent)
		Installation of a coal-seam methane-fired power stations in Moranbah North and Capcoal in Queensland	A reduction of 2.3 million tonnes of CO₂e annually
		New technology in process like AP technology, low emission HIsmet process etc.	Planned reduction of the emissions by 6% from 2008 to 2013
Biodiversity and land		Construction and maintenance of fire breaks and engaged in ecosystem protection activities, as in the Vale natural reserve (Linhares / ES)	Protection of areas that have been classified as Private Reserves of Natural Heritage, like the iron quadrangle of Minas Gerais
		Constructing and populating new habitat areas and implementing a concurrent monitoring and research program at The Hunter River in New South Wales, Australia	Required compensatory habitat area was reduced by approximately 85% through innovative design
		At Reitfontein, with the help of researchers, special trees and plants were selected for tolerance towards adverse conditions to remove pollution from land, air and water	- Species of endangered bullfrogs has returned - Jobs created for local people in nurseries

Sources: Companies' sustainability reports; Press search.

Exhibit 4.9. Illustration of various social initiatives undertaken by leading mining companies

Element	Company	Initiative	Impact
Talent	 VALE	• Vale promotes local community growth by training, financing and communication	• Talent management — Increased employee satisfaction, morale, motivation, and productivity
	 ANGLO AMERICAN	• Anglo American develops business capabilities in SMEs, supports women and handicapped in South Africa by funding them for new ventures	• Stakeholder relationship — Improved relationships with suppliers and local community
	 ESSO	• Esso has a program for development of local suppliers	
Involving local community	 BARRICK	• Barrick involves the local community in Peru to monitor water usage and prevent wastage	• Strong relationship with community in terms of trust
Health and safety	 FREEPORT-McMoRAN COPPER & GOLD	• Freeport-McMoRan launched a collaborative health program in partnership with the health bureau at the Grasberg Mine, Indonesia	• Medical services and support for health initiatives were carried out
	 ANGLO AMERICAN	• Launched the Thermal Coal HIV / AIDS program on HIV counseling and testing, awareness, education and prevention	• As per 2010, 95% of Thermal Coal's permanent workforce has undergone VCT and 89% have reconfirmed their status
Supply chain	 VALE	• The Inove program aims at enhancement of supply chain by training, financing, communication and competitiveness	• Greater community involvement with an efficient supply base and services along the value chain

Sources: Companies' sustainability reports; Press search.

Exhibit 4.10. Sustainability reporting and disclosure of commitment by global mining companies

		 bhpbilliton	 ANGLO AMERICAN	 VALE	 RioTinto	 xstrata
Certifications	Dow Jones Sustainability Index	✓	✓	✗	✓	✓
	FTSE4Good Index	✓	✓	✗	✓	✗
Voluntary commitments	Global Reporting Initiative	✓	✓	✓	✓	✓
	The United Nations Global Compact	✓	✓	✓	✓	✓
	Corporate Responsibility (CR) Index	✓	✓	✗	✓	✓
	The Copenhagen Communiqué on Climate Change	✗	✓	✓	✓	✗
	The Carbon Disclosure Project	✓	✓	✓	✓	✓
	Specific targets to reduce GHG emissions	✓	✓	✗	✓	✓
	Special stress on sustainability on the webpage	✓	✓	✓	✗	✓

Sources: Companies' websites; web search.

Exhibit 4.11. Eight actions proposed by RMDI to address recognized sustainability challenges in mining

Themes	Proposed actions
A Progressive capacity building and knowledge sharing	1 Utilize and contribute to a global repository of good practice guidance 2 Build training and development schemes to foster expertise across stakeholder groups 3 Conduct rigorous socio-economic study for common understanding of costs and benefits of mining
B Stakeholder engagement and multi-lateral governance	4 Develop multi-stakeholder national dialogue platforms 5 Set up local development councils for life-cycle planning and collaboration
C Lifecycle transparency and accountability	6 Publish relevant information: written agreements, tax and revenue data 7 Establish commonly agreed compliance monitoring and enforcement mechanisms 8 Develop and communicate effective conflict resolution mechanisms

Source: WEF-BCG RMDI initiative.

Governments are strengthening execution / compliance

Several governments have introduced provisions for strengthening compliance and ensuring adherence by the mining industry. For example, Indonesian laws provide for following:

- ♦ **Performance Guarantee for an effective mine closure:** Since 1997, Indonesia's Director General of Mining requires mine operators to post a reclamation guarantee reflecting the value of the potential environmental damage the mining operation could cause. In case the performance by the operator is less than satisfactory, the amount is retained by the government and the operator loses claim over the guarantee.
- ♦ **Performance Evaluation and Rating to reduce pollution:** The Indonesian government has introduced a 'Program for Pollution control, Evaluation and Rating' (PROPER) to rate companies on compliance with respect to national wastewater discharge standards. Ratings are provided through a five-color coding system (gold, green, blue, red and black) where

each color quantifies the level of effective compliance ranging from best to worst. Depending upon the color code, formal as well as informal actions are taken. For example, the Indonesian stock exchange does not list securities of firms that fall short of the blue classification. Cultural factors, such as shame avoidance and citizen lawsuits also play a role in motivating polluters to improve their rating. The results have been overwhelming. In the first survey in June 1995, 35.3 percent of the 187 factories were in compliance with the government's water pollution regulations. Two years later, 49.2 percent of the factories were in compliance⁶.

Eight actions identified under the RMDI initiative

The RMDI initiative of WEF, in coordination with BCG, has identified eight key actions, as illustrated in Exhibit 4.11, towards enabling sustainability in mining. The team is working on compiling best practices on these action items and is likely to publish these best practices in 2012.

6. Incentive based policies for environmental policies management in developing countries, Robert C. Anderson, August 2002.

Conclusion

Sustainability challenges, similar to that of India, have been faced globally in the past and are also being faced currently by many countries. There are several examples and best practices that have been employed to tackle these challenges and can be leveraged in Indian context.

The following chapter aims at developing a set of recommendations in the Indian context by juxtaposing the challenges discussed in Chapter 3 with the examples and best practices discussed in this chapter.

Way Forward for Sustainable Mining in India

To recap, two key demographic megatrends — a rapidly rising global population and increasing affluence in populous emerging economies — are driving an unprecedented growth in global demand for natural resources. Growing demand coupled with relatively abundant supply of key minerals in India suggests potential for significant growth of the mining sector in India. However, the continued and potentially higher growth of mining sector in India could leave profound marks on the environment and raise several environmental, social and political challenges. In view of this, two key questions need to be answered in solving the sustainability–growth conundrum for the Indian mining industry:

- ◇ How can the government most effectively drive the sustainability agenda for mining in India? What is the right institutional framework that best addresses the sustainability challenges faced by the mining industry?
- ◇ What is the role of Indian mining industry in ensuring wider and more comprehensive adoption of sustainable mining practices in India? What is the specific action agenda for the mining industry, to drive sustainability in mining?

These issues and the questions raised above are not necessarily unique to India. As discussed in the preceding chapter, mining companies and governments across the world have made attempts, with varying degree of success, to address these issues. There are learnings for India from the examples presented in the previous chapter. These learnings, nuanced to take into account the specific context of India, are a starting point for defining answers to the aforementioned questions.

What Will The Solution Look Like?

We believe that the solution is in three parts, with one part each coming in from the three key stakeholders — the government, the mining industry and the NGOs (representing the local communities).

Recommended agenda for the Government

- ◇ Create and strengthen institutions to effectively drive sustainability agenda
 - Set up a Centre for Integrated Geo–Social–Land Ownership Mapping.
 - Set up State Sustainability Councils (SSCs).
 - Make it mandatory to have a Local Development Council (LDC) for each major mining project.
 - Set up specialised Land and Community Development Corporations (LCDCs).
 - Mandate independent certification for all sustainability aspects.
- ◇ Bring higher degree of transparency with regard to sustainability.

Recommended agenda for companies

- ◇ Proactively create forums for engaging with local communities (through LDCs).
- ◇ Proactively adopt global reporting standards.
- ◇ View sustainability beyond ‘Licence to Operate’ and more as a ‘Source of Competitive Advantage’.

- ◇ Raise the bar on quality of execution for sustainability related initiatives.

Recommended agenda for the NGOs

- ◇ Adopt collaborative approaches at all stages of mining:
 - Act as an advisor and mediator for the mining companies and local community.
 - Bring global best practices on sustainability to the mining companies and local community.
 - Support and constructively participate in the Local Development Councils.
- ◇ Play an active role in promoting sustainability in small scale mines by supporting the merchant miners and helping tackle illegal mining.

Recommendations for Government

Strengthen institutional Set-up

For any regulation to be effective, it needs to be backed by a strong institutional set-up. A set of independent

bodies, which are trusted, leveraged by all stakeholders and whose incentives are aligned with the intent of the regulations, are required. In the Indian context, given the challenges that exist, following institutions need to be set up or strengthened (as shown in Exhibit 5.1).

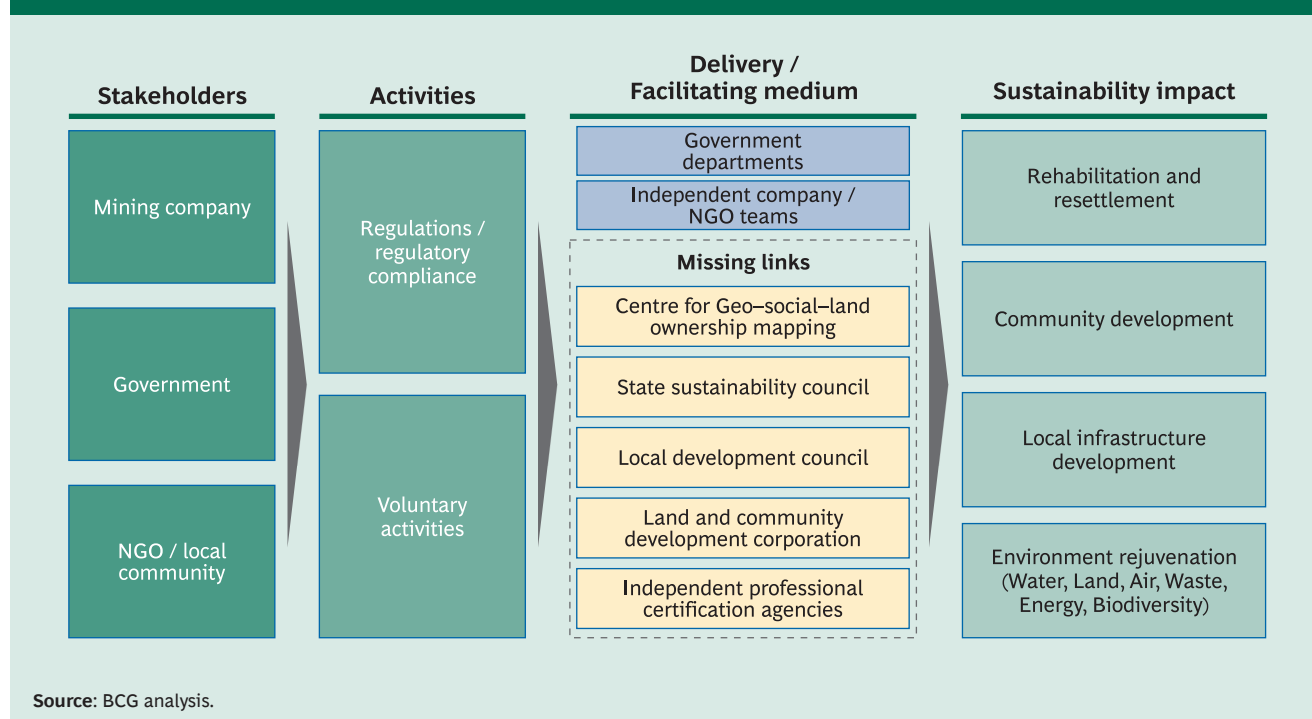
Centre for Integrated Geo-Social-Land Ownership Mapping

Recommendation: Set-up a national level Centre for Geo-Social-Land Ownership Mapping. This centre can be an extension of the current Geological Survey of India (GSI).

Rationale: As discussed in Chapter 3, currently, a very small proportion of mineral resources in India has been mapped and that too based on outdated techniques. The GSI is taking initiatives towards adopting improved and advanced technology for detailed exploration of minerals. However, this is not sufficient unless the mapping also covers ecology, land and social infrastructure.

Role: To undertake a detailed exploration and mapping exercise by the combined efforts of the GSI, Ministry of Environment and Forests, Ministry of Water Resources,

Exhibit 5.1. Setting up strong institutional framework critical for effective sustainability in mining



Ministry of Tribal Affairs, etc. alongwith active involvement of the respective state government departments and to prepare a comprehensive database which covers following:

- ◇ Mineral resources.
- ◇ All the aspects of environment viz. water availability, forests, biodiversity, land quality, air quality, etc.
- ◇ Social aspects like population, nature of community, occupations, income levels, lifestyles, culture, etc.
- ◇ Details of all land ownership with clear titles. This becomes critical since, during land acquisition process, it has been observed that adequate land records are not available or traceable. Multiple owners appear for same piece of land and negotiation / compensation becomes a never ending process. Further, not all land records are currently in digital format leading to challenges of traceability with respect to older records in government land departments.
- ◇ Social infrastructure that exists in various regions so as to indicate what all needs to be recreated during rehabilitation and resettlement.

The database should be updated regularly and made available to companies to factor in the information in developing their mining and sustainability plans.

State Sustainability Councils (SSCs)

Recommendation: Set up State Sustainability Council (SSC) in each state, that acts as a nodal agency for all issues related to sustainable mining in that state and for coordinating a ‘single window’ clearance for mining projects based on sustainability plan proposed by the mine operator.

Composition of the council: Multi-stakeholder council, with adequate representation from various stakeholders — state government, industry and NGOs / bodies representing local communities. Functioning and administrative support to the SSCs can be provided by setting up a separate body under law or setting up a state department.

Rationale: Sustainable mining involves balancing across various objectives and trade-offs. It is a process of

negotiating the best possible outcome for the country, society and the mining company. However, as discussed earlier in Chapter 3, the Acts and Regulations dealing with sustainability in India lack a holistic approach. Also, with the involvement of so many stakeholders, national / state / local governments and departments to obtain clearances, the process becomes tedious and long winding. No single agency has a full perspective of all key elements of sustainability.

Role: Acting as the central authority for sustainability in the state, the SSCs should:

- ◇ Debate and define various aspects of sustainability policy in the state.
- ◇ For a proposed mining project, conduct a holistic review of the sustainability plan, provide recommendation on approval / denial and coordinate with different ministries / bodies for obtaining the required clearances.
- ◇ Weigh various trades-offs and negotiate mining terms and conditions with companies and other stakeholders for sustainable development.
- ◇ Regularly review the activities carried out by the mining companies by monitoring and policing of the terms of the mining lease from time to time.

A few countries have already taken initiatives in this regard, for example, PIRSA (Primary Industries and Resources of South Australia), as discussed in Chapter 4, acts as a nodal agency for mining leases in South Australia. Learnings from this and various other models can be extended.

Local Development Councils

Recommendation: Make it mandatory to set-up a Local Development Council (LDC) for each major mining project. The LDC will be a platform for the local community to:

- ◇ Engage with other stakeholders in a structured way.
- ◇ Engage in proactive planning and execution of various aspects related to mining and sustainable development.

- ◇ Manage funds generated by way of community's share from mining activities.

Constitution: LDC should be a multi-stakeholder council. It should consist of representatives from local community, local administration, mining companies and NGOs.

Rationale: As discussed, in Chapter 3, currently there is limited involvement of local community in making various decisions related to mining. Further, though the local community is most impacted by mining, the benefits of mining do not directly flow to the local community. Currently, the royalty income goes to the state governments and there is no standard provision requiring the state governments to spend a specific portion of that royalty for the benefit of the community impacted.

Role: The LDCs should engage in following set of activities.

- ◇ Develop a long term community development blueprint with a 5 year, 10 year and 20 year outlook.
- ◇ Develop a perspective and plan for land use and mining development in the area.
- ◇ Negotiate compensations for land acquisition, rehabilitation and contribution from mining companies towards local community funds and development. The plan so negotiated should be forwarded by the mining companies to State Sustainability Councils (SSCs) as part of the sustainability plans.
- ◇ Define metrics and indicators for assessing the sustainability performance of the mining companies in the local area.
- ◇ Once the mining plans and sustainability plans are agreed upon, assist mining companies in executing the plans.
- ◇ Review sustainability performance of mining companies as per agreed metrics.
- ◇ Effectively manage funds generated by way of contribution from mining company towards the community.

- ◇ Plan for promoting alternate businesses and industries which will continue to exist beyond the mining tenure.

- ◇ Plan and manage long term sustainability of the community. Create assets for the long term benefit of the community and future generations post mining.

In this regard, it will be useful to leverage the models being studied and developed by RMDI for Local Development Councils.

Land and Community Development Corporations (LCDCs)

Recommendation: Set-up Land and Community Development Corporations (LCDCs) in every state. These LCDCs will be specialized bodies engaged in land acquisition, rehabilitation and resettlement.

Constitution: There are two options in this regard. LCDCs can be set up as state bodies akin to State Industrial Development Corporations or they can operate as private companies.

Rationale: Two of the key challenges in sustainability viz. land acquisition and rehabilitation / resettlement occur at the time of initiating mining and mine closure.

The process of land acquisition and rehabilitation / resettlement is a complex exercise:

- ◇ It is critical to ensure that the right landowners are compensated. Many times the land records are not appropriately maintained leading to several claimants, litigations and delays.
- ◇ Appropriate compensation also needs to be determined for the land acquisition.
- ◇ The whole rehabilitation / resettlement exercise involves relocation of several people and re-establishment of the livelihoods, social setting and infrastructure. This differs from geography to geography.

Further, when a mining activity in an area extends for about a decade or more, a mining community comes into existence around the mine. The closure of a mine implies loss of livelihood for several people as well as the

disruption of the community life. This again raises the need for rehabilitation / resettlement. The planning and action for this, however, needs to start much before the mine closure. The problems of resettlement are similar to those that are faced at the time of mine initiation.

The whole process of land acquisition and rehabilitation / resettlement is a specialist job, requiring thorough understanding and experience of the process (which will vary from state to state), ability to navigate through the issues of incomplete land records, society engagement, and complexities of rehabilitation / resettlement.

Role: The LCDCs will be specialist agencies, with the following roles

- ◇ Acquire land.
- ◇ Implement rehabilitation and resettlement.
- ◇ Develop relevant infrastructure.

Further, for executing their roles, the LCDCs can act:

- ◇ On their own to acquire relevant lands and form land banks which they can then sell to the mining companies later on.
- ◇ As agents for commission acting on behalf of mining companies.

Independent Professional Certification Agencies

Recommendation: Allow independent professional bodies who are experts in matters relating to sustainability to assess and certify various aspects related to sustainability.

Constitution: The Sustainability Auditors can be independent professionals who are qualified by a body established under an Act or Regulations notified by the central government — a structure similar to the profession of Chartered Accountants.

Rationale: It is critical to establish an independent agency for reviewing and certifying various aspects of sustainability because of following reasons:

- ◇ As shown in Exhibit 5.2, currently, most mining leases in India are small scale and artisanal. Out of 10,488

mines (excluding fuel, atomic and minor minerals), about 5,318 (~50 percent) have lease area of less than 5 hectares in size.

- These small and fragmented mines create a monitoring and compliance challenge for the existing stretched resources of the government.
- The challenge is accentuated further, because, the small scale mine operators have limited incentive or expertise to take adequate steps towards sustainability

◇ Further, a set of issues arise between the mining company, government, local communities and NGOs due to lack of trust.

◇ Currently, there is no independent assurance whether the mine development plan and sustainability plan as proposed by the mining company are appropriate and comprehensive. In fact, the plans may not be reviewed appropriately by the local communities / NGOs as they may lack the desired skills to do so or may be biased.

◇ Even the mine closure plans need to be appropriately reviewed to assess:

- Plan for restoration of the bio-diversity and ecology.
- Adequacy of the performance guarantee provided for ensuring effective mine closure.
- Plan for post closure rehabilitation and resettlement.

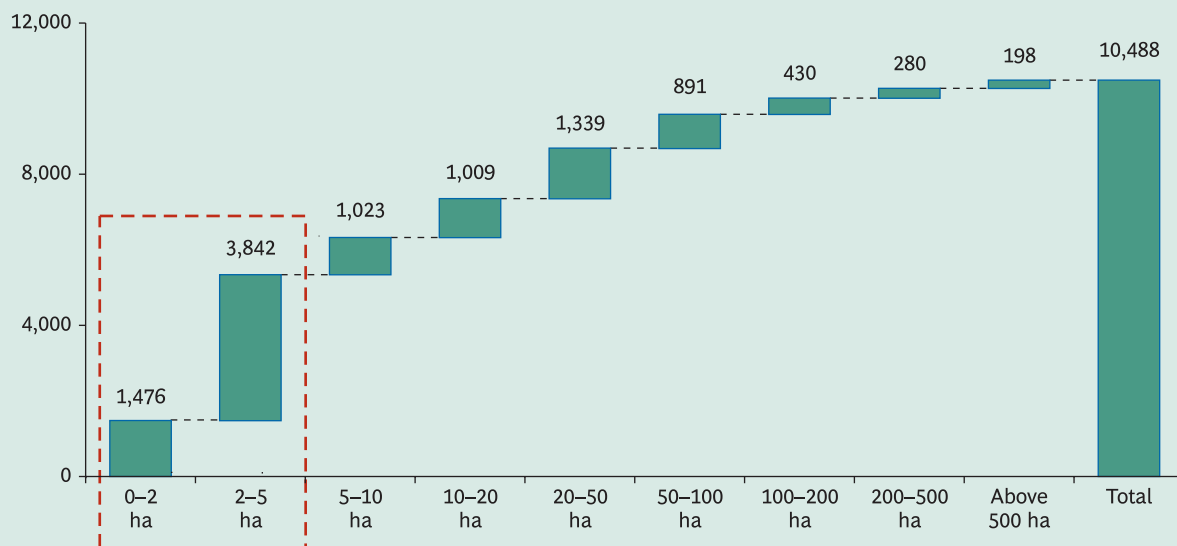
Role: These certification bodies should assess and express true and fair view with regard to the sustainability aspects on the following:

- ◇ Various plans required to be made as a part of the sustainability requirement, for example:
 - Mining plan.
 - Sustainability plan.
 - Rehabilitation and resettlement plan.
 - Mine closure plan.

Exhibit 5.2. Distribution of mining leases in India by area (2010)

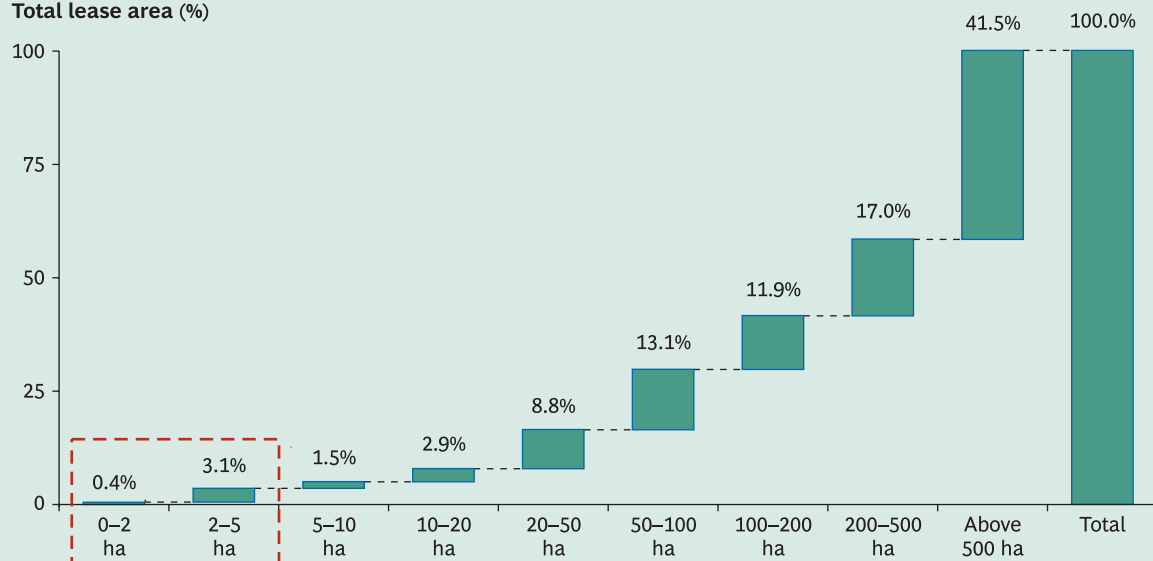
More than 50% of mining leases are for an area of less than 5 hectares...

Number of mining leases



... however aggregate area covered under the small mining leases is only ~3.5%

Total lease area (%)



Source: Indian Bureau of Mines.

They should assess these plans for their appropriateness, adequacy and coverage.

- ◆ Actual performance against the above sustainability plan, rehabilitation / resettlement plan and mine closure plan.
- ◆ Company's performance on various sustainability parameters at regular intervals.

Various guarantees and escrows created by the mining company in favour of various stakeholders, to ensure performance against the above plans, should be released only on the basis of an unconditional certificate issued by these agencies.

Bring higher degree of transparency with regard to sustainability

There is a need to bring in a higher degree of transparency in the system. For example, there is a need to evolve standard reporting mechanism for sustainability and monitoring.

Currently, the Corporate Social Responsibility (CSR) activities in India are governed by the guidelines issued by the Ministry of Corporate Affairs in December 2009. They are based on the fundamental principle that the company should formulate its own CSR policy and allocate appropriate budget for it. The reporting of the budget, activity details, etc. are however all voluntary, diluting the intended impact. There are no standards available against which the sustainability performance of the companies can be effectively assessed.

Hence, there is a need for a standard comprehensive template for reporting the sustainability activities. The whole concept of sustainability should be treated as a separate business subsidiary with its own set of objectives, budgets, priorities, activities, expenditures and benefits which should be reported regularly. The standard template should also lay down the parameters against which the performance of the company can be assessed. Currently, only a small portion of activities that come under CSR are reported by the companies and since that too is voluntary, it is not comparable / reviewable.

As a step in this direction, the government should consider adopting one of the internationally recognized

standard reporting frameworks available for mining. For example, the Global Reporting Initiative framework sets out the principles and performance indicators that mining companies can use to measure and report their economic, environmental and social performance.

Recommendations for Companies

Adopt a more proactive approach

Recommendation: Companies should proactively:

- ◆ Take steps to create forums like Local Development Councils (LDCs) for engaging with local community and other stakeholders, even if not mandated by law. Alcoa's initiative in Juruti mines in Amazon (as discussed in Chapter 4) is an example of such a proactive approach by a company.
- ◆ Adopt global reporting standards on sustainability to bring in more transparency.

Rationale: As discussed in the previous chapters, the mining sector has substantial potential to grow. This is driven by a set of positive factors both on demand and supply side, proposed regulatory changes and infrastructure investment. However, this growth in mining is not possible unless there is more widespread and comprehensive adoption of sustainable mining principles.

There are several examples to show that without sustainable mining plan and practices (including active involvement of local communities), mining projects get delayed or stalled indefinitely. Thus, it is in the interest of the mining industry to be more proactive and voluntarily drive sustainability initiatives across different elements, even if regulations do not mandate them to do so.

As discussed in the Chapter 3 and the earlier section on recommendations for government, there is a lack of an appropriate institutional framework in India's mining sector, especially a common forum for actively engaging with local community and other stakeholders. This results in oppositions, disputes and delays which hinder the growth of the mining sector. The government will, over time, take steps in this direction as a part of its policy initiatives. However, as mentioned earlier, it is in the interest of the mining companies that the institutional gap is bridged at the earliest.

Further, as discussed earlier, it is currently difficult for stakeholders to get a detailed perspective of a company's sustainability activities. The current Corporate Social Reporting provisions are discretionary in their coverage. As a result not all the ten elements of sustainability critical in mining (as shown in Exhibit 2.2) are covered.

Adopt a broader perspective for sustainability

Recommendation: Companies need to develop sustainability initiatives in a more comprehensive fashion, covering all the ten elements of sustainability in mining as outlined in Chapter 2 (refer Exhibit 2.2). They should view sustainability as a means to gain competitive advantage rather than just a compliance requirement or a social 'license to operate'.

Rationale: Sustainable initiatives can lead to several sources of competitive advantages. A company can use three lenses, as shown in Exhibit 5.3 to identify / assess these:

◇ New business opportunities.

◇ Efficiency opportunities.

◇ Intangible benefits.

New business opportunities: Given the fact that the natural mining resources are limited and will get depleted at some point of time in future, diversification through sustainability can lead to new business opportunities which can create additional value. In order to identify the list of relevant opportunities, mining companies need to scan the emerging megatrends in sustainability space. Exhibit 5.4 illustrates a range of new business opportunities that a mining company can evaluate in green space.

Efficiency opportunities: The process of transforming a company into a greener venture can also be a source of cost reduction opportunities along all steps of the internal and external value chain. Exhibit 5.5 lays out an illustrative framework for identifying efficiency opportunities across the value chain.

Intangible benefits: Working on implementing a sustainable strategy can additionally contribute to a set

Exhibit 5.3. Mining companies' transformation towards sustainability as a 'source of competitive advantage' can lead to new opportunities to create value

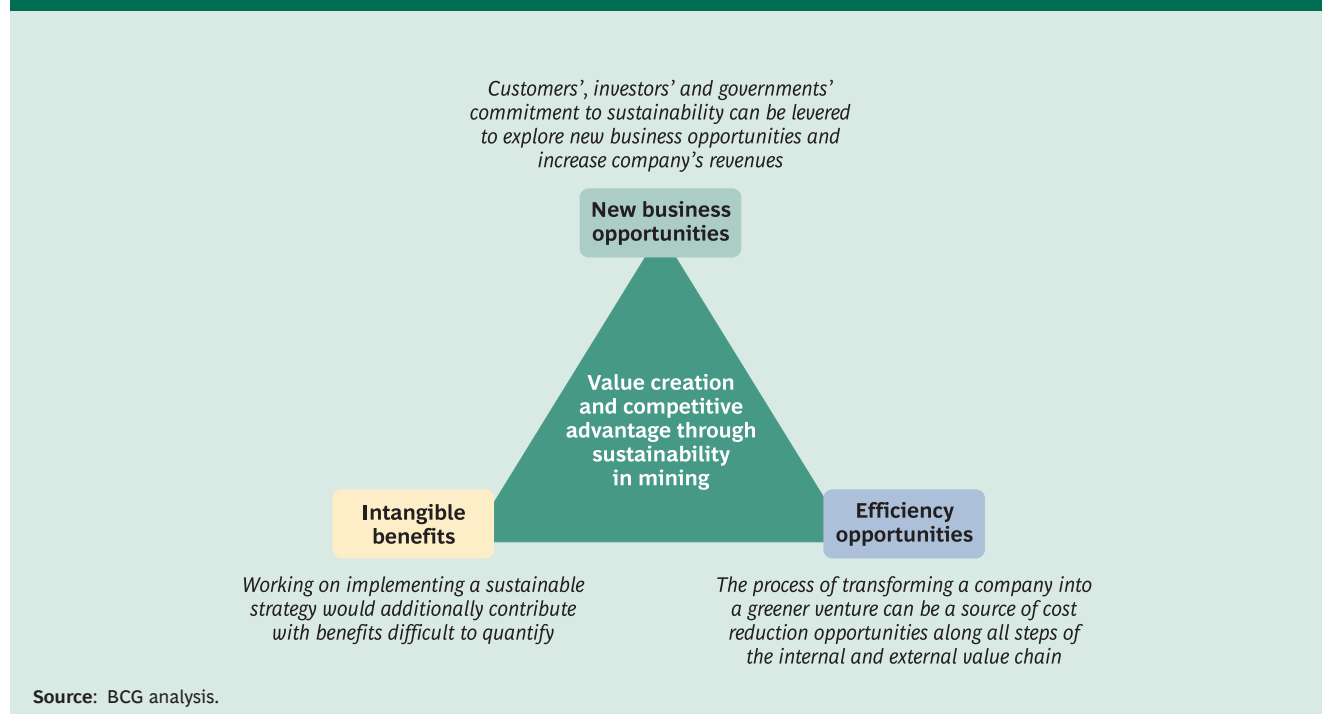
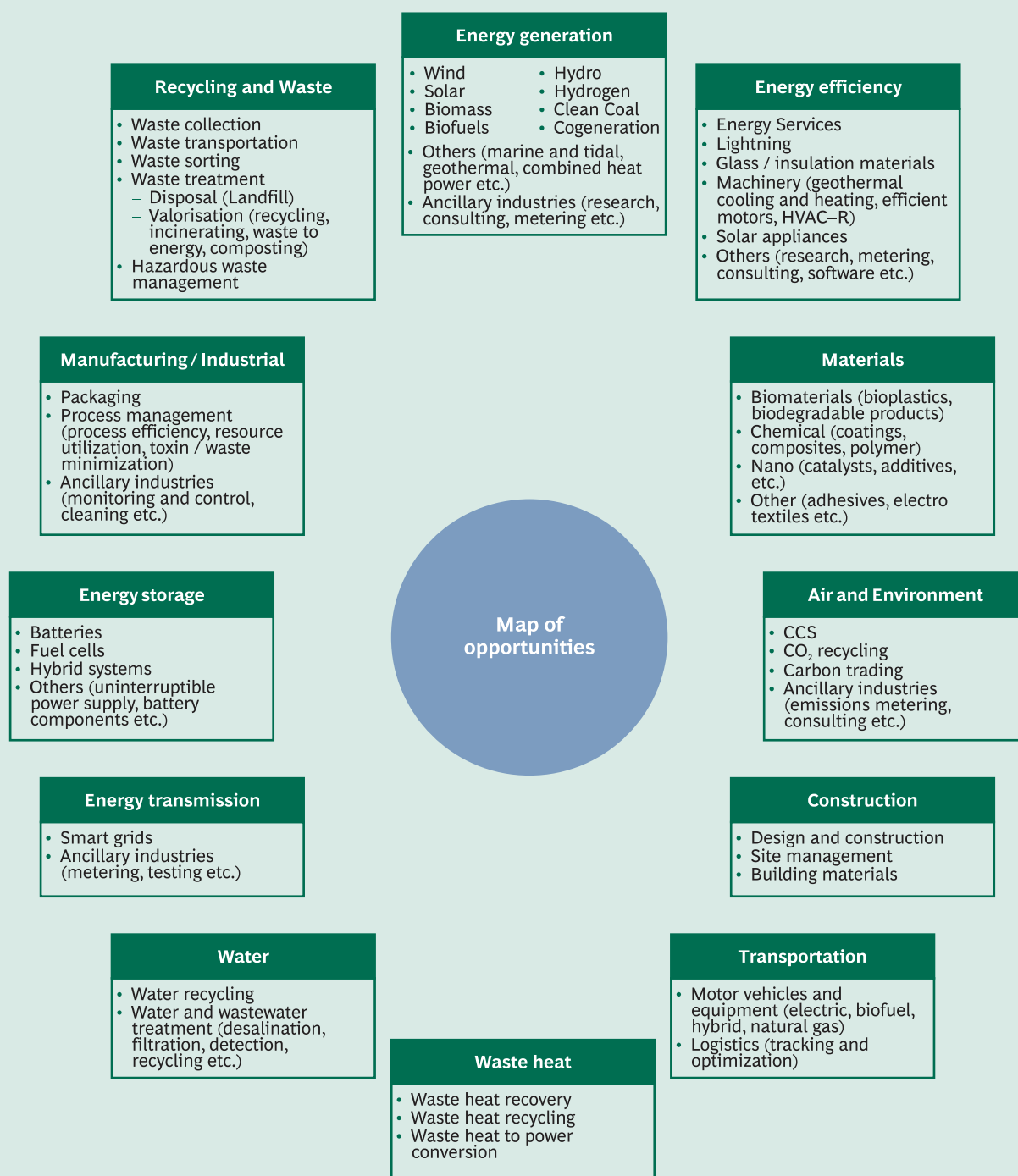
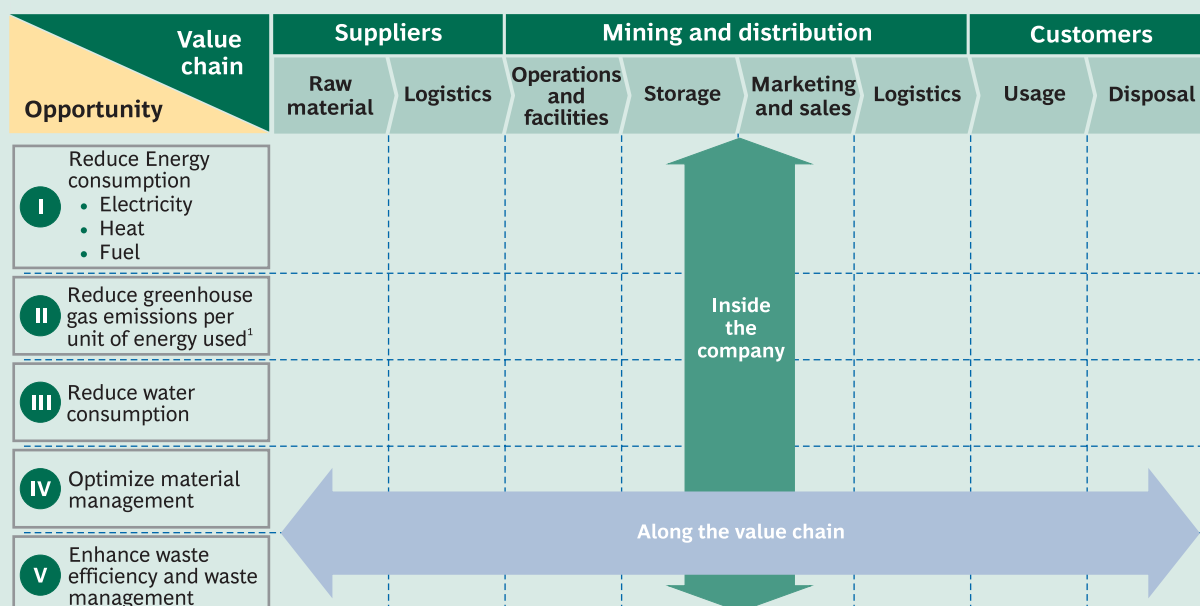


Exhibit 5.4. Sustainability: Road to a whole new world of business opportunities



Sources: Pew Charitable Trust, US Department of Commerce; BCG analysis.

Exhibit 5.5. Efficiency opportunities inside the company and along the value chain contribute to creating competitive advantage



Source: BCG analysis.

¹Reduce GHG emissions per unit of energy used through usage of renewable / cleaner energies, carbon capture or by any other means.

Exhibit 5.6. Implementing a sustainable strategy additionally contributes with other intangible benefits

Type of benefit		Main potential achievements
	Talent management	• Improves ability to attract, engage and retain talent • Increases employee satisfaction, morale and motivation • Increases employee productivity
	Brand	• Improves the perception of how well the company is managed • Improves brand reputation • Improves customer loyalty (lower rate of churn) • Increases pricing power and / or market share
	Stakeholders relationships	• Improves relationships with suppliers, community and government • Facilitates business partnerships • Enhances stakeholder / investor relations • Provides greater access to capital, financing and insurance
	Innovation and differentiation	• Facilitates better innovation of product / service offerings • Increases innovation of business models and process • Allows differentiation from competitors
	Risk mitigation	• Mitigates risks (associated with not fully addressing sustainability issues) • Manages regulatory compliance (maintaining license to operate) • Lowers cost of capital

Source: BCG analysis.

of intangible benefits which can lead to a competitive advantage as demonstrated in Exhibit 5.6.

Viewing Sustainability in a broader perspective and as a ‘source of competitive advantage’, will also ensure that sustainability gets its due importance, and becomes core to decision making.

Ensure effective execution

Recommendation: Raise the bar on quality of execution of sustainability related initiatives.

Rationale: As discussed in Chapter 3, this is one area where more often than not companies falter. Companies do have the right intent, however, the tightness with which other operating departments are managed is not always true for sustainability. There is a vicious cycle of not so effective execution leading to not so concrete results and not so concrete results discouraging need for effective execution.

However, when a company starts visualizing sustainability as a source of competitive advantage and thereby a core part of its business strategy, the focus on execution needs

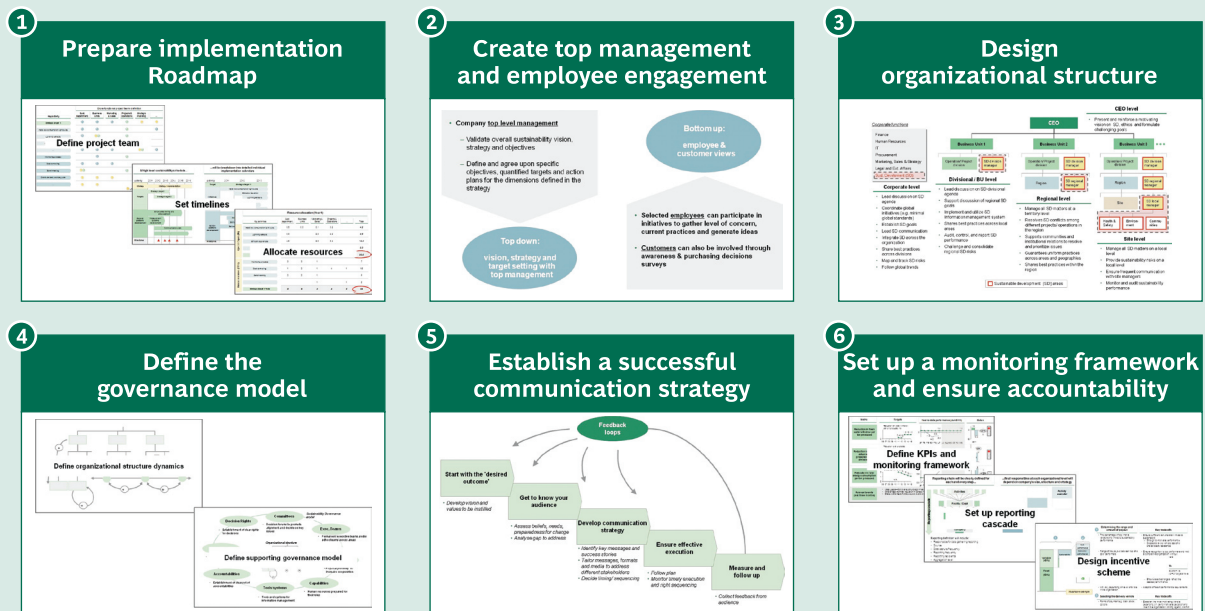
to become sharper.

Process: Exhibit 5.7 highlights key steps the industry can take to successfully execute sustainability initiatives.

Often all plans do not take-off or are not executed well due to lack of visible commitment from the top management and hence employees. The difference between sustainability remaining a ‘buzzword’ and a reality is determined by how much commitment does the top management show to the topic of sustainability. In the words of Will Day, Chairman, UK Sustainable Development Commission — “Where sustainability works best is where an organization’s leadership gets it and wants it to happen and enables it to happen — so everyone from the person who sweeps the floor to the finance director feels part of that conversation”. Exhibit 5.8 further illustrates the point.

It is also critical to define key metrics to measure progress against sustainability initiatives and to track them. Exhibit 5.9 shows illustrative set of metrics that can aid monitoring of implementation initiatives.

Exhibit 5.7. Key steps to ensure a successful execution of sustainability initiatives

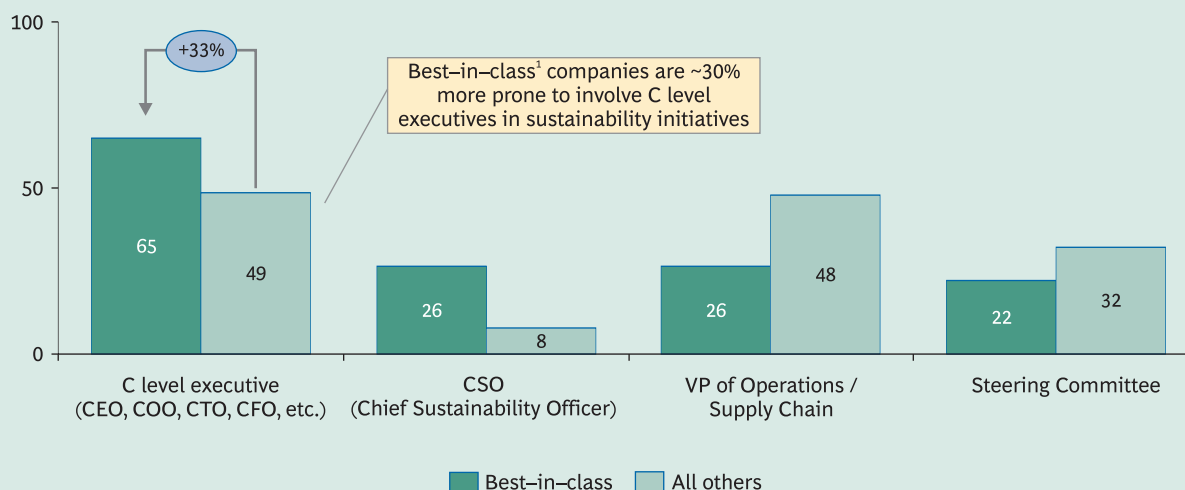


Source: BCG analysis.

Exhibit 5.8. Top management commitment and employee engagement core to effective execution of sustainability initiatives

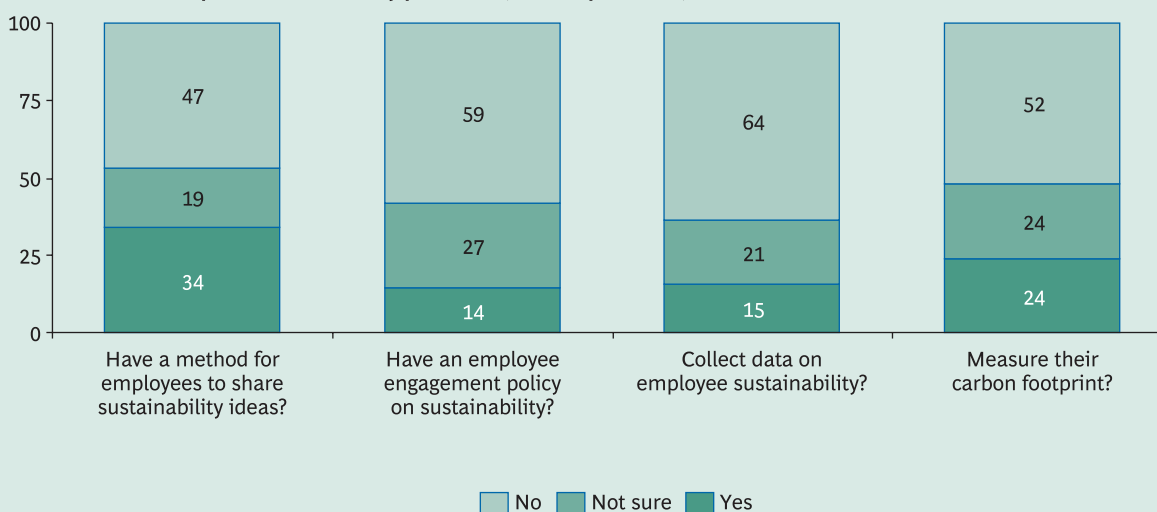
CEO's commitment with sustainability can translate into actions leading to superior sustainability plans

Sustainability initiatives decision makers by statement (% of companies)



Employees believe there is room for improvement to enhance employee engagement

Prevalence of workplace sustainability practices (% of respondents)

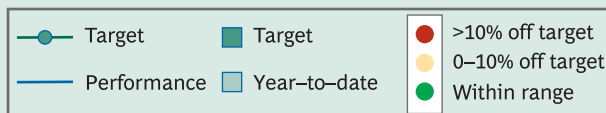
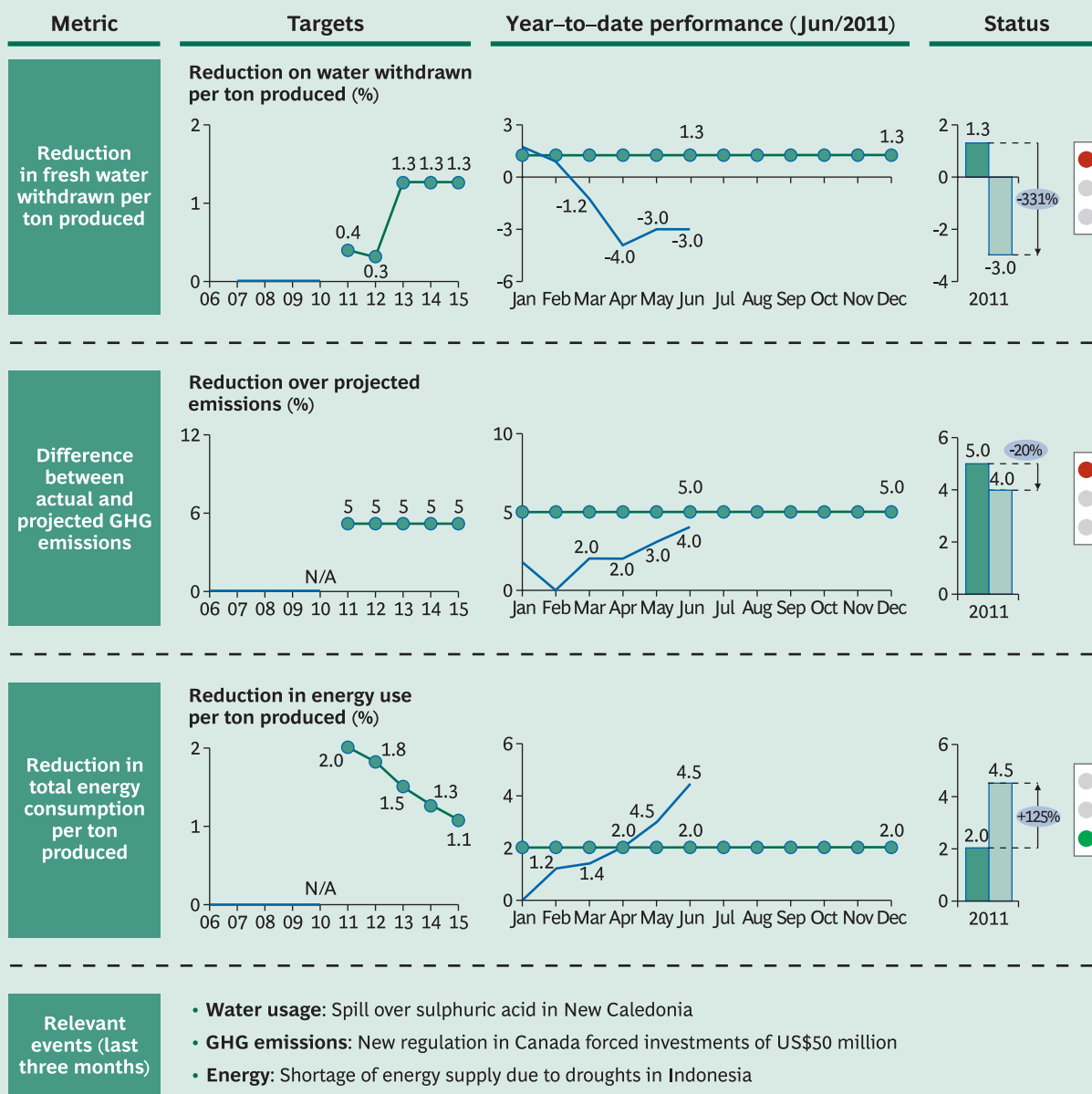


Sources: Results on a survey done for more than 230 global companies included in the report 'Sustainable production: Good for the plant, good for the planet' of Aberdeen Group (September 2009); 'A New Era of Sustainability' UN Global Compact-Accenture CEO Study (2010); 'Employee Engagement Survey', Brighter Planet (February 2010).

¹The report used 4 different KPIs to determine best in class performance: overall equipment effectiveness; reduced energy consumption, reduced emissions, outperformance of corporate margin goals.

Exhibit 5.9. Example of a monitoring framework

Illustrative example



Source: BCG analysis.

Raising the bar on execution will also require mining companies to ensure accountability for performance and link compensation and incentives to the progress of sustainability related initiatives. For example:

- ◇ At Natura¹, 20–30 percent of variable compensation is attached to socio–environmental performance. Further employees are required to achieve at least 80 percent of their sustainability targets in order to be eligible for bonus.
- ◇ At Shell¹, non financial related short term incentives can reach a maximum of 18 percent of the base salary and include things like triple bottom line performance (planet, people, profits).
- ◇ At Xcel energy¹, financial targets represent 33.34 percent of the annual incentive and non financial targets represent 66.66 percent (33.33 percent for GHG emissions profile and 33.33 percent for safety targets).

Recommendations for NGOs / Local Communities

NGOs play a key role in becoming the voice of local community. In order to take the agenda of sustainable mining forward, they should strive to adapt much more on the constructive side of their actions. The key recommendations for NGOs are as follows:

Adopt collaborative approaches at all stages of mining

Act as advisor and mediator between management and local community

Recommendation: NGOs should act as facilitators and mediators between the mining companies, local community and the government by:

- ◇ Helping mining companies understand the local scenario better and requirements for sustainable development in the local area better
- ◇ Driving a positive consensus between the local community and the company
- ◇ Acting as a watchdog to ensure fair distribution of social benefits to the local community

- ◇ Helping local community develop skills for mining jobs in tune with the company requirements

Rationale: NGOs are often deeply involved with the local community. Therefore, they have a much better perspective of challenges of the local community and environment.

Bring the best in class practices

Recommendation: NGOs should leverage the experiences and best practices from other countries and bring them to the mining companies / the areas they operate.

Rationale: Many NGOs have global operations and / or often interact with their counterparts in other countries. By bringing in global practices, they can demonstrate a solution oriented approach to the issues of sustainability and get a constructive dialogue activated.

Support and constructively participate in local development councils / forums

Recommendation: NGOs can support the local community by:

- ◇ Supporting the creation of Local Development Councils / forums on the principles discussed in section on recommendations for government
- ◇ Helping the Local Development Councils review the overall sustainability plan developed by the mining company. They should ensure that all aspects of sustainability are catered to.
- ◇ Ensuring that when the mining lease is finalized, all provisions of the agreement are well documented and metrics for measuring sustainability performance are well defined.
- ◇ Bringing all the required expertise (planning, fund management, etc.) to the local community to ensure effective operation of the local development council.

Rationale: Most of the NGOs working in the mining space have more formal understanding of the technical aspects of the sustainability plan than the local community. They can also leverage their learnings from

1. Companies' websites and annual reports.

other projects and global experiences much more effectively for the benefit of the local community.

Play active role with regard to small scale mining

Address the interests of the merchant miners

Recommendation: To best address the needs of sustainability and interests of the merchant miners, NGOs should:

- ◇ Ensure that even on small scale, mining is carried out in a responsible manner and miners adhere to basic principles of sustainability.
- ◇ Provide the small scale miners the wherewithal and knowledge with respect to sustainability.
- ◇ Bring them together under a collective body and help them implement sustainable practices. They can also bring in a sustainability certification, in coordination with local trade associations, which can be a critical requirement for dealing with the mining output in local community.

Rationale: Majority of mines in India are small scale operations. As discussed earlier, the small scale miners do not have adequate incentive or expertise to employ sustainable practices. The NGOs can help bridge this gap by providing them the required assistance and guidance in implementing sustainability practices.

Raise Awareness regarding illegal mining

Recommendation: NGOs should raise awareness against illegal mining by active reporting, escalations, filing Public Interest Litigations and involving media at the regional and national level.

Rationale: NGOs are well embedded in the local community. They have much more appreciation of the adverse impacts of illegal mining. They also have appropriate muscle, as compared to common individuals of the local community, to take stands against anti-social elements.

Conclusion

To conclude sustainability and growth are two sides of the same coin. Solving the conundrum requires all stakeholders to go beyond the perspective of sustainability as a 'license to operate'. Government needs to strengthen the institutional mechanism and bring higher degree of transparency. Companies need to be more proactive and think beyond the basics. NGOs need to lean more on their constructive side. Last but not the least, all the stakeholders need to act in active collaboration driven by the common goal of sustainable development. This will be the way forward and answer to the mining industry's sustainability conundrum.



Note to the Reader

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For Further Reading

The Boston Consulting Group has published other reports related to sustainability which may be of interest to senior management. Recent examples include the publications listed here.

Establishing a License to Operate: Sustainability Is Key for Resource-Intensive Industries

BCG Perspectives, November 2011

Redefining the Future of Growth: The New Sustainability Champions

A report by World Economic Forum in collaboration with the Boston Consulting Group, September 2011

Sustainability: Moving From “Why?” to “How?” with BCG

BCG Perspectives, May 2011

Sustainability: The ‘Embracers’ Seize Advantage

A Research Report by MIT Sloan management Review and the Boston Consulting Group, February 2011

Value Creation in Mining: More than commodity prices

The 2010 Value Creators Report by the Boston Consulting Group, February 2011

Sustainability: It’s Not About Tree-Hugging

BCG Perspectives, January 2011

Embracing Corporate Social Responsibility: Creating Value by Committing to the Environment

BCG Perspectives, July 2010

The Business of Sustainability: What It Means to Managers Now

A Report by MIT Sloan management Review and the Boston Consulting Group, October 2009

The Business of Sustainability: Imperatives, Advantages, and Actions

A report by the Boston Consulting Group, September 2009

Sustainable Steelmaking: Meeting Today’s Challenges, Forging Tomorrow’s Solutions

A white paper by the Boston Consulting Group, July 2009

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