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Piyush Goyal,

Minister of State with
Independent Charge for
Power, Coal, New and
Renewable Energy and
Mines, Government of India

UNLEASHING INDIA'S MINERAL POTENTIAL

FORBES INDIA

MARQUEE

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LEVERAGING Natural Resources to HARNNESS GROWTH

In the first of its kind initiative, Network18 and CII, organised a Global Natural Resources Conclave in Delhi on the 5th and 6th of April, 2017. This event, which was attended by delegates from 30 countries, aimed to create awareness and spell out the ground realities, in terms of issues and opportunities. The Conclave saw proactive collaboration from industry leaders as well as the most influential Indian and global names in the natural resources space, spanning all sub-sectors including oil & natural gas, mining & minerals, power, metals—aluminium, copper, zinc, etc. This initiative sought to position India as a formidable global player in the natural resources landscape. It also offered an opportunity for global business to consider partaking of the untapped opportunity in India. A look at the current realities that motivated this endeavour...

The extractive industries – oil, gas and minerals, in general – have witnessed significant growth in recent times. This can be attributed to the rise in commodity prices over the last decade, advances in exploration technologies, increasing mobility of production factors, closer linkages amongst countries and regions and greater political stability in many countries with untapped resource wealth.

According to one estimate, no less than 50 African nations are either producing or exploring for oil. New discoveries of gas along the eastern coastline of the African continent could be the largest the world has seen in the last decade. A recent assessment by the UNEP – International Resource Panel (2016) reveals that extraction of primary materials increased by a factor of three during the past four decades, from 24 billion tonnes in 1970 to 70 billion tonnes in 2010. The extraction of both biomass and fossil fuels has doubled, while extraction of metal ores has tripled and the extraction of non-metal minerals has nearly quadrupled during the period.

Resource management is extremely important, particularly for countries in transition which are commonly characterised by imperfectly or unevenly developed legislations and governance structures, compounded by short-term economic pressures to draw on natural resources unsustainably.

When managed prudently, resource investments and the vast revenues they generate can sustain development efforts and make a lasting, positive impact on the life of citizens. The extractive sector has the potential to generate further benefits to the economy beyond the direct contribution of revenues, through its links to other sectors. It can act as a catalyst for job creation, poverty reduction and lead to establishment of forward and backward linkages. These resources are much needed to build industry, act as a lever for infrastructure development and can open up opportunities in new industries, including agricultural exports and tourism.

Restoring and maintaining the health of these resources by incorporating resource efficiency is a key element of sustainable development. The recycling and reuse of secondary raw materials offer the potential to stabilise raw material supply for industry. Moreover, efficient use of resources often has substantial economic benefits.

Through the use of environmentally sound technologies and processes, the overall footprint of consumption and production can be reduced and negative side-effects on society mitigated. It is also important to focus on resource intensity and achieve the same or better outcomes using fewer resources.

INDIAN CONTEXT

In the development model followed by India, natural



resources play a critical role in achieving the objective of poverty reduction through rapid expansion of high-end, knowledge-intensive services and the manufacturing sector. Coal has been the backbone of India's energy infrastructure and will continue to be the major source of energy in the near future as well, even during transition to renewable sources of energy. Apart from coal, the oil & gas sector also plays a major role in enhancing the economy as it is among the six core industries in India. India is the world's largest producer of sheet mica, third largest producer of iron ore and fifth largest producer of bauxite.

The post-liberalisation phase in India has seen the dominance of service sector led growth. The contribution of manufacturing sector has remained mostly stagnant, accounting for less than 20 per cent of India's GDP. The country has not been able to utilize its rich natural resource endowment, which includes iron, coal, mineral oil, manganese, bauxite, chromite, copper, tungsten, gypsum, limestone and mica, to full potential. The manufacturing sector in China, on the other hand, has contributed around 30 per cent to its GDP growth over the last three decades.

According to a study by Ernst & Young, India has explored only 7-9 per cent of mineral resources in comparison to 100 per cent geophysical and geochemical surveys in countries like Australia. The Indian mining sector grew at a CAGR of 7.3 per cent in the last decade,

compared to 22 per cent in China during the same period, and its contribution to India's GDP has been only 2-3 per cent.

India's investments on exploration projects is a mere 0.3 per cent of the global spend compared to 19 per cent by Canada and 12 per cent by Australia. Exploration in India is mostly restricted to depths of 50-100 meters as compared to depths of 300 metres in countries like Australia.

An estimated 75 per cent of India's sedimentary basins have yet to be adequately explored. Of the 26 known sedimentary basins in the country, only seven are currently producing oil & gas. Investing in domestic oil & natural gas exploration is a long-term solution that will help quench India's growing energy demands smartly. With these vast resources lying unexplored, there is a need to enhance the focus on surveys and exploration to develop the available resources for utilization in infrastructure, capital goods and industries.

THE GLOBAL NATURAL RESOURCES CONCLAVE

With participants from 30 different nations, the Conclave provided the much needed forum for open dialogue required to facilitate a healthy business climate for all stakeholders involved in the natural resources sector, both in India and those globally who are looking to invest in India. **19**

APPEAL FROM INDIA INC.

Historically, India has always been dependent on imports for its mineral needs. Yet, according to a study by Ernst & Young, India has explored only 7-9 per cent of its mineral resources in comparison to 100 per cent geophysical and geochemical surveys in countries like Australia. Against this backdrop, India Inc. pitched to increase India's mineral production...



ANIL AGARWAL, CHAIRMAN, VEDANTA GROUP

India has been known for its natural resources for many years now. The Kohinoor diamond came from India; Assam was the first state to produce oil in the world; the Taj Mahal in Agra has been built with Rajasthan marble and the list goes on.

Swadeshi has been the philosophy of many great Indian leaders and thinkers, including Gandhiji, Pandit Nehru and Shri Vinobha Bhave. This philosophy must be carried forward to the natural resource needs of the country too. We must use domestic minerals as far as possible.

At present, India produces only 20 per cent of its mineral requirement and spends USD 500 billion on imports. Our mining activity represents only 2.4 per cent of GDP while in Australia this figure is as high as 8.5 per cent. India's geology is highly prospective for oil, bauxite, iron ore, fertilizers, rock phosphate, gold, uranium, marble and others. Tapping these resources could move our people out of poverty and create jobs.

In fact India has a much better geological endowment than China and yet the latter produces 10 times more than India. This sector can be opened up by self-certification

with strict environmental regulation. There is double-digit demand growth for the minerals that we produce in India every year. The revenue from this sector to the government can be a trillion dollars and 5-10 crore jobs can be created as the sector is the largest employer. Its output will also encourage the development of new downstream industries, in the form of small scale units that process raw materials for further manufacturing, which in turn will create 10-15 crore new jobs. This revenue can be used for investment in education, health care, skill development of our communities and infrastructure. This would give the desired boost to the country and GDP growth.

Natural resources can generate significant revenues for the industry and for the government. The natural resource sector is key for Indian economic development. India offers excellent long-term potential, powered largely by the ever-increasing consumption in India.

I'm sure we will see India's growth accelerate with the active support from the government, that has been working tirelessly to improve ease of doing business and to roll out game changing reforms. And for the world, there will never be a better time than this to invest in India.



SAJJAN JINDAL, CHAIRMAN AND MD, JSW GROUP

We must not import natural resources into our country; we should use our natural resources for our people and industries and ourselves. The irony is that our coking coal mines in Jharia, Jharkhand is a huge natural resource which is on fire and at the same time, nearly 20 billion tonnes of very expensive coking coal is imported by the country every year. The government really needs to do something very significant to unleash that potential that we have in India. **F**

INTERNATIONAL EXPERT SPEAK

The Global Natural Resources Conclave was attended by sector stakeholders from 30 countries across the globe. Amongst those who shared their insightful experience and valuable advice with the audience was Gina Rinehart, Chairman, Hancock Prospecting and Melody Meyer, President, Melody Meyer Energy LLC



It was in India that zinc and diamond mining was first done. Even today the country is well endowed with natural resources waiting to be explored and tapped. It is an exciting time for India as it is not only the fastest growing economy in the world, it has low inflation and a government that is pro-growth and investment. Prime Minister Modi's assurance, 'No red tape, only red carpet is my policy for investors,' has impressed me so much that I have adapted it and adopted it as the title of my book—*From Red Tape to Red Carpet*. Harnessing the mining resources of the country will not only result in growth and development for this nation, it will create jobs and encourage exports to neighbouring Asian countries that require minerals and currently import them from much further destinations.

Much of the world's cutting edge technology comes from India. When applied to the mining sector, it could ensure minimal degradation and maximum benefit.

To ensure seamless policy implementation, taking a page from the experiences of Australia, India should ensure that both the Federal Government and the State Governments share the same intent. ”

Gina Rinehart, Chairman, Hancock Prospecting

The dynamics of the energy world has shifted. No one predicted an oversupply. Disruptive technology, amongst other things, has caused the oversupply

Shifting global dynamics must be taken into account. Instead of searching for new sources of oil, there is a change in energy mixes.

This time the down-cycle has a silver lining. It has driven industry to a higher level of efficiency and stricter capital discipline.

It takes more than resources to create a successful energy industry. ”

– Melody Meyer, President, Melody Meyer Energy LLC





AUTHORITY

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“To grow, countries need natural resources and human resources. Some countries have grown with only one of these and some have grown without either. India is in a unique position to benefit because it has both.”

Suresh Prabhu, Union Minister of Railways.

“

“India will walk the talk on optimisation of natural resources. We are committed!”
Prakash Javadekar, Union Minister of Human Resources Development

“

“This Government has taken a long-term strategic view on the use of domestic resources – both natural and human. That’s what Make in India is about.”

Rajyavardhan Singh Rathore, MOS for Information & Broadcasting.

“

“Rajasthan is going to become the electricity hub of India with its technical initiatives and abundant natural resources, especially sunshine.”

Gajendra Singh Khimsar, Minister for Forest, Environment, Youth Affairs and Sports, Rajasthan.

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ASSURANCES

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“India is in a position to walk shoulder to shoulder with any country in the world. We have a pool of young human resources which is a force to reckon with and plenty of non-human resources.”

Dr. Jitendra Singh, MOS for Development of North Eastern Region (Independent Charge), PMO, Personnel, Public Grievances & Pensions, Department of Atomic Energy & Department of Space.

“Make in India will not succeed unless we have makers in India. The role of my Ministry is to bridge the gap between the availability of people with technical skills and people with practical skills.”

Rajiv Pratap Rudy, MOS (Independent Charge) for Skill Development and Entrepreneurship

“Government is committed to big reforms in the petroleum and natural gas industry. We believe in less interference, in terms of who producers can sell to and at what price.”

Dharmendra Pradhan, MOS (Independent Charge), Petroleum & Natural Gas

“When we study the sustainability of natural resource consumption, we include not only private costs, but public costs as well. We aim for a lower carbon footprint and responsible consumption.”

Amitabh Kant, CEO, Niti Aayog

“We have immense potential in the tourism sector because of our natural resources endowment – 7500 km of coastline, deserts, snowy mountains, culture and tradition and a predominantly young population...”

Dr Mahesh Sharma, MOS (Independent Charge) for Culture and Tourism.

POWER PACKED ADDRESS

In a special address, Piyush Goyal, Minister of State with Independent Charge for Power, Coal, New and Renewable Energy and Mines in the Government of India, candidly spoke about India's natural resources potential, the challenges in exploring it and the way forward...



The natural resources of a country define its future. When we talk about what constitutes national wealth, we fail to realise the important role that minerals play. When this national wealth works in tandem with other forms of wealth – like human and animal endowment – to create value, it brings prosperity to the country.

India is blessed with a large number of minerals; we have mining activities in about 88 minerals, totalling to an output of about 40 billion dollars, without considering petroleum products. On the one hand, this may sound like a significant output but to my mind, it is certainly not the true potential of India. There's a lot more we can do. There is a huge opportunity out there and if one looks at the seven decades of India's independence, we will see a lot of lost opportunities when it comes to using the natural resources that this country has been blessed with, to its full effect.

Today, since I hold the charge of coal, I am facing the stress of not being able to sell the amount of coal that we are producing. We have actually had to regulate the output of coal produced over the past 12 months for lack of adequate avenues to consume that coal. One of the principal causes of this lack of demand is that in earlier years, we never imagined that India could be a coal surplus country. As a result, the thermal coal based power plants that were set up in the country in the past were designed to consume only imported coal (i.e., with lower fly ash content and less impurities than that are present in Indian coal). Because of that, even today the country continues to import thermal coal on the one hand and on the other, we are stressed with large amounts of coal at the pit head, waiting to be mined, for lack of adequate market.

Fortunately, we can hope those days are behind us. Ultra Mega Power Plants that are being set up, like the one in Chennai, are beginning to consider using domestic coal, looking at the current easy availability. We are seeing similar trends in other sectors too, when we assess the natural resources of this country. India produces alumina in fair measure, which could have been a raw material for the growing aluminium needs of the country. But we choose to export the raw material rather than

process it domestically and add value, create jobs and wealth and products that can go to serve the people of India.

We continue to depend on large amounts of imports, both of alumina and aluminium and even more so, downstream aluminium products. So, we are losing jobs at every step of the value chain, especially in the small and medium scale sector, which is known to be labour intensive. We need to reverse this trend and become end-to-end self-reliant.

The time is ripe for India to aggressively go in for more exploration of our natural wealth and resources. It is time we invested heavily in exploration activities; India's share of the world spending on exploration of minerals is just 0.4 per cent. That's a very dangerous situation. To change this situation, we have recently given out a hundred areas for exploration – some to government companies and some have been auctioned out to private companies. Once we have a fair estimate of the natural wealth in those mines, we will have the ability to run a transparent auction process and give licences to people to mine the minerals from them.

The Bharatiya Janata Party, which is founded on the ideology of Pandit Deendayal Upadhyay, believes in what he said more than 50 years ago – The nation's natural resources, i.e. the wealth of the nation, should first go to serve the people at the bottom of the pyramid. It is our duty to ensure that the natural resources of the nation are first used for the poorest of the poor so that we can create a more inclusive society that works for the betterment of 1.2 billion people and gives everyone a chance for a brighter tomorrow. **■**





CONFLUENCE OF MASTERMINDS ON MINING AND MORE





The aim of the Global Natural Resources Conclave was to encourage an honest dialogue on the theme, based on which India could optimise the use of its natural resources, going forward, as a responsible producer and consumer, on its way to becoming a leader in the GNR sector. The panel discussions on various related issues were constructive, engaging and filled with unique perspectives and insights of participants from around the globe...

RE-ENERGIZING INDIA — FOCUS ON OIL & GAS

In India, the oil and gas sector is among the six core industries and a significant contributor to the growth of the country. It is second only to coal, in India's commercial energy mix, contributing more than 40 per cent of the country's conventional energy supply. The sector plays a crucial role in determining India's energy security.

With the rising demand for oil and gas in future, a changing geo-political situation is a major factor determining the accessibility of resources. Compared to oil, gas has the potential for larger domestic reserves, it is less expensive to import than other fuels and is comparatively cleaner too. To unlock the domestic hydrocarbon potential, India needs both technology and risk capital.

In a panel discussion, moderated by Shereen Bhan, Managing Editor, CNBC TV-18 and co-moderated by Roberto Bocca, Head of Energy Industries, Member of the Executive Committee, WEF, Geneva, with participation by Dinesh K. Sarraf, CMD, ONGC, Atanu Chakraborty, Director General, Directorate General of Hydrocarbons, Lalit Kumar Gupta, MD & CEO, Essar Oil & Gas, Ashish Bhandari, CEO (Oil & Gas), GE South Asia, Anil Kumar Jain, Adviser, Energy, NITI Aayog, Shaleen Sharma, Country Manager – Upstream, Shell India, Johannes Benigni, Chairman & Founder, JBC Energy Group and Occo Roelofsen, Senior Partner, McKinsey, a number of crucial issues were discussed and some interesting views emerged.

- In the effort to bring down import dependence and increase domestic production, in line with the Prime Minister's clarion call to reduce crude import dependence

by 10 per cent, from its current levels of about 80 per cent, by 2022, gas exploration will play a larger role than even crude, which will increase by 15-20 per cent. The production of gas is likely to double between now and 2022. We are likely to become a gas-based economy. Nevertheless, for India, it will not be a choice between oil and gas; it will have to be both.

There is also the issue of a decline in production from mature and ageing fields while simultaneously, new oil fields do not deliver enough production. To cope with this, the sector is seeking enhanced recovery processes through better technology and the government is also looking at providing some relief such as lower royalties and no cess for deep water exploration, etc. Effectively, it has to be an era of collaboration.

Layered programmes have been discussed with regard to replacement and efficiency, etc.; we need to add an equivalent of 37 million tonnes of oil & gas over the next five years. All the NELP blocks will have to come into production as early as possible.

There are issues like climate change, geo-politics and modification in the power of OPEC, digitalisation of the economy and the industry and the focus on electrification of the economy, which have changed the dynamics of the sector and how it can proceed in future.

Global energy demands are slowing down considerably because of these trends. India and China are the biggest growth engines of this sector. The determinants of the price of oil have changed structurally. So while there may be restrictions imposed on the output of oil, availability of cheaper sources of electricity amongst other things, will ensure that the price of oil remains within limits.

There has been a decline in FDI in the sector over the past one year. However, the government has been putting more encouraging policies on the table, such as production sharing agreements, towards curtailing oil imports. Foreign companies are looking at a good enabling environment, in terms of well-established and predictable policy, ease of doing business, as well as how easily they can exit if things don't work out. They are more concerned with how they will benefit rather than how much it will cost to invest in India. After all, India is competing for funds that could be deployed in Brazil or South America or anywhere else in the world.

Where the issue of pricing is concerned, there was an opinion that in the cacophony of international crude pricing, the relevance of gas pricing gets lost. Now, the government is opening up pricing to the market for all new contracts. However, along with discussion on the

price, a need for the discussion on market structure was felt as price points can only be arrived at from a market structure. This clarity would go a long way in augmenting FDI and domestic investment in the sector.

India has something that no other market has to offer—demand and market growth. India could also consider making value additions on the technology aspect of the sector and perhaps this technology innovation could be exported.

Meanwhile although crude prices seem to be relatively low, and that's good for a country like India, it must work on its small fields and brown fields and keep exploring since the global crude scenario could change with a single flash point or geopolitical flare up. Improving efficiencies and lowering costs are important and simultaneously opening up renewable areas of focus. Two things India needs to concentrate on are Cost optimisation and Deregulation of the gas market in terms of prices and marketing rights.

Collaboration between companies and not just the government but operators and developers and service providers is the key. Making data on the sub-surface from across the country available – not only to sector players but to academics and research institutions - is another crucial move. This could be done by using the Cloud. This will help small operators to ramp up their operations faster.

NATURAL RESOURCES: BEST PRACTICES & GLOBAL LEARNING

With copious supply of natural gas, shale and coal-bed methane, Canada is rich in natural resources including energy, water, forest and minerals. Large reserves of metallic ores, such as gold, copper, iron, zinc and lead are mined as well as uranium, limestone and diamonds. Natural Resources Canada (NRCan) is the ministry responsible for developing policies and programmes that enhance the contribution of the natural resources sector to the economy.

Canada has been at the forefront of protecting its natural resources and has come up with many programmes, such as the creation of the 'National Energy Board' to promote environmental protection and efficient energy infrastructure, etc. The country has promoted a globally competitive mining sector and aims to broaden the local development benefits that the extractive sector investment can bring.

For India, it is important to ensure best practice technology application across the mining value chain,

most prominently in high-tech exploration instruments and underground mining equipment. The government should help bridge the technology gap in the short term by de-bottlenecking clearances for import and use of technology.

With Arunoday Mukharji, Senior Associate Editor, CNN-News18 as the moderator and Stewart Muir, Executive Director, Resource Works as co-moderator, an enlightening session ensued on the theme of natural resources and the best practices and global learning that could be gleaned. The participants included Pierre Gratton, President & CEO, Mining Association of Canada, Dr Brian Fisher, Managing Director, BAEconomics Pty Ltd, Aldo Pennini, Director, Communications, ICMM and Sami Abu Ahmad, General Manager, Al Etihad Gold.

The figures pertaining to India's reserves are good but they need to be optimised. They need to be coupled with human resources and then the goods have to be transported to the market in the most efficient way. All along, natural resource exploration and utilisation must be with community development.

To optimise resources, infrastructure banks which cater to the needs of the sector must be set up. Logistical constraints should be ironed out as must other domestic policy matters. Physical and Geological information must be garnered so that it is easy to assess where fresh mining activity should be undertaken.

International investors see India as only one of many options. They would like to see consistency in regulations and encouraging tax rates that amount to less than 40 per cent. Dubai, for instance manages to attract so much interest as it is always focused on the goal of facilitating miners.

India has a good future with copious forthcoming investments but conflicts between companies and the government, with labourers, due to CSR and social licences delay action. The country needs to prepare for the future in terms of infrastructure, funds and social readiness.

The takeaway was that before inviting investors, India should undertake an assessment of the kind of economic potential that exists and create necessary infrastructure and list out the benefits in advance.

India is a unique proposition for mining with its average of 450 people per square kilometre. This makes it quite different from other paradigms that it may seek to emulate. Accordingly, the distinctive specifics must be taken into consideration before applying the best practices that have worked in other countries.

EXPLORE IN INDIA TO MAKE IN INDIA: FOCUS ON METALS AND MINERALS

It is estimated (UNEP- International Resource Panel - 2016) that the extraction of primary materials increased by a factor of three during the past four decades from 24 billion tonnes in 1970 to 70 billion tonnes in 2010. The extraction of both biomass and fossil fuels has doubled, while extraction of metal ores has tripled and the extraction of non-metal minerals has nearly quadrupled during the period. The Indian Mining sector grew at a CAGR of 7.3 per cent in the last decade compared to 22 per cent in China for the same period, and its contribution to the GDP has been around 2-3 per cent.

According to a study by Ernst & Young, India has explored only 7 to 9 per cent of its mineral resources in comparison to 100 per cent geophysical and geochemical surveys in Australia. Further, the total budget for India's mining industry for non-ferrous metal exploration has been falling continuously over the last few years (\$21.5 billion in 2012 to \$15.2 in 2013).

Some of the challenges that India faces includes unavailability of suitable technology and state-of-the-art equipment, lack of experienced geoscientists and inefficient policy mechanisms to drive mining and mineral exploration. With these vast sources lying unexplored, there is a need for enhanced focus on surveys and explorations to develop the available resources for utilization in infrastructure, capital goods and industries.

The mining industry had the potential to create six million additional total jobs in India by 2015, accounting for 12 per cent of the new non-farm job gap. At the same time, the mining industry could contribute an additional \$125 billion to India's output and \$47 billion to India's GDP by 2025.

To ensure that Make in India becomes a reality, growth of the mining sector is imperative. For this, enhancing resource efficiency and developing a secondary raw material management sector can play a crucial role in restoring and maintaining the health of these resources and helping tap their potential to create many green jobs.

In a session graced by luminaries from the sector, including Arun Kumar, Secretary, Ministry of Mines, Satish Pai, Managing Director, Hindalco Industries, Sandeep Lakhwara, Managing Director, Deccan Gold Mines, Tom Albanese, CEO, Vedanta Resources, PLC and Vedanta Ltd, Peter Nicholis, Fellow, PerthUSAsia Centre and S Vijaykumar, Distinguished Fellow, TERI, and moderated by Manisha Gupta, Editor – Commodities and Currencies, CNBC-TV18, and co-moderated by

Dr Sarat Acharya, Chairman & MD, NLC India, challenges were discussed and solutions were offered.

There are a number of challenges to harnessing the natural reserves of the country. Sometimes, striking reserves is an elusive exercise; sometimes it can take centuries to find a rich mine and begin reaping returns; sometimes land and forest clearances become a practical issue that has to be ironed out. Leasing of land is another issue that still needs to be addressed. Even in the most backward of locations, leasing of land becomes an extremely expensive proposition. While a lot has been done on the hydro-carbon and mining exploration front, it is far from adequate.

Skilling is another important challenge. The sector needs people with practical skills – technicians and electricians - as much or perhaps more than it needs engineers.

Mineral resources are concentrated in central and backwards states of the country. India has moved forward by initiating a bidding process for blocks and auctions for mines. The exploration policy wherein the cost is borne by the government and incentivisation of private parties that undertake exploration is also a step in the right direction. It makes the entire exercise competitive while offering incentives and de-risking the effort for the industry players.

The problems of the past are being addressed at present but the rate of catching up must be a lot faster. The commitment visible at the senior level, right up to the ministry heads and the prime minister is heartening. It is only a question of waiting for the intentions to convert into visible progress.

The disadvantage that India faces due to its late blooming is that NGOs are a lot more active and aggressive in this era than they were when countries that have flourishing mining and mineral extraction started their exploration.

One aspect that will need attention, as policies are being crafted is to strike a balance between the exploration and environment. There is a need to connect to the community and any project needs their unanimous consent. Nevertheless, the country has to decide that it needs domestic mining and minerals; it needs the employment and development that can result from these activities. The environment cost can be minimised but there is bound to be some trade-off and that must be at an acceptably low level. It has been made mandatory for miners to recreate as far as possible whatever they upset in the process of exploration and mining. Unfortunately,

the sad truth is that a number of miners do not do their best to return the environment to conditions that are even close to the way it was before they began their operations. This brings disrepute to the entire industry. Miners and Association of Miners should take it upon themselves to monitor this and inform if things are not as they should be.

The Ministry of Mines has launched a mining surveillance system that uses satellite imagery, which is now being increasingly used. It was launched in October 2016. This system has been used to identify illegal mining and necessary action follows. In future too, it will be used to ensure that compliance takes place in the most unobtrusive, cost effective manner. As per the current rules, all miners will have to upgrade to a four-star rating within two years. This essentially means that they will have to comply with environment, safety and a whole lot of other requirements and compliances, which impact society at large and lead to more sustainable mining.

In 2014, the country produced 129 million tonnes. In 2015-16, the country did 156 million tonnes; in 2016-17, it is likely to touch 200 million tonnes. If this trajectory follows, we could start beating Australia in exports!

DISRUPTIVE FUTURE TECHNOLOGIES FOR NATURAL RESOURCES

With the life cycle of mining starting with exploration, continuing through production and ending with closure, new technologies have benefits for the sector throughout this full life cycle. Further, these technologies also play an important role in the health, safety and environmental issues associated with the different stages of the mining life cycle. Technology also helps to create value for the final consumers of the mined product by converting the existing mineral resources into viable economic resources.

In India, the presence of limited technical knowhow at the mining stage has inhibited the development of indigenous value chain and led to the nation's dependence on imports of semi-finished and finished products. What is also needed is the acceleration in research and development activities to develop technologies for the economic recovery of the by-products.

There is also a need to improve the education and training of the labour force for using technologies, which will help improve productivity and prevent accidents. New smart programmes and technologies, such as location awareness technologies, GPS and collision detection/avoidance help improve the safety of employees during catastrophies/accidents.

Lastly, building regulatory framework and tools for technology development and promotion can facilitate technology transfer. Resource diplomacy should also be initiated with technologically advanced economies.

With Peter Nicholis, Fellow PerthUSAsia Centre, as an able moderator, experts from the field of mining from across the world shared their observations and advice on technology and innovation in the field of mining...

“Disruptive innovation applies to many domains under mining – geo-science, big data, safety, sustainability, regulatory issues, finance and finally, public trust and understanding of mining issues. In India, all these trends are significant but public trust and understanding is something that should be given adequate importance as it drives everything else today. Without an informed and supportive citizenry, in a democracy, I would fear that the big dreams of industry or government don’t have much chance of realisation. Trust is a technology issue in that context because it conditions how people can experience innovation in all its different forms.”

Stewart Muir, Executive Director of Resource Works

“Investing in innovation and technology isn’t nice to have; it’s a necessity. Data is the new basis of competitive advantage. Given the vast amounts of data out there, modelling is a key area of innovation as it allows one to unlock information from data and find better efficiencies in operations.”

Scott P Lawson, Chief Technology Officer & Executive Vice President, Newmont Mining Corporation

“There is a lot of technology and innovation that is coming into the mining sector at a faster and faster pace. Collaboration is fundamental for the development of technology and innovation. We collaborate and network with some of the best minds in universities and research institutions across the world to facilitate the discovery and application of new technologies.”

S Vijay Iyer, Country Head - India, Rio Tinto

“Data is now being collected digitally. Process speeds and volumes have increased considerably. With the pace of advancement in mining technology, it can

become a challenge to keep up. Outsourcing helps keep up with these changes and the use of a specialist becomes a win-win situation for all involved.”

Scott Caithness, Head, Exploration, Hindustan Zinc

FOCUS ON STATES: OPPORTUNITIES AHEAD

Indian states differ widely in terms of availability, quality and type of natural resources. In addition to varying in size, states vary in population, climate, economic development and policies and also have different economic growth and investment prospects. Since the impact of environmental and resource degradation is not limited to any one jurisdiction or level, policies and actions that address these challenges cannot be shaped and implemented at the state level alone. While the Constitution of India has provided an overarching framework for sharing of roles and responsibilities through distributed governance, which has worked well during the past six decades, there are issues of conflicting priorities and sharing of resources which make synergy of approach and implementation at the national and state levels difficult and challenging.

There is a need to strengthen the systems and processes of cooperative federalism for protecting resource use and the environment. The differences in growth of states partly arise from the imbalances in Centre-State distribution of revenues earned from natural resource sectors. While states have a right to a share of resource revenues in the form of royalties, they do not have any say in the amount. Royalty on most of the minerals is levied on an ad valorem basis, as a percentage of the price notified by the central government, which is then collected by the state governments. Also, while the Centre and states are proactively engaged in creating investment opportunities in resource development, it is important to not overlook local environmental and social responsibilities.

An eclectic gathering of state representatives, which included Nihal Chand Goel, Additional Chief Secretary, Department of Environment & Forest, Rajasthan, Vineel Krishna, MD, Odisha Mining Corporation, Aboobacker Siddique P, Commissioner, Mines, Department of Industries, Mines & Geology, Government of Jharkhand, Anurag Diwan, Joint Director, Mining, Chhattisgarh and Shirish Sankhe, Senior Partner, McKinsey, India offered interesting insights on the topic under discussion under the moderation of Bhupendra Chaubey, Executive Editor, CNN-News18.

Transparency is key to progress and cooperation. With the application method of allocation replaced by auctions, the question of mismanagement has diminished. Now with the advent of GST, the whole perspective of businesses in India, including those in the mining sector will see a change. The more digitalised a country gets, the more transparency it ushers in.

Clearances still remain a bottleneck, especially since mines are close to, rather below, forests. As a solution to this issue, environmental friendly mining and social licences should be adopted. People's grievances have to be addressed if a project is to become sustainable. At the end of the day, stable development is the most crucial goal.

NATURAL RESOURCES: SEEKING ALL-ROUND SUSTAINABILITY

The extraction of natural resources results in varying degrees of environmental degradation and increased pollution. It also has a social impact, which includes the displacement of people from the mining region. The mining sector needs to follow a model of sustainable development. According to the definition by the Sustainable Development Framework for the Mining Sector, Ministry of Mines, Government of India, "Mining that is financially viable, socially responsible, environmentally, technically and scientifically sound, with a long term view of development; uses mineral resources optimally; and, ensures sustainable post-closure land uses. Also one based on creating long-term, genuine, mutually beneficial partnerships between government, communities and miners, based on integrity, cooperation and transparency."

There is a need to design policy instruments for encouraging efficient use of resources, material substitution, recycling and use of new technology. Environmental protection and social licence should be recognised as a part of sound public policy, including sustainable resource use. It is extremely important to facilitate community and civil society participation in decision-making and to help align extractive policies with local and national development priorities. There is a need to create accountability of both the individual consumers and countries for responsible resource uses, whether produced at home or abroad.

India continues to face a challenge in various areas including—the creation of a supply-demand balance for minerals, good governance and environmental management, economic and social responsibility and intra-generational and intergenerational equity.

Alongside, there is the need to improve the levels of public awareness about scarcity of mineral resources and that posing a severe constraint to our developmental agenda.

The last session of the conclave touched upon softer issues that surrounded mines and minerals. The participants – Dr Amrita Prasad, Additional Secretary, Ministry of Environment and Forest, Dr Kirit Parikh, Chairman, IRADe, Dr Prodipto Ghosh, Distinguished Fellow, TERI, Ravichandran Purushothaman, President Danfoss, Mark Wiseman, Vice President, Sustainability, Avalon and Andrew MacLeod, Director, Beyond Shared Values Commission, Kings College London, Corporate Director and Non-Executive Chairman, Humanitarian—all contributed valuable counsel, as the moderator, Anuradha Sengupta, Consulting Editor, CNN-News18 and the co-moderator, Pierre Gratton, President & CEO, Mining Association of Canada, astutely guided the discussion.

Crafting sustainability is a fine balancing act that requires a determined mindset and the right policy environment. To achieve social sanctions, the effort must be made from ground up. Companies have to work with local communities, without talking down to them. There is a clear distinction between conversations and engagements. While the latter may take longer, it is truly worth the time and efforts invested in building genuine engagements with impacted communities.

Within a smaller circumference, to ensure sustainable commitment from the workforce, they must be kept happy and safe. This pre-empts the economic costs of constantly rehiring and retraining.

Keeping the environment clean also eventually works to the advantage of the company. It does not require heavy expenses on cleaning up later, which always works out more expensive than putting in place systems that keep the environment clean to begin with.

Other costs that a company is forced to bear for degrading the environment involve the cost of losing customers and talent. A reputation for being a dirty mine drive away both categories of people. Even bankers and investors protect their money from dirty mining companies.

Lastly, as regulation tightens, not ensuring clean practices could result in sanctions and the revoking of licences in certain cases.

For best effect, the government and mining industry should create and follow compliances that are both mandatory and voluntary. Further, to be sustainable, mining companies must focus on development of their land for all purposes, even beyond mining. **■**





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THANK YOU!

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