

115th ANNUAL GENERAL MEETING

Mining, Geological and Metallurgical Institute of India



PRESIDENTIAL ADDRESS

On behalf of the Mining, Geological and Metallurgical Institute of India (MGMI), it is my proud privilege to welcome you all on this virtual platform to discuss the challenges mining industry is facing along with the solutions that could be developed using the experience and knowledge of the esteemed members of this great century-old institution. It gives me great pleasure to say that our Institute continues to thrive and achieve its goals.



P M Prasad
President

India entered its 75th year of Independence on 15th August this year. Country's economic journey since 1947 has been miraculous. Its GDP stood at 2.7 lakh crore at Independence. 74 years on, it has reached 135.13 lakh crore. India is now the 5th largest economy in the world and is on its way to becoming the third-largest by 2031. An unmissable fact is that there has been a 10- fold increase in the GDP (at constant prices) since the reform process began in 1991. Economy is recovering faster than expected after the second Covid-19 wave. India's GDP grew at 20.1% in the quarter ending June-2021. The economy is projected to grow by more than 9 % this year. Providing rural India with access to electricity has been one of the goals of India's socio-economic policymaking. According to the Ministry of Power, only 3,061 villages had access to electricity in 1950. In 2018 all of India's villages – 5,97,464 in total – had been electrified.

In the development model of India, natural resources have played a crucial role in promotion of Make in India initiative, Power for All and poverty reduction. Coal has been the critical backbone of Country's energy infrastructure and will continue to be the major source of energy in the near future as well.

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It will play an important role during transition to renewable sources of energy. India is the world's second largest producer of coal, largest producer of sheet mica, fourth largest producer of iron ore and fifth largest producer of bauxite in the world.

For "Make in India" to succeed, we must "Mine in India" first. A report from the McKinsey Global Institute suggests that development of the mining sector will be important if India has to achieve 7%-plus GDP growth. The report further says that the sector alone has the potential to create 6 million additional jobs by 2025. Australia set an economic record of not experiencing a recession for almost 30 years, the longest stretch of uninterrupted growth for a developed nation ever seen, powered by its natural resources export. If India is looking to increase the share of the mining sector to 5% of the GDP in the next 20 years, this sector would be required to grow at the rate of 10-12% annually. If mineral production is unable to keep pace with the growing demand of infrastructure development, it would only be increasing the import bill of minerals. The import not only increases forex outflow but it also decreases the employment opportunities for the country. This becomes important since the country faces a huge employment generation challenge.

In 2015 the United Nations adopted "The 2030 Agenda for Sustainable Development" which provides a blueprint for peace and prosperity for the people and the planet. At the heart of this agenda are the seventeen Sustainable Development Goals (SDGs) – ending poverty and hunger, ensuring good health and healthy life for all, provision of clean water and sanitation etc. The SDG 7 is about access to affordable, reliable, sustainable and modern energy for all. This sustainable development goal is one of the most important as it enables the achievement of many other sustainable development goals. Energy is the key input in pulling people out of poverty and raising their standard of living. Important initiatives of the Government of India, like boosting manufacturing under the "Make in India" initiative in order to raise the contribution of manufacturing to India's GDP from the present 16 % to 25 %, smart cities, infrastructure development etc. will be powered by affordable, reliable and sustainable electricity.



If we look at the world's primary energy consumption in 2020, China, US and India are the largest consumers of energy with primary energy consumption of 146, 88 and 32 exajoules respectively. However, energy consumption per capita point of view presents a totally different picture: The energy consumption per capita of India is about a third of the world's per capita energy consumption, about a fourth of China and about one twelfth of US per capita consumption. For India to become a 5 trillion dollar economy by 2024 and a 10 trillion dollar economy by 2030, it requires a CAGR of GDP of over 10 percent in the next ten years. The double-digit growth in GDP will require almost 9 percent growth in electricity generation every year.

The energy options for India are limited. Our dependence on oil imports is over 85 percent and our oil production has been declining at a CAGR of 0.5 % in the last 10 years. The trend is similar for natural gas production, which has declined at a CAGR of 0.4 % in the last ten years. The import dependence for natural gas is about 45 percent. In this bleak fossil fuel production scenario, coal production has been an exception. In FY21, the country produced 716 MT of coal. The CAGR of coal production in the last 10 years is about 3%. Though the country requires a faster growth rate in coal production, given a larger reserve base of 344 BT as on 1st April 2020, the growth has not been up to the desired level due to various reasons like delay in land possession, insufficient infrastructure for coal evacuation, poor law and order prevailing in some coal mining areas and more recently due to Covid-19 pandemic outbreak. Coal will continue to be the backbone of India's energy sector for the next two decades. It is imperative, therefore, that coal production not only be increased but also be sustained at a very high level.

The celebrated author Mark Twain once said "I am in favour of progress; it's change I don't like". Coal is the dominant fuel as it is available in abundance and can be mined economically. Today the global focus is on energy transition. How can India ensure a just transition - a transition without tears? Some stakeholders want to get rid of coal altogether, however a wiser option is to first clean it up.



Coal India Limited is the largest coal producing company in the world. It also operates the largest number of coal mines in the world. Some of the steps taken for sustainability in Coal India are:

1. First Mile Connectivity Projects: The share of conveyors and MGR employed for coal transportation in India is low (MGR – 15 %, belt – 5 %). Australia, which produces one of the cheapest coals in the world, has 80 percent of the coal movement by conveyors. This not only reduces air pollution dramatically but also makes mine operations safer. Pipe conveyors as they are cheaper than road transportation and offer advantages over open conveyors. First mile connectivity projects have been taken up in top 35 projects at a cost of 12,000 crores. The total capacity of FMC projects is over 414 MT. By 2024 end Coal India is planning to increase mechanised transportation of coal from 150 MT to 600 MT.

2. Planning of large capacity mines: Large capacity mines are being given priority. Magadh (51 MTY), Siarmal (51 MTY), Amrapali (25 MTY), Chandragupta OC (15 MTY), Sanghamitra OC (20 MTY), Patratu ABC UG (5 MTY) etc are some of the upcoming mines. Large capacity mines enable deployment of state-of-the-art technology and rapid augmentation of coal production.

3. Increased deployment of Surface Miners and continuous miners: Surface miners eliminate drilling and blasting, enable selective mining and provide crushed coal. Surface miners have found increased use in CIL over the years. In FY21, surface miners produced 280 MT coal (about 50 percent of opencast coal production) in CIL, registering a growth of 4 percent over FY20. MCL is the leader in CIL as far as use of surface miners is concerned, with surface miners producing over 90 percent of the total coal production. There is an urgent need to scale up its deployment in other subsidiaries. Continuous Miner Technology was introduced in India in 2002, while it had been introduced in the USA in the year 1948, in South Africa in the year 1958 and in Australia in the year 1950. Continuous miners produced 7.8 MT coal in CIL in the FY21, which is about 30 percent of the total underground production. The growth in continuous miner production was 20 percent.



Use of Continuous Miners and longwall miners must be scaled up, as it not only enables higher production and productivity but also enhances coal recovery and safety.

4. Tree plantation: Since inception CIL has planted about 100 million trees in an area of 39,842 Ha. 2 million saplings were planted in FY20 and there was 11 percent increase in green cover in FY20 as compared to the previous year. The plantation target this year is 60 percent more than last year.

5. Rehabilitation of Jharia fire sites: Steps have been taken to rehabilitate Jharia fire sites. Plan is to operationalize 15 viable projects and take up 12 non viable projects with VGF/other support.

6. Diversification:

a) **Coal to Chemicals Plants:** Methanol, the simplest single carbon compound can serve as the best alternative fuel for India. Some of the advantages of methanol include; it being a highly efficient fuel, can be blended with gasoline/diesel, emits lesser NO_x, PM, no SO_x, can be further converted to Dimethyl ether (DME), which is a clean diesel alternative and can be blended with LPG as well. Since, coal to methanol is a proven technology in the World, India being the 5th largest country with coal resources, must tap its potential and produce methanol/DME. China has already leapfrogged to methanol in a big way. CIL has an ambitious plan to gasify 100 MT of coal by 2030.

b) **CBM, CMM, Coal Gasification (Surface & Underground):** Coalbed Methane (CBM) and its subsets like Coal Mine Methane (CMM), Abandoned Mine Methane (AMM) & Ventilation Air Methane (VAM) and Surface gasification (SCG) & Underground Coal Gasification (UCG) are emerging non-conventional, clean energy resource which need to be actively exploited to promote clean energy technology to add optimum utilization of additional energy re-sources and exploit untapped sources.



c) **Pit Head Power Plants:** The carbon footprint of pit head power plants is less than power plants set up close to the demand centres, far away from mines. The freight rate in India is very high, as there is cross subsidization of passenger fare by railways. It is seen that for coal transportation beyond 800-1000 km for thermal coal freight cost is as much as the cost price of coal. Pit head plant reduces the load on the railway network. It is suggested to transfer coal by "wire" than by rakes.

d) **Solar Power Plants:** India is committed to creation of renewable capacity of 175 GW by 2022 and 450 GW by 2030. Solar plants can be set up in reclaimed lands. CIL and its subsidiaries have taken steps to set up solar power plants. A total of 3000 MW capacity solar power plants are to be set up. This will make CIL a net zero energy company.

e) **Solar manufacturing:** CIL Board has approved a bid for PLI for wafer manufacturing.

f) **Monetisation of waste:**

i. Reuse of Reclaimed Land: Reclaimed land is being used for setting up of Eco parks, and for solar panels deployment.

ii. Overburden Waste Processing Plants: Overburden is being used in WCL for production of sand. This plant is proposed for replication in other subsidiaries of CIL.

iii. Mine water utilisation: Treated water can be used as raw water for industrial use and potable water for local communities. Treated bottled water from mines is being sold as Coal Neer. It is also being used for irrigation. About 3450 lakh cu.m. of mine water is planned for use in the domestic and irrigation sector by 2025-26.

The move towards sustainability can also be seen in the private sector. Reliance Industries Ltd will invest 75,000 crore over the next three years in green energy initiatives, including the Dhirubhai Ambani Green Energy Giga Complex in Jamnagar, as the global energy behemoth shifts its focus from hydrocarbons to renewable power.



Net zero emission by 2050 is emerging as the latest war cry on the climate front. And the drum beat is getting louder as the COP26 at Glasgow climate conference draws nearer. India's challenge has increased because, in at least 12 of the G20 economies, the net zero goal has either been adopted or is under discussion, with China being one among the latest entrants to the club. A net zero goal by 2050 is not a demand of the Paris Agreement, which only asks the signatories to furnish their commitments in a time-frame of five or 10 years. There is, of course, an expectation that each country will develop a long-term low-emission strategy for growth.

To fix a year for net zero India must know its emissions peak year. If we do not know the peaking date, the net zero target year remains difficult to fix. We need to factor in the growth of energy needs and technologies to be able to do so. China announced it more than five years ago and decided on 2035; it may achieve it sooner than later. China has announced a net zero goal for 2060. That will give them 25 years or more for turning net zero, with nearly five times bigger an economy. How much time will it take for India to reach there? Second, India should work towards carbon neutrality at a sectoral level. The power sector is ready to make the transition. Hon'ble Prime Minister Shri Narendra Modi has already announced a 450 GW target for renewables. This needs to grow massively to around 5,000 GW of solar alone to be able to support full decarbonisation in 2050. The transition to solar energy means that coal use will shrink, though not vanish. We have to ensure a just transition from coal. There should be no net loss of employment and income to the people. The country has to move fast towards a hydrogen economy. The developed world has to support this transition financially and by sharing advanced technology.

Hydrogen is emerging as an important source of energy since it has zero carbon content and is a non-polluting source of energy in contrast to hydrocarbons. As per International Renewable Energy Agency (IRENA), Hydrogen will make up 6 percent of total energy consumption by 2050.

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Though it is the most abundantly available element on the earth, commercially viable hydrogen can be produced from hydrocarbons including natural gas, oil and coal; as well as from renewables like water, sunlight and wind through electrolysis and photolysis and other thermo-chemical processes. Hon'ble Prime Minister Shri Narendra Modi put green hydrogen at the centre stage of India's economic policy and it can help the nation make a "quantum leap" to energy independence by 2047. The National Hydrogen Mission was unveiled by the government earlier this year, which aims to cut down carbon emissions and increase the use of renewable sources of energy while aligning India's efforts with best practices in technology, policy and regulation. The Government of India has allotted 25 crore in the Union Budget 2021–22 for the research and development in hydrogen energy and intends to produce three-fourths of its hydrogen from renewable resources by 2050. The government is planning to create an enabling green hydrogen ecosystem which will attract investments. Although the cost of green hydrogen energy is currently high, they are expected to fall significantly. New technologies are emerging for storage and transportation of green hydrogen, which will lead to a further reduction in costs. Coal is one of the important sources of hydrogen production. The production of hydrogen through gasification of coal is one the most economic options. In line with the hydrogen mission, the Ministry of Coal has constituted two committees for promoting hydrogen-based economy. The committee will identify domain experts in India and undertake review of hydrogen technology. They will prepare the road map for coal based hydrogen production and usage including economic viability and environmental sustainability.

The essence of sustainability of metalliferous mining lies mainly with optimization of the ore recovery techniques, design of suitable method of mining for increasing the life of the mine, safe disposal and gainful utilization of tailings and beneficiation of low grade ores. Ambitious plan for optimum exploitation of deposits and utilization of tailings in backfills should be undertaken.



It is also interesting to note that the wastes generated from metal processing plants have high mineral values, which can be reused to reduce the burden of acquiring good quality raw materials to some extent. In the Indian scenario, approximately 1.2 tons of solid waste are generated in producing one ton of steel. With proper methods put in place to re-capture and reutilize the iron and carbon content in the waste, the cost of raw materials can be lowered considerably enabling a circular economy. Similarly, in case of copper sulphide ores, the tailings can be processed to extract other metals such as lead (from galena) and zinc (from sphalerite), should they exist.

A recent World Bank Group report finds that the production of minerals, such as graphite, lithium and cobalt, could increase by nearly 500% by 2050, to meet the growing demand for clean energy technologies. Manufacturing solar panels, wind turbines, and batteries will shape the supply and demand for critical minerals for the foreseeable future. It is estimated that over 3 billion tons of minerals and metals will be needed to deploy wind, solar and geothermal power, as well as energy storage, required for achieving a below 2°C future. Clean energy transition will be significantly mineral intensive. The report also finds that even though clean energy technologies will require more minerals, the carbon footprint of their production – from extraction to end use – will account for only 6 percent of the greenhouse gas emissions generated by fossil fuel technologies. The report underscores the important role that recycling and reuse of minerals will play in meeting increasing mineral demand. It also notes that even if we scale up recycling rates for minerals like copper and aluminium by 100 percent, recycling and reuse would still not be enough to meet the demand for renewable energy technologies and energy storage.

Despite the opportunities present in mining and metal extraction and several possible avenues of technological advancements, the post - liberalization phase in India has seen the dominance of the service sector led growth with the contribution of the manufacturing sector remaining mostly stagnant.

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Unfortunately, India has not been able to utilize its rich natural resource endowment (of iron, coal, mineral oil, manganese, bauxite, chromite, copper, tungsten, gypsum, limestone, and mica) to full potential to maximize growth and strengthen the economy. According to a study by Ernst & Young, India has explored only 7 – 9 percent of mineral resources in comparison to 100 percent geophysical and geochemical surveys in countries like Australia. It is imperative, therefore, to improve understanding of the coal resources of India as Indian coal resources are classified only geologically without detailed understanding of quality or mineability. This is in contrast to the United Nations Framework Classification. It therefore, is the responsibility of our mining, geological and metallurgical community to come forward, seize this opportunity, drive innovations and the required policy changes. I am certain that with this mission, our ideas and our technological knowhow; we will begin to see a paradigm shift in how minerals are utilized, conserved and re-used in our country leading to sustainable economic growth.

MGMI regularly organizing knowledge sharing events, in this line during pandemic also organized a webinar on reducing CO₂ emissions from the Indian coal sector and transitioning to a net zero context, wherein various options available like shifting to HELE (high efficiency low emission) plants and carbon capture, usage and sequestration (CCUS) were discussed. Commissioning of large scale High Efficiency Low Emission (HELE) power plants together with carbon capture, use and storage (CCUS) can be a pathway for nearly zero emission from coal fired power plants. HELE technologies are commercially available now and if deployed, can reduce greenhouse gas emissions from the entire power sector by around 20 percent.

It is a matter of pride that the quality of the MGMI News journal is improving. I congratulate the Editorial Committee for its efforts. The overarching goal of MGMI is to provide guidance and advisory to the mining industry and the government on sustainable development of the Indian coal and non-coal mining sectors.

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The 9th Asian Mining Congress is scheduled to be held early next year. I am sure the congress and the associated mining equipment exhibition will be a great success. On this occasion, I would like to thank Hony Secretary, MGMI Mr Rajiw Lochan, who has been our Ambassador, using his extensive network to connect us with the Council and other professional bodies globally.

MGMI continues to be in good financial health. As a not-for-profit society, our goal is to host seminars and workshops that enlighten members of the mining fraternity and at the same time maintain the financial strength and flexibility of the Society. Councils past and present have taken great care in managing the Institute's balance sheet and this year was no exception.

I thank you all for giving me the privilege to lead the Institute and I look forward to its continued success.

JAI HIND