खान मंत्रालय
MINISTRY OF
MINES

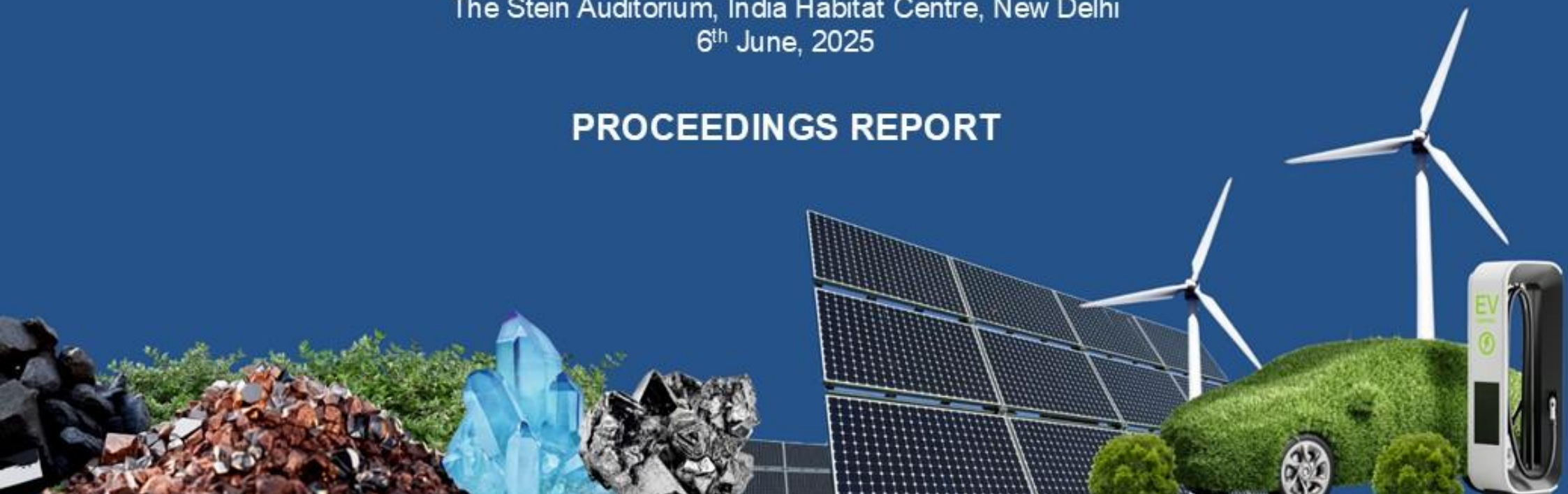
SHAKTI
SUSTAINABLE ENERGY
FOUNDATION

CRITICAL MINERAL PROCESSING SEMINAR

A Step Towards Aatmnirbhar Bharat

The Stein Auditorium, India Habitat Centre, New Delhi
6th June, 2025

PROCEEDINGS REPORT



Acknowledgement

The summit was made possible by the combined efforts of the teams at Ministry of Mines, Government of India, Shakti Sustainable Energy Foundation (Shakti), and The Energy and Resources Institute (TERI). We express our deep gratitude to the Ministry of Mines, particularly to Secretary **Shri VL Kantha Rao**, the Joint Secretary **Shri. Dinesh Mahur** and Director **Shri Anshoo Pandey,** for their vision, unwavering support, and guidance.

We extend our sincere thanks to the Mr. Rishabh Jain from CEEW for moderating the panel discussion on “Unlocking Capital and De-risking Investments for Critical Mineral Processing”. Our gratitude to Mr. Souvik Bhattacharjya from TERI for moderating the panel discussion on “Developing a Robust Recycling Ecosystem for Critical Minerals.”

We appreciate the ENS team for their excellent support in event management.

Most importantly, we thank all the speakers and participants, who joined us from across India, for their interest and contributions to the ongoing discussion on the beneficiation and processing of critical minerals in India.

Organising Teams

Ministry of Mines, Government of India:
Mohammad Sadiq, Director (G);
Madhumita Banerjee, Senior Geologist;

Shakti Sustainable Energy Foundation:
Priti Shukla, Program Manager;
Meghana M, Consultant;

The Energy and Resources Institute:
Souvik Bhattacharjya, Associate Director & Senior Fellow;
Mrunali Tembhurne, Associate Fellow;
Mahima Singh, Project Associate;
Ritu Ghai, Deputy Manager-Events;

Disclaimer

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Overview

Objective of the Workshop:

The 'Critical Minerals Processing Seminar' was organised by the Ministry of Mines, Government of India, in partnership with Shakti Sustainable Energy Foundation, as part of the ongoing efforts under the National Critical Minerals Mission (NCMM). The seminar convened senior representatives from government, industry, academia, and research institutions to foster collaboration, share technical knowledge, and catalyse innovation in the processing and recycling of critical minerals such as lithium, cobalt, graphite, and rare earth elements (REEs). Through focused discussions on domestic processing technologies, the role of state governments, industry-led innovation, and financing strategies, the seminar aimed to advance India's capabilities across the critical minerals value chain and support the country's transition toward a secure, self-reliant, and globally competitive CRM sector.

Overview of Sessions:

The seminar opened with inaugural addresses by senior officials, including the Hon'ble Union Minister of Mines, Shri G. Kishan Reddy, and featured the formal launch of the NCMM Outreach Forum and a strategic MoU signing between Hindustan Copper Limited and RITES Limited.

The first session on **Advancements in R&D for Critical Mineral Processing** showcased indigenous and low-impact technologies for efficient processing of complex and low-grade ores. Leading researchers from premier institutions including IMMT, NML, NFTDC, DMRL, and IIT-ISM Dhanbad shared breakthroughs in mineral processing science, with concluding remarks by the Director of IIT Roorkee.

A second session on the **Role of State Governments in Enabling Domestic Critical Mineral Processing** followed, highlighting initiatives from Gujarat, Uttar Pradesh, Andhra Pradesh, and Rajasthan. Presentations focused on policy support, industrial clusters, and streamlining of clearances to attract investments in mineral processing infrastructure.

The third session on **Driving Innovation in India's Critical Mineral Processing Industry** featured industry leaders such as IREL, Vedanta, Tata Chemicals, ALTMIN, and LOHUM, who presented R&D efforts and commercial strategies for scaling lithium, nickel, REE, and other critical mineral processing.

The fourth session was a panel discussion on **Unlocking Capital and De-risking Investments**, examined financial instruments, risk mitigation mechanisms, and global best practices to strengthen investment in the processing value chain.

The fifth session was a panel discussion on **Developing a Robust Recycling Ecosystem**, focused on technologies and policies for end-of-life battery, e-waste, and industrial scrap recycling, including models for Extended Producer Responsibility (EPR) and reverse logistics.

The day concluded with closing remarks from the Secretary, Ministry of Mines, reaffirming the government's commitment to building a secure and resilient critical minerals ecosystem.

The seminar served as an important platform for advancing dialogue, knowledge exchange, and partnerships to strengthen India's critical mineral processing capabilities. It brought together key stakeholders across government, industry, and research to identify actionable pathways for technology development, investment mobilisation, and ecosystem-building in support of the National Critical Minerals Mission. The discussions throughout the day reinforced the urgency and potential of building a resilient, self-reliant critical minerals value chain. Overall, the seminar laid the groundwork for collaborative efforts that will enable India to secure its critical mineral needs while aligning with broader goals of industrial competitiveness and sustainable economic development. . The full agenda of the workshop is attached as annexure.

Highlights of Sessions

1. Inaugural Session

Welcome Remarks by Mr. Sreyamsa Bairiganjan, Chief of Programmes, Shakti Sustainable Energy Foundation

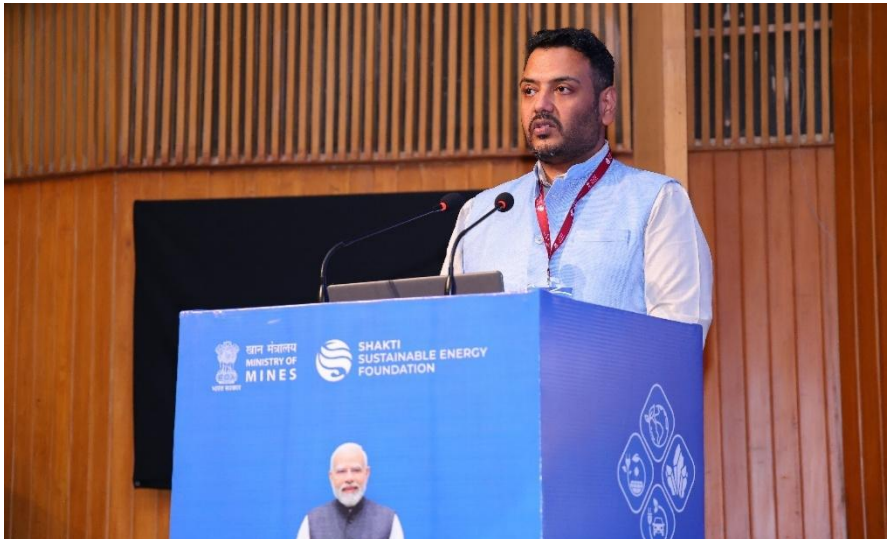

Photo 1 Welcome Remarks by Mr. Sreyamsa Bairiganjan, Chief of Programmes, Shakti

Shri Sreyamsa Bairiganjan opened the seminar by underscoring the pivotal role of critical minerals in achieving India's clean energy, economic, and strategic goals. He emphasized that critical minerals are foundational to enabling clean energy manufacturing, electric mobility, and advanced technologies. Noting the complexity of the sector and the need for a coordinated approach across the value chain, he highlighted the Ministry of Mines' visionary launch of the National Critical Minerals Mission as a landmark move. Shri Bairiganjan also introduced the NCMM Outreach Forum, a collaborative platform aimed at catalysing innovation, facilitating investment, and fostering sustained dialogue. He welcomed participants from across government, industry, research, and civil society to contribute meaningfully to shaping India's domestic critical mineral ecosystem.

Signing of MoU between Hindustan Copper Limited and RITES Limited

Photo 2 Signing of MoU between Hindustan Copper Limited and RITES Limited

The event featured the signing of a Memorandum of Understanding between Hindustan Copper Limited (HCL) and RITES Limited, marking a strategic collaboration between two key public sector enterprises under the Ministries of Mines and Railways. The MoU

aims to strengthen the critical minerals supply chain by leveraging the technical and financial capabilities of both organizations. Through joint efforts in exploration, extraction, refining, and production—both within India and overseas—the partnership seeks to support national objectives for rapid, reliable, and sustainable access to critical resources. The signing, witnessed by Hon'ble Union Minister Shri G. Kishan Reddy, reinforced the government's commitment to integrated, cross-sectoral action in building self-sufficiency.

Keynote address by Shri. V.L. Kantha Rao, Secretary, Ministry of Mines

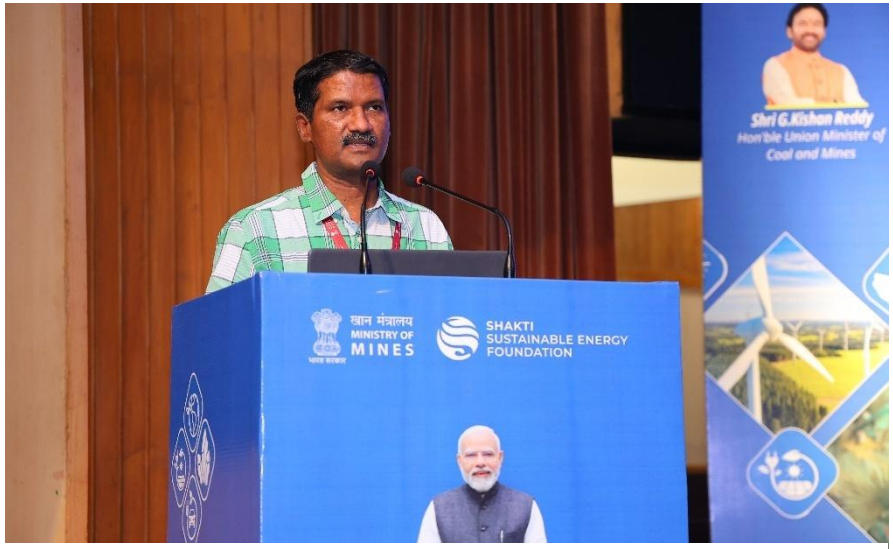

Photo 3 Keynote address by Shri. V.L. Kantha Rao, Secretary, Ministry of Mines

In his keynote address, Shri V.L. Kantha Rao emphasized the seminar's intent as a focused, business-oriented gathering of stakeholders committed to advancing India's capabilities in critical mineral processing. He acknowledged the participation of over 50 companies, along with representatives from state governments, R&D institutions, financial entities, and foreign embassies. Shri Rao outlined the government's multi-pronged support under the National Critical Minerals Mission, including schemes for recycling, exploration abroad, R&D, and stockpiling. He urged participants to identify actionable roadmaps for select minerals, such as rare earth magnets, to ensure domestic processing and value addition. Highlighting the importance of industry-government collaboration, he called for pragmatic, solutions-focused dialogue to deliver tangible outcomes that align with India's broader goal of self-reliance in critical mineral production.

Presentation on NCMM by Shri. Dinesh Mahur, Joint Secretary, Ministry of Mines

Shri Dinesh Mahur provided a comprehensive overview of the National Critical Minerals Mission (NCMM), emphasizing India's current 100% import dependence on key critical minerals such as lithium, cobalt, and nickel. He highlighted the strategic goal of transitioning India from an import-dependent nation to becoming one of the top three global producers of critical minerals. He pointed out the concentrated global supply chain risks, and stressed the importance of international collaboration with the 13 other countries that offer potential partnership opportunities.

The presentation outlined key challenges including limited domestic recycling and substitution, the need for enhanced R&D in processing technologies, and difficulties with overseas investment risks. He reviewed recent government initiatives over the past decade aimed at improving transparency, lease security, exploration incentives, and legislative amendments, all paving the way for NCMM's launch. The mission adopts a whole-of-government approach, targeting the entire critical minerals value chain—from exploration and mining through processing and recycling—to strengthen India's strategic autonomy.

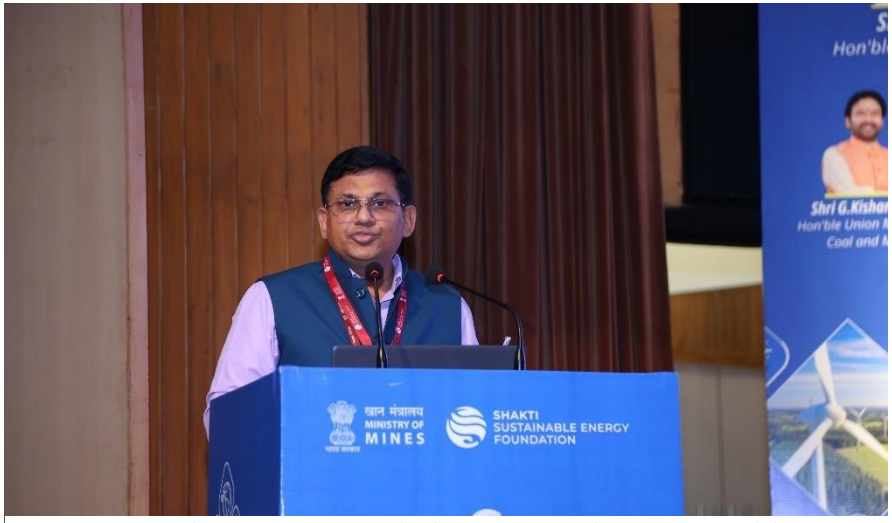

Photo 4 Presentation on NCMM by Shri. Dinesh Mahur, Joint Secretary, Ministry of Mines

Shri Mahur also detailed NCMM's seven core components: boosting domestic production, acquiring foreign assets, enhancing recycling capabilities, developing trade and market mechanisms, advancing R&D, building skilling capacity, and providing fiscal incentives. He highlighted major planned investments totaling over ₹160 billion, physical targets such as 1,200 exploration projects, and ongoing progress in auctioning critical mineral blocks, notably graphite. The presentation concluded with an emphasis on the NCMM's multi-stakeholder approach, including coordination with industry, research institutions, and state governments to build a robust, sustainable critical minerals ecosystem in India.

Launch of NCMM Outreach Forum and Keynote Address by Hon'ble Union Minister, Ministry of Mines, Shri G. Kishan Reddy

Hon'ble Union Minister Shri G. Kishan Reddy inaugurated the seminar by highlighting India's strategic focus on critical minerals as key drivers for energy security, economic growth, and technological advancement. He emphasized the government's proactive reforms over the past decade, including enhanced exploration efforts, transparent auctioning of mineral blocks, and international partnerships with resource-rich nations like Australia, Argentina, and Chile. The recently approved National Critical Mineral Mission (NCMM), with a budget exceeding ₹34,000 crores, aims to develop the entire value chain—from exploration to processing and recycling—ensuring India's self-reliance amid growing global demand and geopolitical supply risks.

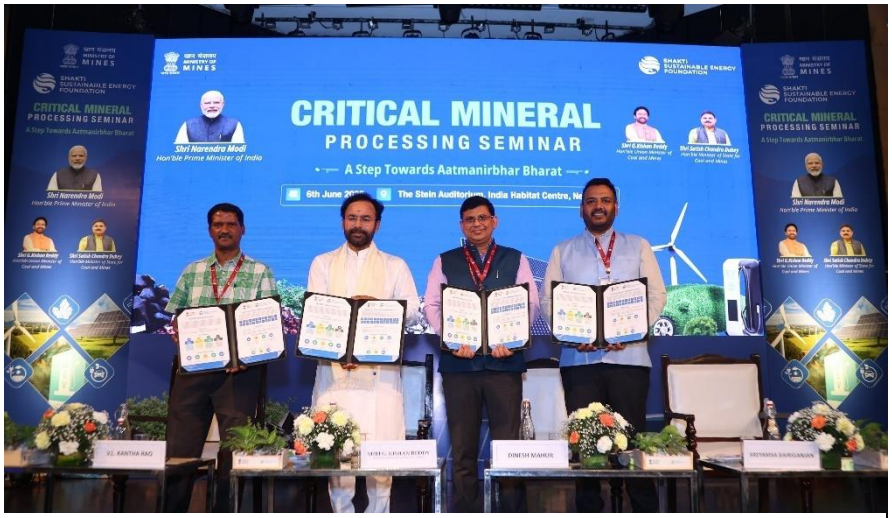

Photo 6 Launch of NCMM Outreach Forum and Keynote Address by Hon'ble Union Minister, Ministry of Mines, Shri G. Kishan Reddy

The NCMM Outreach Forum was launched by Union Minister Shri G. Kishan Reddy as a collaborative platform to strengthen cooperation among government agencies, industry, academia, research institutions, and private sector players. The forum aims to facilitate policy dialogue, research, investment, and industry growth, highlighting the critical minerals sector's vital role in national security, food security, and employment generation. Shri Reddy called on all stakeholders, including PSUs and private companies, to actively invest, innovate, and engage in building a resilient and sustainable critical minerals ecosystem in India.

Led by the Ministry of Mines and Shakti Sustainable Energy Foundation, the forum supports India's vision of self-reliance in critical minerals and reinforces the commitment to sustainable and strategic development of the mining sector.

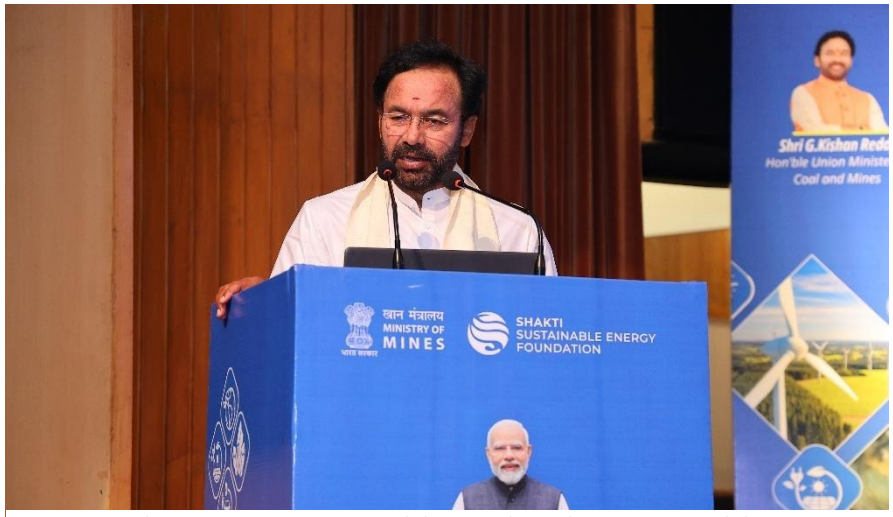

Photo 5 Special Remarks by Hon'ble Minister Shri. G. Kishan Reddy, Ministry of Coal and Mines

Hon'ble Minister Shri G. Kishan Reddy highlighted India's progress in critical minerals, emphasizing the National Critical Mineral Mission's role in boosting exploration, processing, and self-reliance. He launched the NCMM Outreach Forum to foster collaboration among government, industry, and research to strengthen India's critical minerals ecosystem amid rising global demand and supply risks.

Vote of thanks by Ms. Priti Shukla, Shakti Sustainable Energy Foundation

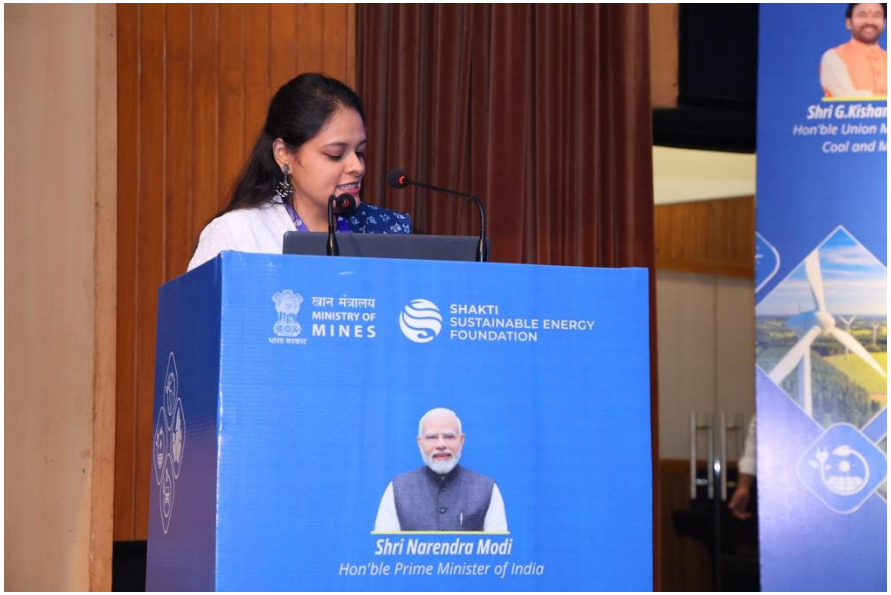

Photo 7 Vote of thanks by Ms. Priti Shukla, Programme Manager, Shakti Sustainable Energy Foundation

Ms. Priti Shukla thanked Minister Shri G. Kishan Reddy for his inspiring leadership and the Ministry of Mines for driving India's critical minerals agenda. She expressed gratitude to all participants and reiterated the collective commitment to advancing the sector and turning the mission's vision into action. The summit features a diverse array of participants, including industry, start-ups, government agencies, scientists, researchers, academicians, representatives from embassies, and public policy experts.

2. Technology Presentations on "Advancements in R&D for Critical Mineral Processing"

Overview:

This session explored the development and application of indigenous and advanced technologies for efficient processing and refining of critical minerals. Given the rising demand and complex nature of domestic ores, speakers emphasized the need for scalable, high-performance, and cost-effective solutions to enhance India's position in the critical minerals value chain. Leading national institutions and public sector enterprises showcased cutting-edge research and industrial applications, including advances in beneficiation, processing of low-grade and complex ores, and successful lab-to-industry translation of technologies tailored to India's resource profile.

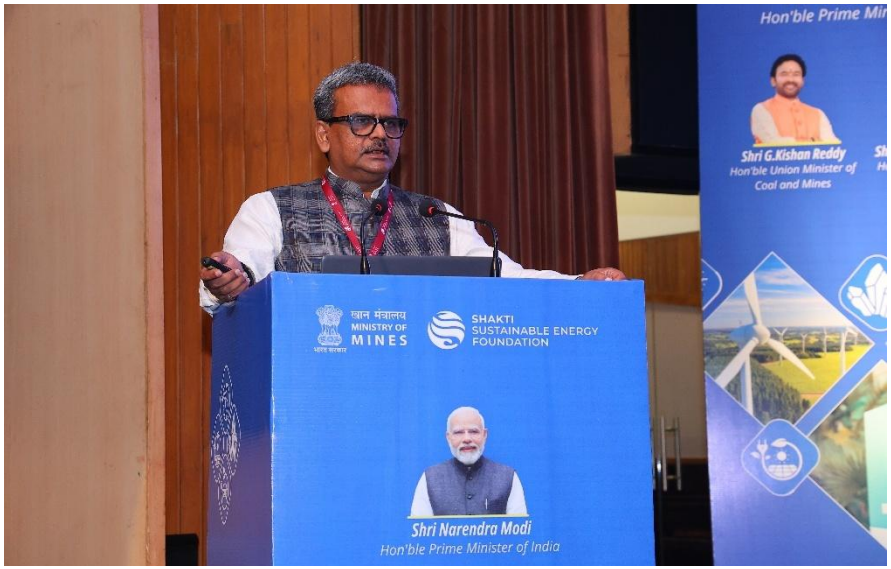

Photo 8 Presentation by Dr. Ramanuj Narayan, Director, IMMT

Dr. Ramanuj Narayan, Director of IMMT, outlined CSIR's extensive efforts supporting India's National Critical Mineral Mission. IMMT focuses on critical minerals through four key missions: battery recycling (from primary lithium resources to manufacturing), mapping and tapping critical minerals, sustainable materials from electronic waste, and a forthcoming mission on beneficiation and separation technologies. IMMT has developed processes for 41 elements, including 19 of the 24 critical minerals identified by the Ministry of Mines. Significant work includes recovering platinum group elements (PGEs) from chromite rejects, advancing lithium processing across multiple deposits in India, and collaborating on polymetallic nodule exploration for cobalt, nickel, and copper. IMMT has successfully commercialized technologies for cobalt, nickel, tungsten recovery, and copper refining, partnering with industry and government agencies. They are also enhancing facilities with pilot plants and advanced analytical infrastructure. Challenges remain in efficient separation of multiple elements, for which IMMT collaborates internationally to develop new membrane, bio-electrochemical, and nanofiltration technologies. Additionally, IMMT is exploring sustainable uses of mineral processing residues in construction materials.

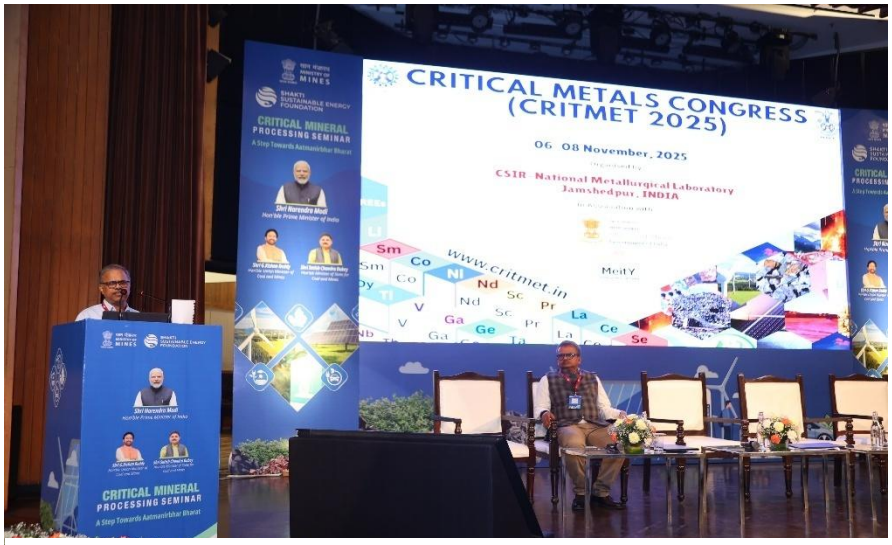

Photo 9 Presentation by Dr. Sandip Ghosh Chowdhury, Director, CSIR-NML

Dr. Sandip Ghosh Chowdhury, Director of CSIR-NML, discussed their extensive work on recovering critical metals from industrial residues and end-of-life products, including niobium from tin slags, cobalt and nickel from spent catalysts, tungsten from scrap for defence, and rare earth elements like neodymium from spent magnets. They operate a pilot lithium battery recycling plant processing mixed battery chemistries and graphite. NML also develops extraction technologies

for sodium, gadolinium, and magnesium, important for nuclear and defence applications. With over 18 patents and multiple technology transfers, they collaborate closely with government agencies and industry partners. He invited attendees to a critical metals conference scheduled for November 2025.

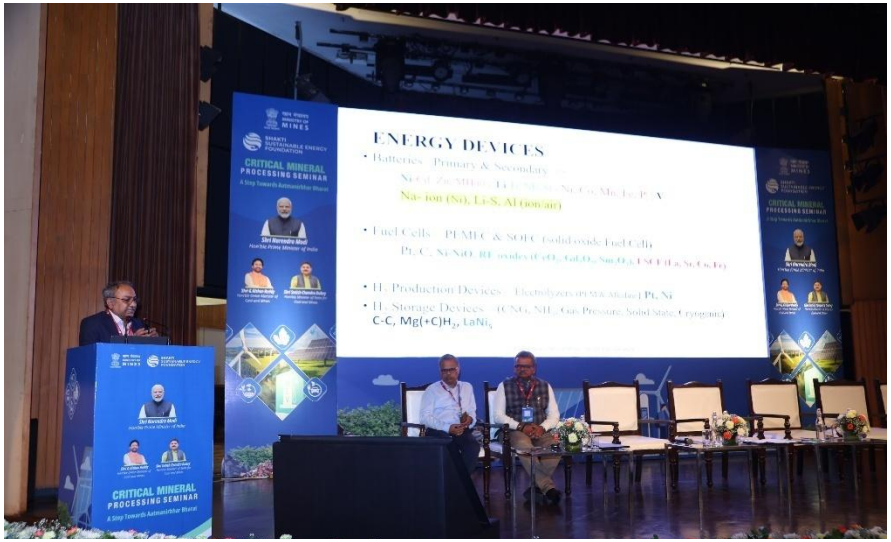

Photo 10 Presentation by Dr. K. Balasubramanian, Director, NFTDC

Dr. K. Balasubramanian, Director of NFTDC, shared the centre's work on developing materials and processes for battery and energy devices, with a strong focus on strategic applications. He noted that while lithium-ion batteries dominate today, nickel plays a more critical role across energy technologies, and a shift toward fuel cells and alternative chemistries like sodium-ion and LFP is expected post-2028. NFTDC has been addressing challenges in recycling LFP batteries, particularly aluminium impurities and phosphorus recovery, and operates a successful pilot plant.

He emphasized the need for core process competencies—covering primary to tertiary sources—and highlighted NFTDC's approach of working backward from product to raw material. NFTDC is scaling up an end-to-end rare earth magnet plant and has already established lithium recovery capacity exceeding 100 TPA. Advanced carbon materials and high-purity vacuum-grade metals are also being developed for aerospace and strategic uses. Their first commercial REPM plant will be rolled out this year, with larger plants planned by 2030.

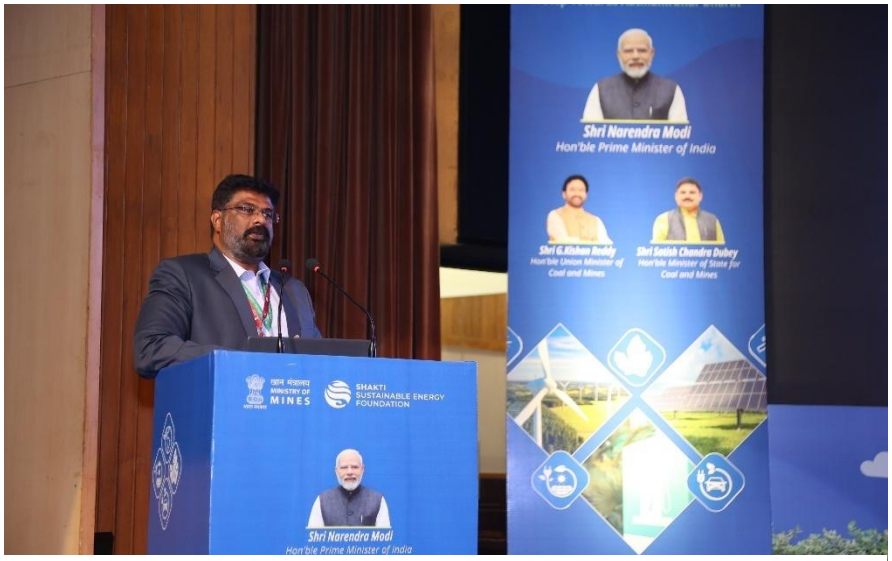

Photo 11 Presentation by Dr. I. Balasundar, Scientist-G, DMRL, DRDO

Dr. I. Balasundar, Scientist-G at DMRL (DRDO), detailed the institute's efforts in developing indigenous material technologies for India's defense sector, focusing on critical mineral extraction and

recycling. Operating primarily in the midstream of the material value chain, DMRL develops alloys, advanced materials, and components for defense platforms. Key achievements include India's titanium sponge production plant at KMML—the sixth globally—with ongoing efforts to restore and expand its capacity. DMRL has also pioneered closed-loop recycling for magnesium and is advancing electrochemical methods for titanium dioxide reduction. Collaborations with IMMT and NML target tungsten extraction from secondary sources, including a planned 50-ton plant.

A major effort is toward building mineral to magnet value chain, culminating in a 3-ton-per-year permanent magnet plant in Visakhapatnam serving strategic needs. To mitigate supply risks, DMRL is developing recycling technologies for end-of-life NdFeB magnets and superalloy turbine blade scraps, reducing waste and reclaiming valuable materials. Dr. Balasundar emphasized the critical need for material security, noting DMRL requires 131 materials—half of which are high-risk—causing project delays and import dependence. Given that over 70% of the minerals on India's critical minerals list are required by DMRL, he emphasized the need for greater investment in domestic supply chains and recycling.

Professor Dhruva Kumar Singh of IIT-ISM Dhanbad highlighted the significant strides made in India's R&D ecosystem for rare earth elements (REEs) and critical minerals. Drawing from his extensive experience and earlier work at BARC, he presented a range of indigenous technologies developed for the extraction, separation, and value addition of REEs from both primary and secondary sources—including monazite, e-waste, permanent magnets, and phosphoric acid. He emphasized that while India is strong in upstream

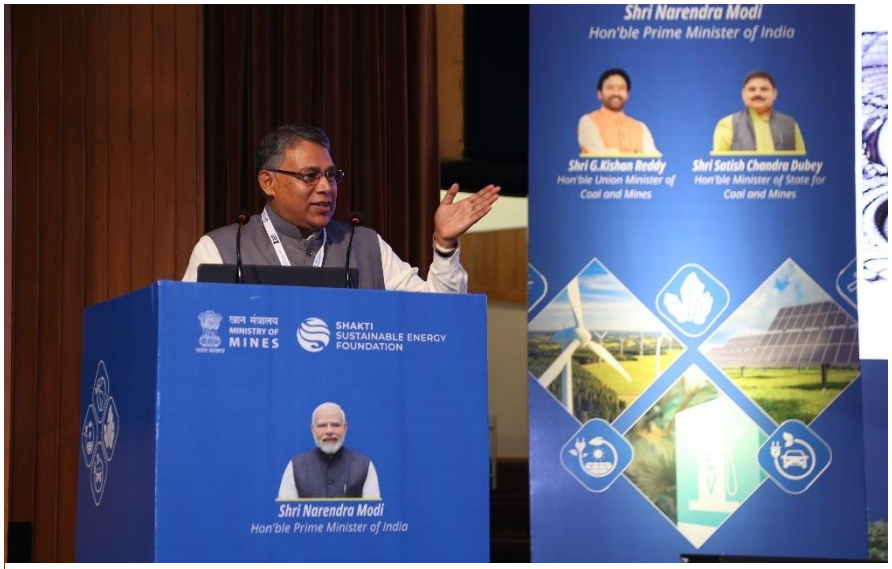

Photo 12 Presentation by Prof. Dhruva Kumar Singh, IIT-ISM Dhanbad

processes, downstream capabilities such as metal production and advanced materials still need to be scaled. Several advanced separation methods, including polymeric beads and MRT (molecular recognition technology), are now available domestically to extract high-value elements like terbium and dysprosium from complex mixtures. He also showcased the role of AI and hyperspectral imaging in mineral exploration and underlined the importance of building an integrated REE value chain within the country. Professor Singh concluded by stressing that the technologies exist and are ready for scale-up—what is now needed is stronger industry uptake, government support, and collaboration with academia to commercialize these innovations and strengthen India's strategic self-reliance.

Concluding Remarks by Prof. Kamal Kishore Pant, Director of IIT Roorkee

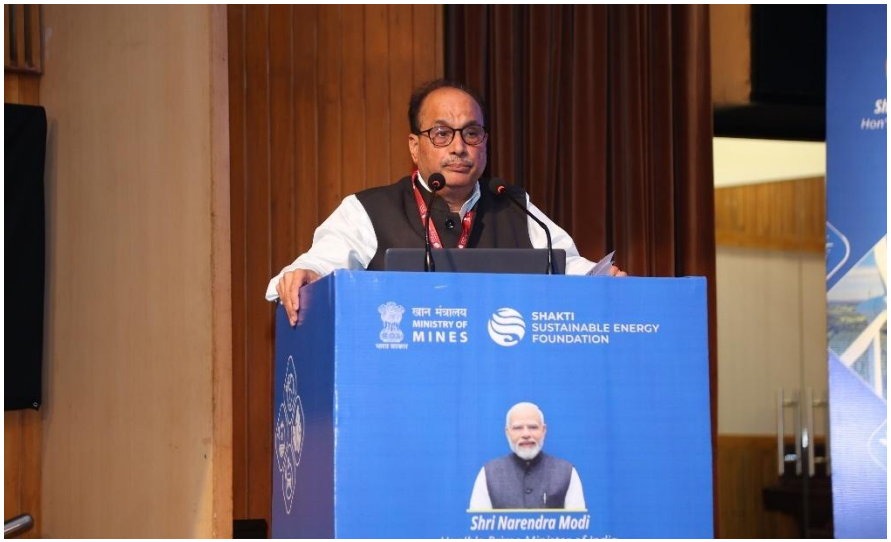

Photo 13 Closing Remarks by Prof. Kamal Kishore Pant, Director, IIT Roorkee

Closing the session, Professor Kamal Kishore Pant, Director of IIT Roorkee, emphasized that while several promising technologies for rare metal recovery and sustainable processing have been developed by institutions like CSIR and IITs, a major gap remains in achieving market readiness and commercial scalability. He highlighted critical challenges such as water-intensive processes, reliance on concentrated acids, and inadequate life cycle and techno-economic assessments. Professor Pant stressed the urgent need for greener, more sustainable solutions—such as ionic liquids and deep eutectic solvents—and called for collaborative efforts to address these issues, improve environmental outcomes, and scale viable technologies.

3. Presentations on "Role of State Governments in Enabling Domestic Critical Mineral Processing"

Overview:

This session explored the crucial role of state governments in advancing critical mineral processing in India. As key drivers of implementation, states enabled infrastructure development, streamlined regulatory processes, and fostered industrial ecosystems. Speakers highlighted how states leveraged their mineral resources and industrial strengths to promote domestic value addition, shared policy initiatives and coordination efforts, and outlined future plans to attract private investment. The session aimed to encourage cross-learning, strengthen centre-state collaboration, and reinforce the strategic importance of states in building a resilient and self-reliant critical minerals ecosystem.

Smt. Mamta Verma, IAS, Principal Secretary of Gujarat's Industries and Mines Department, highlighted Gujarat's strong commitment to aligning with the Government of India's National Critical Minerals Mission and its efforts to secure critical mineral supply chains. She emphasized the strategic importance of Gujarat as a manufacturing powerhouse, contributing significantly to India's GDP, industrial output, exports, and foreign investment, supported by its robust infrastructure, including 40 ports handling nearly 38% of India's cargo. Verma acknowledged challenges in India's current dependence on imports and the dominance of a few countries, in critical mineral processing, and pointed out the crucial gap in the midstream sector. Gujarat aims to become a key player in this value chain by leveraging its strategic location, sector-specific policies in renewables,

semiconductors, aerospace, and defence, and incentives under its Viksit Gujarat scheme. She described initiatives such as the GMDC-led critical mineral observatory with AI-driven data management, grants for pilot processing projects, and the ambitious critical mineral processing hub planned in Bharuch to attract national and international players. Verma underscored the state's rich mineral deposits and industrial ecosystem, skilled manpower, and excellent connectivity as vital enablers for building a strong domestic critical minerals sector, inviting stakeholders to collaborate and innovate toward making Gujarat a global hub in this space.

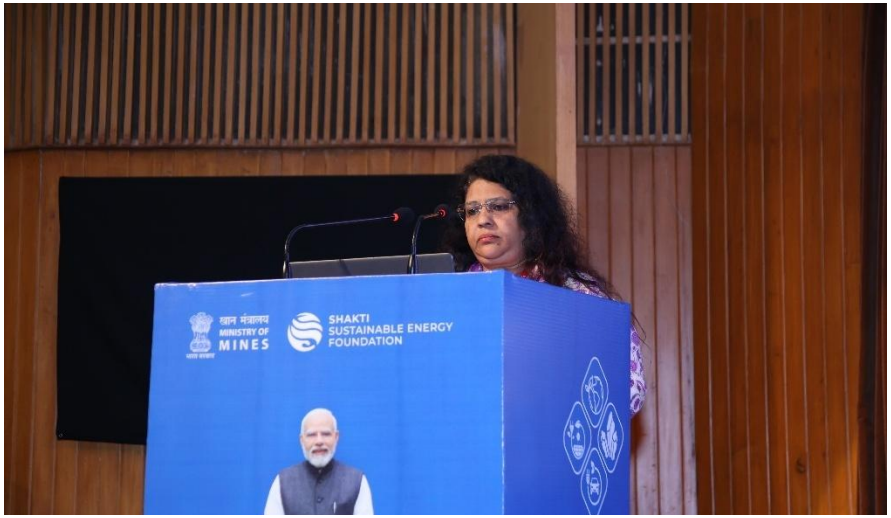

Photo 15 Presentation by Smt. Mamta Verma, IAS, Principal Secretary, Industries and Mines Department, Government of Gujarat

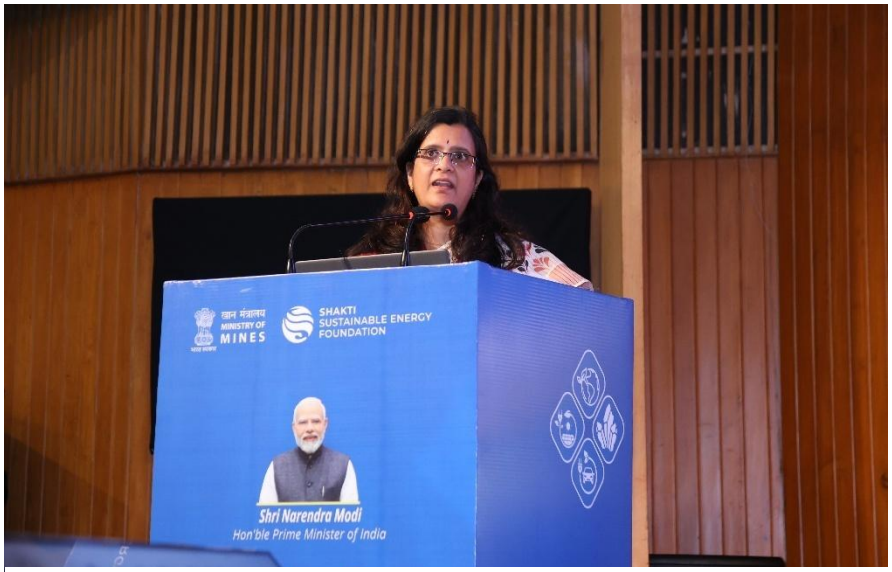

Photo 14 Smt. Mala Shrivastava, Secretary and Director of the Department of Geology and Mining, Uttar Pradesh

Smt. Mala Shrivastava, Secretary and Director of the Department of Geology and Mining, Uttar Pradesh, and **Shri Shashank Choudhary**, IAS, Additional CEO of Invest UP, jointly presented Uttar Pradesh's strong potential and strategic initiatives to promote critical minerals processing and investment. Ms. Shrivastava highlighted the state's focus on southern districts like Lalitpur, Sonbhadra, Jasi, and Mahoba, where critical minerals such as phosphorite, zirconium, and rare earth elements have been identified. She noted successful stakeholder workshops and ongoing exploration efforts, emphasizing a committed

and fast-tracked approach to auctioning mineral blocks and advancing beneficiation studies.

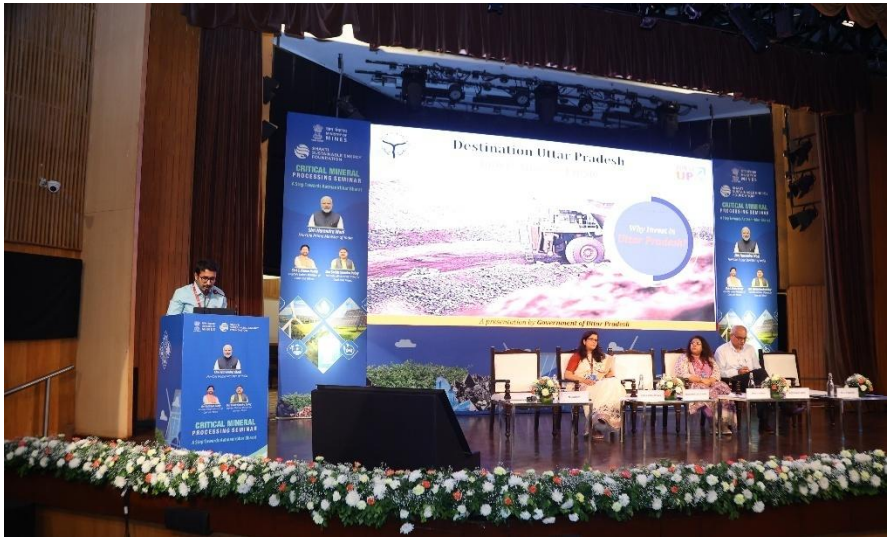

Photo 16 Presentation by Shri Shashank Choudhary, IAS, Additional CEO of Invest UP

Shri Choudhary elaborated on Uttar Pradesh's emerging role as India's growth engine, citing its robust logistics network—including expressways, waterways, and upcoming major airports—strategic access to resource-rich and consumption-heavy regions, and improved governance reflected in top rankings for ease of doing business and export preparedness. He underlined the state's demographic advantage with a large working-age population supported by extensive technical and vocational education institutions. Digital governance systems like Nivesh Mitra provide transparent and streamlined investment facilitation. Additionally, Uttar Pradesh is developing industrial clusters focused on mining, fertilizers, clean energy, and defence, supported by policy incentives such as capital subsidies, GST reimbursements, and R&D grants. Together, the speakers invited investors to leverage UP's unique logistical strengths, policy certainty, and industrial ecosystem to tap into its critical mineral and mining opportunities.

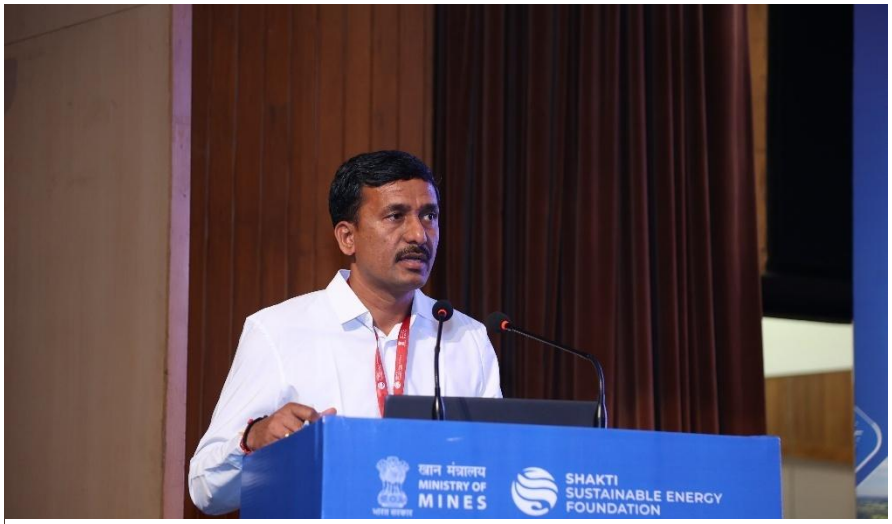

Photo 17 Presentation by Shri. N. Balram, CMD, Singareni Collieries Company Limited (SCCL)

Shri. N. Balram, CMD of Singareni Collieries Company Limited (SCCL), provided an overview of the company's transition from its core coal mining business towards critical minerals and renewable energy. He noted SCCL's diversification into thermal power, solar, and planned wind power projects, highlighting government support from Telangana. Recognizing coal reserves are depleting, SCCL has proactively begun exploring critical minerals within their coal and surrounding geological formations, with sample testing confirming significant concentrations of rare earth elements such as cerium, lanthanum, neodymium, and europium. The company is engaging in

strategic international partnerships, including with Queensland, Australia, to explore critical minerals and is collaborating with premier Indian and global institutions like IIT Hyderabad and Monash University for research and technology development. SCCL is preparing to participate in upcoming government mineral exploration auctions, establishing geoscience laboratories equipped with advanced instruments to support processing and element identification. Mr. Balram emphasized SCCL's readiness to invest significantly and collaborate with other public sector units and institutes to contribute to India's vision of self-reliance in critical minerals.

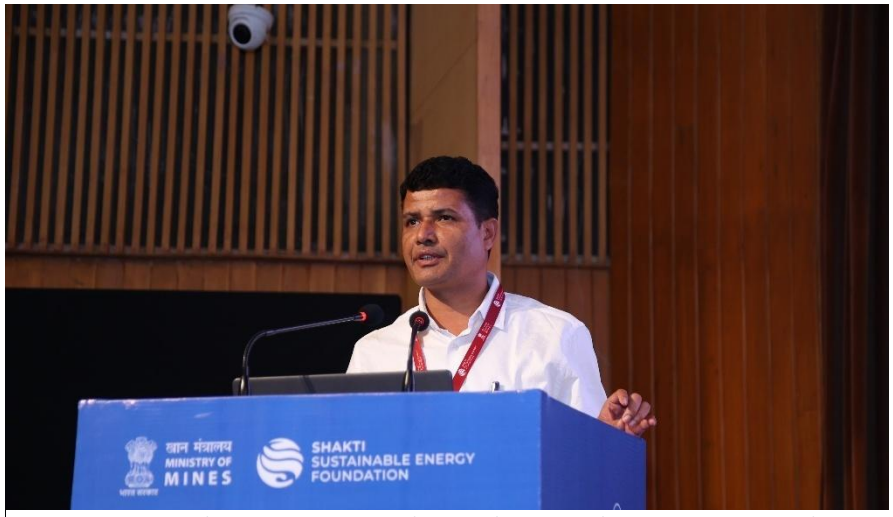

Photo 18 Presentation by Dr. C.P. Dadhich, Senior Geologist, Department of Mines and Geology, Government of Rajasthan

Dr. C.P. Dadhich, Senior Geologist from the Department of Mines and Geology, Government of Rajasthan presented an overview of Rajasthan's critical mineral deposits, highlighting the state's rich geological diversity and mineral wealth. He noted ongoing work in the Barmer region on rare earth elements (REE), including recent progress on land classification for a new block. Rajasthan hosts over two dozen critical minerals under the MMDR Act, such as potash, tungsten, rare earths, lithium, and phosphorite, with active exploration by both state agencies and the Geological Survey of India. Two strategic mineral blocks have been allocated to Oil India Limited and Hindustan Zinc Limited, with further blocks under consideration for auction. He detailed rare earth deposits in hard rock and carbonatite forms, mentioning a resource estimate of over 21 million tons with significant total rare earth oxide content. The state government has committed to establishing a Rare Earth Excellence Centre, and Dr. Dadhich shared his recent engagement with IREL and the Bhopal Titanium and Rare Earth Theme Park to learn best practices for stabilizing the rare earth value chain. He emphasized Rajasthan's efforts to facilitate investment and industry through coordination, single-window clearances, and promotion via the Bureau of Investment Promotion, aiming to support mineral sector growth.

Concluding Remarks by Shri Roopwant Singh, MD, GMDC

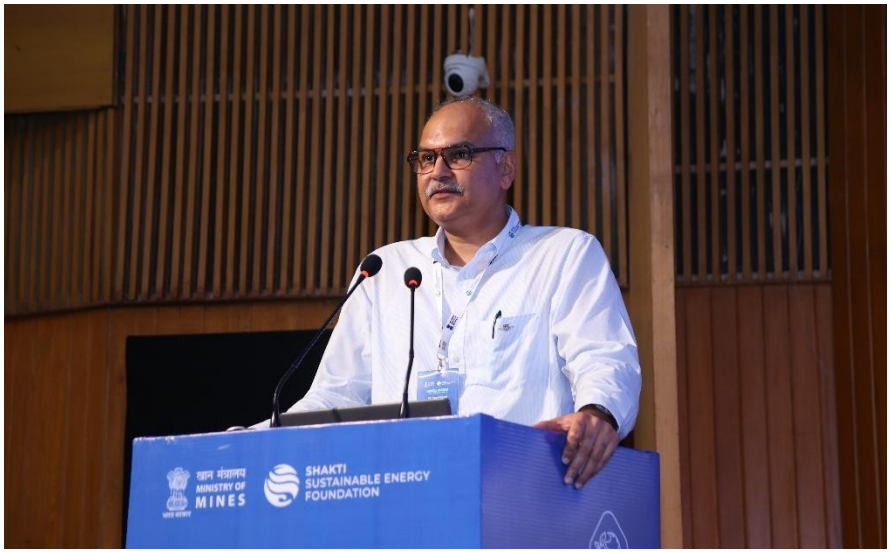

Photo 19 Closing Remarks by Shri Roopwant Singh, IAS, Managing Director, GMDC

Shri Roopwant Singh IAS, Managing Director, Gujarat Mineral Development Corporation Ltd. (GMDC), expressed gratitude to the dignitaries, speakers and representatives from Uttar Pradesh, Rajasthan, and other states for showcasing their mineral wealth and investment facilitation efforts. Emphasizing a key message for the nation, he urged collaboration rather than competition among states and stakeholders to overcome global dominance by a few countries. He highlighted the importance of leveraging geology, research, and technology partnerships to scale projects economically and make a global impact. He encouraged public and private sector entities to embrace innovation, take calculated risks, and work together to unlock the sector's potential.

4. Technology Presentations on "Driving Innovation in India's Critical Mineral Processing Industry"

Overview:

This technology session highlighted current and upcoming industry-led initiatives to strengthen India's processing capabilities across key critical minerals. With a focus on R&D and technological innovation, industry representatives shared how they are developing efficient, context-specific solutions aligned with India's resource base and strategic priorities. Presentations covered sector-specific efforts in

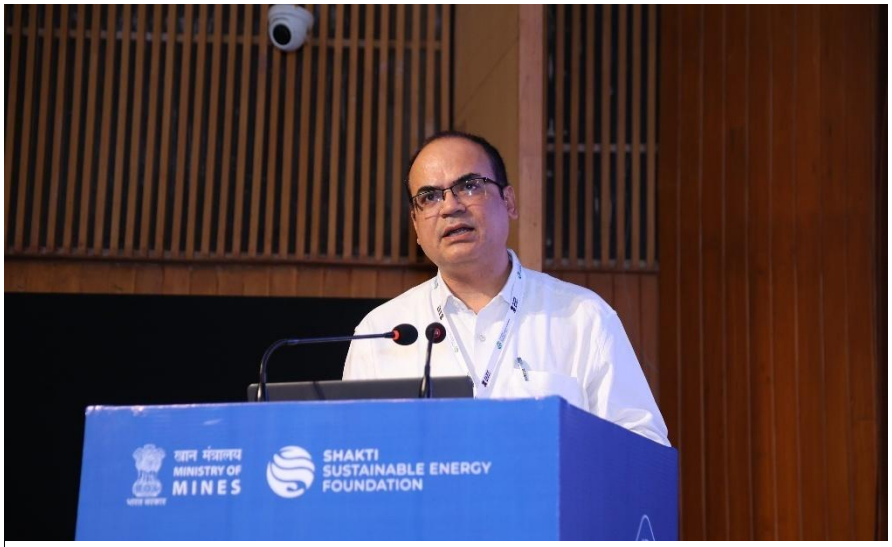

Photo 20 Presentation by Mr. Ravi Prakash Jha, Indian Rare Earths Limited (IREL)

processing minerals such as nickel, lithium, graphite, and phosphates, highlighting operational progress and future outlooks. Drawing on applied research and practical experience, the session underscored the industry's role in building scalable, value-added processing infrastructure and advancing domestic self-reliance.

Mr. Ravi Prakash Jha, representing Indian Rare Earths Limited (IREL), provided a comprehensive overview of India's rare earth processing landscape. Highlighting IREL's pan-India operations, including key facilities in Odisha, Kerala, and Tamil Nadu, he detailed the mining, separation, chemical extraction, and refining processes involved in rare earth production. India predominantly has lighter rare earth elements in its deposits, with heavy rare earths present only in trace amounts. Despite ranking fifth globally in rare earth reserves, India's ore grades are significantly lower than major producers like China, necessitating a more complex, multi-stage processing approach—from mining through refining—compared to China's simpler three-step process. IREL employs advanced physical and chemical separation techniques to concentrate and extract valuable rare earth oxides, producing a range of products such as lanthanum, cerium, neodymium-praseodymium (NDPR), samarium, gadolinium, and dysprosium. The company has recently commissioned strategic facilities including a rare earth permanent magnet plant in Visakhapatnam and a rare earth-titanium theme park in Bhopal. Emphasizing eco-friendly practices, IREL ensures mined areas are rehabilitated through backfilling and plantation. Mr. Jha also noted challenges such as radioactivity associated with monazite minerals, the lengthy gestation period for mines, and the complex and non-standardized extraction methods required for rare earth elements. He concluded by highlighting India's growing role in the green economy, with significant potential to become a global rare earth supplier powering clean energy, electric vehicles, and advanced manufacturing for the 21st century.

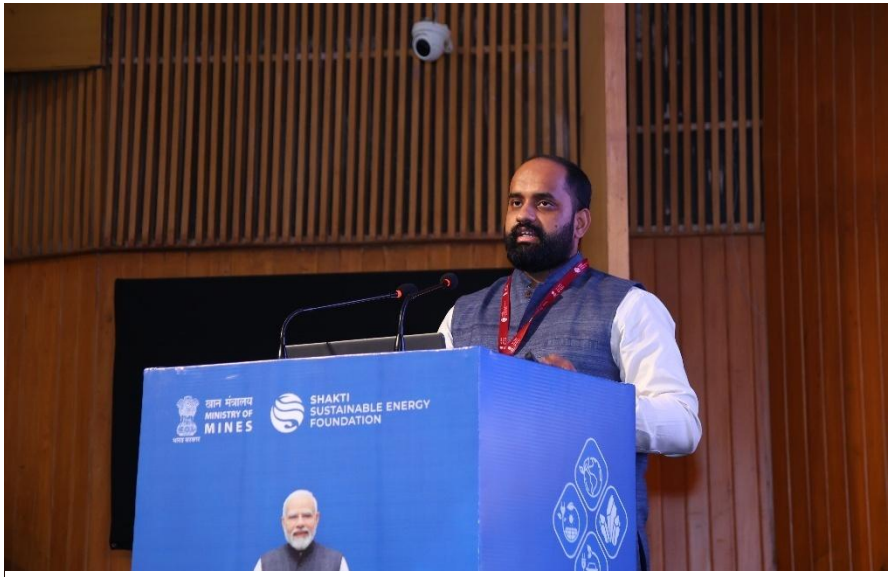

Photo 21 Mr. Aditya Menon, Head of Public Policy and Strategy, Vedanta

Mr. Aditya Menon, Head of Public Policy and Strategy at Vedanta, shared insights from Vedanta's entry into the critical minerals sector since 2021, focusing on nickel processing. He emphasized nickel's importance as it accounts for about 40% of India's critical mineral import bill, with particular attention to class one nickel used in batteries and stainless steel. While India has sufficient capacity for nickel sulphate, it remains dependent on imports—mainly from Indonesia—for nickel cathode, exposing supply chain vulnerabilities. Vedanta's experience with its Goa refinery highlighted the need for

processing facilities to handle a diverse range of raw materials due to fluctuating ore quality and sources. Vedanta has developed proprietary process innovations to produce battery-grade nickel sulphate with low impurities and is exploring sustainable waste management by repurposing processing residues for cement production, potentially replacing scarce gypsum. Mr. Menon underscored the strategic necessity of establishing nickel refineries in India to reduce regional dependency, proposing a phased model starting with standalone refineries importing raw materials, followed by domestic mining acquisitions and overseas asset purchases. He advised investors to design refineries capable of processing multiple ore types to mitigate supply disruptions. Vedanta plans to expand its refinery capacity significantly and is preparing a $400 million investment for a nickel cathode refinery, recognizing India's advantages in talent, labour costs, and improving logistics infrastructure. He concluded that the coming 3–4 years offer a strong investment window for nickel refining to meet India's growing demand.

Mr. Rino Raj, COO of Tata Chemicals, discussed the company's evolving approach to critical mineral processing, driven by their electric vehicle interests with Tata Motors and Jaguar Land Rover. He emphasized the need to move upstream in the battery value chain, focusing on key materials like lithium, cathodes (LFP and NMC), and anodes. Tata Chemicals is exploring two main routes: sourcing spodumene concentrate from multiple global suppliers and importing lithium chloride from Latin America, aiming to establish domestic refining capacity in India. He highlighted key challenges including the high energy intensity of refining, waste management from tailings, and significant capital expenditure compounded by restricted access to Chinese technology and equipment due to export bans. Despite these hurdles, Tata Chemicals leverages its expertise in chemical processing and is working with partners experienced in global refineries to achieve competitive scale and efficiency. Mr. Raj urged the industry and government to support local processing initiatives to reduce dependency on foreign suppliers and strengthen India's battery ecosystem.

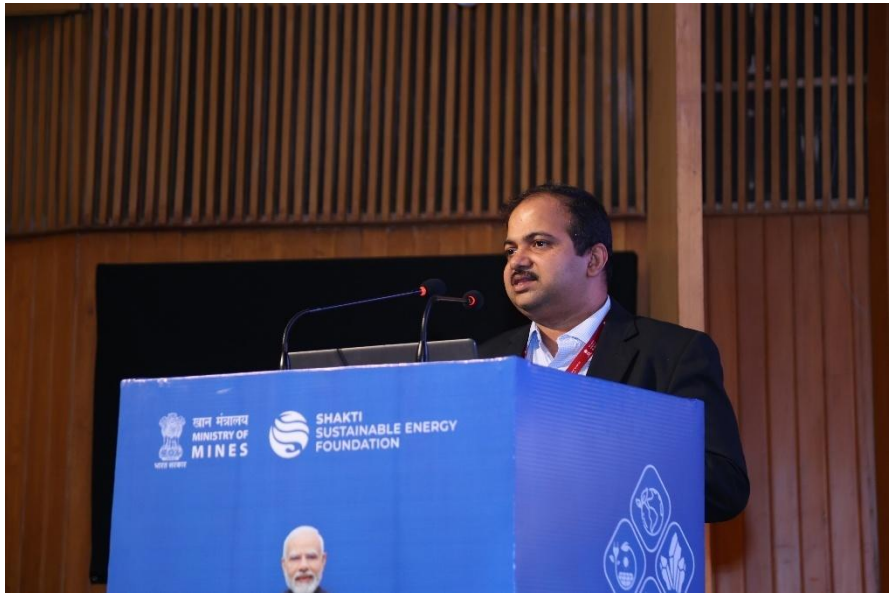

Photo 22 Presentation by Mr. Rino Raj, COO, Tata Chemicals

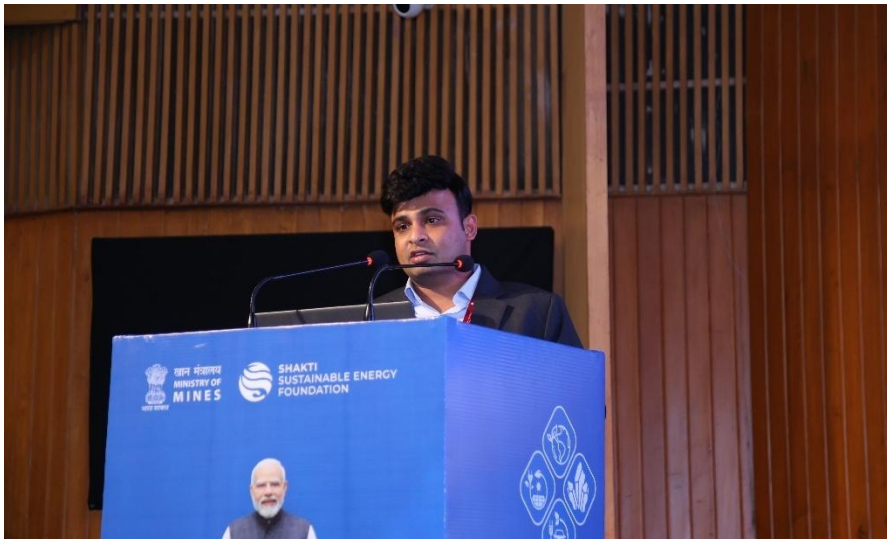

Photo 24 Presentation by Mr. Anjani Sri Mourya Sunkavalli, ALTMIN

Mr. Anjani Sri Mourya Sunkavalli, founder of Altmin, shared insights on lithium processing and domestic battery material manufacturing. Altmin started with a small LFP cathode active material (CAM) plant in Hyderabad in 2023 and is rapidly expanding capacity to 20,000 tons per year while qualifying with leading cell manufacturers. He emphasized the importance of securing spodumene supply at competitive costs, highlighting Altmin's strategic partnership and equity investment with a well-established Brazilian mining and refining company, CBL, which offers lower cost spodumene and advanced refining technology. Altmin is also collaborating with Indian PSUs like NMDC and Singareni to scale lithium refining capabilities domestically. Mourya urged the industry and government to reconsider current tender pricing models by setting minimum support prices reflecting actual production costs plus margins, rather than caps, to foster a viable and self-reliant domestic battery materials ecosystem, reducing dependence on imports and enabling India's growth in next-generation technologies.

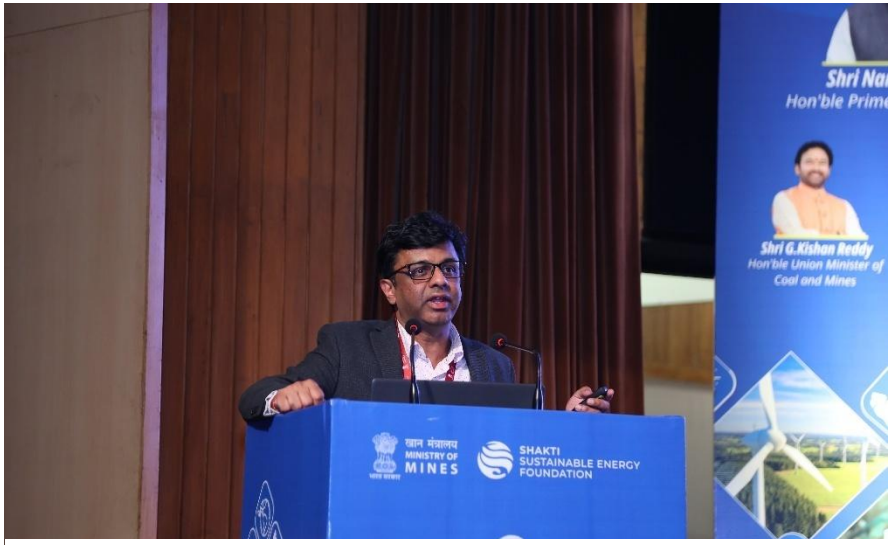

Photo 23 Presentation by Mr. Rajat Verma, LOHUM

Mr. Rajat Verma, Founder of LOHUM stressed the critical need for India to develop indigenous refining technologies for critical minerals, essential not only for battery materials but also for complex applications like jet engines. He pointed out that jet engines require advanced superalloys involving critical minerals, a challenge India has yet to solve due to gaps in downstream processing. Lohum's experience revealed heavy reliance on costly, outdated Chinese technology—especially in cathode active materials—hurting profitability and innovation. Despite the industry being dominated by a few countries, Lohum chose to develop in-house technologies, overcoming challenges in scaling, process know-how, and high-

temperature operations. Currently, Lohum runs lithium, cobalt, and nickel refineries and is expanding into permanent magnets and PGMs, steadily improving yields through internal innovation. Rajat concluded by citing Japan's incremental innovation in magnets as a model, urging India to pursue continuous, homegrown innovation to achieve self-reliance in critical mineral industries like aerospace and clean energy.

Concluding Remarks by Shri Lekhan Thakkar, Joint Secretary, National Security Council Secretariat

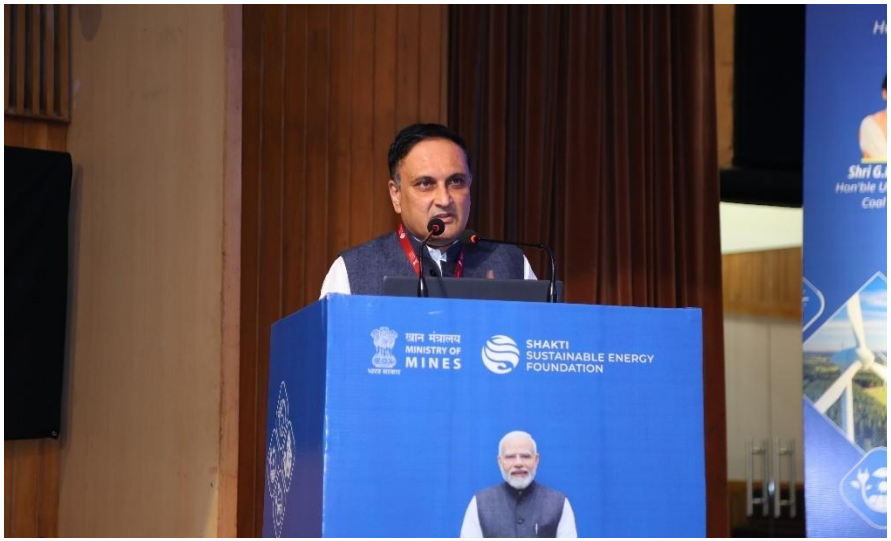

Photo 25 Closing Remarks by Shri Lekhan Thakkar, JS, NSCS

Closing the session, Shri Lekhan Thakkar, Joint Secretary at the National Security Council Secretariat (NSCS), emphasized the strategic urgency of building domestic mineral processing capabilities to secure India's economic and national interests. Highlighting the overwhelming dominance of very few countries in critical mineral processing, technology, and capital goods, he underscored the risks of external dependency, including export controls, dumping practices, and restricted access to advanced equipment and know-how. He called for stronger collaboration between industry, academia, and government, leveraging initiatives under thes NCMM and state-level efforts. Shri Thakkar also mentioned India's role in international dialogues, such as the TRUST Strategic Initiative with the UK and USA, where critical minerals are a central focus. He concluded with a strong call for indigenous technology development to overcome structural barriers and strengthen India's resilience in global supply chains.

5. Panel Discussion on "Unlocking Capital and De-risking Investments for Critical Mineral Processing"

Background for Discussion:

As global demand for critical minerals accelerates, driven by the energy transition, electric mobility, and clean technology manufacturing, countries must move beyond extraction to build resilient, end-to-end value chains. A major bottleneck lies in the mining and processing stages, which are capital-intensive, technologically complex, and often fraught with commercial and regulatory risk. This session explores innovative finance models and de-risking strategies to support the scale-up of critical mineral mining and processing, with a focus on the Indian context. Panellists from multilateral banks, export credit agencies, international organisations, and venture capital share perspectives on mobilising finance, mitigating risk, and catalysing private sector participation. The

discussion also examines financial institutions' views on risks hindering financing, best financing mechanisms for India, relevant policy initiatives, and how international finance can support India's clean energy ambitions.

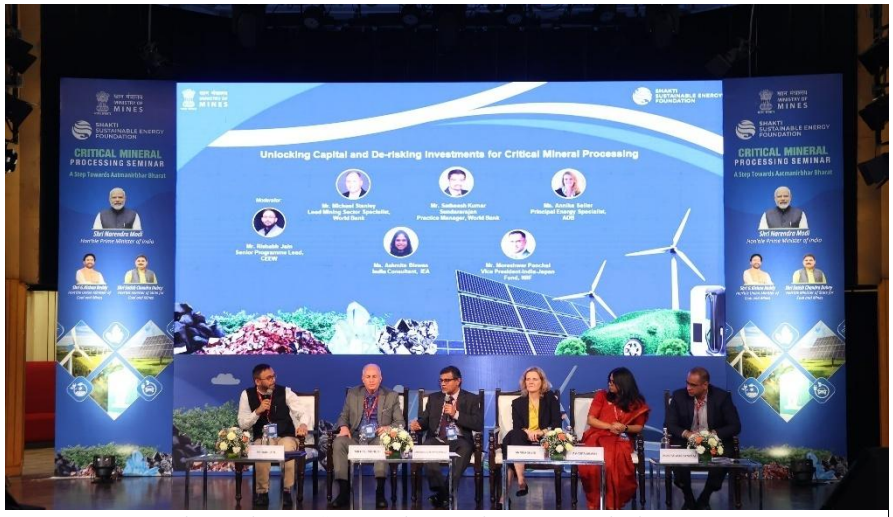

Photo 26 Panel Discussion on "Unlocking Capital and De-risking Investments for Critical Mineral Processing"

Key Highlights of the Discussion:

- The discussion highlighted that limited availability of risk capital remains a key challenge for developing India's critical minerals and rare earth sector, especially in achieving end-to-end integration across the value chain.
- Key financial tools such as incentive frameworks, infrastructure and technology financing, and risk mitigation measures like offtake agreements and blended finance were identified as essential to support sector growth.
- Despite progress in policy and technology, the need to focus more on long-term financing and risk management was emphasized, including attracting capital from domestic, foreign, and multilateral sources to support projects with long development timelines.
- It was noted that the entire critical minerals value chain requires significant capital investment and faces high risks—including technical, regulatory, and market-related—that affect investor confidence given the long horizon for returns.
- The session also stressed the growing focus on processing and recycling within the value chain to retain critical minerals domestically, through urban mining and circular economy approaches.
- A comprehensive financing approach combining sovereign and private sector support, stable policies, and technical assistance can help de-risk investments and foster sector development.
- The importance of environmental, social, and governance (ESG) considerations was highlighted as critical to securing community support and maintaining social licenses for sustainable mining.
- Tools like political risk insurance and government-backed guarantees were discussed as key to boosting investor confidence in this high-risk sector.
- Transparent regulations, knowledge sharing, and strong public-private collaboration are essential to create an enabling environment for sustainable mining that benefits communities.

- Dedicated funding mechanisms play a crucial role in supporting data analytics, investor facilitation, and building momentum for the critical minerals sector domestically.
- The discussion recognized India's expanding role in the global critical minerals ecosystem through its growing expertise, financial capacity, and technical know-how.

6. Panel Discussion on "Developing a Robust Recycling Ecosystem for Critical Minerals"

Background for Discussion:

As India advances its energy transition, electric mobility, and Atmanirbharta in critical mineral supply, recycling end-of-life products is vital. With rising imports of lithium, cobalt, and rare earths, urban mining from batteries, e-waste, and scrap offers a key path to supply chain resilience and reduced foreign dependence. With India expected to generate over 5 million tonnes of e-waste annually by 2025, the need for effective recycling solutions is increasingly urgent.

Yet, India's recycling ecosystem is still emerging, facing regulatory, technological, logistical, and economic challenges. This session will address these barriers by exploring reforms like Extended Producer Responsibility (EPR), scaling collection and processing, and the role of startups in mineral recovery.

Key Highlights of the Discussion:

- The session underscored the significant potential of recycling to reduce India's reliance on imports for critical minerals, with estimates suggesting up to 40% reduction in primary demand for cobalt and copper, and 25% for lithium and nickel by 2050.

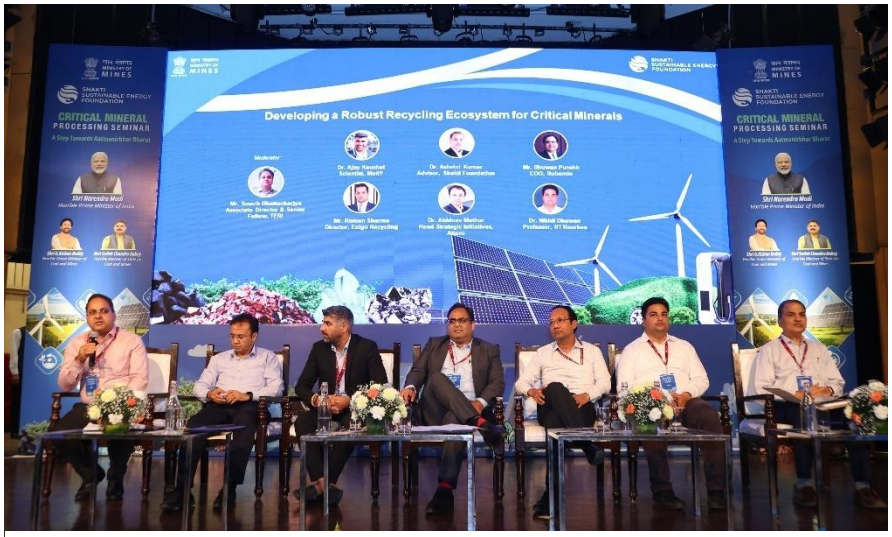

Photo 27 Panel Discussion on "Developing a Robust Recycling Ecosystem for Critical Minerals"

- It was noted that existing regulations such as the Battery Waste Management and E-Waste Rules remain limited in scope, focusing on a narrow set of metals. Expanding regulatory coverage to include a broader range of critical elements in waste streams is essential.
- A key concern raised was the leakage of critical material-rich waste from India due to informal dismantling practices and limited enforcement, with such waste often ending up in other countries for processing. Stronger export restrictions, waste stream tracking, and audit mechanisms were recommended.
- Panellists emphasized the need to reform the EPR framework, with suggestions to introduce differentiated credits based on

recovery efficiency, purity of output, and environmental performance to incentivize advanced recycling.

- The informal sector continues to process over 90% of e-waste but lacks access to safe and efficient recovery technologies. Initiatives such as Common Facility Centres (CFCs) and eco-parks were discussed to integrate and upgrade informal sector practices through training and infrastructure support.
- The panel highlighted the need for a stable and sufficient feedstock supply to fully utilize India's recycling capacity. Suggestions included allowing controlled imports of waste from OECD countries while placing restrictions on the export of valuable secondary materials.
- Innovation and R&D were recognized as critical to developing scalable, efficient recycling technologies. Bridging the gap between academic research and industry uptake through Centres of Excellence and public-private partnerships was seen as a key priority.
- Panellists stressed that a broader scope beyond batteries and e-waste is necessary, including other high-value waste streams such as spent catalysts and industrial slurries that contain recoverable critical materials.
- Shifting the narrative from recycling to upcycling was suggested to reinforce the goal of reintegrating recovered materials into formal manufacturing, thereby adding value and supporting circularity.
- To boost domestic demand for recycled materials, it was recommended to strengthen market linkages and build end-use industries, particularly for battery-grade materials, supported by targeted policy and financial interventions.
- The proposed national incentive scheme was welcomed, with expectations for it to support end-to-end recyclers (R4) through reimbursements on equipment and operations and help scale capacity to 400,000 tons/year by 2030.
- Finally, panellists called for a coordinated approach to skilling across the value chain—linking ITIs, academia, R&D labs, and industry to create a competent workforce for the growing recycling and processing ecosystem.

Concluding Remarks by Shri Shakil Alam, EA, Ministry of Mines

Closing the session, **Shri Shakil Alam, Economic Advisor, Ministry of Mines,** underscored the need for a comprehensive approach to scaling critical mineral recycling in India. He outlined the Ministry's plans under the National Critical Minerals Mission to introduce financial incentives for recycling units, particularly those engaged in high-value extraction processes (R4-level recycling), with a goal to expand capacity to at least 400,000 tonnes annually by 2030. He highlighted the importance of strengthening the EPR framework, advancing translational R&D through Centres of Excellence in a hub-and-spoke model, and integrating skill development across the value chain—from exploration to recycling. The envisaged efforts aim not only to boost domestic recycling infrastructure but also to enable employment generation and technological self-reliance in critical minerals.

7. Closing Remarks

Closing Remarks by Shri V.L. Kantha Rao

In his closing remarks, Shri V.L. Kantha Rao, Secretary, Ministry of Mines, reflected on the day's deliberations and outlined the path ahead under the National Critical Minerals Mission. The workshop convened over 100 participants—including corporates, researchers, financiers, and government stakeholders—to foster dialogue and collaboration on strengthening India's critical minerals ecosystem, particularly in processing and recycling. He emphasized that research and development will be the cornerstone of India's technological capability, citing examples where public R&D has already yielded commercial solutions, such as in permanent magnets. With ₹1,000 crore earmarked under the Mission for R&D—₹500 crore each for domestic and international efforts—the Ministry is prioritizing the establishment of Centres of Excellence, mandating active corporate participation to ensure industry relevance and uptake. On investment promotion, he highlighted promising state-led models such as Gujarat's upcoming rare earth processing park and noted that the Ministry will roll out smaller schemes, including those supporting stockpiling and processing projects through the National Mineral Exploration Trust. The sessions also featured several companies currently operationalising or planning processing units in India, offering concrete models for scaling domestic capacity. Financing emerged as a key enabler, with international and multilateral institutions expressing interest in supporting projects across the value chain. Recycling was acknowledged as an area of high potential, and a dedicated scheme is expected to be among the first launched under the Mission. The Secretary reiterated that while India has made progress in mine auctions, the focus must now shift towards setting up processing units and delivering end-use value domestically. He also reaffirmed the goal of acquiring mineral assets abroad and supporting Indian companies sourcing raw materials internationally. In closing, he noted that this workshop served as a platform to initiate collaboration, and that the Ministry will follow up with participants in focused groups to advance actionable proposals and accelerate implementation.

8. Conclusions and Recommendations

Key Takeaways:

- IMMT is advancing technologies such as membrane, bio-electrochemical, and nanofiltration methods, and exploring sustainable reuse of mineral processing residues in construction.
- A major gap remains in market readiness and commercial scalability of mineral processing innovations.
- Current processes are challenged by high water use, reliance on concentrated acids, and lack of robust life cycle and techno-economic assessments.
- States are enabling mineral sector growth through coordinated efforts, single-window clearances, investment promotion via channels like the Bureau of Investment Promotion.
- States also showcased their proactive approach through stakeholder consultations, mineral block auctions, and

development of industrial clusters focused on clean energy, defence, and fertilizers—supported by strong policy incentives.

- India's rare earth reserves are mainly light REEs, with low ore grades and complex processing needs compared to China's simpler and higher-grade operations. Additionally, processing rare earths is challenged by radioactivity, non-standardized methods, and long gestation periods for mines.
- Nickel refining in India faces challenges like high energy intensity, waste from tailings, high capex, and restricted access to Chinese equipment. There is also a strong need for adaptable processing infrastructure due to varying ore quality and sources.
- India's battery ecosystem is constrained by lack of competitive spodumene supply and tender models that don't reflect true production costs. There is also a heavy reliance on outdated Chinese technology for battery materials and advanced applications, which affects profitability and innovation.
- The entire critical minerals value chain requires significant capital and is exposed to technical, regulatory, and market-related risks, deterring investors due to long return horizons.
- Limited availability of risk capital remains a major challenge for developing India's critical minerals, particularly for achieving end-to-end value chain integration.
- ESG considerations are essential for ensuring community support and securing social licenses for sustainable mining.
- Transparent regulation, knowledge sharing, and public-private collaboration are critical to creating an enabling environment.
- Recycling has the potential to reduce India's import reliance for critical minerals by up to 40% for cobalt and copper, and 25% for lithium and nickel by 2050. But India's recycling capacity is underutilized due to unstable feedstock supply.
- Current regulations like the Battery Waste Management and E-Waste Rules are limited in scope, covering only a narrow set of metals.
- A significant portion of valuable waste is lost due to informal dismantling and weak enforcement, often ending up abroad for processing. A coordinated skilling approach across the value chain is essential to support the emerging ecosystem.
- A broader material scope is needed, beyond just batteries and e-waste, to include high-value streams like spent catalysts and industrial slurries.
- There is a need to shift the narrative from recycling to upcycling to better support circularity.
- Stronger domestic demand and end-use industries are necessary to drive market uptake of recycled materials.

Key Recommendations:

1. Establish **a phased approach to building domestic refining capacity**, starting with imported feedstock and moving toward domestic and overseas mining acquisitions.
2. **Mobilize long-term capital from domestic, foreign, and multilateral sources** to support projects with extended development timelines.
3. Introduce **political risk insurance and government-backed guarantees** to improve investor confidence.
4. **Expand regulatory coverage** to include a broader range of critical materials in waste streams. Include reimbursing mechanisms for expenses on recycling.
5. Allow **controlled imports of recyclable waste from OECD countries** while introducing **stronger export restrictions and implement waste tracking** and audit mechanisms to reduce leakage.
6. Reform the EPR framework with **differentiated credits based on recovery efficiency, purity, and environmental performance.**

Appendix 1: Agenda of the Seminar

09:00 AM – 09:30 AM	**Registration**	
09:30 AM – 10:30 AM	**INAUGURAL SESSION**	
	Welcome remarks by Shri. Sreyamsa Bairiganjan, Chief of Programmes, Shakti Sustainable Energy Foundation	
	Signing of MoU between Hindustan Copper Limited and RITES Limited	
	Keynote address by Shri. V.L. Kantha Rao, Secretary, Ministry of Mines	
	Presentation on NCMM by Shri. Dinesh Mahur, Joint Secretary, Ministry of Mines	
	Launch of NCMM Outreach Forum and Keynote Address by Hon'ble Union Minister, Ministry of Mines, Shri G. Kishan Reddy	
	Vote of thanks By Ms. Priti Shukla, Programme Manager, Shakti Sustainable Energy Foundation	
10:30 AM – 11:30 AM	*Technology Presentations*: **Advancements in R&D for Critical Mineral Processing**	This session will explore indigenous technologies alongside cutting-edge, low-impact innovations for efficient processing and refining of key critical minerals. It will also highlight solutions for processing low-grade and complex ores through advanced technological innovations. **Presentations by:** • Dr Ramanuj Narayan, Director, IMMT • Dr. Sandip Ghosh Chowdhury, Director, NML Jamshedpur • Dr. K. Balasubramanian, Director, NFTDC • Dr. I. Balasundar, Scientist-G, DMRL, DRDO • Prof. Dhruva Kumar Singh, IIT-ISM Dhanbad *Closing remarks by Prof Kamal Kishore Pant, Director, IIT Roorkee*
11:30 AM – 11:45 AM	**Tea/Coffee Break**	
11:45 AM – 12:35 PM	Presentation: **Role of State Governments in Enabling Domestic Critical Mineral Processing**	This session will examine the role of state governments in facilitating infrastructure development, streamlining approvals, and fostering industrial clusters. It will also highlight their efforts in driving localised opportunities through policy support and stakeholder coordination. **Presentations by:** • Smt. Mamta Verma, IAS, Principal Secretary, Industries and Mines Department, GMDC • Smt. Mala Shrivastava, IAS, Secretary, Geology & Mining Dept, Uttar Pradesh and Shri Shashank Choudhary, IAS, Additional CEO, Invest UP • Shri. N. Balram, CMD, Singareni Collieries Company Limited (SCCL) • Shri. A. Sreenivas Kumar, Deputy Director of Mines & Geology, Government of Andhra Pradesh • Dr. C.P. Dadhich, Senior Geologist, Department of Mines & Geology, Government of Rajasthan *Closing remarks by Shri Roopwant Singh, IAS, Managing Director, GMDC*

12:35 PM – 01:30 PM	*Technology Presentation*: **Driving Innovation in India's Critical Mineral Processing Industry**	This session will highlight current and planned industry initiatives in critical mineral processing, with a focus on R&D efforts aimed at developing advanced and efficient processing solutions. **Presentations by:** • Processing of REE - Ravi Prakash Jha Deputy General Manager (Technical), IREL • Processing of Nickel – Mr. Aditya Menon, Head of Public Policy and Strategy, Vedanta Pvt. Ltd. • Critical Mineral Processing – Mr. Rino Raj, COO, Tata Chemicals • Processing of Lithium – Mr. Anjani Sri Mourya Sunkavalli, ALTMIN • Refining of Critical Minerals – Mr. Rajat Verma, LOHUM *Closing remarks by Shri Lekhan Thakkar, National Security Council Secretariat*
1:30 PM – 2:30 PM	**Networking Lunch**	
2:30 PM – 3:30 PM	*Panel Discussion - 1*: **Unlocking Capital and De-risking Investments for Critical Mineral Processing**	**Topics Covered:** This session will explore investment models to enable end-to-end integration across the critical minerals value chain. It will cover India's incentive frameworks, financing instruments for scaling infrastructure and technology, and de-risking strategies such as offtake agreements and blended finance. **Moderator:** Mr. Rishabh Jain, Senior Programme Lead, CEEW **Panelists:** • Mr Michael Stanley, Lead Mining Sector Specialist, World Bank • Mr Satheesh Kumar Sundararajan, Practice Manager – IBRD/IDA Guarantee Unit, World Bank • Ms. Annika Seiler, Principal Energy Specialist, ADB • Ms. Ashmita Biswas, India Consultant, IEA • Mr. Moreshwar Panchal, Vice President, NIIF *Closing remarks by Ms. Petal Dhillon, JS, Department of Commerce*
	Q&A (10-15 minutes)	
3:45 PM – 4:15 PM	*Panel Discussion - 2*: **Developing a Robust Recycling Ecosystem for Critical Minerals**	This session will cover emerging technologies for e-waste, end-of-life battery, and industrial scrap recycling for critical minerals, explore models for extended producer responsibility (EPR), and assess the role of both public and private sectors in developing collection, logistics, and processing infrastructure. **Moderator:** Mr. Souvik Bhattacharjya, Associate Director & Senior Fellow, TERI **Panelists:** • Dr. Ajay Kaushal, Scientist, MeitY • Mr. Bhuwan Purohit, COO, Rubamin • Dr. Ashvini Kumar, Advisor, Shakti Sustainable Energy Foundation

		• Dr. Abhinav Mathur, Head - Strategic initiatives, Attero • Professor Nikhil Dhawan, IIT Roorkee *Closing remarks by Shri Shakil Alam, Economic Adviser, Ministry of Mines*
4:15 PM – 4:25PM	**Closing Remarks by Shri. V.L. Kantha Rao, Secretary, Ministry of Mines**	
4:25PM – 4:30 PM	**Vote of Thanks**	
4:30 PM onwards	**High Tea**	

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