FUTURE MINERALS FORUM

Under the Patronage of the
Custodian of the Two Holy Mosques,
King Salman bin Abdulaziz Al Saud

2026

13 - 15 January 2026

King Abdulaziz International Conference Center

Riyadh, Saudi Arabia

REFLECTIONS REPORT

Dawn of a global cause: Minerals for a new age of development

ORGANISED BY

ENDORSED BY

FOUNDING PARTNERS

WE EXTEND OUR GRATITUDE TO ALL OUR PARTNERS & PARTICIPANTS

Under the gracious patronage of the Custodian of the Two Holy Mosques, King Salman bin Abdulaziz Al Saud, and with the close support and follow-up of His Royal Highness Prince Mohammed bin Salman bin Abdulaziz, Crown Prince and Prime Minister, the fifth edition of the Future Minerals Forum was held in Riyadh from 13–15 January 2026, marking another important milestone in the Kingdom's journey to position mining as a strategic pillar of economic growth and industrial development.

FMF 2026 once again demonstrated the power of shared ambition, purposeful collaboration, and long-term vision. What began as a regional platform has continued to evolve into a truly global forum of growing relevance and consequence.

This year's edition recorded exceptional participation, welcoming approximately 21,500 participants and visitors from more than 170 countries, with international participation accounting for around 75% of total attendance. It also brought together more than 90 governments, 64 international organisations, 13 intergovernmental organisations, and more than 450 speakers, including ministers, chief executives, and leading experts from across the world.

The Ministerial Roundtable and strategic discussions held during the forum reinforced a shared global commitment to advancing the minerals sector in a more integrated, responsible, and future-ready direction. Across the programme, FMF 2026 highlighted the importance of stronger international cooperation, more resilient supply chains, accelerated exploration, smarter financing, technological advancement, and deeper value chain development.

The forum also delivered meaningful outcomes on the investment and economic front. This year's edition resulted in the signing of 132 agreements and memoranda of understanding with a total value exceeding SAR 100 billion (USD 26.6 billion), spanning exploration, financing, innovation, and value chain development.

Alongside these outcomes, the international exhibition accompanying the forum offered a forward-looking vision for the sector through the participation of 274 exhibitors, further reinforcing FMF's role as a platform where ideas, partnerships, technology, and investment come together to shape the future of mining and minerals.

To our founding partners, sponsors, exhibitors, speakers, delegates, and institutional collaborators, we extend our gratitude. Your trust, contribution, and commitment are what give FMF its momentum and meaning. Your participation has helped transform this platform into a global meeting point for those who are not only discussing the future of minerals, but actively building it.

We look forward to welcoming you again at the next edition of the Future Minerals Forum, taking place on 12–14 January 2027.

Ali Al-Mutairi
Executive Director,
Future Minerals Forum

TABLE OF CONTENTS

Welcome 2
Key Outcomes of the FMF 6
FMF Delivers Global Visibility 12
The Power of Meetings – In Numbers 14
Key Testimonials and Impressions From FMF 16
Extensive International Media Coverage of FMF26 20
Ministerial Roundtable: A Government-Only Platform Driven by Partnership, and Action 22
A World Convening Power 24
Strong Participation from International Non-Governmental Organizations 26
Heads of Geological Surveys Meet at the Third International Geological Survey Meeting (IGSM) 28
Second Meeting of the Global Network of Centers of Excellence and Technology 32
Global Arena 34
International Exhibition 36
Delegate Connect 38
Premier Lounge 40
Maaden Auditorium 44
A Technical Exhibition at the Center of Industry Influence 46

Outdoor Heavy Machinery & Smart Logistics Exhibition 48
Live Onsite FMF TV 50
Sponsors 54
Exhibitors 60
Country Partners 62
Agendas 64
– MinGen Agenda 66
– Gateway to Funding Agenda 76
– Maaden Auditorium 122
– MinValley Agenda 212
– State of the Sector 256
– Knowledge Exchange Agenda 290
– Country Showcase Agenda 342

KEY OUTCOMES OF THE FMF26

1. Presentation of the Future of Minerals Framework

The Ministerial Roundtable presented a draft Framework for the Future of Minerals to strengthen cooperation among producing countries, consuming countries, and strategic partners. The framework seeks to support investment attraction, value chain development, infrastructure expansion, local value creation, and cross-border collaboration. Participants agreed to complete the remaining procedural steps ahead of its formal presentation in international forums, prior to its launch in March 2026.

2. Shaping the World Bank's strategic direction on minerals

Through a series of discussions and engagements, the 5th Ministerial Roundtable contributed to shaping the World Bank Group's emerging strategy for minerals and critical minerals, particularly in relation to infrastructure financing and the development of priority mineral corridors. The strategy was framed around three core pillars: policy and governance, infrastructure, and private-sector and innovation support.

3. Advancing transparency and responsible mining standards

The conference brought stakeholders into alignment around the importance of transparency and the harmonization of practices to strengthen trust and reliability across mineral supply chains. During the Ministerial Roundtable, new work was announced to advance responsible mining standards in cooperation with global standard-setting bodies, including ISO and SASO, helping to address inconsistencies that have historically weakened confidence in international supply chains.

4. Endorsement of innovation, sustainability, and capability-building initiatives

The Ministerial Roundtable endorsed a network of centers of excellence to drive innovation, sustainability, and capacity-building in the sector. King Abdulaziz City for Science and Technology (KACST), in collaboration with the Ministry of Industry and Mineral Resources and in partnership with Mohammed VI Polytechnic University (UM6P) in Morocco, the Council for Scientific and Industrial Research (CSIR) in South Africa, and the University of Exeter in the UK, will strengthen these centers of excellence and enhance applied research, talent development, and knowledge transfer across the mining ecosystem.

5. Strengthening the conference's role as a platform for international collaboration

The conference reinforced its role as a central platform for international cooperation in mining and minerals by signing a strategic agreement with the World Economic Forum under the theme "Securing Minerals for Development and Global Prosperity."

The agreement runs through September 2027 and establishes the conference as a principal platform for dialogue and implementation, supported by a joint executive committee.

6. Launch of the Future Minerals Pioneers Global Competition

The conference launched the Future Minerals Pioneers Global Competition, featuring three tracks focused on smart technologies, safety, and sustainability in the minerals sector. Winners were recognized, and finalists were given an interactive platform to present their innovations to investors and decision-makers.

KEY OUTCOMES OF THE FMF26

7. Launch of the Future Minerals Barometer

The 5th FMF marked the launch of the Future Minerals Barometer, developed in collaboration with McKinsey & Company and sector-leading experts. This first-of-its-kind global tool is designed to measure and track the progress of critical mineral value chain development across the “Super Region” spanning Africa, Western Asia, Central Asia, and Latin America, while establishing a comprehensive baseline for how governments, companies, and investors are advancing resilient, responsible mineral supply chains.

8. Launch of the Mining Infrastructure Enablement Initiative

FMF 2026 witnessed the launch of the Mining Infrastructure Enablement Initiative, a last-mile program designed to support energy and water infrastructure in the final stages of exploration projects. The initiative is led by the Ministry of Industry and Mineral Resources, in collaboration with the Saudi Industrial Cities and Technology Zones Authority (MODON). Among the first announced projects is the development of a 75-kilometer treated water pipeline to support industrial and mining development in the Jabal Sayid area.

9. Launch of a venture investment platform for mining innovation

To support venture investment in the sector, the conference introduced the Screening Directors Platform as part of its programme. The platform serves as an interactive space connecting entrepreneurs, investors, and decision-makers to help translate technological innovation into investment opportunities and commercially viable partnerships within the Kingdom’s mining ecosystem.

10. Launch of the Saudi Mining College

A strategic partnership between the Ministry of Industry and Mineral Resources and King Abdulaziz University led to the launch of the Saudi Mining College, aimed at aligning educational outcomes with investment opportunities and labour market needs across the mining sector.

11. Completion of geological and geochemical survey works across the Arabian Shield

The conference announced 100% completion of geochemical and geophysical mapping of the Arabian Shield, alongside a significant increase in exploration spending — increasing from USD 54.6 million (SAR 204.75 million) in 2020 to USD 280.5 million (SAR 1.052 billion) in 2024.

12. Expansion of mining licensing opportunities

The Kingdom announced that it has made more than 33,000 square kilometers available through mining licensing rounds. The ninth licensing round alone resulted in the award of 172 sites to 24 companies and consortia across over 24,000 square kilometers, making it the Kingdom’s largest exploration offering to date.

13. Addressing financing gaps through practical investment platforms

Building on lessons from previous editions, FMF 2026 highlighted the need for practical mechanisms to reduce financing gaps and de-risk exploration. In response, it announced the Gateway to Funding, in cooperation with the Bank of Montreal, alongside the establishment of two new investment funds, to improve access to executable financing opportunities across the sector.

14. Signing of international cooperation agreements in mineral resources

The Ministry of Industry and Mineral Resources signed three memoranda of understanding with Chile, Canada, and Brazil to strengthen technical and investment cooperation in mineral resources and advance collaboration across the mining and minerals industry.

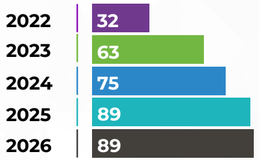
“STRATEGIC CAPITAL ACCESS”
“GOVERNMENT-TO-INDUSTRY ALIGNMENT”
“DEALS THAT SHAPE GLOBAL SUPPLY CHAINS”

FMF unites governments, CEOs, sovereign funds, and industry leaders to drive the policies, partnerships, and investments accelerating mineral development for a new era of mineral development.

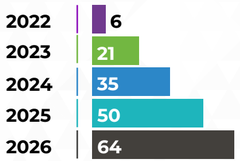
TURNING TALK INTO ACTION.

FMF DELIVERS GLOBAL VISIBILITY

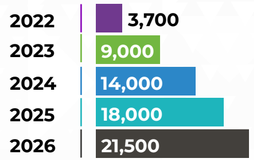
Ministerial Meeting Participants
(Countries)



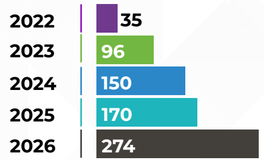
Organizations
(Government and Non-Governmental)



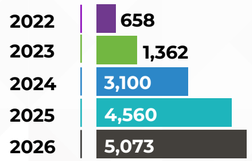
Attendance



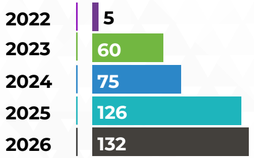
Sponsors and Exhibitors



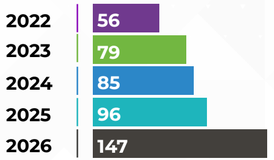
Business Meetings



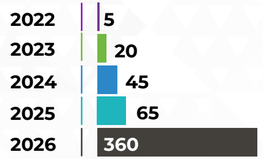
Memorandum of Understanding and Agreements



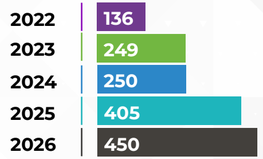
Conference sessions
(Panel discussions, bilateral meetings, keynote speeches, and technical talks)



Attendance from Top Executives
(CEOs of major miners, investment companies and value chain representatives)

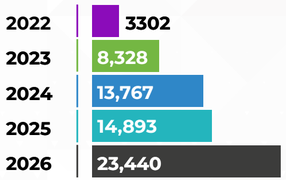


Speakers

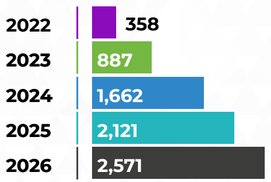


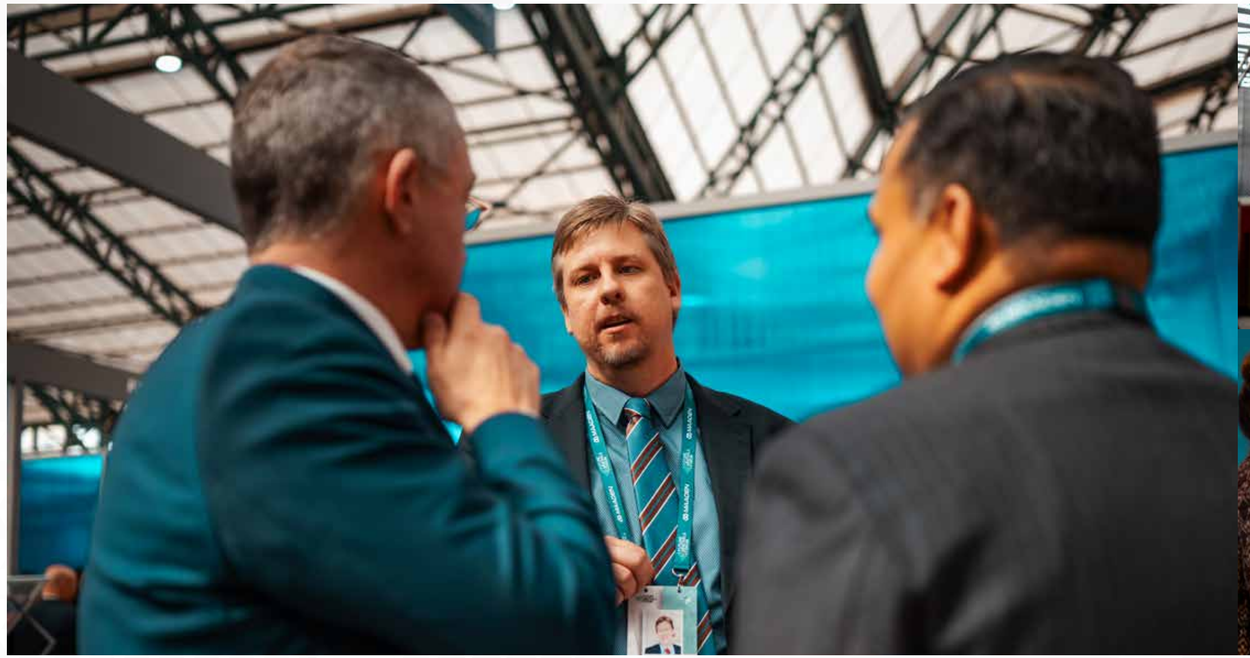
THE POWER OF MEETINGS – IN NUMBERS

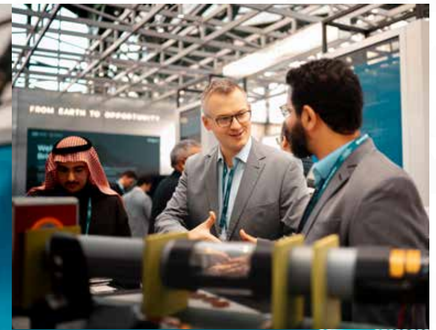
Participants Using The Platform



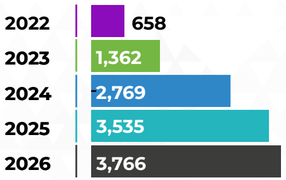
Successful Confirmed Meetings During The Event



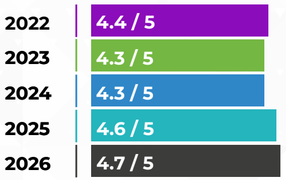




Total Confirmed Meetings



Average Meeting Rating



KEY TESTIMONIALS AND IMPRESSIONS FROM FMF

Paul Kabuswe
Minister of Mines and Mineral Development, Zambia

"The Future Minerals Forum represents a global platform that fosters confidence in Africa and opens new avenues for investment."

Ali Pervaiz Malik
Federal Minister for Energy (Petroleum & Natural Resources), Pakistan

"The Future Minerals Forum comes at a pivotal moment. It highlights the growing importance of collaboration in advancing clean technologies and securing the minerals required for the energy transition.".

David Copley
Deputy Assistant to the President & Senior Director, National Security Council, The White House, USA

"We are grateful for the Kingdom of Saudi Arabia's leadership in convening this important global forum."

H.E. Eng. Karim Badawi
Minister of Petroleum and Mineral Resources, Egypt

"We thank the Kingdom for hosting this important gathering. FMF provides a critical platform to build more resilient mineral supply chains."

Dr. Leila Benali
Minister of Energy Transition and Sustainable Development, Kingdom of Morocco

"The Future Minerals Forum has become a mature platform for serious discussions on the future of the mining industry."

Louis Watum Kabamba
Minister of Mines, Democratic Republic of Congo

The Future Minerals Forum plays a central role in bringing together countries, institutions, regulators and the world's largest mining companies to strengthen dialogue and cooperation."

Benjamin Gallezot
Interministerial Delegate for Strategic Metals & Minerals Supply, France

"The Future Minerals Forum is growing year after year and has become a successful platform that convenes stakeholders to advance global discussions around strategic minerals."

Scott Brison
Vice Chairman, Global Investment Banking, BMO Capital Markets (Former Member of Parliament of Canada)

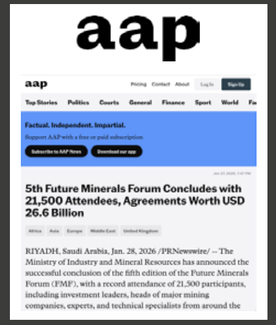
"The Kingdom has provided the world with a forum that, in just a few years, has become a leading global platform for dialogue on minerals — bringing together more than 100 countries under one roof."

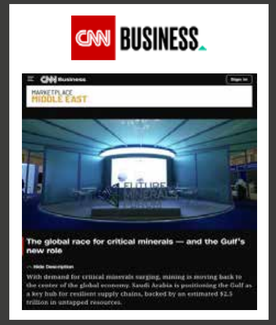
EXTENSIVE INTERNATIONAL MEDIA COVERAGE OF FMF26

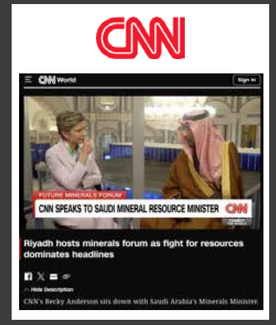
The Future Minerals Forum 2026 generated strong international media coverage, with leading global and regional outlets dedicating significant attention to the forum's strategic discussions, major announcements, and investment outcomes.

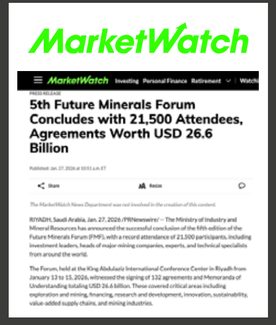
Coverage highlighted FMF's growing role as a globally relevant platform shaping dialogue around minerals, mining, industrial development, and supply chain resilience. Particular attention was given to the scale of international participation, the presence of ministers and senior decision-makers, the signing of agreements and memoranda of understanding valued at more than SAR 100 billion, and the forum's role in advancing cooperation across the full minerals value chain.

MEDIA OUTLETS AT FMF26 INCLUDED:

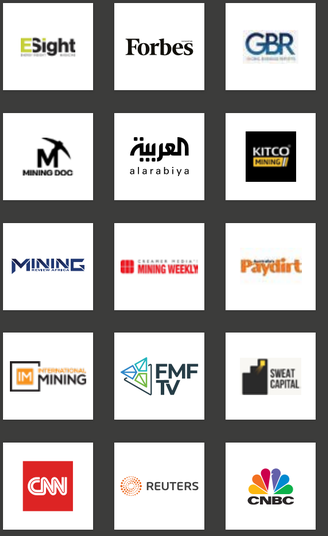








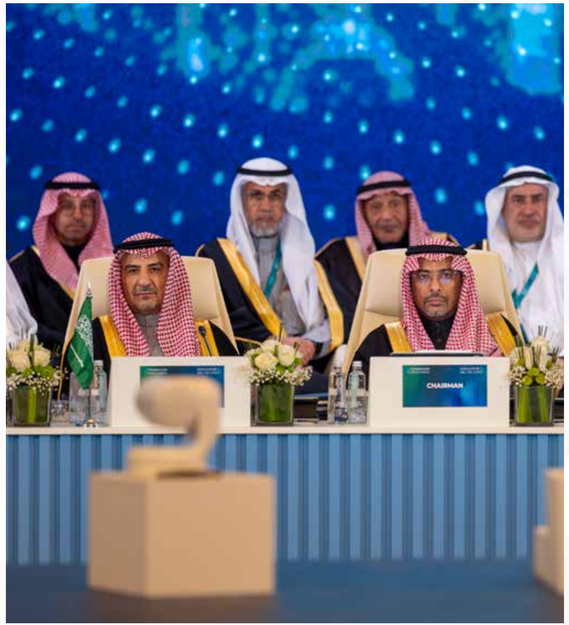
MEDIA OUTLETS AT FMF26 INCLUDED ARE:



MINISTERIAL ROUNDTABLE: A GOVERNMENT-ONLY PLATFORM DRIVEN BY PARTNERSHIP, AND ACTION

The Ministerial Roundtable is FMF's flagship event, bringing together senior government representatives, leading CEOs, industry leaders, and multilateral organizations to promote policies and actions that create resilient and responsible minerals and metals value chains.

FUTURE MINERALS FORUM
MINISTERIAL ROUNDTABLE



A WORLD CONVENING POWER

Host Country

Saudi Arabia

G20 & Leading Mining Countries

Argentina

Australia

Austria

Brazil

Canada

Chile

China

Egypt

DR Congo

EU

France

Germany

India

Indonesia

Italy

Japan

Kazakhstan

Malaysia

Mexico

Morocco

Netherlands

Oman

Pakistan

Peru

Russia

Senegal

South Africa

South Korea

Sweden

Thailand

Turkey

UK

US

Uzbekistan

Zambia

Europe

Belgium

Bulgaria

Czechia

Denmark

Georgia

Greece

Ireland

Kosovo

Norway

Poland

Portugal

Serbia

Slovakia

Switzerland

UK

Africa

Algeria

Burkina Faso

CAR

Djibouti

Eswatini

Gambia

Ghana

Kenya

Liberia

Libya

Malawi

Mauritania

Mauritius

Niger

Nigeria

Sierra Leone

Somalia

South Sudan

Sudan

Tanzania

Tunisia

Uganda

Asia

Armenia

Azerbaijan

Bahrain

Bangladesh

Iran

Iraq

Jordan

Kuwait

Kyrgyzstan

Palestine

Philippines

Qatar

Singapore

Sri Lanka

Syria

Turkmenistan

Yemen

STRONG PARTICIPATION FROM INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS

INTERNATIONAL AND REGIONAL ORGANIZATIONS

IGF, EITI, ISO, OECD, UNIDO, IFC International Finance Corporation, The World Bank, United Nations, UNEP, UNCTAD

BUSINESS ASSOCIATIONS / INDUSTRY ASSOCIATIONS

Global Battery Alliance, Eurometaux, CMIA, Critical Minerals, Consejo Minero, Asociación de Minería, Cobolt Institute, CAEM, World Gold Council, The Mining Association of Canada, Minerals Council South Africa, Minerals Council Australia, International Lithium Association, ifa, ICMM, International Copper Association

NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Africa Minerals Strategy Group, Baker Institute for Public Policy, CESCO, TMD, London Metal Exchange, IUCN, IHRB, IRMA Initiative for Responsible Mining Assurance, United Nations Global Compact, Natural Resource Governance Institute

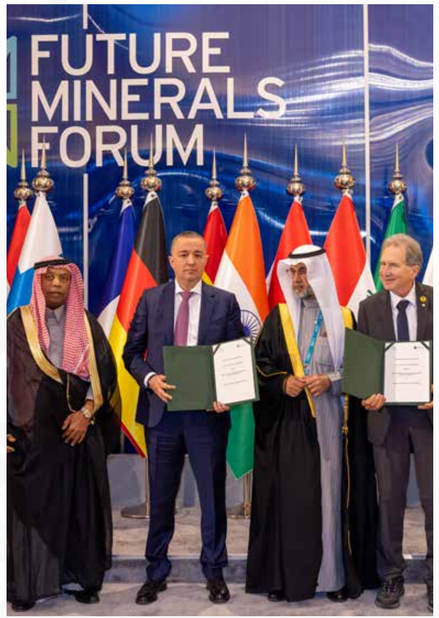
HEADS OF GEOLOGICAL SURVEYS MEET AT THE THIRD INTERNATIONAL GEOLOGICAL SURVEY MEETING (IGSM)

The meeting marked the largest global gathering of heads of geological surveys, providing a platform to advance international cooperation and develop a shared roadmap to strengthen the reliability and governance of geological data as a key enabler of mining investment.

FUTURE MINERALS FORUM
INTERNATIONAL GEOLOGICAL SURVEYS MEETING

This year's IGSM meeting delivered strong international alignment on several key implementation initiatives, including the adoption of the Global Geological Competencies Framework and the launch of the Geology Without Borders program to address skills gaps across continents. It also highlighted a collective commitment to developing AI-enabled digital data platforms aimed at reducing exploration costs and overcoming geological challenges.

Participants also agreed to establish specialized working groups to translate these outcomes into tangible progress ahead of the fourth IGSM meeting in 2027, reinforcing FMF's role in shaping the future of global geology in support of sustainable mineral development.



This year's meeting delivered international alignment around a number of leading implementation initiatives, including the adoption of the Global Geological Competencies Framework and the launch of the Geology Without Borders programme to help address skills gaps across continents. It also highlighted a collective commitment to developing AI-enabled digital data platforms aimed at reducing exploration costs and overcoming geological challenges.

Participants further agreed to establish specialised working groups to translate these outcomes into tangible progress ahead of the 2027 meeting, reinforcing the Kingdom's leadership in shaping the future of global geology in support of sustainable development.

ONE PLATFORM.
MORE THAN $25B IN CAPITAL ALIGNED.

More than 132 business agreements conducted. The Future Minerals Forum is where policy meets investment and projects move from ambition to execution. Engage with ministers, sovereign funds, CEOs and strategic investors shaping the future of critical minerals. Turn dialogue into financing.

» Conversations convert into commitments.

ENGAGE WITH GLOBAL DECISION-MAKERS

SECOND MEETING OF THE GLOBAL NETWORK OF CENTERS OF EXCELLENCE AND TECHNOLOGY

As part of broader efforts to advance research and technological innovation in the sector, the fifth Future Minerals Forum convened the second meeting of the Network of Centers of Excellence and Technology (CoE), drawing participation from global industry leaders, academics, geologists, and representatives from research, innovation, and development sectors.

The meeting delivered an ambitious roadmap defining the strategic roles of three leading regional centers. Under this framework, the Sustainability Center at Mohammed VI Polytechnic University in Morocco will lead work on transparency and responsible mining standards. The Council for Scientific and Industrial Research (CSIR) in South Africa will drive the talent and research agenda. In Riyadh, the Mining Innovation and Acceleration Park (MIAP) will lead and serve as the regional hub for technology and innovation, as well as the coordinator of the network.

Discussions also focused on accelerating research and development and enabling the transfer of advanced technologies into the mining sector. Particular attention was given to Saudi Aramco and King Abdullah University of Science and Technology (KAUST), highlighting the value of cross-sector collaboration between energy and mining.

GLOBAL ARENA

The Global Arena brought together a diverse group of countries through dedicated national pavilions designed to showcase the strength of their mineral resources, investment potential, and sector readiness.

More than an exhibition space, it served as a strategic platform for countries to present their mining ecosystems to international stakeholders across the full value chain — from investors and mining companies to processors, technology providers, and major logistics partners.

By convening public- and private-sector representatives in one place, the Global Arena enabled participating countries to highlight their competitive advantages, build visibility for national opportunities, and engage in partnership discussions that support long-term sector growth.

The presence of value chain stakeholders also reinforced each country's preparedness to develop integrated mining ecosystems capable of attracting capital, enabling operations, and supporting downstream development.

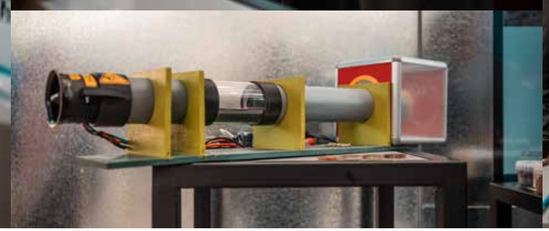
INTERNATIONAL EXHIBITION

The International Exhibition featured more than 270 exhibitors and sponsors, showcasing cutting-edge technologies, advanced solutions, and specialised services to a highly influential audience across all levels of decision-making.

Bringing together government stakeholders, investors, mining companies, engineers, technical experts, and procurement leaders, it created a powerful platform for visibility, connection, and commercial engagement across the full minerals value chain.

As the largest technical exhibition for mineral extraction in the region, it offered exhibitors a unique opportunity to showcase innovation, demonstrate operational capabilities, and engage directly with stakeholders, driving project development and investment decisions. For attendees, it provided access to market-ready technologies and services under one roof, while enabling meaningful dialogue between suppliers, operators, engineers, and decision-makers.

In doing so, the exhibition catalysed more advanced procurement discussions, strengthened cross-value-chain partnerships, and enabled practical collaboration from mine to product.



DELEGATE CONNECT

Delegate Connect provided a smart, AI-enabled networking platform designed to help attendees identify the most relevant stakeholders and schedule meetings before and during the event.

Through intelligent search and matching functions, the platform enabled participants to navigate the scale of the forum with greater precision, uncovering connections based on shared interests, sector focus, and strategic priorities.

The platform created meaningful opportunities for attendees to engage directly with decision-makers, investors, mining companies, service providers, and technical experts, transforming networking into a more targeted and productive experience. By supporting efficient meeting scheduling and higher-quality engagement, Delegate Connect helped maximise the value of participation for attendees across the forum.

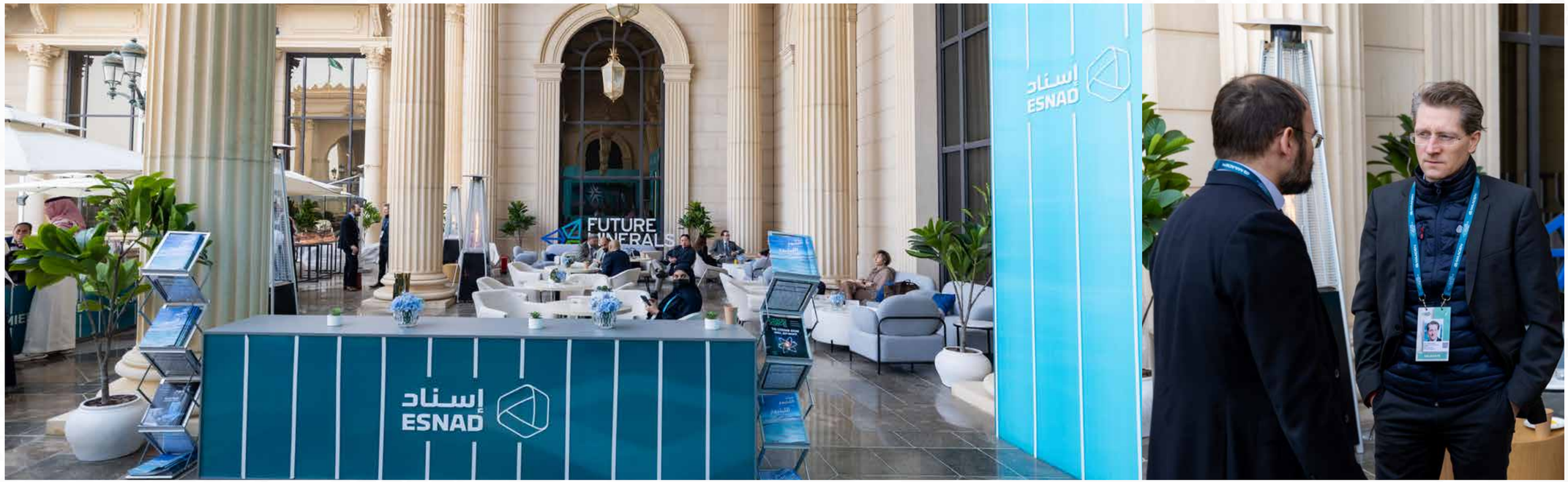
In doing so, it reinforced FMF's role not only as a convening platform, but as an ecosystem designed to accelerate dialogue, partnership development, and tangible business outcomes.

PREMIER LOUNGE

Where leadership conversations take place.

By invitation only, the Premier Lounge is FMF's most exclusive setting, reserved for Premier Guests and senior executives from across the minerals value chain.

Designed for discretion and impact, it provides a dedicated space for strategic dialogue, alignment of priorities, and the strengthening of high-level relationships—away from the public floor.



PARTICIPANTS REPORT MEASURABLE IMPACT. HERE'S WHY:

94%

Strengthened government and strategic investor relationships

91%

Expanded cross-border networks across the mineral value chain

87%

Expect tangible project progression following participation at FMF

92%

Advanced discussions on project financing or capital partnerships

89%

Identified new upstream or downstream collaboration opportunities

MAADEN AUDITORIUM

Where the global conversation takes shape.

The MAADEN Auditorium hosted the core discussions of the fifth Future Minerals Forum, aligned directly with the conference theme.

This is where leaders from across the minerals value chain shared perspectives, challenged assumptions, and debated the pathways to accelerating responsible mineral development.

A TECHNICAL EXHIBITION AT THE CENTER OF INDUSTRY INFLUENCE

Exhibitors at FMF26 had the opportunity to showcase their businesses, technologies, and minerals-related solutions to an influential international audience of more than 21,500 participants from over 170 countries.

As the largest technical exhibition for mineral extraction in the region, the exhibition brought together more than 270 exhibiting organisations and sponsors, creating strong opportunities to engage governments, investors, mining companies, engineers, and procurement leaders across the full value chain.

It also provided a prominent platform for national pavilions to present their resource potential, investment readiness, and ecosystem capabilities, helping countries connect directly with partners across mining, technology, and logistics.

SECTORS REPRESENTED AT THE EXHIBITION

- Government
- Mining & Exploration
- Automotive
- Downstream
- Analytical
- Sustainability
- Data Systems
- Electrification
- Engineering
- Construction & Infrastructure
- Consulting
- Equipment & Tools
- Health & Safety
- Water Usage
- Logistics & Transport
- Automation & Digital Transformation
- Fuel Cells & Batteries
- Refining & Processing
- Manufacturing
- Circular Economy
- Artificial Intelligence and Machine Learning

OUTDOOR HEAVY MACHINERY & SMART LOGISTICS EXHIBITION

The Outdoor Heavy Machinery & Smart Logistics Exhibition showcased the scale, capability, and technical sophistication required to support modern mining operations and mineral supply chains.

Featuring major equipment providers, logistics partners, and industrial solution specialists, the exhibition offered a dedicated platform for demonstrating the machinery, systems, and services that enable efficient execution from extraction through to transport and delivery.

As a live display environment for large-scale assets and operational technologies, the exhibition gave attendees direct exposure to the practical solutions driving productivity, connectivity, and supply chain performance across the sector. It also created strong opportunities for engagement between exhibitors and decision-makers, including operators, engineers, procurement teams, and project stakeholders seeking end-to-end solutions across the mining value chain.

By connecting industrial capability with commercial opportunity, the exhibition served as a catalyst for implementation-focused dialogue, strategic procurement conversations, and partnerships that support integrated mine-to-market development.

LIVE ONSITE FMF TV

FMF TV, the Forum's exclusive video channel, was broadcast to a global audience via YouTube and social media.

Featuring a range of senior voices from across the industry, including mining CEOs, technology leaders, and government ministers, FMF TV was filmed in a dedicated studio space within KAICC. It was supported by a professional production crew and anchored by an accomplished presenter with broad expertise in journalism.

PROMOTE YOUR BRAND TO GLOBAL MINERAL DECISION-MAKERS.

Engage with senior government officials, sovereign wealth funds, mining executives and industrial leaders shaping the future of critical minerals.

FMF convenes mineral-producing and consuming countries, investors, and industry experts across the full mineral value chain on a high-level platform focused on supply chain security and sustainable development.

GLOBAL REPRESENTATION

93%

Countries Represented Regional Participation:

46%
Middle East & North Africa

13%
Africa

9%
Americas

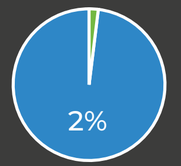
23%
Asia-Pacific

9%
Europe

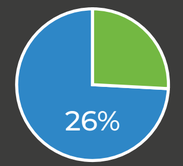
FMF brings together mineral-producing nations, resource holders, investors and downstream industries within one high-level platform focused on supply chain security and sustainable development.

FMF convenes policy architects and executive decision-makers driving capital deployment and regulatory direction across the mineral value chain.

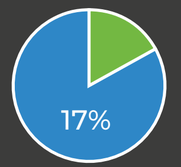
DELEGATE PROFILE BY SENIORITY



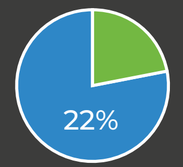
Ministers & Government Officials



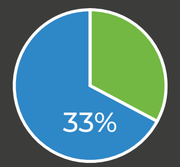
Senior Management



C-Suite & Board Level



Technical & Project Leaders



Other

The Forum connects the full mineral ecosystem — from resource extraction to industrial transformation.

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SWEDEN – MAIN HOST COUNTRY PARTICIPANTS

UK – MAIN HOST COUNTRY PARTICIPANTS

AGENDAS

Full coverage of all conferences across FMF 2026

MinGen Agenda

Pavilion 1

MINGEN AGENDA

Day 1

Tuesday 13 January 2026

Pavilion 1

PANEL SESSION: Securing the future talent pipeline for Saudi Arabia's minerals industry

Moderator

Jos Simson
Chief Executive Officer, Tavistock

Rana Abdullah Zumai
Chairwoman, Women in Mining Association KSA

Jamal Al Obireed
Executive Director of Academy, Saudi Geological Survey

John O'Neill
Director Global, Government and Industry Engagement, Curtin University-Western Australian School of Mines

Eng Sultan Alsunaya
Director General, Directorate General for International Cooperation, Technical and Vocational Training Corporation

The session explored whether Saudi Arabia's mining sector has the human capital, skills base, and institutional readiness required to deliver on the ambitions of Vision 2030, particularly amid rapid growth in greenfield projects, downstream investment, and advanced technologies.

Panellists examined talent development across the full value chain—from vocational training and early-career development to academic excellence, international collaboration, and leadership pathways—emphasizing that human capital must be treated as a strategic enabler rather than a supporting function.

A central theme was workforce diversification, particularly the rapid increase in women's participation in mining, supported by structured change management within companies, early exposure initiatives, and leadership-by-doing approaches that empower women to lead projects from inception.

The discussion also highlighted the transition toward demand-driven education models, project-based learning, and agile curriculum updates aligned with industry needs, including digital skills, AI-enabled exploration, and data interpretation.

Overall, the session positioned talent development as a decisive factor for sector sustainability, competitiveness, and national economic impact, requiring close coordination between government, industry, academia, and civil society.

Key insights, data points or predication

- Saudi Geological Survey announced the launch of two strategic national capacity-building programmes in cooperation with King Abdulaziz City for Science and Technology (KACST).
- Women in Mining Association KSA formalized partnerships with four mining companies, including Ma'aden, to pilot women-led project environments and role-model workplaces.
- Women in Mining Association KSA committed to rolling out education and awareness initiatives, including an exploration kids club and a Saudi-adapted children's mining book.
- TVTC confirmed continued expansion of the Saudi Mining Polytechnic, currently training more than 325 trainees, with women representing 25% of enrolment.
- Curtin University expressed readiness to replicate its dual-degree mining education model with Saudi and regional universities.
- Nearly 40% of new hires at Maaden in the past year were women, reflecting rapid workforce diversification.
- Saudi Geological Survey identified 15 national technical competencies to structure geoscience career pathways.
- Project-based learning and field immersion are being prioritized to transfer tacit knowledge and accelerate workforce readiness.
- Vocational mining curricula are reviewed on a 6–12 month cycle, reflecting fast-changing industry skill requirements.
- Global demand for mining education is rising sharply, with Curtin University facing capacity constraints driven by student growth.
- AI, advanced data interpretation, and digital exploration tools are emerging as core competencies for the next generation of mining professionals.

Session summary

The session reinforced that Saudi Arabia's mining ambitions will be realized not only through capital investment, but through sustained, coordinated investment in people. Talent development—spanning education, skills, leadership, and inclusion—was consistently framed as the decisive factor for sector resilience and long-term competitiveness.

By aligning vocational training, academic excellence, international collaboration, and inclusive workforce strategies, the Kingdom is building a mining ecosystem capable of supporting economic diversification, innovation, and global leadership under Vision 2030.

PANEL SESSION: Breaking new ground: Accelerating the advancement of women in mining

Hassa Alsaab
Director Diversity and Inclusion, Maaden

Farah Ismail
Deputy Minister of Sectoral and Regional Development Affairs, Ministry of Economy and Planning

Ana Gabriela Juárez
President/Founder, CTA Environmental Consultants / WIM Central America

Belinda Labatte
Executive Chair / Founder, Lomiko Metals / The Capital Lab

Stephanie Saliba
President, Young Mining Professionals, Riyadh

Effat S. Ba Deeb
Vice President Board Members WIM KSA and SVP, Board Secretary & Corporate Governance, Maaden

Sahar Sewaralthahab
Investment Director, Manara Minerals

This session positioned the advancement of women in mining as a strategic lever for competitiveness, productivity, and long-term sector resilience—not solely a representation agenda. With Saudi Arabia building a mining sector "from the ground up," panellists argued the Kingdom has a rare opportunity to embed inclusive governance, leadership pipelines, and talent systems by design.

Discussion focused on five interconnected levers: strengthening youth pipelines, widening access to capital and ownership, ensuring real decision-making authority, aligning with national economic strategy, and adopting practical acceleration mechanisms that institutions and companies can implement immediately.

Speakers emphasized that retention is not the main barrier once women enter mining; instead, key constraints include site-location realities, cultural expectations, and limited early exposure to mining careers. Role models, sponsorship, and visible pathways—especially into operational and leadership roles—were highlighted as confidence multipliers for early-career women.

From a system perspective, panellists stressed that meaningful acceleration requires women's participation where capital is allocated and strategic decisions are made—investment committees, executive committees, boards, and governance forums—paired with accountability, tenure long enough to gain "cycle" experience, and organizational policies that actively manage workplace risk and inclusion.

The session concluded that Saudi Arabia can leapfrog traditional models by integrating early exposure, targeted governance reforms, and intentional capital access—while reframing mining as a modern, tech-enabled ecosystem of roles, rather than a remote, physically intensive workplace stereotype.

Key insights, data points or predication

- Women in Mining Central America & the Caribbean reported ongoing youth programming, including direct engagement with 8,000 children and a children's book initiative reaching 35,000 children, translated into eight languages, including Arabic (supported by Saudi government, per speaker).
- The panel advocated for formalizing women's participation in decision-making structures (investment committees, boards, executive committees) as an acceleration lever, with accountability attached to roles (recommendation framed as action).
- Ma'aden referenced internal emphasis on diversity and inclusion through governance policies and procedures, including mechanisms addressing workplace concerns (complaints/harassment) and integrating diversity into leadership and succession planning (described as current practice).
- In Q&A, a panellist stated there is a structured plan to advance women's career progression and onboarding across the mining sector and relevant institutions in Saudi Arabia (details not provided in transcript).
- Panel and audience participants reinforced the need to amplify success stories of women in mining, and to include men as partners in future discussions and sector change efforts.
- Saudi Arabia's macro progress: Female labor force participation increased from 17% (2016) to over 36% today, with more than 1.2 million women added to the workforce (per Ministry of Economy and Planning representative).
- Mining's economic scale (Vision 2030 framing): Mining is expected to contribute over SAR 240 billion to GDP by 2030, with around 20,000 jobs to be added in about four years (as stated).
- Youth engagement as an acceptance lever: Women in Mining Central America & the Caribbean reported impact through youth programming—8,000 children engaged and a book reaching 35,000 children, translated into eight languages, including Arabic.
- Governance and risk: Inclusion policies in mining must cover practical realities of the sector, including handling workplace complaints/harassment and strengthening risk management and compliance through balanced board composition (as described).
- Global talent urgency (North America): An audience/panel intervention cited that 50% of the mining workforce in North America is expected to retire in the next 5–6 years, intensifying the talent imperative (presented as a supporting argument).
- Perception shift: Mining is increasingly framed as a tech-enabled ecosystem (automation, drones, autonomous vehicles, data science, investment, governance), reducing the relevance of physical strength stereotypes and broadening accessible roles.

Session summary

- The session made the case that women's advancement in mining is a system-level competitiveness agenda: it depends on early exposure and pipeline design, intentional access to capital and ownership pathways, and governance structures that place women in decision-making roles with accountability and continuity. Speakers highlighted that Saudi Arabia, as an emerging mining jurisdiction without a legacy structure, can design inclusive leadership and talent systems from inception rather than retrofitting them later.

FIRESIDE CHAT: Meet the Leaders

Jos Simson
Chief Executive Officer, Tavistock

Ana Cabral
Co-Chairperson and Chief Executive Officer, Sigma Lithium

Mark Cutifani
Director and Executive Advisor

This “Meet the Leaders” session focused on practical lessons from corporate transformation, drawing on two senior executives' experiences leading major change programmes in mining and adjacent industries. The discussion emphasized that turnarounds are rarely technical alone; culture, decision-making discipline, and alignment around purpose are decisive.

Anna Cabral described arriving at a company in crisis and prioritizing cultural reset, financial stabilization, and rapid execution toward cash flow. She framed “challenge culture” as essential to protecting shareholder value and avoiding leadership blind spots, contrasting traditional hierarchical environments with Silicon Valley’s iterative, execution-led mindset.

Mark Cutifani shared leadership lessons from both early-career operational roles and later large-scale restructuring. He highlighted the cost of indecision, the importance of maintaining organizational momentum, and the need for candid performance narratives that mobilize teams rather than demoralize them.

Across both case studies, panelists stressed disciplined capital allocation, simplicity over complexity, and the strategic importance of “purpose” as a unifying mechanism—particularly during volatility, restructuring, or when operating in complex jurisdictions. The session also underscored the role of community trust and social inclusion in sustaining an operating license and reducing disruption risk.

Key insights, data points or predication

- Anna Cabral described Sigma Lithium’s shift to a simplified, execution-led operating model focused on becoming a producer quickly and reaching cash flow early, rather than pursuing large, complex capex-heavy projects (strategy approach described; no new announcement made).
- Sigma Lithium implemented a broad-based equity participation programme, described as distributing 18% of company capital to employees, to embed ownership and performance discipline across levels (programme described as implemented).
- Anna outlined early deployment of social inclusion programmes (e.g., microcredit and rainwater irrigation for subsistence agriculture) initiated before revenues, to build community goodwill and strengthen the operating license (programme described as implemented).
- Mark Cutifani described a structured asset review and reallocation approach, prioritizing a subset of assets as primary value creators and selling/closing lower-contributing assets to protect balance sheet confidence during a down cycle (historic case example).
- No formal new partnerships or funding announcements were stated in the transcript; next steps were framed as leadership principles for future ventures rather than event-specific launches.
- Sigma Lithium turnaround approach: stabilize cash position, learn the commodity/industry dynamics, prioritize “first-stage industrialization” as the value-creating step, and execute a “simple and fast” path to production and cash flow.
- Employee ownership lever: Sigma Lithium implemented an equity programme distributing 18% of company capital to employees (described as modest vs Silicon Valley norms).
- Social inclusion scale (community license): Anna stated initiatives created 21,000 “job positions or social inclusion positions”, and that operations ultimately encompassed more than 60% of the economically active population in the local area (as stated in the session).
- Indecision as a risk multiplier: Mark emphasized that leaders’ failure to decide increases uncertainty and can freeze execution across large organizations.
- Asset portfolio focus: Mark cited a case where 37 of 68 assets were assessed as likely to generate 80–90% of value, informing capital reallocation and divestment sequencing (as stated).
- Operational uplift example: Mark stated that prioritized assets improved their production base by around 40% over two years, supporting material cost reduction and performance recovery (as stated).
- Hedging decision case: Mark described buying out a hedge book (a $7 billion decision) and estimated the avoided downside as substantial given subsequent gold price movement (figures referenced in transcript).
- Cross-sector learning: Mark argued that breadth of experience (e.g., oil & gas data discipline) helps leaders challenge inherited assumptions and uncover optionality in resource endowments.

Session summary

The session reinforced that successful corporate transformation in mining depends on culture, clarity, and disciplined execution as much as technical capability. Both leaders emphasized creating environments where challenge is safe, decisions are made with conviction, and simplicity replaces complexity—especially in volatile commodity cycles where capital is constrained and perception can quickly become destiny.

A recurring message was that purpose is not a slogan: it shapes strategy, aligns teams during restructuring, and builds resilience with investors and communities. By pairing early social license investment with ownership incentives and clear asset prioritization, the speakers outlined a leadership playbook focused on long-term value creation, organizational momentum, and credibility under pressure.

Gateway to Funding Agenda

Pavilion 2

GATEWAY TO FUNDING AGENDA

Day 1

Tuesday 13 January 2026

Pavilion 2

EDUCATION SESSION: Mining 101: Part 1

DAY 1 – TUESDAY 13 JANUARY

BRIAN QUAST

Metals and Mining Research Analyst, BMO Capital Markets

This session delivered an in-depth, end-to-end masterclass on how value is created, assessed, and sustained across the mining lifecycle—from early geological exploration and project development through to operational optimization and commodity price formation. The discussion bridged technical mining fundamentals with investment decision-making, offering a practical framework for understanding risk, capital allocation, and long-term profitability in the mining sector.

The session began by explaining how mineral deposits are discovered, defined, and transformed into resources and reserves through progressive drilling, geological modeling, and technical studies. It highlighted the importance of drilling strategy, data quality, QA/QC, and resource estimation methodologies in determining geological confidence and economic potential. The transition from resources to reserves was emphasized as a critical economic decision point, requiring not only geological certainty but also viable mine plans, processing routes, permitting pathways, and cost assumptions.

A significant portion of the discussion focused on mine design and economics, particularly the trade-offs between selectivity, scale, capital expenditure (CAPEX), and operating expenditure (OPEX). The session illustrated how mining methods evolve over time as commodity prices change, deposits mature, and operational constraints emerge. Examples showed how capital-constrained companies can successfully phase development—starting with higher-grade, smaller-scale operations to generate cash flow before expanding throughput—while others fail when insufficient upfront capital locks them into inefficient, high-cost operating models. The importance of optimization and re-optimization throughout a mine's life was underscored as a key driver of long-term value.

The discussion then expanded to processing choices and downstream considerations, including smelting, refining, and concentrate treatment. While traditional smelting was identified as a durable part of the copper value chain, alternative processing technologies such as concentrate leaching were acknowledged as increasingly relevant in specific contexts, particularly for lower-grade deposits or concentrates with deleterious elements. The session emphasized that bottlenecks and imbalances between mining, smelting, and refining can create temporary but sometimes prolonged distortions in margins across the value chain.

The final section addressed commodity price formation and forecasting, highlighting the structural challenges of predicting prices in markets characterized by long project lead times, declining ore grades, and price-inelastic supply. The session explained how analysts combine top-down macroeconomic analysis with bottom-up, mine-by-mine supply modeling to assess future price trajectories, while cautioning that forecasts are inherently uncertain and best interpreted directionally rather than precisely. Particular attention was given to copper, gold, and critical minerals, noting how electrification, energy transition, substitution effects, and inventory dynamics interact to shape demand expectations.

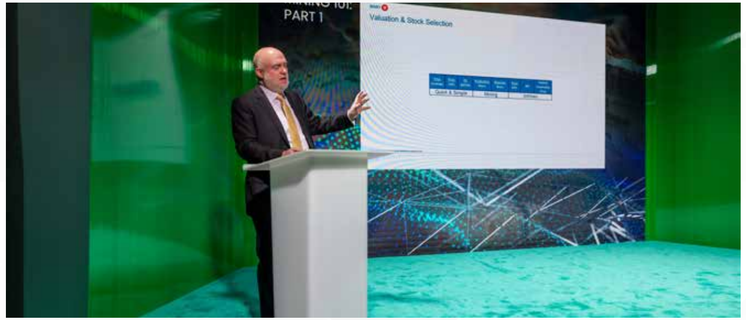
In closing, the session reinforced that mining is a long-cycle, capital-intensive industry where markets ultimately self-correct through substitution, efficiency gains, technological innovation, and demand moderation. While short-term imbalances and volatility are inevitable, long-term outcomes are driven by disciplined project execution, realistic assumptions, and an understanding that geology sets the opportunity—but management, capital discipline, and adaptability determine success.

EDUCATION SESSION: Mining 101: Part 2

DAY 1 – TUESDAY 13 JANUARY

BRIAN QUAST

Metals and Mining Research Analyst, BMO Capital Markets



This session provided a comprehensive, end-to-end examination of how value is created, preserved, and ultimately realized across the mining and metals value chain, integrating geology, mine development, processing, permitting, financing, and commodity price formation. It offered participants a rare, practical walkthrough of how technical decisions taken early in a project directly shape long-term economics, risk profiles, and investment outcomes.

The discussion began by illustrating how mineral deposits progress from exploration to production, emphasizing the critical role of geological understanding, drilling density, and resource confidence.

The session highlighted how early-stage geological interpretation, step-out and infill drilling, and conservative estimation practices underpin credible resource models. Particular attention was given to common pitfalls such as grade capping failures, over-reliance on isolated high-grade intercepts, and insufficient reconciliation between geological models and operational reality—factors that have historically led to project underperformance and financial distress.

A substantial portion of the session focused on mine development choices and economics, especially the trade-offs between open-pit and underground mining. The analysis demonstrated how strip ratios, pit slopes, haul distances, and mining depth progressively increase costs over a mine's life, while also intensifying environmental and permitting challenges. Underground mining methods were explored in parallel, showing how selectivity, footprint size, labor intensity, and safety considerations drive method selection. The session reinforced that mining is inherently iterative: mine plans, pit shells, and production schedules are continuously re-optimized as new geological and operational data become available.

Processing and metallurgy formed a central pillar of the discussion, with detailed explanations of crushing, grinding, flotation, leaching, and refining routes for different deposit types. The session compared sulfide and oxide systems, explaining why flotation dominates in sulfide deposits while acid leaching and SX-EW are used for oxides. Tailings management emerged as a critical risk area, with strong emphasis on tailings dam design, failure history, and the growing importance of downstream, centerline, and dry-stacking methods in response to safety, seismic, and regulatory pressures. The environmental, social, and permitting implications of waste rock, tailings storage, water use, and energy intensity were highlighted as decisive factors in project viability.

The session then examined the mine development lifecycle from construction to commissioning, underscoring that this phase represents the highest financial risk for investors. Cost overruns, schedule delays, and execution failures were identified as widespread industry challenges, often driven by labor shortages, inflation, contractor dependence, and insufficient owner oversight. Permitting timelines were shown to be increasingly long and complex, with environmental baselines, biodiversity studies, community engagement, and regulatory certainty now extending development cycles well beyond historical norms.

In its final section, the session shifted to commodity price formation and forecasting, explaining why commodities remain among the most difficult assets to predict. It outlined how analysts balance top-down macroeconomic drivers—such as GDP growth, electrification, energy transition, and geopolitics—with bottom-up supply-and-demand modeling based on individual mines, smelters, and refineries. Structural features of the mining industry—long lead times, price-inelastic supply, declining ore grades, and limited inventory visibility—were shown to amplify volatility and delay market responses to price signals.

Case studies in copper, aluminum, gold, and critical minerals illustrated how demand from electrification, renewables, data centers, and electric vehicles is reshaping markets, while substitution, recycling, efficiency gains, and demand destruction act as natural balancing mechanisms.

The session also highlighted the growing strategic importance of midstream processing and refining capacity, particularly outside China, where geopolitical considerations, supply security, and industrial sovereignty are now reshaping investment priorities across critical and minor metals.

In closing, the session emphasized that mining is a long-cycle, capital-intensive industry where geology defines opportunity, but disciplined execution, conservative assumptions, and experienced management determine outcomes. Commodity markets ultimately self-correct, but often over time horizons that exceed individual careers. For investors, policymakers, and industry leaders alike, the key lesson is that sustainable value creation in mining requires patience, realism, and a deep understanding of how technical, economic, and geopolitical forces intersect across the full value chain.

GATEWAY TO FUNDING AGENDA

Day 2

Wednesday 14 January 2026

Pavilion 2

OPENING REMARKS

DAY 2 –WEDNESDAY 14 JANUARY

HON. SCOTT BRISON

Vice-Chair,
BMO Wealth Management

This session set the strategic context for global mining discussions at the 2026 Future Minerals Forum, positioning Saudi Arabia as a uniquely trusted convenor at a time of geopolitical fragmentation and declining multilateral cooperation. It highlighted FMF's evolution into a leading global platform bringing together governments, industry leaders, and financial institutions to align on shared mining ambitions.

The narrative emphasized the importance of stable, pro-mining jurisdictions in enabling long-term capital deployment. Key enabling factors discussed included predictable fiscal policy, streamlined permitting, workforce availability, sovereign investment partnerships, and vertically integrated supply chains.

Saudi Arabia's Vision 2030 framework was presented as a case study in coordinated policy execution, global partnership-building, and industrial ambition. The Kingdom's ability to convene over 100 countries, including traditionally polarized economies, was framed as a strategic asset for the global mining sector.

Canada's role was also highlighted, with reference to renewed economic urgency, permitting reform, competitive taxation, and an outward-looking trade strategy. The session underscored the complementary strengths of Saudi Arabia and Canada in shaping the future of responsible, scalable global mining.

The session concluded by setting the stage for deeper company-level discussions, beginning with a moderated dialogue on Ivanhoe Mining's strategic outlook within this complex global environment.

Key insights, data points or predication

- BMO reaffirmed its long-term partnership with Saudi Arabia in mining and capital markets.
- Canada reiterated its commitment to deeper mining collaboration with Saudi Arabia.
- The session launched a series of moderated discussions with global mining companies on strategic outlooks and capital allocation.
- Ivanhoe Mining was introduced as the first company to engage in a focused dialogue on future strategy and growth plans.
- Over 100 countries participated in FMF ministerial-level engagement, spanning North America, Europe, Africa, Latin America, and Asia.
- 75% of Saudi Arabia's population is under 25, positioning workforce development as a long-term competitive advantage.
- Permitting reform was identified as a decisive factor, with leading jurisdictions targeting reductions from 10 years to as little as two years.
- Vertical integration and supply-chain localization were highlighted as emerging models for mining-linked industrial development.
- Trusted bilateral partnerships were positioned as increasingly critical amid global polarization.

Session summary

This session framed the 2026 Future Minerals Forum as a central platform for navigating the geopolitical, economic, and capital challenges facing global mining. It reinforced Saudi Arabia's growing role as a neutral and credible convenor capable of aligning diverse stakeholders around shared priorities.

By highlighting complementary strengths between Saudi Arabia, Canada, and global mining leaders, the session set a constructive tone for forward-looking discussions on investment, policy reform, and strategic partnerships, paving the way for company-level insights and actionable dialogue throughout the Forum.

"Saudi Arabia has truly become the Davos of mining, with the power and relationships to convene more than 100 countries"

– Hon. Scott Brison,
Vice-Chair, BMO Wealth Management

PRESENTATION: Company strategy outlook

DAY 2 –WEDNESDAY 14 JANUARY

Moderator

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Marna Cloete
President & Chief Executive Officer, Ivanhoe Mines

This session provided a detailed company-level perspective on Ivanhoe Mines' strategy, operational performance, and growth pipeline, framed through a fireside conversation between the company's CEO and BMO Capital Markets. It aimed to give investors and stakeholders a clear view of Ivanhoe's assets, operating philosophy, and medium- to long-term expansion plans.

The discussion opened with an overview of Ivanhoe Mines as a Canadian-listed company with a portfolio of large-scale, high-grade assets, primarily in the Democratic Republic of Congo, South Africa, and emerging exploration frontiers such as Kazakhstan. Particular emphasis was placed on the Kamoa-Kakula copper complex, now a fully integrated operation following the commissioning of its smelter.

Operational resilience was a key theme, with the conversation addressing the seismic event and flooding challenges faced at Kamoa-Kakula in 2025, the subsequent dewatering and rehabilitation efforts, and the realism embedded in 2026 production guidance. The role of disciplined guidance-setting and responsible market communication was underscored.

The session also explored Ivanhoe's approach to capital discipline, mine construction, and execution, highlighting the importance of experienced teams, standardized processes, and rapid decision-making. Exploration-led growth, particularly in the Western Forelands and new jurisdictions, was positioned as a core pillar of the company's long-term strategy.

Key insights, data points or predication

- Ivanhoe reaffirmed its 2026 copper production guidance of 380,000–420,000 tonnes at Kamoa-Kakula.
- The company confirmed ongoing rehabilitation and dewatering efforts, with underground conditions proving better than initially anticipated.
- The Kamoa-Kakula smelter has entered operation, delivering immediate logistics savings and enabling sulfuric acid sales.
- Ivanhoe reiterated plans to advance Western Forelands exploration, with development targeted over a three- to five-year horizon.
- A revised Kamoa-Kakula Integrated Development Plan and updated NI 43-101 is expected by end of March 2026.
- Phase 2 expansion at Platreef remains on track, with production targeted for 2027.
- Kamoa-Kakula is targeting >550,000 tonnes of copper in the medium term.
- Kapushi zinc project is expected to produce 240,000–290,000 tonnes of zinc, benefiting from strong market conditions.
- The Kamoa-Kakula smelter is producing approximately 400,000 tonnes of sulfuric acid annually, expected to rise to 700,000 tonnes, with strong local demand.
- Western Forelands resources include 1.7 billion pounds of indicated copper and 18.4 billion pounds of inferred copper.
- Ivanhoe has commissioned two 30 MW solar plants, with two additional units planned, significantly strengthening site-level power security.
- Logistics and power infrastructure, including rail corridors and grid upgrades, are expected to reduce long-term cash costs and support future expansions.

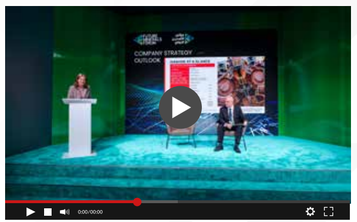
Session summary

This session reinforced Ivanhoe Mines' positioning as a developer and operator of large-scale, high-quality mining assets, underpinned by strong execution capability and a long-term exploration-led growth strategy. The discussion demonstrated how operational discipline and infrastructure investment have enabled the company to navigate short-term challenges while maintaining momentum.

By combining integrated operations, standardized construction approaches, and a willingness to explore new frontiers, Ivanhoe Mines presented a clear roadmap for sustainable growth. The session offered investors confidence in the company's ability to deliver future expansions while contributing to local economic development and long-term resource security.

"The smelter is a real milestone for us, delivering immediate transport savings and opening up a new revenue stream through sulfuric acid"

– Marna Cloete - President & Chief Executive Officer, Ivanhoe Mines



DAY 2 –WEDNESDAY 14 JANUARY

PRESENTATION: Company strategy outlook

Rahim Bapoo
Managing Director, Energy Transition, Metals, Mining & Critical Minerals, BMO Capital Markets

Wang Xiaoshen
Vice Chairman & President, Ganfeng Lithium

This session presented Ganfeng Lithium's strategy and outlook across the lithium value chain, with a particular focus on the accelerating role of energy storage systems (ESS) alongside electric vehicles (EVs). It aimed to clarify how Ganfeng is positioning itself as a vertically integrated player—from upstream resources through chemicals, batteries, energy storage applications, and recycling.

Ganfeng emphasized its ecosystem approach, describing a rare level of integration in the lithium industry and highlighting its capabilities across lithium chemicals, lithium metal, battery manufacturing, ESS deployment, and end-of-life battery recycling. The presentation connected this integration to market expansion opportunities, including solid-state batteries and large-scale storage installations.

A central discussion point was demand evolution over the next two to three years, with Ganfeng arguing that ESS demand could become comparable to—and potentially exceed—EV-driven lithium demand, driven by grid stability needs, remote-site power solutions, and growing electricity loads, including from AI-related power requirements.

The conversation then shifted to Argentina, where Ganfeng and Lithium Argentina described a strong operating ramp-up at the Cauchari-Olaroz project and positioned their partnership model—combining processing expertise with upstream/local operating knowledge—as a blueprint for scaling responsibly. Talent localization, training, and long-term operational capability-building were repeatedly underscored as critical enablers for multi-decade projects.

The session closed with a forward-looking view on scaling production through consolidation and expansion in Argentina, evolving processing technologies (including DLE considerations), and adapting solutions to site-specific constraints such as water availability and brine chemistry.

Key insights, data points or predication

- Ganfeng reaffirmed its strategy to expand energy storage as a major growth engine, alongside EV-related lithium demand.
- Ganfeng highlighted continued scale-up of its ESS footprint, including large containerized systems and utility-scale deployments.
- The company referenced ongoing and planned expansion of its solar + energy storage model for remote operations, including:
- 100% solar + energy storage powering the Mariana project due to remote location constraints.
- A model in Mali combining solar power with energy storage to support local power needs, with intent to replicate and expand the approach.
- In Argentina, partners emphasized continued ramp-up and optimization at Cauchari-Olaroz, and preparation for expanded production through consolidation and staged growth.
- Both partners pointed to technology evolution (including potential DLE applications and flow-sheet improvements) and local talent development as priorities to enable multi-site scaling.
- Ganfeng stated it is among the top three lithium chemical producers globally, with a highly diversified lithium product range for batteries.
- Ganfeng claimed it was #1 in retired LFP battery recycling in China last year (presented as effectively global leadership).
- Ganfeng cited installed ESS scale of over 60 GWh, with 60 GWh of LFP battery capacity referenced for energy storage deployment in China, and 100+ ESS application cases built.
- A highlighted example included a 4 GWh energy storage station described as the single biggest in China last year entering operations (as stated in-session).
- Argentina ramp-up: Cauchari-Olaroz was described as reaching 90%+ of nameplate capacity in just over a year after mechanical completion.
- Expansion ambition in Argentina: a consolidated plan targeting 150,000 tonnes LCE annual production by 2028 (as presented).
- Cost benchmark (as stated by Lithium Argentina): production at sub-$6,000 per tonne (context given as execution competitiveness).
- Market outlook: speakers asserted demand is broadening beyond passenger EVs to energy storage, heavy-duty electric trucks, and electrified industrial equipment.
- DLE commentary: commercialization was framed as most straightforward in brines, but requiring customization per brine chemistry; fresh water needs were flagged as a potential bottleneck depending on process choice and region.
- Energy storage chemistry clarification (Q&A): in response to a direct question, no vanadium was stated for their energy storage business.

Session summary

Ganfeng Lithium used this session to position itself as a vertically integrated lithium and energy storage player, emphasizing that the next growth phase will be increasingly shaped by grid-scale energy storage, not only EVs. The company's narrative linked upstream resources, processing, battery technologies (including solid-state ambitions), and recycling into a single ecosystem designed to capture value across the chain.

The Argentina discussion reinforced a partnership-led scaling model focused on operational execution, cost competitiveness, and long-term localization of talent and capability. Looking ahead, the speakers underscored that successful expansion will depend on site-specific technology choices, infrastructure solutions (renewables + storage in remote regions), and disciplined growth rooted in strong local teams.

PRESENTATION: How are Saudi family businesses viewing the minerals sector and what do they look for when they decide where to invest?

DAY 2 –WEDNESDAY 14 JANUARY

Jay Hambro
Chief Executive Officer, Verdigris Strategic

Ali Abdulaziz Alturki
Managing Partner, Energy Capital Group

This fireside chat explored how Saudi family offices and non-institutional private capital are approaching investment opportunities in the Kingdom's fast-expanding metals and mining sector, with emphasis on mining services, consolidation strategies, and long-term value creation aligned with Vision 2030.

The speakers framed mining as a strategic growth pillar for Saudi Arabia, describing the sector's shift from ambition to execution through policy momentum, licensing activity, and a multi-decade development horizon. The discussion emphasized that the investment opportunity is not only in mining assets, but in building the enabling services ecosystem required to deliver exploration and production at scale.

A core theme was risk management through "cash-flow visibility" and customer stickiness—particularly via consolidating multiple service lines into integrated platforms that can become essential partners to major clients. The speakers argued that this bundled-services model, proven in oilfield and industrial services, can be adapted to upstream mining services such as drilling rigs, geo-services, mobile camps, and laboratory capabilities.

The session also addressed pathways for foreign family offices and private capital to enter Saudi Arabia—via public markets, established institutional platforms, or trusted local partners—while highlighting governance as a critical differentiator for successful fundraising and platform durability.

In closing, the discussion highlighted Saudi Arabia's unique alignment of policy, capital, and execution, as well as strong support mechanisms for innovation, incubators, and commercialization—particularly where technology adoption contributes to localization, job creation, and tangible in-Kingdom value.

Key insights, data points or predication

- The speakers referenced the launch of a new USD 300 million metals and mining services fund focused on Saudi Arabia (announced earlier that week).
- The fund's focus was positioned around building local champions—particularly via consolidation of mining services required by license holders.
- The speakers encouraged prospective investors/operators to review Saudi incentives via the Ministry of Mining portal and highlighted financing support for beneficiation and processing through SIDF (as discussed).
- In Q&A, the speakers pointed to active incubator and innovation programs in the Kingdom (including KACST initiatives) as practical pathways for technology companies to pursue commercialization.
- They indicated openness to follow-up discussions with technology startups on partnership models, especially where there is a Saudi footprint (local setup, jobs, or joint ventures).
- The investment thesis emphasized services as the bottleneck: licensing has advanced rapidly, but execution depends on scaling rigs, geo-services, camps, labs, and trained people.
- The speakers referenced license issuance at scale, noting licenses "in the 2000s" over the last four years and around 200 exploration licenses last year (as stated).
- Bundled-services consolidation was presented as a lower-risk model than single-line providers, due to higher renewal likelihood and better cash-flow forecasting.
- Junior mining companies were described as key drivers of exploration momentum and as strong candidates for Saudi partnership due to funding needs and local navigation requirements.
- Governance risk was flagged as a recurring failure mode: the speakers cited multiple examples of "bad divorces" where two managers/platforms attempted to run one asset/fund.
- Technology adoption was framed as supported in Saudi Arabia through incubators and programs, with investment interest rising when solutions show revenue line-of-sight and clear local value creation.

Session summary

The session positioned Saudi Arabia's mining opportunity as broader than extraction alone—highlighting a major gap and investment runway in the services ecosystem required to operationalize the Kingdom's rapid licensing and exploration expansion. The speakers argued that Saudi family offices are well suited to build scalable champions through consolidation, long-term partnerships, and a focus on essential, cash-flow-visible service platforms.

The discussion also underscored that Saudi Arabia is increasingly attractive for both FDI and innovation-driven entrants, given the alignment of policy, capital, and execution under Vision 2030, and the presence of incentives and incubator ecosystems to support commercialization—especially when investment outcomes translate into local jobs, capability-building, and in-Kingdom value

> **"It's like building a six-star hotel, but now you need the services—valet, dry cleaning, room service—to make it work"**
>
> – Ali Abdulaziz Alturki - Managing Partner, Energy Capital Group

PRESENTATION: Company strategy outlook

DAY 2 –WEDNESDAY 14 JANUARY

Moderator

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Adam Lundin
Chair, Lundin Mining Corporation

Martino DeCiccio
Chief Executive Officer, Montage Gold

This session introduced the Lundin Group of Companies and highlighted its portfolio approach to building value through multiple publicly listed vehicles across commodities and jurisdictions. The objective was to explain how the group structures its businesses—favoring independent, thematic companies rather than a single conglomerate—so investors can choose specific commodity exposure while the group maximizes stakeholder and shareholder value through focused execution.

The discussion then moved to Montage Gold as a flagship growth story, presenting a rapid value-unlock strategy centered on developing a large-scale gold project in Côte d'Ivoire. Montage's leadership described a deliberate "build a new Africa-focused business" approach: assembling the right shareholders and people first, then selecting an undervalued asset with scale, long mine life, low costs, and strong exploration upside.

A major theme was speed-to-production enabled by supportive host-country conditions and experienced mine-building capability. The speakers contrasted global timelines (often ~16 years from discovery to production) with Côte d'Ivoire's track record of moving projects into production in under 10 years, emphasizing that Montage aims to replicate that pace through permit acceleration, rapid financing, and in-house delivery capacity.

The session also emphasized optionality and pipeline creation—through exploration, strategic equity stakes, operatorship-led de-risking, and acquisitions—paired with a strong focus on local workforce development and community support. The Lundin Group's broader institutional knowledge, board depth, and "agility of talent" were presented as accelerators for both construction execution and long-term operational readiness.

Key insights, data points or predication

- Montage confirmed it has launched construction and expects first gold production on the oxide circuit by late 2026 (as stated: "late this year").
- The company stated it has secured USD 950 million of financing and has committed over 60% of capital with "no surprises" indicated on capex to date.
- Montage announced it is planning a mine plan update later in 2026, incorporating additional deposits and new drilling outcomes to support higher annual production.
- The company outlined a continued ~100,000m drilling program in 2026 following an expanded 2025 program.
- Montage referenced the acquisition of African Gold (announced late 2025 per the narrative) to add a second Côte d'Ivoire project to its pipeline and enable sequencing of in-house construction teams.
- The Lundin Foundation approach was reiterated: supporting sustainable local businesses that can outlive mine closures, with a model intended for replication across jurisdictions.
- Fireweed was flagged as an active critical-minerals growth story, with a feasibility study targeted in 2026 and continued project acceleration supported by government grants.
- Montage's project is positioned at ~330,000 oz/year in early years, with an ambition to move closer to ~400,000 oz/year through new deposits, improved grades, and throughput enhancements.
- Construction and design enhancements cited include: added oxide circuit for earlier start and operational flexibility; owner mining to enable quicker mine plan shifts; and expectations of throughput above 11 Mtpa (study base).
- Exploration intensity: planned 90,000m, executed 120,000m drilling last year; 50+ targets identified, ~half tested, with high-grade intercepts reported across tested targets (as characterized in-session).
- Pipeline optionality strategy includes equity stakes and operatorship: ~17% stake in African Gold (with operatorship prior to acquisition), plus stakes in other regional exploration plays (Orem; Sanu/Guinea referenced).
- Operational readiness: Montage cited ~2,000 employees, 100+ pieces of equipment, and 90%+ local workforce, with training programs initiated early.
- Côte d'Ivoire's enabling environment was positioned as a speed advantage: supportive mining policy and social/economic alignment enabling shorter development timelines vs global averages.
- Fireweed: described as a ~1,000 km² land package in Yukon (zinc/silver) plus a tungsten project adjacent in the Northwest Territories; the tungsten asset was described as a high-grade, large resource and supported by grants from US and Canadian governments (as stated).

Session summary

The session showcased the Lundin Group's model of building value through specialized, independently listed companies and highlighted Montage Gold as a high-momentum example of rapid project advancement in a supportive West African jurisdiction. Montage's leadership emphasized that speed and scalability are enabled by pairing a quality, undervalued asset with an experienced mine-building team, disciplined financing, and a strong local operating model.

Looking ahead, Montage positioned itself not only as a single-asset developer but as an emerging platform with exploration upside, strategic partnerships, and a growing pipeline—supported by a broader group ecosystem that brings proven execution, governance, and talent mobility. The session reinforced a consistent message: moving quickly "in the right way" requires both technical readiness and sustained stakeholder alignment in host communities and governments.

PRESENTATION: Company strategy outlook

DAY 2 –WEDNESDAY 14 JANUARY

Moderator

Rahim Bapoo
Managing Director, Energy Transition, Metals, Mining & Critical Minerals, BMO Capital Markets

Luis Fernando Herrera
Chief Executive Officer, Volcan Compañía Minera

This session introduced Volcan as a Peru-based, multi-asset mining company with significant zinc and silver production, long-life operating complexes, and a portfolio of growth projects. The objective was to reposition investor perception of Volcan beyond zinc, highlighting its rising silver contribution and the company's leverage to commodity prices through cash-flow generation.

The CEO outlined Volcan's operational footprint—multiple mining units and processing facilities—supported by hydropower generation and a large land position near Peru's Chancay port, which he framed as a strategic logistics and development corridor. Volcan's scale was positioned through reserves, production metrics, and ranking claims in zinc and silver.

A key narrative was the company's turnaround and renewed financial strength following a change in control, with management emphasizing cost discipline, recurring operational savings, and a rebuilt capital structure designed to withstand commodity cycles. The presentation stressed ongoing brownfield expansions and near-term delivery milestones.

The discussion then focused on growth optionality: bringing the Romina project online, continued debottlenecking and efficiency improvements across five operations, and advancing a pipeline of copper and diversified base metals projects. Management also noted interest in alternative structuring approaches—potentially using separate vehicles—to accelerate project delivery and better match investor preferences.

The Q&A closed on market access and investor exposure, with Volcan acknowledging current liquidity constraints across its trading venues while signaling efforts to broaden availability and raise the company's profile internationally.

Key insights, data points or predication

- Romina project: Volcan stated it expects to bring Romina online around June–July, positioning it as a material near-term contributor to EBITDA and production.
- Cost and efficiency program: Management reiterated continued implementation of "Volcan Avansa" initiatives, describing ~$100 million of recurring savings achieved over five years, with ongoing efforts to move down the cost curve.
- Growth pipeline advancement: Volcan confirmed it is de-risking its broader copper and base-metals project pipeline and pursuing JV approaches to accelerate development timelines.
- Capital markets access: The CEO indicated Volcan is working to make the investment more broadly available, including by explaining access via existing listings and exploring the potential to bring the company closer to new investor markets.
- Capital structure execution: Volcan confirmed completion of a major financial restructuring, leaving a simplified debt profile (as described) to support execution of growth strategy.
- Operational footprint cited: 5 mining units, 5 concentrator plants, 1 leaching plant, and 11 hydropower plants, plus 3 additional hydro projects referenced (45 MW stated).
- Reserves cited: ~2 million tonnes of zinc reserves, ~100 million ounces of silver, and just over 0.5 million tonnes of lead.
- 2025 production figures cited (last year): ~240,000 tonnes zinc, ~40 million ounces silver, ~64,000 tonnes lead.
- Ranking claims (as stated): 2nd zinc and silver producer in Peru, top 10 zinc producer globally, and 13th silver producer globally over the last 12 months; management expects to move into the top 10 with ~16 million ounces of silver per year run-rate (as described).
- Asset longevity: management emphasized >10 years life across most complexes, often closer to ~20 years, and ~15–20 years of stockpiles supporting the leaching plant (as characterized).
- Romina impact (as stated): ~25% contribution to EBITDA, adds ~2 million ounces of silver annually, and increases zinc and lead production profiles by ~20–25%.
- Growth outlook (as framed): management described a pathway to double the company over a multi-year horizon via key copper projects, with further doubling longer term—dependent on capital and execution.
- Financial restructuring (as stated): ~$2B debt refinanced/restructured/paid down over 18 months; leverage reduced from ~3x net debt/EBITDA to ~1.1x; debt simplified to a single ~$250M bond bullet to 2032.
- Land position cited: ~300,000 hectares of prospective mining rights, described as the largest mining land package in Peru.

Session summary

Volcan presented itself as a scaled, long-life Peruvian producer with increasing silver relevance, near-term production growth via Romina, and a broader pipeline that introduces meaningful copper and base-metals optionality. Management's message combined operational scale with a strong emphasis on disciplined execution—cost reduction, brownfield expansion, and rapid project delivery.

A central takeaway was the company's repositioning after a major financial restructuring, with leadership arguing Volcan is now structured to withstand commodity cycles while retaining significant upside from prices and growth catalysts. The session closed with a stated intent to broaden investor access and visibility, leveraging both existing listings and potential future market-facing steps.

PRESENTATION: Company strategy outlook

DAY 2 –WEDNESDAY 14 JANUARY

Moderator

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Marcelo Bacci
Chief Financial Officer, Vale

This session provided an overview of Vale's current scale, portfolio priorities, and strategic direction across iron ore, agglomerates (pellets and related products), and base metals through Vale Base Metals (VBM). The presentation positioned Vale as back to being the world's largest iron ore producer, while emphasizing a portfolio shift over time toward faster-growing copper and higher-value products aligned with decarbonization trends in steelmaking.

A core message was disciplined value creation: Vale emphasized that scale is only meaningful when accompanied by margin, efficiency, and trusted partnership with customers and host communities. Operationally, Vale highlighted initiatives to return to cost leadership in iron ore, supported by asset utilization, replacement of depleted operations with new technology, and continuous efficiency improvements.

Safety and operational transformation were presented as foundational, with Vale referencing an intense cultural change following the Brumadinho dam failure and outlining a shift toward more dry processing, filtering, and reduced reliance on dams. The company also highlighted circular mining as a growing contributor to production through reprocessing tailings.

In growth, Vale underscored "New Carajás" as the platform for doubling copper production over the next decade using its existing endowment and infrastructure in the Carajás region, pursuing a mix of brownfield and nearby greenfield projects while keeping M&A optionality disciplined given high asset valuations. The Q&A further explored iron ore market dynamics (including Simandou), customer-centric product flexibility, nickel market conditions, and the longer-term concept of "mega hubs" to enable low-emission steel supply chains.

Key insights, data points or predication

- Vale reaffirmed its 2025 iron ore production guidance of ~335 Mt, with confirmation expected when results are published in coming weeks (as stated).
- The company reiterated intent to expand iron ore output toward ~360 Mt over time, described as a "sweet spot" given market maturity.
- Vale stated a plan to double copper production over 10 years, progressing a pipeline of brownfield and greenfield projects in the Carajás region.
- Vale confirmed continued execution of a safety transformation, including decommissioning upstream dams and shifting further toward dry processing / filtering, with the intent to eliminate upstream dams by 2028 (as described).
- Vale highlighted expansion of agglomerates (pellets and briquettes) aligned with anticipated demand for lower-carbon steelmaking inputs.
- Vale confirmed ongoing evaluation of strategic options for Vale Base Metals (VBM), including maintaining IPO readiness and other structural alternatives, following the carve-out and minority investment.
- Vale described ongoing development of "mega hub" concepts (five countries, including Brazil and the Middle East) for low-emission steel value chains, noting key dependencies (energy/offtake economics).
- Iron ore: 2025 guidance 335 Mt, with stated global market share around ~20% of a ~1.6 Bt market.
- Pellets/agglomerates: production referenced at ~31 Mt, with capacity described closer to ~40 Mt, constrained by market conditions.
- Nickel: via VBM, Vale cited ~175,000 t production, positioning as #6 globally (as stated), with assets in Canada and Brazil; byproduct credits (including gold) described as enhancing competitiveness.
- Copper: current production cited at ~350,000 t, with a plan to double in 10 years; Vale stated it is #11 in copper reserves globally (as stated).
- Sales: Vale indicated ~60% of sales to China, supported by a dedicated vessel fleet and global distribution network.
- Circular mining: about 10% of iron ore production (~30 Mt) attributed to tailings reprocessing (as stated).
- Cost reductions (last two years, as stated): iron ore -6%, copper -6%, nickel -16%; Vale emphasized costs decreasing while many competitors' costs rise.
- Iron ore market view on Simandou: management framed it as largely replacement/blending versus net-new long-term supply, expecting global supply to remain relatively flat over time (as stated).
- Nickel market view: recent price improvement attributed primarily to supply constraints, including licensing-related issues in Indonesia, rather than demand weakness (as stated).
- Mega hubs concept: use Brazilian high-quality ore to produce direct reduction inputs (HBI) in regions with cheap/clean energy (e.g., Middle East natural gas and future hydrogen), enabling lower-emission steel supply chains (as described).

Session summary

Vale positioned itself as a scaled leader in iron ore with a clear pivot toward higher-growth and decarbonization-aligned opportunities, particularly through copper expansion in Carajás and the development of agglomerated products suited for lower-emission steelmaking. The company emphasized that its strategy is grounded in value creation through efficiency, customer-centric product flexibility, and innovation in mining practices, including circular mining and a shift toward dry processing.

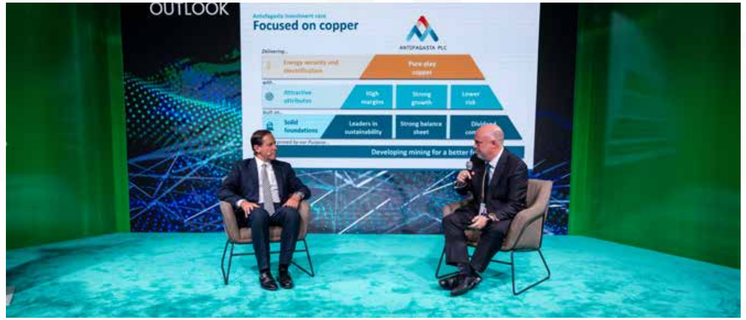
The Q&A reinforced Vale's view of a stable iron ore market where new supply is likely to replace depleted tonnage over time, while copper demand fundamentals remain strong but M&A pricing is challenging—making Vale's organic growth option a strategic advantage. Looking ahead, Vale highlighted base-metals structural optionality via VBM and the longer-term "mega hub" approach as pathways to support the evolving global low-carbon steel ecosystem.

PRESENTATION: Company strategy outlook

DAY 2 –WEDNESDAY 14 JANUARY

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Iván Arriagada
Chief Executive Officer, Antofagasta Minerals



This session outlined Antofagasta's strategy as a pure-play copper producer focused on disciplined growth, operational excellence, and sustainability. The discussion emphasized how the company is executing tangible brownfield expansions already under construction, positioning it among the few global copper producers capable of delivering material growth within the current decade.

The speaker highlighted Chile's role as a stable and mature mining jurisdiction, underpinned by strong institutions, established infrastructure, and a deep mining talent pool. Antofagasta's asset base in Chile provides a platform for scalable growth while maintaining high margins and financial resilience.

A central theme was copper's long-term fundamentals, with demand driven by electrification, digitalization, AI, and energy security. Against this backdrop, the company described a structurally supply-constrained market where brownfield expansions offer the most realistic pathway to meeting future demand.

The narrative also addressed innovation and sustainability as core enablers of growth. Antofagasta's use of renewable energy, desalinated seawater, automation, and proprietary leaching technologies demonstrates how productivity gains and environmental performance can be advanced simultaneously.

The session concluded by reinforcing the company's disciplined capital allocation framework, commitment to shareholder returns, and selective approach to opportunities outside Chile, ensuring growth remains value-accretive and executable.

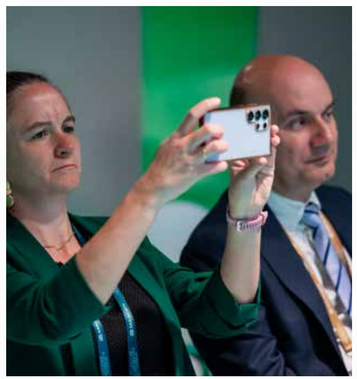
Key insights, data points or predication

- Delivery of ~30% copper production growth by 2029 through ongoing brownfield expansions.
- Construction of a second concentrator at Centinela, now over 50% complete.
- Expansion of Los Pelambres desalination capacity to support mine life extension to 2050.
- Advancement of industrial-scale primary ore leaching technology, with full-scale testing planned for 2026.
- Continued commitment to a minimum 35% dividend payout, historically averaging higher.
- Copper demand expected to grow ~2–3% annually, requiring ~500,000 tonnes of new supply each year.
- Chile produces ~23–25% of global copper, reinforcing its strategic importance.
- Antofagasta operations use 100% renewable energy and ~60% seawater, rising to ~90%.
- Average greenfield copper projects require 10+ years to reach production, reinforcing brownfield priority.
- Automation and scale expected to move key assets into the first quartile of the cost curve.

Session summary

Antofagasta presented a clear case for copper growth grounded in execution rather than aspiration. By advancing large-scale brownfield projects, the company is positioned to deliver meaningful supply into a market constrained by long development timelines and declining grades.

The session reinforced that sustainability, innovation, and financial discipline are not trade-offs but enablers of long-term value creation. As copper demand accelerates globally, Antofagasta's strategy reflects a pragmatic and credible pathway to growth aligned with shareholder, societal, and environmental expectations.



"We are a pure-play copper company with growth already under construction, not in studies"

– Iván Arriagada - Chief Executive Officer, Antofagasta Minerals

PRESENTATION: Company strategy outlook

DAY 2 –WEDNESDAY 14 JANUARY

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Tristan Pascall
Chief Executive Officer, First Quantum Minerals

This session provided an overview of First Quantum Minerals' portfolio, execution model, and growth pathway, highlighting the company's distinctive in-house approach to project development and operational delivery. The discussion emphasized how this model enables tighter control over risk, cost, quality, and schedule across large-scale copper projects.

The speaker outlined First Quantum's core operations in Zambia—Sentinel, Kansanshi (including the S3 expansion), and Enterprise nickel—as the backbone of current production, while addressing the status of Cobre Panamá, which remains under preservation and maintenance pending a regulatory pathway for restart. The company reaffirmed its commitment to Panama, local communities, and environmental stewardship while underscoring that the timing of restart depends on government-led processes.

A key theme was disciplined growth. The company described a pipeline of copper projects in Latin America, including Taca Taca in Argentina and La Granja in Peru (in partnership), with advancement carefully sequenced against balance-sheet strength, permitting progress, and financing readiness. First Quantum emphasized that major sanctioning decisions would only occur under the right regulatory and financial conditions.

The session also contextualized copper demand fundamentals, citing rising per-capita copper intensity in emerging markets, electrification, renewable energy, AI, and data centers as structural drivers. Against this demand outlook, the speaker highlighted the industry's supply constraints and the importance of responsible, socially integrated mining.

The narrative concluded by reinforcing First Quantum's priorities: operational stability, financial resilience, resolution in Panama, and selective progression of growth projects, all underpinned by execution capability and long-term discipline.

Key insights, data points or predication

Continued engagement with the Panamanian government on a pathway to restart Cobre Panamá, following completion of the environmental audit.

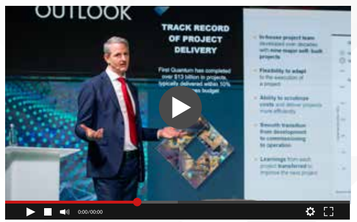
- Advancement of Taca Taca (Argentina), including publication of the NI 43-101 technical report and submission under Argentina's investment promotion framework.
- Ongoing ramp-up of the Kansanshi S3 expansion, with production expected to rise materially through 2026–2027.
- Evaluation of financing options across projects, including offtakes, streaming, and structured financing, while maintaining balance-sheet discipline.
- Expansion of renewable power sourcing in Zambia to mitigate grid and hydropower volatility.
- Sentinel historically produces ~200–240 kt of copper per year; Kansanshi expected to rise toward ~250 kt by 2027.
- Enterprise nickel produces ~30 kt per year.
- Cobre Panamá represents one of the largest single-plant copper operations globally, currently under care and maintenance.
- Copper consumption per capita remains <1 kg in India versus 10–12 kg in the U.S., highlighting long-term demand upside.
- In-house project delivery cited as a key differentiator in managing capital intensity and ramp-up risk.
- Renewable energy and independent power producers increasingly important to mitigate energy supply risks in Zambia.

Session summary

First Quantum presented a clear narrative centered on execution capability, discipline, and long-term value creation. Its in-house project delivery model distinguishes the company in an industry facing rising costs, permitting complexity, and capital intensity.

By prioritizing balance-sheet resilience, responsible engagement with host countries, and phased advancement of its growth pipeline, First Quantum positioned itself as a copper producer focused on delivering supply into a structurally constrained market—without compromising financial discipline or social license.

> **"Copper intensity in emerging markets remains far below developed economies, and that gap will continue to drive demand"**
>
> – Tristan Pascall - Chief Executive Officer, First Quantum Minerals



PRESENTATION: Company strategy outlook

DAY 2 –WEDNESDAY 14 JANUARY

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Shaun Usmar
Chief Executive Officer, Vale Base Metals

This session presented Vale Base Metals as a newly structured critical minerals platform, outlining the strategic rationale for the carve-out, the portfolio's scale across nickel and copper, and the transformation program implemented over the past year. The speaker positioned the business as an under-recognized asset within Vale's broader story, aiming to build market visibility, operational credibility, and investable optionality—particularly in copper.

A central focus was performance delivery and capital discipline. Vale Base Metals highlighted significant controllable cost improvements and a shift from a centralized, siloed model toward an empowered, decentralized operating approach. The presentation emphasized that transformation has been paired with heightened safety and environmental focus, with the company aiming to build trust through consistent delivery against guidance and improved cost profiles.

The growth narrative centered on a Brazil-led copper "district play," anchored by Salobo and supported by a reshaped pipeline of brownfield, lower-capital-intensity projects. The speaker noted that historical value had not been realized due to execution gaps, and described a redesigned projects model that reduced complexity, integrated social licensing earlier, and improved sequencing, project economics, and capital intensity across the portfolio.

The company also underscored exploration as a value lever, citing increased drilling activity and early indications of copper potential at depth in mature districts. In parallel, the nickel portfolio was framed as a resilience and cash flow strategy—focused on driving down unit costs through volume, polymetallic byproducts, and improved asset utilization in a challenging market shaped by Indonesian oversupply.

The session concluded by outlining a strategic ambition to be "IPO-ready" and preserve optionality for Vale and Manara, positioning a potential listing as a pathway to unlock value visibility and create an acquisition currency for longer-term inorganic growth.

Key insights, data points or predication

- Transformation programme: Implemented a shift from centralized/siloed structure to a decentralized operating model, linked to value-per-share focus and portfolio optimization.
- Cost improvement delivery: Reported >$400M controllable cost improvements in the prior year, with a large share attributed to nickel.
- Guidance performance: Indicated the business is trending toward delivering at the upper end of guidance for both copper and nickel (formal results to be announced).
- Bacaba (Brazil): Project described as ready to execute, with CAPEX reductions highlighted and permitting positioned as the immediate gating factor.
- Salobo enhancements: Continued debottlenecking / throughput improvements and a pipeline of incremental projects framed as "high-return" utilization of sunk infrastructure.
- Sudbury partnership framework: Announced a framework agreement with Glencore to access the former Nickel Rim infrastructure, targeting copper-rich ore and long-life synergies.
- Exploration scale-up: Increased drilling materially (more drills, higher total meters), aiming to translate depth potential into resource and production upside.
- IPO optionality: Stated intent to be "IPO-ready" this year, enabling Vale/Manara to decide later on listing or other strategic options.
- Indonesia (Hu'u): Indicated an advanced stage of evaluating a partnering pathway following completion of pre-feasibility, with potential updates later in the year.
- Portfolio described as: ~five mines, five mill concentrators, two smelters, five refineries on the nickel side, plus a copper platform with Brazil as the core growth engine.
- Copper baseline referenced at ~350,000 tonnes/year, with a material portion linked to Brazil and a smaller polymetallic contribution from Canada.
- Highlighted that market coverage is limited (few analysts model the business), creating a visibility and valuation attribution gap.
- Cited capital intensity reductions after restructuring project governance, standards, and sequencing, resulting in improved project returns.
- Bacaba referenced as reduced from "> $500M CAPEX" to ~"$290M" (with internal expectations lower), pending approvals.
- Salobo framed as a "crown jewel" with significant byproduct gold exposure (referenced as >400,000 oz gold in the prior year).
- Sudbury described as highly polymetallic (nickel plus copper, cobalt, PGMs), with potential for long-standing synergies now being advanced via infrastructure access.
- Exploration: drilling scaled from ~20–30k meters/year to ~60k, with an ambition toward ~100–110k meters, and a target of ~20% upside potential from drilling-led outcomes.
- Nickel strategy anchored on resilience through cycle: volume through fixed-cost infrastructure, ramp-ups (e.g., furnaces/refineries), and reducing unit costs to reach break-even and competitiveness.

Session summary

Vale Base Metals positioned itself as a transformed critical minerals platform with a dual mandate: build copper growth visibility through disciplined, lower-capital-intensity execution in Brazil, while stabilizing and strengthening a polymetallic nickel business through cost and volume improvements. The speaker emphasized that the first credibility test is delivery—meeting guidance, lowering costs, and proving that projects can execute to plan.

Looking ahead, the company framed optionality as a strategic asset, including accelerated exploration, partnership pathways for select growth assets, and a deliberate push to be "IPO-ready." The underlying message was that improved execution, simplified project systems, and clearer market visibility could unlock valuation recognition and provide the financial currency needed to compete for future inorganic growth opportunities.

GATEWAY TO FUNDING AGENDA

Day 3

Thursday 15 January 2026

Pavilion 2

PRESENTATION: Company strategy outlook

DAY 3 – THURSDAY 15 JANUARY

Moderator

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Randy Smallwood
Chief Executive Officer, Wheaton Precious Metals

This session introduced Wheaton Precious Metals' pure-play streaming model, outlining how the company provides upfront capital to mining partners in exchange for a contracted share of future metal production, alongside a fixed per-ounce production payment. The presentation positioned streaming as a lower-risk, capital-efficient way to gain exposure to precious metals while retaining upside linked to commodity prices and partner-led mine expansion.

The CEO emphasized that Wheaton's model is designed to reduce operating and inflation risk: capital requirements and per-ounce payments are contractually defined, enabling long-term forecasting and insulating margins from cost escalation that typically follows commodity price increases. The company also highlighted its focus on partnering with high-quality assets and operators, underpinned by intensive technical due diligence and ongoing annual site visits.

A key theme was portfolio quality and longevity. Wheaton noted that a large share of its production is sourced as byproduct precious metals from long-life, capital-intensive copper mines, supporting a reserve and resource profile that is longer than typical precious metals producers. The portfolio is positioned as high quality, with most production coming from assets in the lower half of their cost curves.

The growth outlook was a major focus. Wheaton stated its expectation of production growth materially exceeding prior guidance, citing accelerated expansion plans by partners and incremental contributions from recent acquisitions. The CEO expressed confidence that Wheaton can surpass one million gold-equivalent ounces of annual production by 2029, a milestone framed as a first for its business type.

In Q&A, the session explored how Wheaton's due diligence and contractual protections can reduce uncertainty for markets (particularly in M&A settings), and how streaming can "smooth" the traditional development financing challenge often described by the Lassonde curve—by enabling full project financing without equity dilution or bank debt in select cases.

Key insights, data points or predication

- Updated guidance: Indicated updated production guidance will be released in ~one month, with expected improvement versus prior outlook.
- Growth target: Stated confidence in reaching >1,000,000 gold-equivalent ounces/year by 2029, driven by partner acceleration and acquisitions.
- Acquisitions referenced: Noted Spring Valley and Hemlo as recent additions supporting growth.
- Partner acceleration: Highlighted multiple partners advancing expansion timelines, including Salobo, Platreef, Blackwater (Artemis), and others.
- Project financing case study: Presented Montage (Ivory Coast) as an example where a stream enabled full project financing with no equity issuance and no bank debt.
- Risk structuring stance: Reiterated use of contractual protections (e.g., security/guarantees) and stated focus on protecting shareholder capital in higher-risk jurisdictions.
- Wheaton positioned as a pure streaming company, originating the model in 2004 and expanding beyond silver into gold from 2013 onward.
- Model described as: upfront capital → contracted metal deliveries → fixed per-ounce production payment, creating commodity leverage and cost predictability.
- Portfolio quality: 83% of production tied to assets in the lowest half of their respective cost curves, with a large share in the first quartile.
- Operational footprint: ~45 employees, with ~40% technical staff (geology/metallurgy/mining/process/social disciplines).
- Scale: referenced market capitalization passing ~US$60B (timing tied to "yesterday" in the session).
- Production mix discussed as roughly gold/silver weighted (prior year cited ~60/40), with expectation it may trend toward ~50/50 in updated guidance.
- Reserve/resource longevity highlighted: ~27 years reserves, plus additional M&I and inferred life referenced as significant versus typical gold miners.
- Growth: prior guidance referenced ~600–670 GEO range and earlier projection to ~870 by 2029; CEO signaled upside to >1,000 GEO by 2029.
- Asset examples of upside from partner plans:
- Blackwater (Artemis): accelerated scale-up; timeline pulled forward versus earlier expectations.
- Salobo: coarse particle flotation referenced as a throughput uplift opportunity by ~2029.
- Platreef: ramp-up underway, with initial shipments mentioned and larger capacity milestones ahead.
- Financing insight: streaming positioned as a way to avoid equity dilution and bank debt in development—illustrated through the Montage case and discussion of Lassonde curve dynamics.

Session summary

Wheaton Precious Metals presented the streaming model as a capital-efficient approach to precious metals exposure, emphasizing fixed contractual costs, reduced inflation sensitivity, and strong leverage to commodity prices. The company framed its competitive edge around portfolio quality, long-life assets (often via byproduct streams from copper mines), and deep technical due diligence designed to protect shareholder capital and avoid downside surprises.

The session's forward-looking emphasis centered on growth, with the CEO signaling confidence in exceeding previous guidance and reaching more than one million gold-equivalent ounces per year by 2029. Case studies and Q&A reinforced streaming's role in enabling non-dilutive project financing and in providing additional market comfort through Wheaton's technical validation, structuring discipline, and partner engagement.

PRESENTATION: Company strategy outlook

DAY 3 –THURSDAY 15 JANUARY

Moderator

Brian Quast
Metals and Mining Research Analyst, BMO Capital Markets

Paul Brink
President and Chief Executive Officer, Franco-Nevada Corporation

This session introduced Franco-Nevada's royalty and streaming business model and how it provides capital to mine developers and operators in exchange for a percentage of production over the life of an asset. The speaker distinguished between royalties commonly used on gold mines and streaming structures often used on large copper mines where precious metals are produced as byproducts.

The presentation highlighted Franco-Nevada's global diversification, including a large producing portfolio and a broader pipeline of development and exploration interests. The company emphasized the resilience of its top-line exposure: as commodity prices rise, it benefits from increased revenue without being directly exposed to operators' cost inflation pressures.

A major theme was long-term optionality. Franco-Nevada described how its model captures upside when mines extend life, expand, or discover additional resources, citing a significant increase in attributable gold reserves over time as a practical illustration of embedded growth compared with passive bullion exposure.

The session also discussed near-term and longer-dated growth drivers. The speaker referenced the potential restart of Cobre Panamá (First Quantum) as a key catalyst and pointed to additional "out-of-plan" assets that could drive upside beyond the company's five-year outlook. The Q&A explored investment stages (from exploration through construction-ready financing), funding strategy choices (cash, bullion inventory, equity, and selective debt), jurisdictional preferences, and the impact of permitting reform on project timelines.

Key insights, data points or predication

- Dividend update: Confirmed a dividend announcement is expected in the coming weeks and stated it will follow the company's pattern of annual dividend increases.
- Capital available: Noted ~US$1.8B available to deploy for new investments and expressed interest in opportunities in the Middle East/ Saudi Arabia.
- Cobre Panamá catalyst: Indicated optimism that Cobre Panamá could restart within the year, with potential to materially lift growth alongside other organic drivers.
- Cascabel development path: Highlighted continued funding support through the pre-feasibility → feasibility stage and noted a takeover bid from a major copper player (Jiangxi Copper) that could accelerate execution.
- New Prosperity engagement model: Referenced a new structure enabling First Nations participation up to 20% ownership, intended to improve social license and development potential.
- Argentina pathway: Pointed to RIGI as a new enabling framework and referenced upcoming steps for projects such as TakaTaka (application expected in coming months).
- Company profile: ~40 years operating history as a royalty and streaming business.
- Portfolio scale: ~120 producing assets; 400+ total assets with interests across producing, development, and exploration stages.
- Commodity exposure: primarily precious metals (gold/silver/PGMs) plus select exposure to copper, iron ore, and oil & gas via royalty/stream structures.
- Investment thesis: top-line exposure provides leverage to commodity prices while reducing exposure to operating cost inflation.
- Long-term optionality example: stated that attributable gold today is ~3.6x versus what existed when the company repurchased assets 18 years ago (after accounting for production and current reserves).
- Near-term growth lever: restart of Cobre Panamá (First Quantum) described as a major driver; restart could contribute to meaningful uplift versus recent baseline levels.
- "Out-of-plan" upside: referenced a set of non-contributing assets not included in the five-year plan, totaling ~7 million ounces of potential future optionality.
- Highlighted optionality examples:
  - Cascabel (Ecuador): moving toward feasibility; takeover interest could speed development.
  - New Prosperity (Canada): improved First Nations partnership model aimed at advancing the project.
  - Ring of Fire (Ontario): broad royalty coverage over a highly prospective district; development dependent on access road and government support.
  - Funding approach: preference to maintain ~US$0.5B cash, hold bullion above that level, and monetize bullion selectively to fund attractive deals; historically equity preferred over debt, with debt used cautiously at cycle lows.
  - Permitting reform signals: examples cited in U.S. (critical minerals tailwind) and Argentina (RIGI accelerating project pathways), with specific projects named as likely beneficiaries.

Session summary

Franco-Nevada presented its royalty and streaming model as a diversified, lower-cost-inflation-exposed way to invest in mining outcomes, capturing long-dated upside through mine life extensions, exploration success, and expansions. The company emphasized strong historical shareholder returns, a progressive dividend policy, and a global portfolio anchored in established mining jurisdictions while remaining open to selective opportunities elsewhere.

Looking ahead, the discussion underscored both near-term and longer-dated catalysts, including optimism around a Cobre Panamá restart and a pipeline of "out-of-plan" optionality assets that could add meaningful value beyond the company's five-year base outlook. The Q&A reinforced Franco-Nevada's flexible approach across project stages and financing structures, with increasing attention to enabling frameworks (permitting reform and investment regimes) that can materially change development timelines.

PANEL SESSION: What funding tools are available for investment in mineral development

DAY 3 – THURSDAY 15 JANUARY

Moderator

Talat Hafiz
Secretary General & Spokesman of Saudi Banks, Media & Banking Awareness Committee

Hon. Rod Phillips
Vice Chair, Canaccord Genuity

Lungisa Fuzile
Chief Executive, Africa Regions and Offshore, Standard Bank Group

Pim Kalisvaart
Principal, Hawke's Point Capital

Owen Hegarty OAM
Executive Chairman, EMR Capital

Elian Terner
Global Head, Mining & Metals Investment Banking, National Bank Capital Markets

Christophe Roux
Head of Batteries, Mining and Industries UK, Africa and Middle East, Société Générale

This session examined why mining finance remains structurally challenging—particularly for SMEs—given long investment horizons, geological uncertainty, and the staged de-risking required before traditional lenders can participate. The moderator framed global minerals investment needs in multi-trillion-dollar terms, citing estimates ranging from roughly US$4.2 trillion to US$10.5 trillion through mid-century.

Speakers emphasized that capital is available, but it is fragmented and aligned to different risk stages rather than deployed as a single pool. The panel described the financing "chain": early exploration risk capital (often via public markets such as TSX Venture), followed by successive equity rounds as technical studies mature (resource → PEA → feasibility), and finally structured project debt once permits, reserves and execution plans are bankable. Streaming/royalty capital and private equity were highlighted as complementary funding tools alongside equity and debt.

Government's role was consistently positioned as catalytic—creating investability through stable regulation, predictable permitting, access to land, public geoscience data, and infrastructure (power, roads, ports), while correcting market failures through incentives and development finance institutions. Panelists stressed that abrupt rule changes mid-project remain among the most damaging risks to capital confidence.

Finally, the discussion explored technology—AI, automation and (forward-looking) robotics—as a de-risking lever that can improve productivity, support workforce constraints, and reshape mine design assumptions. Banks welcomed technology where validated and proven in operations, while noting the difficulty of financing unproven technology without demonstrated risk reduction.

Key insights, data points or predication

- Saudi enabling framework: Panelists highlighted ongoing work in the Kingdom to build investor confidence through clearer regulation and sector enablement, positioning this as foundational to unlocking capital across the chain.
- Staged financing pathway as the operating model: Speakers reinforced the need to structure SME progression through defined milestones (resource → studies → permits → debt), rather than expecting one financing solution.
- Policy tool spotlight (Canada): Elian Terner referenced flow-through shares as an example of how tax incentives can mobilize exploration capital.
- Shift toward stable private capital: Pim Kalisvaart urged the sector to improve long-term consistency and delivery to attract pension funds/endowments and reduce dependence on volatile public markets.
- Audience proposal (Belinda): A co-investment approach was proposed where venture capital could "match" government grants to accelerate studies/capex and speed SME projects.
- Global investment need cited: ~US$4.2T to US$10.5T required to scale minerals supply toward 2050 (as stated by the moderator/panel).
- Mining finance is sequenced: Each stage demands different capital (early equity/public risk capital → private equity/streams → debt at bankability).
- SMEs drive discovery: SMEs were highlighted as responsible for much early orebody discovery and drill-out, but face the steepest funding gap.
- Debt is available, with conditions: Christophe Roux outlined three key requirements for bank debt:
  - time for rigorous feasibility/impact studies and third-party review
  - sufficient equity (debt is not 100% of capex)
  - offtake/market validation, especially for niche minerals
- Private equity under-allocation: Pim Kalisvaart noted private markets deploy enormous capital, yet mining captures only a very small share, implying an opportunity if trust/delivery improves.
- Stability as the core government "ask": Predictability and avoiding mid-stream rule changes were framed as critical to unlocking both equity and debt.
- Technology adoption logic: Early adopters tend to be (1) large diversified miners who can absorb failure and (2) projects that need the tech to become economic; over time, proven tech can lower risk and reduce cost of capital.
- Robotics as future mine-design disruptor (forward-looking): Removing some human constraints (heat, ventilation, physical space) could materially shift productivity and what is economically minable.

Session summary

The session concluded that mining finance is not absent—it is conditional and milestone-driven. For SMEs, the central challenge is bridging early-stage risk capital to bankable feasibility, which requires credible technical progress, stable policy, and an ecosystem that supports multiple funding instruments rather than relying on one source.

Panelists agreed that government's most valuable contribution is enabling investability—stable regulation, efficient permitting, access to land and data, and infrastructure—while technology is increasingly a de-risking lever that can improve productivity and, once proven, lower perceived project risk and the cost of capita

INTERVIEW: PIF's role in enabling the development of the Kingdom's minerals value chain

PAVILION 2

DAY 3 – THURSDAY 15 JANUARY

Farid Habib
Head of Mining, Public Investment Fund (PIF)

Igor Hulak
Senior Partner, Kearney

This fireside chat explored the strategic role of Saudi Arabia's Public Investment Fund (PIF) in transforming mining into a core pillar of the Kingdom's economy under Vision 2030. The discussion positioned mining not merely as a resource extraction activity, but as a geopolitical, industrial, and national resilience priority aligned with long-term economic diversification.

Farid Habib outlined how PIF is building fully integrated metals value chains across upstream, midstream, and downstream activities, leveraging its portfolio companies to close gaps in processing, refining, and specialty metals. The objective is to ensure that Saudi Arabia moves beyond raw material production toward globally competitive industrial capabilities.

The session highlighted Ma'aden as the Kingdom's upstream mining champion, now the largest exploration spender globally in a single jurisdiction, alongside Manara Minerals, PIF's international mining investment platform securing access to critical minerals such as copper and nickel. Together, these platforms anchor Saudi Arabia's domestic and international mining strategy.

A major focus was placed on midstream and downstream development, with recent joint ventures in aluminum downstream processing and rare earth separation illustrating PIF's shift toward industrial depth. These efforts are designed to support strategic sectors such as electric vehicles, aerospace, and advanced manufacturing, positioning Saudi Arabia as a reliable supplier of critical inputs.

The discussion also emphasized PIF's role as a patient, long-term investor capable of de-risking complex, capital-intensive projects, enabling private sector participation. Through partnerships, ecosystem access, and offtake support, PIF aims to crowd in both local and international private investors while balancing commercial returns with national development outcomes.

Key insights, data points or predication

- PIF reaffirmed mining as the third pillar of the Saudi economy under Vision 2030.
- Maaden continues to scale exploration, investing over USD 200 million annually, delivering major discoveries including rare earths and expanded gold resources.
- Manara Minerals is advancing international investments to secure access to copper and nickel, including a strategic stake in Vale Base Metals.
- New downstream initiatives announced, including:
  - Red Sea Aluminium JV with Shandong Innovation
  - Rare earth separation JV with MP Materials
- PIF reiterated openness to co-investment with local and international private sector partners, particularly in midstream and downstream projects.
- Saudi Arabia's estimated mineral endowment valued at USD 2.5 trillion.
- PIF holds 64% ownership in Ma'aden, anchoring domestic upstream mining.
- The Kingdom is positioning itself to produce core inputs for electric vehicles, with aluminum and steel comprising 50–60% of EV structure.
- PIF's competitive advantages include patient capital, higher risk tolerance, and neutral geopolitical positioning.
- Integrated value chains are viewed as essential for export competitiveness and industrial resilience.

Session summary

The session underscored PIF's central role in reshaping Saudi Arabia's mining sector from resource extraction into an integrated industrial platform aligned with Vision 2030. By combining upstream scale, international resource access, and downstream industrial development, PIF is positioning the Kingdom as a critical player in global metals supply chains.

Looking ahead, the ambition articulated was clear: Saudi-made metals embedded in global manufacturing—from electric vehicles to aerospace—symbolizing the Kingdom's transition into a competitive, export-oriented industrial economy supported by long-term partnerships and patient capital.

> **"Our role is to build fully integrated metals value chains that make the Kingdom globally competitive across strategic industries—from mining through to advanced manufacturing"**
>
> – Farid Habib- Head of Mining, Public Investment Fund (PIF)

PRESENTATION: Company strategy outlook

PAVILION 2

DAY 3 –THURSDAY 15 JANUARY

Paul Harris
Senior Editor & Anchor, Kitco Mining

Guy Goulet
Chief Executive Officer, Cerro De Pasco Resources

This session explored how legacy mining assets—specifically historic stockpiles and tailings—can be transformed into economically viable, low-risk sources of critical minerals while delivering strong environmental and social benefits. Using the Cerro de Pasco project in Peru as a case study, the discussion demonstrated how reprocessing above-ground mineral resources can rapidly unlock value without the cost, complexity, and risks associated with conventional mining.

Cerro de Pasco is one of the world's oldest continuously operated mining districts, with more than a century of production history. Over time, low recovery rates and outdated processing technologies resulted in exceptionally high-grade tailings and stockpiles. Today, more than 100 million tonnes of material remain on surface, representing what is expected to be the largest above-ground polymetallic resource globally.

The presentation highlighted the strategic significance of recently identified gallium and indium within the tailings—both classified as critical minerals by the United States. With global gallium supply highly concentrated and demand rising for semiconductors, defense, and advanced electronics, tailings reprocessing was positioned as the fastest and lowest-risk pathway to bring new supply to market.

Beyond economics, the project was framed as a model for responsible mining. Reprocessing legacy waste eliminates underground mining risks, significantly reduces environmental impacts, and enables large-scale remediation of historic pollution. At the same time, it restores economic activity and employment in a community that has suffered sharp decline following the closure of the original pit.

Key insights, data points or predication

- Completion of drilling campaigns to fully validate grades across remaining tailings areas
- Ongoing metallurgical testing to optimize recoveries, particularly for gallium and indium
- Advancement of a full feasibility study, bypassing pre-economic assessment due to project maturity
- Application for exploitation permits following feasibility completion
- Phased processing strategy starting with existing facilities, followed by construction of a dedicated modern processing plant
- Over 100 million tonnes of tailings and stockpiled material available with no mining required
- Mining cost reduced to approximately USD 1 per tonne due to surface-based reprocessing
- Recovery rates expected to exceed 70% with modern flotation technology
- Gallium and indium identified as major value drivers, both now on the U.S. critical minerals list
- Project development timeline measured in years rather than decades, significantly shorter than conventional mining

Session summary

The Cerro de Pasco case study demonstrated how historic mining liabilities can be converted into strategic assets through innovation, modern processing, and responsible project design. By eliminating underground mining, reducing environmental impact, and accelerating time to production, tailings reprocessing offers a compelling model for future minerals supply.

"This project can restore economic life to a community that once depended on mining, while cleaning up over a century of legacy impacts"

– Guy Goulet - Chief Executive Officer, Cerro De Pasco Resources

PRESENTATION: Company strategy outlook

PAVILION 2

DAY 3 – THURSDAY 15 JANUARY

Paul Harris
Senior Editor & Anchor, Kitco Mining

Jose Palma
Executive Vice President, Aclara Resources

This session presented Acclara Resources' strategy to build an end-to-end, geopolitically resilient supply chain for rare earth elements—particularly heavy rare earths (dysprosium and terbium) that are critical for permanent magnets used in electric vehicles and high-tech applications. The speaker outlined why Acclara is prioritizing vertical integration across mining, separation, metals/alloys, and magnet manufacturing partnerships, with operations spanning Brazil, Chile, and the United States.

A central focus was Acclara's differentiation through ionic clay deposits and a proprietary processing approach described as a circular, closed-loop method. The company emphasized its ability to recover and recycle most reagents and water, avoid tailings and discharges, and minimize land disturbance through shallow, soft-clay extraction with no explosives, grinding, or milling—positioning the model as lower impact compared to conventional hard-rock rare earth mining.

Operationally, Acclara detailed two upstream projects—Carina (Brazil) and Penco (Chile)—both targeting a 2028 start. The company highlighted Brazil's supportive regional framework in Goiás, formal government prioritization through an MOU, and its feasibility and environmental licensing milestones. In Chile, the Penco project was presented as smaller but more advanced on financing optionality, with CAP positioned to increase participation post-permit and post-offtake, improving capital structure for execution.

Downstream, Acclara explained its decision to locate separation in the United States to accelerate development of a non-China supply chain, including a pilot plant with Virginia Tech and an industrial site selection in Louisiana supported by substantial state incentives. The discussion also covered expectations from governments beyond direct funding—especially their potential role in convening offtake solutions and reducing cost of capital—arguing that sustainable competitiveness requires financial conditions that can match long-established, state-backed supply chains elsewhere.

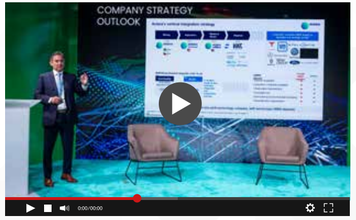
Key insights, data points or predication

- Acclara confirmed a vertical integration roadmap spanning mining (Brazil/Chile), separation (U.S.), metals/alloys (JV with CAP), and magnet value-chain alignment (strategic partnership with Vacuumschmelze).
- The company stated it will complete the Carina feasibility study by end of April and continue fast-tracking execution using learnings from earlier Chile pilots.
- Acclara expects to secure environmental/licensing milestones during the first half of the year, enabling early works and construction readiness for the 2028 operations target.
- The company announced the inauguration of a U.S. separation pilot plant by end of March, developed with Virginia Tech, with planned scale-up to industrial operations in Louisiana.
- Acclara indicated it plans to raise approximately USD 100–200 million during the year to fund early works and maintain schedule toward 2028.
- The speaker reiterated U.S. government engagement via the U.S. DFC "grant financing" instrument supporting feasibility and providing a pathway for further investment consideration.
- Heavy rare earth focus: Dysprosium + Terbium (Dy/Tb) positioned as critical for permanent magnets and the energy transition; company framed projected demand as outpacing supply.
- Production outlook shared: Carina (Brazil) ~175 t/y Dy/Tb and Penco (Chile) ~50 t/y Dy/Tb (speaker emphasis on strong demand gap vs. supply contribution).
- Environmental performance claims for processing: ~98% reagent (ammonium sulfate) recovery and ~95% water recycling; stated no tailings and no discharges in the described closed-loop process (with Chile targeting full recycling).
- Carina (Brazil): life-of-mine ~18 years, feasibility targeted by end of April; CAPEX ~USD 680 million; start of operations targeted mid-2028; state-level support via an MOU to prioritize the project.
- Penco (Chile): life-of-mine ~14 years, smaller scale with CAPEX ~USD 130 million; CAP option to increase participation and inject additional capital post-permit and post-offtake.
- U.S. downstream: separation pilot with Virginia Tech; industrial site selected in Louisiana, citing logistics, reagent availability, skilled workforce, pro-business framework, and ~USD 46.4 million in incentives (tax credits/grants).
- Policy/market framing: speaker argued the key competitiveness gap is cost of capital relative to historically state-funded supply chains, rather than operating efficiency alone.
- Strategic optionality: Acclara signaled potential future replication of downstream capacity in Brazil or Saudi Arabia, depending on exploration success and expansion pathways.

Session summary

Acclara positioned its business as a vertically integrated, multi-jurisdiction supply chain designed to deliver heavy rare earths and downstream products with traceability, long-term contracting capability, and stronger ESG alignment. The company emphasized ionic clay advantages and its closed-loop processing approach to reduce environmental footprint while accelerating project readiness in Brazil and Chile toward a 2028 start.

The discussion underscored that building an alternative rare earth supply chain is both a technical and financial challenge: success depends not only on resources and processing, but also on partnerships, offtake frameworks, and mechanisms that reduce the cost of capital. Acclara's roadmap—supported by strategic industrial shareholders and U.S. ecosystem partnerships—was presented as a practical pathway to scale non-China capacity and potentially expand into additional jurisdictions, including Saudi Arabia, over time.



PRESENTATION: Company strategy outlook

PAVILION 2

DAY 3 – THURSDAY 15 JANUARY

Moderator

Paul Harris
Senior Editor & Anchor, Kitco Mining

Roger Baxter
Executive Chairman, Southern Palladium

This session focused on the strategic importance of platinum group metals (PGMs) as critical minerals across major industrial economies and examined Southern Palladium's approach to developing one of the last large-scale, high-grade PGM assets on the eastern limb of South Africa's Bushveld Complex. The speaker positioned PGMs as essential inputs for catalytic converters, industrial applications, medical technologies, and emerging demand linked to hybrid vehicles, highlighting their scarcity and structural supply constraints.

The presentation outlined the Bengwenyama Project's geological quality, infrastructure advantages, and development strategy. Southern Palladium emphasized its transition from a palladium-focused narrative to a diversified PGM producer targeting approximately 400,000 ounces of PGMs annually, supported by high grades, shallow mining depths, and a long mine life. The asset's location in an established mining jurisdiction with existing power, water, transport, and supplier ecosystems was presented as a key execution advantage.

A central theme was capital discipline and phased development. Following a 2024 pre-feasibility study, the company adopted a two-stage modular development approach to materially reduce peak funding requirements while preserving project economics. This optimization significantly improved fundability, reduced upfront capital intensity, and enabled early cash flow generation to support later expansion.

The session also addressed enabling conditions, including community partnerships, regulatory progress, power market reform in South Africa, and financing options. The speaker highlighted strong community equity participation, improved electricity market liberalization, and alternative funding mechanisms such as chrome streaming and early offtake arrangements. The discussion concluded with near-term catalysts, including permitting, feasibility completion, early decline development, and a final investment decision targeted within the year.

Key insights, data points or predication

- Southern Palladium confirmed a two-stage modular mine development strategy to reduce peak funding requirements and accelerate early cash flows.
- The company indicated it is near receipt of its mining license, following extensive engagement with government authorities.
- A definitive feasibility study (DFS) / bankable feasibility study is targeted for completion by the end of Q2, with publication expected in early Q3.
- Early decline development is planned to commence shortly after permitting, with reef intersection expected within months of initiation.
- The company is advancing chrome stream or prepaid offtake structures as a potential supplementary funding mechanism.
- Southern Palladium confirmed continued engagement with debt providers, streaming partners, and potential offtake counterparties ahead of a final investment decision (FID).
- PGMs are classified as critical minerals in the US, EU, UK, Japan, South Korea, China, India, Australia, and South Africa.
- South Africa hosts approximately 86% of global PGM reserves and produces roughly 70% of global PGMs.
- The Bengwenyama Project targets ~400,000 oz/year of PGMs, including platinum, palladium, rhodium, and associated metals.
- Project grades exceed 9 g/t in situ and 6–6.5 g/t mill feed, positioning the asset among the higher-grade global PGM projects.
- Optimized project economics indicate a post-tax NPV of approximately USD 1.3 billion, with a 33-year mine life.
- A phased approach reduced peak funding needs by ~38%, materially improving project bankability.
- South Africa's electricity market reforms unlocked ~10 GW of renewable capacity, significantly improving power reliability for mining projects.
- Hybrid vehicle adoption is sustaining demand for PGMs, counterbalancing slower-than-expected growth in fully battery electric vehicles.

Session summary

The session reinforced the strategic relevance of platinum group metals in a world balancing decarbonization, industrial resilience, and evolving mobility technologies. Southern Palladium positioned its Bengwenyama Project as a rare combination of scale, grade, infrastructure readiness, and community alignment within the world's most significant PGM province.

With permitting nearing completion, a feasibility study approaching finalization, and multiple funding pathways under evaluation, the company outlined a clear and disciplined route toward development. The discussion highlighted PGMs as a resilient asset class and underscored Southern Palladium's ambition to become a long-life, low-cost PGM producer at a time of constrained global supply and sustained industrial demand.

Maaden Auditorium

Pavilion 2

PLENARY SESSIONS

Day 1

Wednesday 14 January 2025

Maaden Auditorium

OPENING REMARKS

DAY 1 – WEDNESDAY 15 JANUARY

ANJALI RAO

Former CNN International Anchor

H.E. BANDAR BIN IBRAHIM ALKHORAYEF

Minister of Industry and Mineral Resources, Kingdom of Saudi Arabia

The opening address, delivered by H.E. Bandar Bin Ibrahim Alkhorayef, Minister of Industry and Mineral Resources, set the strategic tone for the 2026 Future Minerals Forum (FMF), reaffirming the strong commitment of the Kingdom of Saudi Arabia's leadership—led by the Custodian of the Two Holy Mosques King Salman bin Abdulaziz Al Saud and His Royal Highness Prince Mohammed bin Salman bin Abdulaziz Al Saud, Crown Prince and Prime Minister—to the Forum's continued growth and impact.

Minister Al-Khorayef emphasized that FMF has rapidly evolved into a global, decision-shaping platform that brings together governments, industry leaders, investors, and international organisations to shape the future of the minerals sector.

He positioned the Forum as a catalyst for policy alignment, investment mobilization, and collaboration across the full minerals value chain.

H.E. positioned FMF not only as a convening forum, but as a mechanism for shaping global priorities, aligning policy direction, and accelerating coordinated action across mineral-producing and mineral-consuming countries.

Highlighting the outcomes of the Ministerial Roundtable, Minister Al-Khorayef noted the participation of 100 countries and 59 international organisations, marking the most productive engagement to date and the adoption of the Future Minerals Framework as a shared reference for cooperation.

He underlined that minerals are foundational enablers of economic growth, energy transition, and technological advancement. He underscored that minerals are no longer a sectoral issue, but a strategic input underpinning energy transition, digitalisation, artificial intelligence, and long-term economic resilience.

Turning to national progress, Minister Al-Khorayef outlined how Saudi Arabia is translating strategy into action through large-scale licensing rounds, transparent geological data, and sustained exploration incentives. He also highlighted new FMF initiatives focused on financing, value-chain tracking, and innovation, reinforcing Riyadh's emergence as a global hub for minerals leadership, talent, and investment. These initiatives collectively reinforce Riyadh's positioning as an emerging global hub for mineral innovation, investment, and talent, extending the Forum's impact beyond dialogue to delivery.

Key insights, data points or predication

- Saudi Arabia reaffirmed high-level leadership support for the Future Minerals Forum and its strategic objectives.
- Adoption of the Future Minerals Framework following the Ministerial Roundtable involving 100 countries and 59 international organizations.
- Awarding 172 mining sites to 24 companies and consortia, representing the Kingdom's largest licensing round to date.
- Commitment to continue offering competitive exploration licensing rounds throughout 2026 and 2027.
- Launch of a Gateway to Funding initiative in partnership with the Bank of Montreal to address mining sector financing challenges.
- Introduction of the Future Minerals Indicator to track progress in mineral value-chain development across supplier countries.
- Launch of the Global Future Minerals Pioneers Competition, with winners to be announced during FMF 2026.
- 100 percent completion of geophysical and geochemical survey mapping of the Arabian Shield.
- Exploration spending increased fivefold in four years, reaching USD 280.5 million in 2024, up from USD 133.5 million in 2023, and up from USD 55 million in 2020.
- FMF 2026 is the largest edition to date, with expanded participation, roundtables, exhibitors, and country pavilions.
- The Global Future Minerals Pioneers Competition attracted over 1,800 innovators from 57 countries.
- Geological transparency and infrastructure-led development were positioned as core tools for reducing exploration and investment risk

Session summary

- In his opening address, Minister Bandar bin Ibrahim Al-Khorayef reaffirmed Saudi Arabia's commitment to positioning the Future Minerals Forum as a central global platform for shaping the future of the minerals sector.
- The session underscored the Kingdom's leadership in convening stakeholders, aligning policy, and accelerating global cooperation.
- By combining regulatory clarity, data transparency, infrastructure investment, and innovation-focused initiatives, the address set a forward-looking agenda for FMF 2026—one focused on translating dialogue into action and advancing sustainable, resilient mineral supply chains worldwide.

> **The scale of global mineral demand leaves no time for fragmentation—collaboration is no longer optional.**
>
> – H.E. Bandar Bin Ibrahim Alkhorayef, Minister of Industry and Mineral Resources, Saudi Arabia

PANEL SESSION: A society grows when people plant trees in whose shade they will not sit

SUMMARY:

The session concluded that success in securing critical mineral supply chains must be measured not only by volumes produced, but by the development outcomes delivered for host countries and communities. Speakers agreed that mineral development must integrate infrastructure investment, governance reform, innovation, and social value to remain sustainable over the long term.

Looking ahead, panelists emphasized that deeper international cooperation, blended public-private financing, and trust-based partnerships will be essential to overcoming fragmentation in global supply chains. With demand accelerating rapidly, coordinated action taken today will determine whether critical minerals become a constraint or a catalyst for global economic and energy transformation.

H.E. MOHAMMED BIN ABDULLAH AL-JADAAN

Minister of Finance, Kingdom of Saudi Arabia

"A Securing mineral supply chains today is not about geology alone, but about geopolitics, infrastructure, finance, and long-term policy coherence."

BECKY ANDERSON

Managing Editor of CNN Abu Dhabi and Host of "Connect the World"

"Securing mineral supply chains today is less about where resources sit and more about how nations collaborate across borders, infrastructure, and risk."

GUSTAVO PIMENTA

Chief Executive Officer, Vale

"The challenge in mining is not demand; it is supply. We must scale production while reducing environmental footprints and increasing circularity."

HON. SCOTT BRISON

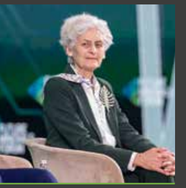
Vice-Chair BMO Wealth Management

"Saudi Arabia has become a trusted global convener, bringing governments and industry together at a time of growing fragmentation."

AUDREY ROBERTSON

Assistant Secretary for Critical Minerals and Energy Innovation, United States

"Critical minerals are an enabler, not an endpoint. They are essential to powering economies, security, and innovation in the decade ahead."



VALÉRIE LEVKOV

Vice President for Infrastructure, The World Bank Group

"Infrastructure is the binding constraint for mining development and addressing it systematically is key to delivering shared value."

H.E. LOUIS WATUM KABAMBA

Minister of Mines, Democratic Republic of Congo

"The DRC is not selling its resources for nothing. We are building win-win partnerships grounded in law, regulation, and long-term development.."

PANEL SESSION: A society grows when people plant trees in whose shade they will not sit

Moderator

Becky Anderson
Managing Editor, CNN Abu Dhabi & Anchor, CNN International

H.E. Mohammed bin Abdullah Al-Jadaan
Minister of Finance, Kingdom of Saudi Arabia

Audrey Robertson
Assistant Secretary for Critical Minerals and Energy Innovation, United States

Valérie Levkov
Vice President for Infrastructure, The World Bank Group

H.E. Louis Watum Kabamba
Minister of Mines, Democratic Republic of Congo

Gustavo Pimenta
Chief Executive Officer, Vale

Hon. Scott Brison
Vice-Chair, BMO Wealth Management

The session explored how governments, financial institutions, and industry leaders can collaborate to secure global critical mineral supply chains amid accelerating demand, geopolitical uncertainty, and infrastructure constraints. It examined the policy, investment, and infrastructure conditions required to mobilise long-term capital, manage cross-border risks, and ensure mineral development delivers sustainable economic and social value for host countries and communities.

The discussion emphasized that demand for critical minerals is rising faster than the pace of investment and infrastructure development, creating growing vulnerabilities in global supply chains. Speakers noted that securing mineral supply is no longer primarily a geological challenge, but one shaped by geopolitics, macroeconomic conditions, financing availability, infrastructure readiness, and policy alignment across regions.

Panelists reflected on the current global environment of subdued growth, elevated interest rates, and heightened geopolitical tensions, highlighting how these factors complicate long-term, capital-intensive mining investments. In this context, predictability, regulatory stability, and credible institutions were repeatedly identified as essential to attracting investment and reducing risk across transcontinental supply chains.

From a policy perspective, the session underscored the increasing convergence between critical minerals, energy security, and national security agendas. Governments described a shift toward more active state participation through strategic partnerships, new financing mechanisms, and long-term industrial strategies, while stressing the continued importance of trusted alliances and international cooperation.

Industry leaders highlighted supply-side challenges, including declining ore grades, longer project timelines, rising costs, and social expectations around environmental and community impacts. They stressed that future competitiveness will depend on collaboration across the value chain, technological innovation, circular mining practices, and the ability to deliver lower-carbon, fit-for-purpose solutions aligned with downstream demand.

Key insights, data points or predication

- United States Department of Energy committed more than USD 1 billion in recent months to innovation across mining, refining, processing, and metallurgy through national laboratories.
- United States and Saudi Arabia confirmed a bilateral agreement on critical mineral security, including cooperation with private industry on refining and processing.
- Democratic Republic of the Congo announced plans to submit a list of strategic mining projects to U.S. investors under a commercial, win-win framework.
- World Bank Group committed to scaling its support to mineral-rich developing countries by up to five times over five years under its new metals and minerals strategy.
- World Bank Group announced the launch of more than 20 country-level compacts to align regulation, infrastructure investment, and private capital mobilization.
- Global copper production is expected to increase from approximately 23 million tons today to nearly 40 million tons by 2040.
- Infrastructure and logistics can account for up to 30 percent of mining operating costs in infrastructure-constrained environments.
- The DRC currently faces an energy deficit of more than 1,000 megawatts, despite long-term generation potential exceeding 100,000 megawatts.
- Around 10 percent of Vale's current production comes from circular mining, including the reprocessing of legacy tailings.
- The mining sector will need to increase supply by five to six times to meet global energy transition, electrification, and digitalization needs.
- Long-term investment decisions depend on regulatory predictability, security of tenure, and cross-border infrastructure coordination rather than short-term market cycles.

"Long-term mining investment depends on credibility, predictability, and certainty. Without stable policies and clear frameworks, capital-intensive projects cannot deliver lasting prosperity"

– H.E. Mohammed bin Abdullah Al-Jadaan, Minister of Finance, Saudi Arabia

GREAT DEBATE: What happened to the nation builders?

SUMMARY:

The session underscored a broad consensus that mining is regaining strategic relevance as a pillar of national development, economic resilience, and global security. Governments are increasingly active, not only as regulators but as investors, facilitators, and long-term partners across the mineral value chain.

Speakers emphasized that future success will depend on ecosystem-based approaches that integrate innovation, sustainability, community trust, and geopolitical cooperation. As mineral demand accelerates globally, mining's ability to deliver inclusive, resilient, and sustainable prosperity will shape both national trajectories and the stability of global supply systems.

DAVID EADES

Journalist & Broadcaster, Former BBC News

"A competitive regulatory environment is crucial for the mining sector's growth, and significant investments are needed to drive the sector forward. Our approach in Saudi Arabia focuses on sector alignment, data investment, and robust regulatory frameworks."

DAVID J. COPLEY

Special Assistant to the President, National Security Council, The White House

"Mining companies are once again central to national development, and governments are now treating minerals as foundational to economic and security priorities."

NIKOLAOS LANG

Global Leader, Geopolitics Practice, BCG

"We are entering a new phase where mining must support nation-building while operating across complex geopolitical and technological ecosystems."

ANA CABRAL

Co-Chairperson and Chief Executive Officer, Sigma Lithium

"Our social license is our operating license. When communities are aligned with mining, projects move faster and create shared prosperity."

SHAUN USMAR

Chief Executive Officer, Vale Base Metals

"This is one of the most consequential moments in mining history, where execution, partnerships, and ecosystem thinking will determine long-term success."

MÁXIMO PACHECO

Chairman, Codelco

"In Chile, mining is not only economic—it is cultural. The fact that young graduates choose mining over global tech companies shows the strength of our ecosystem."

DR. DORIS HIAM-GALVEZ

Program Chair, WMC2026

"Sustainable prosperity requires mining to move beyond short-term gains and become an integrated economic, social, and environmental ecosystem."

GREAT DEBATE: What happened to the nation builders?

David Eades
Journalist & Broadcaster, Former BBC News

Kent Masters
Chairman and Chief Executive Officer, Albemarle

David J. Copley
Special Assistant to the President, National Security Council, The White House

Ana Cabral
Co-Chairperson and Chief Executive Officer, Sigma Lithium

Máximo Pacheco
Chairman, Codelco

Dr. Doris Hiam-Galvez
Program Chair, WMC2026

Shaun Usmar
Chief Executive Officer, Vale Base Metals

Nicholas Lang
Global Leader, BCG

This session explored the re-emergence of the mining sector as a cornerstone of national development, economic resilience, and strategic security in a rapidly evolving multipolar world. Bringing together government, industry, sustainability, and geopolitical perspectives, the discussion examined whether mining is regaining its historic role as a nation-building force and how that role must adapt to contemporary economic, social, and environmental expectations.

From a government standpoint, David Copley outlined a decisive shift in United States policy, positioning mining as a national priority linked to re-industrialization, economic security, and supply chain resilience.

He highlighted accelerated permitting, strategic mineral stockpiling, direct public investment, and ecosystem rebuilding as central pillars of a renewed state role, underscoring that minerals are the foundational inputs required to support advanced manufacturing, defense capabilities, and emerging technologies.

Complementing this perspective, Dr. Doris Horum Galvez emphasized that minerals alone do not build nations; rather, it is the governance of mining as an integrated economic, social, and environmental ecosystem that determines long-term outcomes.

She argued that trust, community engagement, and long-term planning are critical enablers of faster project delivery, stronger investor confidence, and sustainable prosperity that extends beyond the life cycle of individual mines.

Industry leaders including Sean Osmar, Máximo Pacheco, Kent Masters, and Ana Cabral shared operational insights illustrating how mining companies are balancing profitability, innovation, and social license. Their interventions highlighted the importance of partnerships, technological advancement, workforce development, and community alignment in ensuring that mining contributes meaningfully to national development while remaining globally competitive.

Concluding the discussion, Nikolaos Lang framed mining's future role within a broader geopolitical and economic context, noting that surging global demand, technological disruption, and geopolitical fragmentation are pushing the sector toward ecosystem-based nation-building models. Speakers broadly agreed that resilience, collaboration, and long-term vision—across governments, industry, and communities—will define mining's contribution to sustainable development in the decades ahead.

Key insights, data points or predication

- United States government committed to accelerated mine permitting, strategic mineral stockpiling, and large-scale public investment in mining and processing
- Introduction of federal priority permitting pathways for critical mineral projects in the United States
- Continued expansion of public-private partnerships across mining, midstream processing, and downstream applications
- Increased investment in desalination, automation, and digitalization to address water and environmental constraints in mining regions
- Strong emphasis on skills development, innovation ecosystems, and cross-border collaboration
- Average mine development timeline in the United States historically reached 29 years, now targeted for dramatic reduction
- United States allocated USD 2 billion for strategic mineral stockpiling—the largest since the Cold War
- Global mineral demand projected to grow 2–7 times over the next 15 years, driven by energy transition, defense, and urbanization
- Codelco produces over 20% of global copper, with expanding lithium production through joint ventures
- Lithium and battery minerals identified as requiring full ecosystem approaches, not standalone extraction models
- Talent shortages in mining, processing, and metallurgy identified as a critical bottleneck

FIRESIDE CHAT: Maaden: Creating a world champion for Saudi Arabia

David Eades
Journalist & Broadcaster, Former BBC News

Bob Wilt
Chief Executive Officer, Maaden

The session explored how Saudi Arabia's national mining champion, Maaden, is accelerating its growth trajectory under Vision 2030, shifting from foundation-building to rapid expansion in scale, pace, and global ambition. The discussion highlighted how mining is being positioned as a central pillar of national economic diversification.

Bob Wilt, Chief Executive Officer of Ma'aden, reflected on the strong institutional and regulatory foundations laid in earlier phases of sector development, emphasizing that the company did not start from zero. He highlighted how previous leadership, aligned government policy, reformed mining laws, and a supportive ecosystem enabled Ma'aden's accelerated growth.

The conversation focused on Ma'aden's unprecedented capital deployment and partnership-driven growth model. Wilt described how strategic alliances with leading global mining and engineering firms are being leveraged to expand phosphate, aluminum, and gold businesses, while accelerating exploration across the Kingdom.

A significant portion of the discussion addressed talent, culture, and identity. Wilt outlined Ma'aden's efforts to position itself as a "world champion," driven by speed, teamwork, and impact, while competing globally for specialized skills in an increasingly tight labor market.

Key insights, data points or predication

- Maaden confirmed plans to deploy approximately USD 110 billion in capital over the next decade.
- The investment program aims to triple phosphate, double aluminum, and triple gold production.
- Maaden announced 7.8 million ounces of new gold discoveries in the previous year, described as the "first chapter" of a larger exploration pipeline.
- The company plans to triple its exploration program, while partnering externally to cover capacity beyond its internal portfolio.
- Strategic partnerships were highlighted with Alcoa, Mosaic, Vale Base Metals, Hancock, Ivanhoe Electric, and Barrick.
- Maaden indicated plans to sign an owner–partner arrangement with Hatch to bring in thousands of project engineers and managers.
- The company aims to hire approximately 5,000 direct employees and 20,000+ indirect workers over the next five years.
- Capital scale: USD 110 billion planned investment over ten years represents one of the largest mining capital programs globally.
- Production growth: Targeted expansion across phosphate, aluminum, and gold positions Maaden as a diversified mining champion.
- Exploration intensity: One of the world's largest recent exploration programs, with further expansion planned.
- Talent strategy: Global competition for skills requires strong employer branding, global visibility, and clear value proposition.
- Cultural positioning: Maaden is positioning itself as a high-performance "sports team," emphasizing speed, discipline, and collaboration.
- Green transition linkage: Mining demand is no longer driven only by energy transition, but also by AI, electrification, food security, and national security.
- Partnership velocity: Recent global examples show that large-scale partnerships and funding can materialize within months when aligned with strategic priorities

Session summary

The session highlighted Maaden's evolution from a foundation-stage national miner into a rapidly scaling global champion, aligned with Saudi Arabia's Vision 2030. Speed, scale, and disciplined executions supported by deep partnerships—are central to this transformation.

The speaker Bob Wilt emphasized that Maaden's success will depend not only on capital and resources, but on people, culture, and sustained collaboration. By combining national purpose with global capability, Maaden aims to shape the future of mining while delivering tangible economic and societal impact.

"We are not trying to be a tech company; we are building a world champion with the culture and values of a winning team"

– Bob Wilt - Chief Executive Officer, Maaden

PANEL SESSION: Time for bold action: Creating a global mineral fund to supercharge investment

SUMMARY:

The session concluded that mobilizing global capital for mining requires bold, coordinated action to bridge the growing gap between investment needs and deployment. Participants agreed that reducing perceived risk through policy certainty, infrastructure investment, and innovative financing models is essential to unlocking the scale of capital required.

Looking ahead, speakers emphasized that future progress will likely be driven by agile partnerships among like-minded governments, investors, and industry players. In a more fragmented global landscape, smaller, faster, and purpose-driven investment coalitions—supported by strong public-private collaboration—were identified as the most viable path to securing mineral supply and delivering long-term value.

H.E. ENG. KHALID BIN ABDULAZIZ AL-FALIH

Saudi Minister, Kingdom of Saudi Arabia

"There is a clear divergence between the capital required for mining and the capital mobilized so far and closing that gap is essential for global resilience and growth."

BECKY ANDERSON

Managing Editor, CNN Abu Dhabi & Anchor, CNN International

"This is not a discussion about whether mining matters; it is about how quickly capital, policy, and partnerships can move to meet an undeniable global need."

JEFFREY CURRIE

Chief Strategy Officer of Energy Pathways, Carlyle Group

"The challenge is not access to resources, but the willingness to invest in processing and accept the costs that come with it."

RT. HON. DOMINIC RAAB

Head of Global Affairs, Appian Capital Advisory

"Seed capital, strong public-private partnerships, and smart investor selection are essential to closing the gap with China in critical minerals."

MICHAEL BARTON

Managing Partner and Deputy Group Chief Executive Officer, Orion Resource Partners

"The reason sovereigns invest alongside us is confidence that these projects are commercially driven, not politically motivated."

DR. JOSÉ LUIS MANZANO

Founder and Chairman, Integra Capital

"In a fragmented world, minerals will still flow—but only if there is rule of law, price discipline, and sovereign alignment behind long-term demand."

PANEL SESSION: Time for bold action: Creating a global mineral fund to supercharge investment

Moderator

Becky Anderson
Managing Editor, CNN Abu Dhabi & Anchor, CNN International

H.E. Eng. Khalid bin Abdulaziz Al-Falih
Saudi Minister, Kingdom of Saudi Arabia

Jeffrey Currie
Chief Strategy Officer of Energy Pathways, Carlyle Group

Rt. Hon. Dominic Raab
Head of Global Affairs, Appian Capital Advisory

Michael Barton
Managing Partner and Deputy Group Chief Executive Officer, Orion Resource Partners

Dr. José Luis Manzano
Founder and Chairman, Integra Capital

The session aimed to examine how global capital can be mobilised at scale to meet the rapidly growing investment needs of the mining sector, amid rising demand for critical minerals, geopolitical fragmentation, and persistent underinvestment. It focused on identifying effective financing models, risk-sharing mechanisms, and public-private partnerships capable of accelerating mining development while ensuring resilience, sustainability, and supply chain security.

The discussion highlighted the widening gap between surging demand for critical minerals and the level of capital currently deployed across the mining value chain.

Speakers noted that trillions of dollars will be required over the coming decade to fund exploration, development, processing, and enabling infrastructure, and that delays in mobilising capital pose risks to energy transition, technological advancement, and economic security.

Panelists emphasized that perceived risk—ranging from upstream exploration and price volatility to ESG liabilities and geopolitical uncertainty—remains the primary barrier to investment. In response, governments and financial institutions are increasingly adopting more active roles, deploying regulatory reforms, targeted incentives, and patient capital to de-risk projects and crowd in private investment.

Saudi Arabia's approach was highlighted as an example of how consistent leadership, clear policy direction, transparent geological data, and state-backed infrastructure can reduce investor risk and accelerate capital deployment. The Kingdom's strategy combines regulatory certainty, recycling of mining revenues into sector-specific funds, and large-scale public investment in rail, ports, energy, and industrial zones.

From the investor and industry perspective, the session underscored the growing role of hybrid financing models that blend sovereign, institutional, and private capital. Speakers stressed that future success will depend on flexible, fast-moving partnerships—often bilateral or plurilateral rather than fully global—that align strategic objectives, deliver competitive returns, and enable timely execution in an increasingly fragmented global environment.

"There is a clear divergence between the capital required for mining and the capital mobilized so far and closing that gap is essential for global resilience and growth."

"Mining is not a nice-to-have sector; it is absolutely necessary for energy transition, technological progress, and geopolitical resilience."

"We have deliberately taken infrastructure risk off investors' balance sheets—rail, ports, energy and industrial cities are delivered by the state so mining capital can focus on value creation, not basic enablers."

Key insights, data points or predication

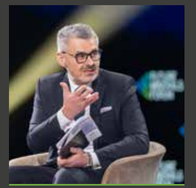
- Saudi Arabia reaffirmed mining as a strategic pillar of economic diversification, supported by consistent leadership, regulatory reform, and public investment in infrastructure.
- Saudi Arabia confirmed that mining royalties and proceeds are recycled into dedicated mining funds to address market gaps not served by the private sector.
- Orion Resource Partners announced the launch of a dedicated Saudi-focused mining fund in partnership with Saudi National Bank, complementing its global Critical Minerals Consortium.
- Orion Critical Minerals Consortium confirmed ambitions to expand from USD 1.8 billion toward USD 5 billion with additional sovereign and institutional partners.
- Appian Advisory and IFC confirmed the launch of a USD 1 billion fund targeting mineral projects in Africa and Latin America through public-private partnership models.
- Maaden and Manara Fund, backed by the Public Investment Fund, were highlighted as vehicles supporting both domestic and global mining investments.
- Global estimates suggest approximately USD 5 trillion in mining and infrastructure investment is required over the next 10 years across the value chain.
- Exploration capital deployment peaked in 2012 and has not recovered, despite rising demand for critical minerals.
- Investors increasingly favour blended financing models combining sovereign, institutional, and private capital to manage risk.
- China's dominance in mineral processing stems from decades of sustained investment in refining capacity rather than resource availability alone.
- Bilateral and plurilateral investment partnerships are emerging as more effective than large multilateral structures in a fragmented geopolitical environment.
- Processing capacity, price stability mechanisms, and infrastructure availability are becoming decisive factors in investment decisions.

PANEL SESSION: Getting more out of the stones: Technology and new processes turning the tide on resource depletion

SUMMARY:

TThe panel concluded that unlocking meaningful supply by 2030 will require a combined focus on technology deployment, operational excellence, and regulatory modernization. While new discoveries remain important, the strongest near-term gains are likely to come from improving recoveries, processing marginal ore, and maximizing existing assets.

Speakers also emphasized that culture and incentives are critical enablers of speed—determining whether organizations can adopt innovation, take calculated risk, and work effectively across partnerships and value chains. Governments and industry alike highlighted that stable frameworks, reliable data, and collaboration are central to building resilient mineral supply.



IGOR HULAK

Senior Partner, Kearney

"We do not have time—meeting 2030 and 2035 horizons requires new technologies, new operating models, and faster ways of working across the mining value chain."

H.E. ENG. KARIM BADAWI

Minister of Petroleum & Mineral Resources, Egypt

"The human element—capacity building and talent—is fundamental to unlocking mineral potential and leveraging technology."

CATHERINE RAW

Chief Development Officer, BHP

"Processing technologies such as low-grade primary sulphide heap leach and coarse particle flotation could unlock marginal ores and deliver meaningful supply gains by 2030."

GARRY KORTE

Group Chief Executive Officer, Hancock Prospecting

"What attracted us was the level of government commitment, responsiveness, and ambition to build a world-scale mining industry that supports long-term investment."

ADAM LUNDIN

Chair, Lundin Mining Corporation

"Efficiency and optimization can materially increase supply by extending mine life and getting more out of existing operations."

GRAHAM KERR

Chief Executive Officer and Managing Director, South32

"Policy—particularly permitting—along with tariffs and geopolitics, will be a major driver of outcomes for the mining industry."

PAULO CASTELLARI

Chief Executive Officer, Eramet

"To get more out of existing assets, we need to adapt operating models and incentives and become more human-centric and agile across the value chain."

PANEL SESSION: Getting more out of the stones: Technology and new processes turning the tide on resource depletion

Igor Hulak
Senior Partner, Kearney

H.E. Eng. Karim Badawi
Minister of Petroleum & Mineral Resources, Egypt

Catherine Raw
Chief Development Officer, BHP

Garry Korte
Group Chief Executive Officer, Hancock Prospecting

Adam Lundin
Chair, Lundin Mining Corporation

Graham Kerr
Chief Executive Officer and Managing Director, South32

Paulo Castellari
Chief Executive Officer, Eramet

This panel examined how the mining industry can deliver faster increases in recoverable supply by 2030, responding to growing pressure from governments and industry to shorten mine development timelines. Speakers explored where meaningful gains can be realized within the decade—through technology, policy reform, and improvements across existing operations.

Panelists emphasized that supply growth will depend not only on new discoveries, but also on better recovery, processing innovation, and productivity improvements in existing assets. Several speakers highlighted that the industry faces increasingly complex, lower-grade deposits, reinforcing the need for safer, more automated operations and more advanced processing routes.

Partnerships were repeatedly presented as essential to success in new jurisdictions and complex deposits. BHP and Lundin Mining described the value of early alignment, shared risk, and long-term trust-building, particularly when partners differ in scale, decision cycles, and operating models.

From a policy perspective, Egypt's minister outlined reforms to improve investor confidence and long-term stability, including streamlining permitting through a coordinated authority model, improving access to modern geological data, and updating exploitation agreements. Across the panel, "culture" and incentives were highlighted as decisive factors for faster execution and the adoption of innovation.

Key insights, data points or predication

- Egypt stated a national ambition to increase mining's contribution from ~1% of GDP to ~5–6% over the next few years.
- Egypt described regulatory steps to accelerate permitting through a more coordinated authority model functioning as a one-stop shop, with cross-government participation (including environment and finance).
- Egypt announced initiation of a nationwide aerial survey, noting the last survey was conducted in 1984, to create reliable digital data and reduce investor risk.
- Egypt indicated it is updating the legal and commercial model for exploitation agreements to align with global standards suited to multi-decade mining investment horizons.
- Egypt referenced plans to launch incentive schemes for junior companies to simplify processes and focus financial resources on exploration.
- Hancock Prospecting cited investment signals in Saudi Arabia including strong government commitment, competitive energy costs, pride in the sector, and responsiveness to industry feedback as factors supporting multi-decade investment decisions.
- Panelists emphasized next steps around developing processing hubs / centers of excellence, strengthening collaboration, and embedding innovation into operating models and incentives.
- Time pressure: The panel reinforced that 2030–2035 horizons require faster delivery; long development cycles are increasingly seen as incompatible with demand.
- Operational efficiency as a supply lever: Examples included extending mine life from ~12 to >25 years through drilling and optimization and raising copper output through improved cycle times and facility performance.
- Processing innovation: Low-grade sulfide heap leach (with catalysts) and coarse particle flotation were highlighted as near-term enablers to unlock marginal ore.
- Permitting as a bottleneck: Speakers cited evidence of lengthening timelines (including a claim that timelines in Australia have doubled over the last 10 years) and noted parallel processing could reduce duplication without lowering standards.
- Maximizing existing ore bodies: Concrete examples included evaluating dense media separation for stockpiled lower-grade material and recovering additional product from process streams (including a cited recovery of ~5 million tons previously going to tailings).
- Value chain realism: Several speakers stressed that bottlenecks frequently sit in processing and downstream capacity, not only exploration and mine development.
- Culture + data: Innovation adoption depends on incentives and mindset; better collaboration and data-sharing can accelerate discovery, processing, and decision-making (including through AI).
- Success measures: Outcomes discussed included more tons mined that would otherwise be stranded, more resilient processing capacity, stronger local ecosystems, and better societal value creation.

MINISTERIAL PANEL: Dawn of a global cause: The role of governments in driving mineral supply

SUMMARY:

The session highlighted a clear shift toward stronger government involvement in securing mineral supply chains, with a focus on competitiveness, value addition, and resilience. Ministers agreed that geology alone is no longer sufficient; success increasingly depends on energy costs, infrastructure, regulatory clarity, and trusted international partnerships.

The discussion concluded with a practical comparison of licensing timelines, underscoring the urgency for governments to accelerate processes while maintaining transparency, standards, and environmental responsibility. Overall, the panel reinforced the Future Minerals Forum's role as a platform for candid, solutions-oriented dialogue on one of the world's most strategic challenges.

ELENI GIOKOS

Anchor and Correspondent, CNN

"Securing minerals and critical minerals has become a matter of national security, and governments can no longer afford to sit on the sidelines."

H.E. BANDAR BIN IBRAHIM ALKHORAYEF

Minister of Industry and Mineral Resources, Kingdom of Saudi Arabia

"Minerals are no longer a sectoral issue; they are a strategic enabler of energy transition, digitalization, and long-term economic growth."

H.E. AURORA WILLIAMS BAUSSA

Mining Minister, Chile

"Chile believes in adding value through domestic processing while maintaining stability, openness, and respect for trade commitments.."

CLAUDE GUAY

Parliamentary Secretary, Minister of Energy and Natural Resources, Canada

"Multilateralism is not dead; alliances remain essential to building resilient mineral supply chains."

H.E. THIAM TIDJANI

Minister of Mines and Industry, Mauritania

"Stability, transparency, and respect for commitments are the foundation for attracting mining investment in Mauritania."

H.E. ALI PERVAIZ MALIK

Federal Minister for Petroleum, Pakistan

"Our responsibility as governments is to reduce friction, simplify regulation, and lower uncertainty for long-term mining investment"

MINISTERIAL PANEL: Dawn of a global cause: The role of governments in driving mineral supply

Eleni Giokos
Anchor and Correspondent, CNN

H.E. Bandar Bin Ibrahim Alkhorayef
Minister of Industry and Mineral Resources, Kingdom of Saudi Arabia

H.E. Aurora Williams Baussa
Mining Minister, Chile

Claude Guay
Parliamentary Secretary, Minister of Energy and Natural Resources, Canada

H.E. Thiam Tidjani
Minister of Mines and Industry, Mauritania

H.E. Ali Pervaiz Malik
Federal Minister for Petroleum, Pakistan

The session examined the increasingly strategic role of governments in securing mineral and critical mineral supply chains amid rising global demand and growing geopolitical pressure. Moderated by Eleni Jarkas, the discussion framed minerals as a national security–level priority, requiring stronger state intervention, international coordination, and long-term policy clarity.

Minister Bandar Al-Khorayef outlined Saudi Arabia's ambition to become a global hub for minerals and downstream processing, stressing that competitiveness—not aspiration alone—must guide national strategies. He emphasized that Saudi Arabia's model rests on three core enablers: resource availability supported by public geological investment, globally competitive energy for processing, and strategic geographic location, complemented by partnerships that bring know-how and shared values.

Several speakers highlighted the need to rebalance global supply chains by expanding processing capacity in producing countries. Canada's Claude Gay underscored the importance of alliances and mineral-by-mineral supply chain planning to build resilience against geopolitical disruption. Pakistan's Minister Ali Pervez Malik emphasized regulatory simplification and certainty as prerequisites for attracting long-term capital into high-potential but underdeveloped mineral belts.

The discussion also focused on value addition, standards, and sustainability.

Chile's Minister Aurora Williams stressed the country's commitment to multilateral trade and institutional stability while pursuing new domestic smelting and refining capacity. Mauritania's Minister Thiam Tijani highlighted political stability, transparent licensing, and a digital mining cadastre as tools to counter risk perceptions and attract investment. Across the panel, ministers agreed that stronger ESG frameworks, traceability, and standardization are essential to scaling supply responsibly.

Key insights, data points or predication

- Saudi Arabia reaffirmed its ambition to become a global hub for minerals and processing, supported by public investment in geology, energy, and enabling infrastructure.
- Saudi Arabia cited existing state-enabled value chains (phosphate fertilizers and aluminum) as models for future minerals development.
- Canada and Saudi Arabia confirmed the signing of a memorandum of understanding to deepen cooperation on minerals and supply chains.
- Pakistan announced it will host the Pakistan Mineral Investment Forum in April to engage global investors and partners.
- Chile confirmed a national strategy to expand domestic smelting and refining capacity, with two facilities under development.
- Mauritania highlighted ongoing reforms, including digitalization of the mining cadaster and transparent licensing processes, to attract value-added investment.
- Critical minerals were repeatedly framed as a national security priority, requiring stronger government leadership and coordination.
- Saudi Arabia identified three competitiveness pillars for processing: resource clarity, competitive energy, and geographic location.
- Saudi Arabia is the fourth-largest global fertilizer producer, enabled by phosphate value-chain investments and public infrastructure.
- Pakistan hosts approximately 2,000–2,500 km of the Tethyan belt and is currently mining around 52 minerals, with significant untapped potential.
- Chile produces approximately 24% of global copper, 23% of lithium, and 15% of molybdenum, with around 50% of copper exports going to China.
- Licensing timelines vary significantly by jurisdiction, reflecting different regulatory models:
  - Canada: historically 5–7 years
  - Pakistan: approximately 2 years following regulatory simplification
  - Chile: 0 to 10 years, depending on project scale
  - Mauritania: 30–90 days, as stated by the minister

"Government intervention can enable value chains, but it must be targeted and cannot substitute market competitiveness forever"

– H.E. Bandar Bin Ibrahim Alkhorayef, Minister of Industry and Mineral Resources, Saudi Arabia

PANEL SESSION: The great catch up: Global mineral supply resilience and new market creation

SUMMARY:

The session underscored that mineral supply chain resilience is no longer a theoretical objective but a practical necessity tied to economic security, industrial competitiveness, and geopolitical stability. Governments were positioned as essential enablers—setting vision, reducing risk, and anchoring long-term investment—while industry and finance execute through partnerships and capital deployment.

Speakers converged on the view that resilience will depend on diversified partnerships, targeted government intervention, and integrated financing models that span exploration, processing, trading, and manufacturing. The discussion reinforced the Future Minerals Forum's role as a platform where policy, capital, and industry align to shape the next phase of the global minerals economy.

CYBA AUDI

Senior News Anchor, Asharq News

"We are moving from awareness to action—governments now face the urgent task of rebalancing extraction, processing, and partnerships to secure resilient mineral supply chains."

H.E ENG. KHALID BIN SALEH AL-MUDAIFER

Vice Minister of Industry and Mineral Resources for Mining Affairs, Kingdom of Saudi Arabia

"Saudi Arabia has moved from a marginal jurisdiction to a globally competitive one through policy clarity, exploration investment, and ecosystem development."

HON. FRANK FANNON

Managing Director, Fannon Global Advisors

"We are past awareness; this is now about execution, capital deployment, and building new architectures for mineral supply."

DALE HENDERSON

Managing Director and Chief Executive Officer, PLS

"Governments set the vision and the stable foundation; industry delivers resilience through execution and partnerships that build full ecosystems."

H.E. ENG. SAAD AL-KHALB

Chief Executive Officer, Saudi Exim Bank

"The scale of mining investment needed by 2040 cannot be delivered by commercial banks alone—public and private capital must work together."

BILL OPLINGER

President and Chief Executive Officer, Alcoa

"Steel built the world, but aluminium will build the future."

BENJAMIN GALLEZOT

Interministerial Delegate for Ores & Metals Supplies, French Government

"We are convinced that cooperation is key in critical minerals—there is no autarkic policy that works in such complex value chains."

PANEL SESSION: The great catch up: Global mineral supply resilience and new market creation

Moderator

David Eades
Journalist & Broadcaster, Former BBC News

H.E Eng. Khalid bin Saleh Al-Mudaifer
Vice Minister of Industry and Mineral Resources for Mining Affairs, Kingdom of Saudi Arabia

Hon. Frank Fannon
Managing Director, Fannon Global Advisors

Dale Henderson
Managing Director and Chief Executive Officer, PLS

H.E. Eng. Saad AL-Khalb
Chief Executive Officer, Saudi Exim Bank

Bill Oplinger
President and Chief Executive Officer, Alcoa

Benjamin Gallezot
Interministerial Delegate for Ores & Metals Supplies, French Government

The session examined how governments, financiers, and industry leaders are redefining supply chain resilience for minerals amid surging global demand driven by energy transition, electrification, defense, and digital technologies. Moderated by David Stringer, the discussion positioned mineral security as a strategic priority requiring long-term policy alignment, capital mobilisation, and trusted partnerships.

H.E. Khalid Al-Mudaifer, Vice Minister for Mining Affairs of Saudi Arabia, outlined how Vision 2030 has elevated mining to a core economic pillar, transforming the Kingdom from a marginal jurisdiction into a globally competitive destination. He emphasized that resilience for Saudi Arabia means securing domestic industrial demand while integrating into global value chains through exploration growth, regulatory reform, talent development, and technology investment.

From a financing perspective, Saad AL-Kalb, CEO of Saudi EXIM Bank, stressed that the scale of required global mining investment cannot be met by commercial banks alone. He highlighted the need for coordinated action between governments, development finance institutions, and private capital, including innovative trade and supply-chain financing models to bridge gaps between producers, traders, and manufacturers.

Industry voices reinforced the urgency of execution. Frank Fannon described the shift from awareness to action, pointing to new bilateral frameworks and investment vehicles, including a Saudi-focused fund under the Orion Critical Minerals Consortium. Dale Henderson of Pilbara Minerals illustrated the volatility faced by lithium producers, underscoring the need for stable policy frameworks and long-term partnerships. Bill Oplinger of Alcoa framed aluminium as a critical enabler of the future economy, while Benjamin Gallezot highlighted France and Europe's push to rebuild processing capacity through international cooperation rather than resource nationalism.

Key insights, data points or predication

- Saudi Arabia reaffirmed mining as the third pillar of Vision 2030, supported by early-stage policy reform and ecosystem development.
- Saudi Arabia announced progress on rare earth development, moving from resource to magnet manufacturing to serve domestic automotive demand.
- Saudi Arabia highlighted partnerships on aluminium smelting, including Red Sea–based projects.
- Saudi EXIM Bank confirmed over USD 1.5 billion in revolving credit facilities to support mineral exports and supply chain resilience.
- Saudi EXIM Bank highlighted the launch of a "Bridges" supply-chain financing initiative linking global traders, suppliers, and Saudi manufacturers.
- Orion Critical Minerals Consortium announced the establishment of a Saudi-focused investment fund, with Saudi National Bank as a cornerstone investor.
- France confirmed operational progress on rare earth separation facilities, including La Rochelle, with additional plants under development through international partnerships.
- Saudi Arabia increased exploration spending five-fold over five years, from under USD 20 to nearly USD 150 per square kilometre.
- Saudi Arabia aims to reach USD 1,000 per square kilometre in exploration intensity, exceeding interim targets ahead of 2025.
- Global mining investment needs to 2040 are estimated at USD 500–600 billion.
- Europe's La Rochelle facility can produce up to 4,000 tonnes of rare earths, covering a significant share of European demand.
- Aluminium demand is projected to rise by approximately 27 million metric tonnes annually over the next decade.
- Lithium markets remain highly volatile, with producers experiencing repeated boom-and-bust cycles, reinforcing the need for policy stability.

"Mining under Vision 2030 is not about extraction alone; it is about securing resilient supply for our industries today and in the future"

– H.E Eng. Khalid bin Saleh Al-Mudaifer, Vice Minister for Mining Affairs, Saudi Arabia

FIRESIDE CHAT: How can diplomacy help supplier countries navigate global competition for minerals?

Becky Anderson
Managing Editor, CNN Abu Dhabi & Anchor, CNN International

H.E. Adel Al-Jubeir
Saudi Minister of State for Foreign Affairs, Cabinet Member, and Climate Envoy, Kingdom of Saudi Arabia

This session examined the growing role of minerals diplomacy as a defining feature of global geopolitics, economic security, and sustainable development. The discussion positioned critical minerals not only as industrial inputs, but as strategic assets shaping alliances, trade relations, and international cooperation.

H.E. Adel Al-Jubeir emphasized that the Future Minerals Forum (FMF) has evolved into a diplomatic platform that brings together producing countries, consuming nations, companies, and civil society to address shared challenges across the minerals value chain. He described FMF as a space for dialogue comparable to a multilateral forum, enabling countries to align priorities and identify practical pathways forward.

The session highlighted a shift away from extractive models that export value out of host countries toward approaches that prioritize in-country value creation, including processing, refining, job creation, and associated industries. This model was framed as essential for economic empowerment, long-term stability, and social development in producing countries.

Looking ahead, the discussion underscored optimism around greater interdependence and integration, including through mineral, logistics, and infrastructure corridors. At the same time, geopolitical tensions were acknowledged, with Saudi Arabia reiterating its consistent emphasis on dialogue, de-escalation, and stability as prerequisites for sustainable development and effective minerals diplomacy.

Key insights, data points or predication

- Saudi Arabia reaffirmed its commitment to advancing minerals diplomacy through dialogue, multilateral engagement, and platform-building via the Future Minerals Forum (FMF).
- FMF Ministerial Round Table highlighted the development of mineral, logistics, and infrastructure corridors, including pathways across Africa and South America, to improve connectivity and value-chain integration.
- Future Minerals Forum emphasized the importance of retaining more value in producing countries, including processing, refining, and downstream industries.
- The Kingdom reiterated its focus on dialogue and de-escalation in regional and global tensions, underscoring stability as essential for development and investment.
- Sustainability principles—environmental protection, social responsibility, and ethical investment—were reaffirmed as core to future minerals development.
- Minerals as geopolitical leverage: Critical minerals are increasingly shaping alliances, trade relations, and global power dynamics.
- FMF as a diplomatic platform: With participation from 100+ countries, FMF functions as a convening space for producers, consumers, companies, and intermediaries.
- Shift in development model: Greater emphasis on in-country value creation rather than export only extraction.
- Infrastructure corridors: Integrated logistics and processing corridors can enhance efficiency and reduce geopolitical friction through shared economic interests.
- Interdependence vs. conflict: Greater connectivity and integration were framed as mechanisms to reduce conflict and enhance global stability.
- Sustainability imperative: Responsible mining—environmental, social, and financial—was presented as a non-negotiable condition for legitimacy and long-term success.

Session summary

The session positioned minerals diplomacy as a central pillar of the emerging global order, where access to resources, value-chain integration, and geopolitical stability are deeply interconnected. Saudi Arabia presented itself as a convenor and facilitator, using dialogue and partnership to align diverse interests across the global minerals ecosystem.

H.E. Adel Al-Jubeir, Saudi Minister of State for Foreign Affairs, Cabinet Member, and Climate Envoy, concluded that the future of minerals development depends on integration rather than confrontation—retaining value in producing countries, investing responsibly, and embedding sustainability at every stage. Through platforms such as the Future Minerals Forum, minerals diplomacy was framed as a pathway toward shared prosperity, reduced tension, and long-term global stability.

"Integration through mineral and infrastructure corridors creates interdependence—and interdependence reduces conflict"

– H.E. Adel Al-Jubeir, Saudi Minister of State for Foreign Affairs, Cabinet Member, and Climate Envoy, Kingdom of Saudi Arabia

ANNOUNCEMENT OF FUTURE MINERALS PIONEERS AWARDS

DAY 1 – WEDNESDAY 15 JANUARY

The Future Minerals Pioneers Awards Ceremony celebrated global innovation, collaboration, and forward-looking solutions that are shaping the future of the mining sector. The ceremony highlighted how emerging ideas—from digital technologies to sustainability-driven and safety-focused solutions—are being translated into practical innovations with real-world impact.

Drawing from thousands of applications submitted from around the world, the competition showcased innovators who challenged convention and reimagined how mining can be more efficient, responsible, and secure. The ceremony underscored that the initiative is not only about recognizing winners, but about supporting pioneers who will drive the next phase of industry transformation.

Awards were presented across three thematic tracks—Smart Technology, Resources Sustainability, and Safety and Security—reflecting the multidimensional challenges facing the global mining industry. Each track demonstrated how innovation can simultaneously advance productivity, environmental stewardship, and workforce protection.

By convening innovators alongside senior government and industry leaders, the ceremony reinforced the Future Minerals Forum's role as a platform that connects ideas with opportunity, accelerates innovation, and supports the journey from concept to implementation.

Key insights, data points or predication

- The Future Minerals Pioneers Competition reaffirmed its role as a global platform for identifying and supporting high-potential mining innovations.
- Second-place awards of USD 60,000 were granted in each of the three tracks to enable further development of shortlisted solutions.
- First-place awards of USD 150,000 were awarded in each track to support scaling and implementation of winning ideas.
- Winning teams were recognized across the following tracks:
  - Smart Technology
  - Resources Sustainability
  - Safety and Security
- The initiative will continue to serve as an innovation pipeline linking pioneers with policymakers, industry leaders, and potential partners.
- Global reach: The competition attracted thousands of applicants from multiple regions, highlighting strong global engagement with mining innovation.
- Targeted funding: Awards ranging from USD 60,000 to USD 150,000 provide early-stage capital to help innovators advance toward deployment.
- Innovation priorities: Solutions focused on digital transformation, sustainable resource management, and safety and security challenges.
- Cross-border collaboration: Winning teams represented diverse national backgrounds, underscoring the global and collaborative nature of innovation in mining.
- Future pipeline: The competition supports a growing pipeline of solutions with potential for pilots, partnerships, and scale-up across the mining value chain.

Session summary

The Future Minerals Pioneers Awards Ceremony underscored the central role of innovation in shaping the future of the mining sector. By recognizing pioneers across technology, sustainability, and safety, the ceremony highlighted how new ideas are already influencing the industry's evolution.

The session concluded by reaffirming the Future Minerals Forum's commitment to fostering global collaboration, supporting innovators, and accelerating the transition from ideas to impact—positioning innovation as a cornerstone of the future of mining.

PRESENTATION: The dawn of the copper age

DAY 1 – WEDNESDAY 15 JANUARY

ROBERT FRIEDLAND

Founder, Ivanhoe Mines, Ivanhoe Electric and I-Pulse

This session explored the emergence of a new "Copper Age," driven by electrification, artificial intelligence, data centers, and the accelerating demand for critical and strategic minerals. The presentation positioned copper—and a wide suite of associated metals—as foundational to sustaining modern lifestyles and enabling future technologies.

Drawing on historical and forward-looking data, the speaker highlighted the unprecedented scale of mineral demand required to support global electricity consumption, digital infrastructure, and industrial growth. Comparisons between historical mining output and projected future needs illustrated the magnitude of the challenge facing the mining industry over the coming decades.

The session also underscored the structural constraints confronting mining, including rising energy and water intensity per unit of copper produced, declining ore grades, and the long lead times required to bring Tier 1 assets into production. These realities, it was argued, necessitate higher commodity prices, accelerated exploration, and transformative technological innovation.

Saudi Arabia was presented as a pivotal emerging mining jurisdiction, benefiting from strong government support, increased exploration spending, and strategic international partnerships. The session highlighted how advanced geophysical technologies, machine learning, and disruptive extraction and processing methods are being deployed in the Kingdom to accelerate discovery, reduce environmental impact, and lower costs.

Key insights, data points or predication

- Confirmation of a 50–50 joint venture between Maaden and Ivanhoe Electric to accelerate mineral exploration in Saudi Arabia.
- Deployment of Typhoon geophysical technology, combining high-powered electrical transmission, big data, and machine learning, across nearly 50,000 square kilometers of the Arabian Shield.
- Advancement of pulse-power rock fragmentation and drilling technologies aimed at reducing energy use, lowering carbon intensity, and increasing metal recovery.
- Continued development of geothermal drilling applications using pulse-power technologies to unlock deep geothermal energy at lower cost.
- Ongoing exploration of rare earth and specialty metals, including scandium, critical for next-generation telecommunications and advanced technologies.
- Copper price evolution: Increased from approximately USD 8,000/ton (five years ago) to an all-time high of around USD 13,400/ton.
- Future demand: An additional 700 million metric tons of copper required in the next 18 years to maintain current global living standards alone.
- Infrastructure impact: Global data center electricity demand projected to equal that of Japan, the world's third-largest economy.
- Mining intensity: Energy required per unit of copper production has increased 16-fold since 1900; water intensity has doubled.
- Exploration investment: Saudi Arabia recorded approximately USD 180 million in exploration spending last year, with further increases expected.
- Technology impact: Pulse-power processing technologies offer up to 80% energy savings and up to 5% higher metal recovery.

Session summary

The session framed the global energy transition, digitalization, and AI revolution as fundamentally mineral-driven, placing copper and associated metals at the center of future economic growth. It emphasized that meeting this demand will require both unprecedented scale and radical innovation across the mining value chain.

The presentation concluded by positioning Saudi Arabia as a future global leader in mining innovation—leveraging advanced technologies, strategic partnerships, and long-term vision to transform how minerals are discovered, extracted, and processed, and to play a defining role in the next era of global development.

> **"Breaking rock with tensile force rather than compression can reduce energy use by up to 80 percent and unlock higher metal recoveries"**
>
> – Robert Friedland- Founder, Ivanhoe Mines, Ivanhoe Electric and I-Pulse

PANEL SESSION: An expensive, complex and slow industry: Defining a fit for purpose business model

SUMMARY:

The panel concluded that mining is not inherently “slow” or “unresponsive,” but that delivery depends on enabling conditions—particularly permitting reform, regulatory stability, and policy frameworks that support investment while preserving ESG integrity. As ore grades decline and costs rise, business models are evolving toward partnerships, risk-sharing structures, and more capital-efficient approaches that can accelerate growth and execution.

Speakers emphasized that technology and execution capability can unlock meaningful gains in productivity and speed, but that talent shortages are increasingly a binding constraint. The session closed with a clear call for closer government–industry collaboration to build local skills pipelines and reposition mining as a modern, technology-enabled sector critical to future economic development and security

MATTHEW MARTIN

Saudi Arabia Bureau Chief, Semafor

“We are seeing mining return to the center of the conversation around energy security and national security, and that is changing how governments engage with the sector.”

WANG QINGHAI

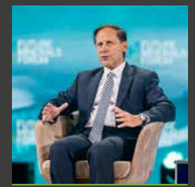
Chairman of the Board, JCHX Mining

“The mining industry faces a universal shortage of qualified personnel, from workers to engineers and managers, and this is becoming a real constraint on delivery.”

MARNA CLOETE

President & Chief Executive Officer, Ivanhoe Mines

“It is possible to move fast in mining when you have tier-one assets and strong execution capability—we have seen that in practice.”



IVÁN ARRIAGADA

Chief Executive Officer, Antofagasta Minerals

“Mining is at a turning point—critical minerals are needed for national security, electrification, and new technologies, and the industry can be responsive when enabling conditions are in place..”

PAUL BRINK

President and Chief Executive Officer, Franco-Nevada Corporation

“As head grades decline, producing the same amount of metal requires much more throughput, which makes the industry increasingly capital intensive.”

TRISTAN PASCALL

Chief Executive Officer, First Quantum Minerals

“Innovation is achievable on the margin; with the right redundancy, you can deploy new technology without jeopardizing daily production.”

ANDREA DE MORI

Global Managing Director, Metals, Hatch

“The industry is becoming more complex and more integrated, and success increasingly depends on assembling teams with overlapping expertise to manage risk and deliver projects right the first time.”

PANEL SESSION: An expensive, complex and slow industry: Defining a fit for purpose business model

Moderator

Matthew Martin
Saudi Arabia Bureau Chief, Semafor

Wang Qinghai
Chairman of the Board, JCHX Mining

Marna Cloete
President & Chief Executive Officer, Ivanhoe Mines

Iván Arriagada
Chief Executive Officer, Antofagasta Minerals

Paul Brink
President and Chief Executive Officer, Franco-Nevada Corporation

Tristan Pascall
Chief Executive Officer, First Quantum Minerals

Andrea De Mori
Global Managing Director, Metals, Hatch

This panel examined whether mining remains an "expensive, complex, and slow" industry and discussed how business models must evolve to meet surging demand for critical minerals. Speakers emphasized that the sector is at a turning point, driven by electrification, emerging technologies, and heightened national and energy security priorities, with mining able to respond faster when enabling conditions are in place.

A recurring theme was the need to accelerate project delivery through permitting reform, regulatory predictability, and policy support.

Panelists noted that permitting can take 16–18 years in some cases, shaping the critical path for engineering and construction sequencing. They pointed to growing momentum for reforms in parts of the Americas and North America, and stressed that speed gains must not compromise ESG outcomes.

The discussion also highlighted a structural shift toward greater capital intensity as ore grades decline, requiring higher throughput to produce the same metal output. This was linked to a rising need for partnerships and risk-sharing models—drawing lessons from oil and gas—alongside innovative financing structures that can lower costs and improve capital efficiency.

Technology and execution capability were presented as key differentiators, including digital engineering, pre-assembly, and incremental deployment approaches that minimize disruption to operating assets. The panel also identified human capital as a binding constraint, calling for stronger public–private collaboration to build local talent pipelines, upgrade skills, and position mining as a modern, technology-enabled career pathway.

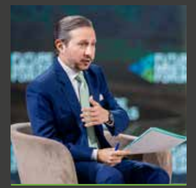
Key insights, data points or predication

- Antofagasta Minerals indicated it is targeting around 30% growth in copper output by the end of the decade, primarily through expansion of existing operations.
- Antofagasta Minerals described using capital-efficiency structures, including monetizing select auxiliary infrastructure (e.g., water systems) and purchasing services back, to reduce capex burden and improve cash flexibility.
- First Quantum Minerals cited bringing into commercial production a rail-run conveyor system, presented as materially more energy efficient than conventional rail, enabled by system redundancy to avoid operational disruption.
- Panelists highlighted increased momentum toward permitting streamlining in parts of North America and the Americas, with emphasis on accelerating timelines without compromising ESG standards.
- Panelists underscored the need for public–private collaboration on skills development and earlier engagement to make mining a more attractive profession for new entrants.
- Permitting timelines: Project permitting can take 16–18 years in some cases, making permitting a dominant constraint on speed to market.
- Cost and grades: Declining average ore grades are driving higher throughput requirements and greater capital intensity across the sector.
- Partnership models: Risk-sharing joint ventures and partnerships are becoming more common as projects scale in cost and complexity.
- Capital-lightening approaches: Operators are exploring alternative ownership and financing for auxiliary infrastructure (power, water) to reduce balance-sheet burden and lower cost of capital.
- Technology deployment: Innovation is often most feasible when implemented incrementally to manage operational disruption risks in large, capital-intensive assets.
- Energy efficiency example: A new conveying system was cited as using around 30% of the energy of conventional rail.
- Human capital shortages: Workforce gaps were described as significant across regions, including an example of around 5,000 roles cited for Queensland, spanning workers through engineers.

PANEL SESSION: Security and powering the digital age: Implications of new demand drivers on mineral supply

SUMMARY:

The session underscored that the digital age—driven by artificial intelligence, hyperscale data centers, electrification, and evolving defense needs—is transforming minerals into strategic assets central to national, economic, and industrial security. Demand is accelerating faster and more intensely than in previous commodity cycles, while supply chains remain constrained by long project timelines, concentrated processing capacity, capital gaps, and geopolitical risk.



NASER EL TIBI

Senior Presenter, Al Arabiya News Channel

"Security today is no longer just about defense; it is about ensuring minerals are available, affordable, and sourced through trusted and resilient supply chains."

BRIAN MENELL

Chairman and Chief Executive Officer, TechMet

"The real systemic risk is not geology; it is price volatility, processing concentration, and the lack of risk appetite outside a few dominant supply chains."

RAJIT NANDA

Chief Executive Officer, DataVolt

"Long-term contracts are essential to reduce volatility in global supply chains. Increased cooperation between companies and governments is necessary to meet future mineral demands and address geopolitical implications."

MICHAEL STEINMANN

President & Chief Executive Officer, Pan American Silver

"Even when metals are mined in stable jurisdictions, refining and smelting remain highly concentrated, creating a major vulnerability in global supply."

MARK KRISTOFF

Chief Executive Officer, Traxys

"Metals have always been strategic, but supply chains were so efficient that most consumers never had to think about where materials came from—until disruption hit."

PROF. MORGAN D. BAZILIAN

Director, Payne Institute and Professor of Public Policy, Colorado School of Mines

"Mineral security cannot be defined by supply alone; institutions, markets, and political priorities shape outcomes just as much as geology."

PANEL SESSION: Security and powering the digital age: Implications of new demand drivers on mineral supply

Moderator

Naser El Tibi
Senior Presenter, Al Arabiya News Channel

Brian Menell
Chairman and Chief Executive Officer, TechMet

Rajit Nanda
Chief Executive Officer, DataVolt

Michael Steinmann
President & Chief Executive Officer, Pan American Silver

Mark Kristoff
Chief Executive Officer, Traxys

Prof. Morgan D. Bazilian
Director, Payne Institute and Professor of Public Policy, Colorado School of Mines

This session examined how accelerating demand from artificial intelligence, digital infrastructure, and defense modernization is transforming minerals from industrial inputs into strategic assets central to economic, industrial, and national security. The discussion framed “security” in its broadest sense—encompassing defense readiness, supply chain resilience, affordability, sustainability, and geopolitical stability.

Opening the discussion, moderator Naser El Tibi highlighted that new demand drivers are arriving faster, more concentrated, and more strategically than in previous commodity cycles.

At the same time, global supply systems remain constrained by long mining timelines, unevenly distributed processing capacity, evolving ESG expectations, and growing geopolitical competition for control over critical minerals.

Professor Morgan D. Bazilian stressed that mineral security cannot be defined solely by supply availability. He emphasized the importance of institutions, markets, and political decision-making in shaping outcomes, noting that defense and civilian demand increasingly overlap, creating complex “dual-use” pressures that governments must manage without distorting commercial markets.

From the digital infrastructure perspective, Rajit Nanda described a powerful “technology supercycle” driven by hyperscale data centers, artificial intelligence, and emerging quantum computing. He underscored that compute intensity is multiplying mineral demand, making access to affordable energy, resilient supply chains, and diversified sourcing essential for digital competitiveness.

Investor and market perspectives highlighted systemic risks across the value chain. Brian Menell pointed to price volatility, processing concentration, and limited risk appetite outside a handful of dominant supply chains as key vulnerabilities, calling for stronger government involvement to de-risk and catalyze private investment. Mark Kristoff explained how traders and logistics providers are adapting through longer-term contracts and new risk-sharing models to ensure continuity of supply in an increasingly politicized market.

From the producer perspective, Michael Steinmann emphasized that upstream challenges are compounded by the extreme concentration of refining and smelting capacity and decades of underinvestment in exploration. He stressed that while demand is accelerating rapidly, responsible supply expansion remains constrained by permitting timelines and midstream bottlenecks.

The session concluded with a discussion on ESG, where panelists agreed that sustainability remains non-negotiable but must be balanced against urgency and security considerations. Innovation, technology deployment, and closer coordination between governments, investors, and industry were identified as essential to delivering secure, resilient, and responsible mineral supply chains for the digital age.

Key insights, data points or predication

- Governments are increasingly intervening to secure mineral supply, including strategic reserves and targeted investments.
- Investors highlighted the need for government-backed de-risking mechanisms to unlock large-scale private capital.
- Traders emphasized the expansion of long-term contracts and new risk-sharing models to stabilize supply.
- Digital infrastructure developers signaled continued rapid expansion of compute capacity, reinforcing long-term demand visibility.
- AI, cloud computing, and defense systems are driving unprecedented demand growth for critical minerals.
- Processing and refining capacity remains highly concentrated, posing strategic security risks.
- Public capital markets remain structurally weak in financing new mining supply.
- ESG remains essential, but security and resilience now dominate policy priorities.
- Without innovation and coordinated policy action, supply constraints risk undermining digital growth and national security goals.

Session summary

Speakers agreed that securing future mineral supply will require coordinated action across governments, investors, producers, traders, and digital infrastructure developers. Key priorities include de-risking investment, diversifying processing and refining capacity, strengthening long-term offtake and financing structures, and balancing ESG commitments with the urgency of supply security. Without innovation, policy alignment, and capital mobilization at scale, current supply systems risk falling short of supporting both strategic security and sustainable economic growth in the digital era.

MINISTERIAL PANEL: Will AI deliver more or faster for the minerals sector?

SUMMARY:

The session demonstrated that artificial intelligence is no longer a future concept for mining, but a core operational capability already delivering measurable impact. By combining AI with human expertise, mining companies are accelerating exploration, improving operational stability, shortening project timelines, and strengthening workforce capabilities. Success will depend on strong leadership, effective change management, and sustained partnerships with technology providers, positioning AI as a central enabler of mining sector transformation and long-term competitiveness

HELENA HEDBLOM

President & Chief Executive Officer, Epiroc

"The real challenge is not technology itself, but change management. Business leaders must understand what AI can do and actively lead the transformation."

DONOVAN WALLER

Chief Technology Officer, Maaden

"AI is not a magic wand, but when the right use cases are combined with the right data and the right people, it becomes transformational for mining operations"

FLAVIA TATA

Co-Founder & Chief Executive Officer, Fleet Space Technologies

"In exploration, AI does not replace the art of geology, but it dramatically increases confidence and allows us to find resources in years rather than decades."

SAMI TAKALUOMA

President and Chief Executive Officer, Metso Corporation

"Almost every mining process today can be optimized to produce more, and AI allows us to unlock value from data that has existed for decades but was never fully utilized."

PANEL SESSION: Will AI deliver more or faster for the minerals sector?

Anjali Rao
Former CNN International Anchor

Helena Hedblom
President & Chief Executive Officer, Epiroc

Donovan Waller
Chief Technology Officer, Maaden

Flavia Tata
Co-Founder & Chief Executive Officer, Fleet Space Technologies

Sami Takaluoma
President and Chief Executive Officer, Metso Corporation

This session examined how artificial intelligence is already reshaping mining operations across the full value chain, moving decisively beyond pilot projects into real, operational deployment. The discussion focused on how AI is being used today to accelerate exploration, improve processing efficiency, shorten project development timelines, and support workforce upskilling.

Speakers emphasized that AI's strongest impact is emerging in data-intensive environments such as supply chains, predictive maintenance, advanced process control, and subsurface exploration. Rather than replacing human expertise, AI is increasingly enhancing decision-making by improving confidence, stability, and speed—allowing mining organizations to act earlier and with greater precision.

The panel also highlighted the organizational and cultural shifts required to scale AI effectively. Successful adoption depends on leadership engagement, strong collaboration between data scientists and operational teams, and a willingness to move away from linear, siloed workflows toward parallel and iterative models that reduce risk while increasing execution speed.

Finally, the discussion underscored Saudi Arabia's ambition to integrate AI across the mining value chain as part of its broader industrial transformation. By embedding AI into exploration, project design, processing, and talent development, the sector aims to unlock resources faster, improve competitiveness, and build a resilient, future-ready mining ecosystem.

Key insights, data points or predication

- Mining companies are embedding AI into core operational systems, including supply chain optimization, predictive maintenance, and advanced process control.
- AI-enabled parametric and parallel design approaches are being deployed to shorten timelines from exploration to project execution.
- Companies are prioritizing long-term partnerships with technology providers, rather than one-off technology purchases, to ensure continuous innovation.
- AI-based tools and digital co-pilots are being used to accelerate workforce upskilling and knowledge transfer.
- AI is enabling a shift from linear mining workflows to parallel, data-driven execution models, significantly reducing development timelines.
- Global mineral demand, particularly for copper, requires unprecedented acceleration in exploration success rates.
- The subsurface represents one of the world's largest untapped datasets, positioning mining as a future foundation for large-scale AI models.
- Organizational culture and leadership ownership are as critical as technology in scaling AI adoption.
- Rapid, incremental AI deployment (weeks rather than months) reduces risk and accelerates adoption across operations.

PANEL SESSION: The rare earths and magnets challenge: processing and market dynamics

SUMMARY:

The session concluded that recent supply disruptions have definitively elevated rare earths from niche inputs to strategic enablers of modern economies. The concentration of processing capacity, combined with rising demand from energy transition and defense applications, makes diversification an urgent global priority.

Speakers agreed that progress over the next year will depend on translating political commitment into bankable projects through pricing transparency, coordinated industrial policy, and deeper collaboration between governments and industry. Building resilient rare earth supply chains is no longer optional—it is foundational to future industrial and energy security.

WILL ARMSTRONG

Partner, McKinsey & Company

"No single country can build a resilient rare earth supply chain alone; collaboration across mining, processing, manufacturing, and policy is essential to close the gap."

ENG. TURKI ALBABTAIN

Deputy Minister for Mining Development, Ministry of Industry and Mineral Resources

"Saudi Arabia sees rare earths as a strategic opportunity to move up the value chain, linking our resource endowment with processing, magnet production, and global market demand."

AMB. CARLOS ENRIQUE PASCUAL

Senior Vice President Geopolitics & International Affairs, S&P Global Energy

"When rare earths and the magnets made from them are disrupted, entire industrial systems are affected—from automobiles and aircraft to defense and energy infrastructure."

AN NUYTTENS

President, Solvay

"The challenge today is not technology; it is speed and investment certainty. Uncertainty is the real barrier to building resilient value chains."

DR. GRACELIN BASKARAN

Director, Critical Minerals Security, Center for Strategic and International Studies (CSIS)

"Rare earths are no longer just commodities; they are strategic assets vital to national security, economic security, and energy independence."

ANA PAULA BITTENCOURT

National Secretary for Geology, Mining and Mineral Transformation, Ministry of Mines and Energy, Brazil

"Brazil has significant rare earth reserves, but transforming resources into production requires regulatory predictability, financing, and coordinated action across government and marketss."

PANEL SESSION: The rare earths and magnets challenge: processing and market dynamics

Moderator

Will Armstrong
Partner, McKinsey & Company

Eng. Turki Al-Babtain
Saudi Arabia's Deputy Minister for Mining Development, Ministry of Industry and Mineral Resources

Amb. Carlos Enrique Pascual
Senior Vice President Geopolitics & International Affairs, S&P Global Energy

An Nuyttens
President, Solvay

Dr. Gracelin Baskaran
Director, Critical Minerals Security, Center for Strategic and International Studies (CSIS)

Ana Paula Bittencourt
National Secretary for Geology, Mining and Mineral Transformation, Ministry of Mines and Energy, Brazil

The session examined how recent geopolitical disruptions have fundamentally altered global perceptions of rare earth elements, shifting them from traditional commodities to strategic assets essential for national security, industrial resilience, and the energy transition. Speakers reflected on how supply shocks in 2025 exposed deep vulnerabilities in global manufacturing systems.

Panelists highlighted the immediate real-world consequences of export restrictions on rare earths, noting how quickly impacts cascaded through automotive, defense, and energy sectors. These events underscored that secure access to rare earths and permanent magnets is now central to economic stability and industrial competitiveness.

The discussion emphasized that supply chain resilience cannot be achieved through mining alone. Instead, it requires a vertically integrated approach spanning exploration, processing and separation, magnet manufacturing, and reliable offtake arrangements among trusted partners and allies.

Speakers stressed that while geological resources exist in multiple regions, investment barriers—particularly market uncertainty, pricing opacity, and long project timelines—continue to delay diversification. Addressing these challenges will require coordinated government–industry action, transparent pricing mechanisms, and targeted industrial policy interventions.

Key insights, data points or predication

- S&P Global (Platts) announced the launch of four rare earth price assessments starting 31 March, aimed at improving pricing transparency and supporting investment decision-making.
- Saudi Arabia reaffirmed its commitment to developing the full rare earth value chain, including mining, separation, and magnet production, aligned with national industrial and energy localization strategies.
- Saudi Arabia and the United States highlighted a strategic framework agreement on critical mineral supply chain resilience, prioritizing cooperation on rare earth processing technology, market access, and investment de-risking.
- Industry representatives emphasized the need for market-side mechanisms, including clearer pricing signals and long-term offtake commitments, to unlock financing for new projects.
- Governments and industry agreed on the importance of cross-border value chain collaboration, where different countries specialize in resources, processing, or manufacturing rather than duplicating the entire chain domestically.
- Supply concentration: Approximately 80–90% of global rare earth processing and magnet production remains concentrated in China.
- Demand gap: Even if all announced non-China projects are completed, speakers estimated a two-thirds gap between rare earth demand outside China and available supply.
- Speed of disruption: Manufacturing disruptions following export restrictions occurred within weeks, illustrating the fragility of current supply chains.
- Vertical integration imperative: Resilient supply requires aligned investment across mining, processing, and magnet manufacturing, supported by secure offtake.
- Investment challenge: The primary constraint is not technology availability, but price volatility, uncertain demand signals, and lack of transparent benchmarks.
- Industrial policy role: Time-bound tools such as price support, equity participation, and demand guarantees were cited as effective mechanisms to accelerate market development.
- Recycling outlook: While critical for sustainability, meaningful recycled magnet supply is not expected to play a major role before 2035 and beyond.
- Global cooperation model: Distributed regional supply chains—linking resource-rich countries, processing hubs, and manufacturing centers—were identified as the most realistic path forward.

"Rare earths are like the vitamins of the industrial system—used in small quantities, but industries simply cannot function without them"

– H.E. Turki Al Babtain, Deputy Minister for Mining Development, Ministry of Industry and Mineral Resources, Saudi Arabia

PLENARY SESSIONS

Day 2

Thursday 15 January 2025

Maaden Auditorium

OPENING REMARKS

DAY 2 – THURSDAY 15 JANUARY

H.E. YOUSEF BIN ABDULLAH AL-BENYAN

Minister of Education, Kingdom of Saudi Arabia

H.E. Yousef bin Abdullah Al-Benyan, Minister of Education, Kingdom of Saudi Arabia, highlighted that the signed Memorandum of Understanding represents a strategic pillar of Saudi Vision 2030, rather than a conventional academic agreement. He emphasised that human capital development is central to national transformation and to building a future-ready mining sector.

H.E. Al-Benyan highlighted the importance of deep collaboration between higher education institutions, government entities, and industry, particularly with the Ministry of Industry and Mineral Resources, to ensure graduates are fully equipped with the competencies, applied knowledge, and skills required by the evolving labor market. The agreement aims to break traditional silos between academia and business and align education outcomes with national economic priorities.

He further stressed that the initiative is not solely focused on job creation, but on embedding innovation as a core driver of competitiveness, noting that sustainable industrial growth—especially in mining—cannot be achieved without long-term investment in talent, research, and innovation. H.E. Al-Benyan concluded by expressing confidence that the impact of this partnership will be clearly reflected in the capabilities of future graduates and in the Kingdom's broader economic transformation.

"This memorandum is not a conventional academic agreement; it is a strategic pillar of Saudi Vision 2030, placing human capital development at the heart of national transformation"

– H.E. Yousef bin Abdullah Al-Benyan, Minister of Education, Kingdom of Saudi Arabia

PANEL SESSION: We want you! Creating a large-scale talent pipeline for the world's emerging jobs factory

SUMMARY:

The session concluded that mining's talent challenge is both immediate and structural: it requires reframing the sector's image, modernizing education pathways, and scaling practical training that delivers workforce readiness across diverse job families. Panelists emphasized that digital skills, AI, automation, and sustainability are now central to mining competitiveness, and must be embedded into curricula, vocational programs, and industry partnerships

Speakers also stressed that long-term success depends on early collaboration and visible hiring commitment from industry, supported by government, universities, and communities. By combining mission-driven narratives with targeted training, applied learning, and inclusive recruitment from local and underrepresented groups, the sector can build resilient pipelines capable of meeting the accelerating demand for critical minerals..

WALTER PRECOURT

Senior Vice President and Chief Administrative Officer, Mosaic

"We hire more than a thousand people each year, and we lead with mission—helping the world grow the food it needs—but it remains a constant challenge, especially for frontline and craft roles."

PROF JEF CAERS

Professor & Mineral-X Director, Stanford University

"Mining education cannot remain traditional; students are drawn to digital tools, data science, and the role of minerals like copper and lithium in the energy transition."

ABDULAZIZ ALHAMWAH

Vice Chairman and Chief Executive Officer, Modern Industrial Investment Holding Group

"We discovered that developing mining services talent requires a structured pipeline built around safety, regulation, certification, and practical deployment—and it must scale beyond one country."

DR. ABDULRAHMAN MASFER ALOSAIMI

Chief Scientist, King Abdulaziz City for Science and Technology (KACST)

"Technology is advancing rapidly, and we need targeted training programs in AI, automation, and mineral processing to close skills gaps and prepare young professionals for the market."

KHALID AL SUHAIM

Chief Digital Transformation Office, Saudi Mining Services Company (ESNAD)

"AMining today is a technology-enabled industry, and the priority is to ensure our communication and branding reflect the full range of modern career pathways—not only field operations"

PANEL SESSION: We want you! Creating a large-scale talent pipeline for the world's emerging jobs factory

David Eades
Journalist & Broadcaster, Former BBC News

Abdulaziz AlHamwah
Vice Chairman and Chief Executive Officer, Modern Industrial Investment Holding Group

Walter Precourt
Senior Vice President and Chief Administrative Officer, Mosaic

Prof Jef Caers
Professor & Mineral-X Director, Stanford University

Abdulrahman Masfer Alosaimi
Chief Scientist, King Abdulaziz City for Science and Technology (KACST)

Khalid Al Suhaim
Chief Digital Transformation Office, Saudi Mining Services Company (ESNAD)

The session examined the urgency of strengthening the mining sector's education-to-employment pipeline, emphasizing that the workforce challenge is not limited to new graduates but also includes upskilling and reskilling existing workers as roles evolve. Panelists stressed that mining today is increasingly shaped by digitalization, automation, AI, and sustainability, requiring a renewed approach to skills development and professional pathways.

A central theme was the need to change the narrative of "mining" to reflect the industry's transformation and broader range of career families beyond field operations.

Speakers noted that outdated perceptions can limit talent attraction, and called for stronger corporate communication, branding, and visibility—supported by platforms like the Future Minerals Forum—to showcase innovation and modern career opportunities.

Participants also focused on building practical readiness through vocational training, micro-credentials, and partnerships with universities and specialized academies. The discussion highlighted how early planning and collaboration—across government, industry, academia, and communities—can create predictable pipelines aligned with sector growth and evolving skills needs.

Finally, the panel explored how companies can recruit and retain talent by linking work to mission and impact, widening participation (including women and local/indigenous communities), and ensuring real-world learning through industry projects and applied research. Retention was framed as a long-term challenge that requires community partnership, meaningful career progression, and workplace models that recognize the operational realities of mining.

Key insights, data points or predication

- Khalid Al Suhaim (ESNAD) referenced efforts to expand workforce readiness through vocational training, reskilling/upskilling, and collaboration with universities and academies, including the use of micro-degrees to accelerate deployment.
- Abdulaziz Alhamwah (Modern Industrial Investment Holding Group) reported a formal program developed with security authorities to certify mining services roles (including blasting), with 380 candidates graduated in 18 months and a plan to scale to around 700 trainees in the coming year, while expanding outreach regionally (Gulf and East Africa).
- Prof. Jef Caers (Stanford) described Stanford's Mineral-X model linking education to practice through an industrial affiliates program, requiring students to complete projects with companies, and expanding collaborations with universities in Africa through scholarships and teaching capacity-building ("teaching the teachers").
- Walter Precourt (Mosaic) highlighted investments in education partnerships to increase participation from rural and indigenous communities, emphasizing retention and long-term community-based workforce development.
- Dr. Abdulrahman Masfer Alosaimi (KACST) emphasized strengthening programs that bridge education and industry needs in mineral processing and advanced technologies, including sustainability and recycling-linked practices.
- World Economic Forum projection (cited in-session): By 2030, 170 million jobs are expected, with 92 million displaced, 78 million net new jobs, and 39% of job skills shifting.
- International Energy Agency projection (cited in-session): Critical minerals jobs are expected to reach 1 million by 2030.
- Training throughput example (Saudi mining services): 380 certified graduates in 18 months, with plans for ~700 trainees the next year.
- Gender participation (training cohort): Approximately 20% of graduates in one program were reported to be women.
- Indigenous workforce participation (Canada example): Growth to ~17% indigenous employees, with stated ambition to increase further; education investments included about USD 1 million across institutions in Saskatchewan.
- Stanford program shift: Mining talent attraction is increasingly tied to AI/data science, sustainability framing, and real-world industry projects, drawing students (including computer science) who seek meaningful impact beyond traditional tech careers.
- Operational reality: Mining's on-site requirements limit fully remote work models, making retention and site-based workforce strategies critical.
- Recycling vs primary supply: Recycling is important, but speakers cautioned it cannot fully substitute for new supply; preventing waste via better exploration and processing efficiency was framed as equally critical.

PANEL SESSION: Let us be known by our deeds: Scaling up transparency and responsible supply

SUMMARY:

The session underscored that transparency and responsible sourcing are no longer optional aspirations but foundational pillars for the future of mineral supply chains. As demand for critical minerals accelerates, the credibility, resilience, and legitimacy of the sector will depend on the ability to embed accountability across jurisdictions and value chains.

Speakers concluded that while progress has been made, sustained collaboration between governments, industry, financial institutions, and international organizations will be essential to ensure that urgency translates into durable, inclusive, and responsible growth for the global mining sector.

JUAN IGNACIO DÍAZ

President and Chief Executive Officer, International Copper Association

"The end user is now dictating how copper must be produced—responsibly, efficiently, with low emissions—and the industry must respond to that demand."

MATTHEW CHAMBERLAIN

Deputy Minister for Mining Development, Ministry of Industry and Mineral Resources

"Standards-based markets are not only about consumer choice—they are essential for long-term security of supply."

INGA PETERSEN

Executive Director, Global Battery Alliance

"Sustainability is no longer a 'nice to have'; it has become a core risk-management requirement across the entire battery value chain."

KARIM DAHOU

Deputy Director and Head of the China Unit, OECD Global Relations and Cooperation Directorate

"Transparency and traceability are essential to ensure responsible behavior throughout mineral supply chains, particularly as investment expands into higher-risk jurisdictions."

DR. MARK ROBINSON

Executive Director, Extractive Industries Transparency Initiative (EITI)

"Urgency must not drive out transparency—especially as new actors enter the sector who may not yet be committed to responsible standards."

ISSAC TANDOH

Chief Executive Officer, Minerals Commisison

"We have shown that with the right regulatory framework, technology, and enforcement, illegal mining can be reduced while livelihoods are protected."

PANEL SESSION: Let us be known by our deeds: How to scale up transparency and responsible mineral supply?

David Eades
Journalist & Broadcaster, Former BBC News

Matthew Chamberlain
Chief Executive Officer, The London Metal Exchange

Inga Petersen
Executive Director, Global Battery Alliance

Karim Dahou
Deputy Director and Head of the China Unit, OECD Global Relations and Cooperation Directorate

Dr. Mark Robinson
Executive Director, Extractive Industries Transparency Initiative (EITI)

Juan Ignacio Díaz
President and Chief Executive Officer, International Copper Association

Issac Tandoh
Chief Executive Officer, Minerals Commisison

This session examined how transparency, traceability, and responsible sourcing can be scaled at speed to meet the rapidly growing demand for critical minerals, without compromising governance, sustainability, or social trust. Against a backdrop of geopolitical tension, accelerating energy transition needs, and investment pressure, speakers explored how urgency must be balanced with accountability across global mineral supply chains.

Panelists emphasized that transparency is no longer a peripheral sustainability objective but a core requirement for market access, risk management, and long-term supply security.

They highlighted the role of international standards, due diligence frameworks, and traceability systems in ensuring responsible behavior across extraction, processing, refining, and manufacturing stages.

The discussion also addressed the uneven global landscape, where compliant producers coexist with informal, illegal, or conflict-affected mining. Speakers examined how regulatory reform, technology, market incentives, and enforcement mechanisms can help formalize supply, reward responsible actors, and curb illicit flows—particularly in resource-rich developing countries.

Finally, the session explored the evolving role of end users, investors, exchanges, and governments in driving standard-based markets, stressing that transparency must translate into tangible commercial value to sustain momentum and ensure fair participation across regions.

Key insights, data points or predication

- OECD and EITI committed to deepening cooperation on traceability and accountability, particularly in conflict-affected regions such as the Great Lakes.
- Ghana's Minerals Commission outlined concrete enforcement and formalization measures, including equipment tracking, licensing reform, and cooperative mining models.
- The Global Battery Alliance announced progress toward product-level sustainability certifications to enable comparability and market differentiation.
- The London Metal Exchange reaffirmed its commitment to OECD-aligned due diligence and sustainability disclosure through its LME Passport system.
- Industry associations emphasized continued collaboration with end users, investors, and governments to scale responsible sourcing practices globally.
- Transparency and traceability are shifting from voluntary initiatives to core market-access requirements, driven by investors, public procurement, and regulation.
- End users and OEMs increasingly demand responsibly sourced, low-emissions minerals, reshaping production expectations.
- Ghana introduced mandatory tracking and geofencing of excavators, licensing reform, and a centralized gold board—bringing over 100 tons of gold and USD 13 billion into the formal economy.
- The OECD Due Diligence Guidance continues to shape EU, US, and global regulatory frameworks for mineral supply chains.
- Standard-based markets are seen as critical to preventing a "race to the bottom" on cost and compliance amid geopolitical competition.

FIRESIDE CHAT: The role of nuclear in the renewable energy mix

Fifi Peters
Senior Anchor, CNBC Africa

Xavier Saint Martin Tillet
Chief Executive Officer, Orano Mining

Richard Sellschop
Senior Partner / Global Mining Leader, McKinsey & Company

Alessandro Petruzzi
Founder & CEO, Terra Innovatum

This session explored the evolving role of nuclear energy as a complement to renewable power sources in the global energy transition. Against the backdrop of rapidly rising electricity demand, grid constraints, and growing intermittency challenges associated with wind and solar, the discussion examined how nuclear energy can contribute to a resilient, low-carbon energy mix.

Speakers highlighted recent shifts in global sentiment toward nuclear power, including renewed policy support, growing private-sector investment, and increased recognition of nuclear's role in ensuring energy security—particularly for energy-intensive industries, data centers, and emerging technologies such as artificial intelligence.

The panel examined technological innovation in nuclear energy, with a focus on micro and modular reactor designs that offer scalability, reduced land requirements, faster deployment, and greater compatibility with decentralized energy systems. These technologies were presented as potential solutions for regions where grid expansion is costly, slow, or impractical.

The discussion concluded by emphasizing that nuclear and renewables should not be viewed as competing solutions, but rather as complementary components of a diversified, low-carbon energy system—provided that policy certainty, regulatory clarity, and long-term planning are in place.

Key insights, data points or predication

- Terra Innovatim reaffirmed its plan to commercially deploy micronuclear reactors by 2028, targeting industrial and off-grid applications.
- Orano Mining confirmed its strategic positioning to support the full nuclear fuel cycle, including recycling, to strengthen long-term fuel security.
- McKinsey emphasized the need for policy certainty and stable regulatory frameworks to enable large-scale nuclear and renewable investment.
- Panelists agreed on the importance of long-term energy planning to address grid constraints and rising electricity demand.
- Global energy demand is expected to at least double over the next 20 years, driven by electrification, digitalization, and industrial growth.
- Renewable energy costs continue to decline, but system-wide costs increase significantly beyond 60–80% grid penetration due to intermittency and storage needs.
- Nuclear energy becomes increasingly competitive at higher renewable penetration levels by providing baseload and firming capacity.
- Micro and modular reactors offer advantages including factory manufacturing, faster deployment, reduced land use, and scalability.
- Countries with balanced energy mixes combining nuclear and renewables consistently achieve very low carbon intensity in electricity generation.

Session summary

The session concluded that nuclear energy is re-emerging as a critical enabler of the energy transition, not as a substitute for renewables but as a stabilizing force that enables higher renewable penetration while maintaining reliability and affordability. Advances in nuclear technology, particularly micro and modular reactors, are reshaping the feasibility and deployment timelines of nuclear solutions.

Speakers emphasized that the success of nuclear-renewable integration will depend on clear policy direction, streamlined permitting, and long-term investment certainly. With these conditions in place, nuclear energy can play a decisive role in delivering secure, low-carbon power systems aligned with global climate and development objectives.

"Nuclear and renewables are almost perfect complements—the strengths of one directly address the weaknesses of the other"

– Richard Sellschop -
Senior Partner / Global Mining Leader, McKinsey & Company

PANEL SESSION: Dealing with uncertainty: How and where to invest without strong price signals?

SUMMARY:

The session concluded that commodity markets are entering a structurally different phase, where uncertainty is shaped by geopolitics, ESG imperatives, supply constraints, and strategic competition rather than cyclical price movements alone. Managing risk now requires deeper integration of financial discipline, stakeholder engagement, and long-term planning.

Looking ahead to 2026, panelists anticipated continued volatility alongside strong opportunities across critical and precious metals, driven by persistent supply shortages, long project lead times, and rising global demand tied to electrification, defense, and energy transition priorities.

JEFFREY LORCH

Partner - North American Metals and Mining Co-Leader, McKinsey & Co.

"What makes this moment distinct is that pricing uncertainty now reflects broader structural change across geopolitics, investment, and long-term supply constraints."

RANDY SMALLWOOD

Chief Executive Officer, Wheaton Precious Metals

"Our focus is always on managing to the downside—identifying risks early and ensuring assets remain resilient across price cycles."

NICHOLAS SNOWDON

Chief Metals and Minerals Economist, Mercuria Energy Group

"We are now in a genuine era of critical minerals competition, where geopolitics and policy are reshaping market structures and creating both volatility and opportunity."

CHRIS MAYBURY

Founder and Chairman, Primary Commodity Fund

"This supercycle will be different—after decades of underinvestment, supply cannot respond quickly enough to meet accelerating global demand."

ROGER BAXTER

Executive Chairman, Southern Palladium

"Today's uncertainty is driven by complexity rather than the unknowns we managed in the past—mine leadership now has to navigate economics, ESG, and stakeholder expectations simultaneously."

CHRIS GRATIAS

Executive Vice-President Strategy & Corporate Development, Gold Fields Limited

"In a high-price environment, uncertainty extends beyond markets to costs, regulation, and fiscal regimes, all of which complicate long-term investment decisions."

PANEL SESSION: Dealing with uncertainty: How and where to invest without strong price signals?

Jeffrey Lorch
Partner - North American Metals and Mining Co-Leader, McKinsey & Co.

Randy Smallwood
Chief Executive Officer, Wheaton Precious Metals

Nicholas Snowdon
Chief Metals and Minerals Economist, Mercuria Energy Group

Chris Gratias
Executive Vice-President Strategy & Corporate Development, Gold Fields Limited

Roger Baxter
Executive Chairman, Southern Palladium

Chris Maybury
Founder and Chairman, Primary Commodity Fund

This session explored how today's commodity pricing environment differs fundamentally from previous cycles, focusing on heightened uncertainty driven by geopolitical tensions, ESG expectations, underinvestment in mining supply, and growing strategic competition for critical minerals. Speakers examined how these dynamics affect investors, producers, traders, and end users across global markets.

Panelists emphasized that uncertainty today is less about short-term price swings and more about structural complexity, including regulatory shifts, fiscal pressures, cost inflation, talent shortages, and community and stakeholder expectations. These factors increasingly shape long-term investment decisions and operational resilience.

The discussion highlighted how different business models respond to volatility: mining companies prioritize cost discipline and stakeholder alignment; streaming firms focus on downside protection and asset quality; traders act as risk managers, facilitating physical flows and capital deployment amid market dislocations.

The session concluded with reflections on 2025 market behavior, outlooks for 2026, and views on which commodities are most likely to benefit from structural supply deficits, long development timelines, and rising strategic stockpiling by governments and institutions.

Key insights, data points or predication

- Mercuria Energy Group confirmed significant capital deployment into industrial metals supply, including multi-billion-dollar investments over the past year, particularly in copper.
- Mercuria highlighted joint ventures with governments in Zambia and the Democratic Republic of the Congo to support value capture, equity participation, and knowledge transfer.
- Southern Palladium referenced a community partnership model granting a 30% equity stake to the local community through a formal governance structure.
- Gold Fields reaffirmed its strategy of managing to the downside while reinvesting excess margins to future-proof operations.
- Panelists collectively underscored the need for accelerated talent development and skills pipelines to support the next wave of mining investment.
- Speakers noted that in some jurisdictions, mine development can take up to 29 years, constraining supply response.
- Structural underinvestment in exploration and mine development over the past two decades is a key driver of current and future volatility.
- Randy Smallwood projected strong upside for precious metals, citing gold's role as a currency rather than a traditional commodity.
- Roger Baxter highlighted platinum group metals as structurally constrained, with rising demand from industrial, technology, and energy-transition applications.
- Panelists emphasized the growing role of price-insensitive buyers, including governments stockpiling strategic minerals.
- Traders were described as essential market stabilizers, managing both physical dislocations and price risk during periods of heightened volatility.

PANEL SESSION: Green premiums: Myth or reality?

Christian Hoffmann
Partner - Metals & Mining Practice, McKinsey & Company

Valère Moutarlier
Deputy Director General for Internal Market, Industry, Entrepreneurship and SMEs, European Commission

This session examined whether “green premiums” for low-carbon and sustainable materials are a commercial reality or remain largely aspirational. The discussion focused on customer demand, willingness to pay, and the implications for investment decisions, project viability, and industrial competitiveness.

Speakers explored the structural challenge facing low-carbon materials: while demand for greener products is growing, production costs often remain higher, and customer premiums do not always fully bridge the cost gap. This mismatch can delay or prevent new projects, asset conversions, and greenfield investments.

The discussion placed particular emphasis on the European Union’s Critical Raw Materials Act, outlining how regulation, project selection, financing, and diversification strategies are being used to strengthen resilience, reduce dependency, and integrate ESG performance into supply-side decision-making.

The session concluded with a broader reflection on linking green premiums to resilience and security of supply, arguing that the true value of sustainable materials must be assessed not only through cost, but through long-term stability, diversification, and industrial sovereignty.

Key insights, data points or predication

- The European Commission reaffirmed implementation of the Critical Raw Materials Act (2023), structured around three pillars:
  - Domestic capacity targets: 10% extraction, 40% processing, and 20% recycling of EU CRM needs.
  - Strategic partnerships with third countries to diversify supply chains.
  - Support for strategic projects in Europe and beyond, with ESG performance weighted alongside technical and operational criteria.
- The Commission announced that an upcoming Industrial Accelerator Act will aim to create lead markets for green materials through public procurement and subsidy mechanisms, starting with green steel.
- Ongoing work at G7 level on price floor concepts and market access conditions was referenced as relevant to future green premium mechanisms.
- Green premiums already exist in selected markets and products, particularly where customers seek carbon reduction or circularity outcomes.
- Current premiums often do not fully offset higher production costs, limiting scalability of low-carbon material projects.
- The EU’s CRM strategy explicitly integrates resilience and diversification as economic values, not only sustainability goals.
- Regulatory tools are increasingly designed to create demand-side incentives, rather than relying solely on voluntary customer willingness to pay.
- Avoided costs—such as carbon pricing exposure and supply-chain disruption risks—are emerging as implicit drivers of green material uptake.
- European public opinion continues to support the Green Deal agenda, provided it is aligned with industrial competitiveness and security of supply.

Session summary

The session concluded that green premiums are real but unevenly distributed, insufficient on their own to unlock the scale of investment required for a low-carbon materials transition. Bridging this gap will require coordinated action across regulation, financing, and demand-side market creation.

By reframing green premiums as part of a broader resilience and security-of-supply strategy, policymakers and industry leaders can better justify investment decisions, support competitiveness, and accelerate the development of sustainable and diversified critical raw material value chains.

“In the EU, green premiums are increasingly linked to resilience, diversification, and security of supply—not just decarbonisation alone”

– Valère Moutarlier,
Deputy Director General for Internal Market, Industry, Entrepreneurship and SMEs, European Commission

PANEL SESSION: Customers shaping the minerals conversation: Perspectives from end-users

SUMMARY:

The session concluded that end users are now active architects of mineral supply chains, shaping demand signals, standards and investment viability through procurement rules and long-term commitments. With regulation tightening, volatility persisting and geopolitics reshaping trade assumptions, customers and suppliers must adopt partnership-based approaches that combine supply security with responsible production.

Panelists emphasized that practical action today requires strategic choices: longer-term contracting, executive-level decision-making on critical inputs, and collaboration models that align incentives across public and private stakeholders.

KAREL ELOOT

Senior Partner / Global Materials Insight Leader & Knowledge Leader, McKinsey & Company

“Customers used to be at the end of the chain, but not anymore — today, customers set the rules.”

JOE KAESERL

Chairman of the Supervisory Boards, Siemens Energy and Daimler Truck Holding

“Minerals are no longer ‘commodities’ that are readily available — they are among the scarcest goods in global supply chains, and the game has shifted to long-term partnerships and resilience.”

DR. FADI TRABUNZI

Managing Director, Advanced Metals Industrial Clusters Co

“Saudi Arabia is now the second-largest titanium exporter after Japan to the aerospace industry globally, and sustained ecosystem and infrastructure support is essential to build trust and continuity.”

MARC WINTERHOFF

Interim Chief Executive Officer, Lucid

“We have made off-take agreements years out, and we are willing to pay more to avoid stoppages — last year we nearly stopped production twice due to magnet shortages.”

DR. KLAUS KLEINFELD

Founder and Chief Executive Officer, K2Elevation

“On the micro level, you need to know where you sit on the cost curve — that is your safety net through a low cycle — and contract structures like off-take shape whether projects are bankable.”

SALEH ALSALEH

Vice President, Aramco Transition Minerals

“Long-term commitments and off-take agreements with end users will encourage us to move faster, and technology is our ticket to lower cost and withstand cycles.”

PANEL SESSION: Customers shaping the minerals conversation: Perspectives from end-users

Karel Eloot
Senior Partner / Global Materials Insight Leader & Knowledge Leader, McKinsey & Company

Joe Kaeser
Chairman of the Supervisory Boards, Siemens Energy and Daimler Truck Holding

Dr. Fadi Trabunzi
Managing Director, Advanced Metals Industrial Clusters Co

Marc Winterhoff
Interim Chief Executive Officer, Lucid

Dr. Klaus Kleinfeld
Founder and Chief Executive Officer, K2Elevation

Saleh Alsaleh
Vice President, Aramco Transition Minerals

This session examined how end users are increasingly shaping mineral supply chains, moving from passive buyers to active rule-setters. The discussion highlighted three major forces driving this shift: regulation requiring supply chain transparency (notably in batteries), high market volatility, and rising geopolitical risk.

Panelists focused on practical actions customers can take now to strengthen supply security and support responsible production. These actions included adopting long-term contract structures, using standards and transparency mechanisms, and building partnerships that enable investment and innovation while preserving flexibility as demand and technologies evolve.

From the supply side, Aramco described leveraging long-standing subsurface capabilities, data and advanced analytics to explore mineral opportunities, including lithium in oilfield brines. It emphasized the importance of aligning development pace and project scale with battery and automotive customers through structured engagement and offtake discussions, alongside piloting direct lithium extraction approaches.

The panel also emphasized that the customer–supplier relationship is shifting from transactional procurement toward strategic partnerships and, in some cases, vertical integration.

Speakers underscored that securing critical inputs increasingly requires executive-level decisions, trade-offs on cost versus continuity, and coordinated approaches that can withstand cyclical commodity markets and policy uncertainty.

Key insights, data points or predication

Aramco Transition Minerals (Saleh Alsaleh) indicated progress on lithium opportunity development, including:

- Ongoing exploration and demonstration phases;
- Field pilots showing promising results for direct lithium extraction;
- continued engagement with battery makers and car makers to align pace, requirements, and potential off-take.

Lucid (Marc Winterhoff) confirmed a strategic shift toward:

- long-term off-take agreements (including materials such as graphite, and discussions on lithium);
- diversification of magnet sources, accepting higher costs to reduce production disruption risk;
- elevating sourcing decisions to C-suite level when availability risk is high.

Advanced Metals Industrial Clusters Co (Dr. Fadi Trabunzi) reinforced the need for:

- continued government enablement (infrastructure and ecosystem development) to sustain Saudi titanium competitiveness and customer trust.
- Industry-wide message (multiple speakers): long-term customer commitments are a key lever to unlock capital-intensive projects and de-risk investment.
- Customers are increasingly defining supply-chain rules through standards, transparency requirements, contract design and capital signals.
- Three main drivers shaping procurement and supply strategy: regulation, market volatility, and geopolitical risk.
- Aramco lithium indicator: lithium concentrations cited as more than 400 ppm, described as four-fold above the commercial limit referenced by the speaker.
- Scale challenge: full global electrification was cited as requiring seven times the number of mines currently operating, while permitting timelines were described as 10–15 years.
- Cost is no longer the sole determinant: companies increasingly accept a cost premium to secure continuity and reduce stoppage risk.
- Procurement decisions for high-risk critical inputs are shifting from routine purchasing to strategic, executive-led decisions.
- Collaboration works when incentives are genuinely mutual (“win-win”), and when partners can structure risk-sharing without undermining competitive positions.

GREAT DEBATE: Can the mining industry's poor reputation be turned around – if so, how?

SUMMARY:

The discussion underscored that the mining industry's reputation is neither uniformly poor nor fixed, but highly dependent on context, conduct, and communication. While mining is increasingly recognized as indispensable to modern life, clean energy transitions, and economic development, its reputation remains fragile and vulnerable to high-impact failures, uneven benefit-sharing, and gaps between legal compliance and societal expectations.

SULIMAN SALEH AL-OTHMAN

Chairman, Saudi Gold Refinery

"Mining is a dream for nations and communities because minerals are essential to jobs, development and the technologies that serve humanity."

JOHN HOWCHIN

Advisor / Board Member, Global Investor Commission on Mining 2030 / GTMI

"Improving mining's reputation is about removing friction—between stakeholders, capital, governments and communities—so the industry can deliver at the pace the world now requires."

JON STANTON

Chief Executive Officer, The Weir Group

"The industry must tell a more joined-up story about skills, technology and purpose if it wants public trust to grow alongside demand for critical minerals."

VICKY BOWMAN

Senior Advisor, Institute for Human Rights and Business (IHRB)

"Just because something is legal does not mean it is socially acceptable, and that lesson has reshaped expectations of leadership across the mining industry."

DON LINDSAY

Board Member, BHP

"The reputation of mining is stronger than many believe, but education is essential—people must understand how deeply mining underpins their everyday lives."

PIERRE GRATTONN

President and Chief Executive Officer, Mining Association of Canada (MAC)

"We undersell ourselves as an industry and too often engage in self-flagellation, despite strong evidence that mining is trusted and valued in many jurisdictions."

TANIA CONSTABLE

Chief Executive Officer, Minerals Council of Australia

"Mining has built hospitals, schools, roads and livelihoods for generations, and we should speak about this industry with clarity, confidence and pride."

FIFI PETERS

Senior Anchor, CNBC Africa

"Reputation depends on who you ask—investors, governments, workers and communities all see mining differently, and the media reflects those multiple realities."

GREAT DEBATE: Can the mining industry's poor reputation be turned around – if so, how?

Moderator

David Eades
Journalist & Broadcaster, Former BBC News

Suliman Saleh Al-Othman
Chairman, Saudi Gold Refinery

John Howchin
Advisor / Board Member, Global Investor Commission on Mining 2030 / GTMI

Jon Stanton
Chief Executive Officer, The Weir Group

Vicky Bowman
Senior Advisor, Institute for Human Rights and Business (IHRB)

Don Lindsay
Board Member, BHP

Pierre Gratton
President and Chief Executive Officer, Mining Association of Canada (MAC)

Tania Constable
Chief Executive Officer, Minerals Council of Australia

Fifi Peters
Senior Anchor, CNBC Africa

This high-level debate examined whether the mining industry's reputation—often perceived as poor or fragile—can be meaningfully improved at a time when global demand for minerals is accelerating due to the energy transition, digitalization, and geopolitical pressures. The session challenged the assumption that mining inherently suffers from a negative reputation, arguing instead that perception varies widely by geography, stakeholder group, and recent experience.

Speakers emphasized that while mining is increasingly recognized as essential to modern life—from smartphones and medical equipment to clean energy and infrastructure—its reputation remains vulnerable to high-profile failures, particularly related to environmental damage, safety incidents, and community trust. Panelists agreed that isolated but severe incidents can outweigh decades of responsible performance if not addressed transparently and decisively.

A recurring theme was the distinction between reputation and trust. While some jurisdictions such as Canada and Australia show strong public confidence in mining at the national level, individual projects can still face opposition if local engagement, benefit-sharing, or social acceptance is weak. The panel highlighted that legality alone is no longer sufficient; societal expectations now demand higher ESG standards, ethical conduct, and meaningful community outcomes.

The discussion also underscored the shared responsibility of governments, companies, investors, media, and civil society in shaping mining's reputation. Improved education, clearer communication of mining's role in daily life, fairer distribution of benefits, and credible global standards were identified as critical to rebuilding and sustaining public confidence—particularly as the sector scales up to meet future demand.

Key insights, data points or predication

- Recognition of the need for stronger collective action across mining companies, governments, investors, and civil society to address reputational risks.
- Emphasis on global standards (including tailings management, transparency initiatives, and human rights frameworks) as essential trust-building tools.
- Calls for improved education and storytelling, particularly targeting urban populations and younger audiences unfamiliar with mining's role.
- Agreement on the importance of responsible capital and long-term investment aligned with ESG performance.
- Support for formalizing and improving artisanal and small-scale mining as part of reputation and development efforts in emerging economies.
- Mining underpins virtually all modern technologies, with over 60 minerals used in a single smartphone.
- Public trust in mining is stronger at national levels than at individual project levels, highlighting the importance of local engagement.
- Reputational damage is driven disproportionately by high-impact failures, even when overall industry performance improves.
- The next 5–10 years will be decisive: reputation is expected to improve in the short term due to critical minerals demand, but remains fragile if standards slip.
- Long-term reputation will depend on whether mining can scale responsibly, transparently, and inclusively while meeting global demand.

Session summary

Panelists agreed that improving reputation is not primarily about messaging, but about performance—particularly in environmental stewardship, safety, transparency, and community trust. High standards, swift and accountable responses to incidents, and credible global frameworks were identified as essential foundations for public confidence.

The debate highlighted that responsibility for mining's reputation is shared. Governments play a critical role in policy stability and land-use planning; companies must lead through ethical leadership and long-term engagement; investors influence outcomes through capital discipline; and media and civil society shape public understanding. Education—especially around mining's role in daily life and future technologies—was repeatedly cited as a missing link.

Looking ahead, speakers emphasized that the coming decade will be decisive. As demand for critical minerals accelerates, the industry's ability to scale responsibly will determine whether its reputation improves or deteriorates. Trust, once lost, is difficult to regain—but when built through transparency, collaboration, and measurable impact, it can become a lasting competitive advantage for the sector.

> **"Reputation is not fixed—it will rise or fall depending on how responsibly and transparently the industry conducts itself in the years ahead"**
>
> – David Eades, Broadcaster & Journalist Former BBC (Moderator)

FIRESIDE CHAT: How can humanity make the most of the minerals age?

Richard Price
Chief Legal and Corporate Affairs Officer, Anglo American

Sir Paul Collier
Professor of Economics and Public Policy, Blavatnik School of Government, University of Oxford

Dr. Daniel Yergin
Vice Chairman, S&P Global

This high-level dialogue examined the growing global imbalance between copper supply and demand amid accelerating electrification, energy transition, digitalization, and geopolitical pressures. The discussion framed copper as a foundational material for economic development, energy security, and technological advancement, particularly in the context of artificial intelligence, electric mobility, defense systems, and future automation.

Dr. Daniel Yergin outlined findings from S&P Global's recent analysis on copper markets, highlighting a structural supply challenge driven by multiple new demand vectors. Beyond traditional uses in construction and infrastructure, copper demand is now being amplified by electric vehicles, AI data centers, defense electrification, and emerging technologies such as robotics.

These converging trends, combined with long mine development timelines, point to a potential supply deficit by the mid-2030s if investment and permitting constraints persist.

Sir Paul Collier placed the supply challenge within a broader development and governance context, emphasizing the historic mistrust between mining companies and host governments, particularly in resource-rich developing economies. He argued that overcoming this legacy requires deliberate trust-building, long-term policy predictability, and institutional reform on both sides to enable sustained investment and shared economic benefits.

The session underscored that copper scarcity would not only be a market issue but a development challenge, with disproportionate impacts on emerging economies where electrification is critical for social and economic progress. The discussion concluded that addressing this generational challenge demands new forms of partnership between industry, governments, investors, and society.

Key insights, data points or predication

- Recognition that copper supply expansion must accelerate significantly to meet future electrification and technology needs.
- Call for long-term policy stability and cross-party political agreements in producing countries to reduce investment risk.
- Emphasis on the need for responsible capital willing to support long-cycle mining investments.
- Acknowledgement that mining companies must play a proactive role in rebuilding trust, including transparency on fiscal practices and community engagement.
- Continued analytical work by industry and research institutions to better quantify future copper demand and supply gaps.
- Global electricity demand could rise by approximately 50% within 15 years, requiring a commensurate increase in copper supply.
- An electric vehicle uses nearly three times more copper than a conventional internal combustion vehicle.
- It takes 17–20 years on average to bring a major new copper mine into production, creating a structural timing mismatch with demand growth.
- AI data centers are emerging as a new, material driver of copper demand, alongside energy transition and defense.
- Failure to expand copper supply risks slowing electrification and economic development, particularly in Africa and India.

Session summary

This session highlighted copper as a strategic material at the heart of the global energy transition, digital transformation, and economic development. While demand is accelerating across multiple fronts, supply growth is constrained by long lead times, investment uncertainty, and governance challenges. Speakers emphasized that the path forward depends on rebuilding trust between industry and governments, ensuring policy predictability, and mobilizing long-term capital. Addressing the copper challenge is not only a market imperative, but a defining test of global cooperation, development ambition, and responsible resource governance.

"Predictability is the single most important factor for investment in long-cycle mining projects that can take nearly two decades to deliver"

– Richard Price, Chief Legal and Corporate Affairs Officer, Anglo American (Moderator)

PANEL SESSION: A new generation shaping the future of minerals

SUMMARY:

The session demonstrated how the Future Minerals Pioneers programme is positioning Saudi Arabia as a global hub for mineral innovation by connecting young entrepreneurs, advanced technologies, and industry leaders. The breadth and maturity of solutions presented underscored the programme's role in accelerating discovery, sustainability, and safety across the mining sector.

With clear commitments to scale the initiative annually, expand venture capital engagement, and enable real-world pilots, the programme is moving beyond innovation showcases toward tangible industrial impact—helping shape a faster, safer, and more sustainable future for mining worldwide.

SCOTT NORTH

Co-Founder, Yeti Ventures

"What we are seeing through the Future Minerals Pioneers is a real step-change in how the mining industry innovates—bringing data, technology, and entrepreneurship together to move ideas from the lab into the field."

H.E. ENG. KHALID BIN SALEH AL-MUDAIFER

Vice Minister of Industry and Mineral Resources for Mining Affairs, Kingdom of Saudi Arabia

"This programme brings disruptive solutions that the mining industry urgently needs and helps shape a new mining legacy driven by young talent and innovation"

RYAN MOHAMMED ALQAHTANI

FounderGeovolt / King Khalid University

"We are turning mining waste into ultra-pure materials with strong economic and environmental value across global industries."

RAHAF MUBARAK ALQAHTANI

Student King Khaled University

"Digital twins, drones, and AI can significantly improve underground safety while also supporting smarter mine planning."

VIVEK SHANKAR VARADHARAJAN

Co-founder and CTO, UnchartedAI (startup)

"By integrating AI, robotics, and unified data workflows, we can discover minerals faster, at lower cost, and with greater certainty."

EMILE SPIERER

Consultant, EEMissions and Advisor, GroundBreak

"Our technology can reduce exploration costs by a factor of seven while delivering precise 3D images deep underground."

WESAM AL-ZAMIL

Director of Innovation, National Industrial Development and Logistics Program (NIDLP)

"Receiving more than 1,800 applications from 57 countries in our first year shows the global demand for innovation anchored in Saudi Arabia."

PANEL SESSION: A new generation shaping the future of minerals

Scott Norths
Co-Founder,
Yeti Ventures

H.E Eng. Khalid bin Saleh Al-Mudaifer
Vice Minister of Industry and Mineral Resources for Mining Affairs, Kingdom of Saudi Arabia

Ryan Mohammed Alqahtani
Founder,
Geovolt / King Khalid University

Rahaf Mubarak AlQahtani
Student,
King Khaled University

Vivek Shankar Varadharajan
Co-founder and CTO, UnchartedAI (startup)

Emile Spierer
Consultant,
EEMissions and Advisor, GroundBreak

Wesam Al-Zamil
National Industrial Development and Logistics Program (NIDLP)

The session explored how the Future Minerals Pioneers programme is empowering a new generation of innovators to transform the global mining sector through advanced technologies, entrepreneurship, and collaboration. It highlighted how early-stage ideas can evolve into scalable solutions addressing exploration efficiency, sustainability, safety, and value creation.

Discussions emphasized the programme's strong alignment with Saudi Vision 2030, particularly its objectives on economic diversification, talent development, and global engagement. Through NIDLP's innovation pipeline, start-ups are supported from ideation to commercialization, positioning Saudi Arabia as a global platform for mineral innovation.

Entrepreneurs presented solutions leveraging artificial intelligence, robotics, advanced sensing, waste valorization, and digital safety systems. These technologies aim to shorten discovery timelines, reduce costs, minimize environmental impact, and improve decision-making across the mining value chain.

The session concluded with a forward-looking focus on field testing, real-world use cases, and investment readiness, underscoring Saudi Arabia's growing venture capital ecosystem and the commitment of public and private partners to move innovations from proof-of-concept to pilot and scale.

Key insights, data points or predication

- Commitment to support field testing and real-world pilots with operating mining companies.
- Confirmation that the Future Minerals Pioneers programme will continue on an annual basis, with expanded scale.
- Plans to increase awards and integrate venture capital participation, beyond prize funding alone.
- Engagement of major mining companies to provide operational use cases and pilot opportunities.
- Continued collaboration between public and private sector partners to incubate talent and scale innovation.
- More than 1,800 applications received in the inaugural programme.
- Participation from 57 countries, with 70 teams selected representing 32 countries.
- Approximate 18% acceptance rate in the first round.
- AI-driven exploration and robotics can significantly reduce discovery timelines and costs.
- Advanced sensing technologies can deliver meter-level resolution 3D subsurface imaging with minimal drilling.
- Mining waste can be converted into high-value materials for pharmaceuticals, semiconductors, agriculture, and energy applications.
- Digital safety solutions can achieve up to 97% accuracy in risk identification and hazard prevention.

CLOSING INTERVIEW

DAY 2 – THURSDAY 15 JANUARY

ANJALI RAO

Former CNN International Anchor

H.E. BANDAR BIN IBRAHIM ALKHORAYEF

Minister of Industry and Mineral Resources, Kingdom of Saudi Arabia

This closing dialogue marked the conclusion of the Fifth Future Minerals Forum (FMF), reflecting on the progress achieved since the Forum's inception and outlining priorities for sustaining momentum beyond the event. The conversation positioned FMF as a maturing global platform that has evolved from convening dialogue to enabling concrete collaboration across governments, industry, technology providers, and the next generation of mining leaders.

H.E. Bandar Bin Ibrahim Alkhorayef highlighted the dual strengths underpinning FMF's growing global influence: its "soft power" in mobilizing youth, ideas, and trust across the mining ecosystem, and its "hard power" through the Ministerial Roundtable (MRT), which has established credibility as a forum for coordinated government action. He emphasized that the Forum's rapid expansion—from participation by around 30 countries to over 100—reflects rising global confidence in FMF as a collective, inclusive initiative rather than a nationally driven platform.

The discussion underscored a notable shift in government engagement over the past five years. Whereas early editions focused on prepared statements and national positions, the latest MRT demonstrated genuine openness to shared problem-solving, global initiatives, and regulatory alignment. This evolution was presented as evidence that the mining sector is entering a new phase of cooperation, driven by shared challenges around supply security, technology adoption, sustainability, and skills.

Looking ahead, the Minister stressed the importance of maintaining momentum throughout the year, not only during the Forum itself. He reaffirmed Saudi Arabia's commitment to enabling innovation, supporting early-stage mining and technology players, adapting regulatory frameworks in response to industry feedback, and fostering an open ecosystem where ideas can be tested, scaled, and commercialized. The session concluded on a personal note, framing FMF as a community with a generational responsibility to build a more resilient, inclusive, and technology-enabled future for mining.

Key insights, data points or predication

- Commitment to sustaining FMF momentum year-round, beyond the annual event.
- Continued strengthening of the Ministerial Roundtable (MRT) as a credible platform for coordinated global action.
- Ongoing support for mining technology adoption, innovation, and commercialization.
- Regulatory reforms in Saudi Arabia informed by direct industry feedback, including:
  - Expansion of licensing plot sizes.
  - Introduction of frameworks to support junior miners.
  - Launch of incentive programmes, including funding of approximately USD 180 million.
- Increased focus on service providers, standards, and centers of excellence to support the full mining value chain.
- Encouragement for governments and corporations to maintain open-minded engagement with entrepreneurs and innovators.
- FMF participation has expanded from approximately 30 countries to over 100, reflecting growing global trust.
- Youth engagement and capability development were identified as central to the sector's long-term sustainability.
- Government participation has shifted from national positioning toward collective global problem-solving.
- Technology adoption—remote operations, digitalization, and automation—is reshaping mining and improving its appeal to younger generations.
- Standardization, regulatory alignment, and shared platforms are increasingly seen as prerequisites for resilient mineral supply chains.

Session summary

As the Fifth Future Minerals Forum concludes, the message is clear: the mining sector has entered a new phase of maturity defined by collaboration, innovation, and shared responsibility. FMF has evolved into a trusted global platform that connects governments, industry, technology providers, and youth around common challenges and solutions. Sustaining this momentum will require openness to new ideas, continued regulatory adaptability, and a collective commitment to building a resilient, technology-enabled, and inclusive future for global mining—one that delivers tangible progress well beyond the Forum itself.

"Energy security, affordability, and sustainability depend on urgent, collective, and inclusive efforts to address critical mineral challenges"

– H.R.H. Prince Abdulaziz bin Salman Al Saud, Minister of Energy, Saudi Arabia

MinValley Agenda

Link

MINVALLEY AGENDA

Day 1

Wednesday 14 January 2026

Link

FIRESIDE CHAT: Innovation and technology in discovery

Dr. Sarah Gordon
CEO / Professor of Practice, Satarla / Imperial

Tim O'Connor
Group Exploration Officer, BHP

Dr. Abdulrahman Al-Shuhail
Chief Technologist Geophysics Technology, EXPEC Advanced Research Center Saudi Aramco

Darryl Clark
SVP of Exploration Resource Development, Maaden

This session examined how innovation and technology are reshaping mineral discovery, as demand grows for critical minerals and metals required for the energy transition and long-term economic development. The discussion positioned exploration as a time-critical challenge: new discoveries must be made faster and more efficiently, with the "easy" deposits increasingly behind the industry.

Speakers highlighted how modern exploration is evolving from traditional "X marks the spot" approaches to integrated, data-driven decision-making—especially identifying where not to drill through better targeting, improved subsurface imaging, and faster screening of large prospective land packages.

Panelists stressed that technology alone is insufficient without strong geoscience fundamentals, physics-based understanding, and—critically—human curiosity. They warned against overreliance on "AI that claims to tell you the spot," underscoring instead the need to ask the right questions, work backwards from the key uncertainties, and integrate multiple datasets and disciplines.

A recurring theme was collaboration and partnerships—within companies, across industries, and with external partners—to share data, build trust, and accelerate innovation.

The session showcased how structured collaboration models can increase idea generation, diversify perspectives, and strengthen exploration culture, while addressing the scale and complexity of modern discovery challenges.

Key insights, data points or predication

Maaden discovery performance metrics (as stated):

- 7.8 million ounces of gold announced.
- A 3 million ounce resource at Wadi al-Jal developed from greenfield in 12 months.
- 75,000 meters drilled; 65 km of road built; 25 rigs deployed.
- Discovery cost cited at US$21 per ounce.

Technology integration in exploration: airborne surveys, geophysical methods, core scanning/automatic logging, and combined inversion of magnetic, gravity, seismic, and electrical datasets to narrow uncertainty and reduce unproductive drilling.

Key capability gap: the ability to frame the right question—panelists argued that better discovery outcomes require working backwards from system requirements and uncertainties rather than expecting AI to generate answers.

AI positioning: best used to augment physics-based models and constrain complex problems (e.g., near-surface complexity), not as a stand-alone "spot finder."

Trust and partnerships: framed as essential to accelerating exploration innovation, with "commonality of the challenge" (more metals needed, insufficient discovery pace) described as a foundation for collaboration.

- Maaden referenced a recent discovery announcement of 7.8 million ounces of gold, underpinned by technology-enabled data assimilation and rapid targeting (as stated in the session).
- Maaden described scaling exploration across a portfolio exceeding 250,000 km², relying on technology and partnerships to progress at speed and scale.
- BHP described its Explore incubator model to access external ideas and diversify perspectives, including:
  - A US$500,000 non-dilutive grant for selected junior companies in cohorts (typically 8–10 participants).
  - Six-month acceleration support with access to BHP teams, data, and technical expertise.
  - Potential follow-on via earn-in arrangements, with a stated ~50% follow-on rate (as described).
- Aramco EXPEC described transferring technologies developed for oil & gas (e.g., integrated inversion approaches) into mineral exploration contexts, emphasizing partnership-driven application.

Session summary

The session concluded that discovery success will depend on combining advanced technology with rigorous geoscience, physics-based understanding, and strengthened human capability—especially curiosity, critical questioning, and the ability to work backward from key uncertainties. While AI and data integration can accelerate targeting and reduce unproductive drilling, speakers emphasized that technology must be guided by domain expertise and disciplined problem framing.

Panelists underscored that the scale of the discovery challenge requires deeper collaboration across the ecosystem: partnerships between majors and juniors, cross-industry technology transfer, and structured innovation platforms. The closing message positioned people as the critical asset—diverse teams, trusted partnerships, and next-generation talent will determine whether the industry can deliver the discoveries the world needs.

PANEL SESSION: Future-proofing supply: How AI is solving the critical minerals crunch

Eng. Adnan Abulsaud
Bilateral Relations Manager, Ministry of Industry and Mineral Resources, Kingdom of Saudi Arabia

Dr. Fred Morstatter
Chief Executive Officer, CommonGround

Hassan Al Johani
Vice President of Business Development, NSG Geospatial Services

Farzi Yusufali
Co-Founder, Stratum AI

Khaled Al-Ofaysan
KSA Managing Partner & Country Head, IBM Consulting

Clayton Ludik
Vice President - Digital Consulting, Worley

Steve de Jong
Chief Executive Officer and Co-Founder, VRIFY

This session examined how artificial intelligence is being applied across the mining lifecycle—particularly in the context of rising global demand for critical minerals. The discussion framed AI and critical minerals as highly visible, often misunderstood themes, and aimed to separate practical capabilities from marketing narratives, while also addressing the implications for developing and mineral-rich countries.

Panelists mapped where AI is currently being deployed—from exploration targeting and geospatial intelligence, to feasibility-stage decision support, project delivery, operational optimization, and social risk monitoring. Speakers emphasized that credible AI capabilities are those that can be tested, validated, and integrated into real decision-making—especially where they shorten time to answers, improve probability of success, and reduce wasted capital.

The session also "pressure-tested" AI claims, highlighting persistent limitations such as data quality and standardization, organizational resistance, operational constraints, and the need for explainability to build trust with technical teams and stakeholders. Several panelists stressed that AI must be paired with domain expertise, clear metrics, and disciplined ROI assessment, rather than being adopted for its own sake.

A key thread focused on fairness and value distribution: who captures the benefits of AI in mining, and whether energy-intensive AI systems create new forms of inequity—especially when decarbonization pressures are placed on developing countries while AI infrastructure and emissions are concentrated elsewhere.

The session concluded with a broad consensus that AI will contribute meaningfully to addressing the critical minerals challenge—but only as part of a wider ecosystem of governance, technology, and responsible implementation.

Key insights, data points or predication

- Verified Technology cited active deployment of its tools across the sector, including working with ~180 show-case mining/exploration companies on visualization and ~60 companies using its AI exploration tool (as stated).
- Common Ground positioned its AI as an early-warning capability for social risk and legitimacy failures that can delay critical minerals projects.
- Stratum described operational deployments globally, emphasizing output formats designed to integrate into mine workflows (e.g., CSV outputs) to reduce operational disruption.
- Worley referenced active work on AI/physics-based simulation to optimize processing performance (example mentioned: maximizing phosphate concentration in flotation), and a staged approach from small use cases to system-wide deployments.
- Panelists collectively emphasized the next step as standardizing metrics and presenting AI outputs in an investor/regulator-readable language to embed AI into go/no-go decision-making.
- Exploration AI validation: hold-out testing and back-testing were highlighted as credibility mechanisms (e.g., removing assays from model building and reintroducing them to test predictions).
- Geospatial AI in exploration: hyperspectral imagery and SAR were cited as already being used to detect anomalies, structural features, and signals linked to gold/copper/silica systems—helping screen large areas quickly and cheaply versus boots-on-the-ground approaches.
- Feasibility-stage AI value: optimizing drillhole placement to reduce cost; identifying pathfinders that connect limited metallurgical tests to broader datasets.
- Operational prerequisites and constraints: sensor/data collection can disrupt operations; adoption depends on explainability, trust, and matching AI outputs to real operational decision cycles.
- Illustrative ROI thresholds: an indicative annual cost cited for "small AI" adoption was US$300k–500k, with the expectation that value creation should be in the millions to justify it (as stated).
- Operational impact example: one mine case cited achieving ~10% production increase, described as material enough to report publicly (as stated).
- Value distribution concern: initial gains often accrue to operators and investors; benefits may not reach communities unless designed intentionally.
- Fairness concern: AI is energy-intensive; emissions and infrastructure are largely concentrated in developed countries while decarbonization pressure can be disproportionately placed on developing, mineral-rich countries (as discussed).
- Consensus conclusion: AI will help address the critical minerals crunch by enabling faster discovery, better de-risking, and improved capital allocation—if implemented responsibly and integrated into decision systems.

Session summary

The panel concluded that AI is already delivering value across the mining lifecycle—from exploration targeting and geospatial intelligence, to feasibility optimization, operational efficiency, and social risk forecasting. However, speakers emphasized that credible AI must be testable, measurable, and integrated into decision-making frameworks, with clear ROI, standardized metrics, and strong domain expertise guiding its use.

While the panel broadly agreed AI will support efforts to meet growing critical minerals demand, it cautioned against over-hype and highlighted equity considerations. Ensuring that mineral-rich regions retain agency over data and intelligence, and that benefits extend beyond operators and investors to communities and resource owners, was positioned as essential to long-term legitimacy and sustainable value creation.

PANEL SESSION: CEO Panel: Gold digitalisation: From mine to market

Moderator

Amena Bakr
Head of Middle East & Opec+ Insights, Kpler

David Tait
Chief Executive Officer, World Gold Council

Michael Steinmann
President & Chief Executive Officer, Pan American Silver

Randy Smallwood
Chief Executive Officer, Wheaton Precious Metals

This session examined whether gold—long treated as a physical store of value—can be digitized credibly for a market that increasingly expects instant, low-cost, 24/7 access to financial assets. Panelists focused on what "digital gold" should mean in practical terms: traceability, custody, integrity, and market infrastructure that can be trusted by institutions and retail users alike.

The conversation positioned trust as the primary bottleneck: gold's sourcing, custody, verification, and market transparency have historically made it expensive to trade and difficult to adopt at scale compared with purely digital instruments. Panelists argued that digitization is less about changing gold itself and more about creating a trusted "layer" that makes gold easier to use, transfer, and potentially apply as collateral.

The World Gold Council's approach was presented as a stepwise build: start with a record of responsible sourcing and integrity, then expand to wholesale market infrastructure and, potentially, industry-wide tokenization standards. The discussion emphasized that institutional adoption depends on robust due diligence (KYC), custody, and market surveillance—areas where past products struggled.

A recurring theme was generational shift: younger investors may be increasingly interested in gold and silver—especially amid price momentum—but expect digital-native usability. The panel framed digitization as a way to broaden participation, increase market liquidity, and potentially reduce gold's historic "tactical" volatility as longer-term institutional holders enter.

(Gold prices were cited as having exceeded $4,000/oz in late 2025 in some market commentary.)

Key insights, data points or predication

- WGC "Wholesale Digital Gold": trial/pilot indicated for Q1 2026, with the aim to become operational by end-2026.
- Market structure vision: development toward a third market layer beyond allocated/unallocated (described as a pooled/digital interest), enabling broader institutional participation.
- Integrity and traceability emphasis: expansion of databases/traceability tools as the foundation for any tokenization or broader digital products.
- Trust is the gating factor: verification of sourcing, custody, and backing is more decisive than the technology itself (blockchain/tokenization is viewed as an enabler, not the solution).
- Collateral unlock was framed as a major institutional driver: digitization could allow more flexible use of gold in financial markets (e.g., fractional/efficient collateralization).
- Institutional upside narrative: WGC cited a very large global investable asset base, arguing digitization could expand gold allocations if friction and opacity are reduced.
- Generational adoption thesis: panelists linked renewed younger-investor interest to usability (24/7, low-friction trading) plus credibility via industry standards and ESG traceability.

Session summary

The session closed on a clear takeaway: gold digitization is no longer a "whether" question, but a "how fast" question, with trust as the deciding factor. Panelists agreed that the winning model will be the one that can credibly connect any digital representation of gold to verifiable sourcing, custody, and market integrity, in a way that institutions and retail users can both rely on.

They also ended on a forward-looking note that digitization could expand access and liquidity and attract more strategic, long-term institutional participation, potentially changing how gold is held and used—while preserving its role as a store of value. The moderator concluded that digitization is already underway and is "a matter of time," with trust, regulation, and industry-wide adoption as the key conditions for scale.

"This is trust combined with generational change—young investors want 24/7 access, but only if the product is credible and responsibly sourced"

– Michael Steinmann,
President & Chief Executive Officer,
Pan American Silver

FIRESIDE CHAT: AI: The road to an equitable and sustainable cobalt supply

Dinah McLeod
Director General,
Cobalt Institute

Prof Jef Caers
Professor &
Mineral-X Director,
Stanford University

This session explored how advanced decision-making AI, inspired by self-driving vehicle technology, can transform the entire cobalt value chain—from exploration and mine planning to processing, ESG integration, and downstream supply-chain investment. Using cobalt as a "canary in the coal mine" for critical minerals, the discussion highlighted how uncertainty in geology, economics, geopolitics, and sustainability can be addressed through sequential planning under uncertainty.

Professor Cares explained that traditional AI models (machine learning, pattern recognition) are insufficient for mining decisions, which require time-based planning, risk trade-offs, and adaptive learning.

By adapting self-driving car AI—where actions, observations, rewards, and uncertainty interact over time—Mineral X has demonstrated that AI-guided drilling and planning can be up to three times more efficient than conventional human-led approaches.

A core insight was that humans remain central: AI does not replace geologists but challenges their assumptions, exposes cognitive bias, and quantifies the value of acquiring new data. Crucially, the session showed that embedding ESG constraints from the start, rather than as an afterthought, leads to higher long-term project value, fewer disruptions, and improved net present value.

Key insights, data points or predication

- Mineral X–Stanford research demonstrated AI-guided drilling that reduced exploration cost and time by ~3× compared to traditional approaches.
- Integrated ESG-first planning showed higher project NPV than scenarios where ESG considerations were applied after discovery.
- New collaboration with Toyota launched to apply decision-making AI across critical-minerals supply chains, linking geology, ESG, geopolitics, and investment risk.
- Continued capacity-building work in Africa, including Zambia and the DRC, to support data acquisition and responsible critical-minerals development.
- Only ~5% of the DRC has been systematically mapped, indicating massive opportunity for AI-enabled data acquisition and planning.
- AI excels at evaluating the value of new information, something humans struggle with under uncertainty.
- Cognitive bias—not lack of data—is a major driver of cost overruns and failed mining investments.
- Governments can use decision-making AI to plan long-term critical-minerals strategies, not just short-term project approvals.
- Cobalt illustrates broader critical-minerals challenges where geology, ESG, and geopolitics must be optimized together, not sequentially.

Session summary

The session concluded that decision-making AI represents a structural shift, not an incremental tool, for the critical-minerals sector. By treating mining, processing, and supply-chain development as connected decisions over time, AI can reduce risk, accelerate discovery, and embed sustainability from the outset—rather than correcting problems later at high cost.

Both speakers emphasized that the future lies in human–AI collaboration, where expert judgment defines hypotheses and values, and AI rigorously tests them against uncertainty. In a world of growing demand for cobalt and other critical minerals, this approach offers a path toward faster, more responsible, and more resilient mineral supply chains.

"Every mining investment is a sequential planning problem under uncertainty, just like a self-driving car navigating a complex road"

– Dinah McLeod -
Director General, Cobalt Institute

FIRESIDE CHAT: Accelerating development of the downstream sector by embracing technology and innovation

Dr. Doris Hiam-Galvez
Program Chair, WMC2026x

H.E. Dr. Abdullah A. Al-Ahmari
Assistant Minister of Planning & Development, Ministry of Industry and Mineral Resources, Saudi Arabia

The session featured a focused dialogue with H.E. Dr. Abdullah Al-Mahari, Assistant Minister for Planning and Development at Saudi Arabia's Ministry of Industry and Mineral Resources, on the Kingdom's industrial and mining transformation under Vision 2030. Dr. Al-Mahari positioned mining and manufacturing as foundational pillars supporting national development, infrastructure expansion, and economic diversification.

Drawing on his experience across industry and government, Dr. Al-Mahari emphasized that technology is a core enabler of this transformation. He outlined how the Ministry is deploying digitalization, automation, and advanced manufacturing tools to streamline processes, improve efficiency, and strengthen the global competitiveness of Saudi industrial assets.

Addressing downstream opportunities, Dr. Al-Mahari highlighted Saudi Arabia's ambitions in green steel and mineral-based manufacturing, linking the Kingdom's mineral endowments to rising domestic demand from mega-projects and industrial cities. He underscored that mining development is being designed to support the entire value chain—not only upstream extraction, but also processing and advanced industrial applications.

On human capital, Dr. Al-Mahari stressed that talent development is critical to sustaining long-term growth. He outlined national plans to reskill and upskill the workforce, strengthen partnerships with leading universities and training institutions, and close the gap between academic programs and rapidly evolving industrial technologies.

Key insights, data points or predication

- Saudi Arabia reaffirmed mining as a core pillar of Vision 2030, supporting industrial growth and national mega-projects.
- The Ministry of Industry and Mineral Resources confirmed the rollout of multiple digital and automation initiatives to streamline licensing, operations, and industrial oversight.
- The Ministry launched the Future Factory Program, targeting the enablement of approximately 4,000 factories through advanced technologies and smart manufacturing solutions.
- Collaboration is underway with MODON and the Royal Commission to transform industrial cities into smart industrial ecosystems incorporating AI, blockchain, and 3D printing.
- Saudi Arabia confirmed continued investment in green steel and mineral-based industries, leveraging domestic resources such as phosphate, aluminum, gold, and specialty metals.
- The Ministry outlined plans to reskill and upskill around 370,000 employees over the next 7–10 years to meet future industrial and mining demands.
- Technology as an enabler: Digitalization, automation, AI, blockchain, and additive manufacturing are central to industrial competitiveness.
- Scale of ambition: The Future Factory Program aims to support ~4,000 factories across Saudi Arabia.
- Human capital investment: Plans are in place to reskill and upskill ~370,000 workers within a decade.
- Academic partnerships: Formal cooperation with King Fahd University of Petroleum and Minerals and King Abdulaziz University supports mining-specific education and training.
- Skills gap challenge: A persistent gap exists between rapidly evolving industrial technologies and academic curricula.
- Green steel opportunity: Strong domestic mineral availability and infrastructure demand position Saudi Arabia to compete globally in greener steel production.
- Talent competition: High global demand for specialized skills increases competition for qualified professionals, reinforcing the need for domestic talent pipelines.

Session summary

The session underscored Saudi Arabia's holistic approach to industrial and mining development, integrating technology, infrastructure, and human capital under Vision 2030. Mining is being positioned not only as a resource sector, but as a catalyst for downstream manufacturing, smart cities, and sustainable industrial growth.

H.E. Dr. Abdullah A. Al-Ahmari, Assistant Minister of Planning & Development at Ministry of Industry and Mineral Resources of Saudi Arabia concluded that success would depend on sustained collaboration across government, industry, academia, and technology partners. With coordinated investment and skills development, Saudi Arabia aims to build a resilient, competitive, and future-ready mining and industrial ecosystem.

"Technology is not optional; it is a fundamental enabler of our industrial and mining transformation under Vision 2030.""

– H.E. Dr. Abdullah A. Al-Ahmari, Assistant Minister of Planning & Development, Ministry of Industry and Mineral Resources, Saudi Arabia

PANEL SESSION: Mineral processing 2.0

Jim Paterson
Principal,
Discovery Group

Kunal Sinha
Co-Founder and Chief Executive Officer, Valor

Pål Kildemo
Chief Financial Officer, Emirates Global Aluminium

Piia Karhu
President, Minerals,
Metso Corporation

This session unpacked what “Mineral Processing 2.0” should mean in today’s context: a shift from a China-concentrated processing model toward re-industrialization, cleaner flow sheets, and technology-driven efficiency across processing and refining. The moderator framed processing as the determinant of value creation across the mining lifecycle—because processing choices directly shape project margins, viability, and investor outcomes.

EGA positioned the discussion in historical cycles: processing leadership moved from the US/Europe to the Middle East (energy advantage), then increasingly concentrated in China—effectively hollowing out “processing 1.0” outside China.

The panel argued the world is now in a new phase (3.0/4.0), where strategic priorities—energy transition, supply-chain resilience, and industrial policy—are pushing capacity back into markets like the US.

Valor emphasized that processing is a conversion business with tight spreads and high CAPEX/OPEX, difficult permitting, and legacy environmental footprints—meaning the West cannot simply rebuild old models. Breakthroughs must deliver both profitability and cleaner performance, otherwise scale is impossible.

Metso highlighted near-term innovation already reshaping flowsheets: energy-efficiency “combinations,” improved recovery (fine/ultrafine flotation and coarse particle flotation), and early gangue rejection as a potentially transformative step to reduce downstream energy and cost burdens. Digitalization and automation—sensors, predictive maintenance, digital twins, VR training, and AI optimization—were framed as accelerating operational efficiency and changing workforce needs.

Key insights, data points or predication

- EGA reaffirmed its role in rebuilding non-China capacity, including efforts tied to a new US smelter initiative and positioning it as a lighthouse for smart manufacturing (Industry 4.0/AI-enabled operations).
- Metso referenced active pilot work on coarse particle flotation and continued collaboration with customers, universities, and labs to speed adoption.
- Valor outlined an ambition to deploy its first plant and then scale via multiple routes (owned builds, partnerships/JVs, region-specific strategies).
- The panel called for stronger industry–government coordination to accelerate permitting, de-risk investment, and account for broader ecosystem
- Processing economics are structurally difficult in many jurisdictions: high CAPEX/OPEX, permitting friction, and historically thin conversion margins.
- A core bottleneck for non-China expansion is CAPEX competitiveness: China cited ~USD 2–3k/ton build costs versus ~USD 5–6k/ton (and up to ~8k/ton) elsewhere (as stated in the discussion).
- “Ecosystem value” (jobs, downstream industrial clustering, resilience) may be necessary to justify projects where pure cost-curve logic fails.
- Technology priorities highlighted: energy efficiency, recovery improvements (fine/ultrafine + coarse particle flotation), early gangue rejection, and digital/AI optimization (sensors, predictive maintenance, twins).
- A recurring conclusion: without breakthrough technology plus structured policy support, Western re-industrialization will remain slow and capital-constrained.

Session summary

The session closed with consensus that Mineral Processing “2.0” is not a single technology shift—it is a combined transformation of flowsheets, energy use, digital operations, and industrial strategy. Panelists emphasized that competing outside China will require both innovation and new models of collaboration between companies, governments, and stakeholders to move faster on permitting, investment, and ecosystem planning.

Final remarks reinforced urgency: society needs more metals, investors demand speed, and processing is the critical link where profitability, sustainability, and localization must be reconciled—through targeted breakthroughs and coordinated value-chain investment.

“Processing dictates the value of the exits—if you don’t understand how to process the minerals, you don’t understand the value”

– Jim Paterson,
Principal, Discovery Group

PANEL SESSION: Building the minerals industry of the future in Saudi Arabia

Moderator

Frederic Ozeir
Partner, Energy and Natural Resources, Oliver Wyman

Eng Hisham Alfouzan
Assistant Deputy Minister for Mining Investment Enablement, Ministry of Industry and Mineral Resources, Kingdom of Saudi Arabia

David Awram
Chairman / Co-Founder, SDC Metals / Sandstorm Gold Royalties

Eng. Mohammed Al Sultan
Vice President of Licenses, Saudi Mining Services Company (ESNAD)

Eng. Badr Abdulaziz Al-Madi
Executive Vice President of the Business Development Sector, Saudi Authority for Industrial Cities and Technology Zones (MODON)

Eng. Yahiya Al Shangiti
Chief Executive Officer, ARGAS (Arabian Geophysical & Surveying Company)

Dr. Talal Al Sudairi
Senior Vice President, R&D, King Abdulzaziz City for Science & Technology (KACST)

The panel examined how Saudi Arabia is building a globally competitive minerals sector, framed around four pillars: (1) accelerating exploration and development of the Kingdom's mineral endowment; (2) expanding midstream and downstream value chains to capture more local value; (3) investing internationally to secure critical mineral supply chains; and (4) strengthening the national mining ecosystem—regulation, licensing, geological data, talent, infrastructure, and service providers.

From a policy perspective, the Ministry emphasized that "critical minerals" are dynamic—defined by shifting supply-demand conditions—and that Saudi's approach is to align mineral development with domestic demand drivers such as electrification, renewable energy, and advanced manufacturing. The panel highlighted a clear strategic intent: move beyond extraction by integrating mining with industrial cities, energy systems, and logistics to support higher-value products, skilled jobs, and sustainable economic impact.

From the ecosystem side, MODON outlined the role of industrial cities and investor-ready infrastructure to attract downstream investment and enable minerals-linked manufacturing. Service enablement and licensing were presented as core levers to investor confidence: streamlined processes, proactive land readiness, integrated digital platforms, and cross-government coordination aimed at reducing friction and shortening timelines from exploration to development.

Investors and technical ecosystem players reinforced the importance of speed and deployability—ensuring capital flows into real work (geophysics, geochemistry, drilling) rather than administrative delays. The panel also stressed the value of high-quality geoscience and survey data, plus national R&D capacity, testbeds, and commercialization pathways to accelerate innovation, localization, and sector maturity.

Key insights, data points or predication

- Ministry (MIMR): Continued focus on demand-linked mineral development, de-risking investment through financing tools and ecosystem coordination.
- MODON: Ongoing commitment to fast investor onboarding, expanded infrastructure, and digital service delivery for downstream and midstream tenants.
- Isnad: Continued rollout of end-to-end licensing enablement, integrated platforms and entity coordination (environmental compliance, commerce, geodata).
- ARGAS / geoscience ecosystem: Scaling the use of airborne and advanced survey technologies to accelerate discovery and shorten development cycles.
- KACST: Expansion of applied research, testbeds, commercialization and spin-offs, plus regional "centers of excellence" and partnerships supporting mining innovation.
- Saudi is actively targeting future-facing minerals (e.g., copper, lithium, zinc, rare earths) alongside established production (phosphate, gold, bauxite).
- Investor appeal hinges on time-to-permit, clarity of process, and ensuring exploration capital is deployed into fieldwork rather than overhead.
- A major competitiveness lever is improving the quality, availability, and usability of geoscience data, alongside capability to interpret it.
- Ecosystem growth requires talent pipelines (skills, universities) and wider adoption of advanced tools including AI to shorten exploration cycles.
- Long-term success depends on integrated execution across policy, industrial infrastructure, licensing services, and R&D commercialization.

Session summary

The session closed with a shared message: Saudi's competitiveness in mining will be determined by how effectively the ecosystem reduces risk and accelerates execution—particularly by shortening timelines, digitizing and integrating investor pathways, and scaling geoscience data and talent capacity. Panelists emphasized that there is no single "silver bullet"; rather, success requires aligned performance across enabling infrastructure, licensing, R&D, and value-chain investment.

Final remarks reinforced urgency and collaboration: technology (including AI), skills development, and cross-sector partnerships—leveraging platforms like the Future Minerals Forum—are viewed as essential to translate ambition into scalable, investable projects and build Saudi Arabia's minerals industry of the future.

"KACST bridges lab-to-market with national labs, testbeds, talent, and spin-offs—so innovation translates into industrial capability for the sector"

– Dr. Saeed Al-Shiri
Vice-President of Energy and Industry, King Abdulzaziz City for Science & Technology (KACST)

FIRESIDE CHAT: Forging a Digital Future for Gold Mining

Dr. Remi Piet
Co-Founder & Senior Partner, Embellie Advisory

Alexei Vostokov
Chief Executive Officer, Polyus

This fireside chat explored how advanced digital technologies—particularly artificial intelligence (AI), big data, and automation—are reshaping the gold mining sector, with a focus on operational efficiency, safety, environmental performance, and workforce transformation.

Drawing on Polyus' large-scale and geographically challenging operations, the discussion highlighted why mining, despite being traditionally conservative, has emerged as a leading adopter of AI. Long investment cycles, capital-intensive assets, harsh operating environments, and the need for continuous reserve confirmation make predictive analytics and real-time decision support essential.

A central theme was the role of AI as an enabler rather than a replacement for human workers. AI systems were presented as tools that reduce fatigue-related risks, anticipate equipment failures, and provide early warnings—while human creativity, judgment, and strategic oversight remain irreplaceable.

The conversation also looked ahead to the concept of the "fully digital mine," where integrated AI systems dynamically connect geology, processing, logistics, and markets. In parallel, the session underscored the importance of workforce reskilling and partnerships with technical universities to prepare a new generation of mining professionals capable of operating in highly digitalized environments.

Key insights, data points or predication

- Polyus confirmed the active deployment of AI-driven systems across operations, including predictive maintenance, real-time anomaly detection, and fatigue monitoring for drivers.
- The company outlined its transition from calendar-based maintenance to condition-based maintenance using IoT sensors and predictive analytics.
- Polyus highlighted the launch of remote control centers overseeing end-to-end mining operations, particularly in extreme environments such as Siberia.
- The company reaffirmed partnerships with leading technical universities to align curricula with industry needs and prepare AI-literate graduates for future roles
- Polyus ranks as the largest gold producer in Russia and among the top global producers, making digital efficiency critical at scale.
- AI enables early detection of equipment failure and operational anomalies, reducing downtime, costs, and safety incidents.
- Integrated AI systems are already helping optimize mine planning and processing to reduce environmental footprint, including energy and water use.
- The future mine is expected to operate with near-zero waste, autonomous processing plants, and real-time optimization linked to market signals.
- Future mining roles will increasingly focus on analysts, remote operators, and strategists working alongside autonomous systems rather than manual extraction alone.

Session summary

The session demonstrated that digital transformation in mining is no longer aspirational but operational, with AI already delivering measurable benefits in safety, efficiency, and sustainability. Large-scale producers such as Polus are showing how advanced technologies can be embedded into core mining processes without displacing the human workforce.

Looking ahead, the discussion positioned the fully integrated digital mine as the next frontier—one that combines automation, environmental responsibility, and human expertise. Success, the speakers agreed, will depend not only on technology adoption but also on investment in people, skills, and education to ensure a resilient and future-ready mining sector.

PANEL SESSION: What do optimal end-to-end supply chains look like from a customer perspective?

Dr. Doris Hiam-Galvez
Program Chair, WMC2026

Dr. Karsten Hoppe
President Smart Buildings & Heavy Equipment, Alat

Johnny Saldanha
Chief Procurement and Supply Chain Officer, CEER National Automotive Company

This session examined how Saudi Arabia is building resilient, sustainable, and competitive supply chains as part of its Vision 2030 industrial transformation, focusing on advanced manufacturing, automotive, and smart infrastructure. Against a backdrop of geopolitical volatility, trade disruptions, and climate-related risks, the discussion emphasized reliability and predictability as defining success factors for modern supply chains.

Johnny Saldanha outlined CEER's strategy to create a fully localized automotive ecosystem from the ground up. With no legacy automotive supply base, CEER is pursuing deep localization across raw materials, components, and tiered suppliers to strengthen resilience, reduce carbon emissions, and ensure long-term competitiveness. Sustainability objectives—including net-zero ambitions—are embedded alongside cost and operational efficiency.

Dr. Kirsten Hope presented Alat's mandate to establish advanced manufacturing capabilities across multiple sectors, including smart buildings, heavy equipment, electronics, and appliances. Central to Alat's approach is attracting global OEMs as anchor partners and building end-to-end value chains that include R&D, manufacturing, and after-sales services, ensuring knowledge and capabilities are retained locally.

Across both perspectives, the session underscored that scale, skills, and partnership are the critical enablers.

Achieving viable localization requires cross-industry collaboration, patient capital, and workforce development models that combine targeted training and apprenticeship-style upskilling to support long-term industrial growth.

Key insights, data points or predication

- CEER confirmed its commitment to maximizing localization across the automotive value chain, including raw materials, components, and tiered suppliers.
- CEER outlined progress toward sourcing a significant share of raw materials domestically and localizing high-volume vehicle components to strengthen onshore resilience.
- CEER highlighted ongoing sustainability measures, including returnable packaging, logistics optimization, recycled and reused materials, and future sourcing of greener materials.
- Alat reaffirmed its partnership-led model, using global OEMs as anchor "nuclei" to build joint end-to-end supply chains in Saudi Arabia.
- Alat emphasized retaining relevant intellectual property locally by embedding R&D, customization, and after-sales services within Saudi-based operations.
- CEER and Alat referenced collaboration on battery localization, enabled through aggregated demand across automotive, energy storage, and other industrial sectors.
- Both organizations highlighted workforce training and upskilling programs, developed in coordination with government entities and industry partners.
- Supply chain resilience and sustainability were identified as dual priorities amid tariffs, conflicts, and natural disasters.
- CEER framed material and logistics costs as the dominant share of vehicle costs, positioning localization as the primary lever for competitiveness.
- Localization was discussed in terms of both value and volume, with high-volume localization reducing exposure to supply disruptions.
- Alat cited that approximately 93% of components in its target manufacturing categories are currently imported, indicating substantial localization potential.
- OEM anchoring was presented as essential to achieving supplier scale, with a "flywheel effect" needed to attract additional manufacturers and suppliers.
- Workforce capability—particularly in precision manufacturing—was identified as a constraint, addressed through targeted training and apprenticeship-style models.
- Saudi Arabia's young population and government support for training were highlighted as structural advantages for long-term industrial competitiveness.
- Both speakers emphasized that building globally competitive supply chains is a long-term endeavor requiring patience, investment, and sustained collaboration.

Session summary

The session highlighted Saudi Arabia's strategic approach to building resilient and sustainable supply chains as a foundation for advanced manufacturing and economic diversification. Through deep localization, cross-industry collaboration, and strong policy support, organizations such as CEER and Alat are laying the groundwork for competitive, future-ready industrial ecosystems.

Speakers concluded that success will depend on partnership, trust, and patient capital—recognizing that supply chain transformation is a long-term journey. With clear vision, coordinated action, and sustained investment in people and capabilities, the Kingdom is positioning itself to compete regionally and globally across multiple advanced manufacturing sectors.

MINVALLEY AGENDA

Day 2

Thursday 15 January 2026

Link

PANEL SESSION: Carbon reduction in mineral production 10 years on from the Paris agreement

Gael Rouilloux
Partner, MEA Energy Lead, Kearney

Nicholas Lugansky
Head of Mining, SLB

Roland Chavasse
Secretary General, International Lithium Association

Turki Alshehri
Regional Vice President for the GCC, Engie

Christian Dye
Research Director, Institute for Energy Technology (IFE)-Norway

This LINC workshop session reviewed progress and persistent gaps in decarbonizing mineral production a decade after the Paris Agreement, recognizing mining's dual role: enabling the energy transition through critical minerals while remaining a carbon-intensive industry. The discussion framed decarbonization as both a technology and systems challenge, requiring coordinated action across mining operations, energy supply, processing, and the wider value chain.

Panelists highlighted demonstrated pathways already delivering results—especially electrification of equipment, renewable power adoption, and digital optimization (including AI) to improve efficiency. They stressed that impact is highest when decarbonization is embedded early in mine design and planning, rather than treated as a retrofit.

A key focus was the growing influence of customers and end-users—particularly in lithium—where close value-chain transparency and OEM pressure accelerate decarbonization expectations. Speakers also emphasized cross-fertilization from oil and gas and other sectors into mining, including directional drilling, improved resource definition, and more efficient water and land use.

The panel was clear that constraints remain significant: technology maturity for certain solutions (e.g., hydrogen for heavy equipment, large-scale CCUS in processing), energy access and "energy realism," fragmented approaches that optimize single assets instead of the full chain, and the need for stronger governance, measurement standards, and social acceptance.

Looking ahead, participants advocated for integrated end-to-end strategies, standardized footprint accounting, and deeper collaboration across public, private, and societal stakeholders.

Key insights, data points or predication

ENGIE perspective: Called for integrating durable, low-carbon power solutions at the design stage of mining projects, with energy developers providing performance and availability guarantees to reallocate risk.

SLB case examples shared:

- Demonstration in Nevada reported major reductions in land use, water use, and chemical reagents versus evaporation ponds.
- Cited behind-the-meter efficiency and water recirculation approaches adapted from oil & gas to reduce energy use (including an example of directional drilling reducing water wells from many to one in certain contexts).
- International Lithium Association: Noted the launch/use of Lithium Footprint Guidance, adopted by 17 companies (as stated), to standardize measurement and reduce inconsistent claims.
- Panel "next step" emphasis (collective): Move from fragmented pilots to end-to-end, value-chain decarbonization strategies, anchored in consistent carbon accounting and stronger cross-sector coordination.
- Mining emissions context: Mining contributes ~3% of global carbon emissions (attributed in-session to ICMM), while also enabling decarbonization of multiple downstream industries through critical minerals.
- Demand pressure accelerates decarbonization in lithium: Lithium's supply base was described as relatively concentrated (~9–10 key producers producing ~90%), making OEM scrutiny direct and fast-moving.
- Energy solutions are evolving to fit mine economics: Battery storage cost declines and 10–15 year lifespans were framed as increasingly compatible with mine life and investment horizons.
- Cross-industry technology transfer is a lever: SLB positioned oil & gas-derived techniques (exploration methods, water management, directional drilling, efficiency practices) as pathways to reduce land, water, energy, and emissions intensity per ton.
- Quantified operational metrics (SLB example): Nevada demonstration cited 7% land, 95% less water, 5% chemical reagents versus evaporation ponds; and a claim that avoiding 1 GW of diesel generation equates to ~6 million tons of CO_2 per year (as stated).
- High-confidence technology pathway: Electrification of mobile equipment, renewable power for Scope 2, and digital/AI optimization were described as proven and impactful, especially when integrated early.
- Areas where expectations may be too high (near term): Hydrogen for heavy mining equipment, full-scale CCUS in mineral processing, and radically new process technologies—citing maturity, infrastructure, and cost barriers.
- System integration is the bottleneck: Repeated emphasis that decarbonization outcomes depend on aligning ore type, energy availability, technology readiness, and regional constraints—rather than optimizing isolated assets.
- Energy realism as a project risk: Projects can be delayed or scaled down when low-carbon energy systems do not develop in parallel with mine development.
- Governance and measurement: Speakers argued for a more consistent carbon management approach and a "level playing field" where what gets measured can be improved; standardized footprint methodologies were positioned as enabling progress.
- Social acceptance: Identified as an "Achilles heel" for mining projects; early societal engagement was positioned as essential to maintain project viability.

Session summary

The session concluded that mining's decarbonization challenge is real but solvable—provided the industry shifts from fragmented, asset-by-asset initiatives toward integrated, end-to-end strategies that account for energy supply, technology readiness, and value-chain emissions. Proven levers—electrification, renewable power, and digital optimization—can deliver near-term reductions, particularly when designed into projects from the outset.

PANEL SESSION: Commodities outlook short / medium / long term

Amanda van Dyke
Founder, Critical Minerals Hub

Kenneth Hoffman
Founder and Chief Executive Officer, Traubenbach

Martin Valdes
Partner, Head of Private Equity, Resource Capital Funds

Matt Fifield
Managing Partner, Pacific Road Capital

Michael Crandall
Managing Partner, Primary Commodity Fund

This session examined why commodity prices remain a decisive—and notoriously difficult to forecast—variable for mining companies, which are largely "price takers" and therefore exposed to sudden shifts in market sentiment, supply disruptions, and demand shocks. The discussion brought together investors, traders, and strategists to compare short-, medium-, and long-term views across major commodity categories, with a particular focus on critical minerals and battery materials.

Panelists emphasized that long-term linear demand projections can be misleading because markets respond dynamically through substitution, efficiency gains, and "thrift and shift" behaviors.

At the same time, near-term pricing can become highly asymmetric when scarcity emerges in "pinch points," producing short-lived spikes that can disproportionately benefit owners of operating assets.

A recurring theme was the growing role of geopolitics: export restrictions, supply-chain "weaponization," and the return of government-led stockpiling were described as structural forces reshaping commodity market behavior. This was linked to a shift from "just-in-time" procurement toward inventory accumulation, creating demand pull-forward and additional volatility beyond visible supply-demand balances.

Finally, the panel explored how AI is changing commodity analysis—particularly by improving visibility on the demand side, enabling more granular and real-time monitoring of end-use markets, and building more nuanced pricing and elasticity models for opaque, niche metals. At the same time, concerns were raised that commoditized AI-driven "research" could increase herding behavior and amplify volatility.

Key insights, data points or predication

- Primary Commodity Fund indicated it is implementing agentic AI models to generate autonomous, proactive demand-side insights and improve forecasting in niche/opaque metals markets.
- Resource Capital Funds stated it has an internal commodity strategy capability used to build granular supply-demand models to guide short- to medium-term investment theses.
- Resource Capital Funds noted active investment positioning (no specific deals announced in-session):
  - "Big bets" in copper based on perceived underinvestment and supply disruption risks.
- Continued interest in lithium (EVs and battery storage demand) and PGMs (catalysts/hybrids; supply constraints).
- Discussion highlighted a policy/market mechanism precedent: the U.S. government establishing a price floor for a rare earth (neodymium) to enable economically viable non-China supply (referenced as part of a Department of Defense arrangement).
- No formal partnerships, funding commitments, or program launches were announced as a session outcome beyond these stated strategic directions.

Scarcity pricing dynamics: Underinvestment can create "pockets of scarcity," driving abrupt price spikes and outsized profitability for operating assets; panelists pointed to historical examples of scarcity psychology lifting price ceilings in materials (illustrative reference made to met coal price levels).

Inventory matters as much as supply-demand: Panelists argued market "balance" can be distorted by inventory build, hoarding behavior, and security-driven procurement, which may not reflect true end-use demand.

Critical minerals are being "weaponized": Export restrictions and geopolitical signaling can drive rapid price moves, with expected additional export limitations over the next 6–12 months (as framed by the critical metals trader).

Shift from just-in-time to stockpiling: Corporations are expanding inventory coverage (e.g., moving from ~3 months toward ~6 months in some cases), while governments are re-entering stockpiling—described as a multi-year driver of demand pull-forward and volatility.

Price elasticity differs sharply in niche metals: Many critical/specialty metals represent a small fraction of the bill of materials in high-value end products, making them harder to substitute and less sensitive to "demand destruction" at higher prices than bulk commodities.

PANEL SESSION: Commodities outlook short / medium / long term

Government stockpile comparison (contextual benchmark): The U.S. was cited as having roughly $40B (in today's dollars) of stockpiles around 1989, versus less than $1B by end-2024, implying early-stage replenishment in a new geopolitical regime.

Gold outlook (bullish case): A strong view was presented that gold could reach $10,000–$20,000 within five years, driven by debt, currency debasement concerns, and central bank accumulation (explicitly framed as the speaker's forecast).

Copper outlook divergence:

- One view flagged caution in the near term due to weak "real demand" and inventory-driven buying potentially misread as consumption.
- Others emphasized structural underinvestment and medium-term tightness as a major investment theme.

Battery materials demand: Battery demand was described as having risen sharply (cited as ~50% year-on-year), with stationary storage growth highlighted as a major driver.

Emerging battery chemistry theme: High-manganese cathode variants were positioned as a potential next wave, with the argument that manganese's large production base could absorb significant battery-sector growth without the same supply shock profile seen historically in smaller markets.

AI impact on markets:

- Upside: improved demand-side measurement, real-time monitoring of end markets, and more sophisticated application-specific pricing models for opaque markets.
- Risk: homogenized "chatbot research" could increase herding and amplify volatility when unforeseen events hit markets.

Sector prediction: Expectation of a major M&A wave in mining over the coming period, positioned as potentially unprecedented in scale.

Session summary

The panel reinforced that commodity markets are entering a more volatile and complex era, shaped not only by classical supply-demand cycles but also by geopolitics, inventory behavior, and the return of price-insensitive buyers such as governments and strategic stockpilers. In this context, short-term price formation may increasingly reflect risk, resilience strategies, and hoarding—not just end-use consumption.

While views differed on near-term positioning in specific metals (notably copper), the speakers broadly agreed that technology and electrification are strengthening medium- to long-term demand, and that AI will materially change how markets are analyzed—particularly for niche metals where data is opaque. The session closed with a clear caution: do not over-rely on simplified narratives, and prepare for a new market regime where volatility, strategic behavior, and consolidation are likely to define the decade ahead.

"Long term, we are entering a new world order—and the next wave will be the biggest surge of M&A activity the mining sector has ever seen"

– Kenneth Hoffman,
Founder and Chief Executive Officer,
Traubenbach

PRESENTATION: US champion in rare earth magnets and battery materials

David Wilcox
Executive Chairman, Evolution Metals & Technologies Corp

This session provided a market and company perspective on rare earths and magnet supply chains, arguing that the central constraint is not geological scarcity but the concentration of processing and refining capacity—especially in China. The speaker framed the issue as a "processing bottleneck" shaped by regulatory and technical barriers (including radioactive thorium in monazite), which has reinforced China's dominant position in separating and refining key rare earth elements used in high-performance magnets.

The presentation then connected geopolitics to market volatility and supply risk, citing recent export controls and restrictions affecting heavy rare earths—materials required for high-performance magnets used in traction motors and other advanced applications. The speaker emphasized that these constraints are driving bipartisan policy attention in the U.S. and similar moves in allied regions, but that successful industrial responses must solve the midstream processing gap.

Against this backdrop, the company positioned its strategy around "low-hanging fruit": closed-loop recovery from end-of-life batteries and electronics (e-scrap), rather than developing new upstream mines. The proposed model integrates dismantling and shredding, hydrometallurgy/pyrometallurgy separation, and conversion into saleable products—specifically magnet outputs and precursor cathode active material (PCAM) for battery supply chains.

Finally, the speaker outlined the company's current footprint (including operating facilities in Korea) and its planned scale-up via a U.S. industrial campus anchored by a large hydrometallurgy facility. The core investment case presented was that above-ground "urban mining" feedstock is abundant and that a domestic hydrometallurgy capability is the missing link needed to prevent dependency on China as the only buyer for intermediate materials such as black mass.

Key insights, data points or predication

- Company IPO milestone: Announced the company began trading on NASDAQ on January 6 (the week prior to the session), with first-day trading described as a significant spike followed by a pullback and stabilization.
- U.S. buildout commitment: Confirmed plans to build a hydrometallurgy facility on a U.S. industrial campus, with completion targeted in 36 months, described as the critical enabler for scaling closed-loop processing.
- Phase 1 scale targets: Stated Phase 1 intends to expand to 55,000 tons of high-temperature magnets and 78,000 tons of PCAM (precursor cathode active material).
- Operating footprint (current state): Reported a mid- and downstream base in Korea with four operating factories and production around 660 tons per annum, producing centered and bonded magnets and related downstream products.
- Feedstock strategy: Reinforced a strategy to secure end-of-life batteries and e-scrap, including U.S. government end-of-life assets (including classified assets handled under strict disposal protocols), as a stable closed-loop feed source.
- Business scope clarity: Explicitly positioned the company as not pursuing upstream mining, focusing instead on midstream processing and downstream manufacturing (magnets and battery material inputs), with base/precious metal outputs routed to diversified smelter markets.
- China's processing dominance: China was cited as processing ~90% of global rare earth material and mining ~70%, importing the remainder—implying the strategic bottleneck is midstream capacity, not ore availability.
- U.S. upstream concentration: MP Materials was described as the only U.S. rare earth mine/producer, cited at ~12% of global rare earth concentrate output.
- Value concentration in a few elements: While there are 17 rare earth elements, the speaker stated ~five elements account for ~95% of value, highlighting neodymium/praseodymium ("lights") and terbium/dysprosium/holmium ("heavies").

PRESENTATION: US champion in rare earth magnets and battery materials

- Geopolitical restriction (Oct 2025): The speaker claimed that in October 2025 China banned exporting magnet/rare earth material containing ≥0.1% heavy rare earths—framed as disruptive because heavies are required for high-performance magnets used in traction motors.
- Closed-loop rationale: The model prioritizes above-ground recovery because high-grade rare earth deposits were described as ~5%, meaning large volumes of non-target material must be managed—creating waste-stream and permitting challenges in many jurisdictions.
- Electronics consumption claim:
  The speaker asserted the U.S. consumes ~3× the electronics of China, while China produces components used across much of the world's electronics—used to justify scale potential for e-scrap feedstock.
- Gigafactory input constraint: The speaker argued gigafactories require PCAM and that early non-China gigafactory challenges reflected constrained access to critical inputs, not necessarily EV demand alone.
- EV vs battery production divergence:
  Cited that EV production fell ~50% year-on-year ('23–'24) while lithium-ion battery production rose ~37%, arguing battery growth is not solely tied to EV volumes.
- Economics of recycling require full-stream value capture: A hard drive example was used to illustrate that extracting only the magnet can be uneconomic unless value is recovered across aluminum, chips, and other materials—supporting an integrated closed-loop approach.
- Hydrometallurgy as the constraint: The "black mass" recycling bottleneck was described as structural because, without domestic hydrometallurgy, black mass tends to be shipped to China; the speaker cited high capex as a barrier and estimated ~$1.6B capex for their planned facility.
- Market structure disadvantage: The speaker highlighted a 13% VAT effect on materials purchased from China, creating a structural pricing disadvantage for non-China vertical integration.
- Circularity analogy: Copper was cited as an analogy for above-ground availability, with the claim that ~98% of copper ever mined remains in circulation, supporting confidence in "urban mining" feedstock availability.

Session summary

The session's core message was that rare earth supply risk is fundamentally a processing and refining problem, intensified by geopolitics and export controls, rather than a shortage of ore. The speaker argued that rebuilding resilient supply chains requires connecting the midstream—particularly hydrometallurgy—to downstream manufacturing so that recycled intermediates (like black mass) are not forced back to China as the only viable buyer.

Positioning the company as a closed-loop alternative, the presentation emphasized commercialized processes, existing operating capacity in Korea, and a planned U.S. hydrometallurgy campus as the decisive step to scale magnets and battery material inputs. The speaker concluded that using above-ground materials already mined provides a compelling sustainability and industrial strategy—supporting jobs, national security, and the material requirements of the next wave of electrification and advanced manufacturing.

PANEL SESSION: Increase funding and focus on rare earth mineral exploration

Moderator

Sheila Khama
Non Executive Director of Companies on Tadāwul, NASDAQ & Former CEO De Beers Botswana

Melissa 'Mel' Sanderson
Co-chair, Critical Minerals Institute

Dr. Philipp Schmidt-Thomé
International Operations Director, Geological Survey of Finland GTK

Edouard de Montmort
Head of Capital Formation, Prisma Capital

Abigail Hunter
Executive Director, SAFE Center for Critical Minerals Strategy

Jose Palma
Executive Vice President, Aclara Resources

This panel examined how rare earth investment is evolving—from a niche market to a strategic priority—driven by the need to expand exploration pipelines and reduce concentrated supply chain risk. The discussion opened by challenging common misconceptions, with Dr. Philipp Schmidt-Thomé emphasizing that the label itself is misleading: "Rare earth minerals is actually a wrong term. Rare earths are not rare at all." He explained that the strategic constraint is not abundance but dispersal and separability—rare earths are "very dispersed" and "geochemically very similar," making them "hard to separate" and unlikely to "accumulate" into major deposits.

In this context, they matter because they are essential to modern technologies, especially electronics, and their relevance has accelerated with the energy transition, digitalization, and defense requirements.

Building on this foundation, Schmidt-Thomé traced the geopolitical concentration to strategic industrial policy rather than geology. He argued that China's position stems from a long-horizon approach—a "40-year long mineral strategy"—paired with the reality that separation is energy-intensive and often tied to radioactive co-occurrence (uranium/thorium), which creates environmental sensitivities.

He suggested that market dominance has been reinforced by lower environmental standards, a factor the panel returned to later when discussing ESG and competitiveness.

From the financing perspective, Edouard de Montmort described how capital markets have shifted in response to these realities. He characterized rare earths and critical minerals as historically "niche and opaque," but noted that investor appetite has accelerated rapidly as mining becomes inseparable from geopolitics. He emphasized that bankability is the true hurdle: the "mineral endowment is there," but converting it into a financeable project requires permitting, credible counterparties, and processing pathways. He underlined that "today... the difficulty is how do you transform that endowment into a bankable project," and argued that in an "ex-China" market, pricing and risk allocation often must be built through offtake structures and aligned partnerships.

Melissa "Mel" Sanderson framed the U.S. shift as a national security inflection point. She referenced earlier signals—such as the 2011 Japan episode—as evidence that the West underestimated China's leverage. In her view, post-COVID vulnerability made the issue unavoidable: critical materials underpin "the technologies that we all rely on," and the U.S. has begun using broader authorities and tools to respond.

She described an expanded role for government financing and—most notably—direct equity participation in strategically important companies, positioning this as more than a temporary bridge and instead as a durable policy direction shaped by long-term supply chain competition.

The ESG discussion, led by Jose Palma, pushed back on generalized assumptions that rare earths are inherently "worse" than other mining. He called this an "oversimplification," emphasizing the need to distinguish responsible formal mining from informal illicit mining. Palma argued that responsible operators can mitigate impacts through modern methods and standards, while environmental degradation is most visible where governance is weak. He also differentiated deposit types—hard rock versus ionic clays—arguing that ionic clays can reduce footprint by avoiding explosives and extensive milling. Palma then highlighted the central unresolved question for the sector: ESG compliance adds significant cost, and "nobody has a clear answer" on who ultimately pays. He suggested cost-sharing must extend to end users who demand high standards, particularly as buyers increasingly value supply independence, traceability, and resilience.

Abigail Hunter broadened the lens beyond a U.S.–China binary and mapped the emerging alliance architecture shaping investment. She cited coordinated pressure among advanced economies, noting that G7 leaders have articulated that they are "not okay with the status quo" of concentrated supply chains, with rare earths receiving specific focus in related roadmaps.

She described a growing toolkit of sovereign involvement—equity, export credit agencies, development finance institutions, and incentives—paired with a practical deal-making reality: effective diversification often happens through small "mini-lateral" coalitions rather than large, slow-moving groupings. As an illustrative example of how these coalitions manifest, she outlined a multi-party arrangement around gallium (a byproduct) linking producing jurisdictions, financing partners, and buyer countries—arguing that demand security depends on clearly structured roles across the capital stack and offtake chain.

PANEL SESSION: Increase funding and focus on rare earth mineral exploration

Key insights, data points or predication

- Exploration pipeline imperative (GTK): Increase exploration to expand the pipeline; recycling helps but is unlikely to be sufficient alone to meet demand growth.
- Bankability prerequisites (Prisma Capital): Projects require permitting clarity, processing/separation pathways, and offtake structures that can underpin financing in an "ex-China" market.
- U.S. policy direction (Critical Minerals Institute perspective): Growing use of public financing tools and direct equity stakes in strategic companies as part of national security supply chain strategy.
- ESG direction (Aclara Resources): Emphasis on responsible, formal mining and clearer differentiation from illicit mining; adoption of deposit-appropriate methods to reduce footprint.
- Alliances and mini-lateralism (SAFE): Continued formation of small, practical coalitions tying producers, financiers, and buyers through export credit/development finance/equity plus offtake.
- No formal agreements were announced as signed in-session; the discussion focused on market direction and enabling conditions.
- Rare earths are widespread but dispersed and difficult to separate; strategic constraint is processing and separability rather than ore scarcity.
- China's dominance was attributed to long-term strategy and willingness to accept higher environmental impacts (as stated), plus the energy intensity and radioactive associations of processing.
- Investment has accelerated as rare earths move from niche commodities into geopolitically framed "critical minerals," with sovereign alignment becoming central to bankability.
- "Ex-China" market building requires structured offtake and pricing formation rather than relying on existing China-linked price dynamics.
- U.S. government tools described include broader regulatory streamlining, agency financing, and equity participation in strategic firms—framed as a durable shift.
- ESG risks are not uniform: responsible mining differs markedly from illicit mining; deposit type matters (hard rock typically higher footprint; ionic clays potentially lower).
- ESG compliance raises CAPEX/OPEX; cost-sharing with end users and premium buyers is increasingly necessary to sustain compliant supply chains.
- Beyond U.S.–China, G7 and allied coordination is increasing; sovereign tools (ECA/DFI/equity) and "mini-lateral" deal structures are emerging to accelerate projects.

Session summary

The panel positioned rare earth exploration and investment as a strategic supply chain priority shaped by technology demand, geopolitics, and the realities of difficult processing. Speakers aligned on a core point: rare earths are not geologically scarce, but building diversified, resilient supply depends on bankable projects—supported by permitting, processing capacity, credible offtake, and increasingly sovereign-backed financing tools.

The discussion closed with a pragmatic message on ESG and alliances: responsible mining is achievable but costly, and the market must share that cost if it wants traceable and independent supply. With concentration risk driving urgency, the most realistic path forward is targeted collaborations small coalitions that combine producer capability, buyer commitment, and financing instruments to accelerate exploration and bring new supply to market responsibly.

PRESENTATION: Case study: Regenerative mining

Rob McEwen
Chairman and Chief Owner, McEwen Inc.

This session set out to reposition mining—particularly copper mining—as both an attractive investment opportunity and a force for environmental and social regeneration. Framed against long-term market cycles, the speaker argued that commodities and mining equities are historically undervalued relative to global equities, creating a compelling entry point for investors at a time when demand for metals is structurally rising.

Using copper and gold as anchor examples, the presentation highlighted long-term supply-demand fundamentals, capital underinvestment, and macroeconomic drivers that point to higher commodity prices. Copper, in particular, was positioned as indispensable to electrification, renewable energy, digital infrastructure, and decarbonization—making it central to the next industrial cycle.

Beyond markets, the core objective was to introduce "regenerative mining" as a new model for the sector. The speaker challenged the perception of mining as "dirty, dangerous, and destructive," arguing that without public acceptance, modern society risks material shortages. Through historical and contemporary examples, he demonstrated that mining can restore ecosystems, create beauty, and earn community trust—while remaining profitable.

The session culminated in a detailed case study of the Los Azules copper project, presented as a blueprint for the mine of the future: carbon-neutral, water-efficient, tailings-free, community-centered, and economically robust. The message was clear—mining can generate strong returns while leaving a positive environmental and social legacy.

Key insights, data points or predication

- Strategic vision announced: Commitment to advance regenerative mining as a scalable model for future mining developments.
- Los Azules project positioning: Presented as a flagship example of next-generation copper mining, integrating sustainability into every design decision from the outset.
- Operational commitments at Los Azules:
- Use less than 25% of the water of conventional copper mines
- One-tenth of typical carbon emissions
- No tailings facility
- 100% renewable energy (on-site and off-site solar)
- Electrified conveyors and fleets with battery backup (no diesel reliance)
- Community and workforce focus: Creation of 1,000+ high-quality local jobs, with emphasis on dignity, livability, health, and well-being.
- Technology pathway: Advancement of closed-loop chemical extraction and renewably powered electrowinning, eliminating the need for a traditional mill.
- Future engagement: Ongoing planning and disclosure of further innovations as project development progresses.

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- Future engagement: Ongoing planning and disclosure of further innovations as project development progresses.

Session summary

The session delivered a clear call to action: mining must redefine itself to meet the material demands of the future while earning social license through environmental regeneration and community value creation. Market fundamentals suggest a strong investment case for metals—especially copper—but financial success alone is no longer sufficient.

Through the concept of regenerative mining and the Los Azules case study, the speaker demonstrated that sustainability, beauty, and profitability are not mutually exclusive. By embedding environmental stewardship, renewable energy, and human-centered design into mine planning from day one, mining can become a model industry—one that supplies the materials essential for decarbonization while leaving ecosystems and communities stronger than before.

PANEL SESSION: Startups and next-generation technologies that will redefine the future of minerals

Jim Paterson
Principal,
Discovery Group

Flavia Tata Nardini
Co-Founder &
Chief Executive
Officer, Fleet Space
Technologies

David Goddard
President, Mining
Division, Hexagon

Hirofumi Katase
Executive Vice
Chairman &
Director, I-Pulse

Scott North
Co-Founder,
Yeti Ventures

Irina Gorbounova
Vice President,
Head of XCarb
Innovation Fund,
ArcelorMittal

This session explored how startups and next-generation technologies are reshaping mineral exploration and the wider mining value chain at a time of unprecedented pressure on the industry. With demand for critical minerals such as copper accelerating rapidly—driven by electrification, digitalization, and the energy transition—the panel examined why traditional discovery models are no longer sufficient and how innovation must fundamentally change exploration economics, timelines, and decision-making.

Opening the discussion, the moderator framed innovation as a strategic necessity rather than an option, highlighting that competitiveness in modern exploration increasingly depends on technological advantage.

The panel agreed that while geology remains the ultimate determinant of success, technology now plays a decisive role in identifying prospective ground faster, reducing costs, and improving capital efficiency.

Panelists emphasized that exploration today is structurally inefficient. Despite millions of drill holes completed globally over the past decade, discovery rates remain extremely low, while timelines to find and develop new deposits often exceed 15 years. In response, startups are challenging the status quo by targeting the largest cost drivers—particularly drilling—and by introducing real-time data acquisition, cloud computing, AI-supported interpretation, and satellite-enabled geophysics to accelerate early-stage decision-making.

A recurring theme was speed with discipline. While real-time data can dramatically shorten exploration cycles, panelists stressed that real-time insight—not raw data—is what ultimately supports billion-dollar investment decisions. Human expertise, geological judgment, and staged validation through drilling remain essential, even as technology compresses timelines from years to months or days in the earliest phases.

From an operational and ecosystem perspective, the discussion highlighted the importance of integrating technology across the entire mining value chain—from discovery and planning to operations, safety, and decarbonization. Partnerships between technology providers, mining companies, universities, and governments were cited as critical to building the talent base and digital capabilities required for modern mines, particularly in emerging mining jurisdictions.

The session also addressed capital and innovation horizons. Unlike software or digital platforms, disruptive mining and metals technologies often require a decade or more to prove technical viability and industrial scalability. Panelists argued for patient capital, milestone-based investment models, and closer collaboration between startups and large industrial players to bridge the gap between innovation and deployment.

The discussion concluded with a strong consensus that technology alone is not enough. People, education, workflow redesign, and tolerance for experimentation and failure are decisive enablers of transformation. To meet net-zero goals and future material demand, the mining industry must move faster, collaborate more deeply, and embrace next-generation technologies as core infrastructure—not peripheral tools.

Key insights, data points or predication

- Exploration transformation: Strong agreement on accelerating discovery through cost reduction, early elimination of non-prospective ground, and faster feedback loops.
- Technology deployment: Emphasis on designing new tools to integrate with existing rigs, infrastructure, and workforce to enable rapid scaling.
- Ecosystem building: Continued partnerships between mining companies, technology providers, universities, and governments—particularly highlighted in Saudi Arabia.
- Capital approach: Support for long-term, milestone-based investment models to scale deep-tech innovation in mining and metals.
- Talent development: Increased engagement with students and early education to reposition mining, steel, and exploration as future-facing, high-impact careers.
- Only ~0.1% of global drill holes lead to discoveries, underscoring the inefficiency of traditional exploration models.
- Average discovery timelines of 15 years are incompatible with energy transition timelines.
- Advanced geophysics, satellites, and cloud-based analytics can eliminate over 90% of low-potential exploration ground early.
- Pulse-power technologies cited can reduce drilling costs by up to 70% and rock-crushing energy use by up to 80% (as stated).
- Mining and steel innovation cycles require decade-long horizons, reinforcing the need for patient capital and industrial partnerships.
- Human capital, workflow change, and education are as critical as technology itself in achieving transformation.

Session summary

The session reinforced that the future of exploration and mining will be defined by structural change rather than incremental improvement. Startups and next-generation technologies—spanning satellites, AI, pulse power, and digital mine platforms—offer powerful tools, but their impact depends on people, culture, and collaboration.

Panelists aligned on a central message: the energy transition, global development, and net-zero ambitions cannot be achieved with existing exploration models. Accelerating discovery, reducing costs, deploying technology at scale, and building integrated ecosystems are now essential. The mining industry's future belongs to those willing to move faster, work together, and fundamentally rethink how resources are discovered and developed.

PANEL SESSION: Mining 4.0: The new era of tech driven mining

Laila Al Habsi
Mineral Resources Development Program Manager, Ministry of Industry and Mineral Resources, Saudi Arabia

Muneef Al Muneef
CEO, NewLab

Maria Hugosson
President Rock Tools Division, Sandvik Business Area Mining

Eng Amin Aljabir
Chief Information Officer (CIO), Nesma & Partners

David Goddard
President, Mining Division, Hexagon

This session examined Mining 4.0 not as a technology challenge, but as an adoption and enablement challenge, focusing on why innovation in mining struggles to scale despite the availability of advanced tools such as automation, AI, and connected systems.

Opening the discussion, the moderator reframed Mining 4.0 away from showcasing technologies and toward understanding why adoption remains the true bottleneck across global mining operations. Panelists agreed that technology itself is no longer scarce—what remains scarce is the organizational readiness to absorb and scale it.

The discussion highlighted that mining has historically been shaped by legacy operating models and risk-averse cultures.

While pilot projects and trials are common, they rarely translate into enterprise-wide transformation. Panelists emphasized that Mining 4.0 succeeds only when organizations are willing to redesign workflows, change operational discipline, and invest in people—not simply deploy tools.

A central theme was the role of data as the foundation of Mining 4.0. While mining companies have accumulated decades of data, challenges persist around data accessibility, transparency, integration, and conversion into actionable information. Without reliable data pipelines and digital infrastructure, AI and automation initiatives fail to deliver value.

From an operational perspective, panelists stressed that mining is an inherently complex environment, where productivity, safety, and sustainability are deeply interconnected. Effective technology adoption improves productivity while simultaneously reducing waste, emissions, and unnecessary material movement—provided it is implemented with strong change management and workforce engagement.

The discussion also explored the importance of digital infrastructure, including intelligent facilities, embedded sensors, communications networks, and localized data centers, particularly given the remote and harsh environments in which mining operations are conducted. Lessons from oil and gas and large-scale industrial projects were cited as transferable to mining.

The session concluded with a strong consensus that human capital is the single most critical enabler of Mining 4.0. Talent shortages, workforce aging, and the need for new digital skills were identified as structural risks to the industry. Without attracting, retaining, and upskilling people, Mining 4.0 ambitions will remain theoretical.

Key insights, data points or predication

- Adoption focus: Clear shift from technology pilots to scalable adoption models rooted in people, processes, and discipline.
- Data foundations: Emphasis on building robust data acquisition, transparency, and analytics capabilities before deploying AI.
- Infrastructure readiness: Recognition of digital infrastructure as a prerequisite for scalable Mining 4.0 deployment.
- Ecosystem collaboration: Strong call for closer collaboration between miners, technology providers, startups, and venture platforms.
- Talent strategy: Agreement on prioritizing workforce attraction, upskilling, and change management as strategic imperatives.
- Mining innovation is constrained more by organizational readiness than by technology availability.
- Decades of mining data remain underutilized due to poor accessibility and integration.
- Automation delivers value only when workflows are redesigned to support it.
- Workforce shortages and aging talent pools are accelerating the need for digital solutions.
- Mining productivity gains directly contribute to sustainability by reducing waste, energy use, and emissions.
- Mining 4.0 requires long-term commitment, not short-term experimentation.

Session summary

The session reinforced that Mining 4.0 is fundamentally a people-centric transformation, not a technology race. While tools such as automation, AI, and connected systems are essential, their impact depends on mindset, data foundations, infrastructure, and execution discipline.

Panelists aligned on a clear message: the future of mining will be shaped by those who invest in talent, redesign how work is done, and build ecosystems capable of turning innovation into operational reality.

Mining 4.0 is not about replacing people with machines—it is about enabling people to operate mines more safely, efficiently, and sustainably in an increasingly complex global landscape.

State of the Sector

Pavilion 1

STATE OF THE SECTOR AGENDA

Day 1

Wednesday 14 January 2026

Pavilion 1

PRESENTATION: Overview of the inaugural Future Minerals Barometer

Jeffrey Lorch
Partner / North American Metals & Mining Co-Leader, McKinsey & Company

This session introduced the inaugural FMF Barometer, a flagship multi-stakeholder report designed to track global progress toward building resilient, diversified, and transparent mineral supply chains. Developed collaboratively with industry leaders, governments, and other stakeholders, the Barometer responds to the growing recognition that global mineral supply has not expanded fast enough to meet accelerating demand driven by the energy transition, digitalization, and industrial growth.

The presentation emphasized that resilient mineral value chains are not solely an industry challenge, but a shared global responsibility involving mining companies, governments, financial institutions, and local communities.

The FMF Barometer adopts a full value-chain perspective, covering upstream extraction, midstream processing, downstream development, and the enabling conditions required to bring projects online at scale.

Beyond perception, the Barometer is firmly grounded in facts and data, analyzing supply–demand balances, infrastructure readiness, talent availability, financing gaps, and regulatory frameworks. It also highlights the need to reshape the global narrative around mining by better articulating the sector's contribution to society, economic development, and the energy transition.

A central focus of the session was the role of the "super region"—initially encompassing Africa, Central Asia, Western Asia, and parts of South and Southeast Asia, and now expanding to include Latin America. While already a critical supplier of raw materials, this region holds a disproportionate share of global mineral resources relative to current production, representing a major opportunity for accelerated, inclusive development across the full mineral value chain.

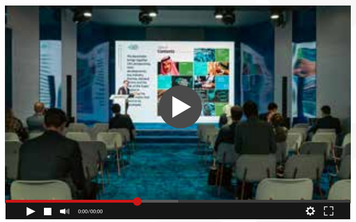
Key insights, data points or predication

- Launch of the inaugural FMF Barometer as a baseline assessment of global mineral supply chain resilience
- Commitment to track progress over time on supply, demand, and enabling conditions through an evolving FMF dashboard
- Expansion of the FMF 'super region' concept to include Latin America and a broader set of developing economies
- FMF to play an active role in supporting key enablers, including infrastructure, water availability, green power, and traceability standards
- Upcoming FMF sessions to focus on leadership perspectives, sentiment surveys, and the Critical Minerals Framework, translating discussion into action
- Global mineral supply chains are shifting from free global trade toward regionalized and nationalized models
- In some commodities, 80–99% of global supply is concentrated in a single country, creating significant vulnerability
- Renewable energy installations have grown by 170% over the past five years, driving rapid growth in demand for critical minerals
- Data center demand is expected to grow by approximately 350%, with copper emerging as a key bottleneck commodity
- China represents 40–60% of global end-use demand for many minerals, with significant implications for conversion and refining capacity
- More than 450 government policy interventions related to critical minerals were recorded in the first half of the previous year alone
- While announced mining project pipelines suggest sufficient future supply, real-world project delays and non-conversion point to looming deficits in base-case scenarios
- Talent shortages and community engagement remain among the most critical constraints on mine development

Session summary

The session underscored the urgency of moving from fragmented discussions toward data-driven, coordinated action to secure future mineral supply chains. The FMF Barometer was positioned as a critical tool to enhance transparency, align stakeholders, and track progress across supply, demand, and enabling conditions.

By grounding the debate in facts and focusing on the full value chain—particularly within the expanding super region—the FMF aims to support more resilient, diversified, and inclusive mineral development. The Barometer sets the foundation for sustained collaboration and accountability as governments, industry, and communities work together to meet the mineral needs of future economies.



PANEL SESSION: Leadership perspectives: global and local

Aldo Pennini
Director of Strategy, Program and Content, Future Minerals Forum

H.E. Moses Engadu
Secretary General, Africa Minerals Strategy Group

Patrick Lahaie
Senior Partner / Global Metals & Mining Co-leader, McKinsey & Company

Cyrus Hiramanek
Senior Managing Director, M. Klein and Co.

This panel session convened leaders from policy, advisory, and investment communities to assess the usefulness and likely impact of the Future Minerals Barometer as a practical decision-support tool for governments, industry leaders, and investors. Building on the previous presentation, the discussion explored how the Barometer could help shape more informed decision-making and improve delivery of minerals needed for the energy transition, digitalization, and industrial development.

The moderator framed the Barometer as a companion to the emerging Future Minerals Framework, positioned as a mechanism to track progress across mineral supply and value-chain development—particularly in the "super region" (Africa, Western and Central Asia, and Latin America). The panel also connected the Barometer to FMF's ongoing workstreams stemming from the Ministerial Roundtable, including infrastructure funding, responsible supply frameworks, and capacity-building through centres of excellence.

Speakers broadly agreed that the report's value lies in its synthesis of complex datasets across enablers such as policy, geology, infrastructure, innovation, responsible supply and traceability, and talent.

They emphasized that decision-makers need a credible, accessible "single view" to identify priorities, quantify risks, and guide action—particularly where mineral markets and geopolitical dynamics are rapidly shifting.

At the same time, the panel underscored that a report alone will not deliver outcomes without implementation mechanisms. They called for the Barometer to become a living instrument—updated regularly, used to measure progress, and embedded in frank multi-stakeholder dialogue focused not only on challenges but also on proof points, practical lessons, and what is working on the ground.

Key insights, data points or predication

- FMF confirmed the Barometer is intended to be an annual publication, with the inaugural edition serving as a baseline for tracking progress year-on-year.
- FMF positioned the Barometer as the tracking mechanism to accompany the draft Future Minerals Framework presented at the Ministerial Roundtable.
- FMF reiterated three ongoing workstreams emerging from the Ministerial Roundtable:
  - Funding infrastructure to enable mineral supply
  - Developing a sustainability/responsible supply framework, including work with ISO on an international traceability standard for copper
  - Building a network of centres of excellence to develop capacity for mineral supply in the super region
- Panelists proposed strengthening future editions through:
  - More investor engagement and feedback incorporated into the report
  - Input from multilateral agencies supporting infrastructure and mining investment
  - Regional/super-regional deep dives to reflect different realities across Africa, Latin America, and Asia
  - Regular interim updates (e.g., quarterly insights) to keep the Barometer "living" and decision-relevant
- FMF and African partners referenced ongoing planning for an FMF Africa-focused meeting to deepen dialogue and evidence-sharing.
- FMF convened a Ministerial Roundtable with 100+ governments and almost 60 international organizations/associations, alongside senior mining leaders.
- FMF identified six key enablers shaping the Future Minerals Framework: geology/exploration, mining development funding, infrastructure funding, technology & innovation, responsible supply & traceability, policy, and talent development.
- FMF referenced seven priority mineral value chains: five in Africa and two in South America, with copper prioritized in Africa and lithium in South America.

PANEL SESSION: Leadership perspectives: global and local

- Africa's mineral potential was framed as significant but underdeveloped, with a reference that exploration has covered less than 20% of the geology discovered/assessed (as stated by the speaker), reinforcing the importance of expanding geological data.
- Talent and demographics were highlighted as both risk and opportunity: Africa has a population of 1.5 billion+, with 70% under 35 (as stated), positioning the continent as a major future workforce pipeline if skills and jobs are built.
- Investors emphasized that the barrier is often policy uncertainty rather than commodity risk, with a strong preference for environments that reduce "unbounded" risk.
- Time-to-delivery is worsening: it was stated that average project timelines have increased to 28 years in the US and 18 years in other contexts, compared with 7 years ten years ago—a trend described as "heading in the wrong direction."
- The Barometer was repeatedly framed as a tool for myth-busting and narrative correction, especially regarding perceived versus actual investment conditions and progress in Africa.

Session summary

The panel concluded that the FMF Barometer has strong potential as a decision-support tool because it synthesizes complex information into an accessible format and helps leaders identify priorities across the enabling conditions required to deliver future mineral supply. Speakers emphasized that quantifying risks—especially policy and execution risk—can materially influence investment decisions and stakeholder alignment.

However, the discussion repeatedly returned to implementation: turning insight into delivery will require stable and actionable policy, risk-sharing partnerships, stronger workforce development, and a "living" approach to measurement. The session closed on a positive note that this moment represents a rare opportunity—an "enablement cycle" for green energy and technology—where decisive action by governments, industry, and investors could reshape mineral value chains and long-term development outcomes.

"This is not just a commodity cycle—it's an enablement cycle for green energy, technology, and the betterment of human life"

– Cyrus Hiramanek,
Senior Managing Director, M. Klein and Co.

PANEL SESSION: Market developments: mineral price index, deal flow, exploration trends, end-user dynamics, supply developments

Aurian De La Noue
Executive Director, Consulting, S&P Global

Marcelo Azevedo
Senior Asset Leader, McKinsey & Co.

Francesca Price
Senior Principal Analyst, S&P Global

This State of the Sector session provided a data-led overview of the trends shaping critical mineral markets, focusing on pricing dynamics, investment flows, exploration activity, and the evolving demand–supply outlook. The presenters anchored the discussion in measurable indicators intended to support FMF's broader objective of tracking progress in the "super region" and globally.

Francesca Price opened with the Mineral Price Index (S&P Platts Global Battery Metals Index), explaining its methodology and what it signals about market conditions for battery metals used in EV production.

The session highlighted how shifts in battery chemistry, macroeconomic conditions, and trade policy contributed to volatility and divergence across commodities—particularly cobalt versus lithium and nickel.

Orion Delano then emphasized that tracking progress requires "hard data," recommending that stakeholders "follow the money" using metrics such as M&A activity and exploration spend. The presentation compared M&A patterns in Africa and Latin America, spotlighted commodity corridors (notably copper in the DRC/Zambia/Botswana and lithium in Argentina), and interpreted exploration trends as a long-term barometer of ecosystem attractiveness and investment readiness.

Marcelo Azevedo concluded with an end-user and supply perspective, arguing that demand fundamentals remain resilient due to demographics, mobility, AI/data centers, and defense spending, even amid a slowdown versus prior expectations in EVs and renewables. He also described structural shifts in mining—greater fragmentation, changing geographic representation of leading firms, and increased use of partnerships—while reiterating that supply adequacy depends on whether announced projects are delivered on time and at scale.

Key insights, data points or predication

- S&P Global presented the S&P Platts Global Battery Metals Index (launched October 2025) as a recurring benchmark to monitor battery metals pricing.
- The session proposed tracking "super region" progress by monitoring capital allocation, including:
  - Deal flow and M&A activity (what assets, where, and by whom)
  - Exploration spend and drilling activity as leading indicators of long-term development
- The exploration and drilling indicators were framed as metrics to be monitored on a six-month or annual basis to assess ecosystem health and investor interest.
- The session concluded by transitioning from pricing and investment indicators to end-user demand and supply development as the next analytical lens for sector tracking.

Pricing & market structure (battery metals):

- The Critical Minerals Index is based on the S&P Platts Global Battery Metals Index, a daily weighted average of cobalt, manganese, nickel, lithium prices, weighted by use in an NMC811 battery; lithium assumes equal weighting between spodumene and hydroxide.
- Battery metals faced a challenging environment from H2 2024, driven by oversupply (lithium and nickel) and weaker-than-expected EV and battery chemical demand.
- Battery chemistry shifted: LFP batteries rose from 41% (2023) to 50% (2024), reducing NMC share and influencing nickel and cobalt demand.
- In 2025, cobalt was the standout performer:
  - Cobalt hydroxide rose ~330% and cobalt sulfate ~280% (as stated).
  - Lithium hydroxide/carbonate ended ~50% higher after a late-year rally; nickel sulfate closed ~50% higher; graphite was largely flat.

Cobalt supply shocks (DRC-driven):

- The DRC accounts for ~75% of global cobalt supply (as stated).
- February 2025: DRC announced a four-month export ban, later extended in June; post-announcement, China cobalt hydroxide price reportedly surged 100%+ in four weeks, with force majeure cited by some refiners/manufacturers.
- September: DRC replaced the ban with an export quota limiting annual exports to 96,600 tonnes for 2026 and 2027, described as roughly 50% of DRC annual production, triggering another major price wave and concerns over critical inventory levels.

Lithium: two halves and cautious 2026 optimism

- Lithium experienced steep price drops March–June, bottoming in summer, amid oversupply and weak EV sentiment/subsidies in key markets.
- From around August, China disruptions (including closure of a CATL mine cited as ~6% of annual supply) and regulatory steps to address overcapacity helped lift prices; lithium carbonate futures reached an eight-month high.

PANEL SESSION: Market developments: mineral price index, deal flow, exploration trends, end-user dynamics, supply developments

- Despite low prices, lithium mining continues expanding, with new projects offsetting curtailments; stronger growth is forecast in Africa and the Americas (as stated).
- China's power sector reforms were cited as boosting lithium demand for power system storage, supporting a cautiously optimistic 2026 outlook despite weak EV demand.

Deal flow, corridors, and "follow the money" indicators

- 2025 M&A: Africa saw approximately $20 billion in M&A transactions targeting Africa-related assets (as stated), while Latin America recorded higher activity, especially in copper due to a more developed copper sector.
- Buyer countries for mining assets were described as predominantly companies registered in the UK, Australia, Canada, and the US, with China and Saudi Arabia also present.
- Copper corridor focus: increased activity in the DRC, Zambia, Botswana since 2015; example cited of UAE sovereign wealth fund IHC investing in Mopani (Zambia).
- Copper price was referenced as reaching $13,000/ton "last week" (as stated), reinforcing strategic appetite for copper exposure.
- Lithium corridor: heightened deal activity in the lithium triangle, particularly Argentina, including Rio Tinto's acquisition of Arcadium Lithium; the lithium triangle was cited as holding 56% of world lithium reserves (as stated).

Exploration & drilling as long-horizon signals

- Exploration spend in 2025 was described as roughly flat vs 2024; Latin America and Africa together were cited at ~20% share of exploration spend in 2024.
- Drilling activity was presented as an additional health metric, recommended for monitoring every six months or annually.
- Notable exploration budget growth: Saudi Arabia was cited as the largest year-on-year increase vs 2024 with $100 million+ additional spend; other increases mentioned include Peru, Chile, Côte d'Ivoire, Papua New Guinea, Suriname, Botswana.
- Commodity drivers: higher exploration for gold, silver, copper (price-driven for gold/silver; long-term fundamentals for copper). Exploration decreased notably in lithium and nickel due to EV headwinds and nickel price pressure (including Indonesia's rapid supply growth).

Demand outlook: resilient fundamentals

- Demographics: the world is projected to add ~1.5 billion people over the next 25 years (as stated), supporting baseline materials demand.
- EVs: despite slowing adoption versus expectations, 2023–2024 sales increased by 3.5 million EVs year-on-year (as stated); China was cited as the largest EV market with nearly one-third of sales being battery EVs by 2024 (as stated).
- Data centers: estimate of ~150 GW of additional data centers between now and 2030, implying a 3x growth; potential +1 million tons of annual copper demand by 2030, described as ~3% of global copper demand (as stated).
- Defense: cited $270 billion increase in global defense spending between 2023 and 2024 (as stated).

Supply adequacy depends on delivery

- In a "high case" where announced projects are delivered, many commodities appear balanced; in a more realistic base case with delays/cancellations, gaps remain, including for uranium, magnetic rare earths, manganese, lithium (as stated).
- The super region was emphasized as holding a disproportionately large share of resources relative to current production, representing a major supply opportunity.

Industry structure and partnerships

- Partnership in asset development: globally over one-third of new mining and processing assets are built by two or more companies; mining partnerships were cited as especially high in Sub-Saharan Africa (~two-thirds).
- Sector fragmentation: top 10 mining companies' share of sector market cap decreased from >50% (25 years ago) to <33% today (as stated).

Session summary

This session provided a cohesive, data-driven picture of the critical minerals landscape, linking price volatility to real-world drivers such as technology shifts, policy interventions, and supply disruptions—most notably in cobalt from the DRC and in lithium through shifting market fundamentals and episodic disruptions. The analysis reinforced that credible indicators and repeatable metrics are essential for tracking progress and informing decisions.

Across prices, investment flows, exploration, and demand outlooks, speakers emphasized that the sector's fundamentals remain strong—driven by demographics, mobility, data center buildout, and defense—while supply resilience depends on whether projects move from announcement to execution. The session positioned "following the money" (M&A and exploration spend) and monitoring partnerships and industry structure as practical tools to understand where future capacity is most likely to emerge, including within the super region.

PANEL SESSION: A Critical Mineral Framework: advancing the development of mineral value chains

Karel Eloot
Senior Partner / Global Materials Insight Leader & Knowledge Leader, McKinsey & Company

Louis Marechal
Chief of Sector Minerals and Extractives, OECD

Michelle Foss
Fellow in Energy, Minerals and Materials, Baker Institute

This panel examined how the FMF Critical Minerals Framework can be translated from strategy into delivery—particularly how to accelerate development of priority corridors across the "super region" (Africa, South America and the Middle East) while maintaining sustainability, competitiveness, and investor confidence. The discussion recognized that demand for critical minerals is accelerating, yet much of the value creation still occurs far from resource locations—leaving many producing countries exporting raw materials and importing finished products.

Speakers argued that bilateral MOUs and fragmented collaborations are insufficient for corridor-scale projects.

Multi-country corridors require a platform that can coordinate across jurisdictions, include producing and transit countries' interests, and ensure the enabling conditions for large infrastructure-led mineral value chains are addressed.

The panel emphasized that private-sector participation—especially from downstream customers—is unlikely to lead corridor infrastructure investments. Instead, governments and multilateral/bilateral funding agencies are increasingly stepping in as early drivers, particularly as security-of-supply concerns and geopolitical competition push projects forward even when standalone commercial returns may be uncertain.

Traceability and responsible sourcing were treated as increasingly important but often misunderstood. Speakers warned that setting traceability as a strict up-front condition can backfire and stressed the need for clear objectives (responsible sourcing versus security-of-supply), realistic expectations, and phased implementation supported by capacity-building—especially to avoid exclusionary effects on supply chain actors and smaller players.

Key insights, data points or predication

- OECD referenced ongoing work on the Lobito Corridor, focused on maximizing corridor impact on local economies and strengthening societal acceptance of major infrastructure projects.
- FMF reiterated the Critical Minerals Framework focus on seven priority corridors across the super region, with the intent to connect stakeholders and accelerate delivery.
- Panelists highlighted likely requirements for progress:
- Government leadership and coordination to align jurisdictions and enable cross-border delivery
- Increased role for multilateral/bilateral financiers in early-stage derisking beyond mining assets alone
- Clearer definitions and phased implementation for traceability and responsible sourcing expectations
- Identified an operational gap: Centres of Excellence need clearer definitions, governance, ownership, and benefit-sharing mechanisms.
- FMF's framework aims to shift value creation closer to resource locations by enabling more transparent and equitable value chains, reducing the "export raw/import finished products" dynamic.
- Bilateral agreements are structurally limited for corridors because infrastructure must cross multiple territorial boundaries and jurisdictions.
- Government involvement is rising due to security-of-supply and geopolitical drivers; speakers noted development-corridor ideas existed for years but accelerated recently amid geopolitical competition.
- Downstream customers may take offtake but are unlikely to fund corridors without clear governance and government-led coordination.
- Risk-sharing is inherently complex and must be case-by-case; long timelines and shifting political agendas (donor and recipient sides) complicate execution.
- Traceability has two competing logics that must be distinguished:
  - Responsible sourcing/assurance and transparency
  - Security-of-supply/custodianship concerns about strategic competitors
- Implementation risk: due diligence tools can be applied in ways that unintentionally exclude actors and create barriers to entry, especially for juniors in opaque, small critical mineral markets.
- Capital access is increasingly standards-linked: without baseline international standards, projects may struggle to obtain financing in many OECD markets.

Session summary

The panel stressed that making the FMF framework operational requires moving beyond bilateral cooperation toward multi-jurisdiction platforms that can unlock corridor-scale infrastructure, governance alignment, and investment confidence. Governments and multilateral/bilateral financiers are positioned as early drivers—especially where projects are propelled by security-of-supply and national development priorities rather than purely commercial returns.

At the same time, the discussion cautioned against unrealistic implementation requirements. Traceability and responsible sourcing can strengthen assurance and attract capital, but only if objectives are clear and delivery is phased with capacity-building and practical expectations. The session closed with a pragmatic message: corridor development is long-term and complex, and progress depends on credible, coordinated government action that enables private and industrial actors to follow effectively.

STATE OF THE SECTOR AGENDA

Day 2

Thursday 15 January 2026

Pavilion 1

PANEL SESSION: Index baseline: An evidence-based approach to tracking corridor progress

Dr. Hamid Rashid
Executive Chairman, Global AI

This “State of the Sector” presentation provided the fact base and baseline underpinning the Future Minerals Forum (FMF) Barometer, focusing on conditions shaping resilient critical mineral supply chains in the “super region.” The speaker positioned the session as a data-driven review of where the sector stands today, and how readiness varies across five priority mineral corridors in Africa.

The presentation framed analysis through the FMF framework’s six enablers—policy and regulation, financing, sustainability, infrastructure, talent, and technology—with a corridor-by-corridor view of progress and gaps.

It also situated the findings within a macroeconomic outlook marked by global uncertainty, persistent high interest rates, and geopolitical volatility—factors expected to influence investment appetite and project timelines.

A key message was that many super region countries are major suppliers of critical minerals, yet remain highly commodity-dependent and face structural constraints in capturing more value locally.

The speaker emphasized that building resilient value chains requires stronger economic integration across corridor countries, improved logistics and trade connectivity, and major upgrades in energy availability, which remains a binding constraint for midstream processing and beneficiation.

While the report identified meaningful progress on sustainability commitments and traceability measures, it also highlighted a persistent “implementation gap”: institutions and enforcement capacity remain insufficient in \ many locations.

The session concluded with an emphasis on the need for more granular tracking over time—especially on human capital and technology transfer—to enable investment, local capability building, and sustained beneficiation.

Key insights, data points or predication

- Global AI confirmed it co-produced the FMF Barometer alongside McKinsey, S&P Global, and GlobeScan, describing it as a tri-continental effort.
- The report’s current edition prioritizes five African mineral corridors, explicitly excluding the Lithium Triangle (Chile–Bolivia–Argentina) from this year’s deep-dive analysis, with an indication it may be covered in future editions.
- The speaker indicated future iterations should expand beyond commitments to assess implementation rates (e.g., tracking not only what standards exist, but how effectively they are enforced).
- FMF was positioned as potentially playing a role in improving economic integration among corridor countries—especially logistics, trade facilitation, and corridor connectivity.

Key insights, data points or predication

- Macroeconomic outlook: Global growth projected at 3.1% in 2026, with headwinds in major economies; Middle East & Central Asia projected at 3.6% growth in 2026, up from 2.6% in 2024.
- Commodity prices: Non-oil commodity prices expected to increase by 11.5% over the next two years (as stated), supported by a weak dollar; however, high interest rates and rate-policy uncertainty were described as a drag on investment.
- Super region definition: Approximately 75 countries spanning Africa, Central Asia, and parts of Latin America; super region supplies more than 50% of global supply for some minerals (examples cited: cobalt, tantalum, manganese).
- Commodity dependence: 25 countries have export baskets where ~40% of exports are commodities; cited examples include Zambia (78%) and Guinea (87%) of exports coming from minerals/metals.
- Priority corridors covered (Africa-focused):
  - Copper Corridor: Zambia, DRC
  - Graphite Corridor: Mozambique, Tanzania
  - 3T Corridor (Tantalum, Tin, Tungsten): Rwanda, Burundi, DRC, Uganda
  - Multi-metal Corridor: South Africa, Namibia, Botswana
  - Iron–Bauxite Corridor: Mali, Sierra Leone, Guinea, plus Liberia and Côte d’Ivoire
  - Combined, the 15 corridor countries cited were estimated at ~US$1 trillion GDP (as stated).
- Economic growth projections: Iron–bauxite corridor economies projected to grow as high as 6.7% on average in 2025–2030 (as stated), while some corridor countries have achieved 6%+ annual growth over the past decade (examples cited: Rwanda, Guinea).

PANEL SESSION: Index baseline: An evidence-based approach to tracking corridor progress

- Integration and logistics constraints:
  - Intra-corridor trade varies sharply; an example cited was the 3T corridor with only ~1% of trade among corridor countries (99% external).
  - Logistics Performance Index global average cited as 2.4, with most corridor countries below this level except the multi-metal corridor.
  - Six of the 15 corridor countries are landlocked, increasing integration challenges (examples cited: Zambia, Mali, Rwanda, Burundi).
- Financing / investment trend: Greenfield mineral investment declined 43% in 2024 (as stated), with capital shifting toward data centers.
- Infrastructure / energy constraint: World average electricity generation per capita cited as 2,639 kWh, while the 3T corridor average was cited as 98 kWh, described as a major constraint for processing and beneficiation.
- Sustainability and traceability: The report found increased adoption of measures and regulations across corridors (examples cited: Rwanda strengthening action against child labor; creation of mining inspector offices in iron–bauxite corridor countries), but institutional capacity to implement remained weak.
- Data center impact (Q&A):
  - Speaker stated ~90% of US non-residential investment in 2025 went into data centers (as stated).
  - Estimated copper intensity: 30,000–50,000 tons of copper per 1 GW of data center capacity (as stated).
  - Claimed ~63 GW of data center capacity added in the US in 2025, implying ~2.53 million tons of “unanticipated” copper demand (back-of-the-envelope estimate provided by the speaker).

Session summary

The session presented a baseline, data-led assessment of how prepared super region countries—especially five African mineral corridors—are to build resilient mineral value chains. Across the six FMF enablers, the analysis highlighted promising momentum on sustainability and traceability commitments, alongside strong growth potential in several corridor economies.

However, the presentation underscored structural gaps that continue to limit value addition and investor confidence: weak regional integration, poor logistics, constrained greenfield investment, and—most critically—insufficient energy supply for midstream processing. The speaker concluded that future progress will depend not only on stronger standards but on measurable implementation, deeper human-capital development, and sustained investment in infrastructure that enables beneficiation at scale.

“We co-produced this report… and what we present today is the fact base—the baseline of what’s happening to the sector in the super region”

– Dr. Hamid Rashid,
Executive Chairman, Global AI

PANEL SESSION: Sentiment survey: Tracking stakeholder perceptions key enablers of

Chris Coulter
CEO, GlobeScan

This session presented GlobeScan's qualitative research contribution to the FMF Barometer Report 2025, focused on assessing stakeholder readiness to deliver resilient mineral supply chains across the super region. The speaker explained that the work used stakeholder perspectives to diagnose what is working, what is not, and what opportunities exist to improve performance—both within the super region and among external actors such as investors and downstream industries.

GlobeScan conducted 41 in-depth, hour-long interviews with a multinational mix of stakeholders spanning mining and downstream technology companies, senior government officials in the super region, multilateral institutions, academics, and industry associations.

The discussions examined the FMF framework's six enablers—policy, financing, infrastructure, sustainability, talent, and technology—emphasizing their interdependence and their combined role in building confidence and unlocking investment.

A consistent theme across interviews was the centrality of risk—political, economic, policy enforcement, and "ecosystem risk" (the risk that other actors in the value chain will not deliver their part). Stakeholders emphasized that improving readiness requires deliberate derisking, including enforceable policies, coherent standards, credible governance, and stronger cross-border coordination—especially for infrastructure and logistics in landlocked contexts.

The session concluded by previewing a 2026 quantitative survey planned by GlobeScan to measure stakeholder sentiment and trust more systematically across a selection of countries in the super region. The speaker emphasized that the intent is not to "grade" countries publicly, but to provide a constructive feedback loop that supports more transparent dialogue and more effective collaboration over the long-term time horizon of mining and industrial development.

Key insights, data points or predication

- GlobeScan confirmed its contribution to the FMF Barometer 2025 through stakeholder interviews assessing readiness across the six FMF enablers.
- GlobeScan announced a planned quantitative stakeholder survey in 2026 to provide a deeper, data-driven assessment of sentiment, trust, and readiness.
- The 2026 work will assess performance at both country level and aggregate level, while avoiding a "report card" approach; the intent is to support feedback loops and more candid, constructive dialogue.
- The survey will focus on a subset of super region countries—described as approximately 16 to 25 countries depending on final scope—covering mainly Africa and parts of West/Central Asia, plus parts of southern Latin America (as stated).
- Methodology: 41 hour-long interviews with stakeholders across mining, downstream technology, government, multilaterals, academia, and industry associations.
- Six-enabler lens: Stakeholders largely affirmed the relevance of the FMF enablers—policy, financing, infrastructure, sustainability, talent, technology—and emphasized that progress depends on moving them forward together, not sequentially.
- Financing constraint: Foreign direct investment (FDI) in the super region was described as minimal and declining recently, and investor hesitation is driven mainly by unbounded risk and long payback periods.
- Policy as derisking: Stakeholders emphasized that policy must be enforceable, and that harmonization across governments is important—while still respecting local nuance and national priorities.
- Sustainability as risk management: ESG was widely seen not as optional, but as a core risk-management lens and "insurance policy" for long-term returns; transparency, reporting, and enforcement remain major gaps.
- Standards fragmentation: Multiple, inconsistent ESG requirements create duplication; stakeholders suggested harmonization through credible frameworks (an example cited was ICMM as a potential reference point).
- Talent gap: Persistent need for STEM education, engineers, and centres of excellence; talent deficits constrain the ability to deploy technology and build infrastructure at pace.
- Infrastructure bottleneck: Logistics, transport, energy and cross-border infrastructure gaps are widely seen as the most visible blocker; stakeholders recognized the "chicken-and-egg" challenge between infrastructure and investment.
- Technology readiness lag: Technology is available but expensive; adoption requires financing and local capability, and stakeholders highlighted growing attention to AI applications.
- Readiness diagnosis (qualitative): Financing and policy were described as "middling but unlockable"; sustainability viewed as necessary but implementation-dependent; talent, infrastructure, and technology were widely perceived as behind across much of the super region.

PANEL SESSION: Sentiment survey: Tracking stakeholder perceptions key enablers of

- Time horizon: Stakeholders reinforced that mining development is a 30–40-year endeavor; progress depends on sustained collaboration, transparent dialogue, and trust-building mechanisms.

Session summary

GlobeScan's findings underline that stakeholder confidence in the super region hinges on credible derisking across the FMF's six enabling conditions. Investors and other decision-makers are not only assessing country risk, but also the integrity of the broader ecosystem—whether policy will be enforced, whether infrastructure will materialize, whether ESG commitments will be implemented, and whether talent and technology capability can be built locally.

The session closed with a forward-looking agenda: a 2026 quantitative survey to deepen measurement of trust and readiness, and to strengthen feedback loops without resorting to simplistic "grading." The speaker emphasized that long-term delivery will require coordinated progress across all enablers, with collaboration and trust positioned as essential drivers of speed, scale, and durability.

"There was strong alignment across stakeholders on the necessity of sustainability and ESG—as a way to de-risk opportunities and enable long-term returns"

– H.R.H. Prince Abdulaziz bin Salman Al Saud, Minister of Energy, Saudi Arabia

PANEL SESSION: FMF Dashboard: Tracking developments in the Critical Minerals Framework

Agesan Rajagopaul
Partner - Africa Metals and Mining Leader, McKinsey & Co.

Mzila Mthenjane
Chief Executive Officer, Minerals Council South Africa

Richard Rothernberg
Chief Executive Officer, Global AI

Dr. Gracelin Baskaran
Director, Critical Minerals Security, Center for Strategic and International Studies (CSIS)

This panel examined how the FMF Critical Minerals Framework is translating into measurable progress across the "super region," with a focus on accountability, execution, and the practical enablers needed to scale resilient mineral value chains. The discussion referenced the FMF Barometer and dashboard as mechanisms to track progress and identify where acceleration is most needed across corridors and jurisdictions.

Speakers described progress as uneven but improving, noting convergence between FMF priorities and other international policy dialogues. The panel highlighted two parallel dynamics: (i) rising commercial focus on emerging mining jurisdictions in Africa, Central Asia and parts of Latin America as long-duration sources of future supply; and (ii) intensified efforts by consuming and investor countries to secure minerals amid geopolitical tension, including innovative financing and human-capital initiatives.

A central theme was investability: panelists emphasized policy stability, enforceable rules, and targeted government mechanisms (including equity, price support and offtake structures) to de-risk early-stage and higher-risk jurisdictions.

The discussion also addressed the cost of capital and the limitations of traditional risk rating approaches, pointing to blended finance and alternative data tools as emerging ways to better differentiate risk across countries.

Infrastructure progress was viewed as tangible in transport and logistics corridors, while energy infrastructure was framed as the more difficult constraint, with implications for social license to operate. On traceability, speakers argued that requirements are expanding due to diversification and security imperatives, but implementation must remain linked to ethics, ESG performance, and clear impact metrics—rather than being treated as a purely technological compliance exercise.

Key insights, data points or predication

- Panelists referenced the FMF's annual Barometer and dashboard as mechanisms to monitor execution and enable accountability across corridors.
- Government-backed financing models were cited as emerging tools to mobilize capital into higher-risk jurisdictions, including:
  - Public–private blended finance structures and partnerships (example referenced: Orion fund involvement and partnership with a development finance actor).
  - National-level signaling funds (South Africa example cited: an exploration fund of ~400 million RAND, described as about US$20 million at the time, intended as a signal to crowd in private capital).
- Infrastructure was highlighted as an area for continued acceleration, with specific interest in scaling "pit-to-port" ecosystems and ensuring energy generation/transmission benefits communities.
- For 2026, panelists articulated "next steps" priorities rather than formal commitments:
  - Stronger policy urgency and stability signals from governments.
  - Clearer private-sector commitments and capital announcements in harder jurisdictions.
  - Practical progress on exploration/geology data, and accelerated talent/technology efforts.
- The "super region" was described as comprising 80+ countries and accounting for 50%+ of global critical mineral extraction (as stated by a panelist).
- FDI into critical mineral projects in the super region was described as having fallen more than 70% in the last couple of years (as stated), driven by energy constraints, limited infrastructure, financing gaps and perceived country risk.
- Two "lanes" of progress were identified:
  - Emerging jurisdictions shifting from an "aid/development lens" to commercial diplomacy and private-sector investment focus.
  - Consuming/investor countries increasing efforts to secure minerals amid geopolitical tensions, including investment in human capital and innovative finance.
- Human-capital pressure in mature markets was cited as a driver: the US mining workforce faces ~220,000 retirements in the coming years (as stated).
- Government intervention tools to de-risk early industries were highlighted: price support, equity, and offtake mechanisms, illustrated through references to US industrial policy approaches and a US-linked deal example (mentioned in transcript).

PANEL SESSION: FMF Dashboard: Tracking developments in the Critical Minerals Framework

- Cost of capital was framed as a growing constraint, with concerns that traditional ratings can apply a “single risk premium” across diverse African markets; speakers cited interest in alternative data and AI-driven approaches to refine risk assessment.
- Infrastructure progress was viewed as stronger for transport corridors (enabling wider economic nodes beyond mining), while energy infrastructure was framed as the key bottleneck and a driver of social license tensions.
  - Examples cited: very low rural electrification in parts of Africa (e.g., 1% rural electrification in rural DRC and ~20% in Kinshasa; sub-20% rural electrification in Tanzania—figures stated by a panelist).
  - Africa-wide challenge cited: ~600 million people without access to energy (as stated).
- Traceability was presented as increasingly central due to supply-chain diversification and security imperatives, and also as relevant to conflict and peacebuilding dynamics—alongside ESG and impact expectations.
- Data center demand was cited as a new driver: 30,000–50,000 tons of copper per 1 GW of data center capacity (as stated), reinforcing urgency for new supply and infrastructure.
- 2026 priorities voiced by panelists included:
  - More decisive policy action and capital mobilization.
  - “Bold” private-sector moves into harder jurisdictions to catalyze broader efforts.
  - More progress on geology/exploration transparency, plus technology and higher skills to reshape long-term mining impacts.

Session summary

The panel concluded that while progress on the FMF Critical Minerals Framework is visible, it is uneven across corridors and jurisdictions, and will require tighter alignment between policy stability, financing mechanisms, and enabling infrastructure—particularly energy. Speakers emphasized that governments have a central role in de-risking early investment conditions, while private-sector capital announcements in more challenging jurisdictions can act as a powerful catalyst for broader ecosystem mobilization.

Looking ahead to 2026, panelists highlighted practical priorities: stronger and more urgent policy support, blended finance to crowd in private capital, accelerated work on geology and exploration, and a step-change in talent and technology to enable productivity, transparency, and sustained societal benefit. The session closed with an emphasis on measurable execution and accountability as the differentiator between frameworks and real-world delivery.

“Traceability has multiple dimensions: ethical sourcing and conflict concerns, but also measurable impact and ESG performance—technology alone doesn’t replace responsible conduct”

– Mzila Mthenjane,
Chief Executive Officer,
Minerals Council South Africa

FIRESIDE CHAT: Recommendations and way forward

Patricia Bingoto
Senior Expert, GEM Expert – Metals & Mining Practice, McKinsey & Company

Aurian De La Noue
Executive Director, Consulting, S&P Global

Dr. Hamid Rashid
Executive Chairman, Global AI

Chris Coulter
CEO, GlobeScan

This closing “Way Forward and Recommendations” session positioned the FMF Barometer as an operational tool to translate the FMF agenda into measurable progress across the mineral value chain. The moderator outlined the Barometer’s purpose: tracking supply–demand dynamics, vulnerabilities, and geopolitical/macroeconomic impacts, while maintaining a forward-looking lens on risk management, sustainability, transparency, and policy effectiveness.

Panelists discussed how future editions of the Barometer can refine the signals that matter most to governments and investors—particularly price signals, exploration activity, and macro trends that shape investment appetite.

S&P Global emphasized that critical mineral price monitoring must adapt as battery chemistries evolve and as price assessments expand (including planned rare earth pricing), ensuring the index remains relevant to the “super region.”

GlobeScan shared insights from stakeholder interviews showing strong enthusiasm for the critical minerals opportunity, paired with heightened awareness of implementation risk. Interviewees consistently underscored the complexity of aligning the six FMF enablers—policy, financing, sustainability, infrastructure, talent and technology—and warned against rushed execution that compromises long-term durability and social license.

Global AI stressed that the macro outlook is a “moving target” and that the Barometer should distinguish short-term volatility from long-term structural trends. The panel converged on the view that progress depends on easing structural bottlenecks—especially energy constraints and midstream capacity—while strengthening talent pipelines and reducing the effective cost of capital through improved productivity, institutional quality, and credible ESG performance.

Key insights, data points or predication

Next edition improvements flagged by panelists (direction of travel):

- Evolving the Critical Minerals Price Index to reflect changing battery chemistries and expanding price assessments (including rare earth pricing assessments planned for next year, as stated by S&P Global).
- More granular macro interpretation separating short-term shocks from long-term trends to avoid misleading policy/investment signals.
- Deeper energy benchmarking specific to mining and minerals (upstream and midstream), acknowledging energy shortages as a core bottleneck for beneficiation.
- Expanded monitoring of exploration conditions, focusing on regulatory/fiscal stability and “ease of doing business” factors that enable grassroots exploration.
- Strengthening the talent lens by tracking engineering and mining-skills pipelines, mining schools, and centers of excellence as enablers of technology transfer.
- Adding stakeholder feedback loops with more quantitative input in future Barometer iterations (as GlobeScan noted, building on interviews).

Practical call-to-action for readers:

- The moderator encouraged participants to access and read the current Barometer edition via the FMF website.
- Barometer positioning: designed to operationalize FMF agenda and track progress across the mineral value chain, emphasizing sustainability, transparency, and policy effectiveness (as stated by the moderator).
- Price signals & index evolution: S&P Global noted price indices must adapt as battery chemistries change and as coverage expands; rare earth price assessments are being developed for next year (as stated).
- Copper price context: copper referenced as crossing $13,000 per ton (prompted by the moderator).
- Data center-driven demand shock: the US reportedly added 63 GW of data centers in the previous year, requiring ~2–3 million tons of copper, contributing to higher copper prices (as stated by Hamid Rashid).
- Exploration spend: global mining exploration spend for 2025 cited at $12.6 billion, roughly flat vs 2024; grassroots exploration was cited at ~20% of total exploration spend (as stated by Arian Delano).
- Exploration drivers & constraints: exploration follows commodity prices but depends heavily on stable regulatory and fiscal systems, and on being able to move capital and operate without excessive “regulatory bypasses” (as described).
- “Six enablers” reinforced by stakeholder research: financing, policy, sustainability, talent, infrastructure, technology; stakeholders expressed optimism but flagged execution risk and the need to “move at the speed of trust.”
- Energy as beneficiation bottleneck: energy shortage described as acute for mining/minerals and decisive for scaling processing, refining and smelting (midstream).
- Talent gap framing: China cited as producing ~20,000 mining engineers per year, while across Sub-Saharan Africa / super region there are fewer than 20,000 mining engineers altogether (as stated by Hamid Rashid).

FIRESIDE CHAT: Recommendations and way forward

- Cost of capital logic: panelists argued that productivity, institutional quality and ESG performance feed into the "true" cost of capital; lowering debt capital cost was highlighted as especially important (as stated).

Session summary

The session concluded by reaffirming the FMF Barometer as a practical, forward-looking instrument to guide policy makers, investors, and industry stakeholders in navigating the rapidly evolving critical minerals landscape. Panelists emphasized that while price signals and short-term market movements are important, long-term structural trends—particularly energy availability, midstream capacity, talent development, and policy coherence—must guide decision-making to avoid volatility and misaligned investments.

A strong consensus emerged around the need to move beyond fragmented indicators toward an integrated assessment of the six FMF enablers: policy, financing, sustainability, infrastructure, talent, and technology. Contributors highlighted that future editions of the Barometer should deepen granularity, incorporate clearer differentiation between short-term shocks and long-term trends, and strengthen stakeholder feedback loops to track real progress and friction points across the super region.

The session closed with a shared call to frame critical minerals not only as a market opportunity, but as a long-term global cause—one that requires coordination, trust, and a compelling vision capable of mobilizing governments, investors, industry, and the next generation of talent.

"There is strong enthusiasm for the opportunity, but stakeholders are clear that coordination, trust, and thoughtful execution will determine long-term success"

– Chris Coulter,
CEO, GlobeScan

Knowledge Exchange Agenda

Link and Dome

KNOWLEDGE EXCHANGE AGENDA

Day 1

Tuesday 13 January 2026

Link

PANEL SESSION: Enabling 4.0 technologies to accelerate mineral project delivery and reduce costs

Jim Paterson
Principal,
Discovery Group

Dr. Moath Al Rawi
Chair, Geovai

Christian Aramayo
Chief Operating Officer and Director,
Kuya Silver

Prof. George Turkkiyah
Research Professor,
King Abdullah University of Science and Technology, KAUST

This session explored the practical role of artificial intelligence (AI) in transforming mineral exploration and mining operations, with a focus on cost reduction, time compression, and improved decision-making. Panelists examined whether AI is delivering genuine Mining 4.0 outcomes or whether its current adoption is constrained by data quality, economic incentives, and unrealistic expectations.

Speakers discussed how recent advances in data availability, computing power, and machine learning have enabled new approaches to exploration, including the integration of historical geological data, remote sensing, and probabilistic modeling. Real-world examples demonstrated how AI-supported targeting can significantly shorten exploration timelines and reduce upfront costs.

At the same time, the panel emphasized the limitations of current AI systems, particularly their dependence on high-quality geological and geophysical inputs. The discussion highlighted the importance of positioning AI as a decision-support "co-pilot," rather than a replacement for human expertise or scientific judgment.

The debate also addressed broader ecosystem challenges, including underinvestment in mining technology, the need for national-scale data platforms, and the role of governments in enabling access to geological data. The session concluded with reflections on how AI could evolve into a trusted digital assistant for geologists, accelerating discovery while preserving scientific rigor.

Key insights, data points or predication

- Mining companies are increasingly using AI and machine learning to fast-track exploration and reduce early-stage costs.
- Panelists highlighted the need for government-led or multi-government geological data platforms to improve AI accuracy and reliability.
- Saudi Arabia was cited as an example of a jurisdiction actively enabling AI-driven exploration through data access, permitting support, and openness to innovation.
- Speakers emphasized continued investment in dedicated mining technology teams and AI development tailored specifically to industry needs.
- AI adoption in mining has accelerated due to the convergence of large datasets, advanced algorithms, and increased computing power.
- AI-supported exploration can significantly reduce discovery timelines, in some cases moving from licensing to drilling within months.
- Machine learning excels at prioritization and probability ranking but remains dependent on high-quality geological and geophysical inputs.
- National-scale data aggregation increases the predictive power of AI models and reduces exploration uncertainty.
- The largest financial impact of AI lies in shortening the path from discovery to production, potentially saving billions in capital expenditure.

Session summary

The session concluded that AI represents a transformative but still evolving capability for the mining industry. When applied responsibly, AI can dramatically improve efficiency, reduce costs, and accelerate discovery by supporting geologists with advanced data interpretation and pattern recognition.

However, panelists cautioned against overstating AI's capabilities or treating it as a substitute for fundamental geological work. The future of Mining 4.0 lies in integrating AI as a trusted co-pilot—enhancing human expertise, strengthening decision-making, and ensuring that innovation is grounded in sound science and reliable data.

> **"AI today works on statistical probability; it can guide decisions, but it cannot replace scientific understanding or the value of geological data"**
>
> – Dr. Moath Al Rawi,
> Chair, Geovai

PANEL SESSION: Overcoming processing complexity for rare-earth elements (REE): Rethinking barriers to meet growing demand

Prof. Mostafa Benzaazoua
Director of the Geology & Sustainable Mining Institute, University Mohammed VI Polytechnic

Kamran Khozan
Chairman and Chief Executive Officer, CVMR Corporation

Kirill Kozenyashev
Partner, EY-Parthenon Strategy Middle East

Dr. Muhammed Imran
Vice President, Rare Earth Elements Division, Saskatchewan Research Council (SRC)

This session examined why rare earth elements (REEs) remain strategically critical yet operationally difficult to bring to market, focusing on the complexity and cost drivers of processing across the value chain. Speakers emphasized that the central challenge is not the geological presence of REEs, but rather beneficiation, cracking, separation, purification, and refining—steps that determine whether a deposit can be commercially viable and environmentally responsible.

Panelists discussed how ore bodies differ significantly in chemistry, grades, and deleterious elements, making each REE project a unique processing proposition that requires piloting and careful scale-up planning.

The discussion highlighted the industry's reliance on conventional solvent extraction—often involving hundreds of stages—while noting that alternative technologies (such as ionic separation and membrane systems) are still largely unproven at commercial scale and require patience and sustained investment.

The session also addressed the geopolitical and market realities shaping the sector, including China's dominance across upstream, midstream, and downstream segments, and the resulting push by other regions to establish processing hubs and resilient supply chains. Speakers stressed that cost comparisons must reflect "full cost," including environmental liabilities and long-term tailings management.

Finally, the panel explored forward-looking levers to strengthen REE supply: applying AI to optimize processing operations, expanding recycling to supplement primary supply, and accelerating research into substitution where scarcity or cost pressures intensify. The overall message was that competitive REE supply chains outside dominant players will depend on sustainable processing, technology maturation, and coordinated ecosystem investment.

Key insights, data points or predication

- Saskatchewan (Canada) investment (2020): The Government of Saskatchewan invested to build a rare earth processing hub via SRC, aiming to strengthen domestic capability across processing stages.
- SRC technology development: SRC reported developing in-house processing technologies over the past five years, integrating AI-enabled hydrometallurgy, solvent extraction, and metallization approaches.
- Scaling through piloting: Speakers emphasized that each project must undertake piloting to validate scalable production, given deposit-specific chemistry and processing pathways.
- AI for operational control: The panel highlighted the use of AI to manage complex separation plants—reducing reliance on large operator teams and improving process stability.
- Value concentration: An estimated 80–90% of value in REEs is associated with processing and separation, not mining.
- China's market position (as stated): China holds approximately 60% upstream, ~90% midstream, and ~93–94% downstream share, driven by decades of sustained investment and know-how.
- Deposit uniqueness: No two REE deposits are "standard"—variation in ore chemistry and deleterious elements drives unique process design and economics for each project.
- Separation bottleneck: Conventional solvent extraction can require hundreds of stages, making it capital- and operations-intensive; alternatives (ionic separation, membrane technologies) are being explored but are not yet widely commercialized per the discussion.
- Operational complexity: A separation plant handling several key elements may require hundreds of cells and thousands of operating variables, historically managed by experienced labor; AI is seen as a pathway to reduce dependence on scarce expertise.
- Small-volume economics: REE volumes are relatively small compared to bulk commodities, making the market more volatile and sensitive to new supply, recycling flows, and price manipulation.
- Recycling dynamics: Recycling can provide cleaner feedstock and potentially faster permitting/time-to-market, but supply depends on end-use life cycles (magnets, turbines) and does not eliminate separation requirements.
- Substitution pressure: As costs rise and supply becomes constrained, substitution R&D was highlighted as an emerging factor that could reshape demand patterns.

Session summary

The panel concluded that rare earth elements are foundational to modern technology and the energy transition, yet the true barrier to supply growth lies in processing—especially cracking, separation, purification, and refining. Each deposit requires tailored process design and piloting, and competitiveness increasingly depends on sustainable, full-cost approaches rather than narrow cost comparisons that exclude environmental liabilities.

Looking ahead, speakers emphasized that building resilient REE value chains outside dominant hubs will require coordinated investment in processing capacity, technology maturation, and specialized talent. AI-enabled operational optimization, recycling as a supplementary supply source, and substitution research were framed as complementary pathways—together shaping a more diversified, sustainable rare earth ecosystem over the coming decade.

PANEL SESSION: Startups and disruptors: Latest developments in technology for a step change in mineral development

Scott North
Co-Founder,
Yeti Ventures

Mohammed Doghmi
Chief Executive Officer, Alkhorayef Mining Company

Roman Teslyuk
Chief Executive Officer, Earth AI

Nathan Williams
Chief Executive Officer, Minespider

Pascal Lacourie
Chief Executive Officer, EPC Asia Pacific

This session examined how startups and emerging technology providers can help deliver a step-change across the mineral value chain—from exploration and development through production and downstream operations—by accelerating adoption of AI, digitization, and data-driven decision-making. The panel framed Saudi Arabia as a "blank slate" with an opportunity to embed modern standards from day one and leapfrog legacy approaches used in more mature jurisdictions.

Speakers highlighted a growing global paradox: trillions of dollars are flowing into advanced technologies and high-tech manufacturing, yet mineral exploration and mining—critical to supplying these industries—remain comparatively underfunded and slow to scale.

The discussion emphasized the urgency of shortening the typical 15–18 year timeline from discovery to production, particularly given projected demand for critical minerals needed for new factories and emerging technologies.

A central theme was the need to treat data as a foundational asset. Panelists argued that end-to-end digitization—covering drilling logs, core data, site due diligence, shipments, and processing—can enable faster iteration cycles, better efficiency, and improved decision-making. Oil and gas was repeatedly cited as a relevant benchmark, having built real-time operational data centers and integrated multidisciplinary workflows that materially shortened development cycles.

The session also explored enabling conditions beyond technology, including regulatory clarity, incentives for early adopters, and standards that make data collection and digital compliance the fastest pathway to permits and licenses. The panel concluded that aligning regulators, industry, and technology providers around clear objectives and measurable performance (including productivity and waste reduction) is essential to realizing Mining 4.0 outcomes at scale.

Key insights, data points or predication

- Earth AI described a vertically integrated exploration model, combining AI-driven target generation with in-house geology, land staking/mineral rights acquisition, and drilling execution to accelerate development.
- Panelists called for mandated minimum data acquisition requirements tied to concessions to prevent loss of critical information and enable future reprocessing and reinterpretation.
- Speakers encouraged regulators to create clear, technology-enabled compliance pathways—making digitization and data standards the fastest route to permits, mining licenses, and trading licenses.
- The discussion emphasized adopting integrated, multidisciplinary workflows (analogous to oil & gas) to reduce sequential delays and accelerate decision cycles.
- EPC Asia-Pacific referenced ongoing deployment of an end-to-end operational data ecosystem across drilling, blasting, and downstream performance monitoring, including KPI tracking to improve productivity and reduce waste.
- Timeline pressure: Mines often take 15–18 years from discovery to production; the panel argued this is increasingly misaligned with near-term growth in demand for critical minerals.
- Oil & gas benchmark examples (cited by panel):
- Liza oil field (Guyana): discovery 2015, first oil 2019 (≈4 years).
- Jafura gas field (Saudi Arabia): discovery 2019, first gas December 2025 (≈6 years).
- Core proposition: "Data is value"—digitizing and storing core, drilling, and subsurface data from the outset preserves optionality to reprocess and extract new insight as technology advances.
- Adoption barriers: Mining faces slower tech uptake due to risk of disrupting existing operations and mismatch between venture capital time horizons and long project development cycles.
- Supply chain digitization: A low share of supply chains is digitally documented (panel reference: "around 1%"), limiting the ability to deploy AI at scale and to enable digital trade documents and product passports.
- Shift in drivers: Digitization is increasingly linked not only to ESG, but also to market access, tariffs, and geopolitical risk, strengthening the business case for traceability.
- Operational optimization: Integrated data from drilling-to-blasting-to-downstream outcomes supports KPI-based performance management, waste reduction, and productivity improvements.

Session summary

The panel concluded that Mining 4.0 will be shaped by the ability to embed technology and data standards early—especially in emerging mining jurisdictions with the opportunity to design systems without legacy constraints. Startups and disruptors can accelerate progress by enabling faster discovery, tighter operational feedback loops, and integrated decision-making across exploration, development, and production.

Speakers emphasized that the biggest accelerators will be clear regulatory frameworks, mandatory minimum data acquisition, and industry-wide digitization—from core sheds and drilling logs to supply chain traceability. With aligned objectives across regulators, industry, and technology providers, Saudi Arabia was positioned in the discussion as a potential leader in leapfrogging toward real-time, data-driven mineral development at scale.

PANEL SESSION: Are we making progress in decarbonizing mineral production? What more needs to be done?

Moderator

Amanda van Dyke
Founder, Critical Minerals Hub

Navaid Alam
Chief Executive Officer and President, EVelution Energy

Prof. Bassam Dally
Professor, KAUST

Björn Jonsson
Business Line Manager Mining & Materials, ABB

This session examined whether the global minerals and metals industry is decarbonising at a pace consistent with climate targets, and what practical actions are required to accelerate progress. The discussion focused on the real-world constraints facing producers, including rising demand for materials, capital intensity, and uneven economic incentives for low-carbon production.

Panelists highlighted that while meaningful progress is being made through electrification, renewable energy integration, and process optimisation, these gains are often offset by rapid growth in demand for steel, cement, copper, and other critical materials. As a result, decarbonisation must be assessed holistically across both power and thermal energy use, and across different commodities with varying technical constraints.

The conversation emphasized that the next two to three decades should be treated as a transition period, where hybrid solutions—such as partial renewable integration and incremental electrification—can deliver emissions reductions without undermining competitiveness. Speakers stressed that decarbonisation strategies must balance climate ambition with operational and financial realities.

Finally, the session explored the enabling role of governments, ecosystems, and collaboration. Access to competitively priced low-carbon energy, regulatory certainty, and partnerships between industry, technology providers, and academia were identified as essential to scaling decarbonisation.

Saudi Arabia was discussed as an example of a jurisdiction attempting to embed advanced technologies and low-carbon pathways from an early stage of sector development.

Key insights, data points or predication

- EVelution Energy outlined the development of a solar-powered cobalt processing facility in Arizona (USA), producing cobalt metal for aerospace and defense applications and cobalt sulfate for electric vehicle batteries.
- The facility aims to recycle approximately 70% of its process water and avoid tailings ponds by operating as a processor rather than a miner.
- ABB referenced ongoing deployment of electrification solutions in mining, including vehicle electrification and infrastructure that improves productivity while reducing emissions.
- Panelists underscored the need to accelerate deployment of existing technologies, rather than waiting for perfect future solutions, supported by ecosystem collaboration and enabling policy frameworks.
- Demand pressure: Steel demand increased by approximately 30% between 2011 and 2021, illustrating how rising consumption can offset efficiency gains.
- Energy dimensions: Decarbonisation requires addressing both electric power and high-temperature thermal processes, with varying feasibility by commodity.
- Hard-to-abate sectors: Cement, steel, and aluminium remain among the most challenging materials to fully decarbonise due to thermal intensity.
- Hybrid pathways: Partial renewable integration (rather than 24/7 renewable operation) can deliver near-term emissions reductions at lower cost.
- Economics over premiums: For bulk minerals and metals, decarbonisation is more strongly driven by long-term competitiveness, regulation, and access to capital than by consumer willingness to pay green premiums.
- Saudi Arabia context (as stated): Saudi Arabia's mining sector was referenced as approximately 1% of global output, with significant untapped resource potential and a policy focus on low-carbon industrial development under Vision 2030.

Session summary

The session concluded that decarbonisation in the minerals sector is advancing, but not fast enough to counterbalance rising global demand. While electrification and renewable energy are delivering tangible progress, the industry must rely on transitional and hybrid solutions in the near term, particularly for hard-to-abate materials.

Speakers emphasized that success will depend less on consumer green premiums and more on structural enablers: affordable low-carbon energy, regulatory certainty, and collaboration across industry, technology providers, and academia. With these elements in place, the panel suggested that emerging mining jurisdictions—such as Saudi Arabia—have an opportunity to embed low-carbon pathways from the outset and move faster than legacy systems elsewhere.

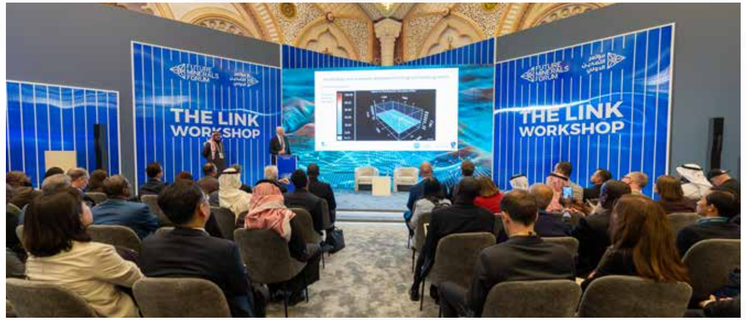
"Electrification is one of the biggest levers we have—electric mining equipment often delivers higher productivity and lower maintenance costs"

– Björn Jonsson, Business Line Manager, Mining & Materials, ABB

PRESENTATION: Accelerating mineral resource development through geometallurgy and AI

Prof. Hylke J. Glass
Professor of Mining and Minerals Engineering, Camborne School of Mines, University of Exeter

Dr. Rakan Abdulwahed
Mining Engineer, Saudi Geological Survey



This session presented a structured framework for accelerating mineral resource development by integrating geometallurgy, risk management, and artificial intelligence from the earliest stages of a project. The central premise was that development delays and cost overruns are often driven by unmanaged geological variability and uncertainty, which can be mitigated through strategic geometallurgical thinking.

The speakers distinguished between strategic geometallurgy, applied during exploration and project definition, and tactical geometallurgy, applied during operations to optimize production outcomes.

Strategic geometallurgy focuses on building spatially informed models that link geology, processing behavior, and value, while tactical geometallurgy supports short-term decision-making to meet production and economic targets.

Using real-world analogies and technical examples, the session demonstrated how conventional grade-focused approaches fail to capture the complexity of ore behavior. Multivariate data analysis, geostatistics, clustering, and simulation techniques were discussed as tools to characterize variability, while also highlighting their inherent uncertainty and limitations when used in isolation.

The session concluded by proposing a next-generation approach that integrates large language models (LLMs) into geometallurgical workflows. By treating geological, metallurgical, and operational data as a structured "language," AI systems can support long-range, multi-scale decision-making, ultimately accelerating development timelines while managing technical and financial risk.

Key insights, data points or predication

- The presenters proposed a multi-agent AI architecture for geometallurgy, consisting of separate but interacting agents for geology, recovery, and plant operations.
- A digital twin approach was recommended to test AI-enabled geometallurgical models using synthetic data before operational deployment.
- The session called for benchmarking geometallurgical practices across projects to standardize best practices and improve comparability.
- Speakers emphasized the importance of sharing anonymized historical datasets to accelerate AI development while managing confidentiality risks.
- Integration of AI-enabled geometallurgy into education and workforce training was identified as a critical enabler for future adoption.
- Primary risk driver: Geological variability is a major source of financial and operational risk in mining projects.
- Data challenge: Most projects lack sufficient geometallurgical data and rely heavily on proxies derived from readily available geological information.
- Model limitations: Conventional geostatistical and lithological simulation techniques can yield materially different results, reinforcing the need to explicitly manage uncertainty.
- Strategic value: Early-stage geometallurgical modelling supports better targeting, exploration prioritization, and development sequencing.
- AI opportunity: Transformer-based large language models can process long sequences of spatial and temporal data, overcoming limitations of earlier neural network approaches.
- Integrated decision-making: AI systems can link geology, mining, processing, stockpiling, and market outcomes into a single optimization framework.
- Future direction: AI-enabled geometallurgy has the potential to shorten development timelines by improving confidence in technical and economic decisions.

Session summary

The session demonstrated that accelerating mineral resource development requires a shift away from grade-centric thinking toward integrated, risk-aware geometallurgical frameworks. By explicitly managing geological variability and linking spatial and temporal models, strategic geometallurgy can reduce uncertainty early in the project lifecycle, while tactical geometallurgy supports operational optimization.

The proposed application of large language models represents a step change in how complex, multivariate mining systems can be understood and managed. While challenges remain—particularly around data availability, uncertainty propagation, and physical constraints—the session concluded that AI-enabled geometallurgy offers a credible pathway to faster, more resilient, and more value-driven mineral development.

PANEL SESSION: Tackling the data challenge in geological surveying and exploration

Moderator

Jim Paterson
Principal, Discovery Group

Killian Charles
President and Chief Executive Officer, Brunswick Exploration

Dr. Janina Elliott
Segment Director, Mining, Seequent

Wayne Koshman
Chairman & Chief Executive Officer, Kenz Global Resources

Tom Bryan
Executive Strategic Lead – Exploration and Development, Gold and Minerals Ltd.

This session explored how exploration companies, technology providers, and geological institutions can better manage the growing volume and complexity of geoscience data to accelerate decision-making and shorten discovery cycles. The panel focused on practical challenges faced in Saudi Arabia, including working with legacy datasets, field execution constraints, and the need to integrate multidisciplinary inputs into actionable targeting strategies.

Speakers emphasized that the core issue is not the quantity of data available, but the ability to process it quickly enough to guide field programs and drilling decisions.

Participants discussed the operational consequences of slow laboratory turnaround, fragmented workflows, and data trapped across hard drives, cloud platforms, and non-standard formats—factors that can delay action and increase cost.

The session contrasted contexts where extensive historical datasets exist (e.g., precious metals and copper exploration supported by major survey work) with commodities such as lithium where legacy exploration is limited or non-existent. In both cases, panelists highlighted the need to extract value from imperfect or proxy data sources, identify what is missing, and deploy rapid validation methods in the field.

Across the discussion, a consistent message emerged: accelerating exploration requires open and interoperable data systems, faster field-to-decision feedback loops, and strengthened workforce capabilities that combine traditional geoscience expertise with data science and AI literacy. Saudi Arabia's progress on digitization and open access to geological information was framed as a positive enabler that can be built upon through collaboration and technology adoption.

Key insights, data points or predication

- Kent's Global Resources reported establishing a local subsidiary and two joint ventures in Saudi Arabia, and winning 12 blocks in bid round nine (with a total position of 14 blocks) with a Saudi partner.
- Kent's described plans to fast-track sampling and targeting using field-enabled tools (e.g., XRF and hyperspectral techniques) to reduce dependence on slow lab turnaround and guide drill targeting.
- Brunswick Exploration indicated continued expansion of lithium exploration into new jurisdictions, including Saudi Arabia, applying rapid field decision approaches and proxy datasets where legacy lithium data is absent.
- Seequent emphasized willingness to build partnerships with operators and explorers to support faster, multidisciplinary interpretation using open systems and integrated workflows.
- Panelists collectively encouraged a more collaborative industry culture in Saudi Arabia, including sharing lessons learned and improving access to digitized geological resources to accelerate exploration outcomes.
- Turnaround time risk: Long laboratory lead times can prevent timely follow-up, especially in seasonal field environments, creating major execution delays.
- Rapid field validation: On-site geochemical tools (e.g., XRF) and fast interpretation approaches enable quicker go/no-go decisions and more efficient drill targeting.
- Legacy data remains valuable: Historical survey work and mapping (including hand-drawn logs, sections, and maps) can remain relevant decades later, but must be digitized and made interpretable for modern workflows.
- Commodity asymmetry: Lithium exploration faces a distinct challenge due to limited historical datasets; explorers rely on reinterpretation of older maps, proxy mineral indicators, and first-time data creation.
- Scale challenge: Large land areas and broad license portfolios require time-efficient methods to prioritize targets and avoid spending months "just analyzing" without field execution.
- Open data as an accelerator: Digitization initiatives—such as making geological libraries and mineral occurrence databases open-access—reduce friction and speed early-stage work.
- Workforce capability: The sector needs to scale geoscience capacity by combining traditional geological expertise with data science and AI understanding to accelerate insight generation.

Session summary

The session reinforced that the mining and exploration sector's competitive edge increasingly depends on how quickly teams can translate complex, multidisciplinary datasets into confident field decisions. Whether working with abundant legacy information or operating in data-sparse commodities such as lithium, panelists agreed that rapid feedback loops—enabled by field technologies, integrated platforms, and open data access—are essential to shorten discovery timelines and reduce cost.

Speakers also emphasized that technology alone is insufficient without the right ecosystem: open and interoperable systems, a collaborative culture, and a workforce equipped to merge geoscience and data science. In the Saudi context, ongoing digitization and improved access to geological information were highlighted as strong foundations that, if paired with faster execution and cross-industry collaboration, could meaningfully accelerate exploration success.

PRESENTATION: Utilizing emerging technologies for mineral deposit predictions: new insights from geodynamic models

Dr. Thamer Aldaajani
General Director, Mining & Hydrocarbons Technologies Institute, King Abdulzaziz City for Science & Tcehnology (KACST)

This session explored how computational geoscience and geodynamic modelling can be used to accelerate mineral exploration and improve prediction of mineral deposits, particularly in tectonically active regions such as the Red Sea and the Arabian-Nubian Shield. The presentation aimed to demonstrate how emerging technologies—originating from mechanical engineering and planetary sciences—can be adapted to mineral exploration challenges.

The speaker introduced geodynamics as a discipline focused on understanding the forces driving deformation, rather than merely describing geological structures.

By applying physics-based numerical models governed by conservation laws of momentum, energy, and mass, geodynamics enables researchers to simulate tectonic processes over geological timescales and link them to mineral system elements such as sources, pathways, traps, and thermal regimes.

Using the Red Sea rift system as a case study, the session illustrated how large-scale tectonic evolution controls structural pathways, heat flow, and fluid circulation that influence mineral prospectivity. Integrated datasets—including gravity, magnetic, and topographic data—were shown to provide boundary conditions for numerical models that can generate predictive prospectivity maps.

The presentation concluded by positioning geodynamic modelling, when integrated with AI and machine learning, as a high-risk but potentially high-reward technology capable of reducing exploration cost, guiding industry validation, and supporting next-generation mineral discovery strategies.

Key insights, data points or predication

- KACST is applying numerical geodynamic modelling to better understand mineral systems associated with the Red Sea and Arabian-Nubian Shield.
- Integrated gravity, magnetic, and topographic datasets are being used to construct regional structural models that inform prospectivity mapping.
- The work aims to generate testable predictions that can be validated by industry and geophysical observations.
- The approach emphasizes future integration of AI and machine learning to enhance model performance and scalability.
- Collaboration with international academic partners (including Penn State University, ETH, and Caltech) was acknowledged as a key enabler.
- Core concept: Mineral prospectivity is controlled by large-scale geodynamic processes that govern deformation, heat flow, and fluid pathways.
- Physics-based modelling: Conservation laws (momentum, energy, mass) provide a unified framework for simulating tectonic and mineralizing processes.
- Scale independence: The same governing equations apply from planetary evolution to basin-scale and deposit-scale analysis.
- Red Sea case study: Rift evolution (~24 million years) provides constraints for modelling mineral systems along Arabia–Africa plate boundaries.
- Cost implication: Geodynamic modelling has potential to reduce exploration cost by narrowing target areas before field campaigns.
- Risk profile: Models are simplified representations of complex natural systems and must be validated with observational data.
- Future outlook: AI-enabled 4D geodynamic models could significantly improve predictive capability for mineral exploration.

Session summary

The session highlighted geodynamic modelling as a powerful, physics-based approach for understanding the deep processes that control mineral systems. By integrating numerical simulations with geophysical observations, researchers can move beyond descriptive geology toward predictive exploration frameworks that link tectonics, heat flow, and structural evolution.

While the approach carries inherent uncertainty and risk, the integration of computational geoscience with AI and machine learning offers a promising pathway for next-generation mineral discovery. In regions such as the Red Sea and the Arabian-Nubian Shield, geodynamic modelling was presented as a strategic tool to guide exploration, reduce cost, and support data-driven decision-making for the mining industry.

"These models can reduce exploration costs, but they remain high-risk technologies that require validation through geophysical observations"

– Dr. Thamer Aldaajani,
General Director, Mining & Hydrocarbons Technologies Institute, King Abdulzaziz City for Science & Technology (KACST)

PRESENTATION: Innovative practices to develop deep sea mining resources

Oliver Gunasekara
Chief Executive Officer & Co-Founder,
Impossible Metals

This session examined the emerging role of deep-sea minerals in meeting global demand for critical metals, with a particular focus on polymetallic nodules located on the abyssal plains of the Pacific Ocean. The presentation aimed to explain what deep-sea minerals are, why they matter for the energy transition, and how new technologies can enable their extraction with minimal environmental and social impact.

The speaker outlined the scale and significance of polymetallic nodules, which contain high concentrations of nickel, cobalt, copper, manganese, and rare earth elements.

With 71 percent of the planet covered by oceans and limited mining activity offshore to date, the deep ocean was presented as a largely untapped resource with substantially higher metal abundance than many declining land-based deposits.

A significant portion of the session focused on governance and geopolitics, highlighting the UN Convention on the Law of the Sea and the role of the International Seabed Authority (ISA). The presentation noted the sponsorship of Impossible Metals by the Kingdom of Bahrain, positioning it as the first GCC and Arab state to secure participation in international deep-sea mineral exploration.

The session concluded with a detailed comparison between conventional dredging-based deep-sea mining and Impossible Metals' AI-enabled, robotic, selective collection approach, arguing that new technology can drastically reduce environmental disturbance, lower costs, and accelerate access to critical minerals needed for global decarbonization.

Key insights, data points or predication

- Impossible Metals confirmed Bahrain's sponsorship for a new exploration application to the International Seabed Authority.
- The sponsored area represents approximately USD 250 billion in mineral potential over a 30-year period, subject to regulatory approval.
- The company plans to complete five years of environmental baseline studies before applying for exploitation licenses.
- Production is targeted to begin as early as 2029, with partnerships planned with existing ISA license holders.
- Continued scale-up of the Eureka robotic collection system is underway, moving from prototype to full-fleet deployment.
- Resource scale: Polymetallic nodules in the Clarion-Clipperton Zone cover ~4.5 million km² of the Pacific Ocean.
- Governance: 31 ISA exploration licenses exist globally, with 16 active licensed areas.
- Environmental baseline: Decades of environmental data have already been collected and are publicly available.
- Technology shift: AI-guided, hovering robotic systems eliminate seabed tracks, dredging, and mid-water sediment plumes.
- Selective mining: Only ~10% of nodules need to be collected to achieve economic viability.
- Cost economics: All-in sustaining costs projected at < USD 1,200 per ton (nickel equivalent)—~10x lower than average land-based nickel mines.
- Social impact: No human displacement risk due to deep-ocean location far from inhabited areas.
- Market outlook: Commercial deep-sea mining could begin globally by 2028–2030.

Session summary

The session positioned deep-sea polymetallic nodules as a transformative opportunity for securing critical minerals essential to the global energy transition. With vast, high-grade resources located in the deep ocean and governed under a clear international framework, the sector is entering a pivotal phase after decades of research and regulatory development.

By leveraging advances in robotics, artificial intelligence, and autonomous systems, the presentation argued that deep-sea mining can be conducted with significantly lower environmental and social impacts than many land-based alternatives. The sponsorship of Impossible Metals by the Kingdom of Bahrain was highlighted as a milestone for regional participation in this emerging industry, signaling both geopolitical diversification and technological innovation in the future of mining.

> **"Polymetallic nodules are essentially potato-sized rocks lying on the seabed that can be collected without blasting, cutting, or tunneling"**
>
> – Oliver Gunasekara,
> Chief Executive Officer & Co-Founder,
> Impossible Metals

PRESENTATION: Requirements for building robust and accessible geological databases in emerging supplier countries

Eng. Abdullah Al Jehani
Senior Geologist, Owner of the National Core Library Initiative (NCL), Saudi Geological Survey

Eng. Mustafa Makki
Senior Computer Scientist, Owner of National Information Initiative (NGD), Saudi Geological Survey

This session presented Saudi Arabia's national infrastructure for geological data management, focusing on the role of the National Core Library (NCL), hyperspectral scanning technologies, and the National Geological Database (NGD) in strengthening mineral exploration and decision-making across the mining sector.

The first part of the session outlined the scale and function of the National Core Library as a centralized facility for hosting, processing, and preserving drill core samples from exploration activities across the Kingdom. The NCL was positioned as a critical enabler of consistent geological data management, ensuring standardized handling of drill core samples from receipt, cleaning, scanning, documentation, and long-term storage.

A key technological focus was the deployment of hyperspectral scanning systems, covering visible to infrared wavelengths, to enable high-resolution mineral identification, alteration mapping, and non-destructive analysis of drill cores. The session emphasized how these technologies support faster interpretation, reduce reliance on destructive sampling, and improve geological confidence for exploration and development decisions.

The second part of the session focused on the integration of NCL outputs into the National Geological Database. The NGD was presented as the Kingdom's central platform for geological data governance, dissemination, and public access.

Through structured data cleansing, standardization, and governance frameworks, the NGD enables the controlled release of high-value geological datasets to industry, researchers, and investors, supporting transparency, competitiveness, and accelerated mineral development.

Key insights, data points or predication

- The National Core Library currently hosts over 100,000 km of drill core samples from exploration activities.
- More than 110 km of drill core have already been hyperspectrally scanned, with 20 km uploaded to the NGD platform.
- Plans were announced to expand NCL storage capacity to 700 km of drill core through upgraded warehouse facilities.
- A new hyperspectral scanning facility is planned, equipped with visible to long-wave infrared systems and high-resolution RGB cameras.
- The NGD has released 13 major geological projects for public download, primarily within the Arabian Shield.
- New datasets include 1:100,000 geological maps, topographic maps, hyperspectral and multispectral remote sensing data, and relinquished license datasets.
- All released datasets are accessible via web portals, APIs, and desktop GIS applications.

Scale of infrastructure: NCL hosts thousands of drill core samples and geological materials from national exploration programs.

- Technology impact: Hyperspectral scanning supports rapid, non-destructive mineral identification across hundreds of meters per day.
- Data governance: NGD applies structured data cleansing, standardization, and access control before public dissemination.
- Transparency: Geological datasets are increasingly released as open or semi-open data to support exploration competitiveness.
- Coverage: Newly released datasets cover tens of thousands of square kilometers, including relinquished and expired licenses.
- Strategic value: Centralized geological data infrastructure reduces exploration risk, duplication of effort, and cost across the sector.

Session summary

The session highlighted Saudi Arabia's significant investment in geological data infrastructure as a foundation for a modern, data-driven mining sector. Through the integration of the National Core Library, advanced hyperspectral technologies, and the National Geological Database, the Kingdom is strengthening the quality, accessibility, and governance of geological information.

By standardizing data workflows, expanding public access to high-value datasets, and deploying advanced analytical technologies, these initiatives aim to reduce exploration risk, accelerate discovery, and enhance investor confidence. The session positioned national geological data as a strategic asset supporting the long-term development of the mining sector and the broader objectives of mineral resource diversification.

> **"The National Geological Database is the source of the treasure of geological data in the Kingdom of Saudi Arabia"**
>
> – Eng. Mustafa Makki, Senior Computer Scientist, Owner of National Information Initiative (NGD,)Saudi Geological Survey

PRESENTATION: Effects of artificial aging and hydration on magnetic mineralogy in volcanic glasses

Fatimah Abdulghafur
Principal Specialist, Geophysics, Maaden

This session presented the findings of a long-term, multi-institutional research project examining how natural volcanic glasses age over geological time and how this aging affects their reliability as recorders of Earth's magnetic field intensity. The research spans more than a decade of work and integrates samples collected globally, ranging from very young oceanic basalts to Jurassic-aged materials.

The study was motivated by a critical gap in paleomagnetic research: despite the widespread use of volcanic glass as an "ideal" material for absolute paleointensity studies, no systematic investigation had previously assessed how magnetic mineralogy and domain states evolve with age.

Given that material freshness is a key determinant of paleomagnetic reliability, the research aimed to establish clearer criteria for what constitutes suitable material.

To address this, the researcher combined analyses of naturally aged samples with controlled artificial aging experiments conducted at different temperatures and durations. A comprehensive suite of rock magnetic measurements was applied to characterize changes in coercivity, remanent magnetization, domain state, and magnetic mineralogy.

The results reveal that aging primarily affects the magnetic domain state—most likely through grain coarsening—rather than consistently generating new magnetic minerals.

Basaltic glasses were found to be more robust recorders of paleomagnetic intensity than rhyolitic glasses, particularly when young and magnetically hard.

Overall, the session reframed how researchers should assess volcanic glass samples, emphasizing the importance of coercivity thresholds, material type, and cautious interpretation of older samples in geodynamic reconstructions.

Key insights, data points or predication

- Confirmation of the publication of the research paper on aging of natural glasses and paleomagnetic implications
- Call to the scientific community to develop improved artificial aging proxies for volcanic glass studies
- Recommendation for stricter selection criteria when using volcanic glass in absolute paleointensity research
- Invitation for further interdisciplinary collaboration to refine aging models and experimental methods
- Study analyzed 167 volcanic glass samples spanning ages from present-day to Jurassic
- Basaltic glasses generally maintain higher coercivity than rhyolitic glasses as they age
- Coercivity and unblocking temperatures decrease with age, consistent with magnetic grain coarsening
- Isothermal remanent magnetization (IRM) shows limited sensitivity to natural aging alone
- Artificial aging at 200–400°C induces changes but does not fully replicate natural aging processes
- Glass transition temperature (Tg) shows weak correlation with aging, limiting its usefulness as a proxy
- Coercivity ≥ 60 mT identified as a practical threshold for selecting reliable paleomagnetic samples.

Session summary

The session provided a rigorous reassessment of long-held assumptions about volcanic glass as an ideal recorder of Earth's magnetic field. Through extensive natural and experimental datasets, the research demonstrated that aging alters magnetic behavior primarily through domain-state evolution rather than wholesale mineralogical transformation.

The findings reinforce basaltic glass—particularly young, magnetically hard samples—as the most reliable material for absolute paleomagnetic intensity studies, while urging greater caution when working with rhyolitic or older glasses. By clarifying both the limits and strengths of current methodologies, the research offers practical guidance for improving the accuracy of future geodynamic reconstructions.

"Artificial oven aging is useful for studying kinetics, but it is not a perfect proxy for natural geological aging"

– Fatimah Abdulghafur,
Principal Specialist, Geophysics, Maaden

PRESENTATION: Risks facing minerals supply: Where to start with the upstream

Dr. Sarah Gordon
CEO / Professor of Practice, Satarla / Imperial

This session examined the nature of risks facing mineral supply chains, with a particular focus on upstream and early-stage risks in mineral exploration and project development. It aimed to move beyond traditional technical risk assessments to highlight how political, social, governance, and geopolitical factors increasingly shape project success or failure.

Drawing on her background in exploration geology, sustainability, and risk assurance, the moderator emphasized that geological uncertainty is inherent and unavoidable, but that the majority of project failures stem from "surface risks" rather than subsurface geology. These include political instability, governance frameworks, stakeholder dynamics, and regulatory environments.

The discussion explored how risk is perceived differently by various stakeholders, illustrating that risks are interconnected and context-dependent.

Through a practical demonstration, the session highlighted how individuals involved in the same situation may identify and prioritize risks differently depending on their role and responsibility.

The narrative further addressed the evolving expectations of corporate governance, particularly the growing requirement not only to disclose risks, but also to demonstrate effective controls and management responses. The session underscored that understanding risk from multiple stakeholder perspectives—governments, companies, and communities—is essential to improving project outcomes.

Ultimately, the session argued that early, inclusive, and multidimensional risk assessment can significantly increase the likelihood of successful mineral projects, accelerating implementation and improving resilience in an increasingly complex global environment.

Key insights, data points or predication

- Emphasis on adopting multi-stakeholder risk perspectives earlier in the exploration and project development phase.
- Call for stronger integration of geopolitical and governance risks into mineral project decision-making.
- Encouragement for mining companies to move from risk identification toward clearer articulation of risk controls and mitigation measures.
- Geological knowledge is inherently probabilistic; certainty before mining begins is unrealistic.
- An estimated majority of project underperformance is linked to surface-level risks such as politics, governance, and stakeholder relations rather than geology.
- Geopolitics has emerged as a primary interconnected risk driver influencing mineral supply security.
- Trade measures, such as tariffs, can simultaneously create opportunities and threats depending on company position and geography.
- Early recognition of interconnected risks can significantly increase project success rates, improving outcomes from "one in a thousand" to materially higher probabilities.

Session summary

The session reinforced that effective mineral supply risk management requires a shift away from siloed, technically driven assessments toward integrated, stakeholder-aware approaches. Understanding how different actors perceive and experience risk is essential to navigating uncertainty in exploration and development.

By embedding governance, geopolitical awareness, and inclusive risk analysis earlier in the project lifecycle, the mining sector can improve resilience, accelerate implementation, and enhance long-term success in securing critical mineral supplies.

"By understanding risks through the eyes of governments, companies, and communities, projects can move faster and succeed more often"

– Dr. Sarah Gordon, Exploration Geologist and Risk & Sustainability Specialist

PANEL SESSION: Rising mining nations: Success stories from the world's most improved jurisdictions

Dr. Mark Robinson
Executive Director, Extractive Industries Transparency Initiative (EITI)

H.E. Sami Al Harbi
Assistant Deputy Minister for Resources and Land Affairs, Ministry of Industry and Mineral Resources

Kimmo Tiilikainen
Director General, Geological Survey of Finland, GTK

Jodi Banks
Deputy Minister, Trade and Export Development, Government of Saskatchewan

This session explored how selected countries and regions have successfully transformed themselves into competitive and attractive mining jurisdictions.

It focused on the reform journeys of Saudi Arabia, Finland, and the Canadian province of Saskatchewan, highlighting the policy choices, institutional reforms, and long-term strategies that supported investor confidence and sector growth.

Panelists discussed why mining became a national or regional priority, often driven by broader economic diversification, industrialization, and long-term resilience objectives. While each jurisdiction followed a distinct pathway, all emphasized mining as a strategic pillar for economic development rather than solely a resource extraction activity.

The discussion examined specific reforms that improved investment attractiveness, including opening sectors to foreign investment, digitalizing geological data, strengthening regulatory frameworks, and investing in skills, research, and infrastructure.

Particular attention was given to the importance of transparency, predictable regulation, and access to high-quality geological information.

The session also addressed how competitiveness can be sustained beyond global rankings.

Speakers highlighted the need for continuous policy execution, value-chain development, social license to operate, and environmental and social responsibility across the mining lifecycle.

Key insights, data points or predication

- Saudi Arabia committed to continued investment in geological data, institutions, and digital platforms to de-risk investment and improve transparency.
- Finland confirmed the update of its national mineral strategy with a focus on full value-chain development and sustainability across exploration, mining, and processing.
- Saskatchewan reaffirmed its Critical Minerals Strategy, including targets for exploration spending growth and positioning the province as a rare earth elements hub.
- All jurisdictions emphasized ongoing regulatory refinement, skills development, and public-private collaboration as next steps.
- High-quality, accessible geological data is a foundational driver of investor confidence across jurisdictions.
- Political stability and predictable regulation consistently rank among the most important factors for mining investment decisions.
- Saskatchewan aims to increase its share of Canadian mineral exploration spending to 15% by 2030 and double the number of critical minerals produced.
- Finland's experience shows that regulatory uncertainty — particularly during tax or legislative changes — can temporarily reduce investment attractiveness.
- Digitalization and reduced human interface in permitting processes are increasingly used to mitigate corruption risks and improve efficiency.
- The future competitiveness of mining jurisdictions depends on extending value chains and embedding ESG standards throughout operations.

Session summary

The session demonstrated that successful mining transformations are rarely driven by a single reform, but rather by a combination of stable governance, transparent regulation, high-quality geological data, and sustained investment in skills and institutions. Despite different national contexts, common success factors emerged across continents.

By treating global rankings as learning tools rather than end goals, and by focusing on long-term delivery, value-chain development, and sustainability, mining nations and provinces can maintain competitiveness while building trust with investors, communities, and society at large.

"Energy security, affordability, and sustainability depend on urgent, collective, and inclusive efforts to address critical mineral challenges"

– H.R.H. Prince Abdulaziz bin Salman Al Saud, Minister of Energy, Saudi Arabia

KNOWLEDGE EXCHANGE AGENDA

Day 1

Tuesday 13 January 2026

Dome

PRESENTATION: Presentation by Global Battery Alliance

Inga Petersen
Executive Director, Global Battery Alliance

The session examined how the global battery value chain is evolving amid geopolitical volatility, shifting demand patterns, and tightening sustainability expectations, with a particular focus on the mining sector's role in enabling responsible and transparent supply chains. It framed batteries as a critical demand driver for minerals such as lithium, cobalt, and nickel, while underscoring the need to align growth with environmental, social, and governance (ESG) performance.

The presentation highlighted the Global Battery Alliance's mission to scale a resilient, responsible, and circular battery value chain by 2030, positioning sustainability not as a compliance exercise but as a market enabler and risk management tool.

Emphasis was placed on multi-stakeholder collaboration across mining, manufacturing, recycling, finance, and civil society to define what credible sustainability performance looks like in practice.

A central focus was the Battery Passport, a digital product passport designed to deliver traceability, sustainability assurance, and product-level comparability across the battery lifecycle. The speaker outlined how regulatory drivers—most notably the EU Battery Regulation—are accelerating adoption, while also introducing uncertainty due to evolving policy and regulatory simplification debates.

The session concluded by outlining the GBA's transition from a "coalition of the willing" to a "coalition of the doing," detailing concrete milestones toward certification, operational trials, and the full rollout of a sustainability certification scheme by 2027, with growing relevance for miners, manufacturers, investors, and procurers alike.

Key insights, data points or predication

- Launch of operational trials involving more than 30 companies to test Battery Passport reporting, verification, and prototype certification
- Confirmation of plans to launch prototype battery certifications with QR codes during 2026
- Commitment to full rollout of the GBA Battery Passport certification scheme by 2027, aligned with EU Battery Regulation requirements
- Ongoing collaboration with International Trade Center (ITC) to develop interoperable data-exchange platforms and lower entry barriers for SMEs
- Continued engagement with global standards initiatives (e.g. IRMA, Copper Mark, RMI) to enable benchmarking and comparability
- Global battery demand exceeds 1 terawatt hour, with continued double-digit growth projected
- Battery market growth remains in the 15–20% compound annual growth range, despite short-term EV market slowdowns in parts of Europe and the US
- Stationary storage (renewables, data centers) is emerging as a major additional demand driver alongside electric vehicles
- LFP battery chemistries are gaining market share globally, while reliance on cobalt-based chemistries has declined
- The EU Battery Regulation will mandate a digital battery passport for batteries placed on the EU market by 2027
- Battery benchmarks represent the first global, consensus-based sustainability metrics enabling product-level comparison across the value chain
- Early adoption is expected to be driven by international financial institutions and investors, rather than consumer price premiums

Session summary

The session positioned the battery sector as a critical test case for aligning mineral demand growth with credible sustainability, traceability, and circularity. It emphasized that future competitiveness will increasingly depend on transparent, verifiable, and comparable performance across complex global value chains.

By advancing the Battery Passport from concept to operational trials and certification, the Global Battery Alliance aims to provide a trusted framework that supports responsible mining, manufacturing, and recycling, while enabling markets, investors, and regulators to distinguish and reward sustainable practices at the product level.

"The Battery Passport is more than a digital product passport; it is a data container for sustainability assurance and product-level comparability"

– Inga Petersen, Executive Director, Global Battery Alliance

PANEL SESSION: Circular economy: Strategies for maximizing resource efficiency, recovering critical minerals from waste, and enabling closed-loop systems

Prof. Yassine Taha
Associate Professor, University Mohammed VI Polytechnic

Tadeu Carneiro
Chief Executive Officer, Boston Metal

Hilde Tellesbø
Head of Department- Industrial Environmental Process, Institute for Energy Technology (IFE)-Norway

Grazielle Parenti
Executive Vice President - Sustainability, Vale

The session explored how circularity can fundamentally reshape the mining industry by turning waste streams—such as tailings, slag, and waste rock—into sources of value. Bringing together perspectives from academia, mining majors, technology innovators, and research institutions, the discussion focused on moving circularity from concept to operational reality.

Panelists highlighted the scale of material inefficiencies in mining and the opportunity to integrate circular principles at every stage of the value chain, from extraction and processing to downstream applications. Circularity was framed not only as a sustainability imperative, but as a strategic lever for improving recovery rates, reducing costs, and extending the life of existing assets.

A recurring theme was the need for site-specific and locally integrated solutions, recognizing that mineral composition, geography, logistics, and market proximity are decisive factors for successful circular models. Speakers emphasized that one-size-fits-all approaches are ineffective, particularly when addressing tailings reprocessing, by-product utilization, and secondary material recovery.

The session also underscored the importance of enabling conditions for scale, including standards, research and development, cross-sector collaboration, and improved public perception of mining. Circularity was positioned as a pathway to reduce environmental footprints, limit land disturbance, and reposition mining as a contributor to sustainable industrial ecosystems.

Key insights, data points or predication

- Vale reported approximately 20 million tonnes of iron ore recovered through re-mining of historical tailings, with a target for around 10% of total production to come from circular sources
- Boston Metal confirmed progress in deploying industrial-scale technology to recover critical metals from low-grade slags and mining waste, with multiple projects prioritized for deployment over the next five years
- Ongoing development of a new international standard on valuing discarded natural materials in mining, targeted for completion by 2027
- Continued collaboration between industry, academia, and standards bodies to advance circularity frameworks and protocols
- Expansion of tailor-made, site-specific processing solutions integrating mining, tailings management, and secondary material recovery
- Mining generates billions of tonnes of waste annually, much of which remains underutilized
- Construction is the only sector capable of absorbing mining waste at scale, provided technical standards are met
- Re-mining tailings can deliver material recovery while reducing land use and avoiding new extraction areas
- Emerging technologies enable recovery from low-grade materials, including waste with 4–5% metal oxide content
- Transport and logistics costs make local and regional integration critical for viable circular solutions
- Standards and certification frameworks are increasingly important to enable scale and cross-sector adoption

Session summary

The session demonstrated that circularity in mining is no longer aspirational, but already delivering measurable economic and environmental benefits. By rethinking waste as a resource and embedding circular design into mining and processing operations, the industry can unlock new value while reducing its footprint.

Scaling these solutions will require stronger standards, sustained investment in research and innovation, and deeper collaboration between mining, downstream industries, and academia. As highlighted by the panel, circularity offers a powerful opportunity to reposition mining as a cornerstone of sustainable industrial development.

"To utilize as much of the ore as possible, mineral processing must be site-specific and tailored to local conditions, from chemistry to geography"

– Hilde Tellesbø, Head of Department – Industrial Environmental Process, Institute for Energy Technology (IFE)

PRESENTATION: Critical minerals, AI, supply chain and U.S. - Saudi Investments

Shah Karim
Yale University Board of Governors Emeritus, Chief Executive Officer, SafeRock

The session examined the rapidly evolving landscape for critical minerals through a management and investment lens, highlighting the strategic importance of minerals to the global energy transition and economic resilience. It framed critical minerals as a key driver of growth, risk, and opportunity, particularly in the context of Saudi Arabia's ambitions to become a regional and global leader in mining, refining, and industrial development.

The presentation emphasized the increasing complexity facing executive teams, including supply chain volatility, policy uncertainty, fiduciary responsibilities, and sustainability constraints.

Using lithium as a reference case, the speaker illustrated how critical mineral supply chains span extraction, processing, and advanced technologies, and how similar challenges extend across batteries, metals, and energy storage systems.

A core focus was the role of artificial intelligence in supporting operational excellence and decision-making. AI was positioned not as a theoretical tool, but as an applied capability that can enhance forecasting, capital allocation, supply chain resilience, and risk management by identifying patterns within complex systems and enabling more fact-based decisions.

The session concluded with a call to action for deeper US–Saudi collaboration, public–private partnerships, and targeted investments. It highlighted the need for clarity on incentives, financial structures, and refining capacity, alongside stronger integration of AI, sustainability considerations, and cross-disciplinary expertise to support long-term value creation.

Key insights, data points or predication

- Call for expanded US–Saudi public–private partnerships across mining, refining, and research and development
- Encouragement for greater use of AI and analytics to improve operational efficiency, forecasting accuracy, and capital allocation
- Emphasis on strengthening investment frameworks and incentives to balance fiduciary responsibility, sustainability, and returns
- Continued dialogue through the Future Minerals Forum Knowledge Exchange to align government, industry, and academic stakeholders
- Critical minerals were referenced as a multi-trillion-dollar opportunity, with Saudi Arabia identified as a potential $2.5 trillion market
- Lithium was highlighted as a core enabler of mobility, power, and energy storage, with supply chains spanning brines, hard rock mining, and direct lithium extraction
- AI-driven forecasting models demonstrated significant improvements in accuracy, outperforming traditional analyst projections
- AI applications can reduce cost overruns, improve supply chain stability, and release working capital
- Sustainability challenges—air, water, solid waste, and carbon—must be addressed in parallel with operational efficiency
- Greater clarity is needed on refining capacity, financial incentives, and outbound investment strategies.

Session summary

The session positioned critical minerals as a central pillar of the global energy transition, requiring integrated management approaches that balance growth, risk, sustainability, and capital efficiency. It underscored the growing role of artificial intelligence as a practical tool for improving decision-making, operational performance, and resilience across complex mineral and energy value chains.

By calling for stronger public–private collaboration, clearer investment frameworks, and deeper integration of AI and sustainability, the session reinforced the Future Minerals Forum's role as a platform for action-oriented dialogue. The discussion concluded with a forward-looking message on aligning technology, policy, and investment to support long-term economic and societal value.

"Artificial intelligence can help leadership teams look around the corner by enabling fact-based decisions and reducing uncertainty in complex markets"

– Shah Karim,
Yale University Board of Governors and Chief Executive Officer, SafeRock

PRESENTATION: Building trusted and reliable mineral corridors for market transparency and minerals security: Saudi Arabia a prime model for a global minerals hub

Dr. Sara Vakhshouri
President,
SVB Energy International, and
Faculty Member,
Edmund A.
Walsh School of
Foreign Service,
Georgetown
University

The session examined how trusted and transparent mineral corridors can strengthen global energy and national security, positioning critical minerals as strategic assets rather than conventional commodities. It traced the evolution of energy security from oil-based supply reliability to a new paradigm centered on minerals essential for electrification, renewable energy, and advanced technologies.

The speaker highlighted the structural vulnerabilities of critical mineral markets, including concentrated extraction and processing, opaque trade flows, and limited supplier diversity.

Unlike oil and gas markets, mineral markets were described as lacking robust governance frameworks, transparent pricing mechanisms, and trusted data platforms—factors that have historically contributed to volatility and price shocks.

A central theme was the need to establish governance systems for minerals that address ethical licensing, traceability, market data transparency, and resilience. The session underscored that ethical production standards, supply chain oversight, and real-time visibility into supply and demand are essential to building market confidence and ensuring fair access.

The presentation concluded by positioning Saudi Arabia as a potential neutral anchor and trusted host for such a platform, drawing on its record of market stewardship, energy reliability, diplomatic balance, and competitive advantages in low-cost conventional and renewable energy. These attributes were presented as foundational to enabling transparent mineral markets and coordinated global dialogue.

Key insights, data points or predication

- Call for the establishment of a governance platform for critical minerals focused on transparency, ethics, and market stability
- Proposal to develop a centralized market data hub for minerals, analogous to existing energy market institutions
- Emphasis on integrating ethical licensing standards across mineral supply chains
- Recommendation to explore stockpiling and mineral swapping mechanisms to enhance resilience during supply shocks
- Continued dialogue through Future Minerals Forum and related platforms to advance coordinated mineral governance
- Critical mineral supply is more concentrated than oil and gas, increasing vulnerability to price volatility
- Mineral trade flows are often opaque and difficult to trace, limiting market transparency
- Price shocks in mineral markets have historically been more severe and abrupt than in traditional energy markets
- Ethical and labor concerns remain prevalent in some mineral-producing regions, underscoring the need for licensing frameworks
- Low-cost and low-carbon energy access is a decisive factor for future processing and refining hubs
- Transparent data was identified as a core pillar of modern energy and mineral security

Session summary

The session underscored the urgent need to rethink mineral markets through the lens of trust, transparency, and governance. As critical minerals become central to electrification and energy transition pathways, the absence of reliable data, ethical oversight, and diversified supply presents systemic risks to global stability.

By leveraging its track record in energy market stewardship, diplomatic neutrality, and competitive energy costs, Saudi Arabia was positioned as uniquely suited to host a trusted platform for mineral transparency. Such an initiative could play a pivotal role in stabilizing markets, enabling ethical supply chains, and redefining mineral security for the decades ahead.

> **""Without transparent market data on supply and demand, mineral markets will remain vulnerable to volatility and price shocks"**
>
> – Dr. Sara Vakhshouri,
> President, SVB Energy International, and
> Faculty Member, Edmund A. Walsh School
> of Foreign Service, Georgetown University

PANEL SESSION: What does best practice look like in sustainable mine water management? Focusing on water use, treatment methods & water stewardship

Stacy Hope
Partner, ERM

Carlos Cardounel
Senior Vice President & General Manager Basic Industries, Global Water, Ecolab

John Cleland
Technical Director - Geoscience and Mining, KAUST Beacon Development

Florian Milz
Sales Director Techno Products (TP) and Mobile Water & Integrated Services (MWIS), Veolia

This panel examined what “best practice” means in sustainable mine water management, with a focus on water use, treatment methods, and stewardship in mining. The discussion positioned mine water management as an ecosystem challenge shaped by climate risk, site conditions, regulatory expectations, and operational realities—particularly in arid regions where water security is central to industrial activity.

Panelists emphasized that mining faces unique constraints that complicate water stewardship: variable ore bodies, commodity price exposure, and distance from end-consumers who increasingly demand transparency on environmental footprints.

These dynamics can make investments in water systems harder to justify unless companies can demonstrate clear operational and risk-reduction value beyond basic compliance.

A recurring theme was the importance of data and measurement to enable effective decision-making and investment. Speakers noted that without site-level, line-level data, mines struggle to quantify water value, build credible business cases (CAPEX/OPEX and ROI), and move from siloed water handling toward integrated site-wide planning across camps, processing, tailings, and rainfall management.

The panel also highlighted the role of technology and partnerships in enabling best practice—ranging from improved treatment and reuse to digital monitoring and operational control. While concepts such as “zero liquid discharge” were discussed, the panel stressed pragmatic approaches focused on minimizing water loss, deploying appropriate technologies, and strengthening alignment between operators and regulators through clear KPIs and shared accountability.

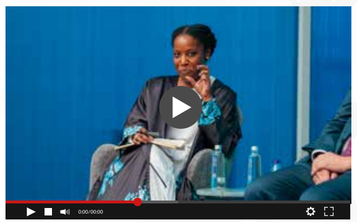
Key insights, data points or predication

- Call for mining companies and regulators to work together to establish clear, site-specific water KPIs and embed water in mine planning and licensing discussions
- Recommendation to shift from siloed management (camp, tailings, processing) to a holistic, site-wide water management approach, including rainfall capture and retention
- Emphasis on expanding real-time monitoring and digital control to maintain compliance and optimize treatment, reuse, and total water consumption
- Encouragement to prioritize minimizing water losses and waste, rather than treating “zero liquid discharge” as a blanket or purely reputational target
- Veolia highlighted the option of outsourcing end-to-end water management and the availability of mobile treatment equipment for mine sites
- “Best practice” depends on context: mine sites vary significantly by ore type, climate, and water source (groundwater, desalination, trucking, rainfall capture).
- A core barrier to stewardship is the difficulty of putting a non-financial “value” on water and linking investments to ROI.
- Arid environments require integrated planning for rainfall events, evaporation control, and reuse across dust suppression and processing.
- Seawater and desalination-based strategies are increasingly relevant; examples from other arid mining jurisdictions (e.g., Chile) were referenced as workable analogues.
- Effective stewardship requires moving from compliance-only measurement to performance improvement supported by credible data and transparent reporting.
- Technology enablers include treatment/reuse systems, chemistry–equipment integration, and digital monitoring to adjust processes in real time.

Session summary

The panel concluded that sustainable mine water management requires more than treatment technologies—it demands an integrated operating model that treats water as a strategic resource. Best practice depends on site-specific realities, but consistently starts with measurement, reliable data, and planning water holistically across the entire mine ecosystem rather than managing it in silos.

Speakers stressed that progress will be accelerated by clearer KPIs, stronger collaboration between regulators and operators, and pragmatic targets focused on reducing losses and improving reuse. With climate risk and water scarcity increasing, the session positioned water stewardship as a defining factor for operational resilience and long-term competitiveness in mining—particularly in arid regions such as Saudi Arabia.



FIRESIDE CHAT: Supply chain development to promote adoption of AI: Pax Silica initiative

Cyba Audi
Senior News Anchor, Asharq News

Jacob Helberg
Under Secretary for Economic Affairs, U.S. Department of State

In a highly anticipated panel discussion, industry leaders and government officials gathered to explore the critical question: “To Build or To Buy: Are Capital Allocation and Financial Discipline Adequate to Meet Demand for Minerals?”

The session, moderated by an engaging host, set the stage for a deep dive into the future of the mining sector, focusing on the balance between building new projects and acquiring existing ones.

The session’s focus was clear: addressing the growing demand for minerals essential to the green transition and ensuring that resource-rich countries benefit from their extraction.

H.E. Mohammad Al-Jadaan, Minister of Finance, Saudi Arabia opened the discussion by highlighting Saudi Arabia’s strategic approach to mining.

He emphasized the importance of sector alignment, data investment, and robust regulatory frameworks. “A competitive regulatory environment is crucial,” he noted, “and significant investments are needed to drive the sector forward,” Al-Jadaan added.

Tom Palmer, President and CEO of Newmont, shared insights into Newmont’s strategy of building a portfolio of Tier 1 gold assets. He stressed the importance of capital allocation, financial discipline, and operational excellence. “Partnerships are key in developing large projects,” Palmer stated, “especially with the growing demand for copper.”

The conversation then shifted to Kent Masters, Chair and CEO of Albemarle, who discussed the challenges in the lithium market, including price fluctuations and geopolitical issues.

Masters emphasized the need for cooperation between companies and governments to build resilient supply chains. “Financial discipline and innovation are paramount,” he asserted.

Jeremy Weir, Chairman of Trafigura, addressed the complexity and volatility of global supply chains. He highlighted the need for increased cooperation between companies and governments to meet future mineral demands. “Long-term contracts are essential to reduce volatility,” Weir explained, “and geopolitical implications cannot be ignored.”

Bonj Galu, International Delegate for Strategic Minerals and Metals from the Office of the President of France, rounded out the discussion by highlighting France’s efforts to support the mining sector through investment funds and international cooperation. He emphasized sustainable practices and government support in attracting private investments. “Long-term contracts and partnerships are vital for developing new projects and increasing recycling capacity,” Galu remarked.

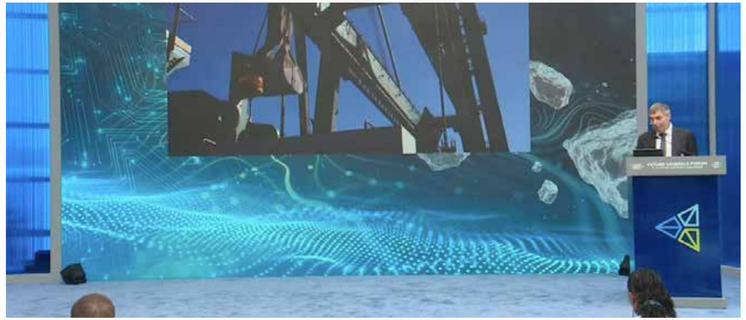
The panelists collectively addressed the risks and long-term nature of mining investments. They discussed the need for predictability and confidence in the regulatory environment to attract investments. The importance of partnerships between governments and the private sector was a recurring theme, as was the need for financial discipline, innovation, and long-term planning to meet the growing demand for minerals.

“Energy security, affordability, and sustainability depend on urgent, collective, and inclusive efforts to address critical mineral challenges”

– H.R.H. Prince Abdulaziz bin Salman Al Saud, Minister of Energy, Saudi Arabia

PRESENTATION: From blue collar to white collar: Role of automation and robotics in addressing the shortage of skilled labor in remote mining locations

Bernd Mann
Chief Executive Officer, iSAM



This session explored why automation is accelerating across bulk material handling and mining operations, and what technical and organizational enablers are making higher levels of autonomy feasible. The speaker framed automation as a response to structural pressures in mining logistics and terminal operations—particularly rising costs, tighter margins, labor constraints, and the need for more consistent productivity.

Four primary drivers were highlighted. First, cost pressures are intensifying as labor costs rise in traditional mining jurisdictions and as remote operations add significant fly-in/fly-out costs.

Second, automation can improve operational predictability by delivering consistent "average-operator" performance shift after shift, enabling better throughput planning and terminal scheduling. Third, labor shortages are most acute in remote sites where it is difficult to attract and retain skilled operators, making centralized remote operation centers an increasingly attractive solution.

A fourth driver emphasized the regional context: upskilling. In the Middle East, automation can convert blue-collar operator roles into control-room supervision positions aligned with national workforce ambitions and potentially widening participation, including for women.

The speaker argued that this reframing of roles is a practical pathway to localization and improved job attractiveness.

The session also outlined the enabling technologies and constraints behind autonomy. Improvements in satellite positioning (multi-constellation GNSS), advances in industrial-grade 3D LiDAR capable of working in dust/steam conditions, and the use of AI to replicate elements of operator decision-making were presented as key breakthroughs. However, the speaker stressed that "level 5" autonomy remains unrealistic in the near term; instead, the industry should focus on "level 4" systems where equipment operates most of the time and escalates edge cases to humans in the loop.

Key insights, data points or predication

- Advocated a phased adoption pathway: start with lower-risk assets (stockyards/stacker reclaimers), build trust and capability, then move toward higher-complexity automation (ship loading/unloading).
- Positioned "human-in-the-loop" Level 4 autonomy as the pragmatic near-term target for bulk handling equipment.
- Shared operational lesson learned: workforce co-design is essential—successful automation requires involving respected operators and maintenance staff in implementation teams, not top-down rollouts.
- Noted regional momentum: Bahrain Steel is implementing the technology with a pathway from stockyard automation toward autonomous ship unloading within the year.
- Labor cost context (as cited): truck-driver labor costs in some traditional mining countries can reach ~USD 200,000, with fly-in/fly-out significantly increasing total cost per operator.
- Multi-constellation satellite systems improved position availability from ~99.9% (earlier single-system) to ~99.99%, improving reliability for "safety-of-life" applications.
- Industrial LiDAR evolution (as cited): from ~28k points/sec and 200m range (early systems) to ~1.2M points/sec and 400m range, with 1,500 nm wavelength enabling better performance in dust/steam.
- Economic rationale for industrial-grade sensors: mining environments can justify higher sensor costs (e.g., ~USD 100k for rugged LiDAR) due to workforce and operational economics.
- Practical autonomy ratios cited: 1 operator supervising ~10 machines in certain stockyard contexts; other equipment may achieve 1:2 to 1:4 depending on risk and complexity.
- Example operational outcome (Hansaport, Hamburg): workforce reduced from ~120 to ~112 while throughput increased from ~8 million to ~15 million tons per annum, illustrating productivity gains through automation and process redesign.

Session summary

The speaker concluded that bulk material handling is entering a practical phase of automation driven by cost, predictability, labor availability, and workforce localization goals. While full autonomy without human intervention is not expected in the near term, "level 4" autonomy—where equipment runs most of the time and escalates exceptions—can already deliver meaningful productivity gains, reduced fly-in/fly-out dependency, and improved safety.

The session emphasized that success depends as much on organizational design as it does on technology. A phased implementation strategy, coupled with strong workforce engagement and co-development, was presented as the most reliable route to adoption—starting with controlled environments such as stockyards and progressing toward more complex operations like ship unloading as trust, capability, and safety assurance mature.

PANEL SESSION: How to resolve three key policy challenges to enable growth in mineral supply (permitting delays, cross border alignment, lack of capacity in regulatory agencies)

Stacy Hope
Partner, ERM

Tania Constable
Chief Executive Officer, Minerals Council of Australia

Nafi Quarshie
Africa Director, National Resource Governance Institute

Ludivine Wouters
Managing Partner, Latitude Five

Ernst Müller
Director (ESG and Sustainability | EMEA), Herbert Smith Freehills Kramer

Edwin Mitchell
CEO Advisor, ESNAD – Saudi Mining Services Company

Livia Paggi
Managing Director - Strategy Risk & Advisory, J.S. Held

This session examined how governments, industry, and institutions can address three core policy challenges constraining the growth of global mineral supply, against a backdrop of increasing geopolitical competition, supply chain concentration, and accelerating demand for critical minerals.

Panelists highlighted that mineral supply is no longer governed by market forces alone, but has become a strategic and geopolitical issue, with governments adopting more interventionist approaches to secure access to minerals essential for energy transition, digitalization, and national security. The discussion emphasized that existing policy and governance frameworks are often outdated and misaligned with the complexity and pace of modern mineral supply chains.

Speakers explored the growing tension between resource nationalism, investor certainty, and the need for faster permitting and regulatory clarity. While domestic processing and value addition are politically attractive, panelists cautioned that such ambitions must be grounded in realistic assessments of infrastructure, energy availability, skills, and governance capacity.

The session also underscored the importance of partnerships—between governments, investors, regulators, and communities—as the primary mechanism for enabling resilient and responsible mineral supply chains. Saudi Arabia's regulatory reforms and digital licensing platforms were highlighted as a practical example of how policy modernization can accelerate investment while maintaining sustainability and compliance standards.

Key insights, data points or predication

·Saudi Arabia reaffirmed its commitment to facilitating mining investment through streamlined licensing, digital platforms, and investor support via ESNAD and the Ministry of Industry and Mineral Resources.

- Panelists emphasized continued policy reform efforts to modernize mining legislation and permitting processes across jurisdictions.
- Stakeholders committed to strengthening collaboration between governments, regulators, industry, and civil society to improve trust and transparency.
- Continued focus on developing regional and bilateral partnerships to secure mineral supply while enabling value creation and sustainability.
- Mineral supply chains are increasingly shaped by geopolitics rather than free-market dynamics alone.
- Excessive concentration of refining and processing capacity presents systemic global supply risks.
- Faster, clearer permitting processes are critical to unlocking new mineral projects and investment.
- Resource nationalism, if poorly managed, can deter investment and delay project development.
- Digital licensing platforms can reduce approval timelines dramatically and improve regulatory oversight.
- Trust and governance quality are emerging as decisive factors in securing long-term mineral investment.

Session summary

The session concluded that enabling growth in mineral supply requires a fundamental shift in how policies, governance systems, and partnerships are designed and implemented. Traditional regulatory approaches are no longer sufficient for the scale, speed, and strategic importance of today's mineral supply chains.

Panelists agreed that the path forward lies in clear legal frameworks, accelerated permitting, strong institutions, and sustained collaboration between governments, industry, and communities.
By aligning policy ambition with practical implementation, countries can unlock mineral potential while ensuring responsible, resilient, and inclusive supply chains for the future.

"Clear, predictable and transparent legal frameworks are essential if we want mineral supply chains to scale, attract investment, and deliver outcomes within credible timeframes"

– Ernst Müller,
Herbert Smith Freehills Kramer

PANEL SESSION: Building resilient global supply chains: the role of Latin America

Moderator

Dr. Remi Piet
Co-Founder & Senior Partner, Embellie Advisory

Alejandra Cardona
Executive Director, CAEM

Juan Camilo Nariño Alcocer
President, Colombian Mining Association (ACM)

Joaquín Villarino
Executive President, Consejo Minero

Jorge Cantallopts
Executive Director, Centro de Estudios del Cobre y la Minería (CESCO)

This panel explored how Latin America's long-standing mining experience can inform Saudi Arabia's ambition to build a sustainable, globally competitive mining sector. With representatives from Argentina, Chile, Colombia, and regional research institutions, the discussion focused on best practices in regulation, exploration, ESG standards, and value-chain development, as well as opportunities for cross-regional collaboration.

Panelists highlighted Latin America's central role in the global supply of energy-transition minerals, particularly copper and lithium, noting that the region accounts for roughly 40 percent of global production of both.

Speakers emphasized that this leadership is underpinned not only by geological endowment but also by decades of institutional knowledge, skilled human capital, and mature supplier ecosystems.

A recurring theme was the importance of regulatory stability. Chile's experience was cited as a benchmark, demonstrating how stable taxation, protected concession rights, and guaranteed capital repatriation have enabled mining investment over more than a century. Argentina and Colombia echoed the need for clear, predictable frameworks to convert exploration potential into long-term economic development.

The panel also addressed shared challenges, including permitting delays, infrastructure constraints (notably water and energy), political stability, and social acceptance. Speakers stressed that accelerating permitting must not come at the expense of environmental or social standards, and that mining's long development timelines require sustained policy consistency.

Finally, the discussion turned to future collaboration between Latin America and Saudi Arabia, particularly across midstream and downstream activities. Panelists underscored the value of partnerships in education, supplier development, processing, and ESG implementation, positioning Latin America's experience as a practical blueprint for Saudi Arabia's mining sector under Vision 2030.

Key insights, data points or predication

- Regional collaboration: Panelists committed to strengthening cooperation among Latin American mining jurisdictions to share expertise in exploration, regulation, and supplier development.
- Knowledge transfer with Saudi Arabia: Agreement on expanding dialogue and exchanges with Saudi institutions to support skills development, education, and best-practice implementation across the mining value chain.
- ESG and standards alignment: Continued promotion of international sustainability frameworks (including TSM) as a common language for engaging communities, regulators, and investors.
- Exploration focus: Recognition of the need to prioritize early-stage exploration—particularly in underexplored jurisdictions such as Colombia—as a foundation for future supply.
- Midstream and downstream cooperation: Exploration of joint investment and partnerships in processing, smelting, and value-added activities linking Latin America and the Middle East.
- Latin America combines geological strength with deep mining expertise and a robust project pipeline.
- Stable regulation, taxation, and concession rights are essential for long-term mining investment.
- Exploration is the critical foundation for future supply but requires better public and community understanding.
- ESG standards and community participation are core business requirements, not optional add-ons.
- Cross-regional partnerships can accelerate skills transfer, supplier development, and value-chain integration.

Session summary

The session concluded that Latin America's mining journey offers Saudi Arabia a valuable reference point for building a sustainable, investor-friendly mining ecosystem. By learning from established jurisdictions while fostering collaboration across exploration, processing, and ESG implementation, Saudi Arabia can accelerate its emergence as a global mining hub. The panel reaffirmed that humility, openness to best practices, and long-term partnership are essential ingredients for success.

"Mining only works over the long term when countries offer stable taxation, guaranteed repatriation of revenues, and clear, respected concession rights"

– Joaquín Villarino, Consejo Minero

PANEL SESSION: What should policymakers take into consideration when assessing deep sea mining?

Dr. Assheton Stewart Carter
Executive Chair and Founder, TDi Sustainability

Marie Bourrel-McKinnon
International Ocean Governance and Seabed Governance Advisor

Oliver Gunasekara
Chief Executive Officer & Co-Founder, Impossible Metals

Prof. Saleem Ali
Lead Critical Minerals, United Nations University

This session examined the policy considerations surrounding deep seabed mineral development, focusing explicitly on how policymakers should assess risks, governance frameworks, environmental impacts, and comparative alternatives—rather than debating whether deep seabed mining should proceed.

The moderator framed the discussion around four key parameters: activities occurring both within national waters and the international seabed "Area"; the primary focus on polymetallic nodules; the distinction between traditional mining and mineral "recovery" or harvesting; and the importance of evaluating deep seabed minerals within broader global mineral supply and energy transition contexts.

Marie Bourrel-McKinnon addressed widespread misconceptions shaping political debate, emphasizing that deep seabed mineral exploration has been underway for more than five decades and is among the most regulated extractive activities globally. She stressed that the policy challenge is not a lack of scientific knowledge, but disagreement over how existing evidence should be interpreted, governed, and compared with terrestrial alternatives.

Prof. Saleem Ali approached the topic through a systems and industrial ecology lens, arguing that policymakers must compare deep seabed mining, terrestrial mining, and circularity across environmental and social impact categories.

He highlighted that deep seabed mining avoids certain direct social impacts—such as displacement of communities—while still requiring robust environmental assessments, drawing lessons from offshore oil and gas regulation.

Oliver Gunasekara focused on the role of technology and governance in securing a social license to operate. He argued that mining impacts are inseparable from the technologies deployed, outlining a selective, AI-enabled approach designed to minimize disturbance. He also highlighted governance challenges, including stalled negotiations at the International Seabed Authority (ISA), the implications of the "two-year rule," and the emergence of parallel regulatory pathways outside UNCLOS.

Key insights, data points or predication

- Impossible Metals announced its intention to pursue commercial deep seabed mineral recovery around 2029, primarily in the Clarion–Clipperton Zone, following extensive environmental baseline studies and testing.
- The company committed to a precautionary, selective recovery model, initially targeting approximately 10 percent of nodules to reduce ecological disturbance.
- Panelists emphasized the need for transparent, peer-reviewed environmental impact assessments, building on methodologies used in offshore oil and gas regulation.
- Recognition that continued stalemate within the ISA risks accelerating parallel national regulatory pathways, underscoring the urgency of resolving governance and stakeholder participation issues.
- Discussion of emerging concepts such as global mineral trust or benefit-sharing mechanisms to reduce geopolitical tension and support equitable access to critical minerals.
- Deep seabed mineral exploration spans over 50 years of scientific research and monitoring.
- Mining in the international seabed "Area" is governed by one of the most comprehensive regulatory frameworks in extractive industries, despite exploitation not yet commencing.
- Governance deadlock at the ISA has persisted for more than a decade, particularly around exploitation regulations.
- Technology choice is a decisive factor in environmental impact, with selective, non-dredging systems offering lower disturbance potential.
- Commercial deep seabed mineral development is expected by panelists to begin within five to ten years, most likely in the Clarion–Clipperton Zone.

Session summary

The session concluded that deep seabed mineral development presents policymakers with a complex but increasingly urgent decision space shaped by global mineral demand, energy transition needs, and evolving governance structures. Participants stressed that decisions must be grounded in evidence, comparative analysis, and transparent regulatory processes rather than polarized narratives.

Speakers agreed that the future of deep seabed minerals will depend on credible governance, responsible technology deployment, and international cooperation. With commercial activity potentially approaching within the next decade, policymakers face a narrowing window to establish frameworks that ensure environmental protection, equitable benefit sharing, and long-term legitimacy.

PANEL SESSION: Building regional capabilities and skills in the critical minerals value chain

Moderator

Dennis Gibson
Chairman, Critical Minerals Association – USA

Jeff Geipel
Managing Director, Mining Shared Value, Engineers Without Borders Canada

Alawi Swabury
Founder and Chief Executive Officer, Africa Battery Initiative (ABI)

Mzila Mthenjane
Chief Executive Officer, Minerals Council South Africa

Sahibzada Muhammad Tariq
Chief Executive Officer, TM Resources

Mounia Boucetta
Senior Fellow, Policy Center for the New South

Eng. Abdulaziz Al Shehri
Chief Shared Services Officer, Saudi Mining Services Company (ESNAD)

This panel explored how mineral-rich regions can build regional capabilities, skills, and infrastructure across the critical minerals value chain, with a particular focus on midstream and downstream development, workforce readiness, and local value creation. The discussion was framed against rising global demand driven by the energy transition, advanced manufacturing, artificial intelligence, and national security considerations.

Speakers emphasized that while Africa, South Asia, and emerging regions hold significant mineral endowments, value retention remains limited due to gaps in processing capacity, skills, infrastructure, and regional integration. Panelists highlighted that building downstream industries must be approached pragmatically, recognizing market scale, capital intensity, and long-term demand.

A recurring theme was the importance of human capital development, local procurement, and modular, scalable processing solutions as practical entry points for countries seeking to move beyond raw material exports. Speakers cautioned against one-size-fits-all beneficiation strategies and stressed the need for evidence-based prioritization of value-chain opportunities.

The session also showcased Saudi Arabia's emerging role as an enabler of critical minerals development through regulatory reform, digitalization, and investor support mechanisms. Panelists agreed that cross-regional partnerships, technology transfer, and policy certainty are essential to unlocking inclusive growth and resilient supply chains.

Key insights, data points or predication

- Local Procurement Expansion:

Engineers Without Borders Canada will continue supporting governments and companies to strengthen local supplier ecosystems as a priority value-retention strategy.

- Modular Processing Pilots:

TM Resources highlighted ongoing deployment of small-scale beneficiation and smelting facilities, particularly for antimony, as scalable models for other critical minerals.

- Africa–Middle East Collaboration:

The Africa Battery Initiative reiterated its role in facilitating investment partnerships between Africa, the Middle East, and Europe in battery minerals and processing.

- Regional Coordination in Africa:

Policy Center for the New South and Minerals Council South Africa emphasized advancing corridor-based and cluster approaches to beneficiation and infrastructure development.

- Investor Enablement in Saudi Arabia:

ESNAD outlined continued digitalization of licensing, compliance monitoring, and investor support services to accelerate mining sector growth.

- Africa retains only 4–20% of total mineral value due to limited processing capacity.
- Local procurement accounts for 50–70% of mining expenditure and offers immediate job creation potential.
- Downstream processing is not always economically viable without sufficient market scale and infrastructure.
- Modular plants and phased investment reduce risk and accelerate skills transfer.
- Policy certainty and regional integration are decisive factors for attracting long-term capital.

Session summary

The panel concluded that building resilient critical minerals value chains requires skills first, scale second, and ambition grounded in market realities. While downstream processing remains a long-term objective, immediate gains can be achieved through local procurement, modular beneficiation, and workforce development.

Ultimately, sustained collaboration between governments, industry, and regional partners—supported by enabling institutions such as ESNAD—will determine whether critical minerals become a true engine of inclusive growth and supply-chain resilience.

"Africa holds the minerals the world needs, but without processing capacity and skills, most of the value continues to be captured elsewhere"

– Dr. Alawi Swabury,
Africa Battery Initiative

Country Showcase Agenda

Dome

COUNTRY SHOWCASE AGENDA

Day 1

Wednesday 14 January 2026

SWEDEN

The Sweden Hour positioned Sweden as a long-standing mining nation and an active partner at FMF, showcasing how Swedish mining has combined centuries of resource development with modern innovation in automation, digitalization, electrification and sustainability. The host, Mikael Johansson, framed the hour as a structured showcase: Sweden's strategic perspective, academic and R&D capability, and a practical industry panel featuring solution providers and export finance.

In opening remarks, Ambassador Petra Menander linked the "race for critical minerals" to the dual requirement of accelerating supply while ensuring environmentally and socially sustainable practices that attract talent and unlock financing.

She emphasized Sweden's historic mining base and its modern competitive advantage: a collaborative innovation ecosystem connecting industry, government, civil society, and research institutions, supported by strong export finance tools.

Luleå University of Technology (LTU) then presented Sweden's applied R&D and education model as a backbone of mining competitiveness. LTU described a holistic geometallurgical approach spanning exploration, processing metallurgy, recycling, and environmental integration across the full value chain—supported by field-based education closely connected to operating mines. LTU highlighted research platforms and international collaboration, positioning itself as a gateway for partnerships with Saudi Arabia and beyond.

The panel shifted to practical implementation: decarbonization pathways, circularity, energy efficiency, skills development, and financing. ABB emphasized that significant decarbonization is achievable with existing technology—particularly through electrification of fleets—and stressed collaboration with OEMs and technology leaders. Sandvik showcased circular economy innovation through improved carbide/tungsten recovery from drill bits, enabling higher-grade re-use and localized service models. Epiroc highlighted Saudi Arabia's early-stage advantage: designing "mine of the future" projects from the outset with sustainability, automation, connectivity and workforce readiness built in.

Atlas Copco underscored the importance of system-level energy efficiency (not only equipment efficiency), arguing that energy losses often occur through system mismatches, leaks, and poor control strategies—creating major opportunities to reduce costs and emissions while improving reliability. Scania presented a broad portfolio of alternative fuels and electrification, emphasizing that sustainability requires correct specification, operations support, and digital performance management—not only hardware.

Key insights, data points or predication

- Sweden invited attendees to engage through the Swedish Pavilion, with Swedish companies available for follow-up discussions and partnership exploration. (Johansson + Ambassador remarks)
- LTU formally welcomed collaboration with Saudi Arabia and international partners across research, innovation and education, including joint projects and knowledge transfer. (LTU closing)
- Epiroc indicated expanded capability-building locally, including launching a training academy in Saudi Arabia to train partners, customers and new employees to accelerate technology adoption. (panel Q&A on youth/skills)
- Export finance support positioned as a practical enabler: EKN and the Swedish export credit system highlighted readiness to share risk with banks, helping projects in higher-risk contexts unlock financing and attract more lenders. (EKN intervention + Q&A)
- Industry-wide emphasis on "designing mines of the future now": panelists encouraged early integration of sustainability, digitalization, electrification and skills planning while Saudi projects are still in ramp-up/exploration phase. (Epiroc + ABB + others)
- ABB cited a global survey of ~400 mining leaders, noting about half expect significant operational transformation within five years, and ~70% believe major decarbonization can be achieved using existing technology.
- Electrification of mining fleets was highlighted as one of the largest near-term decarbonization levers, with additional productivity and operator-environment benefits.
- Sandvik stressed circularity through improved separation and reuse of high-value carbide/tungsten materials from worn drill tools, enabling repeated regeneration into advanced-grade products.
- Atlas Copco argued that energy losses are often system-level (leaks, pressure drops, control strategies, demand/supply mismatch), implying large "hidden" efficiency gains in utilities such as air and gas systems.

SWEDEN

- Scania presented multiple decarbonization pathways: high-efficiency diesel platforms, 100% biodiesel compatibility, gas/biogas engines, and battery-electric vehicles—plus digital services to optimize fleet/driver performance.
- Financing was framed as decisive: export credit guarantees can reduce bank risk appetite barriers, supporting capital mobilization for new projects—especially when bundled Swedish equipment creates larger bankable packages.
- Talent attraction was linked to deploying modern technology (automation, digitalization, electrification), creating safer, more modern workplaces and helping young professionals feel they are "making a difference."

Session summary

The Sweden Hour presented a cohesive Swedish model for future-ready mining: aligning sustainability and productivity through applied innovation, circular economy solutions, system-level energy efficiency, and workforce development—supported by research institutions and export finance tools that reduce barriers to adoption. Speakers emphasized that the technologies to decarbonize and modernize mining are largely available today, and the priority is scaling implementation through collaboration.

For Saudi Arabia and other fast-growing jurisdictions, panelists ahighlighted a strategic advantage: designing new mines from the outset as sustainable, automated and skills-enabled operations. Sweden positioned its ecosystem—industry, academia, and financing—as a ready partner for collaboration across the mining value chain, from R&D and training to deployment and bankability.

"Circularity is not just about ambition—through innovations like advanced carbide recovery, we can regenerate high-value materials and reuse them again and again"

– Maria Hugosson
President Rock Tools Division, Sandvik Business Area Mining

SAUDI ARABIA

This country showcase outlined Saudi Arabia's accelerated transformation into a globally competitive mining and minerals hub under Vision 2030, which positions mining as the third pillar of the Kingdom's economic diversification objectives. The session demonstrated how regulatory reform, geological data transparency, and investor-centric policies have reshaped the Kingdom's mining investment landscape.

Speakers highlighted the rapid evolution of Saudi Arabia's exploration ecosystem, underpinned by a predictable multi-year tender pipeline, substantial government-funded geoscience programs, and exploration de-risking mechanisms.

These reforms have driven a sharp rise in exploration activity, international participation, and capital commitments across gold, copper, phosphate, and critical minerals.

The session also focused on downstream and industrial development ambitions, emphasizing Saudi Arabia's goal to become a top-10 global mineral processing hub. Demand from giga-projects, renewable energy, EV manufacturing, and industrial localization was presented as a built-in market anchor for long-term mineral value chain growth.

Complementing upstream and industrial development, the Ministry unveiled a new Mining Infrastructure Enablement Initiative to address power and water constraints in remote mining areas, while the Ministry of Investment detailed end-to-end investor support mechanisms, a new investment law effective February 2025, and the Regional Headquarters (RHQ) program. Corporate testimonials illustrated how these reforms translate into rapid market entry and large-scale investment decisions.

Key insights, data points or predication

- Launch of the Mining Infrastructure Enablement Initiative, initially focusing on energy and water provision for remote mining areas, with aggregation of demand across licenses.
- Continued rollout of a predictable exploration tender pipeline, including Round 11 and 11,000 km^2 planned for licensing in 2026.
- Expansion of the Exploration Enablement Program, offering reimbursement of up to 25% of eligible exploration costs and support for skilled workforce localization.
- Implementation of a new Investment Law (effective February 2025) to streamline investor registration and unify licensing.
- Ongoing expansion of the Regional Headquarters (RHQ) Program, exceeding 700 licensed RHQs by 2026.
- Private-sector commitments highlighted:
  - Jack Reich International: RHQ established; expansion aligned with Vision 2030.
  - Traxies Group: RHQ established; investment pipeline of approximately USD 2.5 billion in mineral processing projects.
- Saudi Arabia's ranking in mining investment attractiveness improved from 104th to 23rd globally over the past decade.
- Estimated USD 2.5 trillion in untapped mineral wealth, largely within the under-explored Arabian Shield.
- USD 347 million invested in government-funded geoscience programs between 2021–2024.
- Exploration spending growing at approximately 50% annually since the new mining law.
- Industrial demand drivers by 2030 include:
  - 320,000 vehicles (including EVs) manufacturing capacity
  - 130 GW renewable energy capacity
  - 48 GWh energy storage capacity
- Mining infrastructure costs can exceed 25% of project CAPEX, underscoring the importance of public-private enablement.
- RHQ incentives include 0% corporate income tax and 0% withholding tax for 30 years, extendable.

Session summary

The KSA Country Showcase demonstrated how Saudi Arabia has rapidly repositioned itself as one of the world's most attractive mining and minerals investment destinations. Through regulatory reform, large-scale geoscience investment, and targeted de-risking mechanisms, the Kingdom has unlocked exploration momentum and international confidence.

By coupling upstream growth with downstream industrial ambition, infrastructure enablement, and investor-centric programs such as the RHQ initiative, Saudi Arabia presented a fully integrated mining value proposition. The session reinforced the Kingdom's readiness to partner with global investors to build resilient, sustainable, and competitive mineral value chains aligned with Vision 2030.

CANADA

This Canada Country Showcase presented Canada's investment proposition across three connected lenses: (i) national momentum to accelerate critical minerals investment and execution, (ii) Quebec's end-to-end mining value chain and globally active service and technology providers, and (iii) Saskatchewan's positioning as a high-performing critical minerals jurisdiction with growing processing capacity and a strong social license model.

The opening panel framed Canada's opportunity through a pragmatic assessment of global competition and supply-chain urgency.

Speakers stressed that critical minerals leadership is being contested and that Canada's ambition is to regain momentum by scaling production where it has historically been strong (e.g., potash, uranium, gold and copper), while simultaneously improving the investment and execution environment. A key point was the geopolitical and market shift driving faster action—paired with the argument that investors ultimately need clarity, predictability, and confidence in timelines.

Canada's policy direction was described as moving toward more streamlined and coordinated approvals, including a "one window, one review" approach and a Major Projects Office intended to centralize coordination and accelerate reviews for priority developments.

The narrative linked regulatory improvements to the practical bottlenecks companies face—offtake certainty, price risk once in production, and access to capital—highlighting the need to align policy reform with financing mechanisms that unlock earlier-stage progress.

Financing was positioned as a critical accelerator. Export Development Canada (EDC) described its role in bridging capital gaps and catalyzing project timelines, including substantial annual export support volumes, a marked increase in critical minerals-related capital deployment, and targeted tools for junior and earlier-stage miners (including risk capital instruments). Concrete examples were referenced to illustrate "bridge" financing that enables projects to move forward faster than they otherwise could.

The Quebec segment shifted to on-the-ground capability: a compact showcase of institutions and companies that cover the mining lifecycle—from professional ecosystem building and standards-setting, to engineering and due diligence (including NI 43-101/JORC study support), to drilling services scaling into the Kingdom, to project management delivery across dozens of countries, and advanced software that improves planning by modelling geological uncertainty. The throughline was Canada's ability to deliver not only resources, but execution capacity, advisory depth, and innovation that reduce risk across development stages.

The Saskatchewan segment positioned the province as a critical minerals powerhouse and a stable destination for long-term investment. Speakers highlighted Saskatchewan's strong investment climate, established potash and uranium industries, a pipeline of projects under construction, and major investment commitments. Particular emphasis was placed on building value-added capacity inside the jurisdiction—notably rare earth processing—supported by long-standing research and technology institutions. The session also elevated the "social license" playbook in Saskatchewan, describing practical mechanisms that sustain community support: workforce training pathways and jobs, local procurement and supplier development, and Indigenous partnership tools (including public support mechanisms to improve access to capital). The segment closed by underscoring strong alignment and complementarity with the region's mining growth ambitions and the appetite for collaboration, with follow-up encouraged through Canadian and provincial trade teams and upcoming global mining touchpoints (including PDAC).

Key insights, data points or predication

- Canada–Saudi Arabia minerals MoU referenced as a framework to expand bilateral cooperation, including knowledge-sharing across exploration, extraction, and processing technologies.
- Canada advancing measures to streamline and accelerate project review, including:
- A "one window, one review" approach
- A Major Projects Office to centralize coordination and accelerate priority reviews
- EDC scaling critical minerals finance, including:
- Significant capital deployment to critical minerals companies in 2024
- Dedicated early-stage / junior mining risk-capital tools
- Example of bridge financing referenced to accelerate a Quebec rare earth-related project
- Quebec showcase noted operational next steps in-market, including a drilling company stating it is fully registered in KSA with equipment expected to arrive in Jeddah at the end of March.
- Saskatchewan/Canada teams encouraged continued investor engagement via in-region representatives and at PDAC in March.

Canada's production positioning and momentum were discussed, including:

- Historical shifts in nickel ranking over the last two decades (down from top-tier to lower rank), alongside improved positioning in other commodities such as gold and a "turnaround" narrative in copper.

CANADA

- Canada highlighted as #1 in potash and #2 in uranium (as stated during the session).

Financing and acceleration:

- EDC described very large annual export support and a major increase in critical-minerals capital deployment in 2024, including support to 220+ companies and a cited Quebec example involving a $15M bridge facility.
- Canada's public toolkit referenced included measures such as a 30% Critical Minerals Exploration Tax Credit, a $2B critical minerals sovereign fund, plus infrastructure and resilience funds (including first/last-mile connectivity for remote projects).

Saskatchewan positioning:

- Saskatchewan cited as hosting 27 of Canada's 34 listed critical minerals.
- The province described multiple mines under construction, major potash expansion, and emerging value-add capability through rare earth processing.
- SRC rare earth facility capacity was framed in EV-equivalent output terms (half a million EVs) and as a meaningful share of non-China production today.

Social license and workforce:

- A structured model was described around (1) employment and training access, (2) local procurement and supplier development, and (3) partnership mechanisms for Indigenous communities (including public loan guarantees) to expand participation and benefit sharing.

Session summary

Canada's showcase delivered a coherent message: the country is aligning government, industry, and financing to accelerate critical minerals development, improve predictability for investors, and strengthen resilient global supply chains. The presentation linked regulatory reform with practical capital needs and positioned public finance as a catalyst for earlier-stage momentum.

Quebec and Saskatchewan reinforced the national narrative with execution-ready capacity—spanning engineering, drilling, project delivery, digital optimization, processing capability, and long-tested approaches to social license and talent development. Collectively, the session positioned Canada as a stable, partnership-oriented market seeking to convert geological potential into faster project delivery and long-term value-added supply chains.

PAKISTAN: UNLEASHING POTENTIAL: ACCELERATING PAKISTAN'S MINERAL REVOLUTION

This Pakistan Country Showcase positioned Pakistan as an emerging, high-potential mining jurisdiction—anchored by the Tethyan metallogenic belt and large-scale copper-gold opportunity in Chagai—while emphasizing that the country's competitiveness hinges not only on geology but also on reforms that make investment execution predictable, transparent, and bankable.

The session opened with a "case for Pakistan" narrative, supported by a video framing Pakistan's mineral endowment, exploration headroom, and the rationale for global investors to engage now.

The storyline highlighted the breadth of minerals across provinces, the strategic location and infrastructure pathway to deep-sea ports, the role of youth and training in workforce readiness, and the government's intent to strengthen infrastructure, fiscal incentives, and harmonized regulation. It also elevated institutional enablers—particularly a one-window facilitation model and the digitization of geological intelligence and licensing data—aimed at reducing friction for investors.

Saudi Arabia's Deputy Minister underscored an investor decision logic often used in mining: strong geological prospectivity is necessary, but policy clarity and permitting efficiency determine whether capital commits. He argued that Pakistan already clears the geology threshold through globally recognized deposits and a highly accessible exploration environment, and that recent steps by Pakistan's leadership and facilitation mechanisms are progressively "checking the boxes" on the enabling framework needed to scale from a handful of success stories to many more.

Pakistan's Minister for Petroleum outlined a reform-and-delivery trajectory designed to move the sector from promise to pipeline: national alignment (federal and provincial), harmonization of regulatory frameworks to reduce complexity for investors, benchmarking of mining and fiscal regimes against leading jurisdictions, and capability-building in geological survey, labs, and field formations. A core message was that Pakistan aims to attract "patient capital" for multi-year projects by lowering uncertainty, improving data availability, and creating a credible pathway from exploration to development and downstream integration—supported by rail/logistics planning and the concept of industrial parks and refining capacity as the ecosystem matures.

The industry segment translated policy into practice. OGDCL described mining as a strategic diversification, enabled by confidence in prospectivity, regulatory standardization, partner availability, and the wider ecosystem for services and technology.

Pakistan's private sector, represented through consortium-led vehicles, emphasized a shift in business sentiment and a deliberate intent to build modern, ESG-led mining from the start—positioning Chagai as a "new district" opportunity where global best practices can be embedded early. Chinese operator experience in the Saindak copper-gold project was presented as a long-standing example of operational delivery in remote conditions through deep local partnership, supply chain coordination, workforce development, and community support.

Barrick's perspective framed Reko Diq as both a flagship project and a "standard setter" for governance, permitting, community engagement, and the introduction of global suppliers into Pakistan. The narrative emphasized extensive engagement across government levels and regulators, the role of centralized facilitation in accelerating coordination, and the importance of maintaining social license through tangible investments in education, health, and local hiring. The session concluded by reinforcing Pakistan's ambition to move "beyond Reko Diq" through PMIF as the convening platform—using Reko Diq to anchor credibility, while expanding exploration, partnerships, and bankable pipelines across the broader belt and mineral portfolio.

Key insights, data points or predication

- Pakistan Minerals Investment Forum (PMIF) confirmed as the next major convening moment: 8–9 April 2026, positioned under the theme "Beyond Reko Diq", with an explicit call for investors, explorers, service providers, financiers, and governments to participate.
- Pakistan committed to continued regulatory harmonization (federal–provincial alignment), digitization of geological and licensing information, and investor facilitation via a one-window model (SIFC) to reduce friction and increase predictability.
- Government roadmap elements referenced:
- Strengthening infrastructure planning (rail/logistics links and port connectivity) around key belts and districts
- Encouraging movement up the value chain toward processing/refining, enabled through incentives and an evolving royalty/fiscal approach
- Rico Diq highlighted as a national anchor project, with Pakistan indicating financing progress and a target pathway toward production in the coming years (details referenced earlier in the session narrative).

PAKISTAN: UNLEASHING POTENTIAL: ACCELERATING PAKISTAN'S MINERAL REVOLUTION

- Private-sector consortia and state-linked entities (e.g., OGDCL and consortium vehicles) signaled continued exploration and JV formation with international partners, technology providers, and service companies.
- Geological proposition
- Pakistan's outcrops are described as extensively mineralized, with the Tethyan metallogenic belt crossing Pakistan and anchoring globally significant copper-gold potential in Chagai.
- Pakistan framed as under-explored relative to belt-scale potential, creating headroom for new discoveries and new entrants.
- Investor decision logic
- Emphasis on the dual requirement of (1) geology and (2) enabling policy framework—mineral laws, permitting speed, and data quality—positioned as decisive for capital deployment.
- Demand drivers
- Copper demand outlook cited from major institutions (S&P and the World Bank) pointing to substantial growth through 2040, framed as a macro tailwind for new supply districts.
- Electrification narrative reinforced through the higher copper intensity of EVs versus internal combustion vehicles (used to justify urgency for new supply).
- Institutional enablers
- SIFC described as a one-window platform to streamline investment journey.
- A national effort to upgrade geological survey capabilities, including modern, compliance-aligned labs and a digital platform consolidating maps and data for investor access.
- Operational proof points
- Saindak cited as Pakistan's foundational non-ferrous operation integrating mining, beneficiation, and smelting; strong recovery performance was referenced despite low head grade, highlighting technical execution in difficult conditions.
- Reko Diq presented as a scale project driving supplier entry, local job creation, and a benchmark for ESG, permitting, and community engagement.

Session summary

The session presented Pakistan as a frontier-scale mining opportunity with credible flagship momentum—built on exceptional geology and a deliberate shift toward an investor-ready enabling environment. Speakers repeatedly anchored the story in predictability: harmonized regulation, transparent data access, one-window facilitation, and a pathway to bankable, long-horizon project delivery.

Reko Diq was positioned as the torchbearer that can set standards for ESG, governance, and execution while accelerating the broader ecosystem—private-sector consortia, state-linked champions, and international operators—needed to move "beyond Reko Diq." The immediate next step and call to action was clear: convene global partners at PMIF on 8–9 April 2026 to convert Pakistan's exploration headroom into scalable pipelines and long-term supply for the global critical minerals transition.

AUSTRALIA

This double-panel Australia Showcase positioned Australia as a global benchmark for responsible mining, decarbonisation and applied innovation, demonstrating how Australian SMEs and specialist firms are delivering technically robust, economically viable and low-carbon solutions across the full mining value chain — from early exploration to logistics and operations.

The first panel focused on responsible mining and emissions reduction, emphasizing that many of a mine's long-term carbon outcomes are determined during the earliest stages of project design.

Speakers highlighted how Australian best practice embeds decarbonisation into geology, exploration targeting, drilling strategies, mine design and processing flowsheets, rather than treating carbon reduction as a late-stage add-on. Examples from Australian operations illustrated how renewable energy integration, energy-efficient processing technologies and early technical decisions can significantly lower lifecycle emissions while improving operational efficiency.

A strong theme emerging from the discussion was the role of upstream decision-making. Geophysical targeting, advanced orebody characterization and improved geometallurgical modelling were presented as critical tools for reducing unnecessary drilling, minimizing waste movement, optimizing processing routes and extending mine life — all of which reduce cumulative energy use and carbon intensity. Australian expertise was positioned as particularly relevant to Saudi Arabia's rapidly evolving mining sector, where greenfield development provides an opportunity to embed best practice from the outset.

The discussion also addressed the evolution of regulatory standards and performance metrics, noting how Australia's emissions baselines tied to production are reshaping mine planning decisions. Speakers described how sustainability objectives are now influencing choices around mining methods, equipment selection, pit optimization and electrification pathways, encouraging integrated, system-wide solutions rather than isolated technological fixes.

The second panel shifted the focus to mining innovation and scalable technologies, highlighting Australia's strength in modular, deployable solutions designed for remote and early-stage environments. Panelists demonstrated how Australian innovations in assaying, logistics, materials handling, digital platforms and systems integration are delivering immediate emissions reductions while maintaining productivity and safety.

A recurring message across both panels was that decarbonisation only succeeds when solutions are operationally practical and economically sound. Speakers stressed that collaboration across operators, contractors, consultants, OEMs and technology providers is essential to avoid fragmented approaches. Digital integration, system-level planning and data-driven decision-making were repeatedly cited as enablers for achieving real emissions reductions at scale.

Key insights, data points or predication

Australian companies confirmed active engagement and ongoing expansion in the Saudi mining market across exploration, engineering, drilling, logistics and sustainability advisory services.

- The Australian Pavilion was highlighted as a platform for continued business-to-business engagement, collaboration and technology transfer with Saudi stakeholders.
- Panelists emphasized continued collaboration with Saudi partners to embed low-carbon design principles early in new mining developments, rather than retrofitting solutions later.
- Several speakers indicated ongoing development of modular, scalable technologies suitable for Saudi Arabia's remote and greenfield mining contexts.
- Early design decisions (geology, targeting, mine method, processing flowsheets) have the greatest influence on a mine's long-term carbon footprint.
- Geophysics and advanced modelling can significantly reduce unnecessary drilling, fuel use and waste movement while improving resource definition.
- Energy-efficient processing technologies such as HPGR can reduce energy consumption while improving economics.
- Electrification pathways are advancing but must be aligned with mine geometry, haulage profiles and infrastructure readiness to be viable.
- Containerised bulk logistics can reduce dust, product loss and environmental impacts at ports while improving ESG performance.
- Low-carbon assaying technologies and in-field analysis dramatically reduce emissions associated with sample transport and laboratory processing.
- System integration, supported by digital platforms, is critical to align energy, processing, logistics, maintenance and cost performance in both greenfield and brownfield operations.

AUSTRALIA

- Successful decarbonisation requires solutions that are technically feasible, economically justified and scalable, not pilot-only concepts.

Session summary

The Australia Showcase underscored why Australian mining expertise is globally recognized for its combination of technical rigor, practical innovation and responsible delivery. Across both panels, speakers demonstrated that decarbonisation in mining is most effective when embedded early, approached holistically and supported by strong collaboration across the value chain.

By sharing real-world examples and deployable technologies, the session positioned Australia as a trusted partner for Saudi Arabia's mining ambitions—offering solutions that not only reduce emissions, but also strengthen operational performance, investor confidence and long-term sustainability.

EGYPT

H.E. Eng. Karim Badawi
Minister of Petroleum and Mineral Resources, Arab Republic of Egypt

This session presented Egypt's comprehensive repositioning of its mining sector as a strategic pillar of national economic growth, anchored in regulatory reform, infrastructure readiness, and value-chain integration. It outlined how Egypt is transitioning mining from a marginal contributor to GDP into a core industrial and investment-driven sector aligned with global best practices.

Opening the session, H.E. Eng. Karim Badawi set out Egypt's national vision to raise mining's contribution to GDP to 5–6%, highlighting four critical enablers: world-class geology, robust infrastructure, reliable and diversified energy supply, and a modern, competitive fiscal and regulatory framework.

He emphasized that Egypt's mining transformation is a state-level priority supported by decisive reforms and long-term policy stability.

Eng. Yasser Ramadan detailed the institutional transformation of EMRA into the Egyptian Mineral Resources & Mining Industries Authority (MRMIA), now operating as an economic authority and one-stop shop for investors. He outlined how streamlined licensing, digital transformation, and the upcoming national airborne geophysical survey are designed to de-risk exploration, accelerate permitting, and improve transparency across the sector.

The session then shifted to private-sector perspectives on downstream development and execution. Eng. Mostafa El Gabaly demonstrated how Egypt's regulatory responsiveness, infrastructure readiness, and industrial zones position the country as a regional hub for mining-based manufacturing, particularly in phosphates and fertilizer-related industries. He underscored Egypt's move away from raw material exports toward higher value-added industrial production.

Project-level delivery was illustrated through the EQAT Gold Mines case study, presented by Eng. Tamer Fahmy, showcasing Egypt's growing pipeline of compliant, JORC-aligned gold projects. The presentation highlighted the progression from exploration to trial production, underpinned by regulatory clarity, permitting efficiency, and strong public–private partnerships.

The session concluded with WADICO's operational perspective, where Eng. Amgad Goneim highlighted execution excellence, digitalization, safety culture transformation, renewable energy adoption, and measurable ESG performance. WADICO's experience demonstrated Egypt's capacity to operate mining assets in remote areas to international standards while advancing decarbonization and workforce development.

Key insights, data points or predication

- Egypt confirmed the nationwide airborne geophysical survey, covering the Eastern Desert and other prospective zones, to be launched imminently.
- Formal confirmation of MRMIA's role as a one-stop shop for licensing, permitting, and investor facilitation.
- Rollout of 12 targeted incentives for junior mining companies, including reduced rental fees, flexible relinquishment terms, reconnaissance licenses, and open block access.
- Reinforcement of long-term exploitation agreements (30 years) with fiscal stability and full asset ownership guarantees.
- Expansion of downstream phosphate and fertilizer manufacturing projects through PPP models and foreign direct investment.
- Continued scale-up of solar-powered and electrified mining operations, led by WADICO.
- Mining targeted to contribute 5–6% of Egypt's GDP over the medium term.
- Over 50 GW of available power generation capacity, with 42% renewable energy target by 2030.
- Exploration rental fees reduced from ~USD 100/km² to USD 40/km².
- Gold fiscal terms standardized: 15% government free share, 5% royalty, fixed for concession duration.
- EQAT Gold Mine resources increased to 2.25 million ounces, with trial production underway and PFS completed.
- Sukari Gold Mine workforce is 97% Egyptian, with over 6 million ounces produced since 2010 and ~USD 1 billion contributed to the national economy.
- WADICO achieved millions of liters of diesel savings through solar energy deployment, resulting in significant CO_2 reductions.

Session summary

The session demonstrated that Egypt's mining sector has moved decisively from reform planning to execution. With regulatory clarity, institutional reform, and national data initiatives now in place, Egypt is positioning itself as a stable, competitive, and scalable mining jurisdiction.

By aligning upstream exploration, downstream manufacturing, ESG performance, and investor facilitation under a unified national strategy, Egypt presented a compelling case for global mining companies, juniors, financiers, and industrial partners seeking long-term, value-driven opportunities in the Arabian Nubian Shield.

COUNTRY SHOWCASES AGENDA

Day 2

Thursday 15 January 2026

DEMOCRATIC REPUBLIC OF THE CONGO

Peter Arkell
Chairman, Global Mining Association of China (GMAC)

H.E. Louis Watum Kabamba
Minister of Mines, Democratic Republic of Congo

This session positioned the Democratic Republic of Congo (DRC) as a central pillar of the global energy transition, presenting a clear shift from a traditional "pit-to-port" extractive model toward in-country value creation, refining, and industrial transformation. The discussion highlighted the country's strategic role in supplying critical minerals essential for electrification, electric vehicles, and renewable energy technologies.

H.E. Louis Watum Kabamba emphasized that the DRC is no longer merely a source of raw materials, but is actively building domestic refining capacity and special economic zones focused on battery minerals and clean-energy value chains.

He underscored the country's openness to strategic partnerships, particularly with Saudi Arabia, to connect capital, technology, and infrastructure with Congolese mineral endowments.

The Minister addressed prevailing investor risk perceptions, stressing that regulatory clarity and administrative processes are key risk-mitigation tools. He highlighted the stability of the legal framework, the protection of investor assets, and the importance of working with local communities and youth, noting that approximately 70 percent of the population is under 30 years old, making human capital a core asset for long-term stability and profitability.

Louis Humbway provided a technical roadmap for engaging with the DRC mining sector, outlining the digitization of the mining cadastre (CAMI) as a cornerstone reform to enhance transparency, speed, and security in licensing. He detailed the country's mineral endowment across multiple metallogenic provinces and presented concrete production, export, and revenue data demonstrating the DRC's global leadership in cobalt and copper.

The session concluded by framing the DRC as a fast-moving, competitive mining jurisdiction with lower-cost production profiles, improving ESG performance, and clear entry pathways for investors seeking long-term participation in critical minerals markets.

Key insights, data points or predication

- Confirmation that the DRC is transitioning toward in-country refining and mineral transformation, moving beyond raw material exports.
- Ongoing digitization of the mining cadastre (CAMI) to ensure transparent, secure, and accelerated licensing processes.
- Development of special economic zones for battery minerals processing, aimed at reducing investor risk and improving returns.
- Continued strengthening of ESG compliance, including traceability, anti-smuggling measures, and international certification schemes.
- Invitation to investors to engage directly through ANAPI and CDCPM for technical guidance, permitting support, and investment facilitation.
- DRC is the world's leading producer of cobalt, holding 60–70% of global reserves.
- 2024 cobalt production: ~119,900 tonnes, generating approx. USD 5.2 billion in export value.
- 2024 copper exports: ~3.2 million tonnes, valued at approx. USD 19.8 billion, making DRC the second-largest producer globally after Chile.
- Gold production (2024): ~31 tonnes, generating approx. USD 1.5 billion in revenue.
- Rapid mine development timelines compared to global averages, particularly within the Copperbelt.
- Digitized mining registry expected to reduce disputes, accelerate permit issuance, and improve investor confidence.

Session summary

The session reinforced the Democratic Republic of Congo's central role in the global critical minerals supply chain and its ambition to move decisively up the value curve. With unmatched geological endowment, improving governance, and a clear industrial vision, the DRC presented itself as a credible long-term partner for the energy transition.

By coupling regulatory reform, digitalized licensing, ESG progress, and targeted industrial zones with a young and growing workforce, the DRC positioned itself as not only resource-rich, but execution-ready — inviting global investors to participate in shaping a new era of sustainable mineral development.

MAURITANIA

Peter Arkell
Chairman, Global Mining Association of China (GMAC)

Baba Salihi
Vice-President, TML sa. Kinross Gold Corporation

Mohamed Vall Temidi
Chief Executive Officer, SNIM

Ahmed Taleb Mohamed
Senior Advisor of the Minister in Charge of Mines

This session introduced Mauritania as an increasingly attractive mining jurisdiction in West Africa, aiming to move beyond external perceptions and present an “on-the-ground” view of its geology, investment climate, and operating conditions. The moderator framed the session as a chance for investors to assess Mauritania’s potential directly, noting it as an “exciting place” for further investment consideration.

Ahmed Taleb set the scene with a government-focused overview: Mauritania’s strategic Atlantic coastline, proximity to Europe and North America, and positioning between North Africa and Sub-Saharan Africa. He emphasized the country’s low population density and year-round exploration conditions, alongside reported GDP growth averaging around 5%.

He highlighted Mauritania’s “world-class geology,” outlining key geological units and basins associated with iron ore, gold, copper, polymetallic deposits, phosphates, gypsum, black sands, and oil and gas shows.

The presentation stressed that Mauritania is both a mature producer and an under-explored frontier. Ahmed underscored iron ore as a cornerstone, describing the parastatal iron ore company as Africa’s second-largest producer, with ambitions to scale from roughly 12 million tonnes per year to 25 million tonnes in the coming years.

He also highlighted a milestone in gold production, noting the country has crossed one million ounces per year, anchored by Kinross’ Tasiast mine.

Baba provided an investor/operator perspective from Kinross Gold Corporation, portraying Mauritania as a secure and predictable place to operate, with strong rule-of-law, fiscal stability, and an enabling investment code. He described Tasiast as a large open-pit operation with more than 4,000 employees—98% Mauritanian—and highlighted local content, workforce development, and inclusion efforts, including women representing around 9% of the workforce. He also referenced environmental commitments, including a solar plant supplying around 17% of the mine’s energy.

Hashemi Abdallah’s intervention, delivered partly in Arabic/French with an English summary provided by another speaker, focused on the Geological Survey’s role in national mapping and prospect development. He noted that Mauritania contains major geological ages (including Archean and Birimian terrains) associated globally with significant mineral deposits. He also referenced ongoing geological mapping upgrades (moving toward more detailed national mapping) and a portfolio of state-owned projects open for partnership across phosphate, gold, and other metallic minerals.

The session closed with a clear investment invitation: Mauritania is presented as stable, transparent, and “future-ready,” combining geological prospectivity with improving logistics (ports/rail), expanding electricity to mining hubs, and a national ambition linked to broader energy transition opportunities, including green hydrogen developments.

Key insights, data points or predication

- Government commitment to investment climate strengthening, including mining code incentives and stability guarantees (permit renewal upon meeting statutory requirements; regime stability during conventions; international arbitration access).
- EITI compliance highlighted (Mauritania described as EITI-compliant since 2005, with public disclosure of payments).
- Infrastructure upgrades underway / planned: port facility upgrades, railway expansion, and electricity lines to mining hubs (Zouérat referenced) stated as planned to come into operation.
- Kinross operational commitments: strong local content (98% Mauritanian workforce), women participation, environmental efforts including solar energy contribution.
- Geological Survey priorities: advancing national geological mapping (moving toward more detailed scale) and maintaining a portfolio of projects open for partnership (phosphate, gold, and metallic minerals).
- Mauritania described as under-explored despite hosting major portions of West African Craton geology associated with gold potential.
- Energy transition positioning: claimed >43% green energy in the national energy mix; gas production began “since last year” (as stated).
- Iron ore: parastatal iron ore sector described as 2nd producer in Africa; stated production of ~12 million tonnes per year over the last decade, targeting 25 million tonnes in the next 4–5 years.
- Gold: national gold production said to have crossed ~1 million ounces per year; Kinross highlighted as producing >600,000 ounces/year with growth aspirations noted.

MAURITANIA

- Critical minerals upside: references to lithium occurrences (pegmatites and salars), rare earth (historical production; current occurrences and one deposit under development), uranium potential in northern provinces (project cited at >90 million pounds expected to be developed in ~2 years).
- Industrial minerals: gypsum described as ~6 billion tonnes and located ~45–50 km from Nouakchott; silica and phosphate deposits referenced (some >100 million tonnes).
- Operator ESG examples: Tasiast solar plant supplying ~17% of energy; workforce Mauritanian share ~98%; women ~9% of workforce.

Session summary

The Mauritania session presented a clear narrative of a stable West African mining jurisdiction combining mature production (iron ore and gold) with significant under-explored upside across critical and industrial minerals. Government speakers emphasized enabling geology, strategic Atlantic logistics, improving infrastructure, and a regulatory framework designed to provide predictability, fiscal stability, and investor protections, including international arbitration access.

From an operator perspective, Kinross' Tasiast case was used to demonstrate that large-scale, long-life mining operations can be built and sustained in Mauritania with strong local content and visible ESG actions, including solar power integration.

The Geological Survey's mapping and project portfolio approach further reinforced Mauritania's intent to de-risk opportunities and expand partnerships. The session closed with a direct invitation to investors to engage through the Mauritanian booth for deeper technical and commercial follow-up.

ARGENTINA

Anjali Rao
Former CNN International Anchor

H.E. Luis Lucero
Secretary of Mining of the Nation, Argentina

This session explored Argentina's evolving role in the global minerals and energy-transition supply chains, with a focus on execution, investor confidence, and long-term delivery. Against the backdrop of rising global demand for lithium and copper, the discussion positioned Argentina as a country moving decisively from recognized geological potential toward tangible project development and production.

The Secretary for Mining outlined how Argentina's geological endowment—particularly lithium within the Lithium Triangle and large-scale copper deposits along the Andes—defines its strategic relevance. Lithium was highlighted as a near-term strength, with multiple new operations brought online in recent months and ambitious production targets projected toward 2035.

Copper, while more capital-intensive and longer-cycle, was framed as the next major pillar, with several world-class projects progressing toward construction and early production milestones.

A central theme of the discussion was policy credibility and trust-building. The Secretary acknowledged Argentina's historical challenges with economic volatility and defaults, emphasizing that rebuilding confidence—particularly with long-standing investors in Europe and other mature markets—is a deliberate, long-term process. He underscored that the current administration has placed mining at the center of national development policy, supported by broad political consensus across parties, including the approval of the RIGI investment framework.

The session also addressed practical enablers and constraints. Infrastructure gaps—especially roads and logistics in remote mining provinces—were identified as the most significant bottleneck, while community support, workforce development, and social licence were described as relative strengths. Mining was presented as already delivering visible improvements in employment, supplier development, and living standards in producing provinces, particularly in Argentina's domestic lithium triangle.

Looking ahead, Argentina's ambition was framed in decade-long terms. By the mid-2030s, the country aims to operate multiple world-class lithium and copper mines, positioning mining alongside agriculture as a second national export pillar. The session concluded with a clear message to investors and governments: Argentina is open to partnership, accustomed to working with international mining companies, and committed to policy stability, execution discipline, and long-term value creation.

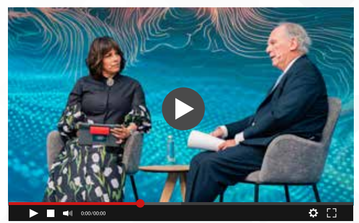
Key insights, data points or predication

- Argentina reaffirmed mining as a strategic national development pillar, with cross-party political backing.
- Continued rollout of the RIGI investment framework, covering mining among other priority sectors.
- Target of reaching ~650,000 tonnes of lithium carbonate equivalent per year by 2035.
- Progression of multiple world-class copper projects, with initial production expected within the next 2–5 years.
- Ongoing coordination between provincial governments and the federal level, particularly on lithium governance, water management, and infrastructure planning.
- Argentina is part of the Lithium Triangle, alongside Chile and Bolivia, and has brought four new lithium operations online in the past 16 months.
- Lithium production could reach ~650,000 t LCE/year by 2035, positioning Argentina as a top global supplier.
- Copper production potential projected at 1.3–1.5 million tonnes per year within 5–8 years, subject to project execution.
- Infrastructure investment remains the primary constraint, while community acceptance and workforce readiness are comparative advantages.
- Mining exports could reach USD 35–40 billion annually, with a longer-term ambition of scaling toward USD 80 billion when combined with energy.

Session summary

The session presented Argentina as a mining jurisdiction at an inflection point, combining world-class geology with a renewed political and economic commitment to execution. While challenges remain—particularly in infrastructure and long-term trust-building—the alignment between national policy, provincial authorities, and global market demand was portrayed as unprecedented.

By positioning mining alongside agriculture as a core economic pillar, Argentina is seeking to rebalance regional development, unlock large-scale investment, and play a central role in the global energy transition. The discussion closed with a clear signal to international partners: Argentina's mining future is being built deliberately, collaboratively, and with a long-term horizon firmly in view



UNITED KINGDOM

Jeff Townsend
Chair, Critical Minerals Association UK

Oliver Richards
Global Head of Critical Minerals International, UK Department of Business and Trade

Neil McKenna
Partner Technical Mining Services EMEA, ERM

Dr. Karen Hanghoj
Director, British Geological Survey

Wael Jaber
Vice President, Mining & Metals Consulting, Wood Mackenzie

This session positioned the United Kingdom as a partner in the global critical minerals agenda, framing the UK's offer across policy, domestic capability, global partnerships, mining services expertise, and finance. The discussion followed a structured sequence: opening presentations from government, market analysis, project delivery and investment challenges, and the enabling role of national geological surveys—followed by an interactive panel discussion focused on UK implementation and international collaboration.

Oliver Richards set out the UK Government's Critical Minerals Strategy and its central "60–20–10" ambitions:

- 60% domestic production/processing contribution to UK demand
- 20% supply from recycling/circular economy
- ≤60% supply dependence from any single country (diversification target)

producing 10% of UK demand domestically, meeting 20% through recycling, and limiting dependency so that no more than 60% of supply comes from a single country. He stressed that the UK intends to be more active both at home and abroad—leveraging domestic projects, university-linked innovation, and international trade relationships—while promoting UK strengths in mining services, innovation and finance.

Wael Jaber (Wood Mackenzie) provided market context, describing "megatrends" accelerating demand growth:

- Energy transition: global power demand expected to double even under delayed scenarios, EV penetration rising sharply (cited as a ~20-fold expansion), and renewable energy scaling significantly (cited as ~six-fold). He emphasized that clean technologies are more metal-intensive and require more diverse metals, while supply chains remain increasingly concentrated downstream and midstream—creating a strategic imperative to secure resilient end-to-end supply.

Neil McKenner (ERM) focused on a "demand–supply paradox": despite strong demand outlooks, mining projects struggle to reach production due to complex geology, price volatility, long timelines, permitting/commercial barriers, and low industry trust. He cited recent analysis indicating an average project development timeline of ~18 years and referenced widespread project delays (noting that permitting and commercial issues are dominant contributors). Karen Hanghøj (BGS) then connected these challenges to the role of geological surveys—supporting discovery, data transparency, criticality assessments, and circular economy planning through "stocks and flows" analysis—highlighting the UK's need to align ambition with real processing capability (including the example of copper scrap exports following closure of domestic copper works).

The panel discussion returned to implementation and partnerships: why the 60–20–10 targets were chosen, how the UK can commercialize innovation (particularly recycling/secondary resources), and how the UK positions itself globally through trusted standards, services expertise, and finance ecosystems (LSE/LME and public finance instruments). Speakers repeatedly emphasized partnerships that are "good enough" and practical—combining domestic actions with long-term international collaboration built on trust, standards, and mutual value

Key insights, data points or predication

- UK Government reaffirmed the "60–20–10" targets under its Critical Minerals Strategy:
- UK highlighted intent to scale domestic projects and innovation (including mineral projects in the southwest and recycling/innovation activity across the UK).
- Commitment to international partnership-building through trade relationships, multilateral forums (e.g., G7/G20/MSP) and engagement with partners including the Gulf region.
- Emphasis on strengthening the UK's role as a global hub for mining services and finance, including use of public finance tools (e.g., export finance linked to UK buyers/offtakers).
- Geological Survey commitment to support delivery through: mapping, data packages, criticality lists, and stocks-and-flows analysis to enable circularity and responsible supply chains.

UNITED KINGDOM

- UK strategy framed around the three headline numbers: 60 / 20 / 10 (diversification / recycling / domestic production).
- Market outlook presented: even under a delayed transition scenario, power demand is projected to double over ~25 years; EV footprint cited as increasing ~20-fold; renewables demand cited as increasing ~six-fold.
- Supply chain structure: upstream relatively more diversified, but midstream/downstream increasingly concentrated, with China highlighted as dominant in processing stages.
- Project execution constraints: average mine development time cited at ~18 years, with an increase versus historical baselines (referenced as ~13 years previously).
- Delays are driven primarily by permitting and commercial factors, more than technical challenges, and are concentrated in earlier project stages (feasibility or earlier).
- Reputation/trust deficit: mining described as facing heightened scrutiny from investors, regulators and the public, reinforcing the need for credible ESG and transparent standards.
- Circular economy reality check: UK was described as a net exporter of copper scrap, illustrating that recycling success depends on domestic processing capacity, not only collection.

Session summary

The session made the case that the UK's critical minerals proposition is built on measurable targets, domestic project ambition, and international partnership—supported by strong services expertise and a mature finance ecosystem. Speakers emphasized that supply-chain security cannot be solved by mining alone: it requires diversified sourcing, faster project delivery, investment readiness, and credible standards.

In closing, the panel argued that the UK can play a distinctive global role as a "trusted" partner—exporting skills, standards, services and finance—while scaling domestic capability and circular economy solutions. The consistent takeaway was that resilient critical mineral supply chains will require practical partnerships now, and long-term collaboration grounded in transparency, responsible practices, and mutual value creation

GERMANY

Dr. Dalia Samra-Rohte
Delegate of the German Industry, German-Saudi Arabian Liaison Office for Economic Affairs (GESALO)

Ajanthas Kumarathas
Managing Director and Executive Member of the Board of Directors, Saudi Liebherr

Jonas Maximilian Becker
Chief Executive Officer, Becker Mining

Tobias Klegraf
Head of Minerals, thyssenkrupp Polysius

Erguen Yildiz
Managing Director & Chief Executive Officer, KSB Pumps Arabia

This panel examined how German industrial, engineering, digital, and financial expertise is actively supporting the development of a sustainable, technology-driven mining sector in Saudi Arabia, aligned with Vision 2030 and the Kingdom's ambition to build a fully integrated mineral value chain.

Panelists highlighted that Saudi Arabia's mining transformation requires reliable heavy equipment, advanced processing technologies, digital automation, energy efficiency, and long-term financing, particularly given the Kingdom's challenging operating environments and large-scale project ambitions.

German companies emphasized their role as long-term partners, bringing not only equipment but also local manufacturing, workforce development, and knowledge transfer.

The discussion underscored the importance of localization as a core success factor. Speakers detailed ongoing investments in Saudi-based production facilities, regional headquarters, service centers, and training programs for Saudi nationals, positioning localization as essential for operational reliability, regulatory compliance, and sustainable growth.

A strong focus was placed on innovation and digitalization, including autonomous equipment, predictive maintenance, digital twins, AI-driven monitoring, and smart energy management systems. These technologies were presented as critical to reducing downtime, improving safety, enhancing productivity, and lowering lifecycle emissions across mining operations.

The panel also addressed ESG and financing, emphasizing that environmental and social standards are no longer optional but central to bankability and risk management. German export finance and banking institutions highlighted their role in enabling early-stage and long-term financing, particularly when projects integrate international ESG standards and energy-efficient technologies.

Key insights, data points or predication

- German companies confirmed continued and expanded localization in Saudi Arabia, including new production facilities, workshops, service hubs, and regional headquarters.
- Multiple panelists announced plans to expand local workforce development, internships, and technical training programs for Saudi nationals.
- Technology providers committed to supporting Saudi mining projects with automation, electrification, AI-driven monitoring, and energy-efficient solutions.
- Financial institutions reiterated readiness to support large-scale mining and processing projects through long-term, competitive export and project financing, aligned with international ESG standards.
- Mining operations in Saudi Arabia face extreme heat, dust, and remote locations, increasing the importance of equipment reliability and uptime.
- Localization is evolving from assembly to full local production, particularly in pumps, machinery, and service components.
- Digital technologies such as autonomous machinery, digital twins, IoT sensors, and predictive maintenance are becoming standard rather than optional.
- ESG considerations directly affect credit risk, investor confidence, and project viability, making sustainability integral to financing decisions.
- German firms position themselves as exporters of expertise and technology, not only equipment, supporting Saudi Arabia's ambition to develop downstream processing and manufacturing.

Session summary

The session demonstrated that German technology providers and financial institutions are deeply embedded in Saudi Arabia's mining transformation, offering long-term partnerships built on innovation, localization, and sustainability. Through advanced equipment, digital solutions, ESG-aligned financing, and strong local presence, German companies are contributing directly to the Kingdom's Vision 2030 objectives.

Panelists concluded that the future of mining in Saudi Arabia will be defined by smart operations, efficient energy use, skilled local workforces, and trusted international partnerships, positioning the Kingdom as a competitive and sustainable global mining hub.

UZBEKISTAN

Han Ilhan
Advisor to the Chairman, TMK (Uzbekistan Technological Metals Complex), Managing Director and Co-Founder, Catalis Strategies

This session presented Uzbekistan's strategic transformation into a global critical raw materials hub, anchored by the establishment and rapid scaling of TMK as a fully integrated, state-backed critical minerals company operating across the entire value chain.

The speaker outlined Uzbekistan's strong macroeconomic and sectoral fundamentals, noting sustained GDP growth averaging 6.5% annually over the past five years, driven largely by mining. Despite this growth, only 30% of the country's territory has been explored, leaving a substantial portion of its mineral potential untapped. Uzbekistan's subsoil resources were estimated to exceed USD 3 trillion across multiple commodities, positioning the country as one of the most underexplored yet resource-rich mining destinations globally.

Central to this transformation is TMK, established under the directive of President Mirziyoyev to address the global disconnect between critical raw material supply and demand. TMK was formed as a dedicated entity with sole responsibility for critical raw materials, entrusted with more than 100 assets and projects nationwide. Unlike most global peers, TMK already operates across the full value chain, from upstream mining to midstream processing and downstream manufacturing, particularly in tungsten and molybdenum, with additional recovery of by-products such as rhenium, tellurium, and selenium.

The presentation highlighted TMK's structured asset development strategy, grouping projects into development-stage assets, advanced exploration and R&D. Priority projects include expanded tungsten and molybdenum feedstock, graphite feasibility development, copper resource expansion adjacent to the Almalyk complex, and downstream manufacturing partnerships, including cooperation with a Korean partner to supply automotive components.

A core strategic pillar is the creation of midstream processing hubs and special economic zones, designed to centralize processing, increase value addition, and attract international end users to co-locate manufacturing facilities. These hubs aim to offer secure long-term supply, fiscal incentives, and access to new regional markets, while supporting broader industrialization and GDP growth.

The speaker emphasized that TMK is not positioning itself as a conventional mining company, but as an industrialization platform leveraging Uzbekistan's natural resources to create sustainable economic value. While TMK is already funded and operational, the scale of its asset portfolio necessitates strategic partnerships to accelerate development and integrate international standards.

Key insights, data points or predication

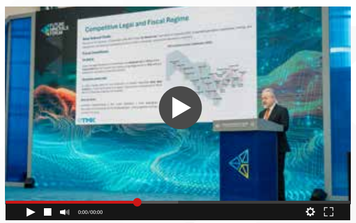
- TMK confirmed an active global outreach program to form partnerships with investors, technology providers, and end users across the critical raw materials value chain.
- The Government of Uzbekistan has allocated USD 220 million through the Uzbekistan Reconstruction and Development Fund to support TMK's asset development.
- TMK outlined plans to develop approximately 70 priority projects, requiring an estimated USD 2 billion in total investment, to be pursued through co-investment partnerships.
- TMK reiterated its commitment to embedding ESG principles as a core operational pillar, integrated into project design rather than treated as a compliance exercise.
- Continued investment in human capital development, including graduate programs and partnerships with universities in Europe and the United States, was confirmed.
- Uzbekistan has explored only 30% of its territory, with extensive historic drilling data from the Soviet era that can be upgraded to international standards.
- TMK manages over 100 assets and projects, a scale described as unmatched globally outside of China.
- Existing operations include world-class copper production at Almalyk, with recovery of multiple critical by-products.
- Planned midstream hubs aim to support not only Uzbekistan but also regional producers, strengthening Central Asia's role in global supply chains.
- TMK's partnership model is built on four pillars:

– Equitable value enhancement and risk sharing
– Co-investment (not capital-only partnerships)
– Technology enhancement rather than one-way transfer
– Human capital development and skills upgrading

Session summary

The session positioned Uzbekistan, through TMK, as a new and credible global partner in critical raw materials, offering scale, integration, and long-term strategic intent. With strong government backing, an operating full-value-chain platform, and a vast undeveloped asset base, TMK aims to play a meaningful role in diversifying global critical mineral supply.

The speaker concluded by inviting co-investors, technology partners, and end users to engage with TMK under a clearly defined partnership framework focused on shared value, ESG integration, and accelerated development—responding directly to global supply chain vulnerabilities in critical raw materials.



BRAZIL

This Brazilian Showcase session positioned Brazil as a strategic, sustainability-aligned destination for mining and critical minerals investment, framing the country's resource endowment, improving regulatory environment, and evolving capital markets as key enablers for global supply-chain diversification.

The moderator opened by emphasizing Brazil's scale and relevance in the minerals landscape, referencing its dominant share of global niobium (93%), broad mineral reserves, and geopolitical positioning as a stable country with wide international relationships.

The discussion then focused on correcting common misconceptions—particularly that Brazil is "impossible" for environmental permitting—arguing instead that licensing has become faster and more predictable in selected states, while maintaining high ESG standards.

Multiple speakers stressed a turning point in environmental licensing and ESG traceability. Meteoric and Viridis cited recent permitting experiences indicating licensing timelines can be significantly shorter than in other mature jurisdictions.

ORI Bank highlighted progress in combating illegal gold, stronger transparency, and an ESG shift driven by enforcement and market reforms—positioning Brazil as a more credible source of legally verified minerals.

A second major theme was investment readiness and the role of capital markets. Panelists noted Brazil's mining finance ecosystem has historically lagged Canada and Australia, with many Brazil-focused junior miners listed abroad. However, the critical minerals boom is accelerating domestic interest, including new funds and stronger investor education efforts. The panel argued that the key barrier is not resource potential but project bankability, specifically the need for international reporting standards (NI 43-101/JORC), credible feasibility pathways, permitting clarity, and de-risking mechanisms.

The conversation then turned to rare earths as a "geological unicorn" opportunity, spotlighting the Caldeira ionic clay rare earth project, described as exceptionally large, high-grade, and logistically advantaged, with renewable energy access and a pathway to competitive costs. Panelists underscored that the strategic window for critical minerals is tightening rapidly, and success depends on accelerating upstream mine development while planning downstream steps (separation, oxides, magnets, recycling) in parallel.

The session concluded with a strong call for international partnerships and speed—not only to secure offtake, but also to enable financing, infrastructure, and development-bank participation. Speakers repeatedly framed "timing" as the decisive factor, with 2030 targets approaching and global demand rising faster than current project pipelines.

Key insights, data points or predication

- Brazilian government referenced as advancing a national approach to prioritizing projects in environmental licensing, accelerating review while maintaining full process requirements.
- Brazilian Development Bank (BNDES) mentioned as establishing a dedicated fund to support junior mining companies, recognizing that juniors often lack balance sheets for traditional guarantees.
- Rare earth developers signaled intent to move downstream:
  - Meteoric stated ambition to pursue separation in Brazil as a first downstream step to reduce market risk and broaden offtake options.
  - A recycling pilot was mentioned via a partnership model linked to Belfast, with magnet recycling trials already conducted using exported material.
- Panelists emphasized continued work among government, capital markets, and private sector to move projects from scoping/pre-feasibility into production, including the use of offtake as part of bankability/guarantee structures.
- Brazil holds ~93% of global niobium (as stated by the moderator).
- Brazil remains under-mapped/under-explored, with speakers citing ~23% mapped and describing ~70% untapped geological potential.
- Environmental licensing timelines referenced by companies:
- Meteoric: LP (preliminary license) in ~18 months, installation licensing target ~2 years for a large project moving ~6 million tons.
- Viridis: license obtained in <1 year for a project moving ~5 million tons/year.
- ORI Bank highlighted Brazil's crackdown on illegal gold: stated official production moved from ~70 t/year to ~40 t/year, framed as removing illegal material from formal markets.

BRAZIL

- Panelists described a shift in Brazil's capital markets:
- Around 120 junior mining companies operating in Brazil, with many listed in Canada or Australia, not domestically.
- Growing domestic fund participation and investor education, but still early-stage for high-risk exploration finance.
- Rare earths focus: the Caldeira ionic clay project was described as:
- ~1.5 billion tons resource and ~100-year mine life (as stated).
- ~0.4% TREO (~4,000 ppm), claimed to be multiple times higher than southern China ionic clays (as stated).
- ~70–80% recovery of magnet rare earths (as stated).
- Competitive positioning supported by renewable grid power, strong infrastructure, and proximity to São Paulo (as stated).
- Strategic message repeated: upstream must be accelerated—downstream capacity is irrelevant without mined feedstock; recycling can help but is limited in scale.

Session summary

The session made a concentrated case that Brazil's combination of resource scale, improving permitting performance, ESG traceability, and a rapidly maturing investment ecosystem positions it as a key partner in the global critical minerals transition. Speakers challenged the view that Brazil is structurally "too difficult" to permit or finance, citing concrete examples of faster licensing and stronger enforcement against illegal mining, particularly in gold.

Looking ahead, the panel argued Brazil's biggest opportunity—and risk—lies in speed. With global supply chains still heavily concentrated and 2030 deadlines approaching, the country can translate geological advantage into geopolitical relevance only if projects move from studies into production quickly, supported by partnerships, bankable standards (NI 43-101/JORC), and blended finance mechanisms that de-risk early stages. The final takeaway was explicit: Brazil is open for business, but timing is everything.

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