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Skillings

Mining Review Magazine

The DELIVERY TEST

Mining has the demand. Now it has to prove supply.

DIGITAL METALLURGY
Smarter systems. Real outcomes.

THE WORKFORCE CRUNCH
Mining's people pipeline is running late.

THE HIGH-GRADE HUNT
Why quality is the new growth.

SMALL TEAM

BIG RESULTS

Optiro

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Optiro is a resource consulting and advisory group.

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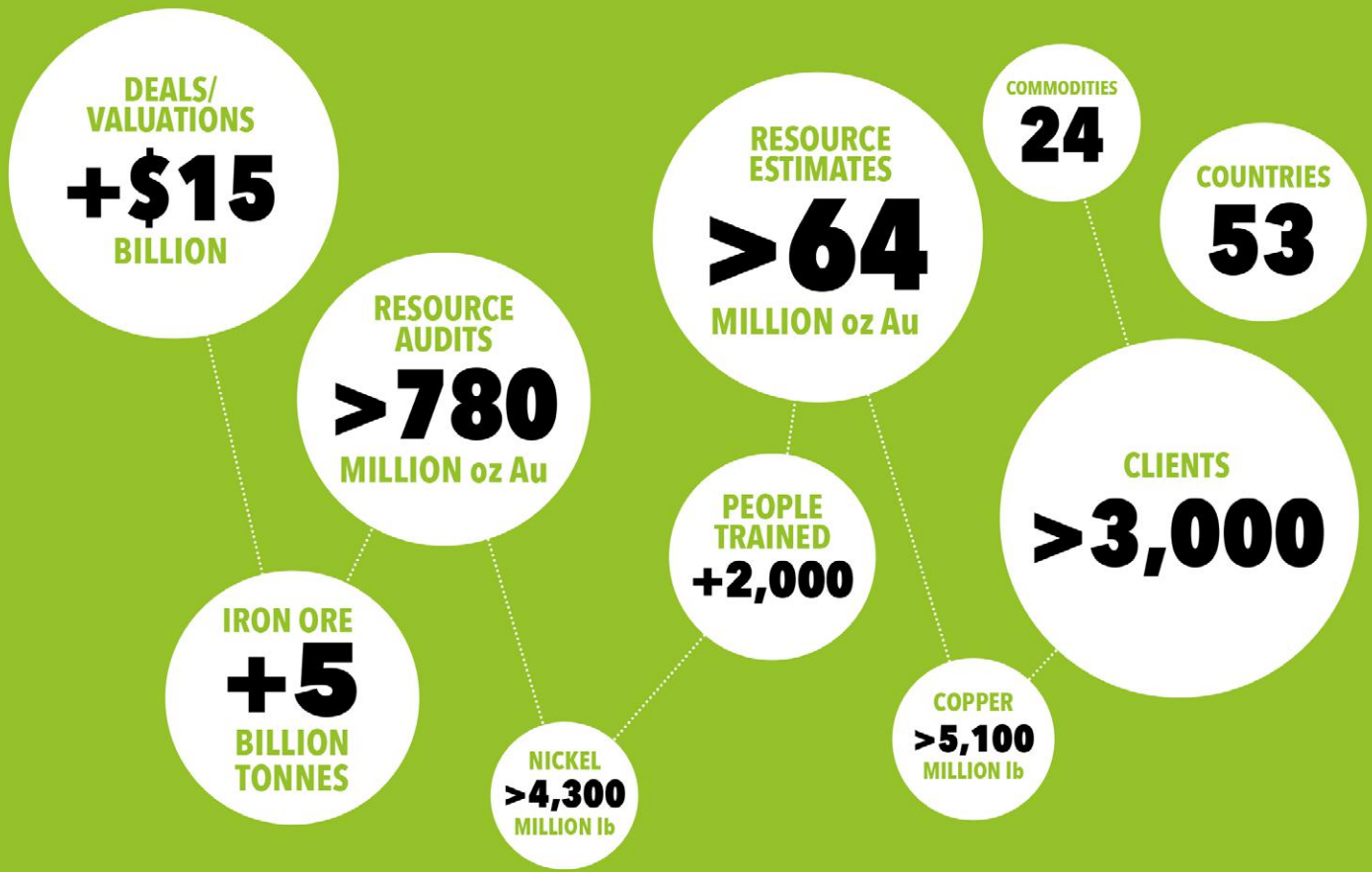
In eleven years, our team has travelled the world providing expertise to improve, value, estimate and audit the world's minerals. Pound for pound we think you'll find no-one delivers greater value – and **BIG** results.



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Skillings MINING Review

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Volume: 115. Issue.06. June 2026

The Great Retirement Crunch

Mining's next supply bottleneck may be people, not ore. This story explains how retiring expertise, simulators, gamified training and remote operations will decide workforce resilience.

THE HIGH-GRADE HUNT

How green steel is reshaping the iron ore map in 2026. Green steel is changing the iron ore map, pushing buyers toward higher-purity feed, pellets and cleaner supply chains. The iron ore market is no longer only a volume story. For decades, the trade was built around moving very large tonnes at very low cost.

Read this for the quality race now reshaping iron ore strategy.

IN THIS ISSUE

Where Mining's Next Cycle Is Taking Shape

This issue of ***Skillings Mining Review*** follows the pressure points shaping mining now: faster permitting, critical-minerals finance, uranium supply, AI-driven power demand, green steel, high-grade iron ore, lithium processing, workforce shortages, digital mine discipline and the changing economics of deal flow.

Across the magazine, one theme connects the stories: demand is moving faster than project delivery. Governments want secure minerals. Steelmakers want cleaner feed. Data centers want firm power. Battery customers want qualified material. Investors want projects that can move from promise to production without losing discipline, trust or capital control. Our cover stories examine the rise of the digital metallurgist, the retirement crunch facing mining's workforce, and the high-grade iron ore hunt created by green steel. Market sections track copper, uranium, lithium, gold, silver, base metals, royalties, safety and regulation.

We also recognize the companies supporting this issue. Our advertorial spotlight features CR Mining, Naylor Pipe, MRC Recruiting, ME Elecmetal and Chevron—partners serving the practical needs behind safer, stronger and more resilient mining operations worldwide. Together, they show why mining progress depends on execution as much as ambition in this cycle and beyond.

Editor,
Skillings Mining Review

SVR Skillings SINCE 1912
Mining Review Magazine

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ADVERTORIAL INDEX

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The company specializes in clear and specific communications, employing a fee structure that works with their clients' budget, and implementing a hiring process that has been proven through years of successfully building quality, high-performance teams.

MRC Recruiting possesses extensive knowledge of the resource/mining space and strives to provide suitable candidates for every position. Their expertise in human capital development and organizational development ensures that clients receive only top, qualified candidates.

Your Team of Skilled Experts

Your team of skilled Recruiters who've developed long-standing relationships with clients and candidates to ensure the best fit possible between the two.
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With a successful history of working across commodities with exploration through major companies, consulting firms, private equity, mining technology and OEMs.

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2. In-depth understanding of your mine: Their boots-on-the-ground approach means they spend time with you in the field to understand your goals and pain points. Their customized approach allows miners to achieve better productivity, profitability, and safety while reducing emissions.

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With lips and GET that are lighter and stronger than plate lips, you'll improve penetration while reducing dig energy. CR's wear protection range, Domite®, extends your bucket wear life by up to six times, and with GET Trakka™, you get rapid and reliable alarms with the ability to find lost GET.

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ME Elecmetal is a leading global supplier and strategic partner in the mineral processing, aggregate, construction, and recycling industries, renowned for its commitment to innovation and technology. Dedicated to delivering cutting-edge, sustainable solutions, ME Elecmetal consistently exceeds customer expectations worldwide.

With a comprehensive range of products and services—including grinding media, mill liners, crusher liners, and large specialty castings—ME Elecmetal is the preferred partner for mineral processors looking to optimize their operations.

ME Elecmetal operates ten cutting-edge metallurgical plants strategically located across Chile, the USA, Peru, China, South Africa, Indonesia, and Zambia. With a robust manufacturing capacity exceeding 134,000 tons for foundry products and 600,000 tons for grinding media, the company continues to meet the growing demands of the mining industry.

ME Elecmetal's commercial presence extends to 40+ countries, solidifying ME Elecmetal's position as a global leader in delivering innovative solutions to the mining sector and all of the other markets it serves.

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Crusher Wear Parts:

ME Elecmetal offers an extensive range of high-quality wear parts designed to optimize the performance and longevity of all makes and models, including primary, secondary, tertiary, and pebble crushers.

ME Digital Lab

ME Elecmetal offers a powerful suite innovative technology solutions that deliver real-time insights and actionable recommendations, empowering our clients to make faster, smarter decisions.

Integral Solutions

In today's mining industry, operational excellence is not just a goal — it's essential. ME Elecmetal's ME FIT® Programs were created to meet this challenge head-on, combining research, innovation, and close collaboration with customers to unlock new levels of performance.

At the heart of ME FIT® is a data-driven, holistic approach to optimization. Our multidisciplinary teams capture and analyze critical operating data — from energy use and processed tonnage to liner wear, grinding media performance, and downtime factors. These insights drive tailored solutions that improve throughput, reliability, safety, and efficiency while reducing overall operating costs.

What makes ME FIT® different is its focus on long-term partnership. By integrating advanced wear materials, digital monitoring tools, and application expertise, we work side-by-side with customers to build continuous improvement roadmaps that strengthen competitiveness, maximize profitability, and support sustainable operations.

With ME FIT®, mining companies gain more than products — they gain a trusted partner committed to ensuring every ton processed contributes to safer, more efficient, and more sustainable results.

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Engineered for Efficiency, Safety, and Sustainability

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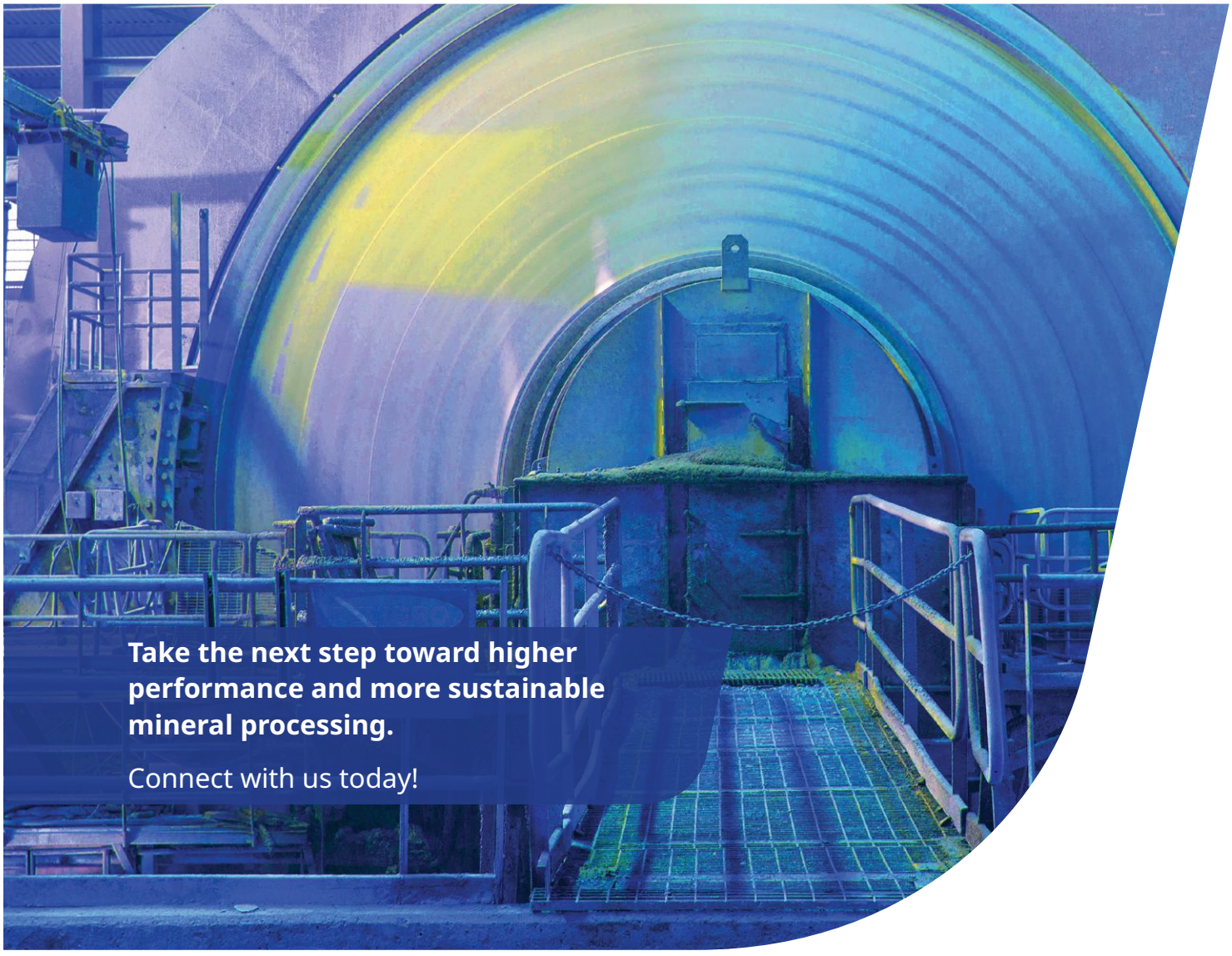
- ☑ **Smart Monitoring Technology:** Sensorized Smart Bolting Systems and advanced analytics deliver safer, more efficient operations.



Take the next step toward higher performance and more sustainable mineral processing.

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Premier Pipe Systems Manufacturer for Over 90 Years

Naylor Pipe Company has been the premier manufacturer of Spiralweld pipe systems since1925.

Naylor Spiralweld is available in diameters from 4” through 96” and wall thickness from 14 Ga. through 1/2” wall. The Spiralweld pipe is complemented with all types of fittings, fabrications to specification, and joint connections, including the exclusive Naylor Wedgelock Coupling, to complete your pipe system.

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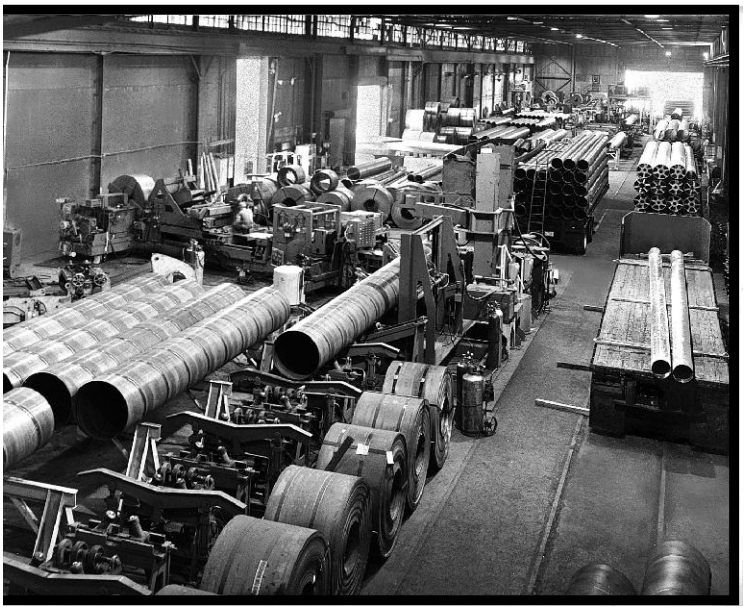

Uniform wall thickness is assured because tolerances of steel strip are governed by the standards established by the American Iron and Steel Institute. In addition, the pipe is furnished in any required length with a cutting tolerance of plus or minus 1/8”. In addition to carbon steel, Spiralweld pipe can be formed from many steel grades, including abrasion resistant, weathering (A-588) and stainless.

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NAYLOR

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- ❒ Foundation Piling
- ❒ Caisson Supports
- ❒ Tank Supports




1925….The Year It All Began
Naylor Pipe started manufacturing Spiralweld Pipe in 1925. We're proud to be the mining industry's pipe source for slurry, tailings, dewatering, and air lines. While other pipe manufacturers have come and gone, Naylor continues to serve and prosper. Celebrating our 100th Anniversary, we pay tribute to the valued women and men who've served Naylor through the years. To them and our many loyal customers, we thank you!
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NAYLOR PIPE Established 1925

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Our 100th YEAR 1925 2025

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NEWS BRIEFS

QUAD MINERALS FINANCE MOVES FROM LANGUAGE TO MONEY

The Quad nations used May to turn critical-minerals cooperation into a financing signal. Reports said India, Australia, Japan and the United States planned to mobilize up to $20 billion for mining, processing and recycling supply chains. The point is not only the size of the number. It is the change in tone. Critical minerals are now being treated as industrial security, not just commodity exposure. That gives miners a clearer political tailwind, but it also raises expectations on traceability, permitting and delivery.

MINING CASUALTIES

92 PEOPLE DIED IN MAY

May brought another grim reminder that mine safety remains uneven across the world. At least 92 people died in reported mining accidents: 82 after a gas explosion at China's Liushenyu coal mine, nine in a methane-related blast at Colombia's La Ciscuda mine, and one at India's Parasia colliery after a roof fall triggered an air blast. At least 149 others were injured or hospitalized. The incidents were different in scale, but not in warning. Gas control, ventilation, ground support, worker tracking, and emergency planning are still the difference between a working shift and a national tragedy for mining families everywhere. For the industry, May was not just a month of production data, but a month of names, families, and unfinished shifts.

ARAFURA'S NOLANS DECISION PUTS RARE EARTHS BACK IN FOCUS

Arafura Rare Earths approved the US$1.6 billion Nolans project in Australia's Northern Territory, giving Western rare-earth strategy a concrete anchor. The project is positioned around neodymium and praseodymium, two magnet minerals tied to electric vehicles, wind turbines and defense supply chains. For buyers trying to reduce reliance on Chinese refining, Nolans matters because it joins mining and processing in one integrated plan. Construction timing, funding and execution now decide whether the project becomes a supply-chain model.

INDIA, RUSSIA DEEPEN RARE-EARTH LINKS

India's rare-earth strategy widened in May as New Delhi strengthened cooperation with Russia while also working through Quad channels. The message is practical: no single diplomatic track is enough. India wants supply options, processing knowledge and bargaining power.

BHP'S CLIMATE DELAYS: A GREEN-STEEL QUESTION

Leaked documents and follow-up reporting put BHP's decarbonization timetable under pressure in May. Delayed renewable projects, diesel fleet questions and the cancellation of a beneficiation plan all matter because iron ore producers now face customers that want cleaner steel inputs. The issue is not whether BHP remains a mining giant.

CHINA COAL BLAST SHARPENS SAFETY PRESSURE

The Liushenyu coal mine blast in Shanxi became one of May's defining safety stories. Reports described a major gas explosion, a large rescue effort and official investigations into possible violations. The incident will likely feed a wider review of underground coal safety, especially where high-gas conditions and production targets collide.

WHYALLA'S FUTURE BECOMES A GREEN-STEEL TEST

The bidding process around Whyalla steelworks became a test case for sovereign steel, high-grade magnetite and low-emission industrial strategy. Reports said M Resources and Jindal were among the contenders, with Australian control and green steel central to the debate.

SUDAN'S GOLD ECONOMY SHOWS THE COST OF INFORMAL SUPPLY

In May, reporting on Sudan's war economy showed how gold keeps flowing even when miners face collapse risk, mercury exposure and armed control. The story matters because artisanal production can be both a livelihood and a financing channel for conflict. For buyers, refiners and governments, the lesson is uncomfortable: gold supply chains need better visibility where state authority is weak.

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Copper tubes with or without lining or industrial insulation for applications in:

- Drinking water and heating networks
- Underfloor heating and cooling
- Gas and medical distribution networks gases
- Cooling and air conditioning systems
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The copper segment of ElvalHalcor S.A. is composed of six subsidiaries and seven associates/joint ventures, based in Greece, Belgium, Bulgaria, Romania and Turkey, while it operates a total of five production plants in Greece, Bulgaria and Turkey.

The copper segment of ElvalHalcor S.A. develops and distributes a wide range of products, including copper and copper-alloy rolled and extruded products with Halcor being the sole producer of copper tubes in Greece. High quality in production is achieved through strict controls applied throughout the production process. With a consistent quality focus, the company implements an ISO 9001:2015 Certified Quality Management System and leverages high technologies and expert staff.

As a result of the Group's strategic investments in research & development, Halcor is recognized as one of the leading copper producers globally, setting new standards in copper processing. The company maintains a consistent focus on quality and environmental protection and a strong commitment to the principles of sustainable development. In this context, all production facilities in the Group's plants leverage advanced technologies to bring in the market innovative products that are energy efficient and environmentally friendly.

For more information, please visit our website www.halcor.com

AUSTRALIAN EXPLORERS PUSH BACK ON TAX RISK

Mining and exploration groups in Australia warned that proposed capital gains tax changes could make early-stage mineral investment harder. The concern is simple. Exploration already carries high geological risk, long timelines and uncertain financing. If investors see lower rewards for patient capital, small companies may struggle to fund the discoveries that larger miners later need.

BHP'S JIMBLEBAR DECISION HITS THE HIGH-GRADE DEBATE

Reporting in May said BHP had shelved a Pilbara beneficiation project that could have improved ore quality and reduced downstream steel emissions. The decision matters because the green-steel market is creating demand for cleaner, higher-grade feedstock. Beneficiation is not simple. It adds water, power, tailings and cost. But the debate shows how iron ore is moving beyond the old 62% benchmark.

CHINA'S IRON ORE BUYING POWER RETURNS

Australian miners faced fresh pressure from China's state-backed buying system in May. Reports described tougher negotiations, lower-price demands and wider concern about Beijing's influence over iron ore trade. The issue is not only price. It is who controls the rules of trade when one customer group dominates demand.

SQM AND CODELCO KEEP LITHIUM POLITICS IN FOCUS

Lithium markets stayed volatile, but Chile remained central. SQM's tie-up with Codelco showed how governments are trying to capture more control without losing private-sector operating skill. The model will be watched closely by other lithium countries.

MINERALS INTO SECURITY POLICY

The Indian Ocean Defence and Security conference in Perth put critical minerals into a wider defense and industrial context. AUKUS, submarines, AI, electronics and sovereign manufacturing all depend on secure material supply. Mining is no longer outside defense strategy. It is inside it.

SUDAN GOLD FLOWS DESPITE WAR AND DANGER

Sudan's gold sector again showed the difficulty of cleaning informal supply chains during conflict. Gold can support families, but it can also finance armed groups and expose miners to unsafe pits and mercury.

REMOTE-SENSING RESEARCH TARGETS ILLEGAL MINING

New research released in May highlighted the challenge of detecting illegal gold mining in the Amazon. Better imagery and AI tools can help, but researchers warned that small structures and cloud cover still make monitoring hard.

RARE-EARTH FINANCE: A WESTERN TEST

Arafura's Nolans decision gave the West a rare concrete rare-earth milestone. The next test is whether customers, governments and lenders can keep projects moving after headlines fade.

JSW'S 25-MILLION-TONNE INTEGRATED STEEL PLANT

JSW Group has begun prospecting at its Gadchiroli iron ore block in Maharashtra, marking an early step toward a planned 25-million-tonne integrated steel plant in the district. The project, linked to roughly ₹1 lakh crore in investment, depends on securing long-term raw material supply from the region. Maharashtra has also started land acquisition for the plant, while improved security and rising industrial activity are reshaping Gadchiroli's mining profile. For India's steel sector, the move is significant: it ties mine development, local infrastructure and downstream steelmaking into one regional growth plan, while testing whether mineral-rich districts can become manufacturing hubs rather than remaining raw ore frontiers.

AUSTRALIAN EXPLORERS WARN ON CAPITAL ACCESS

Proposed tax changes triggered warnings from mineral explorers that risk capital could dry up. For a sector that depends on long lead times, the policy detail matters.

GREEN STEEL TURNS WHYALLA INTO A NATIONAL INDUSTRY CASE

The Whyalla process is now about more than saving a steelworks. It is about whether high-grade ore, low-emission furnaces and sovereign manufacturing can be joined into one credible plan.

BRAZIL WEIGHS AMAZON GOLD PROJECT FUTURE

In May, Brazil's courts moved toward a key decision on Belo Sun's proposed Volta Grande gold project in Pará. The case centers on whether federal or state authorities should control environmental licensing. The ruling could shape one of the Amazon's most contested gold developments, with Indigenous consultation, river protection and regional mining oversight all at stake.

A Level & Density Measurement Revolution for **Flotation Cells** is here!

FloLevel Technologies offers a range of Level & Density products designed to provide continuous process feedback on mineral recovery efficiency to allow for automatic control of the Flotation Cell. The FloLevel Array is the first dedicated “self-cleaning” instrument designed for the Flotation process to remove clay and scale buildup automatically.

Process feedback from the FloLevel Array allows the DCS to control aeration flow rate, adjustment of dart valve, optimisation of solids concentration, and adjustment of frother flow rate for the flotation circuit.

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COVER STORY

The Rise of Digital Metallurgist *in Mining Operations*

Mining plants are no longer managed by instinct alone. As sensors, models and live dashboards reshape recovery decisions, the next generation of plant leaders must understand both ore behavior and the data behind it in real time.

WORDS BY *SALINI KRISHNAN* // **DATA BY SKILLINGS RESEARCH**

For more than a century, the best plant managers were known for feel. They could hear a mill change pitch, read a froth surface, sense a bad reagent balance and know when a circuit was drifting before the lab confirmed it. That experience still matters. But it is no longer enough. Mining plants now run inside a wall of data. Sensors track flow, density, pressure, vibration, power draw, particle size and recovery indicators.

Control rooms can see more in one hour than an operator once saw in a week. The problem is not a lack of information. The problem is turning that information into better decisions before metal is lost.

When Data Meets Plant Instinct

That is where the digital metallurgist enters the plant. This person is not only a metallurgist and not only a data analyst. They understand the process and the model. They know why a flotation cell matters, but they can also question the data feeding a soft sensor. They can speak to operators in plain language and to engineers in numbers. The shift is being driven by cost, grade and energy pressure. Ore bodies are becoming more complex. Plants are being asked to recover more value from lower-grade material. Power prices are rising. Water constraints are tighter.

A manual, delayed approach to process control cannot carry that load forever. Advanced process control, machine learning and digital twins do not remove judgment. They make judgment faster. A digital twin can test how a plant may respond to harder ore before the material reaches the crusher. A soft sensor can estimate concentrate grade between lab results. A remote specialist can support several sites instead of flying to one mine after a problem has already grown. The human role changes. Operators become control-room technicians. Metallurgists become translators between physical behavior and digital evidence.

Models Need Human Discipline

Plant managers become system leaders who can ask better questions: Is the model reliable? Is the sensor clean? Is the change real? What does the operator see that the dashboard missed? The risk is overconfidence. A model can be wrong. Bad data can produce clean-looking

nonsense. A dashboard can hide what people on the floor know. The best plants will not hand control to software and walk away. They will build teams that understand both the process and the limits of the tool. This is the real rise of the digital metallurgist. It is not about replacing the plant manager with a data scientist. It is about making the next plant manager fluent in both worlds.

From Dashboards To Daily Culture

In the next cycle, the winning plants will be the ones that combine experience, discipline and live data into one operating culture. The measure of success will be simple: better recovery, fewer surprises and decisions made early enough to matter. The strongest plants will build this discipline into daily routines.

Morning meetings will review the same data operators use during the shift. Metallurgists will test whether the model still matches the ore. Maintenance teams will look for early warnings before vibration, heat or power draw becomes a stoppage.

The digital system will not sit above the plant; it will become part of how the plant talks to itself. This also changes hiring. A processing team will still need people who understand grinding, flotation, leaching and tailings. But it will also need people who can clean data, read trends, build simple models and explain uncertainty.

> The best plant manager will not own more dashboards, but will know which signal deserves action before losses compound onsite.

THE BEST PLANT MANAGER WILL NOT BE THE PERSON WITH THE MOST DASHBOARDS.

It will be the person who knows which signal deserves action. The final test is practical. If a digital tool improves recovery, reduces energy waste, cuts downtime or helps operators see risk earlier, it earns its place.

If it only adds complexity, it should be challenged. Clear delivery matters through this mining cycle and beyond for operators, investors, suppliers, communities.

SMALL MODULAR REACTORS

SMR Demand Turns Uranium Into a Power-Security Story

Project timelines now matter as much as price forecasts. In May, small modular reactors pushed the market toward a harder question: who can turn fuel-security demand into real, deliverable supply on schedule safely?

Small modular reactors kept uranium in the spotlight through May, but the stronger signal was the wider search for dependable power. Data centers, mines, remote industrial sites and processing plants do not need occasional electricity. They need firm, scalable power that can support continuous operations while lowering emissions.

That makes uranium a fuel story, a power-security story and a mining story at the same time. That is why procurement teams are watching not only spot prices, but also contract terms, conversion capacity and the reliability of the mines behind future fuel commitments across North America, Africa and Australia, because security depends on real material, not policy language alone anymore.

From Reactor Plans To Fuel

Saskatchewan remains central because it combines high-grade deposits, established uranium expertise and a long operating history. That strength gives the region credibility, but it does not remove development risk. Permitting, capital costs, Indigenous engagement, technical execution and market timing still decide which assets advance. Burke Hollow and other U.S. projects add another layer. Domestic supply has political value when energy security and strategic minerals are discussed together. But policy support cannot create pounds without wells, processing capacity and disciplined operating plans.

Not All Exposure Is Equal

For investors, the mistake is to treat all uranium exposure as the same. A company with a resource is not the same as a company with a permitted path to production. A reactor announcement is not the same as a signed fuel contract. A bullish price deck is not the same as a mine plan. The June watchlist should focus on practical milestones: approvals, construction updates, offtake, financing, restart performance and customer confidence.

> Power demand matters only when uranium projects become deliverable fuel.

The market can stay tight for years, but the companies that benefit most will be those that turn power demand into deliverable supply.

Mines Still Move Slowly

Nuclear demand has returned to the center of the energy conversation, but mines still move at mining speed. That gap between power demand and mine timing is now the heart of the uranium story. Producers need discipline as much as commodity exposure. Customers are learning that supply security may be worth paying for earlier in the cycle. Governments can call uranium strategic, but domestic supply matters only if projects actually reach production.

The next few years will test whether policy support can shorten the distance between resource and fuel. Stronger companies will explain timing clearly, avoid hiding development risk and show how pounds will reach the market. The uranium market is being pulled by power demand, project timing and the slow pace of new supply. Clear delivery matters now.

Permits, Projects and the New Race to Build Faster

Critical minerals need faster approvals, but speed without trust creates new risk. As permitting reform accelerates, miners must turn policy urgency into bankable, responsible project pathways that capital can believe in today, globally.

Mining permit reform returned to the center of the debate in May. Governments want more copper, lithium, uranium, graphite and rare earths, but many still rely on approval systems built for a slower world. The result is a familiar gap: policy says supply is urgent, while project timelines still stretch for years.

Faster Does Not Mean Weaker

Faster permitting is not the same as weaker oversight. The best reforms should make expectations clearer, remove duplication and keep agencies accountable for timelines. Communities still need a voice. Water, land and heritage issues still need serious review. But a process that cannot reach a decision is not a strong process. It is a hidden veto.

For companies, the new environment changes strategy. Projects with clean studies, early community work, reliable infrastructure plans and transparent environmental data will have an advantage. Projects that rely on slogans or late-stage fixes will struggle, even under a friendlier policy regime.

The same lesson applies to project execution. Copper districts such as Vicuña and Los Azules may hold the scale the market wants, but scale alone does not build a mine. Mid-tier companies, majors and governments are now searching for structures that reduce risk before billions are committed.

Permitting Is Now Part of Valuation

May showed that permitting is becoming part of valuation. A high-grade project in a slow or uncertain approval system can trade at a discount. A more modest project with a credible path can attract capital sooner.

The winners will be those that treat regulatory work as core engineering. Clear rules can attract capital, while unclear rules raise the discount rate on even good assets. The practical challenge is to move faster without weakening public trust. Communities will not accept urgency as a substitute for transparency. If critical-minerals finance stays vague, even strong deposits can remain stranded for another cycle. Governments that handle foreign ownership well will attract projects that need long-term certainty.

Trust Has Become Project Infrastructure

The practical value of community benefit is measured by whether it helps responsible projects move. Policy is becoming part of the cost curve, not a footnote after the mine plan is written. Clear delivery matters through this mining cycle and beyond for operators, investors, suppliers, communities, regulators alike this month now.

FINANCE/ASSET TRANSACTION

Royalties Stay Attractive

Royalty and streaming deals remained active in May because they offer something both sides want. Operators can raise capital without issuing as much equity, while royalty buyers gain long-life exposure to production without running the mine. In a market where construction costs are high, that structure remains powerful.

The appeal is not complicated. A royalty or stream can turn future mine output into today's funding without forcing an operator to surrender control of the asset. That matters when debt is expensive, equity markets are selective and construction budgets keep moving higher. For developers, the structure can close a financing gap. For producers, it can support expansion or repair.

Capital Without Operating Burden

Buyers like the other side of the trade. Royalty companies gain exposure to gold, copper, silver or battery metals without carrying operating risk. They do not manage the workforce, run the plant, negotiate supplier contracts or absorb cost overruns. Their return depends on production, mine life and contract terms, not direct control of the site.

That makes due diligence critical. A royalty on a weak project is still weak. Buyers need to understand grade, recovery, permitting, water, power, community risk and the operator's track record. The best deals are not attached to large resources. They are attached to mines that can deliver tonnes through changing cycles.

The Discipline Test

For operators, the risk is giving away too much future upside too early. A stream can solve a financing problem today but reduce margin later if the asset performs well. That is why May's deal activity points to a more disciplined market. Capital is available, but it is looking for clearer projects, stronger partners and realistic schedules.

Royalty finance remains attractive because it sits between debt and equity. Used well, it helps good mines advance without weakening ownership. Used poorly, it becomes another claim on cash flow.

Balance Sheets Matter Again

May's finance stories shared one theme: simplification. Companies that cut debt, remove streams, secure permits or add predictable cash flow are earning more attention.

The market is rewarding cleaner stories. The companies that can turn market strength into balance-sheet strength will exit the cycle in better shape. The companies that chase growth without control may find that the market no longer rewards size alone. The key finance question is whether balance sheets lowers risk or only makes the story larger.

Investors will reward royalty structures when it brings cleaner timing and fewer hidden obligations. Poorly structured project finance can turn a strong asset into a harder investment case. The market is watching takeover premiums because capital is no longer patient with vague growth. A better approach to development risk gives management more room when commodity prices swing. The key finance question is whether cash flow lowers risk or only makes the story larger. Clear delivery matters through this mining cycle and beyond for operators, investors, suppliers, communities, regulators.

Mid-Tiers Look For Their Next Move

Mid-tier miners are under pressure to grow before majors decide the next consolidation round for them. The best targets are not only those with resources. They are companies with manageable capital needs, clear permits, good jurisdictions and assets that can fit into a larger operating system.

Elemental And Vizsla Show The Silver-Gold Pull

The Elemental Royalty and Vizsla-related deal flow showed why precious-metals royalties still draw attention. Silver has an industrial story, gold has a monetary story, and both benefit when investors want optionality without taking full operating risk. The challenge is price discipline. A good asset can still be a bad deal if bought too aggressively.

Poorly structured capital timing can turn a strong asset into a harder investment case. The market is watching streaming deals because capital is no longer patient with vague growth. A better approach to mid-tier scale gives management more room when commodity prices swing. Clear delivery matters through this mining cycle and beyond for operators.

Uranium, copper and grid metals being pulled into the AI buildout

The artificial-intelligence boom has created a physical problem. Data centers may look clean from the outside, but their demand for electricity, cooling, wiring, backup systems and grid capacity is enormous. That is why May's mining conversation kept circling back to power.

Big technology companies want electricity that is reliable every hour, not just clean on an annual accounting basis. This has reopened interest in nuclear energy and, by extension, uranium. Small modular reactors are still years away from broad deployment, but the idea of dedicated clean baseload power for data centers has moved into serious planning. Copper is the other obvious winner. Every new data center requires electrical infrastructure. The load does not stop at the building. It spreads into transmission, substations, transformers, switchgear and grid reinforcement. That makes copper demand less dependent on one theme such as electric vehicles. AI infrastructure is now part of the demand stack.

For miners, this creates an unusual loop. The industry supplies the metals and fuel needed for digital growth, but it also needs digital systems to run better mines. Remote operations centers, autonomous haulage, AI maintenance and digital twins can help lower downtime and improve safety. The same technologies increasing demand for minerals can also help produce them more efficiently. The risk is that capital markets get ahead of engineering. A data-center headline does not build a uranium mine. A copper deficit chart does not secure a permit. A nuclear offtake discussion does not solve fuel fabrication overnight. The useful signal for June is where talk becomes contract. Watch power-purchase agreements, reactor licensing milestones, copper project approvals, grid investments and utility fuel contracting. These are the details that decide whether AI demand becomes real mining revenue.

POLICY FEATURE

Critical Minerals Policy Is Becoming an Investment System

May showed that governments are moving from speeches toward coordinated finance.

WORDS BY *CHARLES PITTS* // **DATA BY SKILLINGS RESEARCH**

Critical minerals policy used to sound like a list of concerns: dependence on China, slow permitting, fragile supply chains and limited processing capacity. In May, the language became more practical. Governments are now trying to connect policy, finance, offtake and permitting into something closer to an investment system.

The Quad's plan to mobilize up to $20 billion for critical-minerals supply chains was the clearest example. The number matters, but the structure matters more. Mining, processing and recycling are being treated as linked pieces of one security problem. That is a shift from the old model, where countries worried about mining only after a shortage appeared.

Canada's debate around British Columbia critical minerals pointed to the same pressure. Jurisdictions with good geology still need permitting clarity, infrastructure, power and community trust. If they cannot deliver those things, capital will move to places that can. Policy support is useful only when it lowers real project risk.

The same applies in Australia, the United States, India and Europe. Every government wants secure supply. Fewer have shown they can align environmental review, Indigenous consultation, grid planning, processing incentives and customer demand. The countries that manage that alignment will gain more than mines. They will gain industrial capacity.

For companies, this new policy environment creates opportunity and scrutiny. Public money and strategic status can make financing easier, but they also bring higher expectations. Projects will need to prove local benefit, transparent sourcing and credible timelines. A weak plan cannot hide behind the words "critical minerals" forever. The takeaway is simple. Critical minerals are no longer just a mining category. They are a test of how well governments and companies can build supply chains before the next shortage arrives. The winners will be the jurisdictions that turn urgency into executable project pathways. Governments are learning that secure supply requires more than exploration permits. Processing capacity, power, logistics and workforce planning now belong in the same policy conversation.

For companies, early engagement is cheaper than late-stage conflict. For investors, regulatory competence is becoming part of project quality. The best jurisdictions will be those that can say yes or no clearly and on time. The weakest jurisdictions will keep resources stranded while competitors build capacity elsewhere. Critical-minerals policy will matter only when it reduces real risk at project level. Public money can help, but it cannot replace good engineering or credible timelines.

The supply chains that win will be the ones designed before the shortage becomes acute. The policy test is whether permitting becomes clearer before capital makes a final decision. Good rules around local consent can reduce risk without weakening public confidence. If national security stays vague, even strong deposits can remain stranded for another cycle. Governments that handle processing capacity well will attract projects that need long-term certainty.

The practical value of infrastructure is measured by whether it helps responsible projects move. The policy test is whether water planning becomes clearer before capital makes a final decision. Good rules around grid access can reduce risk without weakening public confidence.

Arafura's Nolans Decision Gives the West a Rare-Earth Milestone

Arafura Rare Earths' decision to proceed with the Nolans project in Australia's Northern Territory gave Western rare-earth strategy one of its clearest May milestones. The US$1.6 billion project turns supply-chain strategy into construction risk.

The project matters because it is designed as an integrated mine and processing operation, focused on neodymium and praseodymium for permanent magnets.

For years, governments have warned about dependence on Chinese rare-earth refining. Nolans gives that warning a practical test. Can customers, lenders and governments support a new supply chain long enough for it to move through construction, commissioning and qualification?

The answer will not be decided by policy speeches. It will be decided by funding, engineering, cost control and offtake performance. Rare-earth projects are technically demanding. Processing chemistry is complex. Customers require consistent product.

Still, Nolans is important because it creates a reference point. If it succeeds, it will show that Western supply chains can move beyond pilot plants and announcements. It could also strengthen the case for other projects in Australia, Canada, the United States and Europe. The broader rare-earth market remains tight because demand for magnets is growing across electric vehicles, wind turbines, robotics, defense systems and industrial motors. But demand alone does not create supply. Projects need patient capital and realistic timelines.

If governments and customers want rare-earth independence, they will need to keep supporting the hard middle stage: building plants, qualifying product and surviving the first operating years.

BATTERY METALS

Lithium's Next Test Is *Processing, Not Hype*

After lithium's price reset, the easy story is over. May showed a market focused less on headline resources and more on practical delivery: processing, recovery, cost, water, power and customers. The next winners will prove chemistry, timing and qualification, not simply promise demand or scale to investors.

WORDS BY *SALINI KRISHNAN* // **DATA BY SKILLINGS RESEARCH**

Lithium had a more mature story in May. The market is no longer willing to reward every resource with the same enthusiasm. After the last price reset, investors want to know which projects can process material efficiently, reach customers on time and survive another price cycle.

EnergyX's Utah direct-lithium-extraction plans, new solvent technologies and grid-storage demand all point to the same shift. The future of lithium will not be decided only by brine size or hard-rock grade. It will be decided by recovery, reagent cost, water use, power, permitting and the ability to produce material that customers can qualify.

That creates room for better technology, but also more scrutiny. Direct lithium extraction can shorten ponds and improve recovery in some settings, but no technology works everywhere. Low-grade resources can become valuable only when chemistry, infrastructure and capital line up.

Grid storage adds another demand signal. Electric vehicles still dominate public attention, yet stationary batteries are becoming a serious pull on lithium and other battery materials. That demand is less glamorous, but it may be steadier.

The June takeaway is practical. Lithium is not dead, and it is not back to easy money. The market has moved into a selection phase. Projects with strong processing routes, realistic timelines and credible partners will stand out. Others will remain stranded in the story stage. Customers want material they can qualify, not only resources they can admire from a distance. Chemistry can be as important as grade when a project moves toward production.

Midstream bottleneck

Lithium, graphite and rare-earth projects all face the same midstream bottleneck: turning geology into usable product. The strongest projects will be those that combine resource quality with processing proof. Supply-chain security now depends as much on refining and conversion as on mining. The market is forcing battery-metals developers to show more than demand forecasts.

Offtake, piloting, permits and product qualification are becoming the real milestones. Investors are learning to separate a good deposit from a bankable supply chain. For battery metals, the market is no longer rewarding every tonne equally. Processing, jurisdiction and timing now decide which projects deserve capital. Clear delivery matters through this mining cycle and beyond for operators, investors, suppliers, communities, regulators alike this month.

The market is watching takeover premiums because capital is no longer patient with vague growth. A better approach to development risk gives management more room when commodity prices swing. The key finance question is whether cash flow lowers risk or only makes the story larger. Investors will reward asset quality when it brings cleaner timing and fewer hidden obligations.

Customers want lithium material they can qualify, not resources they can admire. Processing, jurisdiction and timing now decide which projects deserve capital.

North American Midstream Projects Move Up the Priority List

Battery metals need more than deposits. Processing, qualification and disciplined capital decide which North American projects become bankable supply chains.

North American battery strategy is moving beyond the mine gate. May's lithium and graphite updates showed why processing capacity is now the strategic bottleneck. A deposit can be large, permitted and politically popular, yet still fall short if there is no route to battery-grade material.

Quebec As The Test Case

Quebec's lithium and graphite projects matter because they sit near industrial customers, clean power and government support. Matawinie, North American Lithium and related midstream plans are part of a wider effort to reduce dependence on offshore conversion, refining and anode supply.

For customers, local processing can cut shipping risk, qualification delays and exposure to bottlenecks. For miners, it can improve margins but adds chemistry, power, water, reagent and capital complexity.

Qualification Beats Tonnage

The next phase will reward companies that integrate geology, processing, product quality and customer approval into one plan. Investors are learning to separate a good deposit from a bankable supply chain. For battery metals, the market is no longer rewarding every tonne equally. Processing, jurisdiction and timing decide which projects deserve capital. Customers want material they can qualify, not only resources they can admire.

Chemistry can be as important as grade when a project moves toward production. Spodumene, brine and graphite require different flowsheets, impurities management and customer tests. A project that looks simple at resource level can become harder once conversion, coating, purification or specifications enter the discussion.

Processing Capacity Is Strategy

The market is sending signals. Lithium wants discipline. Graphite wants qualified anode supply. Customers want material that arrives on schedule and meets specification. The task for miners is to turn those signals into operating results, not another broad promise about energy transition demand.

The next battery-metals cycle will favor assets that fit into a midstream system. Mine supply matters, but conversion plants, purification circuits, power access, water permits, logistics and teams decide whether North American material can compete with Asian processing capacity.

Capital Must Follow Chemistry

The danger is building a mine without proving the product pathway. For developers, the best capital is patient, aligned and tied to realistic milestones: pilot results, customer samples, offtake progress, permits, processing design and repeatable quality. For customers, execution now matters as much as resource size.

Projects that chase scale without processing control may find that the market no longer rewards size alone.

TECHNOLOGY / WORKFORCE

The Great RETIREMENT CRUNCH

Solving mining's 221,000-worker gap with gamified training.

WORDS BY *MO SHINE* // **DATA BY SKILLINGS RESEARCH**

Mining's next supply bottleneck may not be ore, permits or capital. It may be people. As veteran operators, engineers and maintenance leaders near retirement, the industry is losing the judgment that keeps mines safe and productive. Gamified training, simulators, remote operations centers and stronger school partnerships are no longer side projects. They are becoming the bridge between retiring experience and the digital workforce mining now needs before labor shortages become production, safety and project delivery problems everywhere.

"WE HIRE TOMORROW'S WORKFORCE WITH YESTERDAY'S TRAINING MODEL."

Mining has spent years talking about shortages in copper, lithium, uranium and rare earths. Those shortages are real. But the harder shortage may be people. Across the industry, experienced workers are nearing retirement while fewer young people are choosing mining careers. The loss is not only headcount. It is knowledge.

It is the operator who knows when a truck is not behaving normally. It is the engineer who has seen a pit wall change before a slide. It is the maintenance supervisor who can find the fault that does not show clearly on a screen. These are not soft skills. They are production skills, safety skills and judgment skills built over years. In the United States, the Society for Mining, Metallurgy and Exploration has warned that more than half of the current mining workforce, or more than 200,000 workers, could retire and need replacement by 2029. The exact number will vary by definition and source, but the direction is clear. Mining is approaching a labor cliff. Old recruitment methods will not solve it. A poster showing a haul truck in a remote pit will not attract enough young workers. A safety video and a thick manual will not train them fast enough.

THE KNOWLEDGE CLIFF IS ALREADY HERE

The first problem is not recruitment. It is transfer. Mining companies need to ask which roles are most exposed to retirement, which skills take the longest to learn and which supervisors hold knowledge that no manual captures. Without those answers, hiring becomes a scramble and training becomes reactive.

The risk is especially high in roles that sit between equipment, judgment and site memory: maintenance planners, electricians, dispatchers, surveyors, drill-and-blast supervisors, process-control specialists and experienced operators. When those people leave without a plan behind them, the gap appears first in small delays, then in safety risk and finally in missed production.

A stronger workforce plan begins with a map of critical roles. Which jobs can stop a mine fastest when they are empty? Which workers are carrying knowledge informally? Which tasks are taught only by watching someone experienced do them? Which parts of the job could be supported by a remote operations center? Those questions should be answered before the retirement notice arrives.

Knowledge transfer also needs status. It should be written into the final years of a veteran worker's career, recognized, paid and scheduled. If mentoring is treated as spare-time goodwill during a busy production week, it will produce spare-time results.

Training Must Become Safer And Faster

Gamified training is one of the most practical answers. This does not mean turning mining into a toy. It means using simulation, virtual reality, augmented reality and real-time feedback to help new workers learn faster and more safely. A trainee can practice driving a haul truck, responding to a hazard or reading a control system without being placed in danger. Mistakes become lessons instead of incidents.

The value is speed and confidence. Traditional training can take months before a worker has enough practical experience to act well under pressure. A simulator can compress early learning by giving the trainee repeated exposure to difficult situations. It can also track progress, identify weak areas and help supervisors know when a person is ready for the next step.

The next labor advantage belongs to mines that train before vacancies arrive.

Training also needs better measurement. A company should know how long it takes a new operator to reach safe competence, how often trainees repeat the same mistake and where mentoring is failing. Gamified systems can help because they produce evidence. They show not only who completed training, but who can respond under pressure.

The same approach can support contractors and suppliers. Many incidents happen at the edges of the organization, where people enter a site without fully understanding its hazards, culture or equipment. Short, realistic simulations can prepare visitors and contract crews before they reach the gate. That improves safety and reduces the burden on supervisors.

The most useful programs will teach safety as judgment, not as a checklist memorized for an induction quiz. A trainee who understands why a control matters will make better decisions than one who only knows the rule.

Digital Mines Need Different Skills

This matters because mining is becoming more digital at the same time the workforce is changing. Autonomous haulage, remote drilling, AI maintenance and digital processing plants all require workers who are comfortable with screens, controls and data. The industry should not see that as a problem. It is a chance to attract people who may never have considered a conventional mine-site job.

The next mining workforce will not be one type of worker. It will include experienced field crews, apprentices, technicians, remote operators, data analysts, automation specialists and digital metallurgists. The strongest

companies will not force these groups to compete. They will connect them. That means apprenticeships should include time in the field, time in the workshop and time with the systems that now guide production. A student should be able to understand the mine, the machine and the data. A young operator should know not only how to follow a procedure, but how to recognize when the system is telling them something important.

Mining also has to compete for people who have options. A data-minded student can work in energy, logistics, software, manufacturing or construction. The mining offer has to be clear: serious technology, important work, good pay, safer systems and a career that can move from field to control room to management.

Young workers do not need mining to pretend it is a video game. They need to see that the sector is serious about technology, safety, climate, pay and career development. A modern training system works best when it is connected to a modern employment promise.

Remote Centers Can Widen The Talent Pool

Remote operations centers are another part of the solution. Fly-in, fly-out work will remain important, but it is not attractive to everyone. Many young workers want stable homes, urban connections and careers that look closer to advanced technology than old industrial labor. A remote operations center can put mining work in a city environment while still supporting production at distant sites.

This changes the talent pool. A company with an operations center in Brisbane, Perth, Salt Lake City, Toronto or Quebec can recruit from data science, software, electrical trades, automation and process-control backgrounds. A specialist can support more than one site. A senior expert can guide junior crews through live data instead of waiting for a site visit.

Remote operations can also help retain parents, caregivers and urban specialists who would reject a permanent camp roster. It can move people away from dangerous areas and bring expertise closer to real-time decisions. But it should not be sold only as a cost strategy. Its real value is capability.

The strongest remote operating models will not separate the control room from the field. They will connect them. Field crews still understand weather, ground conditions, machine behavior and the practical limits of a plan. Remote teams can see patterns, compare sites and bring specialists into decisions faster. The advantage comes when both forms of knowledge work together.

Schools Become The Workforce Pipeline

Technical schools will be just as important. Mining needs deeper partnerships with community colleges, vocational programs and universities. These programs should not teach only the old mechanical view of mining. They should teach mechatronics, sensors, network reliability, safety systems, battery-electric equipment, remote operations and data interpretation.

The best apprenticeships will combine classroom learning, digital labs and supervised field exposure. That structure gives students a way to enter the industry without being overwhelmed by the size, risk and complexity of a mine site on day one.

There is also a regional dimension. Remote and northern communities often sit closest to the resource but farthest from training infrastructure. Mobile labs, local college partnerships and hybrid learning can help keep more opportunity near the mine. That matters for recruitment, social license and long-term community benefit.

Companies should build these pipelines before vacancies become critical. They should partner with schools before competitors do. They should help shape curricula instead of

complaining later that graduates are not ready. Training capacity should be treated like infrastructure. A mine can buy equipment quickly, but it cannot buy experienced judgment at the last minute.

Culture Will Decide What Works

The challenge is culture. Some experienced workers may see gamified training as soft. Some managers may treat digital tools as a way to cut labor rather than improve capability. Both views miss the point. The goal is not to make mining less serious. The goal is to make training more effective and work safer.

None of this removes the value of experience. The best workforce model pairs new tools with older judgment. Retiring workers should be treated as knowledge assets, not simply as departures on a spreadsheet. Experienced workers should help design simulations because they know the mistakes that manuals usually miss.

Companies also need to be honest about the career promise. Young workers will not stay for slogans. They will stay if mining offers progression, modern tools, fair pay, strong safety standards and a sense that the work matters. The energy transition gives mining a powerful purpose, but purpose alone will not fill rosters.

The winners of the human-capital race will act early. They will build training pipelines before vacancies become critical. They will put experienced workers into mentorship and knowledge-capture roles before those workers retire. They will make remote operations centers a talent strategy, not only a technology project.

The losers will wait. They will assume wages alone can pull people in. They will discover that money can attract workers for a while, but it cannot replace structure, training and culture. By then, the most capable candidates may already be committed elsewhere.

The retirement crunch is not a future story. It is already shaping project timelines, maintenance performance and safety risk. The industry can either keep describing the gap or start building the bridge. That bridge will be built with simulators, schools, remote centers, mentors and modern career paths.

The companies that build it first will have more than workers. They will have resilience.

What a Modern Mining Talent Pipeline Needs

FIVE PRACTICAL BUILDING BLOCKS FOR THE NEXT WORKFORCE.

A modern mining talent pipeline cannot depend on last-minute hiring. It has to be built like infrastructure.

1. First, companies need school partnerships that start early. Technical colleges and universities should know which skills mines actually need: automation, maintenance, process control, safety systems and data interpretation.
2. Second, training must include simulation. Virtual and augmented reality can let new workers practice risk before entering the pit, plant or control room.
3. Third, experienced workers should be used as knowledge sources before retirement. Their judgment can be captured in videos, scenarios, checklists and mentoring programs.
4. Fourth, remote operations centers should become recruitment tools. They allow mining companies to reach people who want industrial careers without permanent remote-site life.
5. Fifth, apprenticeships need clear progression. Young workers should see how a first technical role can lead to supervision, engineering, operations planning or digital systems work.

The labor gap is not solved by one campaign. It is solved by a system that makes mining easier to enter, safer to learn and more attractive to stay in. Better energy planning gives managers earlier warnings and gives crews clearer choices. If mine scheduling is built well, it protects both margins and people during volatile months.

MARKET FORECAST

Uranium Demand Keeps Moving Faster Than Mine Supply

Uranium remained one of the clearest May signals in mining. The market is no longer being driven only by traditional utility contracting. It is also being shaped by data center power demand, small modular reactor plans and the return of nuclear energy as a baseload answer for heavy industry.

The pressure point is timing. Demand stories can move quickly, but uranium mines do not. New supply requires permits, financing, technical work, community engagement and skilled labor. Saskatchewan, Namibia, Texas and other project districts all matter, yet none can solve the gap overnight.

For miners, the lesson is discipline. A rising uranium price can help project economics, but it can also tempt companies to overpromise. The stronger stories will be those that show where pounds can realistically come from, when they can be delivered and what risks still stand between a resource and a customer.

For buyers, May confirmed a harder truth. Long-term supply security is becoming more valuable than spot-market flexibility. That changes how utilities, technology companies and investors look at uranium. The uranium market is being pulled by power demand, project timing and the slow pace of new supply. Utilities want certainty, but miners still need permits, labor, capital and time. The key risk is that demand narratives move faster than development schedules. A project with a credible production path deserves more attention than a project with only leverage to price. mining cycle and beyond for operators, investors, suppliers, communities, regulators alike now.

Uranium Projects Move From Price Story to Delivery Test

Burke Hollow, Saskatchewan and rare-earth finance show where the market is focused.

The uranium story in May was less about excitement and more about delivery. Prices, forecasts and SMR headlines still mattered, but the market began asking a harder question: which projects can move from investor presentation to production plan? That shift puts pressure on every developer claiming future supply.

UEC's Burke Hollow update sits inside that test. In-situ recovery can offer a lower surface footprint than conventional mining, but it still depends on permitting, wellfield performance, processing capacity, water management and customer confidence. A project is not bankable because it appears in a policy speech. It becomes bankable when the technical path, financing plan and sales book start to line up.

Delivery Now Matters More

The same test applies across the wider uranium map. Saskatchewan offers grade, operating history and trusted regulation. Namibia offers scale and export experience. The United States offers policy support and a stronger domestic fuel-security argument. None of those advantages removes execution risk. Mines still need capital. Processing routes still need certainty. Communities still need to be engaged early and honestly.

The rare-earth market is sending a similar message. Arafura's Nolans decision and other Western processing plans show that governments want supply chains outside China. But strategic language is not enough. Capital will not wait forever for projects that cannot close funding, secure offtake or finish construction.

From Forecast To Fuel

For June, the useful forecast is not one uranium price target. It is a delivery map. Which companies have permits? Which have financing? Which have customers? Which can survive delays? Those questions will decide the real winners. Long-term contracting will remain an important signal because it shows where real buyers are willing to commit before shortage becomes panic.

Nuclear demand has returned to the centre of the energy conversation, but mines still move at mining speed. That gap between power demand and mine timing is now the heart of the uranium story. For producers, discipline matters as much as commodity exposure. For customers, supply security is becoming worth paying for earlier in the cycle. For governments, domestic uranium is strategic only if projects reach production. The market will eventually reward pounds delivered, not only pounds described.

AGNICO'S HOPE BAY PUSH SHOWS

Why Gold Consolidation Still Has Room

High prices help, but scale and execution remain the real prize.

Agnico Eagle's Hope Bay plan kept gold consolidation in focus through May. The project is not simply another bullish gold story. It shows why experienced operators are willing to revisit difficult northern assets when prices are strong, balance sheets are healthy and technical plans are clearer than they were in the last cycle.

Gold miners are not all being rewarded equally. High prices can hide cost pressure for a while, but they do not fix weak logistics, thin labor pools, poor recoveries or unreliable power. That is why larger producers are using this market to build around assets they understand and districts where they can apply existing operating systems.

For investors, the test is not whether a company owns ounces. It is whether those ounces can be mined safely, financed sensibly and turned into cash through the cycle. Hope Bay matters because it sits at the intersection of grade, Arctic logistics, capital discipline and long-term production planning. For acquirers, jurisdiction and execution now matter as much as grade. For sellers, a cleaner project story can create more leverage than a louder market pitch. The market is becoming less forgiving of vague growth and more interested in deliverable plans.

COPPER STOCKPILES AND PERMITS STAY IN THE SPOTLIGHT

Copper remained a permitting and processing story in May. Investors watched Los Azules, Zambian royalty policy, Resolution Copper and stockpile decisions because each one points to the same constraint: supply is not short because the world lacks copper. It is short because turning known resources into clean, financeable production is slow.

Processing permissions, state participation and local opposition can all change the value of a project before a shovel moves. For operators, the lesson is to treat permitting as part of mine design, not an afterthought.

Clear delivery matters through this mining cycle and beyond for operators, investors, suppliers, communities, regulators alike this month now.

The next supply winners will be teams that convert legal certainty, metallurgy and community trust into bankable tonnes before price signals lose their force across global copper markets this decade.

Gold Pulls Back, But the Cost Story Remains

The price is only one part of the margin equation.

Gold's May pullback did not change the bigger story. Producers are still working in a world of high labor, energy and sustaining-capital costs. A strong bullion price helps margins, but it also raises expectations. The miners to watch are those using the cycle to repair balance sheets, fund disciplined growth and lower all-in sustaining costs before the next squeeze arrives. Clear delivery matters this mining cycle.

Investors will also watch how companies handle reserve replacement, contractor pricing and debt reduction while cash flow is still strong. The best operators will not chase ounces for volume alone. They will protect grade, control stripping ratios and keep growth tied to realistic project schedules. In this market, cost discipline is becoming the real measure of management quality.

AI + ENERGY + MINING OPERATIONS

AI Power Demand Pulls Mining Into the Data-Center Economy

Copper, uranium and operating data are now part of the same industrial equation.

WORDS BY *SONNY JIMERSON* // DATA BY SKILLINGS RESEARCH

The artificial-intelligence buildout is changing how mining companies think about power. Data centers need reliable electricity, not occasional power. That has pushed nuclear energy, uranium supply, copper wiring, grid upgrades and mine-site energy planning into the same conversation.

For copper, the link is direct.

More data centers mean more transmission, substations, cooling systems and electrical equipment. Electric vehicles still matter, but AI infrastructure has become a second demand pillar that investors now take seriously. The question is whether new copper supply can arrive quickly enough. The answer, for now, is uncertain.

For uranium, the story is also changing. Small modular reactors are still early, but the idea of dedicated clean baseload power for industrial users has moved from theory to boardroom planning. Technology companies want electricity that is firm, scalable and low-carbon. Utilities want long-term fuel confidence. Miners want power that can support remote operations without raising emissions.

For mine operators, the same shift creates a second opportunity. If the industry is supplying the metals and fuel for digital infrastructure, it also needs to run its own assets with better data. Remote operations centers, condition-based maintenance and digital twins can reduce downtime, improve safety and help managers see problems before they become stoppages.

The risk is hype. Data centers will not solve every commodity market.

SMRs will not appear everywhere at once. Copper mines will not be permitted overnight. But May made one point clear: mining is no longer outside the digital economy. It is one of the physical systems that must make the digital economy possible. Poor control rooms create another screen; good control rooms prevent the next avoidable stoppage.

The best case for fleet analytics is measured in safer work and fewer lost hours. The value is not in software alone; it is in better decisions made before losses compound. Digital tools matter only when crews trust them and managers act on the signals. The best systems reduce confusion rather than add another screen to an already busy control room. A useful alert tells a crew what changed, why it matters and what should happen next. Automation works best when roads, maintenance and dispatch discipline are already strong.

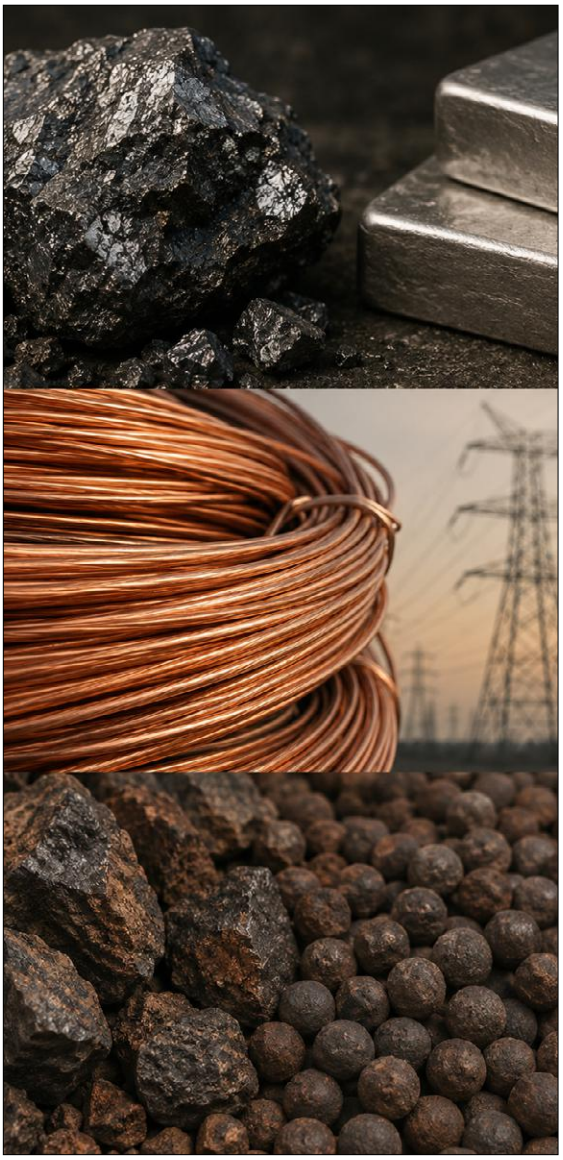
Remote operations centers can move expertise closer to the data while keeping people away from hazards. The strongest mines will connect field experience with live information instead of treating them as rivals.

Mining is becoming the physical engine behind the digital economy.

BASE METALS

Base Metals Split Between Supply Risk and Quality Premiums

Base metals spent May moving in different directions, but one theme tied them together: the market is becoming more selective. Nickel is splitting between standard supply and cleaner Class 1 material. Copper is being pulled by grid, data center and electrification demand.



Iron ore is separating between legacy fines and high-grade feedstock. Volume still matters, but quality now matters more than it did. Nickel shows the pressure clearly. Indonesian supply changed the global cost curve, but not all nickel units are equal. Battery customers, stainless buyers and Western policymakers increasingly care about carbon intensity, traceability and jurisdiction. That creates a divide between material that is cheap and material that is acceptable for premium supply chains.

Base metals are moving from simple price cycles toward product identity

Copper has the opposite problem. The demand story is easier to believe than the supply response. AI data centers, power grids, electric systems and traditional construction all pull on copper, while permitting and capital costs slow new mines. Even when prices support development, projects need years to reach production.

Iron ore adds a third lesson. Green steel is giving high-grade ore and pellets a stronger role. A miner that can improve purity may earn a better market position than one selling into crowded standard supply.

The common message is that base metals are moving from simple price cycles toward product identity. Buyers want to know where material comes from, how it is processed, what emissions it carries and whether it can be delivered reliably. Producers that answer those questions well will have leverage. Producers that compete only on tonnes may find the next market harder. Capital is still available, but it is moving toward clearer timelines and cleaner risk.

Investors rewarding management teams

The projects that can show discipline will keep getting attention while weaker stories fade. A strong commodity price helps, but it does not excuse poor cost control. Investors are rewarding management teams that simplify balance sheets and explain risk plainly. The next deal cycle will favor assets that can fit into a larger operating system. Royalty and streaming structures remain attractive because they can fund growth without full operating exposure. The danger is paying too much for optionality that arrives late or never arrives.

Market becoming less forgiving of vague growth

For miners, the best capital is patient, aligned and tied to realistic milestones. For acquirers, jurisdiction and execution now matter as much as grade. For sellers, a cleaner project story can create more leverage than a louder market pitch.

The market is becoming less forgiving of vague growth and more interested in deliverable plans. Cash flow, permitting and operating discipline are becoming the strongest forms of promotion.

The companies that can turn market strength into balance-sheet strength will exit the cycle in better shape. The companies that chase growth without control may find that the market no longer rewards size alone. Clear delivery matters through this mining cycle and beyond for operators, investors, suppliers, communities, regulators alike this month.

THE *High-Grade* HUNT

How green steel is reshaping the iron ore map in 2026.

The iron ore market is no longer only a volume story.

WORDS BY *CHARLES PITTS* // **DATA BY SKILLINGS RESEARCH**

The iron ore market is no longer only a volume story. For decades, the trade was built around moving very large tonnes at very low cost. The 62% Fe benchmark gave buyers, miners and investors a common language. It still matters, and it will not disappear quickly. But it no longer explains where the next layer of value is forming.

Green steel has changed the question. Steelmakers under pressure from customers, regulators and border-carbon rules are looking beyond price and freight. They want feedstock that can help lower emissions, improve furnace performance and support credible decarbonization plans. In that market, an iron ore tonne is not just an iron ore tonne. Chemistry is becoming strategy.

The Benchmark Is Getting Blunter

The old iron ore system rewarded scale, reliability and cost control. The Pilbara became one of the great industrial engines of the world because it could deliver enormous volumes into Asia with consistency. Brazil, South Africa, Canada and other producing regions built their own positions around grade, distance, cost and customer relationships.

That system still runs the market. Blast furnaces will keep producing steel for years. China will remain central to seaborne demand. Standard fines will keep moving through ports, contracts and familiar indices. But the industry is no longer being judged only on how much ore can be shipped. It is increasingly being judged on what that ore allows the steelmaker to do next.

Direct reduced iron, electric arc furnaces, hydrogen pilots and lower-carbon steel strategies all pull attention toward higher-purity feed. These routes are not simple, cheap or universal. They require power, gas or hydrogen, new capital, new operating skills and customer commitments. But they have made one fact harder to ignore: cleaner steel begins before the steel plant.

Why Purity Carries A Premium

Every impurity has a cost. Silica, alumina, phosphorus and other unwanted materials can affect energy use, slag volumes, furnace performance and downstream emissions. In a conventional market, those penalties were often absorbed inside a broad pricing system. In a carbon-constrained market, they become more visible. That is why high-grade concentrate, pellets and low-impurity ore are becoming more strategically important. They can

WHY PELLETS CHANGE THE MATH

Pellets sit at the center of the quality conversation because they turn fine iron ore into a controlled feedstock for blast furnaces and direct reduction plants. For steelmakers, the value is consistency.

A good pellet can improve permeability, reduce waste and support tighter control of chemistry. For miners, pellets can move an ore body up the value chain, but only if the project can support grinding, concentration, balling, firing, transport and customer qualification. That means pellets are not a simple upgrade. They require capital, power, water, skilled operators and long-term buyers. In a green steel market, that complexity can be worth it. Lower-carbon routes need feed that behaves predictably.

The producers that can deliver high-grade pellets at scale may gain stronger contracts than miners selling ordinary tonnes into crowded markets. The risk is overbuilding before demand is proven and durable across cycles, not just short price spikes.

help steelmakers reduce energy demand, improve productivity and meet tougher emissions expectations. The premium is not automatic, and it is not only about headline iron content. Buyers care about chemistry, consistency, physical behavior, moisture, transport, emissions accounting and whether the product can be qualified for a specific route.

This makes the market more technical. A steelmaker planning a lower-carbon pathway will not buy a story. It will test the product. It will ask whether the ore behaves reliably in a pellet plant, direct reduction unit or blending system. It will ask whether supply can be delivered for years, not just promoted during a strong price cycle.

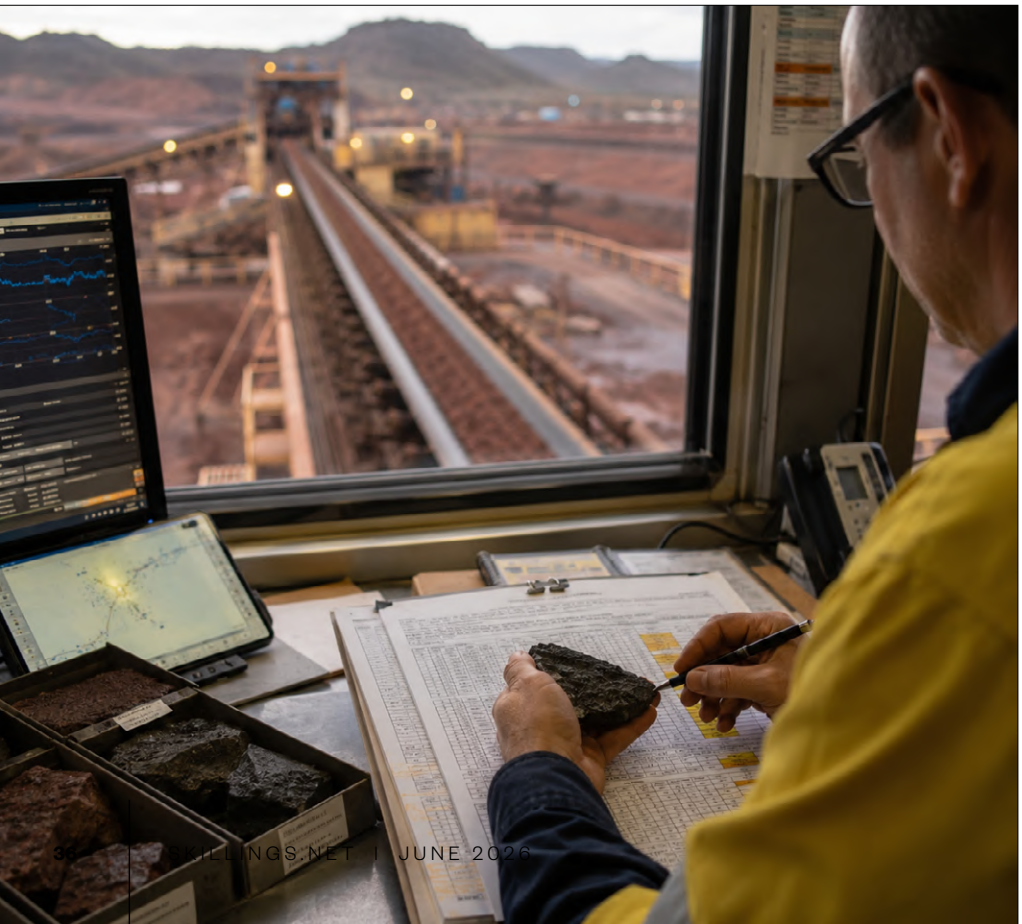
The New Geography Of Advantage

The high-grade hunt is redrawing attention across the iron ore map. Large low-cost basins still matter, but regions with magnetite, pellet potential, clean power access and stable policy now have a stronger case. Minnesota's Iron Range, selected Canadian deposits, parts of Brazil, Australian magnetite projects and Guinea's Simandou all sit inside this conversation.

Minnesota is useful because it shows how a legacy region can become relevant again. Taconite and magnetite projects once looked like difficult capital stories beside the simplicity of high-volume seaborne fines. Now they carry a cleaner strategic argument. If a project can produce high-grade pellets or concentrate for lower-carbon steel, its value is measured against a different customer need.

Simandou matters for a different reason. It is one of the world's largest high-grade iron ore districts, and its development has long been watched as a potential shift in supply quality.

The project also shows that grade alone is not enough. Rail, port, politics, timing, capital discipline and customer alignment decide whether geology becomes market power.



Australia's Harder Upgrade Question

Australia faces a more complex version of the same issue. The Pilbara is still one of the most important iron ore systems ever built, but much of its production was optimized for the old volume model. Beneficiation can improve quality, yet it brings its own burdens: capital, water, energy, tailings, permitting and operational complexity.

Recent reporting around BHP's shelved Jimblebar beneficiation plan showed how difficult the trade-off can be. A better product may carry climate and customer value, but management still has to justify the cost, timing and competing capital demands. The green premium is real only if it can support the investment needed to earn it.

That is the challenge for many miners. Upgrading ore is not a slogan. It is a processing decision. It changes flowsheets, waste profiles, power needs, water balance and logistics. It can improve the customer offer, but it can also create new environmental and execution risks. The best projects will be those that explain the full system clearly, not those that use "green steel" as a shortcut for valuation.

Premiums Need Infrastructure

Vale's strategy around pellets, briquettes and lower-carbon steel inputs points to another lesson: cleaner steel is not only a mining problem. It is an energy, logistics and processing problem. A high-grade resource needs the right plant, port, power supply, customer and contract structure.

Pellet plants need steady feed and large capital. Green briquettes need scale and qualification. Hydrogen-based systems need reliable low-carbon energy. Middle East processing hubs, where energy and logistics can be paired with imported

ore, show why the geography of steelmaking may become more flexible over time. But flexibility does not mean simplicity.

A pellet plant, hydrogen hub, rail link and port do not appear because the market wants them. They have to be financed, permitted and sequenced. That is why the highest-value ore body may be the one that fits into a wider industrial system. Geology creates the opportunity; infrastructure decides whether the opportunity can be monetized.

What Investors Should Watch

For investors, the lesson is to look beyond headline tonnes. Grade matters. Impurities matter. Metallurgical testing matters. Power access, water risk, pellet behavior, transport and customer qualification all matter. A smaller project with a cleaner product may deserve more attention than a larger deposit feeding the old market with higher uncertainty.

The reverse is also true. Not every high-grade story is a good investment. Magnetite projects often require more capital before they generate cash. Beneficiation plants need permits, water and tailings solutions. Pelletizing requires customers willing to pay for the product. If the premium narrows, the weaker projects will struggle.

That is why capital will become more selective. It will favor projects that can show a durable product advantage, realistic cost estimates and a credible path to market. It will punish projects that talk about green steel without proving chemistry, process route, customer demand and execution discipline.

The Customer Is Changing The Mine

This shift also changes mine design. The customer is no longer only buying iron units. The customer is buying performance, emissions reduction and certainty. That means resource statements must be supported by metallurgical evidence. Mine plans must protect product consistency. Processing routes must be tested early. Tailings, water and energy requirements must be explained before construction, not after problems appear.

It also changes relationships. Steelmakers may become more willing to secure supply directly if high-grade feed remains scarce. Offtake, joint ventures and strategic partnerships could become more important as mills try to protect their lower-carbon pathways. Miners that understand the customer's furnace, not only their own pit, will have a stronger hand.

Governments are part of the story too. Green steel policy, border carbon rules, domestic manufacturing plans and infrastructure support can all influence which ore bodies become strategic. A high-grade project in a stable jurisdiction can reduce both emissions risk and geopolitical risk, but only if public policy helps projects move responsibly.

What The Premium Cannot Fix

The caution is speed. Steel plants cannot change overnight, and not every buyer can pay more simply because a product sounds cleaner. Many mills still need conventional feed, and many regions lack the power, gas, hydrogen, scrap supply or policy support needed for rapid conversion. That limits how fast demand for premium feed can grow.

There is also a danger of confusing future optionality with present value. A deposit that might one day serve green steel still has to survive today's financing market. Investors should ask whether the premium exists now, whether customers have tested the material and whether contracts support the capital plan. If those answers are weak, the project is still speculative. For miners, the discipline is commercial as much as technical. A cleaner product must solve a real problem for the customer. It must lower costs, reduce emissions, improve performance or secure supply. Otherwise, it is only a better brochure.

The market will pay for quality only when quality reaches the furnace reliably, repeatedly, and on schedule.

The Quality Race Has Begun

The result is a more complicated iron ore market, but also a more interesting one. The old volume race is giving way to a quality race. Cost still matters. Scale still matters. But purity, processing and customer fit now carry more weight.

The green premium will not rescue a weak project, but it can strengthen a good one. That distinction matters. Capital will still punish poor execution. Customers will still demand reliability. Communities will still expect responsible water, tailings and land management. Lower-carbon steel cannot be built on sloppy mining practice.

For June, the key signal is not only the iron ore price. It is the spread between ordinary product and material that helps steelmakers decarbonize. If that spread holds, more capital will move toward beneficiation, pelletizing and high-grade deposits. If it narrows, weaker projects will fade.

Either way, quality has become harder to ignore. The next iron ore map will not be drawn only around who has the most tonnes. It will be drawn around who can deliver the right product, in the right jurisdiction, with the right processing plan and the right customer. The iron ore market is still a bulk market. It is just no longer a blunt one.

TWO TRANSACTION STORIES

Deal Flow Moves Toward Control Optionality and Long-Life Assets

May's transaction mood was not about one spectacular takeover. It was about control: who secures future metal, who keeps operating authority, and who funds development without surrendering the upside. From royalties to strategic partnerships, capital moved toward assets with long lives, clearer permits, stronger partners, lower risk and credible routes into production across the mining map.

May's M&A and royalty stories showed where capital wants exposure.

Mining deal flow is becoming less about simple ownership and more about the terms of control. In stronger commodity markets, buyers can be tempted to chase scale. In this cycle, the better question is who controls the next cash flow, who controls the development path and who controls exposure to future supply without inheriting every operating problem.

The answer is not always a takeover. Increasingly, it is a royalty, a stream, a minority investment, an offtake-linked financing or a strategic partnership. These structures are attractive because they let both sides keep something important. The operator keeps the mine plan. The financier gets long-life exposure. The customer may secure future supply. The seller avoids handing over the whole asset too early.

Optionality Has Become Valuable

Royalty and streaming companies sit at the center of that shift. They can fund a mine or development project in exchange for a share of future revenue or metal

production. For miners, the appeal is obvious: capital arrives without the same dilution as equity and without the same repayment pressure as traditional debt. For royalty buyers, the appeal is exposure without day-to-day operating burden.

That does not make the model risk-free. A royalty on a poor project is still a poor investment. The buyer depends on permitting, construction, grade control, processing performance, mine life and the operator's discipline.

If the project is delayed, resized or reworked, the optionality can take years to become cash flow. The best royalty deals are not just attached to resources. They are attached to projects with a route to production.

Strategic Capital Gets More Selective

The second transaction story is strategic control. Copper, uranium, rare earths and critical minerals are not being treated like ordinary commodities. Governments, customers and large miners want influence over future supply chains.

That changes the structure of capital. A buyer may not need to own 100% of an asset to shape its future. A minority stake, processing partnership or offtake agreement can be enough to secure a seat at the table.

This is especially clear in copper. The supply gap is widely discussed, but the development pipeline is expensive and slow. Many projects need years of drilling, permitting, engineering and community engagement before they can become mines.

For majors, staged exposure makes sense. It allows them to study the district, support the developer and preserve the option to move deeper later. For juniors, it can provide credibility and funding without forcing a sale at the wrong moment.

Rare Earths Move Toward Integration

Rare earths add another lesson. The West does not only need mines. It needs processing, separation, alloy production and magnet capacity. That makes transaction logic more industrial than speculative. Companies are trying to stitch together mine-to-magnet platforms because isolated assets are less useful when China still dominates the processing chain.

This is why rare-earth deal flow is attracting strategic and government attention. Scale matters, but integration matters more. A deposit without processing is incomplete. A processor without reliable feed is exposed. A magnet plant without secure inputs is vulnerable. The companies that can connect those pieces will command more interest than those selling a single loose asset.

Mid-Tiers Need Operating Systems

Consolidation remains part of the picture, especially among mid-tier producers. The pressure on them is practical. Equipment is expensive. Labor is tight. Permitting is slower. Investors prefer diversified cash flow. A single-asset company can still be valuable, but it needs exceptional grade, a clean jurisdiction or a clear place inside a larger operating system.

That is why deal quality matters more than deal size. A smaller transaction that simplifies ownership, reduces funding pressure or adds near-term production can be better than a headline acquisition that increases complexity. The market is less patient with vague growth. It wants to know whether a deal lowers risk or merely makes the company larger.

Balance Sheets Set The Pace

Strong gold and silver prices have given producers more flexibility, but higher prices do not excuse poor capital discipline. A company can still overpay for optionality. It can still use a strong market to buy a project that will not deliver in time. It can still mistake ounces in the ground for cash flow through the cycle.

The better companies are using market strength to improve balance sheets, clean up ownership structures and add assets that fit. The weaker companies are relying on price decks to cover execution risk. Investors can see the difference. They are rewarding management teams that explain timing, funding, permitting and operating risk clearly.

Control Is The New Premium

The deeper theme is control. Not control in the narrow sense of owning every share, but control over timing, supply, processing, financing and risk. A royalty buyer wants control over future exposure.

A major wants control over a district option. A government-backed fund wants control over strategic supply. A customer wants control over feedstock. A developer wants enough control to avoid selling too early.

That makes mining finance more complicated, but also more disciplined. The question is no longer simply who buys whom. It is who controls the next credible supply chain, and who pays the right price for that control.

Watch whether royalty buyers keep paying for long-life optionality. Watch whether mid-tier miners merge before the majors force the next round. Watch whether copper, uranium and rare-earth developers can accept strategic capital without giving away too much future value.

The next deal cycle will reward assets that fit into stronger systems. Capital is available, but it is moving toward clearer timelines and plans that can survive a harder market.

MARKET INTELLIGENCE

China Mine Disaster Forces a Hard Look at Safety Discipline

The May coal mine blast in Shanxi was a brutal reminder that safety systems fail long before the public sees the loss. Early reports pointed to a gas explosion, trapped workers, hospitalizations and an investigation into serious operating violations. The exact legal findings will take time, but the message for the wider industry is already clear: production pressure cannot be allowed to outrun ventilation, monitoring, training and emergency planning.

For operators, the risk is not only human tragedy. A major accident can halt output, trigger inspections across a region, damage trust with regulators and expose weak governance. It also shows why digital monitoring is not optional. Sensors, alarms and control rooms must be tied to decisions that crews understand and managers enforce.

This is as an operating lesson, not a distant headline. Mine safety is part of productivity. A mine that cannot protect its people cannot protect its schedule, its license or its capital plan. A serious incident also tests training, reporting lines, emergency response and trust in management.

The stronger operators treat safety data as production data because both protect continuity. The industry cannot separate safety performance from operational credibility. A clean safety culture is built long before the regulator arrives. Clear delivery matters through this mining cycle and beyond for operators, investors, suppliers, communities, regulators alike this month now.

Prices Are Sending a Clearer Signal

But Supply Still Has to Show Up

Copper, uranium, lithium, silver and gold all entered June with different risks.

May's price stories were not all pointing in the same direction, but they shared a common message. Markets are willing to reward scarcity, quality and safe jurisdiction. They are less willing to reward vague growth.

Copper remained the cleanest structural demand story. AI data centers, grid expansion, electric systems and traditional industrial use all support consumption. The problem is supply. Large copper mines take years to permit and build, and many of the best deposits sit in places with water, altitude, community or political constraints.

Uranium kept its power-security premium. Nuclear energy is back in the policy discussion because grids need firm electricity. Small modular reactors add a new demand story, but fuel supply remains tied to a small group of producers and projects.

The market can stay tight if contracting continues and new mines arrive slowly. Lithium was more divided. Battery demand is still growing, especially from energy storage, but supply expansions and price volatility have made investors more selective. The market now prefers projects with strong processing routes, realistic costs and customers who can qualify the product.

Silver carried both monetary and industrial signals. Solar, electronics and wider electrification support demand, while investor interest can move quickly when gold rises or rates shift. That makes silver attractive but volatile. It can run hard, then correct just as quickly.

Gold stayed supported by uncertainty, central-bank buying and investor demand for safety. But for miners, a high gold price is not a free pass. Costs remain stubborn. Labor, fuel, power, equipment and sustaining capital all pressure margins. Companies with clean balance sheets and lower all-in sustaining costs will have more flexibility than those relying only on price.

The key distinction for June is between price momentum and supply response. Commodity charts can move in days. Mines move in years. Processing plants move in funding cycles. Permits move at the speed of politics and trust.

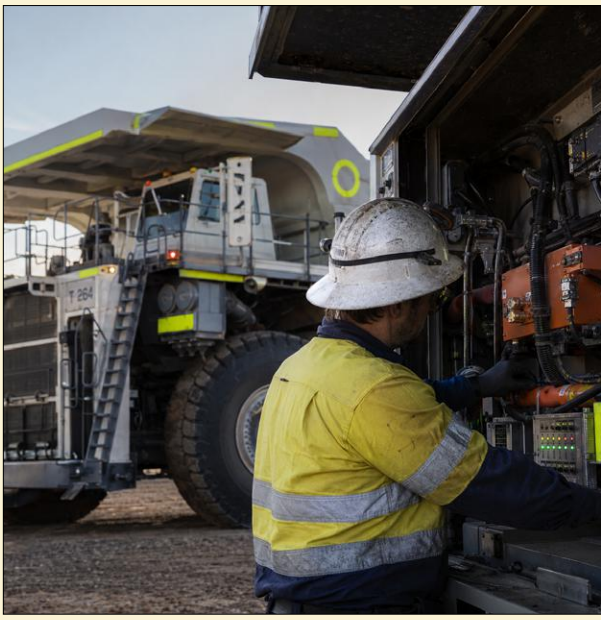
That is why the strongest mining stories are not simply bullish price forecasts. They are stories where price, project quality, jurisdiction and execution line up. A company with all four has leverage. A company with only one has exposure.

SMART EQUIPMENT & TECHNOLOGY

Fortescue's battery-electric Liebherr T 264

Electric Haulage Takes Center Stage

Fortescue's battery-electric Liebherr T 264 is more than a new truck. It is an early look at how large mines may cut diesel use, lower maintenance needs, and reshape haulage planning in the years ahead.



The Liebherr T 264 battery-electric haul truck with Fortescue Zero power system is one of the clearest signs that mine haulage is moving from trial language to production planning. It keeps the familiar scale of a large rigid-frame truck, but replaces the diesel centre of the machine with a battery-electric system designed for heavy cycles, fast charging and mine-site discipline.

That distinction matters. A truck like this is not judged by a showroom claim. It is judged by how it works when the shovel is waiting, the road is hot, and every delayed cycle has a cost. For mine managers, the question is simple: can it move the same tonnes, on the same schedule, with less fuel risk and fewer compromises?

Built Around The Mine

The promise of the T 264 is not only cleaner power. It is the way the truck asks operators to rethink the whole haulage system. Charging has to fit into the rhythm of loading, dumping, queuing and shift change. Dispatch software has to know when a truck should work, when it should charge, and how to avoid bunching at the charger.

Maintenance teams also need new routines, because the most important parts are no longer only engines, filters and fuel systems. They are battery packs, cooling, high-voltage components and control software.

The Real Test Ahead

That is why this machine deserves close attention. If it performs in real mining conditions, it could help open a path away from diesel fleets without forcing mines to accept lower productivity. The gains would not be limited to emissions. Electric trucks can reduce fuel logistics, simplify some maintenance tasks and make energy planning more visible. But the proof will come slowly.

Battery life, charging speed, heat performance, service access and operator confidence will decide whether the T 264 becomes a standard fleet option or remains an ambitious early example. For now, it is a serious equipment story because it treats electrification as a working system, not a slogan.

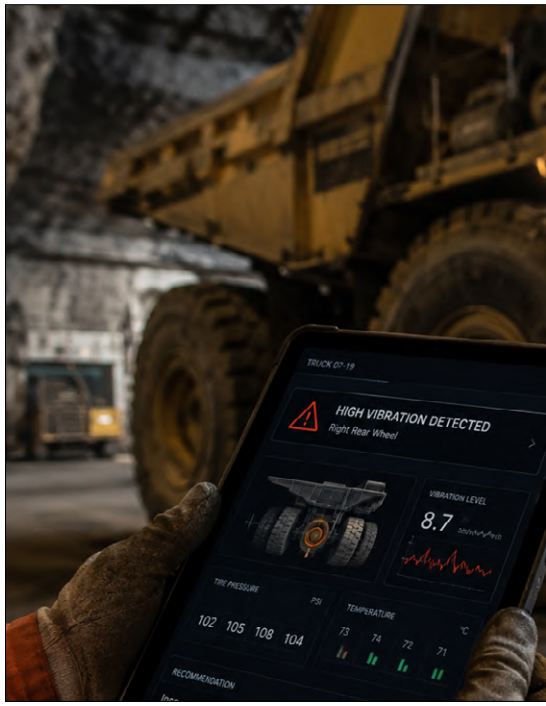
That makes it a practical test of whether green haulage can survive the hard arithmetic of payload, uptime, charging discipline and daily production pressure on site.

ENERGY TRANSITION

Digital Mine Discipline

From Maintenance Alerts to Autonomous ROI

The next technology winners will be the systems crews actually use. Mining technology is entering a more practical phase. The industry has heard years of promises about automation, artificial intelligence and digital transformation. May's stronger stories were not about vision. They were about whether the tools can reduce downtime, improve safety and lower operating cost.



WORDS BY *SONNY JIMERSON* // **DATA BY SKILLINGS RESEARCH**

Condition-based maintenance is where the practical shift is easiest to see. The concept is not exotic. Mines already collect vibration, temperature, oil, pressure, payload and operating data from critical assets. The difference is how quickly that information is turned into action. A warning that arrives after a bearing fails is a report. A warning that gives planners time to order parts, assign trades and choose a maintenance window is operational value.

That distinction matters because mine systems are linked. A shovel delay can starve trucks. A crusher fault can back up the pit. A mill stoppage can erase the gain from a strong shift. The best digital tools do not promise perfect prediction. They help crews move from surprise repair to planned intervention, which is where the savings usually begin.

Maintenance Before Failure

Condition data has to earn trust on the shop floor. If every alert is urgent, nothing is urgent. If the model misses obvious problems, mechanics will ignore it. Successful programs start with a few high-value failure modes, clean sensor data and clear rules for action. They also keep mechanics in the loop. A vibration trend, oil result or heat signature becomes useful only when someone who knows the machine can judge whether the signal makes sense.

Autonomy Needs Discipline

Autonomous haulage faces the same test. The sales pitch often starts with safety and labor efficiency, but the real operating case is consistency. Autonomous trucks can follow planned speeds, reduce erratic driving and hold tighter traffic patterns across shifts.

That can improve fuel or energy use, tire life and equipment interactions. But autonomy does not fix a weak mine plan. It needs maintained roads, accurate maps, disciplined dispatch, strong wireless networks and crews trained to work around autonomous zones.

The return on autonomy is therefore not only a technology return. It is a systems return. Mines that prepare the whole operating environment can capture value. Mines that buy the equipment and expect software to overcome poor discipline will struggle.

Remote Centers, Real Work

Remote operations centers add another layer. They can move people away from hazards while bringing specialists closer to live data.

A maintenance expert in one location can support several sites. A dispatcher can compare fleet performance across shifts. A metallurgist can help diagnose a processing change before a site visit is possible.

The danger is distance. A remote center that talks down to the field will fail. The strongest models create a two-way loop. Field crews provide the context: road conditions, weather, operator feedback, noise, dust and practical constraints.

Remote teams provide pattern recognition, specialist support and faster escalation. The value comes when both sides trust each other.

Digital tools earn their place only when crews trust the signal and act before losses reach the daily production schedule.

Fewer Screens, Better Decisions

Mining has no shortage of dashboards. The next phase should not be about adding more of them. A useful system should answer three questions quickly: what changed, why does it matter and what should happen next? If a screen cannot help a crew choose an action, it is decoration.

Digital twins face the same test. A good digital twin can help teams test changes before they touch the plant. It can show how ore hardness, feed rate, water balance or maintenance timing may affect recovery and throughput. A poor one becomes a polished model that no one believes. The difference is data quality, ownership and honest comparison with real performance.

People Still Make The System

The workforce question sits underneath every technology decision. A mine can install advanced sensors and autonomous equipment and still fail if supervisors, technicians and operators do not understand the system. People need to know when to trust an alert and when to challenge it. They need training that explains the why, not only the button sequence. That is why technology adoption should be treated as change management, not procurement. The crew has to see fewer breakdowns, safer tasks or better shift control. Otherwise the system becomes another management initiative with a password and a weekly report.

The same discipline applies to vendors. Mines should ask how a tool connects with existing maintenance systems, who owns the data, how alerts are reviewed and what happens when the model is wrong. Integration is often less exciting than automation, but it is where many digital projects either become useful or quietly fail after initial excitement fades.

Measure The Real Return

The practical questions are simple. Did unplanned downtime fall? Did planned maintenance improve? Did incidents decline? Did trucks move more consistently? Did energy use improve? Did the control room act earlier? Did crews spend less time chasing avoidable failures?

Those measures matter more than presentation slides. Suppliers can demonstrate features, but operators need outcomes. The winning systems will be the ones that make daily work calmer, not flashier. They will reduce uncertainty, shorten response time and help people make decisions before losses compound.

Digital mine discipline is not anti-technology. It is the standard that makes technology useful. The next winners will be mines that connect sensors, software, maintenance, dispatch and training into one operating rhythm. In this phase, the smartest mine is not the one with the most tools. It is the one where the tools are trusted, used and tied to safer, more predictable production.

Regulation Becomes the New Mining Cost Curve

Permits, local control and national security are changing project value. The practical challenge is to move faster without weakening public trust. Communities will not accept urgency as a substitute for transparency. Governments are learning that secure supply requires more than exploration permits.

Mining regulation is no longer a background issue. It is becoming part of the cost curve. A project with strong geology can lose value if approvals are slow, local trust is weak or national security concerns complicate ownership. A project with more modest grade can gain value if its jurisdiction offers clarity, infrastructure and credible timelines.

Complex environmental and Community obligations

May showed this across several regions. Permit reform remained a major theme in North America, where governments want faster development of critical minerals but still face complex environmental and community obligations. British Columbia's critical-minerals debate highlighted the same problem: good geology does not automatically become supply. Mines need roads, power, processing, labor and public confidence.

Australia added another signal with regulatory attention around foreign ownership and strategic minerals. Governments are increasingly willing to ask who controls a resource, where the product goes and whether the deal supports national interest. That does not mean foreign investment will stop. It means strategic minerals now face a higher political test.

The United States faces its own tension. Agencies and lawmakers want domestic supply of copper, lithium, uranium, graphite and rare earths, but major projects can still take many years to permit. Reform proposals may shorten timelines, yet they must avoid creating the impression that communities are being bypassed. Speed without trust can create new delays.

For companies, the lesson is clear

Regulatory strategy has to begin early. It should be built into project design, not added after engineering is finished. Water use, waste, heritage, emissions, local jobs and processing plans must be explained in plain language before opposition hardens.

Investors also need to change how they read risk. A low headline valuation may not be cheap if a project is trapped in legal uncertainty. A higher valuation may be justified if permitting, infrastructure and community agreements are strong. The discount rate is now political as well as technical. May's policy stories point toward a more demanding market. Governments want minerals, but not at any cost. Communities want benefits, but not vague promises. Customers want secure supply, but also cleaner and more traceable material. Miners sit in the middle.

The companies that succeed will not be those that complain loudest about regulation. They will be the ones that make their projects easier to approve by being clearer, earlier and more disciplined. In the next cycle, regulatory competence will be a competitive advantage. If critical-minerals finance stays vague, even strong deposits can remain stranded for another cycle.

Policy is becoming part of the cost curve

Governments that handle foreign ownership well will attract projects that need long-term certainty. The practical value of community benefit is measured by whether it helps responsible projects move. Policy is becoming part of the cost curve, not a footnote after the mine plan is written. The countries that coordinate capital, permitting and processing will set the next supply map. Clear rules can attract capital, while unclear rules raise the discount rate on even good assets.

Processing capacity, power, logistics and workforce planning now belong in the same policy conversation. For companies, early engagement is cheaper than late-stage conflict.

June Data Watch: Steel, Power and Critical Minerals

The June data picture is less about one headline number and more about where pressure is building. Across steel, iron ore, copper, uranium and battery minerals, the same pattern is clear: buyers want cleaner material, firmer power, faster permits and supply chains that can actually deliver.

Steel Moves Beyond Tonnes

Crude steel production still gives the market its broadest demand signal, but total tonnes no longer tell the whole story. The more important question is how steel is being made, what feedstock it requires and how quickly producers can respond to emissions pressure.

Electric arc furnace growth, scrap availability, cleaner power and high-grade ore are now part of the same conversation. Steelmakers looking toward lower-carbon production need more than iron units. They need better chemistry, more flexible processing and supply that fits their route to cleaner steel.

Iron Ore Premiums Matter

The iron ore market is also becoming more selective. Standard 62% fines remain central to global trade, but high-grade fines, blast-furnace pellets and DRI-grade pellets are carrying more strategic weight. When the spread between ordinary product and higher-purity feed stays wide, beneficiation and pelletizing projects become easier to justify.

That premium is not only a price signal. It is a quality signal. Cleaner feed can reduce waste, improve furnace performance and support lower-emission steel pathways. For miners, the question is whether the product upgrade can support the capital, water, power and permitting burden required to deliver it.

Power Demand Tightens The Link

Copper and uranium remain tied to the power story. Data centers, grids, electric vehicles, industrial equipment and mine supply delays all keep copper exposed to project timing. The world can want more copper quickly, but mines still need years to permit, finance and build. Uranium carries the same delivery test. Nuclear demand and small modular reactor interest have strengthened the power-security case, but the market still depends on real mines, real contracts and real project milestones.

Critical Minerals Need Proof

Battery and critical minerals are moving through the same filter. Lithium price direction, rare-earth milestones, graphite processing capacity and government finance commitments all point to a more disciplined market.

2025 GLOBAL CRUDE STEEL PRODUCTION TOTALS

Total world crude steel production was 1,849.4 Mt in 2025.

Rank	Country	2025	2024	%2025/2024
1	China	960.8	1 005.1	-4.4
2	India	164.9	149.4	10.4
3	United States	82.0	79.5	3.1
4	Japan	80.7	84.0	-4.0
5	Russia (e)	67.8	71.0	-4.5
6	South Korea	61.9	63.6	-2.8
7	Türkiye	38.1	36.9	3.3
8	Germany	34.1	37.3	-8.6
9	Brazil	33.3	33.9	-1.6
10	Iran (e)	31.8	31.4	1.4
11	Viet Nam	24.7	22.0	12.2
12	Italy	20.7	20.0	3.6
13	Indonesia (e)	19.0	18.6	1.9
14	Taiwan, China (e)	17.1	19.2	-10.8
15	Mexico (e)	13.5	14.3	-5.9
16	Spain (e)	12.0	11.9	0.7
17	Canada (e)	11.5	12.3	-7.2
18	Saudi Arabia	10.8	9.6	12.3
19	Egypt	10.6	10.7	-0.8
20	France (e)	9.8	10.8	-8.7
21	Malaysia (e)	9.0	9.0	-0.2
22	Austria	7.6	7.1	5.9
23	Ukraine	7.4	7.6	-2.2
24	Poland (e)	7.2	7.1	0.8
25	Belgium (e)	7.2	7.1	0.5
26	Netherlands	6.5	6.4	1.4
27	Algeria (e)	5.3	4.5	17.9
28	Australia	5.2	4.7	12.1
29	Thailand (e)	5.0	4.9	2.6
30	Bangladesh (e)	4.5	4.5	0.0
31	South Africa	4.5	4.7	-4.7
32	Kazakhstan	4.3	4.2	2.2
33	Argentina	4.0	3.9	4.2
34	Sweden	4.0	4.0	-0.7
35	United Arab Emirates	3.8	3.7	3.3
36	Finland	3.7	3.7	2.1
37	Slovakia (e)	3.7	3.9	-5.6
38	Pakistan (e)	3.6	4.1	-12.2
39	Iraq (e)	3.0	3.0	0.3
40	Oman (e)	3.0	3.0	0.0
	Others	41.8	44.1	-5.3
	World	**1849.4**	**1886.8**	**-2.0**

Source – World Steel Association. 2025 Steel Statistical Yearbook published

e – annual figure estimated using partial data or non-worldsteel resources. * The world total production figure in this table includes estimates of other countries that only report annually.

STATISTICS

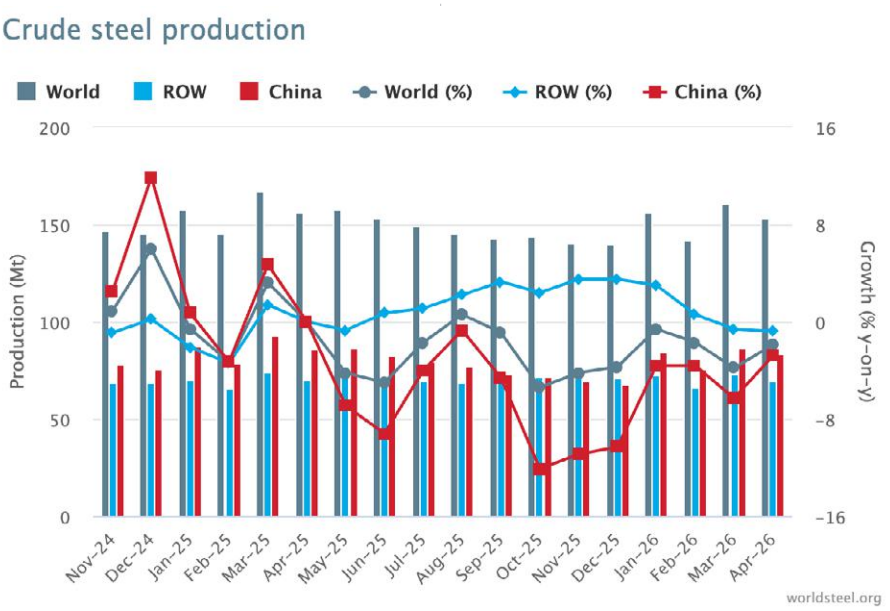
APRIL 2026 CRUDE STEEL PRODUCTION

World crude steel production for the 69 countries reporting to the World Steel Association (worldsteel) was 153.4 million tonnes (Mt) in April 2026, a 1.9% decrease compared to April 2025.

Africa produced 2.1 Mt in April 2026, up 11.5% on April 2025. Asia and Oceania produced 114.2 Mt, down 1.3%. The EU (27) produced 11.0 Mt, down 1.8%. Europe, Other produced 3.6 Mt, up 4.2%.

The Middle East produced 3.7 Mt, down 27.6%. North America produced 9.4 Mt, up 6.9%. Russia & other CIS + Ukraine produced 6.0 Mt, down 13.4%. South America produced 3.4 Mt, up 3.1%.

The 69 countries included in this table accounted for approximately 98% of total world crude steel production in 2025: Africa, Asia and Oceania, European Union (27), Europe,other, Middle East, North America, Russia & other CIS + Ukraine, South America.



TOP 10 STEEL-PRODUCING COUNTRIES

China produced 83.6 Mt in April 2026, down 2.8% on April 2025. India produced 13.8Mt, up 3.9%. The United States produced 7.2 Mt, up 9.4%. Japan produced 6.6 Mt, up 0.3%. South Korea produced 5.2 Mt, up 4.8%. Russia is estimated to have produced 5.0 Mt, down 12.4%. Türkiye produced 3.3 Mt, up 9.4%. Germany produced 3.2 Mt, up 9.5%. Brazil is estimated to have produced 2.7 Mt, up 2.8%. Viet Nam is estimated to have produced 2.1 Mt, up 4.0%.

TABLE 1. CRUDE STEEL PRODUCTION BY REGION

	APRIL 2026(MT)	% CHANGE APR 26/25	JAN-APRIL 2026 (MT)	% CHANGE JAN-APRIL 26/25
Africa	2.1	11.5	8.4	8.7
Asia and Oceania	114.2	-1.3	456.4	-1.8
EU (27)	11.0	-1.8	42.8	-2.2
Europe, Other	3.6	4.2	14.5	4.3
Middle East	3.7	-27.6	16.0	-12.8
North America	9.4	6.9	37.0	3.5
Russia & other CIS + Ukraine	6.0	-13.4	24.7	-11.5
South America	3.4	3.1	13.5	-0.9
Total 69 countries	**153.4**	**-1.9**	**613.3**	**-2.0**

TABLE 2. TOP 10 STEEL-PRODUCING COUNTRIES

	APRIL 2026 (MT)	% CHANGE APR 26/25	JAN-APR 26 (MT)	% CHANGE JAN-APR 26/25
China	83.6	-2.8	331.1	-4.1
India	13.8	3.9	58.7	9.4
United States	7.2	9.4	28.1	6.6
Japan	6.6	0.3	26.7	-1.2
South Korea	5.2	4.8	21.0	2.5
Russia (e)	5.0	-12.4	20.6	-12.0
Türkiye	3.3	9.4	13.0	6.3
Germany	3.2	9.5	12.5	9.1
Brazil (e)	2.7	2.8	10.8	-1.6
Viet Nam (e)	2.1	4.0	8.5	8.4

The 69 countries included in this table accounted for approximately 98% of total world crude steel production in 2024.e:Africa: Egypt, Libya, South Africa, Tunisia Asia and Oceania: Australia, China, India, Japan, Mongolia, New Zealand, Pakistan, South Korea, Taiwan (China), Thailand, Viet Nam,European Union (27),Europe, Other: Macedonia, Norway, Serbia, Türkiye, United Kingdom,Middle East: Iran, Qatar, Saudi Arabia, United Arab Emirates,North America: Canada, Cuba, El Salvador, Guatemala, Mexico, United States,Russia & other CIS + Ukraine: Belarus, Kazakhstan, Russia, Ukraine,South America: Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela

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